
bulletin of
Duke University
1999-2000

Medical Center



The Mission of Duke University

The founding Indenture of Duke University directed the members of the university to "develop our resources, increase our wisdom, and promote human happiness."

To these ends, the mission of Duke University is to provide a superior liberal education to undergraduate students, attending not only to their intellectual growth but also to their development as adults committed to high ethical standards and full participation as leaders in their communities; to prepare future members of the learned professions for lives of skilled and ethical service by providing excellent graduate and professional education; to advance the frontiers of knowledge and contribute boldly to the international community of scholarship; to foster health and well-being through medical research and patient care; and to promote a sincere spirit of tolerance, a sense

and truth.

By pursuing these objectives with vision and integrity, Duke University seeks to
with the university; to contribute in diverse ways to the local community, the state, the nation, and the world; and to attain and maintain a place of real leadership in all that

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The information in the bulletin applies to the academic year 1999-2000 and is accurate and current, to the best of our knowledge, as of February, 1999. The university reserves the right to change programs of study, academic requirements, lecturers, teaching staffs, the announced university calendar, and other matters described in the bulletin without prior notice, in accordance with established procedures.

Information that the university is required to make available under the Student Right to Know and Campus Security Acts may be obtained from the Office of University Relations at 684-2823 or in writing to 615 Chapel Drive, Duke University Durham, NC 27708.

Duke University is accredited by the Commission on Colleges of the Southern Association of Colleges and Schools (1866 Southern Lane, Decatur, Georgia 30033-4097; telephone number 404-679-4501) to award baccalaureates, masters, doctorates, and professional degrees.

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Contents

Calendar of the Medical Center	4
University Administration	8
Medical Center Administration	8
Standing Committees of the School of Medicine and Medical Center	9
General Information	12
Doctor of Medicine Program	20
The Medical Curriculum	21
Doctor of Medicine Degree	23
Combined Degree Programs	29
Student Life	36
The University	37
Living Accommodations	37
Services Available	39
Admissions	44
Financial Information	50
Fees and Expenses	51
Financial Aid	56
Courses of Instruction	62
Roster of Students	141
Doctor of Physical Therapy Program	153
Allied Health Programs	164
Master of Health Sciences in Clinical Research	169
Pathologists' Assistant Program	172
Physician Assistant Program	176
Certificate Programs	186
Clinical Psychology Internship	186
Ophthalmic Medical Technician	186
Pastoral Care and Counseling	187
Residency in Pharmacy Practice	189
School of Nursing Program	190
Graduate Medical Education	214
Roster of House Staff	218
Postgraduate Education	225
Index	226

SCHOOL OF MEDICINE CALENDAR 1999-2000

First Year (Freshmen) Students Fall Term 1999

August	
11-13	Wednesday-Friday – Begin orientation and 1999-2000 academic year
16	Monday, 8:00 a.m. – Begin Block I
October	
7	Thursday, 6:00 p.m. – End Block I
12	Tuesday, 8:00 a.m. – Begin Block II
November	
23	Tuesday, 6:00 p.m. – Begin Thanksgiving holiday
29	Monday, 8:00 a.m. – Classes Resume
December	
17	Friday, 6:00 p.m. – End Block II and Fall 1999 Term

Spring Term 2000

January	
3-7	Monday-Friday – Intro to Clinical Care (intensive learning week) and begin Spring 2000 Term
10	Monday, 8:00 a.m. – Begin Block III
17	Monday – Martin Luther King, Jr. holiday
February	
4	Friday, 6:00 p.m. – End Block III
7-11	Monday-Friday – Intro to Clinical Care (intensive learning week)
14	Monday, 8:00 a.m. – Begin Block IV
April	
19	Wednesday, 6:00 p.m. – End Block IV and begin spring vacation
May	
1-5	Monday-Friday – Intro to Clinical Care (intensive learning week)
8	Monday, 8:00 a.m. – Begin Block V
July	
4	Tuesday – Independence Day holiday
6	Thursday, 6:00 p.m. – End Block V and 1999-2000 academic year

Second Year (Sophomore) Students Fall Term 1999

August	
2	Monday, 8:00 a.m. – Begin Ambulatory Care Clerkship
20	Friday, 6:00 p.m. – End intensive learning period
23	Monday, 8:00 a.m. – Begin classes in sections 81,41
Alternate Schedule for Psychiatry/Medical Practice and Health Systems	
81	PSC August 23 – October 1
	MPS October 4 – October 15
82	PSC October 18 – November 24
	MPS November 29 – December 10
September	
6	Monday, Labor Day holiday
15	Wednesday, 6:00 p.m. – End classes in section 41
20	Monday, 8:00 a.m. – Begin classes in section 42
October	
1	Friday, 6:00 p.m. – End classes in alt. section 81 PSC
4	Monday, 8:00 a.m. – Begin classes in alt. section 81 MPS

- 13 Wednesday, 6:00 p.m. – End Classes in regular sections 81, 42
- 15 Friday, 6:00 p.m. – End classes in alt. section 81 MPS
- 18 Monday, 8:00 a.m. – Begin classes in sections 82,43
- November**
- 10 Wednesday, 6:00 p.m. – End classes in section 43
- 15 Monday, 8:00 a.m. – Begin classes in section 44
- 24 Wednesday, 6:00 p.m. – End classes in alt. section 82 PSC. Begin Thanksgiving holiday
- 29 Monday, 8:00 a.m. – Resume classes in section 82,44. Begin alt. section 82 MPS
- December**
- 10 Friday, 6:00 p.m. – End classes in alt. section 82 MPS
- 11 Saturday, 6:00 p.m. – End classes in regular sections 82,44

Spring Term 2000

January

- 3 Monday, 8:00 a.m. – Begin classes in sections 81,41
- 17 Monday – Martin Luther King, Jr. holiday
- 26 Wednesday, 6:00 p.m. – End classes in section 41
- 31 Monday, 8:00 a.m. – Begin classes in section 42

Alternate Schedule for Psychiatry/Medical Practice and Health Systems

- 81 PSC January 3 – February 11
- MPS February 14 – February 25
- 82 PSC March 6 – April 14
- MPS April 17 – April 28

February

- 11 Friday, 6:00 p.m. – End classes in alt. Section 81 PSC
- 14 Monday 8:00 a.m. – Begin classes in alt. section 81 MPS
- 23 Wednesday, 6:00 p.m. – End classes in regular sections 81,42 and begin spring vacation
- 25 Friday, 6:00 p.m. – End classes in alt. section 81 MPS and begin spring vacation

March

- 6 Monday, 8:00 a.m. – Begin classes in sections 82,43
- 23 Thursday – Third Year Elective Forms for 2000-2001 academic year due in Dean's Office
- 29 Wednesday, 6:00 p.m. – End classes in section 43

April

- 3 Monday, 8:00 a.m., Begin classes in section 44
- 5 Wednesday – Registration Fall 2000, rising third and fourth year students
- 14 Friday, 6:00 p.m. – End classes in alt. section 82 PSC
- 17 Monday, 8:00 a.m. – Begin classes in alt. section 82 MPS
- 24 Monday, 6:00 p.m. – Late registration for Fall 2000
- 26 Wednesday, 6:00 p.m. – End classes in regular sections 82,44
- 28 Friday, 6:00 p.m. – End classes in alt. section 82 MPS

Summer Term 2000

Alternate Schedule for Psychiatry/Medical Practice and Health Systems

- 81 PSC May 1 – June 9
- MPS June 12 – June 23
- 82 PSC June 26 – August 4
- MPS August 7 – August 18

May

- 1 Monday, 8:00 a.m. – Begin classes in sections 81,41
- 24 Wednesday, 6:00 p.m. – End classes in section 41
- 29 Monday, 8:00 a.m. – Begin classes in section 42

June

- 9 Friday, 6:00 p.m. – End classes in alt. section 81 PSC
- 12 Monday, 8:00 a.m. – Begin classes in alt. section 81 MPS
- 21 Wednesday, 6:00 p.m. – End classes in regular sections 81,42
- 23 Friday, 6:00 p.m. – End classes in alt. section 81 MPS
- 26 Monday, 8:00 a.m. – Begin classes in sections 82,43

July

- 4 Tuesday – Independence Day holiday
- 19 Wednesday, 6:00 p.m. – End classes in section 43
- 24 Monday, 8:00 a.m. – Begin classes in section 44

August

- 4 Friday, 6:00 p.m. – End classes in alt. section 82 PSC
- 7 Monday 8:00 a.m. – Begin classes in alt. section 82 MPS
- 16 Wednesday, 6:00 p.m. – End classes in regular sections 82,44
- 18 Friday, 6:00 p.m. – End classes in alt. section 82 MPS

**Third Year (Junior) And Fourth Year (Senior) Students
Summer Term 1999**

May

- 10 Monday, 8:00 a.m. – Begin classes in sections 16,81,41

June

- 5 Saturday, 12:00 noon – End classes in section 41
- 7 Monday, 8:00 a.m. – Begin classes in section 42

July

- 3 Saturday, 12:00 noon – End classes in sections 81,42
- 4 Sunday – Independence Day holiday
- 5 Monday, 8:00 a.m. – Begin classes in sections 82,43
- 31 Saturday, 12 noon – End classes in section 43

August

- 2 Monday, 8:00 a.m. – Begin classes in section 44
- 28 Saturday, 12:00 noon – End classes in sections 16,82,44

Fall Term 1999

August

- 30 Monday, 8:00 a.m. – Begin classes in sections 16,81,41

September

- 6 Monday, Labor Day holiday
- 25 Saturday, 12:00 noon – End classes in section 41
- 27 Monday, 8:00 a.m. – Begin classes in section 42

October

- 23 Saturday, 12:00 noon – End classes in sections 81,42
- 25 Monday, 8:00 a.m. – Begin classes in sections 82,43

November

- 17 Wednesday – Registration for Spring Term, 2000
- 20 Saturday, 12:00 p.m. – End classes in section 43
- 22 Monday, 8:00 a.m. – Begin classes in section 44
- 24 Wednesday, 6:00 p.m. – Begin Thanksgiving holiday
- 29 Monday, 8:00 a.m. – Classes resume in section 44

December

- 8 Wednesday – Late registration day for Spring Term, 2000
- 22 Wednesday – 12:00 noon – End classes in sections 16, 82, 44

Spring Term 2000

January		
	10	Monday, 8:00 a.m. – Begin classes in sections 16, 81, 41
	17	Monday – Martin Luther King, Jr. holiday
February		
	5	Saturday, 12:00 noon – End classes in section 41
	7	Monday, 8:00 a.m. – Begin classes in section 42
March		
	4	Saturday, 12:00 noon – End classes in sections 81,42. Begin spring vacation
	13	Monday, 8:00 a.m. – Begin classes in sections 82,43
	22	Wednesday – Registration for Summer Term 2000 – rising fourth year students
	23	Thursday – Third Year Elective Forms due in Dean's Office
April		
	5	Wednesday – Registration for Fall Term 2000 – rising third and fourth year students
	8	Saturday, 12:00 noon – End classes in section 43
	10	Monday, 8:00 a.m. – Begin classes in section 44
	24	Monday – Late registration day for Fall Term, 2000
May		
	6	Saturday, 12:00 noon – End classes in sections 16,82,44
	13-14	Saturday-Sunday – Graduation activities
Summer Term 2000		
May		
	8	Monday, 8:00 a.m. – Begin classes in sections 16,81,41
June		
	3	Saturday, 12:00 noon – End classes in section 41
	5	Monday, 8:00 a.m. – Begin classes in section 42
July		
	1	Saturday, 12:00 noon – End classes in sections 81,42
	3	Monday, 8:00 a.m. – Begin classes in sections 82,43
	4	Tuesday – Independence Day holiday
	29	Saturday, 12:00 noon – End classes in section 43
	31	Monday, 8:00 a.m. – Begin classes in section 44
August		
	26	Saturday, 12:00 noon – End classes in sections 16,82,44

University Administration

GENERAL ADMINISTRATION

Nannerl Overholser Keohane, Ph.D., *President*

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Jeffrey R. Dawson, Ph.D., *Associate Dean, Medical Education Curriculum*

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Mary T. Champagne, Ph.D., *Dean, School of Nursing*

¹Through June 30, 1999

W. C. Budzinski, *Administrative Manager, School of Nursing*
Elizabeth Kelly, M.A., *Admissions Officer, School of Nursing*
Phillip Hofinga, *Student Services Coordinator, School of Nursing*
Izy L. Obi, *Clinical Site Coordinator, School of Nursing*

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W. C. Budzinski, *Administrative Manager*
Elizabeth Kelly, *Admissions Officer*
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Phillip Hofinga, *Student Services Coordinator*
Izy L. Obi, *Clinical Site Coordinator*

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Audit and Tissue

Clinical chairman of each clinical service and head of each division in service.

Basic Science Appointments, Promotion, and Tenure

K. V. Rajagopalan, Ph.D., *Chair*; Drs. Caron, Cullen, Hylander, Kuhn, McClay, Simon; Dr. Hammes, *ex officio*.

Basic Science Faculty Steering

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Clinical Cancer Education Program

Edward C. Halperin, M.D., *Chair and Director*.

Clinical Sciences Appointments, Promotions, and Tenure

J. G. Reves, M.D., *Chair*; Drs. Anderson, E. Buckley, Cohen, Coleman, Frank, and Telen; Drs. Blazer and Hammes, *ex officio*.

Clinical Science Faculty Council on Academic Affairs

Robert Califf, M.D., *Chair*; Drs. Bowie, Burton, Georgiade, Gottfried, Herbert, Jaffe, J. Mark, R. Moon, S. Moon, Paulson, Richtsmeier, J. Seaber, Shea, M. Swartz, Tanaka, Walmer, Wilkinson, and J. Wilson.

Continuing Medical Education

Joseph S. Green, Ph.D., *Associate Dean*; Four sub-committees of CME Governing Board Int'l, Nat'l, Regional - Robert Jones, M.D., *Chair*; Marketing & Finance - Tom Gambill, M.D., *Chair*; Internal CME/AHEC/Affiliates - Marvin Schwartz, M.D., *Chair*; Education Process/Outcomes - Joe Kisslo, M.D., *Chair*.

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Hospital Infection Control

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Library

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Dan G. Blazer II, M.D., Ph.D., *Chair*; Drs. Bollinger, N. Kredich, Armstrong, and J. Wilson; Administrative Assistant: Ms. Franklin; two student representatives.

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North Carolina Residence

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Pediatric Brain Death

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Study Away

Deborah W. Kredich, M.D., *Chair*; Drs. Blazer, Gianturco, Grady, and Puckett; Ms. A. Chambers.

Undergraduate Medical Education – Curriculum

Caroline Haynes, M.D., Ph.D. and J. Victor Nadler, Ph.D., *Co-chairs*; Drs. N. Anderson, Bradford, Cant, Cartmill, Corless, Dawson, Drucker, Ellinwood, Feinglos, Fitzpatrick, Fortney, Gianturco, Glower, Grady, Halperin, Hoffman, Hylander, G.A. Johnson, V. Kaprielian, K. King, D. Kredich, Kuhn, McElhaney, McIntosh, Michener, Mitchell, Morgenlander, Neelon, Nevins, Padilla, Petrusa, Puckett, Rajagopalan, K. Reimer, Rosse, B. Sheline, Sladen, Steenbergen, Strauss, Vigna, Ward, Wilkinson, and Wong; Student Representative: Mr. Gamard; Drs. Blazer, Fullagar, Hammes, L. Lee, and Snyderman; Ms. Feinglos, Konczal, and Reilly, *ex-officio*.

Veterans Administration Research and Development

Russell P. Hall, M.D., *Chair*; S. Strickland-Wade and B. Thorne, *Program Assistants*; Drs. Annex, Bepler, Branch, Braxton, Cohn, Edelman, Madison, McCarthy, and Provenzale; Drs. Newcomb, Olson, Phaup, Shelburne, and Young, *ex officio*.

Veterans Administration, Chancellor's

Ralph Snyderman, M.D., *Chair*; Barton Haynes, M.D., *Vice-chair*; Drs. R. Anderson, Blazer, Cohen, Corless, Epstein, Feussner, Frances, Grant, Halperin, Hammes, Newcomb, Pizzo, Ravin, Reves, Rotman, Scott, and Yarger; Ms. Bumgarten; Mr. Donelan.

General Information



History

I have selected Duke University as one of the principal objects of this trust because I recognize that education, when conducted along sane and practical, as opposed to dogmatic and theoretical, lines is, next to religion, the greatest civilizing influence.

I have selected hospitals as another of the principal objects of this trust because I recognize that they have become indispensable institutions, not only by way of ministering to the comfort of the sick, but in increasing the efficiency of mankind and prolonging human life.

James Buchanan Duke, Indenture of the Duke Endowment, 1924

In 1924, James Buchanan Duke, an industrialist and philanthropist, established the Duke Endowment and directed that part of his gift be used to transform Trinity College in Durham, N.C., into Duke University. The following year, upon his death, Duke made an additional bequest to the Endowment and the university, including funds to establish the School of Medicine, the School of Nursing, and Duke University Hospital.

One of the Duke's primary motivations in establishing the Endowment and the School of Medicine was the improvement of health care in the Carolinas and across the country. At a time when medicine in the Carolinas was still a cottage industry, Duke dared to dream of creating what he hoped would become one of the leading medical institutions in the nation.

By the time the new school and hospital opened in 1930, this dream was already well on its way to becoming reality. Recognizing its responsibility for providing quality care to the people of the Carolinas, Duke opened the first major outpatient clinics in the region in 1930. The Private Diagnostic Clinic, organized in 1932, not only provided coordinated medical and surgical care to private patients with moderate incomes but also allowed members of the medical faculty to contribute a portion of their earnings toward the continued excellence of medicine at Duke. Less than five years after the School of Medicine opened, the Association of American Medical Colleges ranked it among the top 25 percent of medical schools in the country.

Building on this heritage, Duke University Medical Center has grown and expanded over the years and now ranks as one of the world's outstanding health care centers. In education, its innovative medical curriculum features a generous measure of elective courses in the belief that all health professionals must be prepared for a lifetime of self education. The scientific grounding for that education is provided through participation in a wide variety of ongoing research programs. Now located in facilities opened in 1980 and since expanded several times, Duke University Hospital draws patients from across the Carolinas, the Southeast, and much of the United States for diagnosis and treatment. In both basic and clinical research, Duke University Medical

Center has grown into a premier biomedical research institution and is consistently one of the largest recipients of funding from the National Institutes of Health.

Today, in an era of rapid and substantial change in health care, Duke University Medical Center is evolving into an even broader health care institution, one that will be a model for health care in the twenty-first century. Rather than being a traditional academic medical center where patients are referred almost exclusively for specialty care, Duke is now building an integrated system of health care providers. This new Duke University Health System is composed of Duke Hospital and Clinics; Durham Regional Hospital; Raleigh Community Hospital; Triangle Hospice; WellPath, a joint venture managed care company; Chartwell Southeast, a home health agency; Duke University Affiliated Physicians, Inc.; and many other strategic relationships and programs.

Representing the continuing fulfillment of the dream of James Buchanan Duke, Duke University Medical Center still seeks to carry out its teaching, research, and patient care programs in a manner that meets the needs of society. In keeping with its heritage, it seeks to provide socially relevant medical education, research, and patient care and is expressly committed to the search for solutions to regional and national health care problems.

Medical Center Buildings and Facilities

The eighty-seven buildings and additions which make up the medical education, research, and patient care facilities are located on approximately 200 acres on the West Campus of the University.

The Clinic Zone is contiguous with the main quadrangle of the university and consists of the following: *Duke Clinic*—Ten contiguous buildings, including: *Clinic Reception Building*—Entrance lobby, clinics, food court and amphitheater. *Edwin A. Morris Building*—Clinics, diagnostic, treatment and support services, Department of Radiation Oncology administration, departmental research laboratories and offices. *Davison Building*—Department of Pathology administration, research laboratories and offices, Central Teaching Facility, Division of Audiovisual Education, Medical Center Administration, School of Medicine, and Medical School Admissions. *Original Hospital, 1940 and 1957 Additions*—Rehabilitation inpatient care unit, clinics, diagnostic, treatment, and support services including: Clinical Laboratories, Physical Therapy, Pharmacy, departmental offices. *Baker House*—Department of Obstetrics and Gynecology administration, clinics, diagnostic, treatment and support services including: Speech and Hearing, Oral Surgery, Pastoral Care and Counseling, and departmental offices. *Barnes Woodhall Building*—Psychiatry inpatient care units, diagnostic, treatment, and support services, Radiology, departmental research laboratories and offices, and Hospital administration. *Diagnostic and Treatment Building*—Clinics, diagnostic, treatment, and support services, departmental research laboratories and offices. *Ewald W. Busse Building*—Center for the Study of Aging and Human Development, diagnostic, treatment, and support services, department research laboratories and offices. *Eugene A. Stead Building*—General Clinical Research Center (Rankin), departmental research laboratories and offices *Clinical Research II*—Department of Psychiatry administration, departmental research laboratories and offices, hyperbaric medicine unit. Other buildings within the Clinic zone include the *Bell Building*—offices for the Departments of Surgery, Pediatrics, Radiology, Obstetrics and Gynecology, and Psychiatry, Medical Center Information Systems (MCIS) offices, and the Gross Anatomy laboratories. *Marshall Pickens Building*— Clinics, Student Health Services, Employee Health Services and *Parking Garage I*.

The Hospital Zone consists of the following buildings: *Duke Hospital (Anlyan Tower and Ancillary Building)*—Inpatient care units, diagnostic, treatment and support services including surgical suite, cath labs, Emergency Department, Labor and Delivery suite,

Operating and Recovery Suite, Full-Term Nursery, Radiology, Clinical Laboratories, Respiratory Therapy, Pharmacy, the Departments of Anesthesiology, Pediatrics, Radiology, Surgery administration, and Cardiology Division offices. *Joseph A. C. Wadsworth Building* (Eye Center)—Department of Ophthalmology administration, clinic, diagnostic, treatment and support services including: operating rooms, recovery, research laboratories and offices. *Civitan Building and Child Development Center*—Clinics, laboratories, and offices for the Departments of Pediatrics and Psychiatry. *Hanes House and Nursing School Addition*—Physician Assistant Program, Clinical Research Program, Community and Family Medicine administrative and departmental offices, and School of Nursing administrative and departmental offices, Hospital Education and teaching facilities. *Seeley G. Mudd Communications and Library*—Medical Center Library, Offices of Communications, Office of Grants and Contracts, Office of Continuing Medical Education, Medical Center Commons, and the Searle Center for Continuing Education. *Parking Garage II*—House Staff and Student Exercise Facility, Traffic & Parking office and Pathology laboratories.

The Research Zone consists of the following: *Joseph and Kathleen Bryan Research Building for Neurobiology*—Department of Neurobiology administration, Alzheimer's Disease Research Center, Pharmacology and Neurobiology departmental research laboratories and offices. *Nanaline H. Duke Medical Sciences Building*—Departments of Biochemistry and Cell Biology administration, departmental research laboratories and offices. *Alex H. Sands Medical Sciences Building*—Departments of Anesthesiology, Biological Anthropology and Anatomy, Cell Biology, Obstetrics and Gynecology, Medicine and Psychiatry research laboratories and offices. *Edwin L. Jones Basic Cancer Research Building*—Departments of Immunology and Microbiology administration, departmental research laboratories and offices. *Medical Sciences Research Building*—Comprehensive Cancer Center administration, Departments of Medicine, Obstetrics and Gynecology, Pathology, Pediatrics, Radiology, Radiation Oncology, Surgery and Cancer Center research laboratories and offices. *Clinical and Research Laboratory Building*—Department of Genetics administration, Howard Hughes Medical Institute, Departments of Cell Biology, Genetics, Medicine and Psychiatry research laboratories and offices. *Leon Levine Science Research Center*—Department of Pharmacology and Cancer Biology administration, research laboratories, and offices. *Surgical Oncology Research Building, Environmental Safety Building, Research Park Buildings I, II, III and IV*—Departments of Anesthesiology, Medicine, Pathology, Pediatrics, Radiology, Radiation Oncology and Surgery, research laboratories, offices and hospital clinic laboratories. *Vivarium*—Division of Laboratory Animal Resources and laboratory animal care facilities. *Cancer Center Isolation Facility*—Special containment facility for cancer research.

The West Zone consists of the *Lenox Baker Children's Hospital*—Children's rehabilitation, clinics, diagnostic, treatment and support services and departmental offices. *Dialysis Center*—Treatment facility. *Center for Living Campus*—four buildings including: *Sarah Stedman Nutrition Center*—Department of Medicine research laboratories and offices. *Andrew Wallace Clinic Building*—Clinics, diagnostic, treatment and support services and departmental offices. *Pepsico Fitness Center*—Exercise facilities including indoor track, exercise equipment, swimming pool. *Aesthetic Services and Dermatologic Surgery Clinic*—clinics, diagnostic treatment and support services and CFL administrative offices.

The North Campus Zone consists of the following buildings: *North Pavilion*—Ambulatory Surgery center, Adult and Pediatric Bone Marrow Transplant, Duke Clinical Research Institute (DCRI), Anesthesiology offices and the University Counsel's office. *Parking Garage III*, and *Elba and Elder Street Buildings*—Diagnostic and treatment services, offices for the Departments of Pathology, Psychiatry and Medicine, the Center for the Study of Aging, Procurement Services, Hospital Emergency Services, Occupational and Environmental Safety, Medical Center Engineering and Operations, and the Academic Medical Center Consortium.

Resources for Study

The goal of Duke University Medical Center is to provide leadership in fulfilling its core missions which are:

To provide the most advanced and comprehensive education possible; to prepare our students and trainees for lifetimes of learning and careers as leaders, practitioners, or researchers;

To perform biomedical research producing discoveries that add to understanding life processes and lead to preventing and curing disease and maintaining health;

To translate, to practice, and to make available to the public, with compassion, the benefits of the unique clinical and technological resources of the Medical Center and to support our educational and research missions.

To the maximum extent possible, we will apply our core missions in education, research, and health care delivery to develop the means to solve regional and national health care problems, including providing accessible, cost-effective health care of measurable quality.

Library. The Medical Center Library is located in the Seeley G. Mudd Building, midway between Duke Hospital and Duke Clinics.

The Medical Center Library attempts to provide informational services and collections necessary to further educational research, and clinical activities in the health sciences. The collection of approximately 290,000 volumes and 2,250 current journal subscriptions is freely available for use by Medical Center students and personnel; study accommodations for 500 readers includes extensive provisions for audiovisual and computer-assisted learning. The library also includes the Trent Collection which is unsurpassed in the southeast as a resource for study of the history of medicine. Traditional reference services are supplemented by mediated and self-service access to many computerized databases including MEDLINE and CURRENT CONTENTS.

The Medical Library Education Center (MLEC) opened in October 1995. It includes an electronic classroom, multimedia area, and help desk.

The Medical Center Library is open at the following times: Monday-Friday, 8:00 a.m.-midnight; Saturday, 10:00 a.m.-6:00 p.m.; Sunday, 12:00 noon-midnight. Summer and holiday hours are as announced.

Director: Susan I. Feinglos, M.L.S. (McGill, 1972); Associate Director: Patricia L. Thibodeau, M.L.S., M.B.A. (Rhode Island, 1976), (Western Carolina University, 1991); Curator, Historical Collections: Suzanne Porter, M.L.S. (Columbia, 1966).

Bookstore. The Medical Center Bookstore offers a wide selection of medical reference books, textbooks, software, and instruments to the Duke University Medical Community. Clothing, including scrubs and uniforms, office supplies, and Duke gifts are also offered. Special orders are welcomed. The store is located in the Facilities Building adjacent to the PRT walkway between Duke Hospital North and Duke Hospital South and is open Monday through Friday from 8:30 a.m.-5:30 p.m., and Saturdays from 10:00 a.m.-4:00 p.m. The telephone number is 684-2717.

Store Manager: Tom Tyndall

Searle Conference Center. The Searle Conference Center for Continuing Education in the Health Sciences provides elegant accommodations for conferences, symposia, lectures, and meetings to support the continuing education activities of the Medical Center and university. Additionally, banquet, dinners, weddings, receptions, and other private events may be held on a space available basis. Meeting space, audiovisual needs, catering, and assistance with event planning are all provided by the on-site staff. Please call 684-2244.

Director: Michael A. Evans

Medical Center Commons. The Medical Center Commons restaurant is open for fine dining at lunch time, Monday-Friday. Accepting credit cards, IRs, and reservations (684-5805) the Commons is located in the Searle Conference Center is on the ground floor of the Seeley Mudd Building. The restaurant features gourmet salads, homemade soups, carved

meats, hot entrees, and weekly specials. Prices range from \$5 to \$9. Private dining rooms are available as well as morning, evening, or weekend meeting and catering space. For additional information on these services, please call 684-2244.

Office of Medical Education Research and Development. The Office of Medical Education Research and Development offers expertise to the Medical School community in the areas of curriculum and course development, research and evaluation studies, standardized patients, and faculty development. A few of the projects with which OMERD is involved include the following.

Clinical Performance Examination. In collaboration with the three other medical schools in North Carolina, OMERD has developed and implemented the Clinical Performance Examination (CPX). The CPX is a multi-case, standardized patient-based examination that assesses student skills in the doctor-patient relationship, communication, history-taking, physical examination, and assessment and plan. The CPX has provided useful information for students, for the curriculum, and for accreditation. The North Carolina medical schools have collaborated with the National Board of Medical Examiners to test the feasibility of the NBME protocol of standardized patients for use in the licensure examination process.

Standardized Patients. OMERD has trained more than 250 standardized patients and has developed over 125 standardized patient cases which are used to: (a) highlight and integrate learning issues from basic, clinical, and behavioral sciences; (b) evaluate physical examination skills; and (c) assess doctor-patient relationship and interviewing skills. Duke also has used SPs in residency programs for medical interviewing courses, educational diagnostic screening, department grand rounds, and many continuing medical education courses locally and nationally.

The DOSSIER Project. Funding from the U.S. Department of Education supports a three year project to develop and test the feasibility of using educational contributions dossiers of faculty in medical education. Duke has already endorsed educational contributions as valid evidence on which to justify promotion by establishing new criteria for tenure and non-tenure positions.

MedCATs Consortium. OMERD has collaborated with the SUNY-Buffalo School of Dental Medicine to adapt their curriculum database for use in medical schools. The software, Curriculum Analysis Tools (CATs), is a database and analysis tool for documenting goals of the medical school to the objectives for single sessions. Mapping the relationships among session, course, and curriculum objectives occurs automatically. Many common curricular analyses are already programmed in CATs, such as tallying the frequency of cognitive levels addressed in all goals and objectives. The software adapted for medical and allied health is called MedCATs.

1st Year — Intro to Clinical Care. Amalgamated Clinical Arts, Human Behavior, and Introduction to Clinical Medicine along with new topics such as health care policy and financing, nutrition, medical ethics, patients' end of life issues, and women's health issues. OMERD collaborated with clinical faculty in the development of course segments, educational guidelines for small group and clinical activities, use of laptop computers, formative and summative evaluation.

2nd Year — Ambulatory Care Clerkship. OMERD was central in the development of this innovative clerkship that provides medical students with the opportunity to learn about health care policy, financing and the impact of economics on individual patients and the health care system. OMERD participates in the administration of CEC.

Director: Emil R. Petrusa, Ph.D.

The Thomas D. Kinney Central Teaching Laboratory. The Thomas D. Kinney Central Teaching Laboratory is located on the fourth floor of the Davison Building where it provides laboratory, demonstration, and conference space for all courses taught in the basic sciences with the exception of gross anatomy. A full-time staff maintains a wide range of equipment and provides supplies and services necessary for the teaching programs in allied health as well as medical education. This enables the academic staff of each department to devote its efforts entirely toward the students.

Six unit laboratories, each accommodating sixteen to eighteen students, are devoted to instruction for the first year. All first year medical students are given space (which they maintain for the entire academic year) in one of these laboratories for their own work. Small laboratories are interspersed between the six unit laboratories and provide space for large pieces of equipment used in conjunction with exercises conducted in the unit laboratories. One large multipurpose laboratory that can accommodate forty or more students and one small room that accommodates twenty students provide space for a variety of teaching exercises. Other areas on the fourth floor of the Davison Building include demonstration and conference rooms and a microscopy lab. A computer cluster with electronic mail capability is available to students twenty-four hours a day; a twenty-five workstation electronic laboratory is adjacent for computer-assisted educational training for students, faculty, and employees. A new amphitheater and small group rooms in the clinic building complete space for medical student training.

Services provided by the Central Teaching Laboratory include in-house microscope cleaning and repair, exam grading, grade book maintenance, and course evaluation tabulation and reporting. Room scheduling responsibility also includes also two large conference rooms in South Hospital for groups of 70 to 100 persons.

Manager: Carol G. Really, B.S.

Division of Educational Media Services. As a Medical Center core technology support group, the Division of Educational Media Services has a mission to provide total media support to the teaching, research, patient care, and service missions of the University and Medical Center.

The Medical Art Section provides illustrations produced by various computer graphics and manual art production methods and techniques. Services rendered include surgical and anatomic drawings, schematic and mechanical drawings, diagrams, charts, graphs, designs, lettering, calligraphy, signs, and poster exhibits, as well as other forms of illustrations.

The Medical Photography Facility is staffed and equipped to provide a full range of photographic services for patient care, teaching, and research. Patient photography activity includes black-and-white and color photos in the studio, on the ward, in the clinic, or in the operating room. Copy photography includes a full range of slide services for internal and external lecture and presentation purposes. Black-and-white and color prints for publication, display, and poster session purposes are available also. Other services include daily processing of color prints and of Ektachrome slide film, location photography, and passport and application prints. An extensive computer graphics imaging and media imaging service is offered for faculty and staff who create slides on desktop computer systems.

The Instructional Television section also supports teaching, research, and patient-care programs of the Medical Center. Betacam SP, three-fourths inch U-matic and one-half inch VHS video formats are used for color recording of staff and patient education programs, lecture presentations, and surgical procedures as part of staff professional education. Other services include fully scripted videotape productions for promotional or informational uses, instructional design, and computer-based training. Audiotape services, projection services, and equipment rental are available.

The Curriculum Materials Development Project staff works with faculty to produce media materials such as slidetape programs, videotape productions, and computer-assisted instruction programs. These materials may be a regular part of course presentations or may serve as adjuncts to classroom activities.

Director: Thomas R. Hurtgen, M.B.A.

Duke Hospital. Duke Hospital, one of the largest private hospitals in the South, is part of Duke University Health System and currently is licensed for 1,124 beds. The hospital directs its efforts toward the three goals of expert patient care, professional education, and service to the community. It offers patients modern, comprehensive diagnostic and treatment

facilities and special acute care and intensive nursing units for seriously ill patients. More than 37,000 patients are admitted annually. Surgical facilities include thirty-eight operating rooms in which surgeons perform more than 24,000 operative procedures annually. Approximately 2,500 babies are born each year in the delivery suite. Other special facilities for patients include a heart catheterization laboratory, hemodialysis unit, cancer research unit, medical and surgical intensive care units, hyperbaric oxygenation chamber, and cardiac care unit.

Duke's Home Care, Hospice and Infusion Services provide opportunities for continued care of patients after they leave Duke Hospital.

Ambulatory services include the outpatient clinics, the employee health service, and the emergency department, with annual total patient visits of more than 802,000. The clinical faculty of the Duke University School of Medicine participate in undergraduate and graduate medical education and practice medicine in the hospital and in the private diagnostic clinics.

Duke Hospital, with a house staff of approximately 800 is approved for residency training by the American Medical Association, The Accreditation Council for Graduate Medical Education, and is accredited with commendation by the Joint Commission on Accreditation of Healthcare Organizations.

Veterans Administration Medical Center. The Durham Veterans Administration Medical Center, with 435 beds, annually admits over 7,000 patients. The hospital is within walking distance from the School of Medicine and has closely integrated teaching and training programs for medical students and house staff. These programs are provided by the full-time professional staff who are members of the faculty of Duke University School of Medicine.

Lenox Baker Children's Hospital. On November 1, 1987 the Lenox Baker Children's Hospital became a part of Duke University Medical Center, entering a new phase in its development as an orthopaedic and rehabilitation outpatient center for the children of North Carolina. A full spectrum of outpatient orthopaedic and rehabilitation services is offered to identify and meet realistic goals and to educate, support, and assist families, schools, and communities in providing a rich environment for disabled children.

Durham Regional Hospital. On July 1, 1998, Durham Regional Hospital became a part of the Duke University Health System through a lease agreement with the County to operate the facility. Durham Regional Hospital is a 451-bed, general, short-term care community facility serving the residents of Durham and surrounding counties. This institution participates in many of the medical and health-related professional training experiences.

Raleigh Community Hospital. Raleigh Community Hospital located in North Raleigh, is a 218-bed acute care facility which became a part of the Duke University Health System on September 5, 1998. Raleigh Community Hospital provides primary and specialty care, which includes a Sports Medicine Clinic, a Neuro-otolaryngology, Hearing Institute, and a Cardiac Rehabilitation Center.

In addition, Raleigh Community Hospital has a comprehensive childbirth center with a LDRP birthing service, adult and geriatric psychiatric services, and a same day surgery center.

Other Hospitals. Various cooperative teaching and training programs are available for medical and allied health professional students and house staff at other hospitals including Asheville Veterans Administration Medical Center in Buncombe County, John Umstead Hospital in Butner, Fayetteville Area Health Education Center in Fayetteville, and Cabarrus Memorial Hospital in Concord, North Carolina.

Doctor of Medicine Program



Mission Statement and the Medical Curriculum

The mission of the Duke University School of Medicine is:

To prepare students for excellence by first assuring the demonstration of defined core competencies.

To complement the core curriculum with educational opportunities and advice regarding career planning which facilitates students to diversify their careers, from the physician-scientist to the primary care physician.

To develop leaders for the twenty-first century in the research, education, and clinical practice of medicine.

To develop and support educational programs and select and size a student body such that every student participates in a quality and relevant educational experience.

Physicians are facing profound changes in the need for understanding health, disease, and the delivery of medical care changes which shape the vision of the medical school. These changes include: a broader scientific base for medical practice; a national crisis in the cost of health care; an increased number of career options for physicians yet the need for more generalists; an emphasis on career-long learning in investigative and clinical medicine; the necessity that physicians work cooperatively and effectively as leaders among other health care professionals; and the emergence of ethical issues not heretofore encountered by physicians. Medical educators must prepare physicians to respond to these changes. The most successful medical schools will position their students to take the lead addressing national health needs. Duke University School of Medicine is prepared to meet this challenge by educating outstanding practitioners, physician scientists, and leaders.

Continuing at the forefront of medical education requires more than educating Duke students in basic science, clinical research, and clinical programs for meeting the health care needs of society. Medical education also requires addressing such concerns as national science and health policy, meeting the health care needs of society, providing medical care for the disadvantaged, and applying basic science discoveries to clinical medicine. As health care practices at the federal, state, institutional, and individual levels evolve, these endeavors need input from physicians uniquely prepared to assume guiding roles.

Duke University's role as a leader in medical education is built upon its internationally-recognized tradition of fostering scientific scholarship and providing excellent preparation for the practice of medicine. The curriculum promotes creativity, scholarship, leadership, and diversity. It integrates the basic and clinical sciences and prepares students to pursue the spectrum of options available to modern physicians, from basic science to primary care. Duke University Medical School produces at least three prototype physicians; the physician scientist, the clinician-investigator, and the practitioner (either generalist or specialist).

The Duke faculty enhance the Medical School's curriculum by continually embracing new methods of education and evaluation to improve the medical education experience. Attention to curricular development assures Duke graduates that they are grounded in basic biomedical sciences, competent and caring clinicians, prepared to pursue a lifetime of continuing education, and capable of participating in local, national, and international discussions about the delivery of health care now and in the future. Features of the four-year curriculum include:

- Development of a core medical curriculum that is rigorous, efficient, integrative and forms a realistic base of knowledge for a physician;
- Integration of basic, clinical, psychosocial, and population information and skills throughout the four years of medical education;
- General introduction to basic and clinical science for one year each, followed by two years of individualized curricular options that promote professional diversity and personal development;
- An elective third year which permits students to pursue their independent scholarly interest across a range of scientific disciplines from basic biomedical science to health policy;
- Promotion of structured active learning that includes explicit experience in leadership and cooperative roles;
- Mentorship of students by faculty in all facets of the learning process;
- Implementation of a standardized and valid assessment of progress, carefully and thoughtfully evaluating the acquisition of knowledge, skills, and attitudes appropriate to the future goals of each student;
- Incorporation of information technology and the use of computers into student learning and evaluation;
- Research and implementation of new and improved methods of teaching.

The curriculum, while offering a previously unattainable degree of flexibility to medical education and new opportunities for intellectual exploration, also makes heavy demands upon the student. It should be recognized that medical students at the Duke University School of Medicine are expected to maintain a consistent level of performance and to demonstrate qualities of initiative and dedication to their chosen profession. A scholarly attitude toward medicine that continues throughout an entire career is an important objective of the medical school. The foundations of this attitude to learning should accompany the student upon entering.

Students are expected to maintain a professional attitude toward patients at all times, to respect confidences, and to recognize that they are the recipients of privileged information only to be discussed within the context of scholarship and in circumstances that truly contribute to the educational process or to the care of the patient. This attitude involves consideration not only of speech and personal appearance but also of morality, honor, and integrity.

Beginning in the fall of 1987, the School of Medicine greatly enlarged the focus on ethics and human values in the curriculum. In the face of major advances in medical technology and sciences, today's medical student must be prepared to deal with new complexities of medical practice. These advances and complexities also make it of

paramount importance that medical education enable each student to grow in both depth and breadth as a human being. The Duke University School of Medicine is rising to this challenge.

Doctor of Medicine Degree

The degree of Doctor of Medicine is awarded, upon approval by the faculty of Duke University, to those students who have satisfactorily completed the academic curriculum; demonstrated the intellectual, personal, and technical competencies to function as a skilled physician; and demonstrated their fitness to practice medicine by adherence to a high standard of ethical and moral behavior.

The faculty of Duke University School of Medicine have developed general guidelines for technical standards for medical school admissions and degree completion. These are available on request from the school.

The awarding of degrees is contingent upon payment of, or satisfactory arrangements to pay, all indebtedness to the university.

In February, 1995, the Duke University School of Medicine was fully accredited for seven years by the Liaison Committee on Medical Education of the Association of American Medical Colleges and the Council on Medical Education of the American Medical Association. The complete Self Study Review and LCME database is available for inspection to anyone upon request to the Registrar's Office, 125 Davison Building, phone 919/684-2304.

Course Requirements—First Year. The student studies the principles of all the basic science disciplines. Rather than mastering an encyclopedic array of facts, the purpose is to acquire familiarity with the major principles of each subject. In addition, students are required to participate in a year-long course, Introduction to Clinical Care. This course, which also is offered throughout the second year as Ambulatory Care Clerkship, is designed to expand ambulatory, primary, and continuity care experience for Duke medical students. The course is a combined clinical curricular experience which emphasizes progressive knowledge and competencies. The course meets one afternoon per week with students beginning a supervised clinic assignment in January. Thereafter, students are in the clinic every other week and in small and large group instruction in the alternating weeks.

The first year consists of instruction in the following:

Semester 1	Credit
BAA 200 - Gross Human Anatomy	4
BCH 200 - Biochemistry	4
CBI 200 - Cell Biology	2
CBI 201 - Microanatomy	2
CBI 202 - Medical Physiology	4
GEN 200 - Genetics	2
IND 201 - Intro to Clinical Care	1
Total	19
Semester 2	Credit
IMM 201 - Immunology	2
IND 201 - Intro to Clinical Care	2
MIC 200 - Microbiology	5
NBI 202 - Basic Neurobiology	4
PHR 200 - Pharmacology	4
PTH 200 - Pathology	5
Total	22

A vacation takes place after the conclusion of the first year. In addition, every class has Thanksgiving, Christmas, Martin Luther King, Jr. holiday, and spring break with the exact dates depending upon rotation and class schedules.

Course Requirements—Second Year. Satisfactory completion of the first year curriculum is a prerequisite to the second year curriculum. The second year provides an exposure to clinical science disciplines. This permits students early in their careers to become participants in the care of patients. The acquired appreciation of the problems of the clinical areas and the opportunities to recognize the applications of the basic sciences leads to a more meaningful selection of courses for the subsequent two years.

In addition, students are required to participate in a year-long course, Introduction to Clinical Care. This course, which also is offered throughout the second year as Ambulatory Care Clerkship, is designed to expand ambulatory, primary, and continuity care experience for Duke medical students. The core clinical rotations follow with eight-week rotations in internal medicine, surgery, obstetrics/gynecology, pediatrics, either an eight-week rotation in family medicine or a four-week rotation in family medicine and a four-week rotation in neurology, and a six-week rotation in psychiatry. A core clinical rotation in medical practice and health systems lasting two weeks follows the psychiatry rotation.

The clinical performance examination (CPX) is a standardized test of clinical performance that all students must take and pass after completing second-year clerkships. It was developed by faculty from all four medical schools in North Carolina and is now administered at all schools. The purpose of the CPX is to evaluate the effectiveness of the clinical curriculum and each student's ability to respond to patient problems and concerns. Skills relating to communicating with patients, history taking, physical examination, assessment, and follow-up plans are evaluated for fifteen different patients. Students performing below minimal competency on the CPX are required to complete additional structured learning during their fourth year.

Course Requirements—Third and Fourth Years. Satisfactory completion of the second year curriculum is a prerequisite to the elective curriculum. The third and fourth (elective) years of undergraduate medical education build upon the experiences in basic science and clinical medicine gained in the earlier years. The elective years consist of four semesters of sixteen weeks each. In addition, the fourth year has an optional summer term also of sixteen weeks. Successful completion of sixty-four elective credits (typically thirty-two basic science credits during the third year and thirty-two clinical science credits during the fourth) is required for graduation. Course offerings are described in the different departmental sections in this bulletin. The wide selection affords an opportunity for the student, with guidance from advisers, to design a program that best satisfies her or his needs.

Third Year. The purpose of the scholarly experience, usually occurring in the third year, is to provide the student with an opportunity to focus in an area or areas of interest and to pursue, in depth, a scholarly activity. Time may also be spent gaining strength in areas of basic science weakness. Each student determines a home base study program for the basic science elective experience. With the aid of advisers, the individual elective program is devised to include an area of scholarly work to pursue which may or may not be an independent research project. Any combination of: (a) research preceptorship, (b) tutorials, or (c) courses inside or outside the home base study program may comprise the overall basic science elective experience. With rare exception, the elective experience should be taken as a block. During the eight months that comprise the third year, students are required to complete thirty-two basic science credits.

Fourth Year. The clinical elective experience, usually occurring in the fourth year, should be used to: (a) aid in decision making about the area of choice of postgraduate training, (b) obtain experiences in areas that would not be included in that postgraduate training and, above all, (c) pursue active experiences in patient care sufficient to provide the basic skills necessary for doctor-patient interaction. To satisfy requirements for the M.D. degree, students must complete thirty-two clinical science credits during the fourth year. Four of these credits must be completed in an elective requiring direct patient care.

Academic Standards. The faculty of the Duke University School of Medicine has the responsibility to define minimum acceptable standards for academic performance. In all cours-

es, minimum passing standards are defined by the course director in collaboration with her or his department chairperson and faculty. These standards are communicated to the students at the beginning of each course. In clinical departments, acceptable professional standards of behavior and attitudes are included in performance evaluation.

Faculty have the responsibility of notifying students who are not meeting minimal standards for passing a course early enough for the student to be able to work toward achieving the minimal standard by the end of the course. In most cases, this is at the mid-term of a course. Tutorial help or guidance in correcting deficiencies should be offered to any student so notified.

In addition to performance directly related to course requirements, to maintain all students must maintain a high standard of professional behavior. Examples include how a student communicates with course faculty and support staff, their manifestations of responsibility to the school, fellow students, and patients, as well as behavior off-campus that would be deemed unprofessional for students-becoming-physicians. Incidents reported to the dean's office are investigated. The number of such reports, the severity of the transgression, and other aspects specific to the behavior in question can result in disciplinary action, including dismissal from medical school.

Grading. Where appropriate, certification by the individual faculty person or by the delegated representative of each departmental chairman that a student has satisfactorily completed requirements for a course shall constitute grounds for a grade of *Pass (P)* or *Pass with Honors (H)*. *Pass with Honors* is reserved for those students who have performed in an exemplary manner in the opinion of the faculty. A grade of *Satisfactory (S)* or *Unsatisfactory (U)* is used to rate performance in a course for which the award of the grade of *H* is prohibited.

An *Incomplete (I)* grade is reserved for those students who have not met all of the requirements of a course because of illness or other such extenuating circumstances, or because of the inability to attain sufficient understanding of course material without additional study. *Incompletes* that are not satisfied within one calendar year (unless an extension is granted by an advisory dean and the registrar) automatically become grades of *Fail (F)*. It is the departmental chairman's responsibility or that of the delegated representative of the departmental chairman to certify that an *Incomplete* has been satisfied and to so notify the registrar. A passing grade is placed alongside an *Incomplete* on the permanent and official transcript. Grades of *I* are not removed from the permanent record. All first year courses must be satisfactorily completed before a student may enroll in second year courses. Normally, all second year courses must be satisfactorily completed before a student may enroll in the elective curriculum.

A grade of *Fail* is recorded on the permanent record of a student by the registrar upon certification by the individual faculty person or the delegated representative of the departmental chairman that unsatisfactory work has been done in the opinion of the faculty. Failures cannot be erased from the permanent record, but the requirements of the course may be satisfied by repeating the course in a satisfactory manner. At that time, a passing grade is recorded on the official and permanent transcript. A grade of *Honors* cannot be awarded to students in courses that are successfully remediated rather than retaken.

Promotion. Each student's record is reviewed periodically by promotions committees composed of course directors (or their designees) from the appropriate departments. Recommendations by these committees are made to the dean of medical education who may select one of several options:

1. Promote students whose work is satisfactory;
2. Warn students whose work is less than satisfactory that they must improve their scholastic endeavor and require such students to remediate, retake, or review specific courses, or to undertake other actions that may assist in the correction of deficiencies;
3. Place on probation students whose work is unsatisfactory or who have demonstrated unprofessional behavior; or

4. Request the resignation of any student who is considered an unpromising candidate for the degree of Doctor of Medicine.

A student wishing to appeal a decision may do so to the dean of medical education within two weeks of notification.

The dean of medical education, with the advice of the Medical Center Policy Advisory Committee, reserves the right to require the withdrawal of any student at any time if, in his opinion, the student should not continue in the School of Medicine.

Due Process Guidelines. If a student decides to appeal a decision of a promotions committee, he or she must submit in writing to the dean for medical education the reasons for the disagreement with the decision and any extenuating circumstances he or she wishes to identify within two weeks of receiving notice of the decision. Within a week of receiving the appeal, the dean for medical education appoints a Promotions Appeal Committee of three senior faculty, at least one of whom is from a basic science department. The Promotions Appeal Committee reviews the student's request and meets with other faculty or members of the DUMC staff who have pertinent information. The student may present her or his appeal in person and may bring a friend from the faculty or student body to assist. The Promotions Appeal Committee reports its decision to the dean for medical education who presents this to the student. If the student still is dissatisfied and wishes to appeal further, he or she may request a review of the whole process by the dean of the School of Medicine, with all pertinent documentation is provided to that office. The dean's decision, with the advice and consent of the Medical Center Policy Advisory Committee (MEDPAC), is binding.

Satisfactory Academic Progress. Satisfactory academic progress for students in the School of Medicine is construed as the successful completion of all requirements necessary for the advancement from one year to the next. These requirements are as follows:

First to Second Year. Completion of core basic science courses in one calendar year.

Second to Third Year. Completion of core clinical science courses within fourteen months.

Third to Fourth Year. Completion of thirty-two basic science credits within nine months.

Fourth Year to Graduation. Completion of thirty-two clinical science credits within one calendar year.

In unusual circumstances (including illness, remediation, or irregular sequence of courses) the determination of satisfactory progress for academic purposes is made by the dean for medical education.

For financial aid purposes, federal regulations establish the maximum time frame for completion of the program at 150 percent of the minimum time required to complete the program. Any student exceeding the 150 percent maximum time frame is ineligible for Title IV (Stafford) student financial aid funds.

Course Load. In the first year, students typically complete certain required courses whose total weight equals 19 credits in the fall and 22 credits in the spring semester. During the second year, the normal registration for each sixteen week semester is two 8-week rotations or the equivalent. In the elective years, the normal registration for any term is sixteen credits with a maximum registration of eighteen credits; no more than five credits in any four-week period may be taken. Enrollment for credit above this limit must have the written approval of the advisory dean.

Audit and No Credit Courses. With the consent of the appropriate instructor, *fourth* year students are permitted to audit one course a semester in addition to the normal program. Students who audit a course do not actively participate, submit work, or receive credit for the course. Because of the nature of an audited course, most clinical science courses cannot be audited. However, those offered in a lecture format (as indicated in the Elective Book provided

to third and fourth year students) may be audited with the written permission of the instructor. After the first week of classes in any term, no course taken as an audit can be changed to a credited course and no credited course can be changed to an audit. Further, an audited course may not be repeated for credit.

Third year students may register on a "no-credit" basis only for clinical courses whose total, combined weight does not exceed four. Such courses are not considered to be "audits." Students are expected to participate fully in these courses and are graded upon the quality of their work, but do not earn credit toward degree requirement.

Leave of Absence. A student, after presenting a written request to the dean of medical education, may be granted an official leave of absence for personal or academic reasons for two or more consecutive terms but not to exceed one calendar year. If approved, the dean provides written notification including applicable beginning and ending dates to the student, the registrar, and the director of financial aid. The student must apprise the dean in writing of her or his wish to return to the Medical School or to extend the personal leave at least sixty calendar days prior to the anticipated date of re-entry. The student desiring an extension beyond one calendar year may be required to apply for readmission to the School of Medicine. When a leave of absence is taken, the dean may require the student upon return to repeat some or all of her or his previously completed academic program. To be eligible for a voluntary leave of absence, a student must have met all financial obligations to the university.

Permission to take a leave of absence for medical reasons also must be sought in writing and is usually granted for thirty days. If additional medical leave time is desired, the student's physician is requested to submit documentation concerning the need for a continuation of the leave. A medical leave extending beyond ninety days requires a statement from the student's physician attesting to her or his fitness to return to the Medical School as a full-time student.

For purposes of deferring repayment of student loans during a school approved leave of absence, federal regulations limit the leave to six months.

In all cases of leave of absence, the student is required to complete the full curriculum to be eligible to earn the M.D. degree.

Commencement. Graduation exercises are held once a year in May when degrees are conferred on, and diplomas are issued to, those who have completed requirements by the end of the spring semester. Those who complete degree requirements at the end of the summer or fall terms receive diplomas dated September 1 or December 30, respectively. There is a delay of about one month in the mailing of September and December diplomas because diplomas cannot be issued until they are approved by the Academic Council and the Board of Trustees.

Interinstitutional Program. Under an agreement with Bowman Gray Medical School, the East Carolina University School of Medicine, and the University of North Carolina-Chapel Hill School of Medicine, Duke Medical School allows students participating in the elective program to take courses at participating institutions for grades and credit toward the M.D. degree at Duke. Courses taken usually are not available at the home institution or are not offered at times that can be accommodated by the student's schedule. Students enrolled in interinstitutional courses are charged the current Duke tuition and student health fees.

Medical Licensure. "The Federation of State Medical Boards (F.S.M.B.) and the National Board of Medical Examiners (N.B.M.E.) have established a single, three-step examination for medical licensure in the United States. The United States Medical Licensing Examination (U.S.M.L.E.) provides a common evaluation system for applicants for medical licensure." (*U.S.M.L.E. 1997 Bulletin of Information*) Step 1 concentrates on basic science knowledge, Step 2 on fundamental clinical science knowledge, and Step 3 on advanced clinical science knowledge. Steps 1 and 2 can be taken in any order, but must be passed before applying to take Step 3. Of course, a full license requires also appropriate application procedures and fees for the state in which the license is issued.

Duke University School of Medicine does not use any step of this examination for evaluation of students for progress through the curriculum. Passing the examinations is

the responsibility of the individual, and Steps 1 and 2 may be taken whenever the individual is prepared to do so. The curriculum is not directed toward preparing students for licensure examination, but successful performance in coursework should enable all students to pass each step. In 1999, the March Step 2 Exam and the May Step 3 Exam will be paper and pencil. Computer-based exams begin in April, 1999. Call the Central Teaching Lab Office, 684-5967, for more information. The CTL website, <http://som.mc.duke.edu> will have information as well. Students typically take Steps 1 and 2 while in medical school. The Office of Medical Education assists students as they decide the most appropriate times during medical school to take these steps and with suggestions for preparing for the examination. Students must be registered for courses in the School of Medicine to be eligible to take the U.S.M.L.E. and should speak with affected course directors at least two weeks prior to the test dates to make arrangements for the two day absences.

Visiting Students. The School of Medicine provides opportunities for visiting students to enroll in elective courses for a maximum period of eight weeks. However, visiting students are permitted to enroll in courses only after the registration period for the applicable semester has concluded for Duke medical students. The School of Medicine does not offer long term or extensive clinical experience (sometimes called externships or clerkships) sufficient to satisfy the clinical educational requirements of foreign medical schools. Payment of a registration fee (currently \$50, subject to change) and a student health fee are required. For information write to: Coordinator, Visiting Students, Box 3878, Duke University Medical Center, Durham, North Carolina 27710.

Education Records. In accordance with the Family Education Rights and Privacy Act (F.E.R.P.A.), students are granted certain rights with respect to their education records. They are:

1. The right to inspect her or his education records:
 - Education records include those records which contain information directly related to a student and are maintained as official working files by the university. They do not include records made by faculty and administrators for their own use and not shown to others; campus police records; employment records; records of physicians, psychologists, etc., made or used only for treatment purposes; and records containing information relating to a person's activities after she or he graduates or withdraws from the university.
 - Although F.E.R.P.A. regulations do not require institutions to provide copies of the education records unless to do so would affectively prohibit an individual from viewing her or his records, it is the policy of Duke University Medical School to make such copies available. However, the Medical School may deny requests to release copies of the transcripts of those students in financial default. The Medical School also does not release copies of other schools' transcripts unless mandated by F.E.R.P.A.
2. The right to amend the contents of the education record to ensure that they are not inaccurate, misleading, or otherwise in violation of the student's privacy or other rights.
3. The right to file a complaint with the U.S. Department of Education concerning perceived failure on the part of the school to satisfy the requirements of F.E.R.P.A.

F.E.R.P.A. also limits the disclosure of personally identifiable information to others without the student's prior consent with the following exceptions:

- *Directory Information:* Certain categories of information are considered to be directory information and do not require the student's prior written consent to be disclosed. However, the Medical School Registrar's Office complies with a student's request to withhold directory information if notice is submitted in

writing during the first three weeks of each new academic year; such requests must be renewed annually. Students considering nondisclosure should be aware that negative repercussions may result when inquiries are made by prospective employers, educational institutions, or other interested parties. This is particularly important for graduating students whose final nondisclosure requests continue to be honored until rescinded by the student.

The following have been designated as directory information by the University and/or the Medical School: name, addresses-including email addresses, telephone listing, date and place of birth, photograph, major field of study, participation in officially recognized activities and sports, weight and height of members of athletic teams, dates of attendance, degrees and awards received, and most recent previous educational institution attended. In addition, class rosters are considered to be as directory information in the School of Medicine.

- *Legitimate Interests:* Prior consent is not required for disclosure of education records to school officials of Duke University who have been determined by the registrar to have legitimate educational interests, appropriate parties in connection with an emergency, and in response to a court order or subpoena.

The complete university policy regarding F.E.R.P.A. is located in the Medical School Registrar's Office.

Combined Degree Programs

Medical Scientist Training Program. The Medical Scientist Training Program is designed for highly qualified students strongly motivated toward a career in medical sciences and academic medicine. It provides an opportunity to integrate graduate education in one of the sciences basic to medicine with the full clinical curriculum of the School of Medicine. The program requires, on average, six to seven years of study and leads to both the M.D. and Ph.D. degrees. Although the special emphasis of this program is on basic medical science, the trainees, because of their education in clinical medicine, have a remarkable range of career opportunities open to them. Graduates of this program follow one of two broad paths. Some embark directly on careers in teaching and research in one of the basic medical sciences while maintaining strong ties with clinical science as a result of their combined training. Others enter residency programs before pursuing investigative and teaching careers in clinical medicine, carrying with them strong academic backgrounds which allow them to conduct fundamental research with a foundation of superior training and experience in basic sciences.

Eligibility. Applicants must meet the admission requirements of both the Medical School as a candidate for the M.D. degree and the Graduate School as a candidate for the Ph.D. degree. Most candidates apply for admission to the first year of the program but, in special cases, applications can be accepted from students who are in residence in the Medical School or Graduate School of Duke University. In addition to the minimum requirements for acceptance to the Medical School and the Graduate School, advanced course work in science and mathematics and prior research experience (or other evidence of research aptitude) counts heavily in the selection of candidates.

Financial Support. Students admitted to the first year of the program receive a traineeship award (National Research Service Award) consisting of a stipend and full tuition allowance from the National Institutes of Health. Currently the annual stipend is \$15,500. Financial support from that award can be furnished for up to six years assuming normal progress. These six years need not be consecutive; this permits flexibility in funding in case more than six years are required for completion of the curriculum. Funding by the NIH is limited to citizens or permanent residents of the United States.

The Training Program. This program is designed to offer trainees great latitude in the selection of course material. Basic requirements are two academic years composed of the first basic science year and the second clinical science year of the curriculum for medical

students at Duke University. Following completion of the second year, the trainee enters the graduate program to complete the requirements for the Ph.D. degree. One more academic year of elective clinical study is necessary to complete the requirements for the M.D. degree. Both degrees are awarded at the completion of the sequence. Minor variations in this schedule can be arranged if this is advantageous to the student's education.

Year 1—Core Basic Science Year. This year consists of courses in anatomy, biochemistry, cell biology, genetics, immunology, microbiology, neurobiology, pathology, pharmacology, physiology, and PRACTICE.

Year 2—Core Clinical Science Year. This year encompasses a comprehensive approach to medicine oriented to the patient as a whole. It provides fundamental training in clinical medicine with emphasis on the relationships between general biological processes from conception through birth, development and maturation, to senescence and death, as well as individual clinical states. Special consideration is devoted to the pattern of developmental sequences and to the changes in that pattern determined by genetic composition and the particular environment in which the patient lives.

The second year consists of eight-week rotations in internal medicine, surgery, obstetrics/gynecology, pediatrics, a six-week rotation in psychiatry coupled with a two-week rotation in cost effective care, and either an eight-week rotation in family medicine or a four-week rotation in family medicine and a four-week rotation in neurology, and the year-long PRACTICE course.

Years 3, 4, 5, (6)—The Graduate Years. During the third, fourth, fifth and, if necessary, sixth year of the program, the trainee pursues graduate study to satisfy the requirements for the Ph.D. degree. These requirements include: (1) completion of necessary course work, (2) adequate performance in the preliminary examination, (3) original research suitable for a dissertation, and (4) successful defense of the thesis in the final examination. Detailed description of the other general requirements for the Ph.D. degree are stated in the *Bulletin of the Graduate School*.

The graduate curriculum of each trainee is developed in consultation with the director of graduate studies of the department in which the trainee elects to study and requires the approval of the Medical Scientist Training Program Committee. Since most of the ordering ideas and experimental techniques of all the medical sciences derive from mathematics and the physical sciences, it is essential to ensure that all students in the program have an adequate foundation in these subjects. Because of the close working relationship and geographical proximity of the departments of medical and physical sciences at Duke, the setting is unusually favorable for the achievement of that goal.

Descriptions of the graduate courses in the Departments of Biochemistry, Cell Biology, Microbiology, Immunology, Neurobiology, Pathology, Pharmacology, Biomedical Engineering, Chemistry, Zoology, Molecular Cancer Biology, and Genetics are listed in the *Bulletin of the Graduate School*. Trainees are encouraged to select courses which relate to their developing individual interests rather than follow a prescribed curriculum applied to all students in a given discipline. Such range, flexibility, and freedom are the essence of graduate education. The original research and dissertation of each trainee is supervised by a faculty adviser chosen by the trainee in consultation with the director of graduate studies in the appropriate department. The faculty adviser is the chairman of the trainee's supervisory committee, which consists of at least three members from the major department. This committee generally administers the preliminary examination before the student commences original research and the final examination after the student completes the dissertation.

Final Year—An Elective Year in Clinical Science. In this year, which is entered only after completion of all requirements for the Ph.D. degree, the student and her or his Medical School advisory dean construct an individualized curriculum which often places major emphasis on one clinical area and minor emphasis on other fields. One aim is to integrate research interests and clinical experience in such a way that the student's research competence is facilitated; therefore, the year is planned with regard to the train-

ee's proposed career in research as well. This elective year provides further training in clinical medicine to complement the second (core) clinical year, so that the trainee's total clinical experience is the same as that given in the regular clinical years of medical school (the third and fourth years in the majority of schools). It should be noted that since students in the program receive the M.D. degree upon completion of the final year, great care is taken by the faculty to ensure that students are competent and knowledgeable in current concepts of patient care. It is hoped that the final year provides the student with an experience which is not repeated during the residency but serves to complement later phases of training. For example, future surgeons might be exposed to fields other than surgery, since they receive intensive training in that discipline during their residency programs.

Application and Admission Procedures. The following guidelines should be observed by individuals applying to the Medical Scientist Training Program.

1. The application form for the Duke University School of Medicine should be completed and submitted as early as possible since acceptance into the Medical Scientist Training Program requires acceptance by both the Program Committee and the Medical School Admissions Committee. Applicants who cannot be accepted into the program are still fully eligible for acceptance to the Medical School if the Medical School Admissions Committee considers them qualified and desirable.
2. The application form for the Medical Scientist Training Program should be completed and submitted no later than December 1.
3. To facilitate review of this application, the Medical College Admission Test should be taken, if possible, in April of the year in which the application is submitted.
4. Only those applicants who are accepted for the program are requested to complete an application form for the Graduate School. The Graduate Record Examination is not required for this purpose.
5. Applicants are notified about acceptance into the program on or about February 28.

Additional information may be obtained by writing Salvatore V. Pizzo, M.D., Ph.D., Director, Medical Scientist Training Program, Box 3712, Duke University Medical Center, Durham, North Carolina 27710 or emailing paoburks@acpub.duke.edu.

The Medicine and Clinical Research Program. The Clinical Research Training Program is offered by the faculty of the Division of Biometry in the Department of Community and Family Medicine at Duke with the participation of other members of the Medical Center faculty having expertise in relevant areas. The program provides academic instruction in the quantitative and methodological principles of clinical research. Formal courses in research design, statistical analysis, decision analysis, research ethics and research management are offered. Upon completion of the program, students are awarded the Master of Health Sciences in Clinical Research degree as well as full credit for the third year of the medical school curriculum.

Course of study. The degree requires 24 units of graded course work and a research and thesis project for which 12 units of credit are given. Seven courses constituting 22 units are required for all degree candidates. The student's clinical research activities provide the setting and the data for the project; the thesis serves to demonstrate the student's competence in the use of quantitative methods in medical research.

Application procedure. The CRT Program and the Clinical Research Study Program offered to third year students through the Medical School are two distinct programs; formal application to the Training Program must be made by students interested in pursuing the M.H.S. Medical students seeking admission to the Clinical Research Training degree program should contact William Wilkinson, Ph.D., Program Director, to discuss their interests and to obtain instructions as to how to apply.

Primary Care Program. In September 1994, Duke University School of Medicine instituted the Primary Care Program for medical students. The goal of the program is to develop leaders in primary care disciplines of medicine. Any student matriculating in the Medical School and expressing an interest in becoming a primary care physician can apply to join this program. The program functions much as an academic society, with periodic informal meetings of generalist faculty and program students. Students are encouraged to elect the eight-week family medicine clerkship during the second year. Though the third and fourth years remain elective years for all medical students, Primary Care Program students are encouraged to participate in either the Clinical Research Study Program or the Epidemiology and Public Health Study Program during the third year. These study programs provide an opportunity for dual degrees, such as M.D./M.B.A., M.D./M.H.S., M.D./M.P.P., or M.D./M.P.H. During the fourth year of clinical electives, students are encouraged to take the basic neurology clerkship, a generalist subinternship, and at least one ambulatory care rotation in a generalist discipline such as community medicine or geriatric medicine. Throughout the four years, students are assigned a primary care mentor as well as an advisory dean. Students may join the program at any time during the first three years and may withdraw from the program at any time. Participation also does not necessitate a primary care career choice. The program is jointly sponsored by the Departments of Community and Family Medicine, Medicine, Obstetrics/Gynecology, and Pediatrics. Additional information may be obtained by contacting Barbara Sheline, M.D., M.P.H., Box 3886, Duke University Medical Center, Durham, NC 27710, sheli002@mc.duke.edu.

The Medical Historian Program. The Medical Historian Program is conducted under the auspices of the School of Medicine and the Graduate School. Individuals earning the Ph.D. degree in history from Duke may petition the dean for medical education to receive transfer credit that can be applied to the medical school degree if the major subject area is one that is related to the discipline of medicine, health policy, or public health. The combined M.D.-Ph.D. program typically extends for six years. Students complete the first two academic years in the School of Medicine (the required, core basic and clinical courses) prior to taking a leave of absence to enroll in the Graduate School. A range of appropriate courses are available there through the Department of History. Following the completion of the Ph.D. degree, the student resumes requirements for the M.D. degree.

Application and Admissions Procedures. Applicants must meet the requirements for admission to the School of Medicine and the Graduate School in the Department of History. Candidates who have completed two years of medical school are also considered. In addition to the minimum requirements established by the School of Medicine and the Graduate School, courses in history and in the history and philosophy of science count in the selection of candidates.

Applicants should complete and submit an application form to the Duke University School of Medicine and to the Graduate School for admission to the Department of History.

Further information may be obtained by contacting Margaret Humphreys, M.D., Ph.D., Box 3675, Duke Children's Primary Care, Duke University, Durham, NC 27708, meh@acpub.duke.edu.

The Medicine and Business Administration Program. The Duke School of Medicine and the Fuqua School of Business jointly sponsor a program of combined medical and business administration education. The program provides an opportunity to acquire a full basic study of the two fields within five years. Upon satisfactory completion of the required course of study, candidates are awarded both the M.D. and the M.B.A. degrees.

Course of Study. The student in the M.D.-M.B.A. program begins the program in the School of Medicine. As in the regular M.D. program, the first year is devoted to the basic medical sciences and the second year to the basic clinical disciplines. Upon successful

completion of the second year, the student takes a leave of absence from the Medical School and enters the Fuqua School of Business where the first-year curriculum is the same as that of other M.B.A. students. After the completion of two semesters, the student returns (commonly in the month of May) to the School of Medicine to begin the first half of an eight month scholarly experience through, typically, the Epidemiology and Public Health Study Program or the Clinical Research Study Program. In the fall of that year (the beginning of the fourth year), the student continues enrollment in the School of Medicine but returns to the School of Business to complete course work. During the spring of the fourth year, the student completes the second four months of the scholarly activity period. The fifth and final year is spent at completing the Medical School elective clinical work tailored to the student's specialized needs.

Eligibility. Applicants for the M.D.-M.B.A. program must qualify for admission to both the School of Medicine and the Fuqua School of Business. The usual approach is to apply to the Fuqua School of Business during the second year of Medical School. It is helpful, however, for a student to indicate upon admission to the School of Medicine that he/she has an interest in the joint degree program of the School of Medicine and the Fuqua School of Business. Neither school gives preference to joint degree candidates in the admission process. *Application Procedures.* Application forms for the Fuqua School of Business may be obtained by writing to the Office of Admissions, Duke University Fuqua School of Business, Box 90104, Duke University, Durham, NC 27706. Applications for the School of Medicine should be made by utilizing the M.C.A.T.S. procedure described in this bulletin.

Financial Aid. During the four years that students are enrolled in the School of Medicine, they are eligible for financial aid from the School of Medicine. During the year students are on leave of absence from the School of Medicine and enrolled in the Fuqua School of Business, they are eligible for loans and grants through the School of Business, only.

For additional information, contact the M.D.-M.B.A. advisor Steven J. Bredehoeft, M.D., Box 2928, Duke University School of Medicine, Durham, NC 27710, brede001@mc.duke.edu and Sim B. Sitkin, Ph.D., Professor, Fuqua School of Business, Box 90120, Duke University, Durham, NC 27706, sbs4@mail.duke.edu.

The Medicine and Juris Doctor Program. The School of Medicine and the School of Law of Duke University jointly sponsor a highly selective program of combined medical and legal education. The program provides an opportunity to acquire a full basic study of the two fields. Upon satisfactory completion of the required course of study, candidates are awarded both the M.D. and the J.D. degrees.

Course of Study. The student in the M.D.-J.D. Program generally begins her or his course of study in the School of Medicine. As in the regular M.D. Program, the first year is devoted to the basic medical sciences and the second year to the core clinical disciplines. The completion of the first two years allows the individual to integrate the classroom with the clinical experience of patient care. At the time at which the Medical School curriculum starts a third year of research experience, the student enters the School of Law where the first-year curriculum is the same as that of other law students. During the next two years the student takes electives in the law curriculum, including available health law courses. In addition, some students pursue legal clerkships during the two summers to gain experience in health care law. A total of seventy-four credits must be earned in the Law School. The final time is spent in the Medical School completing elective basic science and elective clinical science work that is tailored to the student's specialized needs.

Eligibility. Applicants for the M.D.-J.D. Program must qualify for admission to both the School of Medicine and the School of Law. The usual approach is to apply for both schools simultaneously, thus reserving a place in the program prior to arrival. Applications are also accepted from members of the first and second year medical school class

for admission to the School of Law and from the second year law school class for admission to the School of Medicine. Neither school gives preference to joint degree candidates in the admissions process.

Application Procedure. Application forms for the School of Law may be obtained by writing to the Office of Admissions, Duke University School of Law, Durham, North Carolina 27706. Applications for the School of Medicine shall be made by utilizing the A.M.C.A.S. procedure described in this bulletin.

Deadlines. For those seeking simultaneous admission to both schools: at the end of the junior year take the new Medical College Admissions Test (M.C.A.T.) and the Law School Aptitude Test (L.S.A.T.).

For admission to the Medical School, the A.M.C.A.S. application procedures should be completed. Upon receipt of the supplemental application form from Duke, the box indicating M.D.-J.D. Program should be checked. The deadline for the A.M.C.A.S. procedure is November 1. There is no deadline for the Law School but January 15 or earlier submission is suggested.

For additional information contact the M.D.-J.D. Advisor, Paul Lee, M.D., J.D., Box 3802, Duke University Medical Center, Durham, North Carolina 27710, lee00106@mc.duke.edu, (919) 681-2793.

The Medicine and Public Health Program. Students enrolled in the School of Medicine, after satisfactory completion of the first two years of the regular curriculum, may request approval to seek a Master of Public Health degree at the University of North Carolina, Chapel Hill. The program is designed to train physicians in epidemiology, biostatistics, maternal and child health, health policy and administration, environmental sciences, or in evaluating health care delivery systems. Upon receipt of the M.P.H. degree, students are awarded a full year of basic science credit toward the M.D. degree.

For additional information contact the M.D.-M.P.H. Advisor, Laurence G. Branch, Ph.D., Box 3003, Duke University Medical Center, Durham, North Carolina 27710, (919) 416-5880 ext. 223, lgbranch@geri.duke.edu.

The Medicine and Public Policy Program. This four-year program is offered to meet the growing demand for persons who combine medical skills and training with a capacity for analytic public decision-making. It aims at training those persons with the requisite talent to be leaders in the development and implementation of health policy at all levels of government. Such leadership might be provided as an elected or career public official, as a leader of medical professional organizations, or as a practicing physician or medical scholar active in public affairs.

Utilizing the faculty and resources of the School of Medicine and the Terry Sanford Institute of Public Policy, the program offers students a multidisciplinary education that provides:

1. A complete course of study in the basic medical sciences and clinical training in the practice of medicine identical in scope and rigor with the education received by students enrolled in the Doctor of Medicine program alone;
2. Familiarity with the organization and financing of health services, with particular focus on the economics and politics of health care;
3. An understanding of the political, bureaucratic, and social processes that define public problems and limit alternative approaches to their solutions;
4. A capacity for quantitative and logical methods of analysis useful in forecasting and appraising policy consequences and in evaluating existing policies;
5. An understanding of the uses and limitations of various analytic techniques and an awareness of the value considerations and ethical choices implicit in particular policy alternatives.

During the first two years at Duke, students enroll in the normal course of study in the School of Medicine. In the third year, course work shifts to the Institute. In addition to the normal public policy curriculum, combined degree students are required to complete an epidemiology course. Between the third and fourth years, students have a twelve-week policy internship. During the fourth year, students complete their requirements in the School of Medicine and write a “master’s memo” for the Institute. When they have completed all the requirements for the two programs, both the M.D. and Master of Public Policy (M.P.P.) degrees are awarded.

Admissions. Students may apply for admission to the program when they make application to the School of Medicine or during their first or second years.

Applications. Requests for applications and specific questions about the program should be addressed to the Director of Graduate Studies, Terry Sanford Institute of Public Policy, Box 90243, Duke University, Durham, North Carolina 27708-0243, mpp@pps.duke.edu. Inquiries can also be addressed to Dan G. Blazer, M.D., Ph.D., Box 3005, Duke University Medical Center, Durham, North Carolina 27710, blaze001@mc.duke.edu.

Student Life



The University

Duke University, located in Durham, North Carolina, has an enrollment of 11,611 students from all fifty states and from many foreign countries. Currently, Trinity College of Arts and Sciences, the Graduate School, and the Schools of Business Administration, Divinity, Engineering, Environment, Law, Medicine, and Nursing comprise the university.

Durham, with a population of 148,000, is in the Piedmont region of North Carolina and has easy access to the sea coast and mountains. It is one of the three cities bounding the Research Triangle Park where numerous private research laboratories and governmental agencies are located. Duke University is twenty-five miles from North Carolina State University in Raleigh, eight miles from the University of North Carolina at Chapel Hill, and is in the same city as North Carolina Central University.

Conduct of Students

Duke University expects and requires of all its students cooperation in developing and maintaining high standards of scholarship and conduct.

All students are subject to the rules and regulations of the university which are currently in effect or which, from time to time, are put into effect by the appropriate authorities of the university.

Any student, in accepting admission, indicates the willingness to subscribe to and be governed by these rules and regulations and acknowledges the right of the university to take such disciplinary action, including suspension and/or expulsion, as may be deemed appropriate for failure to abide by such rules and regulations or for conduct adjudged unsatisfactory or detrimental to the university.

Living Accommodations

Duke University has two residential apartment facilities in which graduate and professional students live. These apartments are available for continuous occupancy throughout the calendar year. All the apartments are completely furnished by the university. An itemization of furnishings is included with the floor plans sent out in the application packet.

Spaces in apartments for single students are provided on an individual basis with each student paying rent per academic term to the university. This method permits students to share apartments with others of their choice. When this is impractical, the Department of Housing Management strives to place persons with similar interests together.

Town House Apartments. Town House Apartments, located about three blocks from the main East-West Campus bus line, is a thirty-two-unit complex. These apartments are more spacious than most apartments found on campus or in Durham. Because of its location away from the academic facilities, students find that these apartments offer a change from normal campus life and activities.

Each air-conditioned apartment includes a living room, a master bedroom, a smaller bedroom, a bath and a half, and an all-electric kitchen with a dining area. Spacious closets and storage spaces are provided within each apartment. A swimming pool, located in the center of the complex, is open during the late spring and throughout the summer months.

All utilities—water, heat, air-conditioning, and electricity—are provided. Telephone jacks are provided in each apartment. Duke University's Tel-Com supplies telephone service. Residents are responsible for providing their own phones and having them connected.

Central Campus Apartments. Duke University also operates a 500-unit apartment complex.

A swimming pool, located in the center of the complex, is open during the late spring and throughout the summer months. Additional facilities include a pub, convenience store, tennis courts, and basketball courts.

All utilities—water, heat, air-conditioning, and electricity—are provided. Telephone jacks are provided in each apartment. Duke University's Tel-Com supplies telephone service. Residents are responsible for providing their own phones and having them connected.

Efficiency, two-bedroom, and three-bedroom apartments are rented to graduate students. Efficiency units are very limited in number and are not generally available to new students.

Application Procedures. When students are informed of their acceptance to the Medical School they also receive a postcard on which to indicate preference for university housing. This postcard may be returned to the Department of Housing Management and detailed information on the types of accommodations and application materials will be forwarded to the accepted student. Students may find it more convenient to review housing information and to apply for accommodations on-line through the Housing Management website: <http://www.housing.duke.edu/grad/>. In recognition of the unique challenges that face newly accepted international students, priority for assignment to graduate student housing is awarded to students who arrive from abroad on student visa status. Due to limited availability of space assignment to university housing cannot be guaranteed.

Off-campus Housing. The Department of Housing Management maintains a listing of rental apartments, rooms, and houses provided by property owners or real estate agencies in Durham. These listings are available in the department only; during the summer an assistant is available to answer questions and to aid students in their attempts to obtain housing off campus. Information on commercial complexes in the Durham area may be obtained by indicating a preference for off-campus housing on the postcard which students receive with their acceptance notices. Except for assuring that owners sign a statement of nondiscrimination, off-campus property is in no way verified and neither the university nor its agents negotiate between owners and interested parties.

The search for accommodations should begin as soon as possible after acceptance to the Medical School. A visit of two or three days allows students the opportunity to make use of the off-campus service and to inspect personally the availabilities.

Dining Facilities. In addition to the Medical Center cafeteria, a number of dining facilities are located within a short distance from the Medical Center. Duke Dining Services operates a variety of dining facilities including coffee bars, traditional cafeteria-style facilities, full-service restaurants, and fast food facilities. The many dining locations on campus give Duke students virtually unlimited dining options. For more information about campus dining options, contact Dining Services at 029 West Union Building, Box 90898, Durham, NC 27708-0898, 919/660-3900, dining@mail01.adm.duke.edu.

Services Available

Student Personal and Professional Advisory Program. One important objective of Duke University School of Medicine is to promote an informal, cordial student-faculty relationship. It also is felt that this type of relationship fosters better curriculum and career advising for the student. Each entering student is assigned to one of four advisory deans who oversees her or his academic progress and with whom the student meets in small groups and individually for personal advising, curriculum planning, and career counseling. A full-time associate dean is available to students on a strictly confidential basis for personal and crisis counseling or referral.

Student Health Service. The Student Health Service is administered by the Department of Community and Family Medicine, Duke University Medical Center. Medical services are provided by board-certified faculty and by physician assistants, nurse practitioners, and resident physicians under faculty supervision.

Duke Family Medicine Center. The D.F.M.C. (684-3180), located on the corner of Erwin Road and Trent Drive in the Marshall Pickens Building, is the primary location for medical care. Students are seen by appointment Monday-Friday, 8:00 a.m.- 5:30 p.m., Saturdays and Sundays from 11:00 a.m.-2:00 p.m. A wide variety of services are available: general medical care, health education, laboratory, pharmacy, travel and immunization, x-rays, cold/flu self-help table, allergy clinic, and nutrition counseling.

Students are encouraged to use the Duke Family Medicine Center as their portal of entry to other health resources when needed, including the specialty clinics at Duke University Medical Center. This helps with coordination of appropriate care.

For problems arising after hours, students should call the Infirmary (684-3367). The nurse may advise the student to come to the Infirmary or to the Duke Emergency Department (684-2413) for further evaluation. In the event of an obvious life-threatening emergency, students should go directly to the Emergency Department. If necessary, Duke Public Safety (call 911 or 684-2444) provides on-campus transportation to the Emergency Department or the Infirmary.

The Infirmary. The Infirmary (684-3367), located on the fourth floor of Duke University Hospital South Division, purple zone, provides inpatient treatment of illnesses too severe to manage in the residence hall or apartment, but not requiring hospitalization. Confidential HIV testing, flu shots, walk in assessments, and a cold, flu, allergy self help table are also provided.

Health Education. This component of the Student Health Service is headquartered at Hanes Hall and at the Healthy Devil Health Education Center in House 0 on West Campus. Health education staff are available to assist students in making informed decisions that promote their health. Topics of concern include alcohol and other drug usage, eating and nutrition, sexual activity and sexually transmitted diseases, stress management, and others. Consult the Healthy Devil online at <http://h-devil-www.mc.duke.edu/h-devil>.

Student Health Physical Therapy. The Student Health Physical Therapy Clinic is located on West Campus in the basement of Card Gym. A physical therapist is available from 2:00 p.m.-5:00 p.m. weekdays when undergraduate classes are in session, on a walk-in basis, to assess exercise-related problems and to outline short-term treatment plans, aid recovery, and help prevent re-injury. Call 684-6480 during the summer months for hours.

Confidentiality. Information regarding the physical or mental health of students is confidential and is released only with the student's permission.

Student Accident and Hospitalization Insurance. Health insurance is essential to protect against the high cost of unexpected illnesses or injuries which would require hospitalization, surgery, or the services of specialists outside the Student Health Service. Therefore, all students are required to have such insurance. At the beginning of each fall

semester, medical students must provide proof to the bursar's office of coverage under an accident and hospitalization insurance policy or purchase the Duke Student Accident and Hospitalization Insurance policy. This insurance policy provides protection twenty-four hours per day during the twelve-month term of the policy of each student insured and is specifically designed to complement the coverage provided by the student health fee (see below). Students are covered on and off the campus, at home, while traveling between home and school, and during interim vacation periods. Coverage for the student's spouse and dependent children also may be purchased. Further information about this plan can be obtained from Hill, Chesson, and Associates (489-7426).

Health Fee. All currently enrolled full-time students and part-time degree candidates are assessed a mandatory student health fee. This covers most services rendered within the Student Health Service during each enrolled semester. An optional summer health fee for students not enrolled in summer sessions is also available through the bursar's office.

Services Covered by the Health Fee. The health fee covers most of the services at Duke Family Medicine Center if medically indicated and rendered by a student health provider:

- medical care for acute and chronic illness and minor injuries
- one health maintenance examination every two years and most associated studies
- annual gynecological exam
- most routine laboratory and x-ray services
- allergy shots
- confidential pregnancy testing
- most medications required for short-term treatment of acute problems
- immunizations required for programs receiving academic credit at Duke (note: a supplemental fee may be required for certain immunizations), excluding prematriculation immunizations

The health fee covers a variety of other service at D.F.M.C. and other locations:

- health education and health promotion, including nutrition consultation
- infirmery service, not including meals and not including diagnostic testing ordered by specialist consultants
- mental health and career counseling at C.A.P.S.

Services not Covered by the Health Fee. If you are unsure whether a service is covered, *please ask the staff of the Duke Family Medicine Clinic business office prior to receiving the service.* You are financially responsible for the following:

- medical care provided in the Emergency Department, hospital, or other non-student health facility
- care provided by specialist consultants, including those working within the student health facilities
- dental care
- pregnancy care or deliveries
- tests, procedures, prescriptions not medically indicated, not on the approved list, or not ordered by student health providers
- immunizations required for entrance to Duke or other universities or for personal travel
- medications not on the student formulary and those required for long-term use; contraceptives

Student Health Service, William A. Christmas, M.D., *Director*, 353 Hanes Hall

Counseling and Psychological Services. Counseling and Psychological Services (C.A.P.S.) is located in Suite 214, Page Building on West Campus. C.A.P.S., a component of student services, provides a range of counseling and psychological services designed to address the acute emotional and psychological difficulties of Duke students.

The professional staff is composed of psychologists, clinical social workers, and psychiatrists experienced in working with college students. They provide direct services to students including evaluation and brief counseling/psychotherapy regarding a wide range of concerns. These include issues of self-esteem and identity, family relationships, academic performance, dating, intimacy, and sexual concerns. Ordinarily students are seen for counseling by appointment. If the concern requires immediate attention, a C.A.P.S. staff member assists with the emergency at the earliest possible time.

Each year C.A.P.S. offers a series of counseling, therapy, and support groups. These explore such interests as stress, relationships, awareness of diversity, and management of eating disorders. Support groups have been offered to graduate and professional school women and gay and lesbian students.

Another function of C.A.P.S. is to provide consultation regarding student development and mental health issues affecting not only individual students but the campus community as a whole. The staff works with other campus personnel including administrators, faculty, the student health staff, and student groups in meeting needs identified through such liaisons. Contact C.A.P.S. at 660-1000.

Student and Professional Organizations

Alpha Omega Alpha Medical Honor Society. Alpha Omega Alpha, founded in 1902, is the national medical honor society. The society works to promote scholarship and research in medical schools as well as high standards of character and comportment toward patients among students and physicians. The Duke chapter of A.O.A. was founded in 1931 and has since played an important role in the medical center. For the past thirty years, A.O.A. has sponsored an original studies symposium where third year medical students present their research findings. The symposium consistently attracts speakers of national prominence to deliver the keynote address. Election into the honor society is restricted to one-sixth of the graduating class. Members are elected in both the third and fourth years of medical school. The primary criteria for election in the third year is superior academic performance as demonstrated by excellent grades in the first two years of medical school. Election in the fourth year is still primarily based on outstanding academic achievement in courses, but additional factors such as comportment towards patients and colleagues, community service, significant research activities, and other similar accomplishments are accorded greater weight. A.O.A. membership is also conferred upon physicians, including alumni and faculty members who have distinguished themselves in research, teaching, and practice.

Duke University Chapter Councillor: Harvey Jay Cohen, M.D.
President: Patrick J. Lager

Davison Society. All medical students are dues-paying members of the Davison Society, named for the first dean of Duke University School of Medicine. The society is governed by the Davison Council which consists of elected officers (president, service vice-president, social vice-president, secretary, treasurer, and intramural sports chairman) and elected representatives from each class. Primary responsibilities of the council include: chartering of medical student groups, budgeting funds for student groups and medical school activities, organization of medical school activities and social events, appointment of medical students to Medical Center and university committees, coordinating the selection of faculty and resident awards for excellence in teaching, and representing student views to the pertinent faculty and administration. The Davison Council also coordinates medical student projects with community service groups such as Habitat for Humanity, Share Your Christmas, Durham City Schools Seventh Grade Sex Education Program, AIDS Volunteer Network, Durham Community Kitchen, and the North Carolina Museum of Life and Science Saturday Science Program.

Medical student groups affiliated with, and in the past funded by, the Davison Society include: the American Medical Student Association, the North Carolina Student Rural Health Coalition, the North Carolina Medical Society Student Chapter, the Student National Medical Association, *Shifting Dullness* (the medical student newspaper), the Christian Medical and Dental Society, the Asian-American Medical Student Association, and the Duke Jewish Medical Student Association.

Also: Student Curriculum Committee, Duke Comprehensive Cancer Center Volunteer Network, AIDS Education Roadshow, Lennox Baker Children's Hospital Program, Duke Medical Gleaning Program, Homeless Shelter Clinic, Children's Miracle Network Fair, Family Medicine Interest Group, Pediatric Cardiology Volunteer Program, Self Defense Workshop, the *Aesculapian* (yearbook), American Medical Women's Association, and the Mind-Body Interest Group.

Meetings of the council occur every two weeks. Minutes of council meetings and information pertinent to the student body are posted on the medical students' Internet site, <http://www.duke.edu/web/medstudent>. The members of the council are elected in the spring of each year except for the first year class representatives who are elected during the first fall after matriculation. An annual formal, the Davison Ball, is held in the spring.

President: Sunil Sudarshan
Social Chairman-Vice-President: Shilpa Hattangadi
Service Chairman-Vice-President: Jacob Laubach
Secretary: R. Craig Castellino
Treasurer: Jonathan Hata
IM Chairman: Nathan Mick

The Engel Society. The Engel Society, established in 1966 as a memorial to Professor Frank L. Engel, is designed to promote intellectual and social interaction between students and faculty. Membership is limited to six junior students and six senior students who have demonstrated an inquisitive nature, humanitarian interests, and high scholastic ability. Four faculty members are selected annually by members of the society for three year terms. Four to six programs are held each year, and all students may be invited to participate in lecture programs sponsored by the Society.

Engel Society Moderator: Delbert L. Wigfall, M.D., Box 3959, Duke University Medical Center, Durham, North Carolina 27710.

Duke Medical Alumni Association. The Duke Medical Alumni Association seeks to support and promote the interests of Duke University Medical Center and its extended community by creating and strengthening life-long relationships between classmates, colleagues, faculty, and future physicians. The association is comprised of more than 4,500 Duke School of Medicine graduates and 5,500 former house staff members representing every state in the nation as well as forty-six countries world wide. Each year the association sponsors events and activities including Medical Parents Weekend; the Davison Club/Medical Alumni Association Student-House Staff-Faculty Tennis Tournament, the Alumni Host Program; the Davison Ball; the "History of Duke Medicine", a program during Medical Alumni Weekend that focuses attention on the Medical Center's unique history; *Aesculapian*, the medical school yearbook; student orientation activities, including a welcome event and a copy of *Davison of Duke*, the memoirs of the medical school's first dean; and distribution of the publications *Prespectives* and *Medical Alumni News*.

President: L. Scott Levin, M.D., H.S. 1982-91, Durham, North Carolina
President-Elect: Robert L. Murrah, Jr., M.D. 1983, H.S. 1983-85, Winter Park, Florida
Ellen R. Luken, Executive Director, Medical Alumni Affairs

Awards and Prizes

Allen Travel Award. Dr. Susan Allen (Duke alumna) has provided funds to assist a third or fourth year student in traveling to Africa for research/study of health care. Se-

lection of an appropriate student is made by the dean; the amount of the award may be up to \$1,500.

Davison Scholarship. The Davison Scholarship award, consisting of \$2,000, is supported by the Davison Club in the memory of Dean Davison to enable a medical student to participate in a clinical science elective outside the United States in an area of primary care. Any student eligible to study away may apply for the award. For consideration for the scholarship, the elective must be approved by the Study Away Committee.

Thomas Jefferson Award. This award, consisting of \$100, a certificate, and a book recognizes a graduating senior student who has made outstanding contributions to the university or to fields which have not been traditionally confined to science and medicine. The award is given by the Awards Committee to a graduating senior.

The Joseph Eldridge Markee Memorial Award in Anatomy. This award, donated by the friends and family of the late Dr. J. E. Markee, James B. Duke Professor of Anatomy and chairman of the Department of Anatomy from 1943 to 1966, consists of a certificate, medallion, and cash award of \$200. It is presented by the Department of Anatomy to the most outstanding student in anatomy during the first year in the Medical School.

C. V. Mosby Book Award. Three graduating senior students are selected by the Awards Committee for active participation in service to the students, community, and medical school. The award is a Mosby book of the student's selection.

E. Eugene Owen, M.D. Clinical Awards. Four graduating seniors are selected for a cash award based on excellence in the clinical sciences in the second and fourth years. The Owen Award honors Dr. E. Eugene Owen, a distinguished diagnostician of the Watson Clinic in Lakeland, Florida. The Watson Clinic Foundation makes these annual awards.

Trent Prize. An annual award of \$100 is given to a Duke medical student for the best essay on any topic in the history of medicine and allied sciences. Mary Trent Semans established this award in memory of the late Josiah C. Trent to encourage students to undertake independent work in the history of medicine and to utilize the resources of the Trent Collection.

Upjohn Award. The award consists of \$200 cash and a certificate and is presented to a Duke graduating senior for excellence in community health science projects and service to the community.

Sandoz Award. This award is given to a senior student who has done distinguished work in basic science research or clinical research. Students are nominated for this award by departmental chairmen with whom their work has been done. The work must have been presented at the A.O.A. symposium and voted upon by the Awards Committee. It consists of a plaque and a check for \$100 and is limited to one student.

Ciba Award. This award is given to a third year student who has contributed to the health care of the community. Students are nominated by the student body and voted upon by them. The award consists of the complete set of medical illustrations and text by Frank Netter.

Other Awards. Throughout the year, Duke Medical School receives notification of awards consisting of books, money, and/or plaques or medals to be awarded to students in a variety of fields at all medical schools on a national competitive basis selected by committees of the sponsoring organizations. These awards are screened by the dean's office and publicized appropriately.

Admissions



Admission Procedures

Good study habits, intelligence, character, and integrity are essential qualifications for admission. Beyond this, premedical students should strive for an education that develops abilities to observe critically, think analytically, and work independently. Though a knowledge of basic scientific principles should be secured, the competence with which premedical students conduct their undergraduate careers is of more importance than the specific subjects which they study.

Application for Admission. The Duke University School of Medicine participates in the American Medical College Application Service (A.M.C.A.S.). Application materials may be obtained from a premedical adviser or by writing: American Medical College Application Service, Association of American Medical Colleges, Suite 201, 2450 N Street, N.W., Washington, D.C. 20037-1131.

Upon receipt of the application materials from A.M.C.A.S., if credentials indicate, a supplemental application and other information are mailed which serve as notification of receipt of the application from A.M.C.A.S. Applications are received by A.M.C.A.S. any time after June 15 until November 1, which is the deadline for all material to be received by A.M.C.A.S. Applicants are urged to file their applications as early as possible. Supplemental applications should be returned within two weeks of receipt by the applicants. The absolute deadline for the supplemental application is December 15. Upon receipt of the supplemental application, two faculty members determine whether or not to proceed with an interview.

Requirements. Admission to the School of Medicine requires a minimum of ninety hours of approved college credit including one year of college English or a university writing course, one year of inorganic chemistry, one year of organic chemistry, one year of physics, one year of biology and/or zoology, and one year of calculus. An introductory course in biochemistry during the senior year is helpful. All science requirements must be completed not more than seven years prior to entrance. The Medical College Admission Test, administered by the American College Testing Programs and Services, P.O. Box 414, Iowa City, Iowa 52240, is required of all applicants. This test is given in April and September of each year at numerous colleges throughout the United States. If possible, students should arrange to take this test in April of the year they plan to submit applications for admission. M.C.A.T. scores dated earlier than four years prior to the year applied for are not considered.



Selection

The earliest date of notification of acceptance is in February for students entering the following August. Data on each candidate are screened using a computer model of matriculated students. Those selected to receive a supplemental application are carefully evaluated by the Committee on Admissions. A personal interview is conducted at Duke for those students with satisfactory credentials. Candidates may have personal interviews with regional representatives of the Admissions Committee. Those candidates who demonstrate the most promise for exceptional performance in their future practice of medicine are admitted on the basis of merit. In order to ensure enrollment, accepted candidates must return a signed agreement within three weeks after notification. Since admission is offered in advance of matriculation, it is provisional upon the successful completion of any incomplete premedical required subjects as well as the continued demonstration of scholarship in college course work.

Transfer

Duke University School of Medicine does not accept transfer students except in unusual circumstances.

Advanced Placement

After acceptance to the School of Medicine, students who hold Ph.D. degrees in biomedical or preclinical sciences may apply to be considered for a three-year, M.D. degree program. This program consists of the core basic science courses during the first year, the core clinical rotations during the second year, and clinical electives during the third year. Students whose Ph.D.'s have not been awarded prior to expected matriculation are not eligible for this program. Students must complete all Ph.D. requirements prior to matriculation if application is made while still in graduate school.

Reapplication

Students who wish to apply for a second time should write A.M.C.A.S. requesting new application forms. Supporting documents are transferred to the new application file. These documents are kept on file for three years. To be seriously considered, reapplicants must make significant additions of experience or coursework to the original application.

Immunization and Health Record

North Carolina State law and the Infection Control Committee at the Medical Center require all new students to provide, within thirty days of matriculation, evidence of immunity to certain vaccine-preventable illnesses. Upon acceptance, students receive the Student Health Immunization Form and Report of Medical History which should be completed and returned to the Director of Student Health Services, Box 2899 DUMC, Duke University, Durham, North Carolina 27710.

Summary

Three years of college work, a sixty-five dollar (\$65) nonrefundable application fee, a signed agreement within three weeks of notification of acceptance, and the Medical College Admission Test are required. The estimated, first year class size for 1999-2000 is 100.

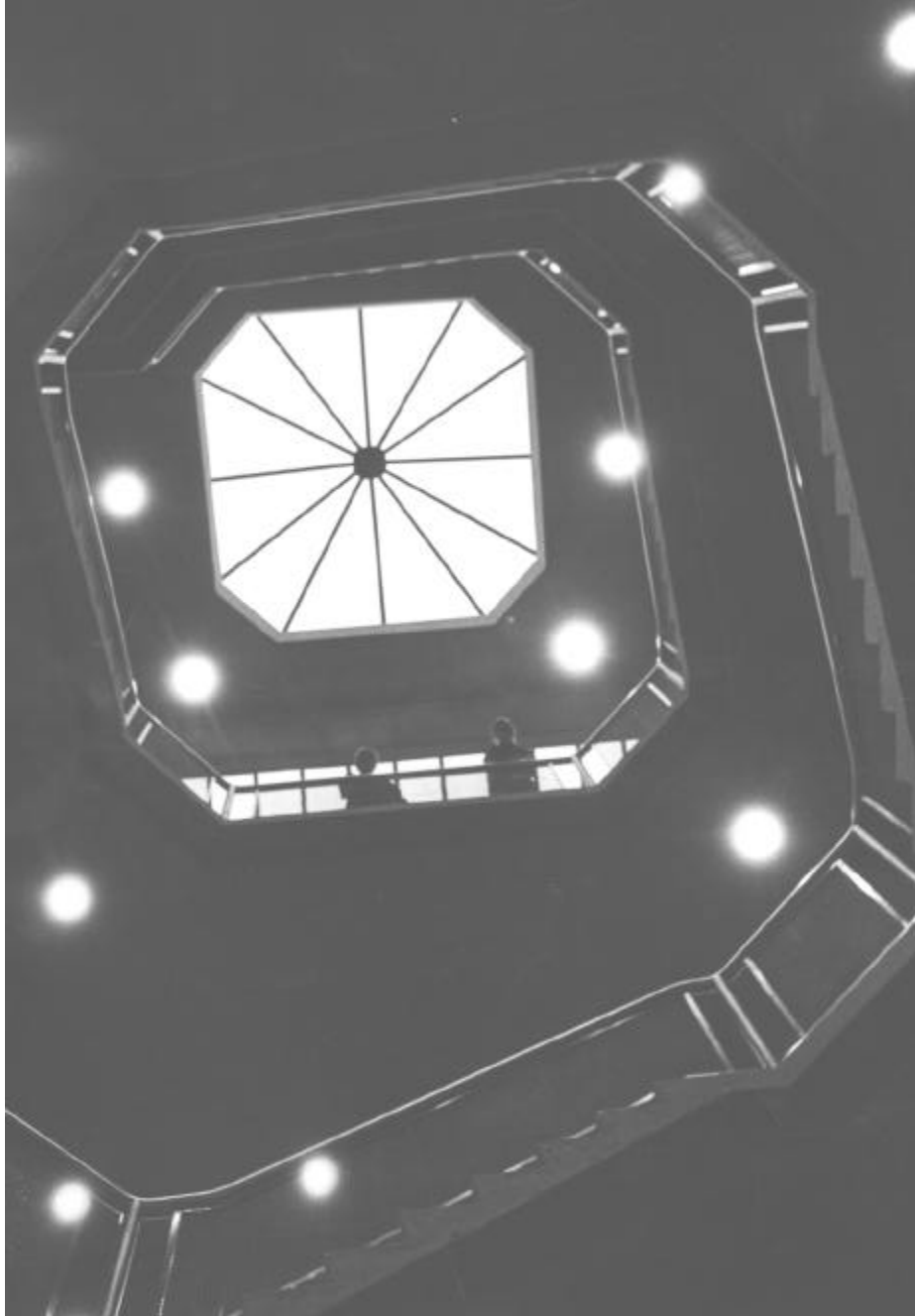


Roster of Regional Representatives of Admissions Committee

Alabama:	<i>Birmingham</i> , Margaret M. Tarpey
Arizona:	<i>Phoenix</i> , Beth Ann Banks; <i>Scottsdale</i> , Andrew S. Jacob
Arkansas:	<i>Little Rock</i> , Karl Staub
California:	<i>Carlsbad</i> , Mark Landon; <i>Carmichael</i> , John R. Dein; <i>Hillsborough</i> , Jerome M. Javer; <i>Irvine</i> , A. Brian Davis; <i>La Jolla</i> , Herman F. Froeb; <i>Los Angeles</i> , Kenneth P. Ramming, Douglas F. Smiley; <i>Orange</i> , Timothy R. S. Harward; <i>Redwood City</i> , John B. Simpson; <i>Sacramento</i> , Sidney M. Gospe, Jr.; <i>San Diego</i> , Stuart B. Kincaid, Karen Van Hoesen; <i>San Francisco</i> , Robert Kahn, R. Gray Patton, Henry Safrit; <i>Santa Fe</i> , Richard A. Schatz; <i>Walnut Creek</i> , David S. Forth
Colorado:	<i>Denver</i> , Frederick L. Grover, Michael J. Jobin, Alan Klein, York E. Miller; <i>Englewood</i> , Bertram Goldberg; <i>Littleton</i> , David S. Shimm
Connecticut:	<i>Glastonbury</i> , Catherine C. Wiley, James F. Wiley, II; <i>New Haven</i> , G. P. Beardsley, Stephen J. Huot; <i>Old Saybrook</i> , Richard L. Reece; <i>Woodbridge</i> , David J. Goodkind
District of Columbia:	Jonca C. Bull, Linda D. Green, Kurt D. Newman
Florida:	<i>Gainesville</i> , Jerry Berger; <i>Hollywood</i> , Norman Moskowitz; <i>Miami</i> , Leonard A. Kalman; <i>Miami Beach</i> , Stephen W. Unger; <i>Naples</i> , James Halika; <i>Tampa</i> , Americo A. Gonzalvo, Douglas Reintgen
Georgia:	<i>Atlanta</i> , Crawford F. Barnett, Jr.
Hawaii:	<i>Honolulu</i> , Garrett F. Saikley; <i>Kealahou</i> , Thomas E. Austin; <i>Wahiawa</i> , Ned Stoughton
Idaho:	<i>Barrington</i> , George Pepper
Iowa:	<i>Iowa City</i> , Febe I. Wallace
Kansas:	<i>Hopkinsville</i> , Robert B. Bressler; <i>Lexington</i> , Julia L. Stevens
Louisiana:	<i>Baton Rouge</i> , Karen H. Miller; <i>New Orleans</i> , Nancy Haslett
Maryland:	<i>Annapolis</i> , Robin E. Rutherford; <i>Chevy Chase</i> , James R. Gavin, III; <i>Olney</i> , Joseph Buffington
Massachusetts:	<i>Arlington</i> , K. Lea Sewell; <i>Belmont</i> , Lars Erickson; <i>Boston</i> , Christian T. Campos, Ann W. Crosson, Matthew W. Gillman, Paula Kadison, Richard Kopelman, Brit Nicholson; <i>Brockton</i> , Desiree A. Carlson; <i>Hyannis</i> , Linda A. Bishop; <i>Jamaica Plains</i> , Jayne Trachman; <i>Natick</i> , Gregg C. Checani; <i>Newton</i> , Bernard Levy, Stephen A. Sohn; <i>Wellesley</i> , George King; <i>Worcester</i> , Katherine S. Upchurch
Michigan:	<i>Detroit</i> , John J. Fath; <i>Flint</i> , Melissa Hamp; <i>Grosse Pointe</i> , John M. Lesesne
Minnesota:	<i>Minneapolis</i> , James A. Halikas
Missouri:	<i>Fair Grove</i> , C. Norman Shealy; <i>Kansas City</i> , David L. Smith, Gerald Wood; <i>St. Louis</i> , Scott J. Anderson, W. Edwin Dodson

Montana: *Dillon*, Scott McKee
 Nebraska: *Omaha*, Linda K. Matson
 Nevada: *Las Vegas*, Thomas L. Lambert; *Reno*, Thomas
 Fyda
 New Hampshire: *Concord*, Joseph R. Snow; *Portsmouth*, Eric D.
 Lister
 New Jersey: *Hackensack*, Steven P. Honickman; *Moorestown*,
 Michael S. Entmacher; *Morristown*, Neal D.
 Shore; *Pompton Plains*, Charles W. Ross; *Prince-*
ton, Timothy Patrick-Miller; *Summit*, Wayne S.
 Barber; *Watchung*, R. Christopher Stucky
 New York: *New York*, Bruce Horten, Lenard E. Jacobson,
 Cynthia L. Krause, Nathan Saint-Amand; *Port-*
land, J. Paul Lunas; *Rhinebeck*, Catherine Toye
 Ohio: *Akron*, Robert W. Novak; *Cincinnati*, Donald
 Rucknagel; *Cleveland*, Stephen E. Alpert; *Colum-*
bus, Miles E. Drake, Jr.; *Elyria*, William L. Has-
 sler
 Oklahoma: *Tulsa*, James A. Young
 Oregon: *Portland*, Marcia Freed
 Pennsylvania: *Johnstown*, W. Frederick Mayer; *Philadelphia*,
 Christopher V. Chambers, John J. Furth, David
 M. Goodner, James R. Harp, Richard I. Katz,
 Sheila M. Katz, Graham E. Quinn, Mona M.
 Shangold; *Pittsburgh*, Richard L. Green, Martin
 A. Morse, Michelle Roberts; *Rydal*, Anthony J.
 Limerakis; *State College*, Richard H. Dixon,
 Donald F. Mandetta; *Wallingford*, Cathy Wiley,
 Jim Wiley
 Rhode Island: *Lincoln*, Henry G. Magendantz; *Providence*, Ben-
 jamin T. Jackson
 South Carolina: *Greenville*, Will Flanagan
 South Dakota: *Sioux Falls*, Samir Abu-Ghazaleh
 Tennessee: *Chattanooga*, Roger G. Vieth; *Memphis*, Peter D.
 Jones; *Nashville*, Alexander C. McLeod
 Texas: *Dallas*, Paul Pin, William Shapiro; *Galveston*, J.
 Andrew Grant, Jr.; *Houston*, Madeline Duvic,
 Kenneth Gould, Jr., Barry N. Hyman, Eugenia
 Kleinerman, Leonard A. Zwelling; *Plano*, Alan
 D. Davis
 Utah: *Provo*, Clark T. Bishop
 Vermont: *Norwich*, John Modlin
 Virginia: *Alexandria*, Andrea M. Jackson; *Falls Church*,
 Thom A. Mayer
 Washington: *Auburn*, Joseph Gehrett; *Renton*, Wallace H. J.
 Chang; *Seattle*, Gregory J. Raugi; *Woodinville*,
 Alice M. Ormsby
 West Virginia: *Morgantown*, Lisa Gangarose
 Wyoming: *Laramie*, Elizabeth Schreiner

Financial Information



Fees and Expenses

Tuition Policy Statement. The Duke University School of Medicine's mission in medical education is to build upon our internationally-recognized tradition of excellence in training outstanding practitioners and physician-scientists who will be leaders in all fields of medicine. By selecting outstanding and dedicated students for matriculation, the school is committed to preparing physicians to respond to societal health needs. The School of Medicine has a policy of need-blind admission and adequate financial aid for those students with financial need. Tuition is set at a level which is competitive with schools of comparable quality and selectivity for admission. This tuition policy, plus a financial aid program which protects against excessive student indebtedness, permits the school of medicine to attract the most qualified students nationally and regionally, regardless of the student applicant's personal or family financial status. It is important that tuition and financial aid are balanced to ensure that debt does not skew career choices of medical students once they graduate from the Medical School.

Tuition. The following table represents an estimate of a student's necessary expenses in the School of Medicine. The total of these figures suggests a basic minimum budget of approximately \$35,890 for a fourth year student to \$44,960 for a first year student. These are estimated figures only. Tuition and fees are subject to change without notice. Allowances for recreation, travel, clothing, and other miscellaneous items must be added to this estimate with allowances for individual needs and tastes.

1998-1999 Cost of Education

Tuition Year 1, 2, and 3	26,700
Tuition Year 4	25,450
Accident and Sickness Insurance ⁺ (subject to change)	685
Laptop computer rental fee	1,620
First Year Fee ⁺ (includes microscope rental, first year only)*	275
Annual Cost of Books and Supplies: first year	1,610
Annual Cost of Books and Supplies: second year	1,434
Annual Cost of Books and Supplies: third and fourth years	679
Lodging: first year	4,800
Lodging: second year	5,200
Lodging: third and fourth years	3,200
Board: first year	3,810
Board: second year	4,130
Board: third and fourth years	2,540
Student Health Service ⁺ \$215 per semester	430
Student Government ⁺ (Davison Society)	50
Continuation of Enrollment Fee [‡] (per semester)	3,535
Graduate Student Fee ⁺	19
Motor Vehicle Registration: car	120
Motor Vehicle Registration: motorcycle	31

*Sphygmomanometer, ophthalmoscope, otoscope, and other equipment required of each student must conform to rigid standards.

⁺Mandatory fees.

[‡]The School of Medicine encourages students to interrupt their studies to pursue approved research that is complementary to the medical curriculum at Duke or elsewhere for no credit. To retain full-time student status for loan deferment purposes, students may seek approval to enroll in the Continuation of Enrollment option. Only students eligible to be enrolled at Duke during the applicable time period may participate.

Tuition and fees are payable on a semester basis, and students are required to pay full tuition for four years as a requirement for graduation. For the freshman year, one-half of the annual tuition and fees is billed in July and the other one-half in December. Students who must repeat 60 percent or more of the required first year courses pay full tuition while prorated tuition is paid by those repeating less than 60 percent of those courses. Second year students are billed a per credit rate for a total of 54 credits. Juniors and seniors are billed for a total of sixty-four credits during the elective years. Distribution of tuition charges depends upon the number of credits for which a student is registered each term. Annual cost per credit is obtained by dividing the tuition by thirty-two, half the number of elective credits required for graduation. No tuition is charged for elective credit taken in excess of the sixty-four required to obtain the M.D. degree provided the credit is taken within the same semester in which the student completes graduation requirements. Please note, however, that the student is no longer eligible to receive financial aid funding after he or she has completed the sixty-four elective credits.

Payment of Accounts for Fall and Spring. Monthly invoices for tuition, fees, and other charges are sent by the bursar's office and are payable upon receipt but no later than the late payment date. As a part of the agreement of admission to Duke University, a student is required to pay all invoices as presented. If full payment is not received by the late payment date, a late payment charge as described below is assessed on the next invoice and certain restrictions as stated below are applied. Failure to receive an invoice does not warrant exemption from the payment of tuition and fees nor from the penalties and restrictions. Nonregistered students are required to make payment at the time of registration for tuition and fees and any past due balance on the account.

Monthly Payment Option. The Monthly Payment Option Plan allows students and their parents to pay all or part of the academic year's expenses in ten equal monthly payments from July 1 to April 1. The only cost is an annual, nonrefundable fee of \$90.00. The participation fee can be paid by Visa or MasterCard. Payments may be made by check or by bank draft. Questions regarding this plan should be directed to Tuition Management Services, 1-800-722-4867 or 401-849-1550. At renewal, the plan can be extended to twelve months. The monthly payments can be increased or decreased without additional cost.

Late Payment Charge. If the "Total Amount Due" on an invoice is not received by the late payment date, the next invoice shows a penalty charge of 1 1/4 percent per month assessed on the past due balance regardless of the number of days past due. The "Past Due Balance" is defined as the previous balance less any payments and credits received on or before the late payment date and also any student loan memo credits related to the previous balance which appear on the invoice. The amount of the 1 1/4 percent penalty charge is the same regardless of the number of days payment is received after the late payment date.

Restrictions. An individual is in default if the total amount due is not paid in full by the due date. A student in default is not allowed to register for classes, receive a transcript of academic records, have academic credits certified, be granted a leave of absence, or receive a diploma at graduation. In addition, an individual in default may be subject to withdrawal from school and have the account referred to a collection agency or credit bureau.

No credit is given for any term in which the tuition has not been paid, whether the work has been at Duke or elsewhere. It is not advisable for students to attempt outside work to defray their expenses during the academic year. Spouses of medical students desiring employment may secure information from the Duke University Human Resources Office.

Fall and Spring Refunds. Tuition and fees refunds are governed by the following policy:

1. In the event of death a full tuition and fees refund are granted.
2. In all other cases of withdrawal or leave of absence, students or their parents

may elect to have tuition refunded or carried forward as a credit for later study according to the following schedule:

- a. withdrawal before the beginning of classes—full refund;
 - b. withdrawal during the first or second week—80 percent;
 - c. withdrawal during the third through fifth week—60 percent;
 - d. withdrawal during the sixth week—20 percent;
 - e. withdrawal after the sixth week—no refund;
 - f. tuition charges paid from grants or loans are restored to those funds on the same pro rata basis and are not refunded or carried forward.
3. In the case of changing enrollment category from full-time to part-time, dropping special fee courses (music, art, golf, etc.), or dropping audit courses, a full refund is granted during the drop/add period. Subsequent to the drop/add period, changes of category are not allowed. Students may, however, withdraw from courses after the drop/add period with no refund or add new courses if the proper tuition is paid.

Because Duke University participates in Title IV federal aid programs, it follows federal guidelines with respect to the refund and repayment of these funds. All first time students who have their charges and financial aid adjusted according to the federal regulations. Additional information regarding this procedure may be obtained from the Office of Financial Aid.

Continuation of Enrollment Option Fee. The School of Medicine encourages students to interrupt their studies to pursue approved research that is complementary to the medical curriculum either at Duke or elsewhere for no credit. Full-time student status can be retained for a maximum period of two years during these periods of study if approval is obtained from the appropriate officials and the student registers for and pays an enrollment fee of \$35 for each semester or part of a semester away. No refund of any portion of the fee is allowed for students who subsequently withdraw from the School of Medicine.

Although considered to be full-time by the Duke School of Medicine, financial aid recipients should be aware that such status may not be recognized by all lenders for loan deferment purposes.

Only students eligible to be enrolled at Duke during the applicable time period may participate in this option.

Transcripts. Requests for transcripts of academic records should be directed to the Office of the Medical Center Registrar, Box 3878 DUMC. A fee of three dollars, payable in advance, is charged for each copy. However, the transcript fee is waived for financially needy students who require transcripts to apply for external funding. After graduation from the School of Medicine, transcripts of deans letters may also be obtained from the Office of the Registrar for the fee of one dollar per copy.

Living Accommodations

Housing Costs. For the 1999-2000 academic year, rental rates for the first-year medical student are projected to be \$4,972 for the Town House apartments. Utility charges, except telephone, are included in these rates. Rates are per person per academic year.

Rental rates in Central Campus Apartments for the 1999-2000 academic year are projected to range from \$4,224 to \$6,516 for first-year medical students. Utility charges, except telephone, are included in the Central Campus Apartment rates. Rates are per person per academic year.

Food and Other Expenses. Duke Dining Services and Duke University Store operations are located on campus to service the needs of the Duke community. For the convenience of students, the university identification card, called The DukeCard, can be used to access prepaid accounts and make purchases in these facilities.

There are two kinds of accounts: the dining account, which can be used for food purchases only, and the flexible spending account, which can be used to purchase not only food, but any items sold by Duke stores, such as books, supplies, laundry services, health and beauty aids, and more. These campus retail operations also accept cash.

For more information about establishing an account, contact The DukeCard Office, 024 Union West, Box 90911, Durham, North Carolina 27708-0911, 919/684-5800.

Motor Vehicle Registration

Each motor vehicle operated on Duke University campuses by students enrolled in the School of Medicine must be registered at the Medical Center Traffic Office, PRT Level, Parking Deck II, within five days after operation on the campus begins, and thereafter must display the proper registration decal.

All students must pay an annual fee of \$120 for each four-wheeled motor vehicle and \$31 for each motorbike or motor scooter registered. Bicycles are registered free of charge at the Public Safety Department, 2010 Campus Drive.

To register a vehicle, the student must present a valid state registration for each vehicle registered and a valid state operator's license.

Parking, traffic, and safety regulations are given each student at the time of registration of the vehicle(s). Students are expected to abide by these regulations.

Merit Awards for Medical Students

The School of Medicine offers awards to students from the following scholarships based solely on academic excellence to support the Senior Scholarship and Dean's Tuition Scholarship Programs:

William G. Anlyan, M.D. Scholarship, established 1988, by gifts from faculty, staff and friends.

Barham Endowed Merit Fund, established November, 1984, by gift from Mr. and Mrs. Joseph Barham, Oak Ridge, Louisiana.

Family Dollar Scholarship, established November, 1984, by gift from Mr. Leon Levine, Chairman of the Board, Family Dollar Stores, Inc., Charlotte, North Carolina; for minority students.

Dr. William Redin Kirk Memorial Trust for North Carolinians, established March, 1984, by bequest of Mr. Frederick H. Pierce, Owensboro, Kentucky.

Mary W. and Foster G. McGaw Scholarship, established February, 1986, by bequest from Foster G. McGaw.

Dr. Kenneth L. Pickrell Scholarship, established February, 1984, by gift from the Department of Surgery, Duke University Medical Center, for an entering student.

School of Medicine Merit Fund, established 1984, by gifts from medical alumni, students, and American Medical Association-Education and Research Foundation.

Senior Scholarships from the above funds (except Pickrell) are offered to third year students for use during their fourth year of study. Selection by a special committee is based on outstanding academic achievement and extracurricular activities during the first two and one-half years of medical school. These scholarships, to be paid toward tuition, are in the range of \$5,000 each for ten awards, and are not in addition to any other tuition award.

Financial need is not a criteria for selection; however, applicants who feel their financial need is greater than the merit award may apply for financial aid.

The Dean's Tuition Scholarships. Seven Dean's Tuition Scholarships in the amount of current tuition are given to academically excellent freshmen minority students each year. Preference is given to residents of North Carolina. Selection is made by the dean based on recommendations from the Medical School Admissions Office. Annual renewal is contingent upon satisfactory academic progress.

Medical Student Research Scholarships

Several groups now sponsor medical student research scholarships. In most of the scholarship programs, students selected for scholarships are eligible to receive thirty-two basic science credits for the experience.

Some have delegated the responsibility to the Medical School to select participants in the program, others have their own independent selection processes. A full twelve months is required for the research experience. Selection for the following awards is made by the Student Research Scholarship Committee.

Sarnoff Society Endowment For Cardiovascular Science

Stanley Sarnoff was Director of the Cardiac Physiology Laboratory at the NIH for many years before establishing the Survival Technology Corporation. The Society he founded in 1978 now includes 130 fellows from 30 medical schools. Ten new Sarnoff Cardiovascular Fellows are selected each year to work at any laboratory involved in cardiovascularly oriented research of their choice within the United States but outside their own medical school. There is a Sarnoff Society reception at each year's American Heart Association Meetings and funding for travel is provided. The Society meets each year for two days of scientific presentations and social events on the eve of the Spring Scientific Meetings in Washington, DC.

Eugene A. Stead Student Research Scholarships

This program has included sixty-one Duke students during its first fourteen years. Three of the scholarships have been endowed by grateful patients of Drs. James Clapp and Andrew Wallace, and one other is supported by the general Stead Scholarship fund. There is an annual Stead Breakfast Meeting during which Stead Scholars discuss their program with first year medical students. The McDaniel-Stead scholarship is intended for trainees in cardiovascular research. *All Stead Scholar preceptors must have a primary appointment in medicine or in a basic science department.* (contact Dr. Rosse at 919-684-3724 or by e-mail rosse001@mc.duke.edu)

Four School Physician Scientist Program

The Four Schools Physician Scientist Program includes one to two students from each of the following schools: Duke University, University of Pennsylvania, Washington University (St. Louis), Johns Hopkins University. The students selected travel together to visit laboratories at each of the four institutions. Following medical school graduation, the student is assured clinical internal medicine house staff training and guidance in securing a position for research training at one of the four institutions. This program is designed for individuals with a strong interest in academic career development in internal medicine.

All students applying to these programs prepare their applications and receive interviews during the second year of medical school. Announcements of the scholarship recipients are made in April.

In addition, there are other foundations which support student research scholarship programs and are approved for Duke University School of Medicine credit but have their own methods for evaluation and selection. Because of the unique nature of the Duke University School of Medicine curriculum, we have been highly successful in having students in the various programs. The Howard Hughes/National Institutes of Health Research Scholars Program requires that the student works in a particular institution away from their parent medical school. The Hughes/NIH program selects thirty students each year to live on the NIH campus and work in one of their basic science laboratories. We have also been very successful in having our students in scholarship programs supported by the Few Foundation, Arthritis Foundation, the Pharmaceutical Manufacturers Foundation, and the Fight for Sight Foundation.

Financial Aid

The Duke University School of Medicine makes financial assistance available to accepted students who due to economic circumstances could not otherwise attend the university. The school recognizes, however, the responsibility of the individual and the family to provide funds to achieve the objective of a medical education. Thus, the school does not consider parents to have discharged the full financial obligation for the continuing education of their sons or daughters upon the latter's completion of the undergraduate degree.

Financial assistance is available in a combined form of grants and loans, and all awards are made on the basis of demonstrated need to eligible U. S. citizens.

Duke University School of Medicine reserves the right to decline to approve loan applications for those applicants who do not have a satisfactory credit history. U.S. citizenship or permanent residence visa is required of all students receiving loans through the school.

It is the responsibility of recipients of financial aid to keep the Medical Center Office of Financial Aid informed of any outside financial assistance they may receive. It must be understood that the school reserves the right to reconsider its offer of financial assistance in the event of a major outside award to a recipient. No financial aid funds may be used during a period when the recipient is not involved with work toward the degree. Less than half-time or special students are not eligible for financial aid.

Financial Assistance to Incoming First-Year Students. The students should start the financial aid application process as soon as possible after January 1st. Students are given information about this process at the time of their interview and all students, regardless of their interest in financial aid, are sent information at the time of their acceptance. The economic circumstance of the applicant has no bearing on whether the applicant is accepted into the medical school.

The applicant requesting financial aid is expected to work during the summer preceding entrance into medical school and to save part of those earnings to defray a portion of the first-year expenses.

The applicant's need is determined before an award is made. The Office of Financial Aid, therefore, requires the *Need Access* and the Free Application for Federal Student Aid (FAFSA). Copies of federal income tax returns with supplemental schedules are required as part of the financial aid application.

An official aid award notice is sent to the accepted applicant within a few days after receipt of the required forms. Awards are conditional until all required documents are received.

Financial Assistance to Upperclassmen. Annual reapplication is required of all need based aid recipients. Upperclassmen seeking financial assistance for the first time may consult with the director of financial aid.

Duke University Medical Center Endowed Funds.

Barney Baker and Minnie P. Baker Endowed Scholarship Fund, established March, 1992, by bequest of their son Barry Baker.

Charles W. Banner Loan Fund, established in 1953, by a gift from Mrs. Edward B. Benjamin.

Germain Bernard Scholarship, established in 1959, by the B. C. Remedy Company.

Thomas C. Bost Scholarship, established in 1965, by a gift from Dr. Thomas C. Bost, supplemented by subsequent gifts.

Franklin and Louise Brown Medical Scholarship, established March, 1992, by bequest of Franklin and Louise Brown.

Elizabeth Burgess Bressler Memorial Scholarship Fund, established in 1983, by her children: Garrett S. Bressler, M.D.; Robert B. Bressler, M.D.; Barbara B. Marques; Peter B. Bressler, M.D.

Ortrude S. Busse Medical Scholarship Endowment, established in 1993, by gift from her husband, Ewald W. Busse, M.D.

James L. Clark Memorial Scholarship, established in 1965, by a gift from Mr. and Mrs. Marvin D. Clark and supplemented by gifts from other donors.

C. T. Council Scholarship, established in 1959, by the B. C. Remedy Company.

Helen M. Curtis Endowed Scholarship Fund, established June, 1992, from the estate of Helen M. Curtis.

John H. Dorminy Scholarship, established in 1980, by gift from John H. Dorminy, Jr.

Isobel Craven Drill Endowment for Medical School Scholarships, established 1993, by Isobel Craven Drill.

Herbert T. Dukes, M.D. Memorial Loan Fund, established in 1983, by his classmates and friends.

Eagles-Andrews Memorial Scholarship, established in 1982, by a gift from Dr. and Mrs. William M. Eagles.

William F. Franck Memorial Scholarship, established in 1958, by gift from William F. Franck, Jr. '39, and supplemented by additional gifts.

Henry Garris Scholarship Fund, established 1995, from the estate of his widow Jean S. Garris.

Constance I. Gottwald Medical Scholarship, established 1987, with preference for minority students by gift from Constance I. Gottwald.

Hazel Endowment Fund, established 1984, by gift from Mr. and Mrs. William A. Hazel.

Warren W. Hobbie Fund, established in 1980, by trustees of the Warren W. Hobbie Charitable Trust.

Earl P. Holt, Jr. Memorial Scholarship, established 1986, by gift from family and friends for first or second year medical students with preference given to minority students.

George Lee Hundley and Rebecca Barnhill Hundley Fund, established in 1980, by gift from George Lee and Rebecca Barnhill Hundley.

H. B. and Adelaide F. Ingle Medical Scholarship, established in 1976, by gift from Mr. and Mrs. Harry B. Ingle.

B. Everett Jordan Scholarship, established in 1974, by the late Senator B. Everett Jordan and his widow, Katherine Jordan.

Thomas D. Kinney, M.D. Memorial Scholarship, established in 1980, by gifts from his widow, Dr. Eleanor R. Kinney, and their children: Thomas R. Kinney, M.D.; Eleanor D. Kinney, J.D.; Hannah C. Kinney, M.D.; and Janet S. Kinney, M.D.

Dr. John Haden Lane Memorial Scholarship, established in 1968, by gift from Edward H. Lane Foundation.

E. C. Langston Medical Scholarship, established in 1979, by bequest of Mrs. Denzil L. Mosteller.

Paul E. Leviton Medical Scholarship, established in 1981, from the estate of Paul E. Leviton.

James Cecil McGehee Memorial Medical Scholarship, established in 1975, by gift from C. G. McGehee, Jr.

Medical Alumni/Alumni Fund Scholarship Fund Quasi Endowment, established 1995.

Medical Alumni Scholarship, established in 1974, by Duke Medical Alumni.

Medical School Annual/Alumni Gifts Scholarship, established 1994.

Medical School Faculty Wives Scholarship, established in 1968, by a gift from the Medical School faculty wives whose source of funds is proceeds from the Nearly New Shoppe.

John F. Ott Endowment Fund, established in 1984, by bequest of John F. Ott, M.D., 1943.

Henry A. Page Scholarship Fund, established 1942, by gift from Henry A. Page, Jr., and Gertrude Wetherill Page.

Physical Medicine Scholarship, established in 1963, by gift from Central Carolina Con-

valescent Hospital, Inc., Greensboro, North Carolina.

Queen Effat Muhammed Al Thenayan Medical Scholarship Endowment, established 1993, by gift from Her Royal Highness Queen Effat Muhammed Al Thenayan.

Radiological Science Medical Student Loan Fund, established in 1980, by the Department of Radiology.

Senior Class Gift, established by graduates of classes of 1977 and 1978.

Melvin D. and Judith N. Small Medical School Scholarship Fund, established in 1976, by gift from Dr. Melvin D. and Mrs. Judith N. Small.

Sigmund Sternberger Endowment Fund, established in 1978, by gift from the Sigmund Sternberger Foundation, Inc., Greensboro, North Carolina.

William E. Stevens, Jr. Scholarship, established in 1983, by the Broyhill Foundation, Lenoir, North Carolina.

B. W. Stiles Scholarship, established in 1981, by gift from the Mary Duke Biddle Foundation.

Francis and Elizabeth Swett Scholarship, established in 1966, by gift from the late Dr. and Mrs. Swett.

A.J. Tannenbaum, M.D. Medical Scholarship Endowment Fund, established November, 1995, by the Trustees of the Sigmund Sternberger Foundation, Inc., Greensboro, North Carolina.

Larry and Violet H. Turner Scholarship, established 1977, by gift from Drs. Larry and Violet H. Turner.

Dr. Hillory M. Wilder Memorial Scholarship, established in 1962, by bequest from Celeste Wilder Blake and Kenneth M. Blake.

Roland R. and Ray R. Wilkins Medical Scholarship Quasi Endowment, established December 1995, from reserves of the Estate Planning Council.

Sue Eggleston Woodward Memorial Scholarship, established in 1966, by gifts from parents, relatives, and friends.

Vivian Zirkle Memorial Scholarship, established in 1981, by gift from Drs. Lewis and Sara Zirkle.

Other Medical School Scholarships. Mary Duke Biddle Foundation Scholarships, Duke University School of Medicine Scholarships, State of North Carolina (tuition remission up to \$2,000), and the Lettie Pate Whitehead Foundation.

Federal Scholarships. Armed Forces (Army, Navy, and Air Force) Scholarship programs may be available for accepted or enrolled students. The recipient receives full tuition, fees, and a monthly stipend in return for a commitment of service as a physician for each year of funding. The special application is made directly to the program in which the student is interested.

Scholarships for Students of Exceptional Financial Need (E.F.N.). This federally funded program provides grant assistance to schools for students who qualify on the basis of federal criteria. Recipients, who are selected by the school, must be those who meet federal criteria for the grants. The selected student receives tuition and all other reasonable educational expenses (minus living expenses). Recipients must enter and complete a residency training program in a primary health care specialty not later than four years after completing the undergraduate medical education program and must practice in the primary health care specialty for five years after completing the residency program. Students who fail to maintain an acceptable level of academic standing and graduates who fail to comply with the primary care requirements are liable to the federal government for the amount of the E.F.N. award and for interest on such amount at the maximum legal prevailing rate not later than three years after the date on which the individual breaches the agreement.

Financial Aid for Disadvantaged Health Professions Students (F.A.D.H.P.S.). Recipients of this federally funded grant program are selected by the school on the basis of federal criteria. The selected student must be from a disadvantaged environment or

from a low income family as described by federal regulations. Recipients of F.A.D.H.P.S. scholarships must agree to meet the same primary health care service requirements as required of E.F.N. scholarship recipients described above.

Scholarships for Disadvantaged Students (S.D.S.) and Loans for Disadvantaged Students (L.D.S.). Duke University School of Medicine does not participate in these two programs.

Primary Care Loan (P.C.L.) was formerly known as *U. S. Health Professions Student Loan (H.P.S.L.)*. Recipients must agree to enter and complete a residency training program in primary health care not later than four years after the date on which the student graduates from the school, and must practice in such care through the date on which the loan is repaid in full. Students who received their first H.P.S.L. funds before July 1, 1993, are exempt from this requirement.

If the borrower fails to complete a primary health care residency and to practice in a primary health care field, the loan balance is recomputed from the date of issuance at an interest rate of 12 percent per year, compounded annually, instead of five percent.

North Carolina Board of Governors Medical Scholarships. Board of Governors Medical Scholarships (B.G.M.S.) are awarded annually to twenty first-year medical school candidates who have been accepted for admission at one of the four medical schools in North Carolina. B.G.M.S. recipients are selected from among candidates who are financially disadvantaged state residents and who have expressed an interest in practicing medicine in the State of North Carolina. The awards provide a yearly stipend of \$5,000 plus tuition and all mandatory fees except the Sickness and Hospitalization Insurance, which is covered if sufficient funds are available. The B.G.M.S. may be renewed for three years if the recipient continues to demonstrate financial need and maintains satisfactory academic progress.

Loans

University loans are available under the specific restrictions of the loan funds and are awarded on the basis of financial need. Some of them are: W. K. Kellogg Foundation Loan Fund, Seaborn L. Hardman Loan Fund, Medical Freshman Tuition Loan, Scott Loan Fund, Charles W. Banner Loan Fund, Carl Perkins Student Loans, Radiological Science Medical Student Loan Fund, U. S. Health Professions Student Loans, and Primary Care Loans.

The Francis and Elizabeth Swett Loan Fund is an emergency loan available in small amounts to any medical student on a no-interest basis for a short period of time.

Loans from Outside the University

North Carolina Student Loan Program for Health, Science, and Mathematics. These loans provide financial assistance to North Carolina residents who demonstrate need as determined by the North Carolina State Education Assistance Authority. Loans are available for study in the medical fields, mathematics, and science programs that lead to a degree. The applicant must be a domiciliary of North Carolina and accepted as a full-time student in an accredited associate, baccalaureate, master's, or doctoral program leading to a degree. Loan recipients in some professional or allied health programs may cancel their loans through approved service in shortage areas, public institutions, or private practice. Medical students may receive up to \$8,500 per year for each of the four years; master's degree students are eligible for two loans of up to \$6,500 each; bachelor's degree students are eligible for three loans of up to \$5,000 each. For application forms and more information write: Executive Secretary, North Carolina Student Loan Program for Health, Science, and Mathematics, P. O. Box 20549, Raleigh, North Carolina 27619-0549, or telephone 919/571-4178.



Federal Stafford Student Loans. The Federal Stafford Student Loan is available to eligible students. For purposes of Federal Stafford Loans and other Title IV funds, graduate and professional students are financially independent of parents. The annual maximums for medical students are \$8,500 subsidized and \$30,000 unsubsidized. For current medical students, the total maximum unsubsidized loan is \$38,500. The aggregate maximums are \$65,500 subsidized and \$138,500 unsubsidized (minus the subsidized amount). The interest is paid by the federal government on the subsidized Federal Stafford Loan until repayment begins six months after graduation. On the unsubsidized Federal Stafford Loan, the borrower is responsible for the interest which may be paid or deferred during the enrollment period. Eligibility for the subsidized and unsubsidized Federal Stafford Loan is determined by the Financial Aid Office based on the Student Aid Report as a result of filing the F.A.F.S.A.

There is a two year deferment of repayment for residency training for those who first borrowed prior to July 1, 1993. First-time borrowers *after* July 1, 1993, are not eligible for the two-year deferment of repayment for residency training.

Effective July 1, 1994, the loan origination fee is 3 percent, paid by the borrower on the amount of the loan; the fee is deducted from loan disbursements. Also effective at the same time is a 1 percent insurance fee deducted from the loan disbursements.

When repayment begins, the interest for those who first borrowed prior to October 1, 1992 is 8 percent during the first four years and 10 percent beginning with year five of the repayment period. For first time borrowers after October 1, 1992, the interest rate is annual variable based on a 91-day Treasury Bill plus 3.10 percent capped at 9 percent. Those who first borrow after July 1, 1994 have an interest cap of 8.25 percent.

Additional information may be obtained by writing to Office of Financial Aid, Box 3067 DUMC, Durham, North Carolina 27710.

Courses of Instruction



Anesthesiology

Professor Joseph G. Reves, M.D. (Med. Univ. South Carolina, 1969); M.S. (Alabama-Birmingham, 1973), Chairman.

Professors: Peter B. Bennett, Ph.D., D.Sc. (Southampton, 1984); Frank H. Kern, M.D. (Pennsylvania, 1987); Richard E. Moon, M.D., C.M. (McGill, 1973), M.Sc. (Toronto, 1979); William J. Murray, M.D. (North Carolina, 1962), Ph.D. (Wisconsin, 1955); Debra A. Schwinn, M.D. (Stanford, 1983); Bruno J. Urban, M.D. (Albertus Magnus, Germany, 1960); David S. Warner, M.D. (Wisconsin, 1980).

Clinical Professor: Norbertus P. de Bruijn, M.D. (Groningen, 1976).

Professor of the Practice of Experimental Anesthesiology: David W. Amory, M.D., (British Columbia 1967), Ph.D., (Washington, 1961).

Associate Professors: Cecil O. Borel, M.D. (Hahnemann, 1977); Brian Ginsberg, M.B., B.Ch. (Witwatersrand, 1975); Peter S. Glass, M.B., B.Ch. (Witwatersrand, 1976); Peter C. Huttemeier, M.D., Ph.D. (Copenhagen, 1977, 1989); David A. Lubarsky, M.D. (Washington Univ., 1984); Jonathan B. Mark, M.D. (Stanford, 1978); Joseph P. Mathew, M.D. (Southwestern, 1986); Jon N. Meliones, M.D. (Tufts, 1984); Mark F. Newman, M.D. (Louisville, 1985); Donald H. Penning, M.D. (Queens Univ., Canada, 1983); Robert L. Reed, M.D. (Virginia, 1976); Scott R. Schulman, M.D. (George Washington, 1982); Sidney A. Simon, Ph.D. (Northwestern, 1973); John Sum-Ping, M.B. Ch.B., F.R.C.A. (Manchester, England, 1978).

Associate Clinical Professors: Fiona Clements, M.D. (Duke, 1975); Mohammad Maroof, M.B., B.S., D.A. (London, 1964); Kerri M. Robertson, M.D., F.R.C.P.(c) (British Columbia, 1980); Dianne L. Scott, M.D. (North Carolina, 1978).

Assistant Professors: Elizabeth A. Bell, M.D. (North Carolina, 1990); Helen D. Benveniste, M.D., Ph.D. (Copenhagen, 1986, 1991); Guy de Lisle Dear, M.B., Ch.B. (St. George's Hospital, England, 1979); T. J. Gan, M.B., B.S., D.A., F.C. Anes. (London Hosp. Med. Coll., 1986); Joel S. Goldberg, M.D. (Duke, 1977); Roy A. Greengrass, M.D., F.R.C.P.(c) (Manitoba, 1973); Katherine P. Grichnik, M.D. (Tufts, 1987); Andrew K. Hilton, M.B., B.S. (New South Wales, Australia, 1983); Lewis R. Hodgins, M.D. (SUNY-Downstate, 1985); Stephen M. Klein, M.D. (New Jersey, 1992); Madan M. Kwatra, Ph.D. (Montreal, 1977); Catherine K. Lineberger, M.D. (North Carolina, 1987); Holly Muir, M.D., F.R.C.P. (c) (Dalhousie, 1983); Laura Niklason, M.D., Ph.D. (Chicago, 1988); Claude Piantadosi, M.D. (John Hopkins, 1975); James D. Reynolds, Ph.D. (Queens Univ., Canada, 1994); Allison L. Ross, M.D. (Marshall, 1988); Thomas F. Slaughter, M.D. (Duke, 1987); Mark Stafford Smith, M.D., C.M. (McGill, 1983); Jacques Somma, M.D. (Montreal, 1991); Bryant W. Stolp, M.D. (North Carolina, 1988); Barbara E. Tardiff, M.D. (Yale, 1983); Christopher C. Young, M.D. (New York Med. Coll., 1987).

Assistant Clinical Professors: Robert L. Coleman, M.D. (Virginia, 1984); Francine D'Ercole, M.D. (Med. Coll. Pennsylvania, 1989); Peter D. Dwane, M.D., C.M. (McGill, 1967); Jennifer T. Fortney, M.D. (Maryland, 1978); H. David Hardman, M.D. (Minnesota, 1981); Steven Hill, M.D. (Vanderbilt, 1986); Kathryn P. King, M.D. (North Carolina, 1988); Andrew F. Meyer, M.D. (SUNY-Downstate, 1969); Stephen J. Parrillo, M.D. (Bologna, Italy, 1982); Ziaur Rahman, M.B., B.S. (Prince of Wales Med. Center, India, 1968); Susan Steele, M.D. (Illinois, 1983); Timothy H. Webb, M.D., Ph.D. (Texas, San Antonio, 1980, 1974); Dana N. Weiner, M.D. (Duke, 1989).

Assistant Research Professors: Barry W. Allen, Ph.D. (Duke, 1984); Wayne A. Gerth, Ph.D. (California-San Diego, 1979); Lieju Liu, M.D., M.B., M.S. (Tongji Med. Univ., China, 1978, 1981); Jantje Margaretha Oortgiesin, Ph.D. (Utrecht, 1989); Richard Vann, Ph.D. (Duke, 1976).

Associates: Alexis Carmer, M.D. (North Dakota, 1993); Jennifer Charlton, M.D. (North Carolina, 1994); John B. Eck, M.D. (Duke, 1992); Anne Marie Fras, M.D. (Michigan, 1993); Carolyn M. Garduno, M.D. (Georgetown, 1993); Veeraindar Goli, M.B., B.S. (Osmania, India, 1978); James D. Gould, M.D. (SUNY, 1994); Alina M. Grigore, M.D. (Romania, 1989); Hilary Grocott, M.D. (Saskatchewan, 1991); Billy K. Huh, M.D., Ph.D. (Alabama, 1993); Brian P. Jones, M.D. (Oregon, 1994); Stephen P. Kantrow, M.D. (Louisiana, 1988); Nancy W. Knudsen, M.D. (Missouri, 1991); Ellen M. Lockhart, M.D. (Texas, 1993); Eugene W. Moretti, M.D. (Temple, 1993); Mark L. Phillips, M.D. (Wake Forest, 1980); Iain Sanderson, M.A., M.Sc., F.R.C.A. Anaes. (Oxford, 1985); Guatam Sreeram, M.D. (Emory, 1993).

Clinical Associate: Randall F. Coombs, M.D. (Southern California, 1972).

Visiting Associates: Joseph E. Arrowsmith, M.B., B.S. (London, 1985); Harbans S. Bhogal, M.B., Ch.B., F.F.A.R.C.S.I. (Armed Forces, India, 1992); Thomas Erb, M.D. (Basel, Switzerland, 1987); Charles R. Garcia-Ridriquez, M.B., B.S., F.R.C.A. (London, 1989); Andrew J. Hartle, M.B., Ch.B. F.R.C.A. (Leeds, 1987); David B. MacLeod, M.B., B.S., F.R.C.A. (St. Mary's Hospital, London, 1987); Raman Madan, M.B., B.S., D.A.,

F.F.A.R.C.S., M.R.C.P.(I) (Delhi, 1977, 1979); Gavin Martin, M.B., Ch.B., F.R.C.A. (South Africa, 1989); John A.C. Murdoch, M.B., Ch.B. (Glasgow, 1991); Piers Robertson, M.B., B.S., B.Med.Sc. (Hons), D.A. (Adelaide, 1986); Andrew J. Soppoitt B.Sc., M.B., Ch.B., M.R.C.P., F.R.C.A., Birmingham, England, 1988); Sally J. Tompkins, B.A., M.B., B.Chir., F.R.C.A. (Cambridge, London, 1989).

Adjunct Professor: Kwen Jen Chang, Ph.D. (SUNY at Buffalo, 1972).

Adjunct Associate Professor: Randall L. Carpenter, M.D. (Michigan, 1978).

Adjunct Assistant Professor: Fritz F. Klein, Ph.D. (Duke, 1973).

Assistant Consulting Professors: John D. Buckwalter, M.D. (North Carolina, 1982); Frederick J. Carpenter, M.D. (Wisconsin, 1982); John J. Freiberger, M.D. (Southwestern, 1979); Scott Thomas Howell, M.S., M.D. (Duke, 1986, 1990); James R. Jacobs, M.D. (Duke, 1985), Ph.D. (Alabama, 1987); Moya E. Kileff, M.D. (Birmingham, England, 1973); Judith O. Margolis, M.D. (Colorado, 1984); Edward Burt McKenzie, Jr., M.D. (North Carolina, 1985); C.P. Reddy Parvata, M.D. (Inst. of Med. Sciences, India, 1966); Gary Lee Pellom, M.D. (North Carolina, 1984); Edward G. Sanders, M.D. (North Carolina, 1985); Paul V. Stankus, M.D. (North Carolina, 1976); Thomas E. Stanley III, M.D. (Duke, 1981); Cathy N. Thomas, M.D. (North Carolina, 1984); Rolf B. Wallin, M.D. (North Carolina, 1984).

Consulting Associates: David S. Bacon, M.D. (Duke, 1990); James M. Chimiak, M.D. (North Carolina, 1986).

Research Associates: Petar J. Denoble, M.D. (Zagreb, 1975); Masaya Kudo, M.D. (Yamagata, 1990); George Burkhard Mackensen, M.D. (Hamburg, Germany, 1994); Gregory A. Micholotti, Ph.D. (South Carolina, 1992); Yoshihide Miura, M.D. (Yamagata, Japan, 1989); Carlos Luis Nebreda, M.D. (Venezuela, 1978); Bengt M. Nelligard, M.D., Ph.D. (Sweden, 1983, 1992); Karen Nielsen, M.D. (Federal Do Parana, 1995); Barbara Phillips-Bute, Ph.D. (Duke, 1988); Mona A. Razik, Ph.D. (North Carolina, 1996); Huaxin Sheng, M.D. (Nantong Med. Col., 1984); Kengo Warabi, M.D. (Juntendo, Japan, 1993); Bo Wu, M.D. (China Med. Univ., 1985).

Scholar in Residence: Kenneth Sugioka, M.D. (Washington, 1949).

Visiting Scholar: Lynda Carroll, M.B.B.Ch. (Witwatersrand, 1974).

Emeriti: Edmond C. Bloch, M.B., Ch.B.; Elisabeth J. Fox, M.B., B.S.; Merel H. Harmel, M.D.; Joannes H. Karis, M.D.; Lloyd F. Redick, M.D.; Stanley W. Weitzner, M.D.

Basic Science Electives

ANE-243B. Research Methodology and Experimental Design I

ANE-244B. Research Methodology and Experimental Design II

This two semester sequence of courses (Research Methodology and Experimental Design I and II) is intended to provide a framework about research design for third year medical students currently engaged in bench top research and to give the participants broad exposure to techniques used in a variety of research settings. This breadth of exposure enables each student to understand research technologies of the future as well as what is currently available. Formal seminars and informal discussions during laboratory sessions are used to present didactic information, while observational and hands-on work demonstrate laboratory methodology. The evaluation is based on two submitted papers. The fall paper is 5-10 pages in length and is in the format of a grant, based on the student's proposed research. This "grant" serves to focus the student's research along with familiarizing them with the current state of knowledge in their area of interest. The spring paper is a Scientific American Style manuscript (5-10 pages) presenting the student's results and conclusions from their research year. Credit: 1 per semester. Enrollment: min 1, max 15. *King, Moon, Reynolds, Stolp, and Warner*

Clinical Science Electives

ANE-215C. Advanced Cardiac Life Support (ACLS). The ACLS Provider course follows the American Heart Association (AHA) guidelines. This course consists of twelve hours of lecture skill stations, case-based teaching, and evaluation. The course will be offered once in spring 2000. (Contact the Registrar's Office for the date.) Prerequisite: Current Basic Life Support Certification (CPR). Credit: 1. Enrollment: min 10, max: 50. *King and staff*

ANE-240C. Clinical Anesthesiology. This course is designed to directly expose students to the clinical practice of anesthesiology. Throughout the rotation, each student is assigned on a weekly basis to an individual resident or attending physician who su-

pervises the student's active participation in the pre-, intra-, and post-operative anesthetic care and management of patients. Opportunities exist for students to participate in the various subspecialty areas of anesthesiology including pediatric, obstetric, cardiac, and neurosurgical anesthesia as well as the recovery room, ICU, and pain clinic. While initial assignments are made prior to the first day of the rotation, there is flexibility with regard to students' particular areas of interest. The evaluation of patients pre-operatively is taught with emphasis placed upon formulating a plan of anesthetic management that is appropriate for the individual patient. The consequential impact of anesthetics and surgical procedures upon particular disease states is stressed also. Students review the clinical pharmacology of anesthetic and adjuvant drugs as well as apply the principles of pharmacology, physiology, and anatomy to the clinical anesthetic management of patients. Didactic information regarding principles of airway management including endotracheal intubation is presented and reinforced with application in the clinical setting. Participants are exposed to basic methods of administering anesthetics and monitoring the depth of anesthesia through physiologic responses of the patient. Instruction to the appropriate techniques and complications of obtaining vascular access for administering drugs and monitoring hemodynamic status is provided. In addition to this clinical work, students are given the opportunity to attend various lectures including an introductory series (covering preoperative assessment, airway management, and anesthesia equipment), grand rounds and resident lecture series, and various subspecialty conferences (cardiac, pediatrics). No drops or adds are accepted during the week before the course begins. Students wishing to drop or add two weeks prior to the start of the course must contact the course director, Peter Dwane, M.D., (beeper #9433). The course is offered September to December; January and February. Credit: 4. Enrollment: max 6, min 2. *Dwane and staff*

ANE-241C. Surgical Intensive Care. This course is designed to broaden the student's knowledge and experience in managing critically ill patients. Under supervision, students function as sub-interns in the Surgical Intensive Care Unit (SICU). Students re-assigned their own patients and actively participate in daily rounds as part of the SICU team. There is a morning lecture on aspects of critical care each day. Students take call one night in four and work on a one-on-one basis with SICU house staff in the supervised management of critically ill patients. Two weeks are spent in the SICU at Duke University Medical Center (trauma, vascular surgery, liver-kidney-pancreas transplantation, general surgery) and two weeks in the SICU at the Durham VA Medical Center (cardiothoracic and vascular surgery, general surgery). There is emphasis on teaching of procedures and techniques necessary for the management of all critically ill patients including hemodynamic assessment and monitoring, cardiovascular resuscitation and use of vasoactive drugs, ventilator management including ARDS, prevention and management of nosocomial infections, and nutritional support. Students are formally evaluated by the SICU house staff and the attending physician. C-L: SUR 241C. Credit: 5. Enrollment: max 8. *Young and staff*

ANE-242C. Anesthesiology Research. Selected students participate actively in assigned research projects. These well-focused segments of ongoing work in the Department of Anesthesiology are designed to provide an intensive exposure to the process of new investigation in applied pharmacology and physiology. Most students are based in the Anesthesiology Research Laboratories and are strongly oriented toward personal involvement in the clinical research settings in the Duke Medical Center operating rooms, obstetrical delivery areas, post-operative and intensive care units, the Hyperbaric Laboratories, the pain clinic, or the Clinic Research Unit. An important goal of this experience consists of guiding the student to take conceptual information and to change it into concrete scientific presentation and publication. This course is designed primarily for the student who wishes to consider seriously a career in academic anesthesiology. Credit: 4-8. Enrollment: max 2. *King and staff*

Biochemistry

George Barth Geller Professor Christian R. H. Raetz, M.D., Ph.D. (Harvard, 1973), Chairman.

Professors: James B. Duke Professor Irwin Fridovich, Ph.D. (Duke, 1955); Arno L. Greenleaf, Ph.D. (Harvard, 1974); Gordon G. Hammes, Ph.D. (Wisconsin, 1959); James B. Duke Professor Robert L. Hill, Ph.D. (Kansas, 1954); Tao-Shih Hsieh, Ph.D. (California at Berkeley, 1976); Nicholas M. Kredich, M.D. (Michigan, 1962); James B. Duke Professor Robert J. Lefkowitz, M.D. (Columbia, 1966); James B. Duke Professor Paul L. Modrich, Ph.D. (Stanford, 1973); James B. Duke Professor K. V. Rajagopalan, Ph.D. (Madras, India, 1957); David C. Richardson, Ph.D. (Massachusetts Inst. Tech., 1967); James B. Duke Professor Jane S. Richardson, M.S., M.S.T. (Harvard, 1966); Lewis M. Siegel, Ph.D. (Johns Hopkins, 1965); Leonard D. Spicer, Ph.D. (Yale, 1968); Deborah A. Steege, Ph.D. (Yale, 1974); Robert E. Webster, Ph.D. (Duke, 1965).

Associate Professors: Michael D. Been, Ph.D. (Washington, 1982); Patrick Casey, Ph.D. (Brandeis, 1986); Ronald C. Greene, Ph.D. (California Inst. Tech., 1954); Russel E. Kaufman, M.D. (Ohio State, 1973); Terrence Oas, Ph.D. (Oregon, 1986); Eric Toone, Ph.D. (Toronto, 1988).

Assistant Professors: Lorena S. Beese, Ph.D. (Brandeis, 1984); Daniel Gewirth, Ph.D. (Yale, 1988); Homme W. Hellinga, Ph.D. (Cambridge, 1986); Michael S. Hershfield, M.D. (Pennsylvania, 1967); Sheldon R. Pinnell, M.D. (Yale, 1963); John York, M.D. (Washington Univ, 1993).

Assistant Research Professor: Jean L. Johnson, Ph.D. (Duke, 1974).

Adjunct Assistant Professor: Per-Otto Hagen, F.H.W.C. (Watt Univ., Scotland, 1961).

Research Associates: Dwayne Allen, Ph.D.; Shib Basu, Ph.D.; Ines Batinic-Haberle, Ph.D.; Laura Bazemore, Ph.D.; Ludmil Benov, Ph.D.; David Benson, Ph.D.; Keith Bjornson, Ph.D.; Russell Bishop, Ph.D.; Leonard Blackwell, Ph.D.; Karen Conklin, Ph.D.; Robert De Lorimer, Ph.D.; Derek Duckett, Ph.D.; Serena Farquharson, Ph.D.; Jochen Genschel, Ph.D.; Kendra Hightower, Ph.D.; Barbara Hindenach, Ph.D.; Chih-Chin Huang, Ph.D.; Jennifer Hunt, Ph.D.; Remy Kachadourian, Ph.D.; Margaret Kanipes, Ph.D.; Thomas Kirby, Ph.D.; Stefan I. Liotchev, Ph.D.; Simon Lovell, Ph.D.; Kevin Mason, Ph.D.; Donald Mika, Ph.D.; Daniel Morris, Ph.D.; Jeffrey Myers, Ph.D.; Somashe Niranjana, Ph.D.; Sean Parkin, Ph.D.; Juan Perez-Vilar, Ph.D.; Nanette Que, Ph.D.; Anthony Ribeiro, Ph.D.; Gregory Runyon, Ph.D.; Matthew Saderholm, Ph.D.; Yizhong Sha, Ph.D.; Cathy Silver-Key, Ph.D.; Claudia Spampinato, Ph.D.; Hope Taylor, Ph.D.; Gang Tong, Ph.D.; Rafael Tosado-Acevedo, Ph.D.; Ronald A. Venters, Ph.D.; Shuntai Wang, Ph.D.; Kim White, Ph.D.; Gene Wickham, Ph.D.; Margot Wuebbens, Ph.D.; Timma Wyckoff, Ph.D.; Jae-Sung Yu, Ph.D.; Zhimin Zhou, Ph.D.

Emeriti: Samson R. Gross, Ph.D.; Walter R. Guild, Ph.D.; Jerome S. Harris, M.D.; Kenneth S. McCarty, Sr., Ph.D.; Yashiko Nozaki, Ph.D.; Robert W. Wheat, Ph.D.

Required Course

BCH-200B. Biochemistry. The core course given to all freshman medical students during a period of seven weeks in the first term emphasizes the relationship between structure and function of the major classes of macromolecules in living systems including proteins, carbohydrates, lipids, and nucleic acids. The metabolic interrelationships and control mechanisms are discussed as well as the biochemical basis of human diseases. Credit: 4. *Raetz*

Electives

BCH-357B. Research in Biochemistry. In a limited number of cases, a student is permitted to participate in the research program of a faculty member. Acceptance is by individual arrangement with the proposed faculty preceptor. Credit: 1-16. *Staff*

BCH-358B. Research in Biochemistry. A student may obtain first hand research experience by participating in the research program of a faculty member. Acceptance is by individual arrangement with the proposed faculty preceptor. Credit: 1-16. *Staff*

BCH-417B. Membranes, Receptors, and Cellular Signaling. Basic and current concepts of the biological membranes, membrane proteins and organization; mechanism of action of hormones at the cellular level including hormone-receptor interactions, secondary messenger systems for hormones, mechanism of regulation of hormone responsiveness, regulation of growth, differentiation and proliferation, cellular electrophysiological mechanisms of transport and ions channels, secretory and sensory stimulus sensing and transduction. Some lectures stress the clinical correlation of the basic concepts in the course. C-L: CBI-417B; Graduate School. Credit: 3. *Caron, Webster, Bell, and invited lecturers*

Biological Anthropology and Anatomy

Professor Richard F. Kay, Ph.D. (Yale, 1973), Chairman.

Professors: Matthew Cartmill, Ph.D. (Chicago, 1970); Kenneth Glander, Ph.D. (Chicago, 1975); William L. Hylander, D.D.S. (Illinois, 1963), Ph.D. (Chicago, 1972); James B. Duke Professor Elwyn L. Simons, Ph.D. (Princeton, 1956), D. Phil. (Oxford, 1959); Kathleen K. Smith, Ph.D. (Harvard, 1980); John Terborgh, Ph.D. (Harvard, 1963); Carel van Schaik, Ph.D. (Utrecht, 1985).

Associate Professor: V. Louise Roth, Ph.D. (Yale, 1982).

Assistant Professors: Frank H. Bassett III, M.D. (Louisville, 1957); Steven Churchill, Ph.D. (New Mexico, 1994); Theresa R. Pope, Ph.D. (Florida, 1989); Daniel Schmitt, Ph.D. (SUNY-Stony Brook, 1995).

Assistant Research Professors: Diane K. Brockman, Ph.D. (Yale, 1994); Leslie J. Digby, Ph.D. (California at Davis, 1994); Mark Spencer, Ph.D. (SUNY-Stony Brook, 1995); Blythe A. Williams, Ph.D. (Colorado, 1994).

Adjunct Professor: Clark Larsen, Ph.D. (Michigan, 1980).

Adjunct Associate Professor: Patricia C. Wright, Ph.D. (New York, 1985).

Adjunct Assistant Professors: Thomas Anderson, Ph.D. (Duke, 1971); Deborah Overdorff, Ph.D. (Duke, 1991).

Research Associates: Friderun Ankel-Simons, Ph.D. (Copenhagen, 1963); Pierre Lemelin, Ph.D. (SUNY-Stony Brook, 1996); Rick Madden, Ph.D. (Duke, 1990); Christine Wall, Ph.D. (SUNY-Stony Brook, 1995).

Research Scientists: Susan Crissy, Ph.D. (Maryland, 1985); Lillian Spencer, Ph.D. (SUNY-Stony Brook, 1995); Thomas Struhsaker, Ph.D. (California-Berkeley, 1965).

Associates in Research: Christopher Vinyard, M. A. (Northern Illinois, 1994); Anne Weil, M.A. (Texas-Austin, 1992).

Instructor: Kirk Johnson, M.A. (Duke, 1981).

Lecturing Fellow: Prithijit Chatrath, B.S. (Punjab Univ., 1964).

Required Course

BAA-200B. Gross Human Anatomy. First-year medical students are required to take gross anatomy. The course includes the complete dissection of a cadaver; laboratory work is supplemented by conferences which place emphasis upon biological and evolutionary aspects. Credit: 4. *Cartmill*

Electives

BAA-214B. Anatomy of the Head and Neck. This course is designed to be a review of the head and neck, emphasizing its phylogenetic and ontogenetic development along with clinically important features of the anatomy of this region. Credit: 2. Enrollment: min 5, max 12. *K. Smith and staff*

BAA-221B. Anatomy of the Trunk. Emphasis is on the anatomy of the thoracic, abdominal, and pelvic organs including relationships, blood supply, and innervations and, where practical, developmental and microscopic anatomy. The dissections are supplemented with audiovisual presentations and discussions with such prosections as are available. Credit: 2. Enrollment: min 8, max 20. *Staff*

BAA-224B. Tutorial in Gross Anatomy. A detailed review of selected regions of the human body in the context of the "core" gross anatomy sequence. The student plans prosections, special presentations, etc., with staff. The student also elects to study one or more selected regions in consultation with staff. Credit: 1-5. Enrollment: min 1, max 5. *Hylander and staff*

BAA-231B. Anatomy of Back and Extremities. The course includes complete dissection of back and the extremities including pectoral and pelvic girdles. Visual aids are used extensively. Course planned for orthopaedics, general practice, or neurosurgery. Credit: 3. Enrollment: min 6, max 20. *Bassett and staff*

Cell Biology

George Barth Geller Professor for Research in Molecular Biology Michael P. Sheetz, Ph.D. (California Inst. Tech., 1972), Chairman.

Associate Professor Daniel P. Kiehart, Ph.D. (Pennsylvania, 1979), Chief, Division of Developmental Biology.

Associate Professor Jo Rae Wright, Ph.D. (West Virginia, 1981), Chief, Division of Physiology and Cellular Biophysics.

Professors: G. Vann Bennett, M.D. (Johns Hopkins, 1976); Celia Bonaventura, Ph.D. (Texas at Austin, 1968); Joseph Bonaventura, Ph.D. (Texas at Austin, 1968); James B. Duke Professor Marc G. Caron, Ph.D. (Miami, 1973); James B. Duke Professor Harold P. Erickson, Ph.D. (Johns Hopkins, 1969); Diane L. Hatchell, Ph.D. (Marquette, 1968); Thomas J. McIntosh, Ph.D. (Carnegie Mellon, 1973); R. Bruce Nicklas, Ph.D. (Columbia, 1958); George M. Padilla, Ph.D. (California at Los Angeles, 1960); Michael K. Reedy, M.D. (Washington, 1962); George G. Somjen, M.D. (New Zealand, 1961).

Associate Professors: Onyekwere E. Akwari, M.D. (Southern California, 1970); Nels C. Anderson, Ph.D. (Purdue, 1964); Frederick R. Cobb, M.D. (Mississippi, 1964); Jonathan Cohn, M.D. (Rockefeller, 1978); Joseph M. Corless, M.D., Ph.D. (Duke, 1972); Joseph C. Greenfield, M.D. (Emory, 1956); Tobias Meyer, Ph.D. (Basel, 1986); Elliott Mills, Ph.D. (Columbia, 1964); Frederick H. Schachat, Ph.D. (Stanford, 1974); David W. Schomberg, Ph.D. (Purdue, 1965); Steven R. Vigna, Ph.D. (Washington, 1978).

Assistant Professors: Page A. W. Anderson, M.D. (Duke, 1963); Blanche Capel, Ph.D. (Pennsylvania, 1989); Arturo De Lozanne, Ph.D. (Stanford, 1988); Marc K. Drezner, M.D. (Pittsburgh, 1970); Richard G. Fehon, Ph.D. (Washington, 1986); James M. Grichnik, M.D., Ph.D. (Harvard, 1990); John A. Klingensmith, Ph.D. (Harvard, 1993); William E. Kraus, M.D. (Duke, 1982); Haifan Lin, Ph.D. (Cornell, 1990); Brian S. McKay, Ph.D. (Medical College, Wisconsin, 1995); Christopher V. Nicchitta, Ph.D. (Pennsylvania, 1987); Theresa O'Halloran, Ph.D. (North Carolina, 1986); Patricia M. Saling, Ph.D. (Pennsylvania, 1979); Sean P. Scully, M.D. (Rochester, 1986); Jonathan S. Stamler, M.D. (Mt. Sinai, 1985); Bryant W. Stolp, M.D. (North Carolina, 1988), Ph.D. (Duke, 1985); William E. Yarger, M.D. (Baylor, 1971).

Associate Research Professors: Peter G. Aitken, Ph.D. (Connecticut, 1978); E. Ann LeFurgey, Ph.D. (North Carolina, 1976).

Assistant Research Professors: Rodney Fotz, M.D. (Washington, 1989); Bruce M. Klitzman, Ph.D. (Virginia, 1979); Jae Moon Lee, Ph.D. (Duke, 1989); Virginia Lightner, M.D., Ph.D. (Duke, 1989); Bruce Lobaugh, Ph.D. (Pennsylvania State, 1981); Emmanuel C. Opara, Ph.D. (London, 1984); Katherine I. Swenson, Ph.D. (Washington, 1983); Timothy Webb, M.D., Ph.D. (Texas at San Antonio, 1980, 1974).

Adjunct Professor: Martin Rodbell, Ph.D. (Washington, 1954).

Adjunct Associate Professors: Charles R. Horres, Jr., Ph.D. (Duke, 1975); James M. Schooler, Jr., Ph.D. (Wisconsin, 1964).

Adjunct Assistant Professors: Leslie A. Lobaugh, Ph.D. (Duke, 1986); Elizabeth Murphy, Ph.D. (Pennsylvania, 1980); R. Neal Shepherd, Ph.D. (Duke, 1975).

Emeriti: J. Joseph Blum, Ph.D.; Sheila J. Counce, Ph.D.; Frans F. Jöbsis, Ph.D.; Edward A. Johnson, M.D.; Thomas J. McManus, M.D.; Jacqueline A. Reynolds, Ph.D.; Knut Schmidt-Nielsen, Dr.Phil.

Required Courses

CBI-200B. Cell and Tissue Biology. Lectures on the structure and function of the cells and tissues of the body. The laboratory provides practical experience with light microscopy studying and analyzing the extensive slide collection of mammalian tissues. Credit: 2. *McIntosh and staff*

CBI-201B. Microanatomy. Lectures on the structural organization of the organs of the body, as determined by light and electron microscopy, with emphasis on the relation of structure to function at the cellular level. Laboratory sessions are used to study histological preparations of mammalian tissues. Credit: 2. *McIntosh and staff*

CBI-202B. Medical Physiology. Lectures, labs, and clinical symposia on organ systems function. Computer simulations of organ functions complement lecture and lab material. The course ends with a live animal cardiovascular reflex lab. Credit: 4. *N. Anderson and staff*

Electives

CBI-212B. The Cell and Molecular Biology of Reproduction. During the last de-

cade, cell, molecular, and neurobiological investigations have dramatically advanced our understanding of reproduction. In this course, we aim to focus on these recent findings to present an integrated view of the reproductive process in males and females. The general areas to be covered include neuroendocrinology, reproductive endocrinology, gametogenesis, and fertilization although recent studies in areas such as gene regulation, intercellular communication, hormones, growth factors and signaling, and early development and differentiation are emphasized. C-L: Graduate School. Credit: 3. Enrollment: min 6, max 20. *Saling and Schomberg*

CBI-219B. Preceptorship in Cell Biology/Physiology. Guided independent study of original literature and/or research experience in cell biology and/or physiology. Prerequisites: consent of instructor and departmental director of medical studies. Credit: 1-16. *Staff*

CBI-251B. Molecular Cell Biology. Current research topics in cell biology presented in a lecture and discussion format based on recent research papers. Topics include: protein secretion and trafficking, the nucleus; cytoskeleton and cell motility, extracellular matrix and cell adhesion, growth factors and signaling, cell cycle. C-L: Graduate School. Credit: 1. *Erickson and staff*

CBI-340B. Tutorial in Cell Biology/Physiology. Selected topics are chosen for intensive reading and discussion. Topics may be chosen relating to basic problems of cytology, growth and development, biophysics, endocrinological control, neuroanatomy, physiological differentiation, and evolutionary origins of functional microsystems. Prerequisites: permission of faculty preceptor. C-L: Graduate School. Credit: 1-3. Enrollment: max 8. *Staff*

CBI-417B. Cellular Signaling. Basic and current concepts of mechanism of action of hormones at the cellular level including hormone-receptor interactions, second messenger systems for hormones, plasma membrane receptor signaling (G protein-coupled receptors, receptor tyrosine kinases, phospholipid signaling, ion channels), intracellular signaling pathways (calcium, cyclic nucleotides, nuclear receptors, phosphatases), regulation of growth and differentiation and pathophysiology involving signaling pathways. C-L: PHR 417; BCH-417B; Graduate School. Credit: 3. Enrollment: 50. *Caron, Casey, Pendergast, York, VanDongen, Heitman, McDonnell, Means, Shenolikar, and Kornbluth*

Community and Family Medicine

Clinical Professor James L. Michener, M.D. (Harvard, 1978), Chairman.
Professor: Barbara K. Rimer, Dr. P.H. (Johns Hopkins, 1981).
Associate Professors: Colleen McBride, Ph.D. (Minnesota, 1990); Joellen Schildkraut, Ph.D. (Yale, 1987).
Associate Clinical Professor: Jean G. Spaulding, M.D. (Duke, 1972).
Assistant Research Professor: Kathryn I. Pollack, Ph.D. (Houston, 1996).
Assistant Clinical Professor: Susan D. Epstein, M.P.A. (New Hampshire, 1974).
Clinical Associates: Warren A. Blackburn, M.D. (Uniformed Svcs., Univ. of Hlth. Sciences, 1982); Mark A. Crissman, M.D. (Temple, 1980); Philip E. Stover, M.D. (Eastern Virginia Med. School, 1980).
Research Associate: Marilyn F. Vine, M.P.H. (Yale, 1983), Ph.D. (North Carolina, 1988).

DIVISION OF BIOMETRY

Associate Professor William E. Wilkinson, Ph.D. (North Carolina, 1968), Chief.
Professors: J.P. Gibbons Professor Dan G. Blazer II, M.D. (Tennessee, 1969), Ph.D. (North Carolina, 1980); Stephen L. George, Ph.D. (Southern Methodist, 1969).
Research Professor: Kenneth G. Manton, Ph.D. (Duke, 1974).
Associate Professors: Elizabeth R. DeLong, Ph.D. (North Carolina, 1979); Lloyd Edwards, Ph.D. (North Carolina, 1990); Kerry L. Lee, Ph.D. (North Carolina, 1974); Gary L. Rosner, Sc.D. (Harvard, 1985); Gregory Samsa, Ph.D. (North Carolina, 1988).
Associate Research Professor: Victor Hasselblad, Ph.D. (UCLA, 1967).
Assistant Professors: David M. DeLong, Ph.D. (North Carolina, 1977); Susan Halabi, Ph.D. (Texas, 1994); Bercedis L. Peterson, Ph.D. (North Carolina, 1986); Carl F. Pieper, Dr.P.H. (Columbia,

1990).

Assistant Research Professors: Habib El-Moalem, Ph.D. (North Carolina, 1995); James E. Herndon, II, Ph.D. (North Carolina, 1988); Maragatha Kuchibhatla, Ph.D. (Texas A&M, 1992); Lauren McIntyre, Ph.D. (North Carolina State, 1996); Donna Niedzwiecki, Ph.D. (Yale, 1984); Lawrence H. Muhlbauer, Ph.D. (North Carolina, 1981); Sandra Stinnett, Dr.P.H. (North Carolina, 1993); Gail E. Tudor, Ph.D. (North Carolina, 1991).

DIVISION OF MEDICAL INFORMATION SCIENCES

Professor William E. Hammond, Ph.D. (Duke, 1967) Chief.

Assistant Research Professors: Joseph W. Hales, Ph.D. (Utah, 1991); David Lobach, M.D., Ph.D. (Duke, 1987,1986), M.S. (Duke, 1994).

FAMILY MEDICINE PROGRAM

Assistant Clinical Professor Hershey S. Bell, M.D. (Toronto, 1982), Vice Chair.

Assistant Professor George R. Parkerson, Jr., M.D. (Duke, 1953), M.P.H. (North Carolina, 1977).

Associate Professors: Barrie J. Hurwitz, M.B. (Witwatersrand, 1968); Joseph Lipscomb, Jr., Ph.D. (North Carolina, 1975); Robert J. Sullivan, Jr., M.D. (Cornell, 1966), M.P.H. (North Carolina, 1973).

Clinical Professor: Kathryn A. Andolsek, M.D. (Northwestern, 1975).

Associate Clinical Professors: William Christmas, M.D. (Boston, 1965); Victoria Kaprielian, M.D. (UCLA), 1985); Albert A. Meyer, M.D. (SUNY at Brooklyn, 1975); Kimberly S. Yarnall, M.D. (Florida, 1985); Joseph Green, Ph.D. (Illinois, 1975).

Assistant Professors: Linda S. Lee, Ph.D. (North Carolina, 1991); Deborah L. Squire, M.D. (Northwestern, 1978).

Assistant Clinical Professors: Joyce A. Copeland, M.D. (North Carolina, 1975); Toni Cutson, M.D. (Med. College of VA, 1980); Margaret Gradison, M.D. (Cincinnati, 1981); Mary Lee Lobach, M.D. (Vanderbilt, 1984); William Purdy, M.D. (Case Western, 1977); Sarah Ro, M.D. (Loma Linda, 1991); Barbara L. Sheline, M.D., M.P.H. (North Carolina, 1984); Jonathan L. Sheline, M.D. (North Carolina, 1984); Lawrence R. Wu, M.D. (Duke, 1982).

Assistant Research Professor: Veronica M. Hegarty, M.B., M.R.C.P.I. (Dublin, 1984).

Clinical Associates: Chika Akera, M.D. (Minnesota, 1995); Andrew A. Bonin, M.D. (Duke, 1975); Mark Crissman, M.D. (Temple, 1980); Katie B. Dore, P.A.-C. (Duke, 1991); Richard T. Ferro, M.D. (Robert Wood Johnson, 1994); Sumera Hayat, M.D. (Jefferson Med. College, 1995); Janet H. Keating, M.D. (Missouri, 1987); Janet Lehr, M.D. (Florida, 1982); Amrit Singh, M.D. (West Virginia, 1990); Roy Stein, M.D. (Duke, 1980); William T. Vaughan, R.Ph., R.P.A. (North Carolina, 1972).

Associate: Catherine M. Severns, R.N.P. (Yale, 1971).

DIVISION OF OCCUPATIONAL AND ENVIRONMENTAL MEDICINE

Assistant Professor Samuel D. Moon, M.D. (Virginia, 1975), M.P.H. (North Carolina, 1991), Division Chief.

Professor: David G. Warren, J.D. (Duke, 1964).

Associate Professor: John Dement, Ph.D. (North Carolina, 1980).

Associate Clinical Professors: George W. Jackson, M.D. (Western Reserve, 1968); Jerry J. Tullis, Ph.D. (Catholic Univ., 1965).

Assistant Clinical Professors: Dennis Darcey, M.D., M.S.P.H. (North Carolina, 1986, 1988); Carol Epling, M.D. (Virginia, 1989), M.S.P.H. (Colorado, 1994); Gary N. Greenberg, M.D. (Northwestern, 1978), M.P.H. (North Carolina, 1983); Debra Hunt, Dr.P.H. (North Carolina, 1984); Craig R. Stenberg, Ph.D. (Denver, 1982); Woodhall Stopford, M.D. (Harvard, 1969), M.S.P.H. (North Carolina, 1980); Edward D. Thalmann, M.D. (Georgetown, 1970); Wayne R. Thomann, Dr.P.H. (North Carolina, 1983).

Assistant Research Professor: Hester J. Lipscomb, Ph.D. (North Carolina, 1995).

Associate: Thomas O. Brock, III, Ph.D. (Wake Forest, 1980).

Clinical Associates: Judith Holder, Ph.D. (Southern Illinois, 1995); David P. Siebens, M.D. (Washington, 1983); Andrew S. Silberman, M.S.W. (North Carolina, 1982).

Consulting Associate: Deborah Smith, M.S.W. (North Carolina, 1979).

Research Associates: Larry L. Cook, Ph.D. (North Carolina State, 1986); Norma A. Knutson, Ph.D. (North Carolina, 1991); James M. Schmidt, B.H.S. (Duke, 1974); Priscilla W. Shows, M.S.W. (Georgia State, 1979).

DIVISION OF PHYSICIAN ASSISTANT EDUCATION

Associate Clinical Professor Reginald D. Carter, Ph.D. (Bowman Gray, 1970), Division Chief.

Assistant Clinical Professor Joyce A. Copeland, M.D. (North Carolina, 1975), Medical Director.

Assistant Clinical Professors: Lovest T. Alexander, M.H.S. (Duke, 1991); Patricia A. Dieter, M.P.A. (Pennsylvania State, 1983); Phillip Price, M.H.S. (Duke, 1991); Margaret Schmidt, Ed.D. (Duke, 1988);

Jan Victoria Scott, M.H.S. (Duke, 1991).

Clinical Associates: Robert Giggey, P.A.-C. (Maine Medical Center, 1991); Paul C. Hendrix, M.H.S. (Duke, 1991); Gloria Jordan, P.A.-C. (Duke, 1988); John C. Lord, P.A.-C. (Duke, 1981); Peggy R. Robinson, M.H.S., P.A.-C. (Duke, 1992).

DUKE DIET AND FITNESS CENTER

Assistant Clinical Professor Michael A. Hamilton, M.D. (Rochester, 1964), M.P.H. (North Carolina, 1969), Chief.

Assistant Clinical Professor: Ronette L. Kolotkin, Ph.D. (Minnesota, 1978).

Assistant Research Professor: Spencer A. Brown, Ph.D. (Pennsylvania, 1984).

Clinical Associate: Lisa Giannetto, M.D. (Loyola, 1986).

ADJUNCT FACULTY

Adjunct Professors: Barbara S. Hulka, M.D. (Columbia, 1959), M.P.H. (Columbia, 1961); Arnold J. Schecter, M.D. (Howard, 1962) M.P.H. (Columbia, 1976); Anostasios A. Tsiatis, Ph.D. (California-Berkeley, 1974).

Adjunct Associate Professors: Mark R. Conaway, Ph.D. (Minnesota, 1985); James F. Gifford, Jr., Ph.D. (Duke, 1969); Frank E. Harrell, Jr., Ph.D. (North Carolina, 1979).

Adjunct Assistant Professors: James D. Bernstein, M.H.A. (Michigan, 1968); Brian A. Boehlecke, M.D. (SUNY at Buffalo, 1970), M.P.H. (North Carolina, 1981); Patricia M. Eiff, M.D. (Med. Coll. Wisconsin, 1983); Lars C. Larsen, M.D. (SUNY at Syracuse, 1973); Gina R. Petroni, Ph.D. (Michigan, 1990); Clare J. Snachez, M.D. (Colorado, 1975); Katherine M. Shea, M.D. (Oregon Health Sciences, 1978), M.P.H. (North Carolina, 1995); Bonnie Yankaskas, Ph.D. (North Carolina, 1982), M.P.H. (Yale, 1973).

Adjunct Associate: Susan Lief, Ph.D. (North Carolina, 1996).

COMMUNITY FACULTY

Associate Clinical Professor: Charles Ellenbogen, M.D. (Chicago-Pritzker, 1964), Fayetteville, NC.

Assistant Clinical Professors: L. Allen Dobson, Jr., M.D. (Bowman Gray, 1980), Mt. Pleasant, NC; Lauracinnie Jenkins, M.D. (SUNY at Buffalo, 1982), Harare, Zimbabwe; Oliver N. Oyama, Ph.D. (Indiana, 1985), Fayetteville, NC; James M. Wetter, M.D. (SUNY at Buffalo, 1974), Fayetteville, NC.

Clinical Associates: Gloria Jordan, P.A.-C. (Duke, 1988), Autryville, NC; James A. Mergy, M.D. (California, 1987), Fayetteville, NC; Lenard Salzberg, M.D. (Albany, 1988), Fayetteville, NC.

Consulting Professors: Barrie Cassileth, Ph.D. (Pennsylvania, 1978), Chapel Hill, NC; Roger O. McClellan, D.V.M. (Washington State, 1960), Durham, NC; Samuel W. Warburton, Jr., M.D. (Pennsylvania, 1969), Durham, NC.

Associate Consulting Professors: Joan Cornoni-Huntley, Ph.D. (North Carolina, 1970), Chapel Hill, NC; Linda Frazier, M.D. (Mount Sinai, 1980), M.P.H. (North Carolina, 1992), Douglas, KS; Marvin L. Hage, M.D. (Michigan, 1967), Durham, NC; Kathryn Magruder-Habib, Ph.D. (North Carolina, 1987), Washington, D.C.; Sigrid J. Nelius, M.D. (Ludwig Maximilian, Germany, 1949), Durham, NC; Katherine M. Simon, Ph.D. (Iowa, 1979), St. Louis, MO.

Assistant Consulting Professors: Anne M. Akwari, M.D. (Howard, 1976), Durham, NC; Powell Anderson, M.D. (Duke, 1949), Waynesboro, VA; Evan A. Ballard, M.D. (Duke, 1976), Jonesville, NC; Daniel H. Barco, M.D. (Duke, 1972), Durham, NC; James S. Blair, Jr., M.D. (Maryland, 1947), Wallace, NC; Don W. Bradley, M.D. (Med. Coll. Virginia, 1976), Durham, NC; David K. Broadwell, M.D. (Baylor, 1976), M.P.H. (Texas, 1986), Charleston, NC; Susan E. Brown, M.D. (Georgetown, 1976), Durham, NC; Jack R. Cahn, M.D. (Penn. State-Hershey, 1972), Sparta, NC; Jane T. Carswell, M.D. (Med. Coll. Virginia, 1958), Lenoir, NC; John Cromer, Jr., M.D. (Nebraska, 1972), M.S.P.H. (North Carolina, 1980), Wilmington, NC; Bruce A. Dalton, Jr., M.D. (North Carolina, 1969), Research Triangle Park, NC; Charles Davant, III, M.D. (North Carolina, 1972), Blowing Rock, NC; John D. Davis, Jr., M.D. (North Carolina, 1978), Blowing Rock, NC; Clyde J. Dellinger, M.D. (Duke, 1961), Drexel, NC; Howard Eisen-son, M.D. (Duke, 1979), Durham, NC; Curtis J. Eshelman, M.D. (Michigan, 1971), Durham, NC; Lawrence L. Fleenor, Jr., M.D. (Virginia, 1966), Big Stone Gap, VA; Henry A. Fleishman, M.D. (Emory, 1974), Eden, NC; Raymond A. Gaskins, Jr., M.D. (North Carolina, 1975), Fayetteville, NC; Wilson Grif-fin, III, M.D. (Duke, 1977), Jonesville, NC; James K. Hartye, M.D. (Vanderbilt, 1977), North Wilkes-boro, NC; Paul O. Howard, M.D. (Virginia, 1955), Sanford, NC; Peter Jacobi, M.D. (Western Reserve, 1979), Durham, NC; Lane E. Jennings, M.D. (Miami, 1975) Port Orange, FL; Pamela H. Jessup, M.D. (Bowman Gray, 1977), Sanford, NC; Eric M. Johnsen, M.D. (Wayne State, 1977), Albermarle, NC; Charles W. Lapp, M.D. (Albany Med. Coll., 1974), Raleigh, NC; Walter L. Larimore, M.D. (Louisiana, 1977), Bryson City, NC; Lawrence Myers, Ph.D. (California at Berkeley, 1972), Research Triangle Park, NC; Melvin T. Pinn, Jr., M.D. (Virginia, 1976), Charlotte, NC; Jessica Sax-Schorr, M.D. (Tufts, 1977), Charlotte, NC; Charles P. Scheil, M.D. (Duke, 1958), Lenoir, NC; Evelyn D. Schmidt, M.D. (Duke,

1951), M.P.H. (Columbia, 1962), Durham, NC; Harold D. Schutte, M.D. (Loma Linda, 1962), Asheville, NC; Greg Stave, M.D., J.D. (Duke, 1984), M.P.H. (North Carolina, 1989), Research Triangle Park, NC; William B. Waddell, M.D. (Duke, 1962), Galax, VA; John W. Watson, M.D. (Med. Coll. Virginia, 1953), Oxford, NC; Abner C. Withers, M.D. (North Carolina, 1962), Morganton, NC.

Consulting Associates: David P. Adams, Ph.D. (Florida, 1987), M.P.H. (Ohio, 1994), Concord, NC; Susan R. Andersen, M.D. (Southern Florida, 1992), Concord, NC; Paul E. Austin, M.D. (North Carolina, 1989), Durham, NC; Clarence H. Beavers, M.D. (West Virginia, 1982), Eden, NC; Peter K. Brady, M.D. (Mississippi, 1989), Durham, NC; Peter A. Cardinal, M.D. (Uniformed Services Univ. of the Health Sciences, 1984), Fayetteville, NC; Michael A. Cassaday, D.O. (Coll. Osteopathic Med., 1976), Fort Bragg, NC; Karol Cheek, M.D. (South Carolina, 1987), Concord, NC; Young S. Choi, M.D. (Oklahoma, 1985), Fort Bragg, NC; David L. Christopherson, M.D. (Michigan, 1974), Concord, NC; Kiara S. Eily Cofield, M.D. (Bowman Gray, 1991), Durham, NC; Bruce A. Cohen, M.D. (St. George's Hosp., 1981), M.P.H. (North Carolina, 1997), Durham, NC; Phillip A. Contino, Jr., M.H.S. (Western Carolina, 1994), Franklin, NC; Steven W. Corso, M.D. (South Carolina, 1988), Fort Bragg, NC; Michelle E. Crow, Pharm.D. (Texas, 1993), Durham, NC; James F. Cummings, M.D. (Georgetown, 1993), Fayetteville, NC; R. Joseph Cutler, P.A.-C. (South Carolina, 1974), Kannapolis, NC; Terry G. Daniel, M.D. (West Virginia, 1988), Eden, NC; David J. Desilets, M.D. (Georgetown Univ., 1990), Fayetteville, NC; Mary Carol Digel, M.D. (Duke, 1987), Sparta, NC; Tommy K Earnhardt, P.A.-C. (Emory, 1984), Mt. Pleasant, NC; Nathan Erteschik, M.D. (George Washington, 1979), Fort Bragg, NC; Cristine V. C. Eudy, F.N.P. (North Carolina, 1994), Concord, NC; Ann K. Freneau, M.D. (George Washington, 1985), Durham, NC; Conrad L. Flick, M.D. (Duke, 1989), Raleigh, NC; Lawrence L. Golusinski, M.D. (Med. Coll. Virginia, 1989), Atlanta, GA; William Gunn, Ph.D. (Virginia Polytechnic, 1986), Concord, NC; Gordon S. Hardenberg, M.D. (Brown, 1991), Durham, NC; Ruppert A. Hawes, M.D. (Ohio State, 1991), Concord, NC; Jeffrey D. Hoffman, M.D. (North Carolina, 1984), Concord, NC; Kevin P. Howard, M.D. (Wayne State, 1982), Reidsville, NC; Rosemary Jackson, M.D., M.P.H. (North Carolina, 1980, 1989), Durham, NC; Robert A. Joy, M.D. (Vermont, 1991), Fort Bragg, NC; Richard Juberg, M.D. (East Carolina, 1982), Erwin, NC; Kenneth R. Kemp, M.D. (Arkansas, 1988), Fort Bragg, NC; Eugenie M. Komives, M.D. (Harvard, 1985), Durham, NC; Michael R. Kunkel, M.D. (Virginia, 1990), Fort Bragg, NC; William L. Lasswell, M.D. (Brown, 1989), Fort Bragg, NC; Edward N. LaMay, M.D. (Bowman Gray, 1988), Durham, NC; Glen R. Liesegang, M.D. (Kentucky, 1983), Blowing Rock, NC; Christopher Manasseh, M.D. (Kilpauk Medical College Univ. of Madras, 1992), Fayetteville, NC; Matthew McCarty, M.D. (Case Western Reserve, 1988), Fort Bragg, NC; James S. McGrath, M.D. (Tulane, 1980), Durham, NC; Ronald K. McLearn, M.D. (Ohio State, 1975), Durham, NC; Ofelia N. Melley, M.D. (Guadalajara, 1984), Southern Pines, NC; Alicia R. Mercer, M.D. (Mercer, 1992), Ft. Bragg, NC; Richard Michal, M.D. (Duke, 1980), Rocky Mount, NC; David Nave, Jr., M.D. (Bowman Gray, 1981), Sanford, NC; J. T. Newton, M.D. (North Carolina, 1981), Clinton, NC; Sandra J. Newton, M.D. (Wayne State, 1984), Durham, NC; Malcolm H. Pannill, B.H.S. (Bowman Gray, 1988), Fayetteville, NC; Ronald A. Pollack, M.D. (Med. Coll. Virginia, 1986), Charlotte, NC; Gwendolyn Powell, M.D. (Miami, 1981), M.P.H. (North Carolina, 1986), Durham, NC; John A. Powell, M.D. (USUHS, 1987), Fort Bragg, NC; Michael A. Rave, M.D. (USUHS, 1989), Fort Bragg, NC; Michael Reil, D.O. (Kansas, 1984), Fort Bragg, NC; Charles W. Rhodes, M.D. (Bowman Gray, 1980), Mt. Pleasant, NC; Rebecca S. Rich, M.D. (Brow, 1983), Durham, NC; Sarah Cornwell Ringel, M.D. (Duke, 1985), Durham, NC; Mark D. Robinson, M.D. (Pennsylvania, 1983), Concord, NC; Paul W. Sasser, M.D. (California at Los Angeles, 1984), Eden, NC; Lori J. Seymour, P.A.-C. (Duke, 1992), Mt. Pleasant, NC; Deborah Smith, M.S.W. (North Carolina, 1979), Durham, NC; Christopher Snyder, III, M.D. (Virginia, 1975), Concord, NC; Erika A. Steinbacher, M.D. (North Carolina, 1992), Kannapolis, NC; Loretta Stenzel, M.D. (Duke, 1986), Durham, NC; Phillip E. Stover, M.D. (Eastern Virginia, 1980), Louisburg, NC; Dennis O. G. Stuart, M.D. (Med. Coll. Virginia, 1982), Elkin, NC; Jennifer L. Swanson, M.D. (Virginia, 1988), Durham, NC; Edward Taylor, M.D. (Hahnemann, 1982), Lumberton, NC; Gregory W. Taylor, M.D. (Bowman Gray, 1979), Fayetteville, NC; Michael J. Trombley, M.D. (Rochester, 1991), Concord, NC; Teresa Vanderlinde, D.O. (Philadelphia Coll. Pharm. And Sci., 1989), Fort Bragg, NC; Albert A. Verilli, III, M.D. (Case Western Reserve, 1984), Faison, NC; Mark A. Vincent, M.D. (Virginia, 1992), Concord, NC; Eugene Wade, M.D. (Howard, 1981), Burlington, NC; Jeffrey L. Warhaftig, M.D. (Pittsburgh, 1994), Ft. Bragg, NC; Karen L. Weaver, M.D. (Michigan, 1993), Wilmington, NC; Paul H. Wiegand, M.D. (Bowman Gray, 1982), Durham, NC; Patricia S. White, M.D. (Harvard, 1986), Kannapolis, NC; Gwendolyn R. Whitley, M.D. (South Carolina, 1987), Concord, NC; Theodore E. Wilson, M.D. (Med. College of Ohio, 1991), Wilson, NC.

Duke University Affiliated Physicians

Assistant Clinical Professor: William S. Friedman, M.D. (Tulane, 1972).

Assistant Consultant Professors: John B. Anderson, M.D. (Cincinnati, 1980); Philip Singer, M.D.

(Duke, 1975); William Tucker, M.D. (North Carolina, 1966).

Clinical Associates: John Michael Aquino, M.D. (Toronto, 1991); Brian Benjamin, M.D. (Rochester, 1991).

Consulting Associates: Ginetta Archinal, M.D. (New South Wales, 1982); Gillian A. Aylward, M.D. (Canada, 1983); Mignon Benjamin, M.D. (Rochester, 1991); Katherine Bliss, M.D. (North Carolina, 1989); Anita Blosser, M.D. (Kentucky, 1991); W. Kevin Broyles, M.D. (Florida, 1986); Joseph Bruckert, M.D. (Dusseldorf, 1982); Isa Cheran, M.D. (Bowman Gray, 1988); Daniel Crummett, M.D. (Wayne State, 1982); Delora Cummings, M.D. (Albany Med. College, 1989); Jean F. Cyriadque, M.D. (SUNY at Buffalo, 1991); Kati Dessauer, M.D. (North Carolina, 1985); Jenny Franczak, M.D. (West Virginia, 1988); Joanne Fruth, M.D. (Med. Coll. Ohio, 1987); Parul Harsora, M.D. (Univ. of Western Ontario, 1992); Craig A. Hoffmeier, M.D. (Louisiana State, 1986); Robert Juer, M.D. (Tennessee, 1979); Joel R. Kann, M.D. (Eastern Virginia, 1989); Richard Kennedy, M.D. (Illinois, 1983); Thomas Koinis, M.D. (Case Western Reserve, 1980); Thomas Lynn, M.D. (Georgetown, 1987); Rhonda Matteson, M.D. (Cincinnati, 1988); Janet McKeown, M.D. (Toronto, 1990); John Mills, M.D. (Bowman Gray, 1982); George H. Moore, M.D. (East Carolina, 1981); Jane Murray, M.D. (North Carolina, 1984); Corey Muselman, M.D. (Florida, 1991); Elisabeth B. Nadler, M.D. (New York, 1985); T. Andrew O'Donnell, M.D. (Medical College of Ohio, 1993); Coin Page, M.D. (North Carolina, 1983); Jane Satter, M.D. (Rochester, 1977); Carols Sotolongo, M.D. (Univ. Autonoma De Guadelajara, 1981); Tamra H. Stall, M.D. (Case Western Reserve, 1987); Margaret Stetson, M.D. (Rochester, 1977); Richard Taylor, M.D. (North Carolina, 1962); Kelvin E. Wynn, M.D. (Howard, 1988).

Emeriti: Arthur C. Christakos, M.D.; E. Harvey Estes, Jr., M.D.; Siegfried H. Heyden, M.D.; Dorothy E. Naumann, M.D.; Max Woodbury, Ph.D.

Required Courses

During the second year non-primary care students may select either CFM-205 or a combination of CFM-207 and MED-207, the four-week neurology clerkship. Primary care students may complete the neurology clerkship during their fourth year.

CFM-205C. Family Medicine. This basic course in family medicine consists of an eight-week clinical clerkship in the second year. The course goal is to provide students with an understanding of the principles of family medicine and how these apply in community practice. The course emphasizes continuous and comprehensive health care for people of both sexes and all ages within the context of their social groups and communities. Particular attention is paid to the diagnosis and treatment of common medical problems and to health maintenance, ambulatory care, continuity of care, and the role of consultants in primary care. Other topics covered include social factors such as the doctor-patient relationship, the role of the physician in the community, and the economics of health care delivery.

Students are placed with community-based faculty who are practicing family physicians in communities outside of Durham, principally within North Carolina. Most of these preceptorship sites are in rural communities, providing students with exposure to many issues of rural health care such as farming and other occupational injuries, transportation difficulties, and local customs. The eight week sites are scheduled based on the availability of the preceptors. These sites may not be available every rotation. Students gain extensive experience in diagnosing and managing patient problems in an ambulatory care setting under the guidance of the department's faculty. In addition, the clerkship provides students with opportunities to see patients in a variety of other settings including home, nursing home, and community hospital. There is also the opportunity for medical students to be paired with physician assistant students at a community practice site for the purpose of working with mid-level practitioners in a team practice setting. Note: CFM-205C is strongly recommended for all students in the primary care program. Changes in the rotation are not made less than sixteen weeks prior to the start of the rotation. Credit: 8. *J. Copeland*

CFM-207C. Family Medicine Preceptorship. Students not enrolled in the Primary Care Program may opt for a shorter Family Medicine experience. This course is similar to CFM-205C, described above, but lasts only four weeks. This shorter clerkship provides good exposure to the diagnosis and treatment of common problems in ambulatory

family medicine; due to time limitations, less experience is available in prevention, community medicine, and continuity of care. Preceptorship sites are located across the state of North Carolina. Availability of sites is dependent upon approval of the preceptor. Most sites involve living in the community for the duration of the clerkship. Students are expected to complete this clerkship outside of Durham. Changes in the rotation are not made less than eight weeks prior to the start of the rotation. Credit: 4. *J. Copeland*

Basic Science Electives

CFM-238B. Tutorial in Community and Family Medicine. An individually arranged experience in which the student participates in the research program of a faculty member. The subject matter, course credit, and meeting time is arranged with the faculty member. Each student meets regularly with his faculty preceptor and carries out a project related to the preceptor's work. Through these discussions and the project, the student is able to develop an understanding of the discipline involved. Possible areas include health education, geriatrics, family dynamics, occupational health, functional health and quality of life assessment, severity of illness assessment, case-mix adjustment, medical education, management sciences, economic aspects of health care, computer technology, biostatistics and epidemiology, clinical decision making, diagnosis and management of common problems, alcoholism and social support systems. Because of the variety of projects available and the necessity of prior arrangements, it is essential that interested students consult with the instructor and staff at least two months before the beginning of the term selected. Prerequisite: permission of instructor. Credit: 1-16. *G. Parkerson*

CFM-246B. Historical Studies in a Medical Specialty. This elective is offered primarily to those who have made the choice of their probable career specialty. It is intended to provide an appreciation of the developments in that specialty and thereby depends an understanding of it. While the choice of elective topic is made on an individual basis and depends on the interests of each student, emphasis generally is placed on specific theoretical, practical, and organizational developments since the second half of the nineteenth century. The format comprises selected readings, tutorials, and a student project. Credit: 1-2. *English and Gifford*

CFM-247B. Medicine in America. The historical development of the medical profession in the United States with attention to such topics as the changing basis of authority for medical practice, the education of physicians, the impact of science and technology on health care, physician-patient relations, the organization of the profession as a whole and by specialty, the emergence of the hospital, the role of government in health care delivery and contemporary criticisms of the health care system. The history of the Duke University Medical Center provides a recapitulation of course themes. Additional units of credit may be earned through independent study. Credit: 1. *Gifford*

CFM-248B. The Development of and Perspectives on Modern Medicine. Comprised of lectures, discussion, and readings, this course outlines the general history of medicine with particular attention given to recent developments. The course includes such topics as the contributions of William Harvey, medical systems, aspects of clinical diagnosis, and the evolution of key concepts in modern medicine such as cell theory, the germ theory, antisepsis, and theories of immunity. Full use is made of the excellent resources of the Trent Collections. Additional units of credit may be earned through independent study. Credit: 1. *Gifford*

Clinical Science Electives

CFM-250C. Clinical Nutrition. This course provides an overview and opportunity to develop skills in the assessment and management of common nutritional problems in primary care. Topics include nutritional assessment; nutrition during pregnancy and lactation, infancy and childhood, as well as senescence; nutritional management of chronic diseases (diabetes, obesity, cardiovascular disease); health promotion/disease prevention. If permitted by the instructor, this clinical science course can be audited.

Credit: 1. Enrollment: min 3, max 8. *Adams*

CFM-251C. Complementary Medicine: Academic and Community Perspectives.

The purpose of the course is to familiarize Duke students with the large variety of complementary medicine techniques that many of their patients are likely using in the triangle community and to provide a rigorous scientific review of clinical effects. Duke faculty members will be responsible for guiding students in critically evaluating these practices and the available literature on the possible benefits and risks. Community clinicians will be invited to participate as guest lecturers to explain what patients might expect to experience in dealing with a complementary practitioner. They will be instructed to be prepared to field questions of a critical nature, and they will be expected to sign a release stating they will not use participation in the course for marketing purposes in the community. It is expected that the rigorous and balanced course outlined will facilitate communication between the students and their patients in the future. Credit: 3. Enrollment: min 28, max 70. *Burk*

CFM-254C. Community Medicine Elective. This elective combines patient care with study of community health issues and a population-based approach to treatment. Students develop an intervention plan for a problem they perceive and that is perceived by the community. Student also practice study design and implementation via a quality assurance project. This elective is held in Madison County in western North Carolina. Credit: 3. Enrollment: max: 1. *B. Sheline and staff*

CFM-255C. Health Promotion and Disease Prevention. This elective is an intensive clinical experience in health promotion and disease prevention. Students see patients in the Duke Family Medicine Center and participate in a variety of activities designed to help them provide excellent health maintenance care. Specific content areas addressed include counseling skills in nutrition, safe sex practices, and smoking and alcohol cessation, as well as screening tests and immunizations. Credit: 4. Enrollment: min 2, max 6. *Yarnall and staff*

CFM-256C. Ethical Issues in Medicine. This seminar examines ethical questions raised by modern medical science and technology with special attention to their implications for primary care practitioners. It includes both historical and systematic philosophical analyses of these questions. Among topics for consideration are ethical methods (e.g., clinical ethics, philosophical ethics, and public policy), as well as selected practice-related issues (e.g., truth-telling, confidentiality, informed consent). Credit: 1. Enrollment: min 6, max 12. *Sugarman*

CFM-257C. Philosophic Problems for Physicians. This seminar is designed to help the fourth year medical student prepare for becoming an intern/resident in the areas of dealing with patients: taking on that level of responsibility, telling the family/patient about serious illness or about the patient's terminal condition, working with a family at the time of death, and dealing personally and professionally with the kinds of pressures placed on the intern/resident (how to do more than survive the next three to five years, keeping marriage together, being a parent, etc.) Prerequisite: permission of the instructor. If permitted by the instructor, this clinical science course can be audited. Credit: 2 or 4. Enrollment: min 3, max 8. *Puckett and staff*

CFM-258C. Legal Issues in Medicine. A seminar which introduces participants to the basic approach of law and legal process to contemporary issues in medical care including malpractice, hospital privileges, confidentiality, natural death, abortion, consent/authorization for treatment, human experimentation, and peer review. Topics may be chosen by individual students. Common misconceptions about malpractice law and the rights of physicians and patients as well as the legal mechanisms for resolving disputes are examined including the role of expert witnesses. If permitted by the instructor, this clinical science course can be audited. Credit: 2. Enrollment: min 5, max 20. *Warren*

CFM-259C. Advanced Clerkship in Family Medicine. This course provides inten-

sive instruction and practice in the care of primary care patients in the community setting. Students may select from three sites: the Duke Family Medicine Center on the Duke campus, the Duke-FAHEC Family Medicine Center in Fayetteville or the Duke-Cabarrus Family Medicine Residencies in Concord. This course has an outpatient focus and is recommended for students who would like to improve their skills in the care of ambulatory patients, especially those with common problems. Students are involved with day to day patient care under the supervision of family physician faculty and residents. Because of restrictions on the number of students allowed at each site preference is given to those students entering Family Medicine Residencies. Students are advised to contact the department as early as possible for course approval (at least eight weeks in advance). No drops are permitted within sixty days of the first day of the rotation. Prerequisites: permission of instructor. Credit: 2-8. Enrollment: max 4. *Gradison and staff*

CFM-260C. Subinternship in Family Medicine. This course provides senior medical students with an intense inpatient clinical rotation with responsibilities and autonomy similar to that of an intern. The student acts as the primary medical provider for inpatients on the family medicine service in Durham Regional Hospital and follows outpatients at the Duke Family Medicine Center in the setting of a residency program. Clinical instruction and supervision on each patient encounter are afforded by senior level housestaff and faculty members of the Department of Community and Family Medicine. Individual reading on patient problems encountered in the daily work routine is expected. Frequent balanced feedback is provided to students. Students are advised to contact the department as early as possible for course approval (at least eight weeks in advance). No drops are permitted within sixty days of the first day of the rotation. Prerequisites: permission of instructor. Credit: 4. Enrollment: max 2. *Bell and staff*

CFM-261C. Family Medicine Continuity Experience. Students manage a panel of patients over an extended period of time at the Duke Family Medicine Center under the supervision of one family physician faculty member. Patient care is scheduled for one to two half days a week for two to four months. The rotation may be repeated to provide further continuity. A project is required for course credit. Due to the need for clinic schedule arrangements, students are advised to contact the department as soon as possible for course approval (at least eight weeks in advance). Prerequisites: permission of instructor. Credit: 2-8. *Kaprielian and staff*

CFM-271C. The Computer Textbook of Medicine. Students participate in the ongoing development of a computerized database in cardiovascular disease. They participate in research concerning the diagnosis, treatment, and prognosis of patients with coronary artery disease. And, they learn how to make predictions about outcome based on test results of patients on the cardiology service. Prerequisite: permission of instructor. Credit: 2-4. Enrollment: max 5. *Califf, Lee, and Harrell*

CFM-273C. The Ideal Physician. What is the role of the physician in relating with patients? How do you communicate with patients and families? How well do you do this? What is your "bedside manner"? How do you learn about this other than through models and self-reflection? This seminar provides a small group atmosphere for learning more about such skills and for receiving direct feedback on your own communication style and skills. If allowed by instructor, this clinical science course can be audited. Prerequisite: permission of instructor. Credit: 1-2. Enrollment: min 3, max 8. *Puckett and staff*

CFM-274C. The Ideal Patient. Who is the "ideal" patient? What about those who are not so ideal? This seminar combines theory and practice. Information about "difficult" personality types and effective interpersonal skills for dealing with these individuals are integrated into actual practice. Members of the seminar are asked to draw upon past and current experiences with difficult persons and situations as well as to focus on case presentations provided by the instructor. If permitted by the instructor, this clinical science course can be audited. Prerequisite: permission of instructor. Credit: 1-2. Enrollment:

ment: min 3, max 8. *Puckett and staff*

CFM-299C. Community and Family Medicine Preceptorship. An individually tailored preceptorship may be arranged for students to work with a family physician in a community practice site almost anywhere. The rotation allows students to observe and participate in the delivery of health care to individual patients and their families within the context of the community in which they live. The rotation is intended to supplement and complement the second year core clerkship. A wide variety of geographic locations and practice types are available; students may choose from an extensive list or nominate a new site. Because of the necessity for site approval and prior arrangements with preceptors, it is essential that interested students contact the Department as soon as possible and at least four months prior to the desired rotation. Drops are not accepted. Prerequisites: permission of instructor. Credit: 4. *Kaprielian and staff*

DIVISION OF BIOMETRY

CRP-241B. Introduction to Statistical Methods. An introduction to the concepts of statistical estimation and hypothesis testing as applied in clinical research. Topics include probability distributions, descriptive statistics, graphical displays, parametric and non-parametric tests for differences in central tendency, paired comparisons and correlation, simple linear regression, one-way analysis of variance, and logistic regression. Types of study designs and epidemiological concepts are woven into the statistical presentation. Several medical articles are critiqued to foster evaluation of the literature and to demonstrate proper application of statistical techniques. In addition, basic concepts and procedures of SAS are presented for computation of the statistical measures presented in the course. Credit: 4. *Staff*

CRP-242B. Principles of Clinical Research. General principles and issues in clinical research design. Formulating the research objective and the research hypothesis; specifying the study population, the experimental unit and the response variable(s). Classification of studies as experimental or observational, prospective or retrospective, case-control, cross-sectional, or cohort; their relative advantages and limitations and the statistical methods used in their analysis. Emphasis is placed on the traditional topics of clinical epidemiology such as disease etiology, causation, natural history, diagnostic testing, and the evaluation of treatment efficacy. Prerequisites: CRP-241B. Credit: 4. *Staff*

DIVISION OF MEDICAL INFORMATION SCIENCES

MIS-233B. Introduction to Medical Informatics. An in-depth study of the use of computers in biomedical applications. Important concepts related to hardware, software, and applications development are studied through analysis of state-of-the-art systems involving clinical decision support, computer-based interviewing, computer-based medical records, departmental/ancillary systems, instructional information systems, management systems, national data bases, physiological monitoring, and research systems. Approval of the instructor required. C-L: BME-243 (Graduate School). Credit: 3. *Staff*

MIS-234B. Artificial Intelligence in Medicine. An introduction to basic concepts of Artificial Intelligence (AI) and an in-depth examination of medical applications of AI. The course includes heuristic programming, a brief examination of the classic AI programming languages (LISP and PROLOG), and a study of rule-based systems and cognitive models. Specific applications examined in detail include MYCIN, ONCOCIN, PIP, CASNET, ILIAD, QMR, and DXPLAIN and selected EXPERT systems. Approval of the instructor required. C-L: BME-241 (Graduate School). Credit: 3. *Staff*

MIS-235B. Microprocessors and Digital Instruments. Design of microcomputer-based devices including both hardware and software considerations of system design. Primary emphasis on hardware aspects including a progression through initial design, prototype construction in the laboratory, testing of prototypes to locate and correct faults, and final design evaluation. Evaluation includes examination of complexity, reli-

ability, and cost. Design and construction is oriented toward biomedical devices or instruments that include dedicated microcomputers, usually operating in real time. C-L: BME-205 (Graduate School). Credit: 3. *Hammond*

MIS-399B. Preceptorship in Medical Informatics. An individualized research program under the direction and supervision of a member of the faculty of the Medical Information Sciences Program. Credit: 1-16. *Staff*

Genetics

Professor Joseph R. Nevins, Ph.D. (Duke, 1976), Chairman.

Professors: Bryan R. Cullen, Ph.D. (New Jersey Medical School, 1984); Y.-T. Chen, M.D. (National Taiwan Univ., 1973), Ph.D. (Columbia, 1978); Margaret Pericak-Vance, Ph.D. (Indiana, 1978).

Associate Professors: Joseph Heitman, Ph.D. (Rockefeller, 1989), M.D. (Cornell, 1992); Jeffery Vance, Ph.D. (Indiana, 1979), M.D. (Duke, 1984).

Assistant Professors: F. Andrew Futreal, Ph.D. (North Carolina, 1993); Joseph Heitman, Ph.D. (Rockefeller, 1989), M.D. (Cornell, 1992); Daniel Lew, Ph.D. (Rockefeller, 1990); Douglas A. Marchuk, Ph.D. (Chicago, 1985); Andrew S. Peterson, Ph.D. (Harvard, 1988); Bruce Sullenger, Ph.D. (Cornell, 1990); Robin P. Wharton, Ph.D. (Harvard, 1986).

Required Course

GEN-200B. Genetics. A course designed for first year medical students that focuses on the principles of genetics as they apply to human disease. The course emphasizes molecular aspects of gene structure and expression, experimental systems for genetic analysis, and various aspects of human genetics including population genetics and genetic epidemiology, the use of genetic analysis for the identification of disease causing genes, cytogenetics, and genetic diagnosis and counseling. Credit: 2. *Nevins*

Elective

GEN-210B. Genetic Analysis of Human Disease. This course introduces the student to quantitative and molecular aspects in the identification of human disease genes, implications for genetic counseling and risk assessment, and legal and social issues associated with the human genome initiative. The course draws extensively from the scientific literature to illustrate concepts of linkage analysis in Mendelian and complex disease, molecular approaches to disease gene cloning, molecular mechanisms of disease gene expression, gene therapy, and the utility of animal models for understanding human disease. C-L: Graduate School. Credit: 2. *Speer*

Immunology

Professor Thomas F. Tedder, Ph.D. (Alabama, 1984), Chairman.

Professors: R. Randall Bollinger, M.D. (Tulane, 1970), Ph.D. (Duke, 1977); Rebecca H. Buckley, M.D. (North Carolina at Chapel Hill, 1958); Jeffrey R. Dawson, Ph.D. (Case Western Reserve, 1969); Michael M. Frank, M.D. (Harvard, 1960); Eli Gilboa, Ph.D. (Weizmann Inst., 1977); Barton F. Haynes, M.D. (Baylor, 1973); Garnett Kelsoe, D.Sc. (Harvard, 1979); David R. McClay, Jr., Ph.D. (North Carolina, 1971); David S. Pisetsky, Ph.D. (Albert Einstein, 1972); Wendell F. Rosse, M.D. (Chicago, 1958); Hilliard F. Seigler, M.D. (North Carolina at Chapel Hill, 1960); Ralph Snyderman, M.D. (SUNY, 1965); Frances E. Ward, Ph.D. (Brown, 1965).

Associate Professors: Michael S. Krangel, Ph.D. (Harvard, 1982); Kent J. Weinhold, Ph.D. (Thomas Jefferson, 1979).

Associate Research Professors: Andrew E. Balber, Ph.D. (Rockefeller, 1971); Carolyn Doyle, Ph.D. (New York at Stony Brook, 1985); Kay H. Singer, Ph.D. (Duke, 1977).

Assistant Professors: Russell P. Hall, M.D. (Missouri, 1975); Philip Hanna, Ph.D. (Pittsburgh, 1990); Maureane Hoffman, M.D., Ph.D. (Iowa, 1982); Herbert Kim Lyerly, M.D. (California at Los Angeles, 1983); Mary Louise Markert, M.D. (Duke, 1982), Ph.D. (Duke, 1981); Michael G. McHeyzer-Williams, Ph.D. (Melbourne, 1991); Dhavalkumar D. Patel, M.D., Ph.D. (Duke, 1989); Clay Smith, M.D. (Texas-Southwestern, 1984); J. Brice Weinberg, M.D. (Arkansas, 1969); Yuan Zhuang, Ph.D. (Yale, 1989).

Assistant Research Professor: Donna D. Kostyu, Ph.D. (Duke, 1979); Marcella Sarzotti-Kelsoe, Ph.D. (Torino, 1980); Joel R. Ross, Ph.D. (Texas-Southwestern, 1991); Douglas A. Steeber, Ph.D.

(Wisconsin-Madison, 1995); Herman F. Staats, Ph.D. (South Alabama, 1992); Biao Q. Zheng, M.D., (Zhejiang Medical, 1983), Ph.D. (Kings College, London, 1992).

Research Associates: Gabriel Bikah, Ph.D.; Alice P. Bradney, Ph.D.; Juan Carabana, Ph.D.; Shui Cao, M.D.; Mei-Fang Dai, M.D.; Chandrika Ediriwickrema, Ph.D.; Sandra Foster, Ph.D.; Manabu Fujimoto, M.D.; Shuhua Han, M.D.; Minoru Hasegawa, M.D.; Cristina Hernandez, Ph.D.; Scott Langdon, Ph.D.; Xuan Li, Ph.D.; John Mikszta, Ph.D.; Patricia G. Murphy, Ph.D.; Jon Poe, Ph.D.; Adriana C. Vidal, Ph.D.

Emeriti: D. Bernard Amos, M.D.; Charles E. Buckley, III, M.D.; Richard S. Metzgar, Ph.D.

Required Course

IMM-201B. Immunology. A short core course in immunology for first-year medical students. The course includes a general introduction to special areas of immunology such as immunochemistry, immunohematology, and immunogenetics including transplantation and tumor immunology. The initial lectures describe the properties of antibodies, the characteristics of antigens, classes of reactive lymphocytes and accessory cells, the biology of cytokines and the complement system. The course enriched with patient oriented problem-solving sessions. Credit: 2. *Dawson*

Electives

IMM-252B. General Virology and Viral Oncology. The first half of the course is devoted to a discussion of the structure and replication of mammalian and bacterial viruses. The second half deals specifically with tumor viruses which are discussed in terms of the virus-cell interaction, the relationship of virus infection to neoplasia, and the application of retroviruses in molecular and developmental biology. Permission of the instructors is required. C-L: MIC-252B; Graduate School. Credit: 4. Enrollment: min 5. *Keene and staff*

IMM-259B. Molecular Biology I: Proteins and Enzymes. Detailed concepts of the structure and function of proteins as enzymes and as structural elements of cellular substructures including: protein primary structure and its determination, patterns of protein folding, mechanisms of enzyme catalysis and regulation, function and formation of multimeric protein assemblies, proteins and other constituents of biological membranes. C-L: BCH 259B; CBI 259B; MIC 259B; Graduate School. Credit: 3. *Fierke and staff*

IMM-268B. Molecular Biology II: Nucleic Acids. Biochemistry of nucleic acids, with emphasis on their chemistry, structure, metabolism, and biological function in information transfer. Prerequisites: introductory biochemistry and Biochemistry 259. C-L: BCH 268B; MIC 268B; Graduate School. Credit: 4. *Steege and staff*

IMM-269B. Advanced Cell Biology. An advanced course in cell biology with emphasis on current research literature and featuring in-depth discussion of selected areas by staff engaged in research in these areas. The course covers membrane structure and physiology, the cytoskeleton, cell motility systems, chromosome mechanics, chromosome structure and function, and eukaryotic gene structure, control, and replication. C-L: CBI 269B; MIC 269B; Graduate School. Credit: 3. *Siedow and staff*

IMM-291B. Comprehensive Immunology. An intensive course in the biology of the immune system and the structure and function of its component parts. Major topics discussed are: properties of antigens; specificity of antibody molecules and their biologic functions; cells and organs of the lymphoid system; structure and function of complement; inflammation and non-specific effector mechanisms; cellular interactions and soluble mediators in lymphocyte activation, replication, and differentiation; regulation of immune responses, neoplasia and the immune system; molecular structure and genetic organization of immunoglobulins, histocompatibility antigens, and T cell receptor. C-L: MIC-291B; Graduate School. Credit: 4. Enrollment: max 10. *Krangel and staff*

IMM-330B. Medical Immunology. A brief review of basic concepts of immunology is followed by in-depth discussions of the role of immune mechanisms in the pathogenesis and treatment of human diseases. Principle emphasis is placed on immune deficien-

cy diseases, hypersensitivity, transplantation, infectious diseases, autoimmunity, tumor immunology, and immunohematology. applicable the classes include patient presentations and laboratory demonstrations. C-L: MIC-330B Graduate School. Credit: 5. *F. Ward and staff*

IMM-399B. Preceptorship in Immunology. An individual reading and/or laboratory course in specialty areas supervised by an individual faculty member. Acceptance, nature of topic, and amount of credit by individual arrangement with proposed faculty member. Prerequisites: to be determined instructor. Credit: 1-16. *Staff*

Interdisciplinary Courses

Required Course

IND-206C. Medical Practice and Health Systems/CEC. This two-week required clerkship uses lectures, small group discussions, practical projects, and readings to improve students' awareness and understanding of the complexity of the physician's role in rapidly changing systems of healthcare delivery. The course emphasizes the professional and ethical tensions that emerge while striving to optimize care for individuals and the populations of individuals. Consideration of cost focuses on the nature and behavior of costs relevant to healthcare and explores the ambiguities inherent in assessing cost effectiveness of interventions from the divergent viewpoints of payors, managed care organizations, physicians and individual patients. Interdepartmental faculty additionally provide perspective on past and present patterns of medical practice and offer possible models of future physician practices. Credit 2. *Bredehoeft, L. Branch, and staff*

Electives

IND-304C. Medicine in the Third World: A Haitian Perspective. This course is divided into a didactic period conducted between September and December followed by one week in Haiti in early January. The didactic portion of the course will involve seven to ten two-hour sessions to discuss history, medicine, religion, culture, and travel in the third world. In addition, some rudimentary knowledge of the Kreyol language will be introduced. During the didactic portion each student will read a book on a topic relating to Haiti and lead a group discussion related to their reading. While in Haiti, the student will participate as a member of a mission team involving members of the medical and divinity schools. Each student will keep a journal while in Haiti. Four weeks after the trip, each student will turn in a short paper dealing with a topic of personal interest that incorporates all of their experience in the course. Goals of the course: (a) exposing students to health care in the third world; (b) an appreciation for physical diagnosis skills developed by physicians trained without the use of Western technologies and; (c) an appreciation for the natural progression of disease in an environment where health care resources are limited to absent. Credit: 2. *Walmer*

Medicine

Barton F. Haynes, M.D., Frederic M. Hanes Professor of Medicine, (Baylor, 1973), Chair.

DIVISION OF CARDIOLOGY

Professor Gary L. Stiles, M.D. (Vanderbilt, 1975), Chief.

Professors: Thomas M. Bashore, M.D. (Ohio, 1972); Victor S. Behar, M.D. (Duke, 1961); Robert M. Califf, M.D. (Duke, 1978); Fred R. Cobb, M.D. (Mississippi, 1964); Joseph C. Greenfield, Jr., M.D., James B. Duke Professor of Medicine (Emory, 1956); Joseph R. Kisslo, M.D. (Hahnemann, 1967); Robert J. Lefkowitz, M.D., James B. Duke Professor of Medicine (Columbia, 1966); Daniel B. Mark, M.D. (Tufts, 1978); James J. Morris, M.D. (SUNY, 1959); Robert H. Peter, M.D. (Duke, 1961); Harry R. Phillips, M.D. (Duke, 1975); Richard S. Stack, M.D. (Wayne State, 1976); Robert E. Whalen, M.D. (Cornell, 1956).

Associate Professors: Christopher B. Granger, M.D. (Connecticut, 1984); Augustus O. Grant, M.D. (Edinburgh, 1971); J. Kevin Harrison, M.D. (New York, 1984); Michael B. Higginbotham, M.D. (Melbourne, 1973); Mitchell W. Krucoff, M.D. (George Washington, 1980); Kenneth Morris, M.D. (Ohio,

1972); Christopher M. O'Connor, M.D. (Maryland, 1983); E. Magnus Ohman, M.D. (Royal Coll. of Surgeons, 1981); Robert A. Rosati, M.D. (Duke, 1967); Thomas J. Ryan, M.D. (Indiana, 1981); Michael H. Sketch, M.D. (Creighton, 1984); Martin J. Sullivan, M.D. (Ohio State, 1980); James Tchong, M.D. (Johns Hopkins, 1988); Galen S. Wagner, M.D. (Duke, 1965); Robert Waugh, M.D. (Pennsylvania, 1966); J. Marcus Wharton, M.D. (Vanderbilt, 1980); James P. Zidar, M.D. (Loyola, 1985).

Associate Research Professor: Judith C. Rembert, Ph.D. (North Carolina, 1972).

Assistant Professors: Brian H. Annex, M.D. (Yale, 1985); Tristram D. Bahnson, M.D. (California at San Francisco, 1984); Michael A. Blazing, M.D. (California, San Francisco, 1987); Carolyn L. Donovan, M.D. (Texas, Southwestern, 1988); Donald F. Fortin, M.D. (Massachusetts, 1984); Neil J. Freedman, M.D. (Harvard, 1985); Samuel E. George, M.D. (Washington Univ. 1980); Ruth Ann Greenfield, M.D. (Duke, 1985); M. Dee Gunn, M.D. (Southwestern, 1983); Robert A. Harrington, M.D. (Tufts, 1986); James G. Jollis, M.D. (Ohio, 1986); William E. Kraus, M.D. (Duke, 1982); Kenneth W. Mahaffey, M.D. (Univ. of Washington, 1989); L. Kristin Newby, M.D. (Indiana, 1987); Eric D. Peterson, M.D. (Pittsburgh, 1988); Gail E. Peterson, M.D. (Michigan, 1991); Stuart D. Russell, M.D. (Univ. of Washington, 1991); Robert A. Sorrentino, M.D. (Albany Med. Coll. 1985); Andrew Wang, M.D. (Duke, 1990).

Assistant Clinical Professor: Richard L. Callihan, M.D. (Marshall, 1989).

Assistant Research Professors: Patricia A. Cowper, Ph.D. (California at Davis, 1984); Eric L. Eisenstein, D.B.A. (Cleveland State, 1995); Mark E. Olah, Ph.D. (Ohio, 1988); Karsten Peppel, Ph.D. (SUNY at Albany, 1990); Julie A. Pitcher, Ph.D. (Univ. of Dundee, 1988); Richard T. Premont, Ph.D. (City University of New York, 1992); Doris A. Taylor, Ph.D. (Texas, Southwestern, 1987).

Associates: Karen P. Alexander, M.D. (Duke, 1992); James J. Crowley, M.B. (University College Galway, 1985); Michael S. Cuffe, M.D. (Duke, 1991); Christopher D. Kontos, M.D. (Medical College of Virginia, 1989); Chen Y. Tung, M.D. (Ohio State, 1992).

DIVISION OF CLINICAL PHARMACOLOGY

Professor Edward L. C. Pritchett, M.D. (Ohio, 1971), Chief.

DIVISION OF DERMATOLOGY

Professor Russell P. Hall, M.D. (Missouri, 1975), Chief.

Professors: Elise A. Olsen, M.D. (Baylor, 1978); Sheldon R. Pinnell, M.D., J. Lamar Callaway Professor of Dermatology (Yale, 1963).

Associate Professors: Claude S. Burton, M.D. (Duke, 1979); John C. Murray, M.D. (Duke, 1977); Neil S. Prose, M.D. (New York, 1975).

Associate Research Professors: Saood Murad, Ph.D. (California at Davis, 1978); Heather N. Yeowell, Ph.D. (North Carolina, 1982).

Assistant Professors: James M. Grichnik, M.D. (Harvard, 1990); Sarah C. Myers, M.D. (Duke, 1989).

Associate: Maria Mariencheck, M.D. (Washington Univ., 1994).

DIVISION OF ENDOCRINOLOGY, METABOLISM, AND NUTRITION

Associate Professor Francis A. Neelon, M.D. (Harvard, 1962), Acting Chief.

Professors: Marc K. Drezner, M.D. (Pittsburgh, 1970); Mark N. Feinglos, M.D. (McGill, 1973); Jerome M. Feldman, M.D. (Northwestern, 1961); Edward W. Holmes, M.D. (Pennsylvania, 1967).

Associate Professors: Warner M. Burch, M.D. (Bowman Gray, 1971); George J. Ellis, M.D. (Harvard, 1963); John R. Guyton, M.D. (Harvard, 1973).

Associate Research Professor: Bruce Lobaugh, Ph.D. (Pennsylvania State, 1981).

Assistant Professors: Ann J. Brown, M.D. (Stanford, 1988); Louis Luttrell, M.D. (Virginia, 1989); Diana B. McNeill, M.D. (Duke, 1982).

Assistant Clinical Professor: Leslie J. Domalik, M.D. (Pittsburgh, 1986).

Associates: Jennifer B. Green, M.D. (Virginia, 1993); Thomas J. Weber, M.D. (Pritzker, 1989).

DIVISION OF GASTROENTEROLOGY

Professor Rodger A. Liddle, M.D. (Vanderbilt, 1978), Chief.

Professors: Paul G. Killenberg, M.D. (Pennsylvania, 1963); Michael McLeod, M.D. (Duke, 1960); Joanne A. P. Wilson, M.D. (Duke, 1973).

Associate Professors: John Baillie, M.B. (Glasgow, 1977); M. Stanley Branch, M.D. (Med. Coll. of Georgia, 1984); Scott R. Brazer, M.D. (Case Western Reserve, 1981); Jonathan A. Cohn, M.D. (Rockefeller, 1978); Thomas T. Long, M.D. (Bowman Gray, 1966); Don C. Rockey, M.D. (Med. Coll. of Virginia, 1984).

Assistant Professors: Wendy Z. Davis, M.D. (Duke, 1989); Paul S. Jowell, M.D. (Capetown, 1983); Peter J. Mannon, M.D. (Boston, 1983); Jane E. Onken, M.D. (George Washington, 1987); Dawn Provenzale, M.D. (Albany, 1984).

Assistant Clinical Professors: Frank Pancotto, M.D. (Chicago, 1975); James F. Trotter, M.D.

(Emory, 1989); Duane D. Webb, M.D. (SUNY-Stony Brook, 1974).
Associates: Kevin McGrath, M.D. (Jefferson, 1992); Michael A. Shetzline, M.D. (Ohio State, 1991); Mark W. Swaim, M.D. (Duke, 1990); Kaylan S. Wadwa, M.D. (Wuerzburg, 1984).
Instructor Temporary: John F. O'Connor, M.D. (Ireland, 1983).
Visiting Instructor: Alastair D. Smith, M.D. (Aberdeen, 1988).

DIVISION OF GENERAL INTERNAL MEDICINE

Associate Professor Eugene Z. Oddone, M.D. (Colorado, 1985), Chief.
Associate Professors: David B. Matchar, M.D. (Maryland, 1980); David L. Simel, M.D. (Duke, 1980); Jeremy Sugarman, M.D. (Duke, 1986).
Associate Research Professor: Ronnie D. Horner, Ph.D. (Ohio State, 1984).
Assistant Professors: Lori A. Bastian, M.D. (Emory, 1987); David E. Edelman, M.D. (Baylor, 1991); Douglas C. McCrory, M.D. (Miami, 1986); James A. Tulsy, M.D. (Illinois, 1987); Eric C. Westman, M.D. (Wisconsin, 1986); John D. Whited, M.D. (West Virginia, 1990).
Assistant Clinical Professors: Charles O. Beauchamp, M.D. (Duke, 1975); Lawrence H. Greenblatt, M.D. (Northwestern, 1990); Faith H. Holcombe, M.D. (Washington Univ., 1980); Judith M. Kramer, M.D. (North Carolina, 1977); Lynn E. Keplinger, M.D. (West Virginia, 1990); Evangeline R. Lausier, M.D. (Vermont, 1979); Lia S. Logio, M.D. (Johns Hopkins, 1992); John J. Paat, M.D. (Med. Coll. of Ohio, 1984); Robert W. Paterson, M.D. (Duke, 1979); Zeses C. Roulidis, M.D. (Virginia, 1986); Kathleen A. Waite, M.D. (Duke, 1990).
Assistant Research Professor: Hayden B. Bosworth, Ph.D. (Pennsylvania State, 1996)
Associates: Amy P. Abernethy, M.D. (Duke, 1991); Cheryl A. Baker, M.D. (Albany 1995); Cedric M. Bright, M.D. (North Carolina, 1990); Christopher H. Cabell, M.D. (Duke, 1994); S. Tublu Chatterjee, M.D. (Boston, 1990); Cathleen S. Colon-Emeric, M.D. (Johns Hopkins, 1994); Rowena J. Dolor, M.D. (Duke, 1991); Marisa R. Silva, M.D. (North Carolina, 1992); Lisa A. Giannetto, M.D. (Loyola, 1986); Kenneth C. Goldberg, M.D. (Med. Coll. Wisconsin, 1994); Nicole E. Jelesoff, M.D. (Georgetown, 1991); Scott V. Joy, M.D. (Pittsburgh, 1992); Sheri A. Keitz, M.D. (Mount Sinai, 1991); Felicia S. Lacksen, M.D. (UMDNJ, 1994); Michael W. Meredith, M.D. (North Carolina, 1994); Delia Roddy, M.D. (Georgetown, 1995); Amy J. Rosenthal, M.D. (Medical College of Virginia, 1987); Amy W. Shaheen, M.D. (Washington Univ., 1989); Jeannette F. Stein, M.D. (North Carolina, 1981); Eugene E. Wright, M.D. (Duke, 1978).
Clinical Associate: Linda H. Harpole, M.D. (Duke, 1992).

DIVISION OF GERIATRICS

Professor Harvey Jay Cohen, M.D. (SUNY, 1965), Chief.
Associate Professors: Kenneth W. Lyles, M.D. (Med. Coll. of Virginia, 1974); Kenneth E. Schmader, M.D. (Bowman Gray, 1980).
Associate Clinical Professor: Byron B. Hamilton, M.D. (SUNY, Syracuse, 1959).
Associate Research Professors: Connie Bales, Ph.D. (Tennessee, 1981); Elizabeth Clipp, Ph.D. (Cornell, 1984).
Assistant Professors: Anthony N. Galanos, M.D. (South Alabama, 1986); Helen Hoenig, M.D. (Arizona, 1985).
Assistant Clinical Professors: Byron B. Hamilton, M.D. (SUNY at Syracuse, 1959); Jack I. Twersky, M.D. (Hahnemann, 1982).
Assistant Research Professors: Pao-Hwo Lin, Ph.D. (Texas, Austin, 1990); Miriam Morey, Ph.D. (North Carolina, 1997); Christine Ruby, Pharm.D. (Pittsburgh, 1994); Miriam Smyth, Ph.D. (Maryland, 1986).
Associates: Arline Bohannon, M.D. (New York at Syracuse, 1988); Robert E. Martell, M.D. (Wayne State, 1993); Heidi K. White, M.D. (Washington Univ., 1989).

DIVISION OF HEMATOLOGY

Professor Marilyn J. Telen, M.D. (New York, 1977), Chief.
Professors: Charles S. Greenberg, M.D. (Hahnemann, 1976); Wendell F. Rosse, M.D., Florence McAllister Professor (Chicago, 1958); J. Brice Weinberg, M.D. (Arkansas, 1969).
Associate Professors: William H. Kane, M.D. (Washington Univ., 1982); Thomas L. Ortel, M.D. (Indiana, 1985).
Assistant Professor: Scott D. Berkowitz, M.D. (Jefferson, 1979).
Assistant Research Professor: Dipak K. Ghosh, Ph.D. (Calcutta, 1984).
Associate: Laura M. De Castro, M.D. (Autonoma de Santo Domingo, 1986).

DIVISION OF INFECTIOUS DISEASES

Professor John D. Hamilton, M.D. (Colorado, 1964), Chief.
Professors: G. Ralph Corey, M.D. (Baylor, 1973); John Perfect, M.D. (Med. Coll. of Ohio, 1975);

Daniel J. Sexton, M.D. (Northwestern, 1971); Kenneth H. Wilson, M.D. (North Carolina, 1974).
Associate Professor: John A. Bartlett, M.D. (Virginia, 1981).
Assistant Professors: Gary M. Cox, M.D. (Virginia, 1989); Richard Frothingham, M.D. (Duke, 1981); Carol Dukes Hamilton, M.D. (Utah, 1985); Alison E. Heald, M.D. (Pennsylvania, 1986); Charles B. Hicks, M.D. (George Washington, 1979); Kathryn B. Kirkland, M.D. (Dartmouth, 1986).
Assistant Research Professor: Dena L. Toffaletti, Ph.D. (North Carolina, 1977).
Associates: Murray Abramson, M.D. (Duke, 1991); J. Andrew Alspaugh, M.D. (Duke, 1991).

DIVISION OF MEDICAL ONCOLOGY

Professor Keith M. Sullivan, M.D. (Indiana, 1971), Chief.
Professors: O. Michael Colvin, M.D., William W. Shingleton Professor of Cancer Research, (Washington Univ., 1961); Jeffrey Crawford, M.D. (Ohio State, 1974); Jon P. Gockerman, M.D. (Chicago, 1967); Andrew T. Huang, M.D. (Taiwan, 1965); Russel Kaufman, M.D. (Ohio, 1973); Joseph O. Moore, M.D. (Johns Hopkins, 1971).
Associate Professors: Gerold Bepler, M.D. (Philipps, 1983); Nelson J. Chao, M.D. (Yale, 1981); James J. Vredenburgh, M.D. (Vermont, 1983).
Associate Clinical Professor: Gwynn D. Long, M.D. (Bowman Gray, 1983).
Associate Research Professors: David Adams, Ph.D. (Nebraska, 1979); Susan M. Ludeman, Ph.D. (Catholic Univ., 1979).
Assistant Professors: Carlos de Castro, M.D. (Southwestern, 1985); Jennifer L. Garst, M.D. (Med. Coll. of Georgia, 1990); Marc Gautier, M.D. (Dartmouth, 1986); Herbert I. Hurwitz, M.D. (Jefferson, 1988); Michael Kelley, M.D. (Michigan, 1985); David Rizzieri, M.D. (Rochester, 1991); Clayton A. Smith, M.D. (Southwestern, 1984); Linda M. Sutton, M.D. (Massachusetts, 1987).
Assistant Clinical Professors: Lyndsay N. Harris, M.D. (Alberta, 1988); William P. Petros, Ph.D. (Philadelphia Coll. of Pharm., 1987).
Assistant Research Professor: Michael P. Gamcsik, Ph.D. (Edinburgh, 1983); Ying-Fu Su, Ph.D. (Colorado, 1979).
Associates: Darrel P. Cohen, M.D. (Boston, 1992); Eileen Johnston, M.D. (Virginia, 1991); Gail A. Leget, M.D. (Faculte Libre de Medecine, 1992); Scott G. Lilly, M.D. (Medical College of Ohio, 1991); Susan J. Littman, M.D. (Albany, 1989); P. Kelly Marcom, M.D. (Baylor, 1989); Michael Morse, M.D. (Yale, 1990); Kellie E. Rizzieri, M.D. (Rochester, 1991).
Instructor Temporary: Michael R. Cooper, M.D. (Duke, 1983).

DIVISION OF NEPHROLOGY

Professor Thomas M. Coffman, M.D. (Ohio, 1980), Chief.
Professors: James R. Clapp, M.D. (North Carolina, 1957); Steve J. Schwab, M.D. (Missouri, 1979); William E. Yarger, M.D. (Baylor, 1963).
Clinical Professor: Arthur Greenberg, M.D. (Washington Univ., 1975).
Associate Professors: L. Darryl Quarles, M.D. (Alabama, 1979); Stephen R. Smith, M.D. (Duke, 1985); Robert F. Spurney, M.D. (Ohio, 1983); Laura P. Svetkey, M.D. (Harvard, 1979).
Assistant Professors: Michael S. Berkoben, M.D. (Pennsylvania, 1986); David W. Butterly, M.D. (Duke, 1987); Eugene C. Kovalik, M.D. (McGill, 1987); Roslyn B. Mannon, M.D. (Duke, 1985); Michael I. Oliverio, M.D. (West Virginia, 1990); Lynda A. Szczech, M.D. (Jefferson Med., 1991).
Associates: Krairerk Athirakul, M.D. (Prince of Sojgkla, 1986); Russ P. Carstens, M.D. (Yale, 1990); Olafur S. Indridason, M.D. (Iceland, 1987).
Visiting Instructor: Matthew J. Oliver, M.D. (Western Ontario, 1993).

DIVISION OF NEUROLOGY

Professor Warren J. Strittmatter, M.D. (Duke, 1973), Chief.
Professors: James O. McNamara, M.D., Carl R. Deane Professor of Neuroscience, (Michigan, 1968); Margaret Pericak-Vance, Ph.D. (Indiana, 1978); Donald B. Sanders, M.D. (Harvard, 1964).
Associate Professors: Mark J. Alberts, M.D. (Tufts, 1982); Larry B. Goldstein, M.D. (Mt. Sinai, 1981); David A. Hosford, M.D. (Emory, 1983); Barrie H. Hurwitz, M.D. (Witwatersrand, 1968); Janice M. Massey, M.D. (Georgetown, 1978); Rodney A. Radtke, M.D. (Northwestern, 1980); Marvin Rozear, M.D. (Duke, 1966); Donald Schmechel, M.D. (Harvard, 1974); Jeffery M. Vance, M.D. (Duke, 1984).
Associate Research Professors: John R. Gilbert, Ph.D. (North Carolina, 1982); Michael P. Vitek, Ph.D. (Dartmouth, 1983).
Assistant Professors: James R. Burke, M.D. (New York at Brooklyn, 1985); Carmelo Graffagnino, M.D. (West-Ontario, 1985); Daniel T. Laskowitz, M.D. (Duke, 1991); Joel C. Morgenlander, M.D. (Pittsburgh, 1986); Richard W. Tim, M.D. (California at San Diego, 1986); Kevan VanLandingham, M.D. (Virginia, 1985).
Assistant Research Professors: Elizabeth Hauser, Ph.D. (Michigan, 1998); Michael A. Hauser,

Ph.D. (Johns Hopkins, 1990); Xiao-Ping He, Ph.D. (Shanghai, 1987); Ram S. Puranam, Ph.D. (Indian Institute, 1986); Ann Saunders, Ph.D. (Duke, 1987); William K. Scott, Ph.D. (South Carolina, 1996); Marcy Speer, Ph.D. (Duke, 1993); Patrick M. Sullivan, Ph.D. (North Carolina, 1993).

Associates: Gregory N. Barnes, M.D. (Kentucky, 1992); Vani R. Chilukuri, M.D. (Andhra Med. 1982); Aatif M. Husain, M.D. (Rawalpindi, 1989); Eden R. Martin, Ph.D. (North Carolina State, 1997); Jeremy N. Rich, M.D. (Duke, 1993); Burton L. Scott, M.D. (Miami, 1990); Sibyl E. Wray, M.D. (Bowman Gray, 1994).

Clinical Associate: E. Wayne Massey, M.D. (Texas at Galveston, 1970).

Instructor Temporary: Martin J. McKeown, M.D. (Toronto, 1990).

Visiting Associate: Ilkcan Cokgor, M.D. (Hacettepe, 1989).

DIVISION OF PULMONARY AND CRITICAL CARE MEDICINE

Professor William J. Fulkerson, M.D. (North Carolina, 1977); Chief.

Professors: Neil R. MacIntyre, M.D. (Cornell, 1972); Claude Piantadosi, M.D. (Johns Hopkins, 1975); Jonathan Stampler, M.D. (Mt. Sinai, 1985); Stephen L. Young, M.D. (California at San Francisco, 1968).

Research Professor: Fredrick J. Miller, Ph.D. (North Carolina State, 1977).

Visiting Professor of Medicine: Werner Hofmann, Ph.D. (Vienna, 1973).

Associate Professors: Peter S. Kussin, M.D. (Mount Sinai, 1985); Victor F. Tapson, M.D. (Hahnemann, 1982).

Assistant Professors: Rodney J. Folz, M.D. (Washington Univ. 1989); Y. C. Tony Huang, M.D. (National Taiwan, 1983); Douglas G. Kelling, M.D. (Harvard, 1972); Michael L. Russell, M.D. (North Carolina, 1985); Karen Welty-Wolf, M.D. (Duke, 1986).

Assistant Clinical Professor of Medicine: Mark P. Steele, M.D. (Illinois, 1982).

Assistant Research Professors: Barbara Buckley, Ph.D. (Johns Hopkins, 1985); Andrew J. Gow, Ph.D. (Temple, 1995); Alfred Hausladen, Ph.D. (Virginia Polytechnic, 1992); Yun Zhao, Ph.D. (Shanghai Med. Univ., 1990).

Associates in Medicine: Martha S. Carraway, M.D. (Bowman Gray, 1988); John P. Connolly, M.D. (Rochester, 1982); Joseph A. Govert, M.D. (California, Irvine, 1989); Harvey E. Marshall, M.D. (Bowman Gray, 1991); Loretta G. Que, M.D. (Chicago - Pritzker, 1989).

Visiting Associate in Medicine: Ernst-Gilbert Schreiber, M.D. (Cologne, 1987).

DIVISION OF RHEUMATOLOGY, ALLERGY AND CLINICAL IMMUNOLOGY

Professor David S. Pisetsky, M.D. (Albert Einstein, 1973), Chief.

Professors: Michael S. Hershfield, M.D. (Pennsylvania, 1967); Barton F. Haynes, M.D., Frederic M. Hanes Professor (Baylor, 1973); Nicholas M. Kredich, M.D. (Michigan, 1962); Ralph Snyderman, M.D., James B. Duke Professor of Medicine, (New York, Downstate, 1965).

Associate Professors: Nancy B. Allen, M.D. (Tufts, 1978); Peter Bressler, M.D. (Duke, 1981); David S. Caldwell, M.D. (Bowman Gray, 1967); Dhavalkumar Patel, M.D. (Duke, 1989); John R. Rice, M.D. (Miami, 1968); E. William St. Clair, M.D. (West Virginia, 1980).

Associate Clinical Professor: Rex M. McCallum, M.D. (Vanderbilt, 1980).

Associate Research Professor: Kay H. Singer, Ph.D. (Duke, 1977).

Assistant Professor: Virginia B. Kraus, M.D. (Duke, 1982).

Assistant Research Professors: Haribabu Bodduluri, Ph.D. (Indian Inst., 1984); Hua-Xin Liao, Ph.D. (North Carolina, 1991); M. Richardo Richardson, Ph.D. (Barcelona, 1988); Herman F. Staats, Ph.D. (South Alabama, 1992).

Associate in Medicine: John S. Sundry, M.D. (Hahnemann, 1991).

ADJUNCT FACULTY

Professor of Experimental Medicine: James E. Niedel, M.D. (Miami, 1973).

Adjunct Associate Professors of Medicine: John S. Penta, Ph.D. (Purdue, 1967); Walter J. Rogan, M.D. (California, San Francisco, 1975); Sandra L. White, Ph.D. (Michigan, 1974).

Adjunct Assistant Professors of Medicine: Edward Breitschwerdt, D.V.M. (Georgia, 1974); Linda A. Charles, M.D. (North Carolina, 1991); Richard Kent, M.D. (California at San Diego, 1975); Jack A. Taylor, M.D. (Wisconsin, 1984).

Adjunct Assistant Professor of Experimental Medicine: John J. O'Neil, Ph.D. (California at San Francisco, 1974).

CONSULTING FACULTY

Consulting Professors: Perry J. Blackshear, M.D. (Harvard, 1977); James D. Crapo, M.D. (Rochester, 1971); David T. Durack, M.B. (West Australia, 1969); Robert A. Gutman, M.D. (Florida, 1962); Robert J. Jacobson, M.D. (Witwatersrand, 1966); Eric N. Prystowsky, M.D. (Mount Sinai, 1973); Barry W. Ramo, M.D. (Colorado, 1964); Allen D. Roses, M.D. (Pennsylvania, 1967); Eric J. Topol, M.D.

(Rochester, 1979).

Associate Consulting Professors: Richard V. Clark, M.D. (Washington, 1977); Kevin G. Peters, M.D. (Iowa, 1983); David B. Pryor, M.D. (Michigan, 1976); Joseph A. Puma, D.O. (New York Coll. of Osteopathy, 1985).

Assistant Consulting Professors: Syed Ahmed, M.D. (Dow Med. Coll., 1967); June Almenoff, M.D. (Mt. Sinai, 1985); Roy M. Ambinder, M.D. (Columbia, 1975); Franc A. Barada, M.D. (Virginia, 1971); Robert P. Bauman, M.D. (Wayne State, 1977); Camille L. Bedrosian, M.D. (Harvard, 1983); Robert N. Belkin, M.D. (Cornell, 1980); Charles F. Bethea, M.D. (Oklahoma, 1971); Frederic Blum, M.D. (New York Univ., 1985); Dean A. Bramlett, M.D. (Illinois, 1976); J. Trig Brown, M.D. (Washington Univ., 1977); Cho-Yen Chiou, M.D. (Taipei Medical College, 1984); A. Alan Chu, M.D. (Duke, 1980); Gary J. Collins, M.D. (Uniformed Services, 1982); Peter J. Conlon, M.D. (Royal Coll. of Surgery, 1986); Edwin Cox, M.D. (Duke, 1971); Stephen C. Culp, M.D. (Vermont, 1986); Philip H. Dunn, M.D. (Duke, 1976); Nancy L. Earl, M.D. (North Carolina, 1982); Maha ElKordy, M.D. (North Carolina, 1988); Lewis D. Elliston, M.D. (Baylor, 1969); John W. Froggatt, III, M.D. (Miami, 1983); Andrew J. Ghio, M.D. (Boston, 1981); F. Roosevelt Gilliam, M.D. (Duke, 1981); William Gough, M.D. (Rochester, 1976); Rochelle M. Hanley, M.D. (Michigan, 1978); Robert A. Harrell, M.D. (Johns Hopkins, 1980); M. Alycia Hassett, M.D. (Duke, 1978); John W. Hiemenz, M.D. (Virginia, 1978); Elizabeth H. Holt, M.D. (Bowman Gray, 1986); Christine M. Hunt, M.D. (Boston, 1982); Susan F. Isbey, M.D. (North Carolina, 1987); Eric M. Janis, M.D. (Johns Hopkins, 1989); Souha Kanj, M.D. (St. Joseph, 1987); Elizabeth Kanof, M.D. (New York, 1960); Vincent L.M. Keipper, M.D. (Vanderbilt, 1973); G. Wallace Kernodle, M.D. (North Carolina, 1981); Joel S. Kovarsky, M.D. (Iowa, 1972); Allan R. Krusell, M.D. (Tufts, 1986); Gunther Lallinger, M.D. (Ludwig, 1972); Andrew J. Laster, M.D. (Johns Hopkins, 1979); Virginia A. Lightner, M.D. (Duke, 1982); S. Spence McCachren, M.D. (Duke, 1978); Frank A. McGrew, M.D. (Case Western Reserve, 1970); J. Frederick McNeer, M.D. (Duke, 1972); Roderick B. Meese, M.D. (Cincinnati, 1981); Gwenesta B. Melton, M.D. (Tulane, 1979); Lefkos T. Middleton, M.D. (University of Louis Pasteur, 1976); G. Diego Miralles, M.D. (Buenos Aires, 1986); Robert D. Mitchell, M.D. (Michigan, 1982); Brant S. Mittler, M.D. (Duke, 1972); G. Radford Moeller, M.D. (Duke, 1977); Eva L. Morgenstern, M.D. (Connecticut, 1976); Rebecca L. Moroose, M.D. (Connecticut, 1980); John J. Murphy, M.D. (Northwestern, 1982); Robert B. Reynolds, M.D. (Royal College of Surgeons, 1984); Stephen H. Royal, M.D. (New York, Downstate, 1981); John H. Russell, M.D. (Virginia, 1963); Iqbal K. Savani, M.D. (Dow Medical, 1985); Ricky M. Schneider, M.D. (Yale, 1977); Ala Sharara, M.D. (Beirut, 1987); William J. Shergy, M.D. (Hahnemann, 1982); John B. Simpson, M.D. (Duke, 1973); David K. Smith, M.D. (Case Western Reserve, 1974); Adam F. Spitz, M.D. (SUNY at Brooklyn, 1988); James G. Wall, M.D. (North Carolina, 1982); Abe Walston, M.D. (Duke, 1963); James O. Wynn, M.D. (Cornell, 1951); Lee H. Zehngbot, M.D. (Pennsylvania, 1976); Darryl C. Zeldin, M.D. (Indiana, 1986).

Consulting Associates: Fred H. Allen, M.D. (Columbia, 1959); David J. Ahr, M.D. (Georgetown, 1969); Russell D. Anderson, M.D. (Duke, 1984); Faye T. Banks, M.D. (Virginia, 1982); L. Thomas Barber, M.D. (George Washington, 1982); Habib Bassil, M.D. (St. Joseph, 1980); Kenneth R. Beer, M.D. (Pennsylvania, 1989); Polly A. Beere, M.D. (Chicago, 1986); Alfonso E. Bello, M.D. (Chicago, 1990); Ira M. Bernstein, M.D. (Bowman Gray, 1970); Nayan K. Bhatt, M.D. (Sheffield Univ., 1981); Alan M. Blaker, M.D. (Maryland, 1984); Charles R. Bokesch, M.D. (Emory, 1973); James F. Boyd, M.D. (Duke, 1974); Garrett Bressler, M.D. (Duke, 1978); Louis L. Brunetti, M.D. (Mount Sinai, 1983); A. Gray Bullard, M.D. (North Carolina, 1985); Dwayne D. Callwood, M.D. (Medical Coll. of Virginia, 1989); Paul Campbell, M.D. (Temple, 1985); Stefani L. Capone, M.D. (Tulane, 1991); John F. Carr, M.D. (Tennessee, 1968); Raul G. Castillo, M.D. (Ponce Sch. of Medicine, 1985); Charles J. Cattano, M.D. (SUNY at Syracuse, 1982); Geoffrey S. Chapman, M.D. (California at San Francisco, 1975); Ambrose Chiang, M.D. (Taipei Med. Coll., 1981); Timothy A. Collins, M.D. (Wayne State, 1988); Paul R. Conkling, M.D. (Ohio, 1982); Henry Y. Chow, M.D. (Eastern Virginia, 1991); James H. Cooke, M.D. (Duke, 1976); Thomas A. Dalton, M.D. (Maryland at Baltimore, 1987); James D. Daniels, M.D. (Med. Coll. of Virginia, 1966); Manuel H. Enriquez, M.D. (East-Ramon Magsaysay, 1979); Richard B. Everson, M.D. (Rochester, 1972); Kenneth A. Fath, M.D. (Ohio State, 1986); Richard Goulah, M.D. (St. George, 1982); Ralph Gousse, M.D. (Faculte de Medicine Haiti, 1982); James N. Harris, M.D. (Emory, 1973); Douglas L. Hill, M.D. (Vanderbilt, 1987); John D. Hunter, M.D. (Duke, 1976); Dennis C. Kabasan, M.D. (Graz, 1977); Roger Karam, M.D. (Los Andes, 1980); Gerrit A. Kimmey, M.D. (South Carolina, 1979); Joseph M. Kmonicek, M.D. (Jefferson, 1980); Fred M. Krainin, M.D. (Boston, 1981); Bruce J. Kowalski, M.D. (Marshall, 1991); Gilbert A. Leidig, M.D. (Pennsylvania, 1984); Stanley Levy, M.D. (Georgetown, 1971); Richard N. Lind, M.D. (Illinois, 1977); Linda F. Lukman, M.D. (St. George, 1990); Elisabeth A. McKeen, M.D. (Albany, 1974); Gary P. Miller, M.D. (Virginia, 1976); David C. Molthrop, Jr., M.D. (Louisiana State, 1987); Ritwick Panicker, M.D. (Christian Med. Coll., 1982); Alexander Paraschos, M.D. (Med. Coll. of Virginia, 1986); Robert E. Pryor, M.D. (Baylor, 1986); Michael A. Rave, M.D. (Uniformed Ser-

vices, 1989); Veronica J. F. Ray, M.D. (North Carolina, 1979); John D. Reed, M.D. (North Carolina, 1986); David F. Rhodes, M.D. (Vanderbilt, 1985); David N. Robinson, M.D. (Florida, Gainesville, 1989); Vera Ann Rose, M.D. (East Tennessee, 1985); Neal A. Rothschild, M.D. (UMDNJ, 1981); Manfred Rothstein, M.D. (Duke, 1974); Peter Rubin, M.D. (Calgary, 1988); Augustin J. Schwartz, M.D. (Jefferson, 1971); Roger L. Seagle, M.D. (Bowman Gray, 1979); Jeffrey T. Seder, M.D. (CETEC Univ., 1982); Willie J. Sessions, M.D. (Tufts, 1985); Daniel L. Spitz, M.D. (Med. Univ. of South Carolina, 1980); Robert K. Stack, M.D. (Wayne State, 1981); Thomas A. Steffens, M.D. (Tufts, 1982); Jean-Francois Tanguay, M.D. (Montreal, 1987); Thomas F. Trahey, M.D. (Bowman Gray, 1984); Janet K. Vasey, M.D. (Indiana, 1983); Robert A. Warner, M.D. (SUNY at Syracuse, 1969); Diane M. Williams, M.D. (Minnesota, 1987); Boshra George Zakhary, M.D. (Ain Shams Univ. 1981); William J. Zimmer, M.D. (Wisconsin, 1986).

CONSULTING ASSOCIATES (Duke University Affiliated Physicians): Martha B. Adams, M.D. (Virginia, 1976); Ron D. Fleming, M.D. (Vanderbilt, 1984); Ronald F. Halbrooks, M.D. (Texas Medical Branch, 1983); Keith Hassan, M.D. (West Virginia, 1990); Nicole S. Hinson, M.D. (Wake Forest, 1993); Paul E. Kile, M.D. (Tufts, 1982); Carol Kirschenbaum, M.D. (North Carolina, 1991); Carlton David Miller, M.D. (North Carolina, 1987); A. Dean Morgan, M.D. (Duke, 1975); Karlyn Paglia, M.D. (Jefferson, 1995); Colleen P. Ramsey, M.D. (New Jersey Medical School, 1992); Michael B. Shipley, M.D. (Duke, 1974); Robert D. Stewart, M.D. (West Virginia, 1974); Raymond J. Toher, M.D. (Duke, 1975); William F. Uthe, M.D. (Med. Coll. of Ohio, 1974); John W. Whelan, M.D. (Jefferson, 1990); James C. Womble, M.D. (North Carolina, 1986).

CONSULTING ASSOCIATES (COMMUNITY PDC PHYSICIANS): Russell Anderson, M.D. (Duke, 1984); James C. Cook, M.D. (Tulane, 1976); Sydney G. Short, M.D. (West Virginia, 1983); Brian C. Torgerson, M.D. (Minnesota, 1978).

Emeriti: C. Edward Buckley, M.D.; Walter L. Floyd, M.D.; John T. Garbutt, M.D.; J. Caulie Gunnells, M.D.; Albert Heyman, M.D.; Jacqueline C. Hijmans, M.D.; Charles Johnson, M.D.; Yi-Hong Kong, M.D.; Johannes A. Kylstra, M.D.; Harry T. McPherson, M.D.; Barbara Newborg, M.D.; Thomas F. Newcomb, M.D.; Richard M. Portwood, M.D.; Herbert A. Saltzman, M.D.; Herbert O. Sieker, M.D.; Harold R. Silberman, M.D.; Eugene A. Stead, Jr., M.D.; Ara Tourian, M.D.; Malcolm P. Tyor, M.D.; James B. Wyngaarden, M.D.

Required Courses

MED-205C. Medicine. The second year clerkship in medicine provides students with the basic humanistic and clinical skills as well as some of the factual information used in the practice of medicine. It is a time for students to consolidate what has been learned during the first year and apply it to the study of their "own" patients. Since it is not possible to cover systematically the entire body of internal medicine during the next eight weeks, students are provided with a series of representative learning experiences based on the case-study method. The goals are to teach a method of patient evaluation and care and to provide a firm foundation in medical problem-solving that will be helpful throughout the student's future careers. It is specifically expected that: (1) Students perform and record a complete history and physical examination on each patient they admit. (During the first four weeks, this should be a **minimum** of two patients per week; thereafter **at least** three patients per week) (2) After the resident has also assessed the patient, students discuss their plans(s) for the evaluation and care of the patient. Students and residents return to the bedside to resolve any discrepant historical or physical examination findings. (3) The student's complete work-up (including analysis of primary data such as the peripheral blood smear, urinalysis, sputum gram stain, ECG, etc. where appropriate) is in the chart by 8:00 a.m. the next day. It is important during the clerkship to learn to evaluate primary data in timely fashion. (4) Students take primary responsibility for the care of their patients, following them daily and writing progress notes in the chart. Students are responsible for knowing what has happened to their patients since last rounded on including the rationale for all diagnostic tests and therapeutic interventions as well as their outcomes. (5) Students participate in various diagnostic/therapeutic procedures (e.g., lumbar punctures, thoracentesis, paracentesis, arthrocentesis, arterial blood gases, placement of intravenous lines) and, where appropriate, perform these procedures under the supervision of the house staff. (6) Students see each of their patients on a daily basis **before** morning work rounds, review what has happened since last seen, and formulate a preliminary plan of care and treatment for each patient.

Students then present these formulations to their ward teams during morning work rounds. (7) Students prepare for their bedside case presentations by reading, at a minimum, relevant sections in a standard textbook of medicine. (8) Students present their patients to an attending physician within 24 hours of admission, knowing all pertinent medical information as well as the rationale for their ongoing plan(s) for care and evaluation; (9) Students do not miss any attending rounds without prior permission from their attending physician. (10) Students attend all the Chairs Conferences, sign-out rounds with the Chief Medical Resident, Physical Diagnosis Teaching Rounds, Medical Grand Rounds, and the Student Lecture Series unless urgent ward duties preclude doing so. Weight: 8. *Waugh*

MED-207C. Neurology. The second year course in neurology provides the student with a firm understanding of the neurological examination, formulation of clinical neurological problems, and practice with written and oral communications in a hospital setting. The student has the opportunity to apply the neuroanatomy, neurophysiology, neurochemistry, and neuropathology learned in the first year to the evaluation and care of his or her patients. Each student is assigned patients from the neurology services at Duke Hospital or the Durham VA Medical Center. The student elicits a history and performs a physical examination. The student records the findings in the hospital charts and presents the findings at regular staff rounds. The student then participates with a clinical team of faculty and house officers in the hospital evaluation of the patients. The student is encouraged to participate in all diagnostic procedures such as lumbar puncture. The student has the opportunity to follow patients through neuro-radiological and neuro-surgical procedures forming part of evaluation and treatment.

The specific expectations for the sophomore student are: (1) to perform and record a competent neurological and history examination on each admitted patient, (2) to be competent in the hospital management of neurological patients including diagnostic appropriate electrical studies, (3) to assume responsibility as the primary care person for his or her patients, to include daily progress notes on hospital charts, and to be familiar with the results of all therapeutic interventions and diagnostic tests performed on his patients, (4) to participate in daily work rounds with an assigned team of house officers and faculty, (5) to be sufficiently knowledgeable to be able to participate in patient care decisions, (6) to attend faculty attending rounds and to present his patients to faculty within twenty-four hours after admission, and (7) to participate in neurology service rounds and conferences during the course.

The course includes faculty lectures. A written evaluation is provided to the students by faculty and house staff. There is an examination.

This course is usually taken in conjunction with CFM-207. Weight: 4. *Morgenlander*

Electives

MED-210C. Advanced General Medicine (Duke/Durham-VA). (1) Course Goals: To expand the experience and knowledge gained during the second year medicine clerkship. Primary - Providing additional experience in the management of hospitalized patients with a wide variety of general internal medical problems. Secondary - Developing a comprehensive understanding of the pathophysiology of the common problems encountered on an internal medicine inpatient service. This course is recommended for visiting students and Duke students who receive a straight grade of Pass in MED 205C. (2) How Goals Are Achieved: Students are assigned to one of the general medical wards at either Duke or the VA Hospital. They are assigned patients in rotation with the second year students on the service and are expected to perform and complete an initial evaluation, develop a care plan, write the orders (to be countersigned by the intern), present the patient at teaching rounds, and follow the patient throughout the hospital course. Students are assigned three to five patients per week and are expected to do outside reading on each. The student may be advanced to the subinternship level during the eight week period at the recommendation of the chief medical resident. (3) Methods of

Evaluation: The evaluation form is made available to each student at the beginning of the rotation. There are formal mid-term and final evaluations. No final exam is given. Requests for Duke or Durham VA rotation are accepted on first-come, first-served basis. Call 681-6745. Credit: 10. Enrollment: max 6. *Waugh and staff*

MED-211C. Internal Medicine Subinternship (Duke/Durham-VA). (1) Course Goals: To provide an internal medicine inpatient care experience at the intern level. (2) How Goals Are Achieved: Students are assigned to one of the two inpatient services (Duke or VA) and are supervised by a second or third year internal medicine resident. The student functions as an intern on that service with the exception that orders must be countersigned by a medical house officer. A pager and sleep-in facilities are available. No other medical intern is assigned to the subintern's patient. The number of patients assigned is determined by the supervising resident with anticipated increases over the four weeks. (3) Methods of Evaluation: Students are evaluated by their resident and senior staff attending. The evaluation form is made available to each student at the beginning of the rotation. There is an informal evaluation at two weeks and a formal evaluation at four weeks. No final exam is given. Prerequisites: available only to Duke medical students who receive grades of Honors or P+ in MED 205C. Students must obtain the written permission of Dr. Robert Waugh to register for or drop this course. Call 681-6745. Students may indicate a preference for Duke or the VA Hospital on a first-come, first-served basis but ultimate assignments to one institution or another will be made on the basis of factors such as team availability and patient census. Credit: 5 or 10. Enrollment: max 13. *Haynes and staff*

MED-213C. Tutorial in Medical PDC. (1) Course Goals: Primary–To broaden student exposure to ambulatory care in internal medicine and allow students to work intensively with a single, seasoned medical practitioner. Students learn the informational content relevant to the discipline, but also have the opportunity to observe how one doctor goes about daily practice. (2) How Goals Are Achieved: Students work in a one-to-one relationship with a faculty member in the Department of Medicine who see patients regularly in the Medical PDC. Students evaluate patients and develop plans for treatment and follow-up under the guidance of the preceptor. Students may follow patients admitted to the hospital. Students may select preceptors from General Internal Medicine or any of the medical sub-specialities. (3) Methods of Evaluation: The preceptor observes the student's interaction with patients and the quality of the student's evaluation, including assessments, plans, and follow-up on a daily basis. Prerequisites: Students must prearrange their elective with an individual preceptor and communicate the preceptor's approval to Dr. Waugh (681-6745). Credit: 2 (10 hrs/wk for 8 weeks), 4 (full time for 4 weeks or 20 hrs/wk for 8 weeks or 10 hrs/wk for 16 weeks), or 8 (full time for 8 weeks). *Waugh and staff*

MED-214C. Introduction to Outpatient Primary Care Internal Medicine. Course Goals: (1) To broaden exposure to outpatient diagnosis and management of internal medicine problems including a wide variety of diseases that are generally seen only in clinic; (2) to develop the student's skills in (a) taking a problem-focused history, (b) performing a directed physical exam, and (c) doing office-based procedures; (3) to provide the student as much as possible with a continuity of care experience. How Goals Are Achieved: This course is similar to MED 217C, but is designed to be more flexible and less intensive. The student chooses a faculty mentor within the Division of General Internal Medicine and spends one or more days per week with this mentor seeing patients in the Medical Private Diagnostic Clinic (MPDC). In all cases the student sees the patient first then discusses the case with the attending. The student must outline in writing five goals that he/she wishes to accomplish during this rotation. This should be delivered to Dr. Lia Logio at least three weeks before the rotation begins. Methods of Evaluation: Student evaluations are done by the faculty mentor who works directly with the student. Grades are based on the student's interactions with patients and his or her thought process regarding diagnosis and management of their problems. Improvement during the

course of the rotation and enthusiasm are highly weighted. Prerequisites: Third year and fourth year students who have successfully completed the second-year medicine clerkship. Credit: 1 (10 hrs/wk for 4 weeks), 2 (20 hrs/wk for 4 weeks), or 4 (20 hrs/wk for 8 weeks). *Logio and general internal medicine staff*

MED-220C. Emergency Medicine. (1) Course Goals: Primary - To provide a broad exposure to emergent clinical problems, emphasizing acute internal medicine in such a way that students can see patients before any other physician contact, permitting the learner to make initial diagnoses and plan short-term "workups". Secondary - To develop students' ability to rapidly obtain history and shorten the amount of time required to do a focused physical examination, to enhance dexterity when performing minimally invasive procedures, to gain experience and confidence by evaluating undifferentiated patient complaints, and to teach the concepts of triage and prehospital care. (2) How Goals Are Achieved: Each student works with attending physicians and residents (not interns) approximately twenty twelve-hour shifts, and in general does not spend the night. In collaboration with residents or senior staff, students are involved in diagnostic evaluations and therapeutic interventions. Didactic sessions cover clinical topics related to emergency medicine. (3) Methods of Evaluation: Residents and senior staff evaluate the student. Each student presents one case and leads a conference discussion on the diagnosis and emergency management of a patient they have seen during the rotation. Prerequisites: none mandatory, prior experience in other electives is beneficial. Credit: 4 or 8. Enrollment: min 1, max 4. *Staff*

MED-223C. Intensive Care Medicine Subinternship (Duke). (1) Course Goals: Primary - To introduce the student to a pathophysiologic approach to critically ill adults. Secondary - To provide an opportunity for students to perform selected procedures. (2) How Goals Are Achieved: Students function as subinterns in a very active intensive care unit. Patient evaluations, procedures, diagnostic planning and treatment planning are performed by students under the direct supervision of the junior assistant resident, critical care fellow, and attending physician. Night call occurs every third night. Regular didactic lectures on topics related to the diagnosis and treatment of the critically ill are given by the attending staff. The physiological and biochemical approach to critical care medicine is stressed. A syllabus of selected reprints from the critical care literature is provided to each student. Emphasis is placed on access to attending physicians and critical care fellows for the discussion of specific patient oriented questions. Preferences for the month of rotation are honored, if possible. Questions should be directed to Dr. Fulkerson, 681-5850. (3) Methods of Evaluation: Each student's performance is assessed by the unit director through direct observation of the student in the clinical and didactic environments. Input from the residents, fellows, and other attending physicians is also obtained. Credit: 5. Enrollment: max 3. *Fulkerson and critical care staff*

MED-224C. Intensive Care Medicine Subinternship (Durham-VA Hospital). (1) Course Goals: Primary - To provide training in clinical physiologic and pharmacologic principles of the care of the critically ill. Secondary - To develop students' skills in performance and interpretation of diagnostic procedures. (2) How Goals Are Achieved: Under the supervision of junior assistant residents and a pulmonary fellow, students function as subinterns and are responsible for patient workups and daily bedside presentations. Students are given responsibilities for procedures and decision-making in direct proportion to the development of their patient management skills. Daily attending rounds stress an integrated physiologic approach to the management of critically ill patients with emphasis on acute respiratory care, hemodynamic monitoring, acid-base balance, and nutritional support. Each student is provided with a syllabus of selected readings that supplements regular didactic sessions on diagnosis, pathophysiology, and management of critical illness. Student on call schedule is every third night for the duration of this four-week course. The student registered for MED-224C may drop the course up to one month before the start date. After that time, the student must arrange

for a replacement if he/she subsequently drops the course. (3) Methods of Evaluation: Student evaluations are done by the fellows and faculty attending on the MICU and are based on observed performance. Information may be obtained by telephoning 286-6946 or 684-6143. Credit: 5. Enrollment: max 3. *Piantadosi and pulmonary staff*

MED-230C. Pulmonary Medicine. (1) Course Goals: Primary - To provide training in clinical aspects of pulmonary medicine. The primary diseases emphasized include asthma, chronic obstructive lung disease, pulmonary vascular diseases including pulmonary embolus, acute respiratory failure, hypersensitivity, interstitial and immunologic lung diseases and pulmonary manifestations of systemic illnesses, i.e., sarcoid, scleroderma, cystic fibrosis, etc. Secondary - To provide experience with pulmonary laboratory techniques including pulmonary function testing, cardio-pulmonary exercise testing, chest radiology, and bronchoscopy. (2) How Goals Are Achieved: Students assigned to the Pulmonary Consult Services at either the VA or at Duke Hospital. They have primary responsibility for workup and presentation of selected patients on these services. All patients are presented and followed at daily rounds with fellows and faculty. Students also participate in a half-day outpatient clinic each week. Joint seminars and conferences involving both the Duke and VA Consult Services are held each week to provide instruction in pulmonary function evaluation, pulmonary physiology, chest radiology, pulmonary pathology and clinical pulmonary medicine. (3) Methods of Evaluation: Student evaluations are done by fellows and faculty assigned to the Consult Services during the period of the course and are based on observed performance. Credit: 4. Enrollment: min 1, max 4. *Fulkerson and pulmonary staff*

MED-242C. Clinical Arrhythmia Service. (1) Course Goals: Primary - To provide students with an in-depth exposure to the diagnosis and management of cardiac arrhythmias, electrophysiologic studies, ablation of arrhythmias, cardiac pacemakers, and implantable defibrillators; to help students to understand the electrophysiologic events that result in arrhythmias and ECG changes. This course is not designed to be a substitute for the general cardiology elective (MED 244C and 245C). Secondary - To familiarize the student with certain basic techniques of arrhythmia diagnosis such as esophageal recording and pacing. (2) How Goals Are Achieved: The student spends four weeks working on the Clinical Arrhythmia Service. The student makes rounds with the Clinical Electrophysiology Service on inpatients with arrhythmia problems. The student is encouraged to attend electrophysiologic studies and assist in the analysis of data from these studies. Attendance of electrophysiologic surgical procedures is also encouraged. The student is responsible for the work-up of patients admitted to the Arrhythmia Service as well as inpatient consults and plays an important role in the follow up of these patients while they are in the hospital. The student sees outpatients during Arrhythmia Clinics that meet on Monday, Tuesday, Wednesday, and Thursday in the PDC. The student assists in the evaluation of patients for permanent pacemaker implantations. Students are responsible for reviewing the literature on subjects related to the patients that they have seen on the clinical service. (3) Methods of Evaluation: Students are evaluated on their clinical skills in taking histories, performing physical examinations as well as in their presentation and assessment of the patient's problem. They are also assessed on their ability to read and understand the relevant literature and their ability to assume a responsible role in the care of patients on the Clinical Arrhythmia Service. Credit: 4. Enrollment: max: 1. *Wharton, Pritchett, Grant, Greenfield, Sorrentino, and Bahnson*

MED-243C. Cardiology Subinternship (Asheville VA). (1) Course Goals: Primary - To provide experience in the assessment and management of patients with acquired heart disease. Secondary - To familiarize the student with both invasive and non-invasive procedures available at this medical center. (2) How Goals Are Achieved: The student is assigned to an attending cardiologist and is expected to work up patients presenting to both the coronary care unit and the cardiology nonacute ward. Daily work rounds commence at 7:30 a.m. with additional student teaching rounds occurring three

times a week. In addition, daily interpretation of electrocardiograms, stress tests, Holter monitors, and echocardiograms focus on student teaching. Cardiac catheterization results also are reviewed on a daily basis. Night call is optional, but students may elect to take call with appropriate attendings. (3) Methods of Evaluation: The preceptor evaluates the student's ability to assess patient problems based on the history and physical and to formulate a plan to evaluate the problems. Furthermore, the preceptor assesses each student's ability to evaluate and act upon data derived from both invasive and non-invasive diagnostic methods. Credit: 4. Enrollment: max 2. *Ramesh and Leon*

MED-244C. In-Patient Cardiology Subinternship. (1) Course Goals: Primary - To provide an in-depth experience in the evaluation and care of in-patients with various cardiovascular problems requiring hospitalization. Secondary -To refine student understanding of the cardiovascular history, physical examination and non-invasive and invasive laboratory testing in evaluating and managing patients with known or suspected cardiovascular disease. (2) How Goals Are Achieved: Students are assigned to the Duke CCU, the VA CCU, or to the private cardiology in-patient service at Duke. They, in concert with the housestaff, cardiology fellows, and senior staff attendings, work up and manage patients admitted to these various services. They also participate in a core curriculum experience, including individually assigned times to work with HARVEY, the cardiology patient simulator and various computer assisted instruction programs. Because of the considerable logistics involved in scheduling and coordinating the various cardiology electives, students who wish to drop must do so at least one week before the scheduled starting date. After that time, drops are allowed only if a replacement student can be provided. (3) Methods of Evaluation: Students are evaluated by all resident, fellow, and senior staff with whom they work. The evaluation questionnaire is available at the beginning of the elective. Depending on circumstances, students may also be evaluated by written and practical examinations at the beginning and/or end of the elective. Credit: 5. Enrollment: min 1, max 6. *Waugh and cardiology staff*

MED-245C. Consultative Cardiology. (1) Course Goals: To refine student understanding of normal and pathologic cardiovascular physiology while functioning in the role of a consultant for inpatients and outpatients with various cardiovascular problems; to develop the skills necessary to quickly and accurately interpret ECGs. (2) How Goals Are Achieved: Students are assigned to the consult service at either the VA Hospital or Duke, where, in concert with the SAR, fellow and senior staff attending, they evaluate the operative risk for non-cardiac surgery as well as make decisions concerning cardiac surgery in patients with ischemic and other types of heart disease. Students participate extensively in reading ECGs. They also participate in a core curriculum experience including individually assigned times to work with HARVEY, the cardiology patient simulator and various computer assisted instruction programs. (3) Methods of Evaluation: Students are evaluated by the resident, fellow, and senior staff with whom they work. The evaluation questionnaire is made available at the beginning of the elective. Depending on circumstances, students may also be evaluated by written and practical examinations at the beginning and/or end of the elective. Credit: 4. Enrollment: min 1, max 7. *Waugh and cardiology staff*

MED-250C. Clinical Dermatology. The elective in clinical dermatology is designed to prepare students to perform an accurate skin examination, formulate appropriate differential diagnoses, and choose relevant diagnostic or therapeutic interventions. This course is valuable to any student interested in improving their ability and confidence in the cutaneous exam. Students in the rotation spend two weeks working in the outpatient dermatology clinics, one week on the inpatient consult service at Duke, and one week at the VA Medical Center. The outpatient clinical experience includes general dermatology clinics as well as a variety of specialty clinics such as pediatric dermatology, HIV dermatology, cutaneous oncology, and dermatologic surgery; clinic attendance can be tailored to the student's future career goals. Patient care is supplemented with lectures

designed to provide the student with a foundation in dermatologic principles, and students are encouraged to attend weekly departmental teaching conferences. Student evaluations are based on the development of clinical skills as assessed by faculty and residents, and by a brief clinically oriented examination. Any questions may be discussed with the course director, who may be reached at 681-1629. Students are to report to the Dermatology Clinic, Duke South, Orange Zone, Room 0027 at 8:30 a.m. on the first day of the rotation for orientation. Credit: 4. Enrollment: max 4. *Mariencheck*

MED-255C. Pharmacotherapy of Common Problems in Internal Medicine. The purpose of this course is to integrate basic pharmacology with rigorous clinical science in order to understand how drugs should be used to treat common medical problems. Topics covered include heart failure, stroke, arthritis, hypertension, asthma, diabetes, infectious disease, and cancer. Two lectures per week during the spring term. This course is offered to fourth year students for clinical credit. Third year students may take the course for basic science credit by registering for PHR-255B. CL: PHR-255B. Credit: 2. Enrollment: min 2. *Pritchett and Nadler*

MED-256C. Ethical Issues in Medicine. This seminar examines ethical questions raised by modern medical science and technology with special attention to their implications for primary care practitioners and their patients. It includes both historical and systematic philosophical analysis of these questions. Among topics addressed in this course are methods (e.g., clinical ethics, philosophical ethics, and public policy) as well as selected practice-related issues (e.g., truth-telling, confidentiality, informed consent). CL: CFM-265C. Credit: 1. Enrollment: min 6, max 12. *Sugarman*

MED-260C. Gastroenterology. (1) Course Goals: Primary - To provide an experience with digestive diseases from which the student can develop a sound fundamental approach to the diagnosis and management of these problems. Secondary - To provide an exposure to recent advances in the field including therapeutic and diagnostic endoscopy; to stimulate questions concerning digestive diseases and to attract students into the field. (2) How Goals Are Achieved: Participation in the care, work-up and management of patients hospitalized on the general wards of Duke or the VA Hospital under the guidance of the resident, fellow, and faculty members assigned either to the VA or Duke Consultation Service. The students' experience may include participation in the activities of the clinic endoscopy unit of the Division of Gastroenterology. This unit offers specialized tests and/or procedures necessary for the state of the art care of patients with digestive diseases. Procedural activities include upper endoscopy, endoscopic retrograde cholangiopancreatography, colonoscopy and polypectomy and endoscopic papillotomy of the ampulla of Vater. Data derived from these and other laboratory studies are discussed in the context of specific patient problems in weekly conference settings. Students have an opportunity to interact with all the faculty of the Division at morning rounds and other conferences where patients from all of the services (Duke and VA) are discussed. (3) Methods of Evaluation: Student evaluation forms are completed by the resident, fellows, and faculty working with the student on individual patient care services. Final evaluation represents a composite of these forms that chiefly identifies clinical skills, fund of basic information, organizational ability, and degree of interest and participation. Credit: 4. Enrollment: max 4. *Liddle and gastroenterology staff*

MED-270C. Outpatient Hematology-Oncology (Duke or Durham VA). (1) Course Goals: To give the student experience in the diagnosis, long-term treatment, and supportive care of patients with hematologic and oncologic disorders in the outpatient setting. The use and interpretation of peripheral blood films and other specialized laboratory tests (e.g., bone marrow aspirate/biopsy, serum electrophoresis, coagulation studies, tumor markers, leukemia cell markers), as well as an approach to the evaluation and treatment of common hematologic problems (anemias, bleeding and clotting disorders, hematologic and solid tissue malignancies) are included. Issues such as quality of life and care of the geriatric oncology patient are addressed. (2) How Goals Are

Achieved: The student is assigned a staff member as preceptor with whom to work in the Hematology/Oncology clinic one-three half days per week in clinic, depending on the student's schedule and the availability of physicians in clinic. If desired, a preceptor who concentrates mainly on hematology or oncology may be arranged. This course is offered for eight or, preferably, sixteen weeks. (3) Methods of Evaluation: Students are evaluated by their preceptors on the basis of their ability to obtain a history, perform a physical examination, evaluate hematologic and other laboratory data, and propose assessments and plans of action. Credit: 1-2. Enrollment: max 4. *Telen and hematology/oncology staff*

MED-272C. Clinical Hematology And Oncology (Duke or Durham VA). (1) Course Goals: Students learn how to interpret peripheral blood films, how to use and interpret other specialized laboratory tests (e.g., bone marrow aspirate/biopsy, serum electrophoresis, coagulation studies, tumor markers, leukemia cell markers), and how to approach the evaluation and treatment of common hematologic problems (anemias, bleeding and clotting disorders, hematologic and solid tissue malignancies). (2) How Goals Are Achieved: Students receive a series of core lectures, gain familiarity with chemotherapy regimens and administration, and attend the ongoing clinical, research, and didactic divisional conferences. Clinical duties include the performance of inpatient consults under the supervision of a fellow and staff member. Students may opt to pursue a broad experience in hematologic and oncologic problems or may choose to focus on a particular area, e.g., coagulation and transfusion, experimental therapeutics of malignancy, bone marrow transplant, hemoglobinopathies. Students choosing the broad experience may elect to spend one week on the coagulation/transfusion consult service. This course may be taken for four or eight weeks. (3) Methods of Evaluation: The students are expected to perform and present initial evaluations of consult cases including peripheral blood film on daily rounds, and to perform limited literature searches and evaluations of chosen clinical topics. Credit: 4 or 8. Enrollment: max 4. *Telen and hematology/oncology staff*

MED-274C. Medical Subinternship In Hematology-Oncology. (1) Course Goals: This is an intensive experience in the care of inpatients with serious hematologic and oncologic disorders. The student learns to interpret peripheral blood films, how to use and interpret other specialized laboratory tests (e.g. bone marrow aspirate/biopsy, serum electrophoresis, coagulation studies, tumor markers, leukemia cell markers), and how to approach the evaluation and treatment of hematologic and solid tissue malignancies and their complications. (2) How Goals Are Achieved: Under supervision of a Hematology/Oncology fellow and a division staff member, the student is given considerable responsibility in the care of inpatients on one of the Hematology/Oncology or Experimental Therapeutics wards in Duke North. They receive instruction and guidance in performing diagnostic and therapeutic procedures and gain experience in the use of chemotherapeutic drug regimens. Specific issues such as quality of life, care of the aging patient with malignancy, and decisions regarding DNR status are addressed by the patient-care team. In addition, students receive a series of core lectures, receive training in chemotherapy, and attend the ongoing clinical, research and didactic divisional conferences. (3) Methods of Evaluation: Students are evaluated by their preceptors on the basis of their ability to obtain a history, perform a physical examination, evaluate hematologic and other laboratory data, and propose assessments and plans of action. Prerequisite: Approval of the faculty based on prior performance. Credit: 5. Enrollment: max 4. *Telen and hematology/oncology staff*

MED-275C. Clinical Coagulation. (1) Course Goals: Primary - To teach the clinical and laboratory approach to patients with a hemorrhagic or thrombotic disorder. The student learns to evaluate clinical coagulation disorders and become familiar with coagulation laboratory testing and interpretation. Secondary - To expose the student to recent advances in the area of coagulation research. (2) How Goals Are Achieved: The

student spends four weeks on the Clinical Coagulation Consult Service under the direction of Dr. Thomas Ortel, Dr. Scott Berkowitz, Dr. William Kane, or Dr. Charles Greenberg. The student is expected to work-up inpatients referred to the Coagulation Service as well as participate in a half day a week Coagulation Outpatient Clinic. Patients generally present with complex diagnostic as well as therapeutic problems. The rotation includes Coagulation lab rounds during which the student learns to interpret lab tests and review abnormal results. The student is expected to read standard texts regarding their patients' problems, as well as relevant reviews provided by the attending physician. The student may also interact with the Anticoagulation Management Service to gain a better understanding of various approaches to outpatient management of anticoagulant therapy. Students electing to do an eight week rotation have a more extensive laboratory and clinic research experience. (3) Methods of Evaluation: The student's performance is evaluated by the Coagulation attending with input from the fellow and/or medicine resident on the service. The evaluation is based on observation of the student's ability to do careful histories and physical examinations, to appropriately assess the problem and develop a logical diagnostic and therapeutic plan, and to demonstrate an increase in knowledge regarding laboratory tests and their application to clinic problems. Credit: 4 or 8. Enrollment: max 2. *Ortel, Greenberg, Kane, and Berkowitz*

MED-280C. Clinical Infectious Diseases. (1) Course Goals: To provide experience in the clinical and laboratory diagnosis of infectious diseases and in their therapy. The primary emphasis is placed on learning from interaction with patients, resident staff, and faculty on the consultation service. Students are expected to work up assigned patients by interview, physical examination, and collation of laboratory results, leading to a summary and synthesis of the problem. Particular emphasis is placed on close follow-up of the patients during hospitalization, including attendance at procedures or operations whenever possible. Students should know their own patients well enough to be able to give a reasonable presentation on ward rounds or at conferences without notice. Students are expected to read standard texts in-depth about their patients' problems, as well as a few recent relevant primary references. Students are expected to attend the various conferences listed on the weekly schedule of division activities punctually including Microbiology Plate Rounds, Journal Club, and tutorials. They are asked to present cases and provide some discussion at the Thursday V.A. Conference. Each student should be prepared to present and briefly discuss articles that he or she considers to be interesting and timely at Journal Club. (2) Methods of Evaluation: Each student's performance is evaluated and graded by the resident, fellow, and attendings, using the usual "honors", "pass plus", "pass", "deferred", or "unsatisfactory" system that is utilized internally in the Department of Medicine. In arriving at a consensus, appropriate emphasis is placed on knowledge, enthusiasm, and evidence of improvement during the rotation. There is no written examination. Adds are accepted at any time providing the course has not been filled. However, because this course is usually oversubscribed, drops are not accepted within thirty days of the first day of classes unless the student finds his own replacement. MED-280C is a full-time experience. Also, it is offered as a sole-enrollment course and, as such, cannot be taken in conjunction with any other course without the permission of the advisory dean and the course director. Credit: 4. Enrollment: max 5. *Hamilton and infectious diseases staff*

MED-290C. Metabolism and Endocrinology. (1) Course Goals: Primary—The student has an in-depth experience in the evaluation and management of patients with endocrine disorders. Secondary— The student learns basic principles of hormone physiology and apply these concepts in clinical settings. (2) How Goals Are Achieved: Each student is introduced to patient problems by working with the Endocrine Faculty (Drs. Brown, Burch, Drezner, Ellis, Feinglos, Feldman, Guyton, Domalik, Green, Luttrell, Neelon, Weber, McNeill.) Prior arrangements may be made with a particular faculty member under the appropriate course number. The student is exposed to clinical

endocrine disorders by seeing patients in two endocrine outpatient clinics (Diabetes/General Endocrine, and VA General Endocrine Clinic), as well as experiencing the inpatient Endocrinology Diabetes Management/General Endocrine Consult Service. The student has the opportunity to review general literature on common endocrinologic conditions and endocrinologic emergencies as well as learning basic assessment skills of the patient with diabetes, thyroid disease, and other common endocrinologic presentations. Division conferences include Grand Rounds, Research Seminar, Inpatient Attending Rounds, and Consult Rounds with opportunities to integrate basic concepts with clinical applications. (3) Methods of Evaluation: A written critique is provided by the student's preceptors with comments from other members of the division as appropriate. Credit: 4. Enrollment: max 3. *McNeill and endocrinology staff*

MED-300C. Nephrology. (1) Course Goals: Primary - To provide clinical experience in the diagnosis, assessment and treatment of renal diseases and hypertension. Secondary -To integrate renal physiology, immunology, pathology, and biochemistry into the clinical assessment of renal diseases. (2) How Goals Are Achieved: Students participate fully in both inpatient and outpatient assessment of patients presenting with fluid and electrolyte disorders, problem hypertension, acute renal failure, end-stage renal disease, and related complications. The student rounds daily with a renal fellow or senior resident, attends regular faculty teaching rounds and scheduled conferences devoted to correlations with basic science review of renal biopsy material, transplantation, etc. Special emphasis is placed on renal physiology and pathophysiology, renal histopathology, and hypertension. Students may elect to participate at the VA Hospital or on the private or nonprivate services at Duke. (3) Methods of Evaluation: Written comments from the faculty. Credit: 4. Enrollment: max 4. *Coffman and nephrology staff*

MED-301C. Fluids And Electrolytes. (1) Course Goals: Primary - To provide an applied approach to the management of fluid and electrolyte problems encountered in clinical medicine. To do this, cases are presented as problem-solving examples. The goal is to develop a systematic approach to the analysis of specific electrolyte derangements and to the correct selection of appropriate intravenous replacement therapy. These case studies are interwoven with a series of lectures designed to review specific areas such as compartmentalization of body fluids, derangements in acid-base balance, diuretic selection and use, analysis and approach to the treatment of potassium problems, etc. Secondary -To integrate basic renal physiology with clinical problems of fluid and electrolytes metabolism. (2) How Goals Are Achieved: Classroom experience. Does not involve patient exposure. (3) Methods of Evaluation: Final exam. If permitted by the instructor, this clinical science course can be audited. Credit: 2. Enrollment: min 6. *Berkoben and nephrology staff*

MED-307C. Neurology Clerkship. This course is restricted to those students who did not take the Neurology rotation in their second year. It provides the student with a firm understanding of the neurological examination, formulation of clinical neurological problems, and practice with written and oral communications in a hospital setting. The student has the opportunity to apply the neuroanatomy, neurophysiology, neurochemistry, and neuropathology learned in the first year to the evaluation and care of his or her patients. The patients are drawn from the neurology services at Duke Hospital or the Durham VA Medical Center. The students elicit a history and perform a physical examination. The student records the findings in the hospital charts and presents the findings at regular staff rounds. The student then participates with a clinical team of faculty and house officers in the hospital evaluation of the patients. The student is encouraged to participate in all diagnostic procedures such as lumbar puncture. The student has the opportunity to follow patients through neuro-radiological and neuro-surgical procedures forming part of evaluation and treatment. The specific expectations for the student are: (a) to perform and record a competent neurological and history examination on each admitted patient; (b) to be competent in the hospital management of neurologi-

cal patients including diagnostic evaluations such as hematological and urine evaluations, lumbar puncture and appropriate electrical studies; (c) to assume responsibility as the primary care person for his or her patients; (d) to participate in daily work rounds with an assigned team of house officers and faculty; (e) to be sufficiently knowledgeable to participate in patient care decisions; (f) to attend faculty attending rounds and to present patients to faculty within twenty-four hours after admission; and (g) to participate in neurology service rounds and conferences during the course. The course includes faculty lectures. A written evaluation is provided to the students by faculty and house staff. There is an examination. Credit: 4. Enrollment: max 1. *Morgenlander and neurology staff*

MED-308C. Clinical Neurology Subspecialties. (1) Course Goals: To provide the student to clinical exposure to a specific subspecialty in neurology. (2) How Goals Are Achieved: The student focuses on one specific subspecialty in neurology and attends clinic for 3-8 hours weekly. During that time the student participates in the clinical evaluation of patients with a member of the neurology faculty. Clinical experience in Neuro-muscular Diseases, Epilepsy and Sleep Disorders, Cerebrovascular Disorders, Memory Disorders, or Neuro-oncology are available. Appropriate reading material is utilized to complement the clinical experience. MED-207C or MED-307C are prerequisites for this course. (3) Method of Evaluation: Standard written evaluation form by faculty supervisor. Approval by the course director in order to ensure access to the desired neurologic subspecialty is required. Credit: 1-2. Enrollment: max 5 (if participating in different subspecialties) *Morgenlander and neurology staff*

MED-309C. Consultative Neurology. (1) Course Goals: To introduce senior medical students to the diagnostic and treatment issues encountered on the consultative neurology service. (2) How Goals Are Achieved: The student becomes part of the inpatient neurology consultation team either at Duke Hospital or the Durham VA Hospital. This team consists of senior neurology attendings on a rotating basis as well as a neurology and/or medicine house officer. Consultations are performed by the student under the guidance of the house staff and then are presented to the attending on rounds. The student is responsible for performing a neurologic history and physical as well as assisting in the interpretation of all important laboratory data. The student continues to follow the patient's course as required. The student also attends rounds when other patients are presented by the house officers. Appropriate reading material is utilized to complement the clinical experience. Attendance at Neurology Grand Rounds and various Neurologic Subspecialty Conferences are required. Experience on an inpatient neurology service such as MED-207C or MED-307C are prerequisites for this course. (3) Method of Evaluation: Standard written evaluation by faculty supervisor with house staff input. Credit: 4. Enrollment: max 2. *Morgenlander and neurology staff*

MED-310C. Neurology Subinternship. (1) Course Goals: To provide a neurological patient care experience at the intern level. Students have the opportunity to apply neurological examination skills learned in the second year to direct patient care situations. Students are exposed to a variety of neurological problems, procedures, and therapies. This course is recommended for the student interested in neurology, psychiatry, internal medicine, neurosurgery, neuropathology or ophthalmology. (2) How Goals Are Achieved: Students are assigned to the Duke or Durham VA Hospitals' neurology ward and take call in rotation with a medical intern as part of a patient care team. Students attend Neurology-Neurosurgery Grand Rounds, Neurology Subspecialty Conferences and participate in all ward activities. Full time participation is expected. (3) Methods of Evaluation: Resident and staff physician provide a written evaluation and grade. Credit: 5. Enrollment: min 1, max 1 (more than one with course director's approval). *Morgenlander and neurology staff*

MED-320C. Rheumatic And Immunological Diseases. (1) Course Goals: Primary - To provide experience in the recognition and care of patients with rheumatic, chronic in-

inflammatory, immunological diseases, including the various forms of arthritis, connective tissue disease, vasculitis, and metabolic arthropathies. Secondary - To develop skills in the interpretation of specialized laboratory studies relating to the evaluation of patients with rheumatic, immunological, and metabolic disorders. Students are also exposed to joint aspiration and injection, synovial fluid analysis, bone and joint radiology, histopathological analysis of tissue. (2) How Goals Are Achieved: Students evaluate patients at the Duke and Durham VA Hospitals. Daily rounds are held with faculty, house staff, and students that focus on oral presentation of patients with detailed review of pertinent laboratory, x-ray and pathological findings. Basic Science Conference, Bone and Joint Radiology Conference, Pathology Conference, and Rheumatology, Allergy, and Clinical Immunology Grand Rounds are held on a regular basis. Emphasis is placed on a comprehensive approach to the evaluation and treatment of patients with rheumatic, inflammatory, immune and metabolic disorders. Students are assigned primary house officer level responsibilities on the Consultation Service and the Outpatient Clinics at the Duke or Durham VA Hospitals. (3) Methods of Evaluation: Student evaluations are based on their performance on rounds and in the clinics, including history and physical examination skills and outside reading. This is a sole-enrollment course and, as such, cannot be taken in conjunction with any other course. Credit: 4. Enrollment: max 2. *St. Clair and rheumatology/allergy/immunology staff*

MED-321C. Introduction to Clinical Rheumatology. (1) Course Goals: An introductory course in Clinical Rheumatology designed to introduce students to the basics of differential diagnosis in the field of rheumatic disease; to provide more detailed knowledge of the most common, major groups of rheumatic disorders. (2) How Goals Are Achieved: Didactic and interactive lectures are the primary mode of teaching. Handouts and outlines on relevant topics and the Primer of Rheumatic Diseases are provided at the beginning of the course. One or more sessions(s) may be devoted to patient presentations, with several patients available for questioning and discussion. Basic pathophysiology, clinical features, laboratory studies, radiographic findings and pathology correlations are presented. (3) Methods of Evaluation: Participation in class and discussion of subject matter in concluding session. Course director evaluates student with standard Duke evaluation. If permitted by the instructor, this clinical course can be audited. Credit: 1. Enrollment: min 3, max 20. *N. Allen and rheumatology staff*

MED-322C. Outpatient Community Rheumatology. The clerkship in clinical rheumatology in the community setting is based in the Danville, Virginia Rheumatology Outreach Clinic. Students travel with the attending physician to the outpatient site five days per month for two consecutive months participating in the evaluation of patients with rheumatic disease. New and return patients are seen averaging 15-20 patients per visit. The student is under the direct supervision of the attending physician as no fellows or residents are involved in this particular clinic. The student is expected to learn extensively about the approach to patients with rheumatic complaints and also gain an understanding of therapeutic options in the management of such patients. Credit: 2. *Caldwell*

MED-400C. Geriatric Medicine. (1) Course Goals: Primary - To enable the student to become familiar with the principles of caring for the geriatric patient. Secondary - To familiarize the student with the physiology and diseases of aging. (2) How Goals Are Achieved: This elective is offered by the interdepartmental faculty of the Division of Geriatric Medicine. The student works with faculty, fellows, and housestaff in a number of settings involved in the care of the geriatric patient. These include the Geriatric Evaluation and Treatment Clinic (Duke), Geriatric Evaluation Unit and Clinic (VA), Geriatric Consultation Services (VA, Duke), extended care and rehabilitation center (VA) and other nursing home facilities, interactions with community services, home assessment and other. Principles to be stressed are biology and pathophysiology of aging, multiple clinical problems in the elderly, interdisciplinary team approach to evaluation, planning

and treatment, goals of maximal functional achievement and independence for the elderly. The student participates actively in the workup and management of patients in inpatient extended care and outpatient settings to become more familiar with the problems of the elderly in the community. Familiarity with the growing literature in geriatric medicine is encouraged. The student participates in seminars, lectures and team meetings at the appropriate sites including the Duke Center for the Study of Aging. (3) Methods of Evaluation: Evaluation is by consensus of instructors and fellows at the various training sites. It is based on discussions and presentations throughout the course period. Prerequisites: approval of course director. Credit: 4. Enrollment: max 2. *Cohen and staff*

Microbiology

Professor Jack D. Keene, Ph.D. (Washington, 1974), Chairman.

Professors: Deepak Bastia, Ph.D. (Chicago, 1971); Dani P. Bolognesi, Ph.D. (Duke, 1967); Bryan R. Cullen, Ph.D. (New Jersey, 1984); Sharyn A. Endow, Ph.D. (Yale, 1975); Elwood Linney, Ph.D. (California at San Diego, 1973); Joseph R. Nevins, Ph.D. (Duke, 1976).

Adjunct Professors: H. Mario Geysen, Ph.D. (Melbourne, 1976); William Phelps, Ph.D. (Minnesota, 1985); Norman F. Weatherly, Ph.D. (Kansas, 1962).

Associate Professors: Soman Abraham, Ph.D. (Newcastle Upon Tyne, UK, 1981); John D. Hamilton, M.D. (Colorado, 1964); Gale B. Hill, Ph.D. (Duke, 1966); Dolph Klein, Ph.D. (Rutgers, 1961); Kenneth N. Kreuzer, Ph.D. (Chicago, 1978); Thomas G. Mitchell, Ph.D. (Tulane, 1971); David J. Pickup, Ph.D. (Natl. Inst. For Med. Research, London, 1979); Kenneth H. Wilson, M.D. (North Carolina, 1974); Peter Zwadyk, Jr., Ph.D. (Iowa, 1971).

Associate Research Professors: Lizzie J. Harrell, Ph.D. (North Carolina State, 1978); Sara E. Miller, Ph.D. (Georgia, 1972).

Adjunct Associate Professors: Jeffrey J. Collins, Ph.D. (Harvard, 1972); Jonathan Horowitz, Ph.D. (Wisconsin, 1985).

Assistant Professors: Kenneth Alexander, M.D., Ph.D. (Washington-Seattle, 1989); Jonathan Freedman, Ph.D. (Albert Einstein, 1986); Richard Frothingham, M.D. (Duke, 1981); Mariano A. Garcia-Blanco, M.D., Ph.D. (Yale, 1984); Philip C. Hanna, Ph.D. (Pittsburgh, 1990); Meta Kuehn, Ph.D. (Washington Univ., 1993); John H. McCusker, Ph.D. (Brandeis, 1986); Ross E. McKinney, Jr., M.D. (Rochester, 1979); John R. Perfect, M.D. (Med. Coll. Ohio, 1974); Daniel J. Sexton, M.D. (Northwestern, 1971); Robin P. Wharton, Ph.D. (Harvard, 1986).

Assistant Research Professor: Barry S. Henderson, Ph.D. (Purdue, 1992).

Associate: Donald Komma, Ph.D. (Michigan, 1964).

Research Associates: Dragana Antic, Ph.D.; Ulus Atasoy, M.D.; Hirock Datta, Ph.D.; Kathleen Dudas, Ph.D.; Ashish Gautam, Ph.D.; Alan Goldstein, Ph.D.; Phillip E. Hartzog, Ph.D.; Barbara Lipos, Ph.D.; Bidyut K. Mohanty, Ph.D.; Sashidhar Mulugu, Ph.D.; Margaret S. Neece, Ph.D.; Erin O'Reilly, Ph.D.; S. Shamsuzzaman, Ph.D.; Scott Tenenbaum, Ph.D.; Jianping Xu, Ph.D.

Emeriti: Wolfgang K. Joklik, D. Phil.; Suydam Osterhout, M.D., Ph.D.; Robert W. Wheat, Ph.D.; Hilda P. Willett, Ph.D.

Required Course

MIC-200B. Microbiology. The course in microbiology for medical students is given during the second semester of the first year. An intensive study is made of the common bacteria, viruses, fungi, and parasites that cause disease in humans. The didactic portion of the course focuses on the fundamental biology of micro-organisms causing disease and the molecular mechanisms of the microbial pathogenesis. Attention is given to the host-microbial relationship and the impact of the immune system and antimicrobial therapy on this interaction.

The laboratory portion of the course is designed to acquaint students with the basic techniques employed in the clinical microbiology laboratory, and to reinforce microbiological concepts. Medical case histories are presented by the clinical staff to correlate this course with patient care. Credit: 5. *Mitchell and staff*

Electives

MIC-252B. General Virology and Viral Oncology. The course is devoted to the

molecular biology of mammalian viruses, with emphasis upon mechanisms of virus replication, virus-host interactions, viral pathogenicity, and the relationship of virus infection to neoplasia. C-L: IMM-252B; Graduate School. Credit: 4. Enrollment: min 5. *Keene, Alexander, Bastia, Cullen, Nevins, and Pickup*

MIC-291B. Comprehensive Immunology. An intensive course in the biology of the immune system and the structure and function of its component parts. Major topics discussed are: properties of antigens; specificity of antibody molecules and their biologic functions; cells and organs of the lymphoid system; structure and function of complement; inflammation and non-specific effector mechanisms; cellular interactions and soluble mediators in lymphocyte activation, replication, and differentiation; regulation of immune responses, neoplasia and the immune system; molecular structure and genetic organization of immunoglobulins, histocompatibility antigens, and T cell receptor. C-L: IMM-291B; Graduate School. Credit: 4. Enrollment: max 10. *Krangel and staff*

MIC-308B. Clinical Microbiology-Immunology. A bench-training course in methods used in clinical microbiology stressing isolation and characterization of clinically significant microorganisms. Course conducted at the VA hospital microbiology laboratory. Prerequisites: Permission of instructor. Credit: 8. Enrollment: max 4. *Zwadyk*

MIC-330B. Medical Immunology. A brief review of basic concepts of immunology is followed by in-depth discussions of the role of immune mechanisms in the pathogenesis and treatment of human diseases. Principle emphasis is placed on immune deficiency diseases, hypersensitivity, alloimmunity, transplantation, infectious diseases, autoimmunity, tumor immunology, and immunohematology. When applicable the classes include patient presentations and laboratory demonstrations. C-L: IMM-330B; Graduate School. Credit: 5. *F. Ward and staff*

MIC-399B. Preceptorship in Microbiology. An individual reading and/or laboratory course in specialty areas supervised by an individual faculty member. Acceptance, nature of topic, and amount of credit by individual arrangement with proposed faculty member. Prerequisites: to be determined by instructor. Credit: 1-16. *Staff*

Neurobiology

George Barth Geller Professor for Research in Neurobiology Dale Purves, M.D. (Harvard, 1964), Chairman.

Professors: Mohammed Abou-Donia, Ph.D. (California at Berkeley, 1967); George J. Augustine, Ph.D. (Maryland, 1980); Dona M. Chikaraishi, Ph.D. (California at San Diego, 1973); Robert P. Erickson, Ph.D. (Brown, 1958); Owen Flanagan, Ph.D. (Boston, 1977); Warren G. Hall, Ph.D. (Johns Hopkins, 1975); William C. Hall, Ph.D. (Duke, 1967); Lawrence C. Katz, Ph.D. (California Instit. of Tech., 1984); Gregory McCarthy, Ph.D. (Illinois, 1980); David R. McClay, Ph.D. (North Carolina, 1971); James O. McNamara, M.D. (Michigan, 1968); J. Victor Nadler, Ph.D. (Yale, 1972); Sidney A. Simon, Ph.D. (Northwestern, 1973); Theodore Slotkin, Ph.D. (Rochester, 1970); George G. Somjen, M.D. (Amsterdam, 1956); John E.R. Staddon, Ph.D. (Harvard, 1964); Warren J. Strittmatter, M.D. (Duke, 1973); E. Lee Tyrey, Ph.D. (Illinois, 1969); David S. Warner, M.D. (Wisconsin, 1980).

Associate Professors: Rose-Mary Boustany, M.D. (Amer. Univ. Beirut, 1979); Nell B. Cant, Ph.D. (Michigan, 1973); Joseph M. Corless, M.D. (Duke, 1972), Ph.D. (Duke, 1971); David Fitzpatrick, Ph.D. (Duke, 1982); Michael M. Haglund, Ph.D. (Washington, 1988); Darrell V. Lewis, M.D. (Minnesota, 1969); Roger D. Madison, Ph.D. (Duke, 1981); Stephen Nowicki, Ph.D. (Cornell, 1985); Donald E. Schmechel, M.D. (Harvard, 1974); Rochelle D. Schwartz-Bloom, Ph.D. (Georgetown, 1983); J. H. Pate Skene, Ph.D. (Washington Univ., 1980); Dennis Turner, M.D. (Indiana, 1975); Fulton Wong, Ph.D. (Rockefeller, 1977).

Assistant Professors: Helene Benveniste, M.D., (Copenhagen, 1986), Ph.D. (Copenhagen, 1991); Michael D. Ehlers, M.D., Ph.D. (Johns Hopkins, 1998); Robert T. Fremeau, Jr., Ph.D. (George Washington, 1985); Timothy M. George, M.D. (New York, 1986); David A. Hosford, M.D. (Emory, 1983), Ph.D., (Emory, 1981); Erich Jarvis, Ph.D. (Rockefeller, 1995); Julie A. Kauer, Ph.D. (Yale, 1986); Donald C. Lo, Ph.D. (Yale, 1989); Richard D. Mooney, Ph.D. (California Inst. Tech., 1991); Miguel A. L. Nicolelis, M.D. (Sao Paulo, 1984), Ph.D. (Sao Paulo, 1988); Andrew S. Peterson, Ph.D. (Harvard, 1988); Peter H. Reinhart, Ph.D. (Australian Natl. Univ., 1985).

Assistant Research Professor: Gillian Einstein, Ph.D. (Pennsylvania, 1984).
Emeriti: Irving T. Diamond, Ph.D.; John W. Moore, Ph.D.

Required Course

NBI-202B. Basic Neurobiology. An intensive introduction to the structure and function of the mammalian nervous system designed specifically for first-year medical students. Lectures, laboratory exercises, clinical presentations and problem-solving conferences. Credit: 4. *Cant and staff*

Electives

NBI-315B. Molecular Neurobiology. The macromolecules responsible for the specialized functions of neurons and glia. Topics stress the biochemical, molecular, cellular, and genetic processes involved in the development and function of the mammalian nervous system. Introductory biochemistry is recommended. Prerequisite: consent of instructors. Offered fall semester. C-L: Graduate School. Credit: 3. Enrollment: max 5. *Chikaraishi, Skene, and Reinhart*

NBI-317B. Neuronal Signaling: Ion Channels and Synapses. Basic principles of neural electrical signaling. Areas of emphasis include action potential generation, ion channel structure/function relationships, modulation of channel activity, neurotransmitter secretion, transmitter receptors, and mechanisms of synaptic plasticity. Prerequisite: consent of instructors. Offered fall semester. C-L: Graduate School. Credit: 3. Enrollment: max 5. *Augustine, Kauer, Lo, and Reinhart*

NBI-321B. Systems Neurobiology. Structure and function of the mammalian sensory and motor systems, including their cognitive aspects. Prerequisite: consent of instructors. Offered spring semester. C-L: Graduate School. Credit: 3. Enrollment: max 5. *Nicolelis, Cant, Fitzpatrick, and Purves*

NBI-322B. Developmental Neurobiology. The development of the nervous system covering both the history and present status of the major issues in the field. Prerequisite: consent of instructors. Offered spring semester. C-L: Graduate School. Credit: 3. Enrollment: max 5. *Mooney, Katz, and Lo*

NBI-372B. Research in Neurobiology. Guided independent study and research experience in neurobiology. Nature of topic to be decided by individual arrangement with faculty advisor. Prerequisite: consent of faculty advisor. Credit: 1-16. *Staff*

Obstetrics and Gynecology

Professor Charles B. Hammond, M.D., E. C. Hamblen Chair of Reproductive Biology and Family Planning, (Duke, 1961), Chairman.

Professors: Walter L. Thomas Professor W. Allen Addison, M.D. (Duke, 1960); Andrew Berchuck, M.D. (Case Western Reserve, 1980); Richard C. Bump, M.D. (Ohio State, 1973); James M. Ingram Professor Daniel L. Clarke-Pearson, M.D. (Case Western Reserve, 1975); Ronald N. Goldberg, M.D. (California-Los Angeles, 1972); Roy T. Parker Professor Arthur F. Haney, M.D. (Arizona, 1972); F. Bayard Carter Professor William N.P. Herbert, M.D. (Bowman Gray, 1972); Gale B. Hill, Ph.D. (Duke, 1966); David F. Katz, Ph.D. (California, 1972); Allen P. Killam, M.D. (Texas, 1960); Stanley J. Robboy, M.D. (Michigan, 1965); David W. Schomberg, Ph.D. (Purdue, 1965); John T. Soper, M.D. (Iowa, 1978); E. Lee Tyrey, Ph.D. (Illinois, 1969).

Research Professor: Claude L. Hughes, M.D., Ph.D. (Duke, 1980).

Associate Professors: Charles H. Livengood, III, M.D. (Duke, 1976); Patricia M. Saling, Ph.D. (Pennsylvania, 1979); J. Brice Weinberg, M.D. (Arkansas, 1969).

Associate Clinical Professor: Stanley J. Filip, M.D. (Mt. Sinai, 1979); Stephen C. Gooding, M.D. (Bowman Gray, 1965); Joanne T. Piscitelli, M.D. (Duke, 1980); Anna L. Stout, Ph.D. (South Carolina, 1980); David K. Walmer, M.D., Ph.D. (North Carolina, 1983).

Assistant Professors: Nels C. Anderson, Ph.D. (Purdue, 1964); Lori A. Bastian, M.D. (Emory, 1987); Kimberly A. Boggess, M.D. (SUNY-Stony Brook, 1990); James D. Bowie, M.D. (Oklahoma, 1967); Ann J. Brown, M.D. (Stanford, 1988); Grace M. Couchman, M.D. (Colorado, 1985); Barbara Hertzberg, M.D. (Duke, 1980); Pamela L. Johnson, M.D. (Illinois, 1989); Elizabeth G. Livingston, M.D. (Duke, 1984); Diana B. McNeill, M.D. (Duke, 1982); Evan R. Myers, M.D. (Pennsylvania, 1988); Donald H. Penning, M.D. (Queens, 1983); Gustavo C. Rodriguez, M.D. (Illinois, 1985).

Assistant Clinical Professors: Cindy L. Amundsen, M.D. (Tennessee, 1991); Jeffrey C. Andrews, M.D. (Toronto, 1983); Paul S. Andrews, M.D. (North Carolina, 1981); Avis A. Artis, M.D. (Duke, 1984); Rudy W. Barker, M.D. (North Carolina, 1967); Diana Dell, M.D. (Louisiana State, 1982); Richard J. Dwane, M.D. (Georgetown, 1962); Anne C. Ford, M.D. (North Carolina, 1991); Joe W. Hardison, M.D. (North Carolina, 1965); Charles O. Harris, M.D. (North Carolina, 1979); William R. Lambeth, M.D. (Bowman Gray, 1974); Mary Lee Lobach, M.D. (Vanderbilt, 1984); William S. Meyer, M.S.W. (Illinois-Chicago, 1977); M. Cristina Muñoz, M.D. (California-San Francisco, 1988); Gerard G. Nahum, M.D. (Stanford, 1984); Douglas J. Raburn, Ph.D. (Nebraska, 1990); David L. Richardson, Jr., M.D. (South Carolina, 1973); Ira Q. Smith, M.D. (Bowman Gray, 1979); Robert K. Yowell, M.D. (Duke, 1961).

Assistant Consulting Professors: James L. Allen, M.D. (Emory, 1965); Arnold B. Barefoot, Jr., M.D. (North Carolina, 1982); Walker H. Campbell, M.D. (Virginia, 1963); Karen H. Clark, M.D. (Alabama, 1982); Richard V. Clark, M.D., Ph.D., (Washington, 1977); Vivian E. Clark, M.D. (Boston, 1981); Yancey G. Culton, Jr., M.D. (Duke, 1956); Jerry L. Danford, M.D. (Duke, 1967); James R. Dingfelder, M.D. (Jefferson, 1965); Michael D. Fried, M.D. (New York, 1971); Carl A. Furr, Jr., M.D. (North Carolina, 1958); Francis S. Gardner, Jr., M.D. (Maryland, 1951); Michael D. Gooden, M.D. (North Carolina, 1973); Howard M. Goodman, M.D. (Med. Coll. Virginia, 1979); Ronald E. Granger, M.D. (California-Irvine, 1977); William B. Gunter, Jr., M.D. (Emory, 1982); William D. Haithcock, M.D. (Med. Univ. South Carolina, 1973); Perry M. Harmon, M.D. (North Carolina, 1974); Bennet A. Hayes, Jr., M.D. (North Carolina, 1957); Melvin L. Henderson, M.D. (Duke, 1978); Robert W. Holloway, M.D. (Vanderbilt, 1993); Wanda L. Jenkins, M.D. (Cincinnati, 1979); Johnnie E. Jones, M.D. (Meharry, 1976); Samuel J. Kapnick, M.D. (Harvard, 1991); Glenward T. Keeney, M.D. (Med. Coll. Virginia, 1967); John W. Lane, M.D. (Duke, 1972); Richard E. Lassiter, M.D. (North Carolina, 1965); Stephen C. Lies, M.D. (Duke, 1976); Frank E. Long, M.D. (Maryland, 1975); Jack P. McDaniel, M.D. (North Carolina, 1956); Dudley C. Miller, M.D. (Missouri, 1959); James P. Moon, M.D. (South Dakota, 1979); William A. Nebel, M.D. (North Carolina, 1962); Phillip H. Pearce, M.D. (Duke, 1960); H. Newton Pleasant, Jr., M.D. (East Carolina, 1992); Marla M. Presta, M.D. (Chicago, 1982); Elizabeth G. Raymond, M.D. (Columbia, 1984); Steven M. Scott, M.D. (Indiana, 1974); E. Frank Shavender, M.D. (North Carolina, 1968); W. Siegfried Smith, Jr., M.D. (Duke, 1961); Paul A. Vieta, M.D. (New Jersey, 1966); Bertram E. Walls, M.D. (Duke, 1972).

Research Associates: Weirong Shang, Ph.D. (Tennessee, 1994); Yulian Zhao, Ph.D. (Harbin, 1990).

Associates: Angeles A. Alvarez, M.D. (Washington, 1994); Matthew D. Barber, M.D. (Jefferson, 1994); Elizabeth A. Bell, M.D. (North Carolina, 1990); Michael F. Carney, M.D. (Loyola, 1990); Martha L. Decker, M.D. (East Carolina, 1985); Andra H. James, M.D. (Virginia, 1993); Peter D. Dwane, M.D. (McGill, 1967); G. Larry Maxwell, M.D. (North Carolina, 1991); Holly A. Muir, M.D. (Dalhousie, 1983); Amy P. Murtha, M.D. (Med. Col. of Pennsylvania, 1992); Barbara H. Osborn, M.D. (Duke, 1993); Sharon L. Rupp, B.S., A.A.S.; Stuart D. Shelton, M.D. (Eastern Virginia, 1989); Anthony G. Visco, M.D. (SUNY-Syracuse, 1993); Alison C. Weidner, M.D. (Duke, 1992); Ernest J. Zeringue, M.D. (Med. Univ. South Carolina, 1994).

Clinical Associates: Katrina H. Avery, M.D. (North Carolina, 1991); Elizabeth J. Burkett, B.S.N., M.S.N.; Susann L. Clifford, M.D. (Florida, 1993); MargEva M. Cole, M.D. (Harvard, 1993); Richard D. Duncan, III, M.D. (Tennessee, 1994); A. Dawan Gunter, M.D. (Michigan State, 1994); Jouko K. Halme, M.D., Ph.D. (Helsinki, 1968); Mary G. Hammond, M.D. (Florida, 1974); Janice L. Henderson, M.D. (Queens, 1983); Andréa S. Lukes, M.D. (Duke, 1994); Rebecca M. Ryder, M.D. (North Carolina, 1989).

Consulting Associates: Kerry H. Ainsworth, M.D. (Northwestern, 1962); Thomas K. Barefoot, M.D. (East Carolina, 1986); Steven H. Berliner, M.D. (SUNY-Brooklyn, 1978); Geoffrey K. Bowman, M.D. (Dalhousie, 1982); Linda K. Bresnahan, M.D. (Indiana, 1987); Pat C. Bryan, M.D. (North Carolina, 1983); Cathryn L. Crosland, M.D. (Kentucky, 1983); Alan S. Davis, M.D. (North Carolina, 1994); Timothy G. DeEulis, M.D. (West Virginia, 1996); Racine N. Edwards-Silva, M.D. (Hahnemann, 1983); Gerianne Geszler, M.D. (Duke, 1985); Daniel L. Gottsegen, M.D. (Tufts, 1969); André F. Hall, M.D. (Cincinnati, 1992); Stuart H. Jordan, M.D. (North Carolina, 1985); Linda T. McAlister, M.D. (California-San Francisco, 1978); Robert E. Meeks, Jr., M.D. (Mercer, 1989); Celia M. Mendes, M.D. (Brown, 1991); Glen A. Nowachek, M.D. (Loyola, 1982); Denise M. Olson, M.D. (Michigan State, 1988); Russel F. Palmeri, M.D. (Georgetown, 1980); Kathy A. Santoriello, M.D. (Duke, 1984); David A. Schutzer, M.D. (Robert Wood Johnson, 1993); Myron S. Strickland, Sr., M.D. (East Carolina, 1984); Camille J. Wahbeh, M.D. (Amer. Univ. Beirut, 1977); John S. Welsh, Jr., M.D. (Louisiana, 1989); Miles E. Wilson, M.D. (Meharry, 1973).

Adjunct Assistant Professor: Neil J. Finkler, M.D. (Mount Sinai, 1982).

Professor Emeriti: Arthur C. Christakos, M.D.; Roy T. Parker, M.D.; Warren E. Patow, M.D.; Charles H. Peete, Jr., M.D.

Required Course

OBG-205C. Obstetrics and Gynecology. Required of all second-year students—consists of eight weeks in general obstetrics and gynecology. Students attend lectures, work daily in the general and special outpatient clinics, and are assigned patients on the obstetric and gynecologic wards. Students share in patient care, teaching exercises, and in daily tutorial sessions with the faculty. Clinical conferences, a gynecologic-pathology conference, endocrine conferences, and correlative seminars and lectures are included. Credit: 8. *Nahum*

Electives

OBG-210C. Gynecologic Cancer. This course presents a clinical experience in the management of patients with a gynecologic malignancy. The student assumes the role of an sub-intern. Outpatient, inpatient, and operative exposure to these patients is extensive. Credit: 4 or 8. Enrollment: max 1. *Clarke-Pearson, Soper, Berchuck, Rodriquez, and gynecologic oncology fellows*

OBG-213C. Preparation for Practice, Cape Fear Valley Hospital, Fayetteville AHEC. This is a unique opportunity to receive both didactic exposure and clinical experience in obstetrics and gynecology in Cape Fear Valley Hospital, a large community hospital in Fayetteville, North Carolina, where almost 4,000 patients are delivered each year. A student actively participates in the care of patients in the labor and delivery room, assists at surgery, and renders postoperative care. This is a community hospital experience rather heavily credited in clinical obstetrics. Students are exposed to a large volume of clinic opportunities. Three senior residents from Duke rotate through Cape Fear Valley Hospital. The students are directly supervised by three full-time Duke faculty at Cape Fear, in addition to Duke Ob-Gyn residents. Prerequisites: permission of Dr. Hammond prior to signing for the course. Check availability through Dr. Gooding's office. Credit: 4. Enrollment: max 1. *Hammond, Gooding, Richardson, Hardison, and staff of Cape Fear Valley Hospital*

OBG-231C. Clinical Reproductive Endocrinology and Infertility. Course for students who desire additional basic and clinical experience in examination, diagnosis, and treatment of obstetric and gynecologic patients with endocrinopathy and infertility. Course consists of clinical core of reproductive endocrine problems correlated with examination and treatment of patients both in the Endocrinology Outpatient Clinic, in surgery, and in the hospital. Exposure to assisted reproductive technologies is also available depending on the current clinical load. Permission of instructor required. Credit: 4. Enrollment: max 1. *Walmer, Couchman, Haney, Hammond, and reproductive endocrinology fellows*

OBG-239C. Perinatal Medicine. A study of the relationship of clinical factors during pregnancy, labor, delivery, and the first month of life. Emphasis is placed on abnormal conditions of pregnancy as related to the infant, prenatal pathological conditions adversely affecting the fetus and the newborn, and early management of the infant. Current problems in the maternal-fetal relationships are outlined. The clinical rotation consists of half-time on the high risk obstetric service and half on the nursery service. Duke North Labor and Delivery, ICN, or Nurseries. See also PED 225C. Prerequisites: must contact Dr. Murtha prior to registration. Credit: 8. Enrollment: max 2. *Herbert, Killam, Livingston, Murtha, Boggess, and maternal-fetal medicine fellows*

OBG-245C. Office Gynecology. For students preparing for non-ob-gyn careers. Outpatient clinic diagnosis and patient care are taught. Credit: 4 or 8. Enrollment: max 1 *Nahum*

OBG-247C. Clinical Obstetrics. For students preparing for general practice of medicine, pediatrics, or obstetrics and gynecology. This course studies the relationship of clinical factors during pregnancy, labor, and delivery. Emphasis is placed on abnormal conditions of pregnancy as related to the infant. Current problems in the maternal-

fetal relationship are outlined. The student functions on an intern level and takes part in activities of the housestaff and faculty. Credit: 5 or 10. Enrollment: max 2. *Herbert, Killam, Livingston, Murtha, Boggess, and fellows on obstetrical service*

OBG-249C. Clinical Gynecology and Urogynecology. For students preparing for obstetrics and gynecology, general practice, surgery, and urology. Emphasis is placed on the outpatient assessment of patients with acute and chronic gynecologic disorders including pelvic floor dysfunction, pelvic organ prolapse, urinary and fecal incontinence, and others. Students have the opportunity to work closely with faculty members in the Division of Gynecology. Inpatient care is not required, but participation in the operative care of gynecologic patients can be arranged if desired. Ample time for independent study is planned. The student is expected to utilize this time reviewing a specific clinical problem with frequent guidance and input from a member of the Gynecology Division with similar interests. Credit: 4 or 8. Enrollment: max 1. *Bump, Addison, Livengood, Amundsen, and urogynecology fellows*

OBG-253C. Preparation for Practice, Cabarrus Memorial Hospital, Concord, North Carolina. This is an opportunity to receive both didactic exposure and clinical exposure in obstetrics and gynecology in the community hospital. The student is expected to function as an intern. The student participates actively in the care of the patients in the labor and delivery area, assists at surgery, and renders postpartum and postoperative care. This is a community hospital experience rather heavily credited in clinical obstetrics. The student is exposed to a large volume of clinical material. The practitioners in the community are all board certified obstetricians and gynecologists and are interested in student teaching. A Duke faculty person provides additional guidance by visiting once per week. This elective can be taken for four weeks for four units or eight weeks for eight units. The students are housed in quarters available for them. Prerequisites: permission of Dr. Livengood prior to signing for the course. Credit: 4, 6, or 8. Enrollment: max 1. *Livengood and staff of the Cabarrus Memorial Hospital*

Ophthalmology

Joseph A. C. Wadsworth Clinical Professor David L. Epstein, M.D. (Johns Hopkins, 1968), Chairman.

Professors: W. Banks Anderson, Jr., M.D. (Harvard, 1956); Edward G. Buckley, M.D. (Duke 1977); Jonathan G. Dutton, M.D. (Washington, 1977), Ph.D. (Harvard, 1970); Diane Van Horn Hatchell, Ph.D. (Marquette, 1968); Glenn J. Jaffe, M.D. (San Francisco, 1983); Joseph A. C. Wadsworth Research Professor of Ophthalmology Gordon K. Klintworth, M.D., Ph.D. (Witwatersrand, 1957, 1966); Paul Lee, M.D. (Michigan, 1986); J.D. (Columbia, 1996); Brooks W. McCuen II, M.D. (Columbia, 1974).

Associate Professors: Tereté Borrás, Ph.D. (Madrid, 1977); Alan Carlson, M.D. (Duke, 1981); Stephen C. Pollock, M.D. (Illinois, 1981); Alan D. Proia, M.D. (Cornell, 1980), Ph.D. (Rockefeller, 1979); Fulton Wong, Ph.D. (Rockefeller, 1977).

Associate Clinical Professors: R. Rand Allingham, M.D. (Cincinnati, 1979); Judy H. Seaber, Ph.D. (Duke, 1985).

Assistant Professors: Joseph Corless, M.D., Ph.D. (Duke, 1972); Christopher DeBacker, M.D. (Mt. Sinai, 1991); Monica A. De La Paz, M.D. (Stanford, 1987); Craig Fowler, M.D. (Med. Coll. Virginia, 1985); Sharon F. Freedman, M.D. (Harvard, 1985); Leon W. Herndon, M.D. (North Carolina, 1991); Peter C. Huttemeier, M.D. (Copenhagen, 1977); Terry Kim, M.D. (Duke, 1992); Eric A. Postel, M.D. (Jefferson, 1991); Angela Royster Scott, M.D. (North Carolina, 1990); Cynthia Toth, M.D. (Med. Coll. Pennsylvania, 1983).

Assistant Clinical Professor: Calvin H. Mitchell, M.D. (Duke, 1958).

Assistant Research Professors: Brian McKay, Ph.D. (Med. Col. Wisconsin, 1995); Margaret Pericak-Vance, Ph.D. (Indiana, 1978).

Associate Consulting Professors: Edward K. Isbey, Jr., M.D. (Michigan, 1955); Lawrence W. Moore, Jr., M.D. (Duke, 1963).

Assistant Consulting Professors: David P. Berry, M.D. (South Carolina, 1975); John E. Bourgeois, M.D. (Virginia, 1979); David J. Browning, M.D. (Duke, 1981), Ph.D. (Duke, 1980); Terry A. Cox, M.D. (Kansas, 1975); Anne Marie Hanneken, M.D. (Med. Coll. Wisconsin, 1984); Edward K. Isbey III, M.D. (North Carolina, 1981); Jeremiah R. Marion, M.D. (Duke, 1975); Walter C. McLean, Jr., M.D. (Virginia

1975); Charles F. Sydnor, M.D. (Virginia, 1969).

Consulting Associates: Thomas L. Beardsley, M.D. (Duke, 1971); J. Thomas Foster, M.D. (Duke, 1958); William R. Harris, M.D. (North Carolina, 1956); Ann Kathryn Joslyn, M.D. (Duke, 1983); John H. Killian, M.D. (Bowman Gray, 1967); Martin J. Kreshon, M.D. (Marquette, 1954); W. Hampton Lefler, M.D. (Bowman Gray, 1963); Harold E. Shaw, Jr., M.D. (Med. Univ. South Carolina, 1973); Robert E. Wiggins, M.D. (North Carolina, 1984).

Adjunct Associate Professor: M. Joseph Costello, III, Ph.D. (Duke, 1971).

Electives

OPH-210C. Medical Ophthalmology. The ophthalmic signs and symptoms of systemic disease are presented in a lecture series. Oriented for those students interested primarily in pediatrics, internal medicine, or ophthalmology. If permitted by the instructor, this clinical science course can be audited. Credit: 1. Enrollment: min 8, max 20. *Allingham and Mitchell*

OPH-212C. General Ophthalmology. A clinical preceptorship in which the student participates and observes the regular housestaff activities, conferences, lectures, patient care, and treatment including surgery. Emphasis on the use of specialized ophthalmic apparatus is emphasized. Prerequisites: OPH-210C recommended, but not required. Credit: 4 or 8. Enrollment: max 2. *Allingham*

OPH-213C. Ophthalmic Pathology. The student reviews all ophthalmic pathology specimens submitted and any pertinent permanent specimens. He or she attends all regular ongoing ophthalmic pathology conferences. Prerequisites: OPH-212C and OPH-210C recommended, but not required. Not available during the summer term. Credit: 1. *Klintworth and Proia*

OPH-214C. Investigative Ophthalmology. The student is assigned a project relating to basic ophthalmologic problems. Technical assistance, sufficient equipment, and laboratory animals are supplied for the completion of the project. The student is expected to attend all scheduled research seminars. Prerequisites: OPH-212C and OPH-210C suggested, but not required. Students must devote at least three months to the elective. Credit: 4 or 8. Enrollment: max 2. *Klintworth, Hatchell, Wong, Proia, Jaffe, Epstein, DeLaPaz, Fowler, and Borrás*

OPH-215C. Pediatric Ophthalmology. A clinical preceptorship in which the student participates in an outpatient pediatric ophthalmology clinic. The student encounters the more common ocular disorders of childhood including ocular motility disturbances, congenital disorders, and congenital metabolic disorders. The diagnosis and treatment aspects are emphasized heavily. The course meets on Tuesdays or Thursdays from 9:00 a.m. till 4:00 p.m. or by special arrangement, such as a half-day Tuesday and a half day Thursday. Additional experiences, which would include surgery and/or pediatric neuro-ophthalmology, can be arranged. Credit: 1 or 2. Enrollment: max 3. *Buckley, Seaber, and Freedman*

OPH-216C. Clinical Neuro-Ophthalmology. An advanced clinical preceptorship that provides students with exposure to a variety of neuro-ophthalmologic problems, including diseases affecting the optic nerve and central visual pathways and disorders of eye movement. Emphasis is placed on history taking, acquisition of specialized examination techniques (visual fields, pupils, ocular motility, and fundus), and the logical analysis of clinical information. The course meets one day per week, either on Tuesday or Thursday and begins at 8:30 a.m. Prerequisites: OPH-212C. Credit: 1. Enrollment: max 1. *Pollock*

Pathology

Professor Salvatore Pizzo, M.D. (Duke, 1972), Ph.D. (Duke, 1973), Chairman.

Professors: Darell D. Bigner, M.D., Ph.D. (Duke, 1965, 1971); Sandra H. Bigner, M.D. (Tennessee, 1971); Edward H. Bossen, M.D. (Duke, 1965); William D. Bradford, M.D. (Case Western Reserve, 1958); Gordon K. Klintworth, M.D., Ph.D. (Witwatersrand, 1957, 1966); Keith A. Reimer, M.D. (Northwestern, 1972); Nancy Reinsmoen, Ph.D. (Minnesota, 1987); L. Barth Reller, M.D. (Virginia, 1966); Stanley J.

Robboy, M.D. (California at Los Angeles, 1965); Victor L. Roggli, M.D. (Baylor, 1976); John D. Shelburne, M.D., Ph.D. (Duke, 1972, 1971).

Adjunct Professors: James D. Crapo, M.D. (Rochester, 1971); Paul Nettesheim, M.D., D.M.S. (Bonn, 1959); Vladimir Petrow, Ph.D., D.Sc. (London, 1936, 1942); Nicholas Vick, M.D. (Chicago, 1965).

Associate Professors: Soman Abraham, Ph.D. (Newcastle Upon Tyne, U.K., 1981); Marcia Gottfried, M.D. (Northwestern, 1978); Maureen Hoffman, M.D., Ph.D. (Iowa, 1982); David N. Howell, M.D., Ph.D. (Duke, 1984, 1982); Alan D. Proia, M.D. (Cornell, 1980), Ph.D. (Rockefeller, 1979); Christopher Shea, M.D. (Georgetown, 1983); Charles Steenbergen, M.D., Ph.D. (Pennsylvania, 1978, 1979); John Toffaletti, Ph.D. (North Carolina, 1977); Peter Zwadyk, Jr., Ph.D. (Iowa, 1971).

Clinical Associate Professors: Mazin B. Qumsiyeh, Ph.D. (Texas Tech, 1986); Emily A. G. Reisner, Ph.D. (Case Western Reserve, 1969).

Associate Research Professors: George Cianciolo, Ph.D. (Miami, 1977); Carol W. Lewis, Ph.D. (North Carolina, 1972).

Assistant Professors: Michael S. Ballo, M.D. (Case Western Reserve, 1991); Rex Bentley, M.D. (Harvard, 1986); Scott Berkowitz, M.D. (Jefferson, 1979); Steven J. Bredehoeft, M.D. (Kansas, 1974); Kenneth Copeland, Ph.D. (Manitoba, 1991); Mark W. Dewhirst, D.V.M., Ph.D. (Colorado State, 1975, 1979); Leslie Dodd, M.D. (Nevada, 1987); Jan Enghild, Ph.D. (Univ. Aarhus, Denmark, 1987); Henry S. Friedman, M.D. (SUNY at Syracuse, 1977); Herbert Fuchs, M.D., Ph.D. (Duke, 1984); Charles S. Greenberg, M.D. (Hahnemann, 1976); John Guyton, M.D. (Harvard, 1973); Laura P. Hale, M.D., Ph.D. (Duke, 1990, 1991); Lizzie Harrell, M.D. (North Carolina State, 1987); John M. Harrelson, M.D. (Duke, 1965); Christine M. Hulette, M.D. (Louisville, 1983); Randy H. Jirtle, Ph.D. (Wisconsin, 1976); William Kane, M.D., Ph.D. (Washington Univ., 1982); Virginia Kraus, M.D., Ph.D. (Duke, 1982, 1993); Joanne Kurtzberg, M.D. (New York Med. Coll. 1976); James G. Lewis, Ph.D. (Duke, 1982); James E. Lowe, M.D. (California at Los Angeles, 1973); Kim Lyerly, M.D. (California at Los Angeles, 1983); John F. Madden, M.D., Ph.D. (Duke, 1989); Karen Mann, M.D., Ph.D. (Tufts, 1988); Roger C. McLendon, M.D. (Med. Coll. Georgia, 1982); Sara Miller, Ph.D. (Georgia, 1972); Thomas Ortel, M.D., Ph.D. (Indiana, 1985, 1983); Victor G. Prieto, M.D. (Alicante, Spain, 1986), Ph.D. (Barcelona, 1991); L. Darryl Quarles, M.D. (Alabama, 1979); Greg Riggins, M.D., Ph.D. (Emory, 1994); Jonathan I. Scheinman, M.D. (Illinois, 1966); Timothy T. Stenzel, M.D., Ph.D. (Duke, 1992); Marilyn Telen, M.D. (New York Univ., 1977); Philip J. Walther, M.D., Ph.D. (Duke, 1975, 1974); Michael R. Zalutsky, Ph.D. (Washington Univ., 1974).

Assistant Clinical Professors: John A. Bittikofer, Ph.D. (Purdue, 1971); Jane Gaede, M.D. (Duke, 1966); Robert B. Kinney, M.D. (Duke, 1981); Babatunde Olatidoye, M.D. (North Carolina, 1990); Richard J. Rahija, D.V.M. (Kansas, 1974), Ph.D. (North Carolina, 1989); Margaret C. Schmidt, M.A. (Louisville, 1969), Ed.D. (Duke, 1988); Frank A. Sedor, Ph.D. (Florida, 1971); Robin T. Vollmer, M.D. (Duke, 1967).

Assistant Research Professors: Gerald E. Archer, Jr., Ph.D. (Cincinnati, 1987); Mario Gonzalez-Gronow, D.Sc. (Chile, 1970); Uma K. Misra, Ph.D. (Kansas State, 1958); B. K. Ahmed Rasheed, Ph.D. (Indian Instit. Sci., 1981).

Adjunct Assistant Professors: James Bonner, Ph.D. (Mississippi State, 1987); John Butts, M.D. (Duke, 1972); Thomas B. Clark, III, M.D. (Med. Univ. South Carolina, 1983); James D. Crapo, M.D. (Rochester, 1971); Lynn Crook, M.D. (Med. Univ. South Carolina, 1974), Ph.D. (Emory, 1966); Arthur Davis, M.D. (Minnesota, 1953); Peter Ingram, Ph.D. (Southampton, 1967); Myla Lai-Goldman, M.D. (Columbia, 1983); James Alan Popp, D.V.M. (Ohio State, 1968), Ph.D. (California at Los Angeles, 1972); Jerry E. Squires, M.D. (West Virginia, 1974), Ph.D. (Yale, 1971); Peter Wentz, Ph.D. (Florida, 1972).

Associate: Kenneth R. Broda, Ph.D. (Duke, 1977).

Emeriti: Bernard F. Fetter, M.D.; Robert B. Jennings, M.D.; John A. Koepke, M.D.; Phillip C. Pratt, M.D.; Kenneth A. Schneider, M.D.; Joachim R. Sommer, M.D.; F. Stephen Vogel, M.D.; Benjamin Wittels, M.D.

Required Course

PTH-200C. Pathology. The core course in pathology is given during the second term of the first year. Fundamentals of pathology are presented by correlating gross and microscopic material to illustrate the structural changes in disease. Lectures dealing with broad concepts of disease processes are presented by senior faculty, and conferences with small groups of students are held under the guidance of staff members. Etiology and pathogenesis of disease, as well as the experimental approach are emphasized for

the purpose of correlation with clinical disease. In addition to group work, conferences are scheduled to discuss problems derived from autopsies. Students are required to collaborate in postmortem studies and present cases in clinical-pathologic conferences under the direction of the staff. Credit: 5. *Steenbergen*

Electives

PTH-223B or C. Autopsy Pathology. The course is intended to introduce students to the autopsy as an investigative tool. Anatomic-clinical correlation is emphasized. Students work directly with one or more members of the pathology department. They first assist at autopsies and then perform autopsies under supervision. They work up these cases with particular attention to correlations with clinical and experimental medicine, prepare the final autopsy reports, and work essentially at the level of a house officer. Students are expected to present their findings at staff conferences. Preference given to Pathology Study Program students. Credit: 4 or 8. Enrollment: max 2. *Proia*

PTH-227B. Molecular Diagnostics. This course is designed to provide exposure to the basic molecular biologic techniques that are used in the diagnosis and characterization of inherited diseases and human tumors. The student spends the majority of time at the bench in the Molecular Diagnostic Laboratory, first extracting nucleic acids and then performing southern blot and polymerase chain reaction studies on patients samples. The results of these studies are correlated with both clinical and histopathologic findings to learn the utility and limitations of molecular biologic analysis in the assessment of human disease. Prerequisites: Permission of instructor. Credit: 4. Enrollment: max 2. *Stenzel*

PTH-241B. Pathologic Basis of Clinical Medicine. This is a lecture course stressing clinicopathologic correlation, morphologic diagnosis, pathophysiology, and laboratory medicine. It is required for students enrolled in the Pathology Study Program, but is available as a separate elective for all students. Lectures are on Thursdays from 8:00 a.m. to 9:30 a.m. and on Fridays from 12:00 p.m. to 1:00 p.m. Gross Demonstration is Tuesdays 8:00 - 9:00 a.m. Course must be taken for the entire year. No audits are allowed. Credit: 1. *Bradford, Reimer, and Hoffman*

PTH-281B or C. Cytopathology Preceptorship. This course consists of full-time rotation in the diagnostic cytopathology laboratories. By working with the laboratory staff, the student explores in detail the role played by diagnostic cytopathology in the diagnosis of disease. In addition to general cytology, the student has the opportunity to participate in the fine needle aspiration biopsy service. Although not a requirement, the student is encouraged to pursue special research projects. Preference given to Pathology Study Program students. Credit: 4 or 8. Enrollment: max 1. *Ballo, Olatidoge, Dodd, Bigner, and cytopathology staff*

PTH-342B. Special Topics in Pathology. Special problems in pathology are studied with a member of the senior staff. The subject matter is individually arranged. Permission of the instructor required. Credit: 1-16. *Pizzo and staff*

PTH-348B or C. Practical Surgical Pathology. This course serves as an apprenticeship in which the student works closely with residents in the actual preparation and diagnosis of tissue changes. Microscope required (limited number available on loan). Prerequisites: permission of Dr. Bradford. Preference given to Pathology Study Program students. Credit: 4 or 8. Enrollment: max 2. *Gottfried and staff*

PTH 350B or C. Medical Microbiology. This is an introduction to medical microbiology (CMB) including appropriate use of diagnostic tests and other laboratory resources for patient care and hospital infection control. The student participates in laboratory rounds with the faculty, medical microbiology fellows, and the infectious diseases services. The student gains appropriate bench experience in all CMB disciplines including the use of molecular biology methods used in patient related tests and infection control investigations. Credit: 4. Enrollment: max 1. *Reller, Harrell, Henshaw, Madden, and staff*

PTH-353B. Neuropathology. A view of neuropathology that emphasizes clinico-pathologic correlation. Credit: 3. *McLendon and staff*

PTH-359B. Fundamentals of Electron Microscopy. Emphasis is placed on the theory and application of electron microscopy to ultrastructural pathology. The methods relating to electron microscopy as well as x-ray microanalysis, ion microscopy, and immunocytochemistry are considered. Laboratory experience is included. Credit: 3. *Shelburne, Roggli, Ingram, LeFurgey, and Miller*

PTH-364B. Skeletal Pathology. An overview of skeletal pathology beginning with the development of the normal skeleton. a systematic review of inflammatory, neoplastic, metabolic, arthritic, vascular, dysplastic, and traumatic diseases of the skeleton. Clinical correlation. Credit: 2. Enrollment: min 4, max 10. *Harrelson*

PTH-366B. Pulmonary Pathology and Pathophysiology. Emphasis is on pulmonary pathology and pathophysiology of infections, metabolic, environmental, neoplastic diseases, and certain diseases of unknown etiology (sarcoid, alveolar proteinosis, e.g.). Credit: 3. Enrollment: min 2, max 15. *Roggli and Sporn*

PTH-380B or C. Surgical Pathology—Emphasis: Electron Microscopy. This course is an apprenticeship in which the student becomes engaged in the actual preparation and diagnosis of tissue changes using both light and electron microscopy. The student, of necessity, learns how to operate the electron microscope. Prerequisites: PTH-359B suggested, but not required. Permission of instructor is required. Credit: 4 or 8. Enrollment: max 1. *Shelburne and Vollmer*

PTH-385B. Molecular Aspects of Disease. This course presents background, investigative methods, and recent advances in understanding the molecular basis of selected diseases, with an in-depth focus on a small number of diseases whose defects are known at the genetic or molecular levels. The course is taught in a small group seminar format by experts in each disease studied. Topics include molecular cytogenetics, immunodeficiency diseases, mechanisms of microbial antibiotic resistance, hemoglobinopathies, neurologic/neuromuscular diseases, coagulopathies, cancer susceptibility genes, tumor suppressor genes, ethical issues in genetic susceptibility testing, gene therapy, and more. Credit: 3. Enrollment: min 5 max 50. *Stenzel and Hale*

Pediatrics

Samuel L. Katz Professor Michael M. Frank, M.D. (Harvard, 1960), Chairman.

Professors: Page A. W. Anderson, M.D. (Duke, 1963); George Bisset, III, M.D. (South Florida, 1975); James B. Sidbury Professor Rebecca H. Buckley, M.D. (North Carolina, 1958); Y.T. Chen, M.D. (Taiwan Univ., 1973), Ph.D. (Columbia, 1978); John M. Falletta, M.D. (Kansas, 1966); John W. Foreman, M.D. (Maryland, 1973); Henry S. Friedman, M.D. (SUNY-Syracuse, 1977); Ronald N. Goldberg, M.D. (California, Los Angeles, 1972); Edward C. Halperin, M.D. (Yale, 1979), William N.P. Herbert, M.D. (Bowman Gray, 1972); Wilburt C. Davison Professor Thomas R. Kinney, M.D. (Duke, 1970); Joanne Kurtzberg, M.D. (New York Med Coll., 1976); Darrell V. Lewis, Jr., M.D. (Minnesota, 1969); Jon N. Meliones, M.D. (Tufts, 1984); Stephen P. Sanders, M.D. (Louisville, 1975); Alexander Spock, M.D. (Maryland, 1955); William R. Treem, M.D. (Stanford, 1977); Russell E. Ware, M.D., Ph.D. (Duke, 1983, 1991).

Clinical Professors: James A. Stockman III, M.D. (Jefferson, 1969); Norman S. Talner, M.D. (Michigan, 1949); W. Samuel Yancy, M.D. (Duke, 1965).

Associate Professors: Brenda E. Armstrong, M.D. (St. Louis, 1974); Roger C. Barr, Ph.D. (Duke, 1968); Rose-Mary Boustany, M.D. (Amer. Univ. Beirut, 1979); Edward G. Buckley, M.D. (Duke, 1977); Dennis A. Clements, M.D. (Rochester, 1973), M.P.H., Ph.D. (North Carolina, 1988, 1990); G. Robert DeLong, M.D. (Harvard, 1961); Peter C. English, M.D., Ph.D. (Duke, 1975); Michael S. Freemark, M.D. (Duke, 1976); Frank H. Kern, M.D. (Pennsylvania, 1982); John G. Looney, M.D. (Texas-Southwestern, 1969); M. Louise Markert, M.D., Ph.D. (Duke, 1982, 1991); Ross E. McKinney, Jr., M.D. (Rochester, 1979); Thomas M. Murphy, M.D. (Rochester, 1973); Martin P. O'Laughlin, M.D. (Columbia, 1980); Neil Prose, M.D. (New York, 1975); Philip M. Rosoff, M.D. (Western Reserve, 1978); Scott Schulman, M.D. (George Washington, 1982); Ross M. Ungerleider, M.D. (Rush, 1977); Emmanuel B. Walter, M.D. (Maryland, 1983); Larry Williams, M.D. (Duke, 1977); Jo Rae Wright, Ph.D. (West Virginia, 1981).

Associate Clinical Professors: Laura T. Gutman, M.D. (Stanford, 1962); Ronald J. Kanter, M.D.

(Vanderbilt, 1979); Deborah W. Kredich, M.D. (Michigan, 1962); Mazin Qumsiyeh, Ph.D. (Texas Tech, 1986); David T.H. Tanaka, M.D. (Johns Hopkins, 1979); Gordon Worley, (Harvard, 1973).

Associate Research Professor: William D. Matthew, Ph.D. (California, San Francisco, 1981); David S. Millington, Ph.D. (Liverpool, 1969).

Assistant Professors: Kenneth A. Alexander, M.D. (Washington, 1989); Andrea Amalfitano, D.O., Ph.D. (Michigan State, 1990, 1989); Richard Auten, M.D. (North Carolina, 1981); A. Resai Bengur, M.D. (Medical University South Carolina, 1982); William D. Bradford, M.D. (Western Reserve, 1958); Ira M. Cheifetz, M.D. (Yale, 1989); Paulo Ferrez Collett-Solberg, M.D. (Universidade Federal Do Rio De Janeiro, 1989); Emil Chuang, M.D. (Sydney, 1983); Randall G. Fisher, M.D. (Tulane, 1988); Sharon Freedman, M.D. (Harvard, 1985); Herbert E. Fuchs, M.D., Ph.D. (Duke, 1984); Timothy M. George, M.D. (New York, 1986); Ricki F. Goldstein, M.D. (Cornell, 1981); Eva Nozik Grayck, M.D. (Colorado-Boulder, 1988); J. Rene Herlong, M.D. (Duke, 1989); Priya Kishnani, M.D., B.S. (Bombay, 1985); Richard M. Kravitz, M.D. (Temple, 1984); Jennifer Li, M.D. (Duke, 1987); Darryl C. Longee, M.D. (Arkansas, 1983); Samuel M. Mahaffey, M.D. (West Virginia, 1979); Paul L. Martin, M.D., Ph.D. (Washington, 1987); Marie T. McDonald, M.D. (Trinity College, Dublin, 1994); Cindy Miller, M.D. (George Washington, 1985); Richard P. Morse, M.D. (Dartmouth, 1987); Joseph L. Roberts, M.D., (Emory, 1981), Ph.D. (Duke, 1992); M. Henderson Rourk, Jr., M.D. (Pennsylvania, 1963); Laura E. Schanberg, M.D. (Duke, 1984); Paul Szabolcs, M.D. (Simmelweis, Budapest, Hungary, 1985); Robert J. Thompson, Jr., Ph.D. (North Dakota, 1971); Judith A. Voynow, M.D. (Pennsylvania, 1982); John S. Wiener, M.D. (Tulane, 1988); Sherri A. Zimmerman, M.D. (UNC, 1991).

Assistant Clinical Professors: Denise M. Adams, M.D. (Georgetown, 1988); Jeffrey Baker, M.D. (Duke, 1984); Robert P. Drucker, M.D. (Duke, 1979); Nancy E. Friedman, M.D. (Med. Coll. Virginia, 1975); Karen H. Frush, M.D. (Duke, 1986); Martha Ann Keels, D.D.S., Ph.D. (North Carolina, 1984, 1990); Ave Maria Lachiewicz, M.D. (Minnesota, 1980); Elizabeth A. Landolfo, M.D. (Manitoba, 1988); J. Marc Majure, M.D. (Mississippi, 1981); Beatriz Morris, M.D. (Puerto Rico, 1988); John W. Moses, M.D. (Med. Univ. South Carolina, 1983); Christine Rudd, Pharm.D. (North Carolina, 1973); Gail Spirdigliozzi, Ph.D. (Kansas, 1988); Deborah Squire, M.D. (Northwestern, 1978); Delbert Wigfall, M.D. (Emory, 1979).

Assistant Research Professors: Michael D. Feezor, Ph.D. (North Carolina, 1969); Donald E. Fleenor, Ph.D. (Emory University, 1987); J. Francis Heidlage, Ph.D. (Missouri, 1978); Haixiang Jiang, M.D., Ph.D. (Shanghai Medical University, China, 1975, 1991); Stewart P. Johnson, Ph.D. (Case Western Reserve, 1983); Rashid N. Nassar, Ph.D. (Duke, 1974); Karen J. O'Donnell, Ph.D. (North Carolina, 1983).

Associates: Ulus Atasoy, M.D. (Minnesota, 1984); Michelle L. Bailey, M.D. (SUNY, 1995); Gregory N. Barnes, M.D., Ph.D. (Kentucky, 1992, 1990); Laura M. Brooks, M.D. (Virginia, 1994); Timothy A. Driscoll, M.D. (The Ohio State University, 1990); Richard P. Howrey, M.D. (Michigan, 1991); Jennifer Lawson, M.D. (Vermont, 1990); L. Scott Levin, M.D. (Temple, 1982); Laurie A. Myers, M.D. (Ohio State, 1992); Maria A. Pane, M.D. (UNMDN, 1989); Roberts H.A. Smith, M.D. (Texas-Houston, 1990); Karen S. St. Claire, M.D. (Texas-Galveston, 1982).

Clinical Associates: Joanne Barton, Dr.P.H. (North Carolina, 1990); Muki W. Fairchild, M.S.W. (North Carolina, 1976); Robert D. Fitch, M.D. (Duke, 1976); MaryLu Goldberg, Ph.D. (Miami, 1988); Kathryn E. Gustafson, Ph.D. (Ohio, 1988); Ailyn McConkie-Rosell, M.S.W. (Arkansas, 1980); Alexia E. Minanov, M.D. (North Carolina, 1994); Marcia Morgenlander, M.D. (Pittsburgh, 1988); Katharine S. Mosca, M.D. (Virginia, 1991); William H. Schultz, P.A. (Duke, 1981); Yui-Lin Tang, M.D. (Taiwan, 1983); A. William Taub, M.S.W. (North Carolina, 1981).

Research Associates: Yan An, Ph.D. (Ottawa, Canada, 1995); Shih-Fong Chao, Ph.D. (North Carolina, 1992); Pasquale Chitano, Ph.D. (Milan, 1992); Bernard M. Fischer, DVM, Ph.D. (North Carolina State, 1988, 1997); Wei-Xing Guo, M.D., Ph.D. (Hunan, China, 1982; Montreal, 1995); Bradley L. Hodges, Ph.D. (Illinois, Urbana-Champaign, 1997); Huimin Hu, Ph.D. (Western Ontario, 1997); Qiang Li, M.D., (China Medical, Shenyang, People's Republic of China, 1983), Ph.D., (Saskatchewan, Saskatoon, Canada, 1996); Hui-Ming Liu, M.D. (Norman Bethune, 1978); Kathleen McKenna, M.D. (Saint Joseph's, Philadelphia, 1995); Alison J. McVie, Ph.D. (Scotland, 1997); Lisa Palmer, D.O. (North Texas Health Science Center, 1994); Wen-Ling Shaiu, Ph.D. (Iowa State, 1993); Robert D. Stevens, Ph.D. (London, 1969).

Associate in Research: Edward R. Darken, A.M. (Duke, 1985); James H. Heller, M.A. (Minnesota, 1980), M.S. (Memorial University of Nfld., St. John's, Nfld., Canada, 1983).

Consulting Professor: Thomas K. Oliver, Jr., M.D. (Harvard, 1949).

Associate Consulting Professors: Reese H. Clark, M.D. (North Carolina, 1982); Rosalind Coleman, M.D. (Case Western Reserve, 1969); William L. London, M.D. (North Carolina, 1955); Howard H. Loughlin, M.D. (Pennsylvania, 1970); Lois A. Pounds, M.D. (Pittsburgh, 1965); Evelyn Schmidt, M.D.

(Duke, 1951), M.P.H. (Columbia, 1962).

Assistant Consulting Professors: Clarence A. Bailey, M.D. (North Carolina, 1958); William L. Coleman, M.D. (New Mexico, 1979); James S. Hall, Jr. M.D. (Duke, 1957); Alvin H. Hartness, M.D. (Bowman Gray, 1965); Thomas M. McCutchen, Jr., M.D. (Vanderbilt, 1963); Kathy A. Merritt, M.D. (Duke, 1985); Charles B. Neal III, M.D. (Duke, 1955); John C. Pollard, M.D. (Virginia, 1968); William C. Powell, M.D. (Bowman Gray, 1952); Rupa Redding-Lallinger, M.D. (Cornell, 1980); Ann Reed, M.D. (Med. Coll. Ohio, 1984); James B. Rouse, M.D. (Duke, 1965); Frank S. Shaw, M.D. (Pennsylvania, 1959); Charles I. Sheaffer, M.D. (Western Reserve, 1958); Leonard D. Stein, M.D. (Med. Coll. Georgia, 1975); J. Gordon Still, M.D. (Bowman Gray, 1978), Ph.D. (Wake Forest, 1978); Fred R. Stowe, Jr., M.D. (North Carolina, 1958); Marjorie E. Tripp, M.D. (Yale, 1973).

Consulting Associates: Krystal S. Bottom, M.D. (Florida, 1989); Carol A. Burk, M.D. (Pittsburgh, 1983); R. Meade Christian, Jr., M.D. (Western Reserve, 1967); Douglas W. Clark, M.D. (North Carolina, 1983); William G. Conley III, M.D. (Virginia, 1960); Lisa Piglia Ferrari, M.D. (Duke, 1994); Jean M. Findlay, M.B., Ch.B. (Aberdeen, Scotland, 1970); Gregory A. Fisher, M.D. (South Florida, 1976); Martha E. Gagliano, M.D. (Duke, 1982); Keith Gallaher, M.D. (Pennsylvania State, 1982); William M. Gay, M.D. (Eastern Virginia, 1980); James W. Grant, M.D. (Duke, 1979); Katherine M. Harper, M.D., (North Carolina, 1995); Larry C. Harris, M.D. (Duke, 1977); Keith L. Hassan, M.D. (West Virginia, 1990); Rufus McP. Herring, Jr., M.D. (Bowman Gray, 1969); Sandra Hosford, M.D. (Duke, 1986); Cheryl Jackson, M.D. (Pennsylvania, 1987); Jennifer L. Lail, M.D. (Kentucky, 1978); Charles W. Lallier, M.D. (Virginia, 1981); Pierre C. LeMaster, M.D. (Florida, 1971); Donald N. Ludlow, Jr., M.D. (Hahnemann, 1983); Ashok B. Mehta, M.D. (Baroda Med. Coll., India, 1974); Bindi M. Nikhar, M.D. (Bombay, India, 1986); Melinda L. O'Leary, M.D. (Vanderbilt, 1992); William R. Purcell, M.D. (North Carolina, 1956); Janice D. Stratton, M.D. (Tulane, 1961); Charles A. Trant, Jr., M.D. (East Carolina, 1989); Joseph W. Whatley, M.D. (Duke, 1958); James C. Womble, M.D. (North Carolina, 1986).

Emeriti: Edmond C. Bloch, M.B.; William Cleland, M.D.; Susan C. Dees, M.D.; Thomas E. Frothingham, M.D.; Jerome S. Harris, M.D.; Samuel L. Katz, M.D.; Shirley K. Osterhout, M.D.; Madison S. Spach, M.D.; Bailey D. Webb, M.D.; Catherine M. Wilfert, M.D.

Required Course

PED-205C. Pediatrics. The basic course in pediatrics for all students is an eight-week clerkship in the second year. Its principal aim is to provide an exposure to the field of child health. The student has a varying series of experiences which should give a grasp of the concepts that underlie the discipline. Goals include acquiring familiarity and competence with the basic tools of information-gathering (history, physical examination, and laboratory data) and developing an approach to the integration of this material for the solution of problems of health and illness in infancy, childhood, and adolescence. This should be accomplished with continuing reference to the basic principles of pathophysiology encountered in the first year courses.

Those patients to whom the student is assigned provide the focus for case studies. In addition to the careful history and physical examination which must be recorded, the student is expected to organize an appropriate differential diagnosis and to seek and read pertinent reference material relevant to each patient. The student should learn to present each case verbally in an organized and succinct fashion, to follow the patient's progress, and to interpret all studies which are performed. The student is expected to learn from a number of sources: standard textbooks and journals, current publications and conferences, and also from people—house staff, faculty, nurses, parents, and all others with whom contact is made in the clinical setting.

Objectives include an understanding of the roles played in pediatrics by other members of the health care team, both in the ambulatory and hospital settings. Patient care may involve nurse, social worker, recreation therapist, psychologist, physiotherapist, dietitian, and others. The eight weeks is divided to include time into several of the following settings: (a) Duke outpatient clinics and emergency room, (b) Duke inpatient, (c) Durham Regional Hospital, (d) Duke nursery, (e) Lincoln Community Health Center, and (f) community practices in and away from Durham. Credit: 8. *Drucker*

Electives

PED-210C. Advanced Pediatrics. This course permits the student to elect an in-depth experience within pediatrics. Each student has a specific faculty preceptor who develops and implements the curriculum tailored to the individual's needs. Listed below are the faculty representatives to contact. Arrangements for the elective must be made with these individuals prior to enrolling in the course. The name of the preceptor with whom a student is working must be noted on the registration card submitted to the Registrar's Office. Credit: 1 to 8. Enrollment: max 1. *Drucker and departmental division chiefs*

Division	Faculty	Telephone
Allergy/Immunology	Rebecca H. Buckley, M.D.	684-2922
Cardiology	Stephen P. Sanders, M.D.	681-2916
Critical Care Medicine	Ira Cheifetz, M.D.	681-5872
Emergency Department	Karen Frush, M.D.*	684-2246
Endocrinology	Michael S. Freemark, M.D.	684-3772
Gastroenterology	William R. Treem, M.D.	681-4841
Hematology/Oncology	Philip Rosoff, M.D.	684-3401
Infectious Diseases	Ross McKinney, M.D.	684-6335
Medical Genetics	Y. T. Chen, M.D., Ph.D.	684-2036
Nephrology	John W. Foreman, M.D.	684-4246
Neurology	Darrell Lewis, M.D.	684-3219
Perinatal Medicine	Ronald N Goldberg, M.D.	681-6024
Pulmonary	J. Marc Majure, M.D.	684-2289
Rheumatology	Deborah Kredich, M.D.	684-6575
Rural Health Clinics	Joanne Barton, Dr.P.H.+	684-3172
Sports Medicine	Deborah Squire, M.D.	477-4297

* The student participates in the initial evaluation, stabilization and management of pediatric medical and surgical patients in the emergency department. Special emphasis is placed on the approach to the pediatric trauma victim. Weekly didactic lectures and case review conferences are offered. The student is expected to research a relevant topic of his/her interest and lead a brief discussion with faculty and house staff during the elective. The student is evaluated by the ED Attending staff and receives ongoing feedback throughout the rotation as well as a formal exit interview.

+ The Rural Health Clinics rotation provides a broad exposure to general pediatric problems in a medically indigent community. Four days a week (Monday through Thursday) the student travels with a senior pediatric resident to each of four rural county health departments to provide pediatric care in collaboration with public health nurses and child health clinicians. There is approximately two hours a day driving time, which allows for a one-on-one tutorial with the senior resident. The Special Topics course may vary from two to four weeks in length. Student may not drop within sixty days of the starting date without finding a replacement. Student must contact Dr. Barton three weeks before the course starting date.

PED-211C. Pediatric Infectious Diseases. This course provides experience in the clinical and laboratory diagnosis of infectious diseases and in their therapy. The student works closely with the infectious disease fellow and participates actively in evaluation of patients. Daily rounds in microbiology laboratory. Credit: 4 or 8. Enrollment: max 2. *McKinney, Gutman, Katz, Drucker, Walter, Clements, Alexander, and Fisher*

PED-215C. Endocrine Disorders in Children. Students attend in the Pediatric Endocrine, Diabetes, Neuroendocrine (Brain Tumor), and Insulin Resistance/Obesity Clinics and assume active roles in the evaluation and management of inpatients admitted to the Endocrine Service. Emphasis is placed upon the evaluation of growth and sexual development as indices of endocrine status during childhood. Students also participate in a monthly endocrine journal club and in weekly intra- and interdepartmental endocrine clinical and research conferences. Prerequisite: contact instructors. Credit: 4 or 8. Enrollment: max 2. *Freemark and staff*

PED-217C. Pediatric Hematology and Oncology. Includes all aspects of clinical and laboratory hematology as well as the diagnostic evaluation, care, and treatment of patients with malignant diseases. Emphasis is placed on fundamental concepts. Stu-

dents will accompany the inpatient team on ward rounds for one to two weeks of the rotation with the remaining time spent in the clinic evaluating new patients and seeing established patients. Students also expected to attend Divisional teaching conferences. Students may be asked to research a specific topic and present a short presentation at the end of their rotation. Prerequisites: contact instructor. Credit: 4 or 8. Enrollment: max 2. *Rosoff, Falletta, Ware, Adams, Zimmerman, Martin, Howrey, and Driscoll*

PED-225C. Neonatology. Students have patient care responsibilities and experiences in the Duke North Intensive Care Nursery. The course involves direct participation in patient care under the supervision of the faculty and housestaff. Emphasis is placed on the initiation of parent-child relationships and a pathophysiologic approach to assessment and management of the critically ill neonate. This is a sole-enrollment course and, as such, cannot be taken in conjunction with any other course. Credit: 5. Enrollment: max 1. *Goldberg, Goldstein, Auten, Pane, Tanaka, and Meyers*

PED-231C. Clinical Pediatric Cardiology. This course provides an intensive learning experience in the clinical diagnosis and management of childhood heart disease. Emphasis is placed upon the pre and postoperative management of children with surgical heart disease as well as upon the outpatient management of children with less serious heart disease. The student also is exposed to pediatric acute care medicine and the modalities available to maintain cardiovascular function in the extremely ill child. Scope: history, physical examination, and special diagnostic techniques (echocardiography, electrocardiography, cardiac catheterization and cineangiography). Students participate on daily ward rounds, outpatient clinics four days per week, and all clinical and didactic teaching conferences of the Division. Prerequisites: PED 205C. Credit: 4 (or 8 with special permission of the instructor). Enrollment: max 2. *Bengur, Sanders, Talner, and Armstrong*

PED-233C. Allergy and Clinical Immunology. Clinical evaluation and practice in use of methods of diagnosis and treatment of allergic and immunologic disorders including the atopic diseases, immunologic deficiency states, and bone marrow transplantation. Scope: in-depth seminars, history, physical examination, skin testing, a variety of clinical immunologic tests, and Clinical Research Unit experience. Credit: 4 or 8. Enrollment: max 3. *Buckley, Markert, Williams, Myers, and Roberts*

PED-234C. Clinical Genetics and Metabolism. The student becomes familiar with evaluation and management of various genetic disorders including malformation syndromes and biochemical disorders. History taking, pedigree construction and analysis, specialized aspects of the dysmorphological physical examination, diagnostic techniques, routine and specialized laboratory methods (cytogenetic, biochemical, molecular), and reference materials (texts and computer programs) are covered. Students participate in weekly teaching and clinical conferences and may take part in prenatal evaluations. May take with BCH-234B. Credit: 4. Enrollment: max 2. *McDonald*

PED-241C. Pediatric Nephrology. The course is designed to provide experience in diagnosis, interpretations of laboratory tests, natural history, and treatment of acute and chronic disorders of the kidney in children. The student also is exposed to the management of fluid and electrolyte disorders in infants and children. Prerequisites: PTH-362B suggested; prior approval of Dr. Wigfall. Credit: 4. Enrollment: max 1. *Foreman and Wigfall*

PED-243C. Adolescent Medicine. Students participate in a weekly seminar with emphasis on the behavioral and developmental aspects of adolescence, drug abuse, sports medicine, and the pregnant teenager. Patient interactions are arranged in the Youth Clinic at the Duke General Pediatric Clinic on Monday afternoon and/or the Sports Medicine Clinic on Thursday afternoon. Tutorial and supervisory time to discuss specific patients and pertinent literature are arranged. Credit: 2 Enrollment: max 2. *Yancy, Squire, and Moses*

PED-250C. Advanced General Pediatrics, Pediatric Intensive Care Unit. This advanced course is designed to allow students a four week experience as a subintern in the Pediatric Intensive Care Unit. Under supervision of faculty attendings and resident housestaff, the senior student assumes primary responsibility for the care of critically ill children admitted to the Medicine and Surgery services in the Pediatric Intensive Care Unit. Emphasis is placed on the development of the pathophysiologic approach to the diagnosis and therapy of a broad spectrum of pediatric illnesses as they present in acute care settings. Advanced concepts in pediatric critical care are emphasized. Students rotate night call with resident pediatric housestaff. Prerequisite: PED-205C. Credit: 5. Enrollment: min 1, max 2. *Cheifetz, Meliones, Kern, Schulman, and Grayck*

PED-260C. Advanced Clerkship in Pediatrics. This course is designed to provide the student with an intensive, in-depth exposure to the diagnosis and management of pediatric patients hospitalized at Duke. Students are responsible for admission histories, physical examinations, and management throughout the hospitalization. The student serves as a subintern throughout the rotation. Night call is expected every fourth night. This is a sole-enrollment course and cannot be taken in conjunction with any other course. Students must obtain the written permission of Dr. Robert Drucker or Dr. Deborah Kredich to register for or to drop this course. Credit: 5. Enrollment: max: 2. *Drucker, Kredich, and faculty*

PED-281C. Pediatric Neurology. Students examine both hospitalized and ambulatory pediatric patients with neurological disorders. Emphasis is placed on the neurological history, examination, investigation, and management techniques of nervous system disorders of infancy, childhood, and adolescence. Prerequisites: contact Dr. Lewis. Credit: 4 or 8. Enrollment: max 2. *Lewis*

Pharmacology and Cancer Biology

Professor Anthony R. Means, Ph.D. (Texas at Austin, 1966), Chairman.

Professors: Mohamed Abou-Donia, Ph.D. (California at Berkeley, 1966); Robert T. Abraham, Ph.D. (Pittsburgh, 1981); Everett H. Ellinwood, M.D. (North Carolina, 1959); Cynthia M. Kuhn, Ph.D. (Duke, 1975); James O. McNamara, Sr., M.D. (Michigan, 1968); Elliott Mills, Ph.D. (Columbia, 1964); J. Victor Nadler, Ph.D. (Yale, 1972); Saul M. Schanberg, M.D., Ph.D. (Yale, 1964, 1961); Debra Schwinn, M.D. (Stanford, 1983); Theodore Slotkin, Ph.D. (Rochester, 1970); Gary Stiles, M.D. (Vanderbilt, 1975); Pelham Wilder, Ph.D. (Harvard, 1950).

Associate Professors: Joseph Heitman, M.D. (Cornell, 1992), Ph.D. (Rockefeller, 1989); Homme W. Hellinga, Ph.D. (Cambridge, 1986); Elwood A. Linney, Ph.D. (California at San Diego, 1973); Donald McDonnell, Ph.D. (Baylor, 1987); Tobias Meyer, Ph.D. (Basel, 1986); Ann Marie Pendergast, Ph.D. (Riverside, 1985); Rochelle D. Schwartz, Ph.D. (Georgetown, 1983); Shirish Shenolikar, Ph.D. (Leeds, 1975); Antonius VanDongen, Ph.D. (Leiden, 1988); Xiao-Fan Wang, Ph.D. (Los Angeles, 1986); A. Richard Whorton, Ph.D. (Vanderbilt, 1975).

Assistant Professors: Sheila Collins, Ph.D. (Massachusetts Inst. Tech., 1985); Christopher Counter, Ph.D. (McMaster, 1996); Robert T. Fremeau, Jr., Ph.D. (George Washington, 1985); Samuel E. George, M.D. (Washington Univ. 1980); Walter Koch, Ph.D. (Cincinnati, 1990); Madan M. Kwatra, Ph.D. (Montreal, 1977); Edward D. Levin, Ph.D. (Wisconsin, 1984); Tso-Pang Yao, Ph.D. (San Diego, 1994); John D. York, Ph.D. (Washington Univ., 1993).

Research Professors: Gertrude Elion, D.Sc. (George Washington, 1969); Wilkie A. Wilson, Jr., Ph.D. (Duke, 1971).

Associate Research Professor: Jorge Bartolome, Ph.D. (Univ. Chile, 1978).

Assistant Research Professors: Ram Gupta, Ph.D. (Delhi, 1982); Maxine Okazaki, Ph.D. (Toronto, 1984); Frederic J. Seidler, Ph.D. (Duke, 1986).

Adjunct Professors: Humberto Viveros, M.D. (Univ. Chile, 1962); Joseph Yanai, Ph.D. (Colorado, 1971).

Adjunct Associate Professor: Richard J. Kavlock, Ph.D., (Miami, 1977).

Adjunct Assistant Professors: Rochelle Hanley, M.D. (Michigan, 1978); Christopher Lau, Ph.D. (Duke, 1982); David Martin, Ph.D. (London, 1987); Hernan A. Navarro, Ph.D. (Kentucky, 1987).

Emeriti: Norman Kirshner, Ph.D.; Leon Lack, Ph.D.; Athos Ottolenghi, M.D.

Required Course

PHR-200B. Medical Pharmacology. This basic course in pharmacology for medical and graduate students describes the action of drugs in relation to biochemical and physiological processes and the rationale for their clinical use. Additional topics include pharmacokinetics, drugs of abuse, and commonly encountered toxins. Nine lectures and one small-group, case-based discussion per week for eight weeks, April-June. Credit: 4. *Nadler and staff*

Electives

PHR-233B. Essentials of Pharmacology, Toxicology, and Drug Discovery. Drug absorption, distribution, excretion and metabolism; structure and activity relationships; drug and hormone receptors and target cell responses. C-L: Graduate School. Credit: 4. Enrollment: min 5, max 30. *Slotkin and staff*

PHR-234B. Interdisciplinary Approach to Pharmacology. Several model systems (cardiovascular, reproductive, neural, and cell cycle) are used to explore the molecular, biochemical, and physiologic basis of drug action. CL: Graduate School. Credit: 3. Enrollment: max 20. *Shenolikar and staff*

PHR-255B. Pharmacotherapy of Common Problems in Internal Medicine. The purpose of this course is to integrate basic pharmacology with rigorous clinical science in order to understand how drugs should be used to treat common medical problems. Examples of topics to be covered are: heart failure, stroke, arthritis, hypertension, asthma, infectious disease, diabetes and cancer. Two lectures per week during the spring term. This course is offered to third year students for basic science credit. Fourth year students may take the course for clinical credit by registering for MED-255C. C-L: MED-255C. Credit: 2. *Nadler and Pritchett*

PHR-372B. Research in Pharmacology. Laboratory investigation in various areas of pharmacology. C-L: Graduate School. Credit to be arranged. Credit: 1-16. *Staff*

Psychiatry

Professor Allen Frances, M.D. (SUNY at Downstate, 1967), Chairman.

DIVISION OF BEHAVIORAL MEDICINE

Professor Redford B. Williams, Jr., M.D. (Yale, 1967), Division Head.

Professor: Roy J. Mathew, M.B. (Medical College of Trivandrum, India, 1970).

Associate Consulting Professor: Valerie F. Holmes, M.D. (Louisville, 1980).

Assistant Clinical Professors: Lakshmi Kamaraju, M.D. (Andhra, 1976); Indira M. Varia, M.D. (Shah Medical College, 1968); Michael R. Volow, M.D. (Seton Hall, 1964).

Clinical Associates: John G. Giragos, M.D. (Beirut, Lebanon); Katayoun Tabrizi, M.D. (Tehran, 1984).

Research Associates: John Feaganes, Ph.D.; Michael J. Helms.

DIVISION OF BIOLOGICAL PSYCHIATRY

Professors: Everett H. Ellinwood, Jr., M.D. (North Carolina, 1959); C. William Erwin, M.D. (Texas, 1960); K. Ranga Krishnan, M.D. (Madras Medical College, 1978); Saul M. Schanberg, M.D., Ph.D. (Yale, 1964); Theodore A. Slotkin, Ph.D. (Rochester, 1970); Richard Weiner, M.D., Ph.D. (Duke, 1975).

Consulting Professor: Richard J. Wyatt, M.D. (Johns Hopkins, 1964).

Adjunct Professors: Jau-Shyon Hong, Ph.D. (Kansas, 1973); Jeffrey Lieberman, M.D. (George Washington, 1975).

Associate Professors: P. Murali Doraiswamy, M.D. (Madras, India, 1987); Edward D. Levin, Ph.D. (Wisconsin, 1984); Joseph P. McEvoy, M.D. (Vanderbilt, 1973); Bruno J. Urban, M.D. (Albertus-Magnus Univ., Germany, 1960).

Assistant Professors: Lawrence A. Dunn, M.D. (Michigan, 1984); Veeraindar Goli, M.D. (Osmania Medical College, 1978); Scott D. Moore, M.D. (Virginia, 1986); Rochelle Schwartz-Bloom, Ph.D. (Georgetown, 1983); David Steffens, M.D. (Texas, 1988).

Assistant Clinical Professor: Marian Butterfield, M.D. (North Carolina-Greensboro, 1990).

Assistant Consulting Professor: Stephen L. Oxley, M.D. (Kentucky, 1973).

Associate Research Professor: Sheila Collins, Ph.D. (Mass. Institute Technology, 1985); Jed E. Rose, Ph.D. (San Diego, 1978).

Assistant Research Professor: Tong H. Lee, M.D. (Stanford), Ph.D. (Duke, 1986).
Associate: Leann Nelson, M.D. (Texas, 1986).
Clinical Associates: Frederick Cassidy, M.D. (Vanderbilt, 1988); Geoffrey M. Georgi; Kenneth R. Gersing, M.D. (Washington, 1993).
Consulting Associates: Christopher Byrum, M.D. (Virginia, 1988); Byron Cole, M.D. (Cincinnati, 1960); Ugo Goetzi, M.D. (New York Medical College, 1968).
Adjunct Associate: Richard Weisler, M.D. (North Carolina, 1976).
Research Associates: Jeffrey Cohn, Ph.D. (Tulane, 1988); Colin Davidson, Ph.D. (London, 1996).
Associate in Research: Martha E. Payne, M.P.H. (North Carolina, 1996).

DIVISION OF CHILD AND ADOLESCENT PSYCHIATRY

Assistant Clinical Professor Allan Chrisman, M.D. (George Washington, 1971), Division Head.
Professor: John G. Looney, M.D. (Southwestern, 1969).
Visiting Research Professor: Robert Coles, M.D. (Columbia, 1954).
Associate Professors: Adrian C. Angold, B.Sc. (London, 1976); Charles R. Keith, M.D. (Harvard, 1961); John S. March, M.D. (Los Angeles, 1978).
Associate Clinical Professors: Jean G. Spaulding, M.D. (Duke, 1972); W. Samuel Yancy, M.D. (Duke, 1961).
Assistant Professor: Lisa Amaya-Jackson, M.D. (North Carolina, 1986).
Assistant Clinical Professors: Allan Chrisman, M.D. (George Washington, 1971); Karl Stevenson, M.D. (Bowman Gray, 1966).
Assistant Research Professor: Alaattin Erkanli, Ph.D. (Carnegie Mellon, 1991).
Assistant Consulting Professors: Cesar Guajardo, M.D. (Mexico, 1961); James B. Payton, M.D. (Arkansas, 1971); Ingrid Pisetsky, M.D. (Albert Einstein, 1971).
Clinical Associates: Lucy T. Davis, Ed.D. (Columbia, 1955); Paul Grant, M.D. (Bowman Gray, 1973); Ranota D.T. Hall, M.D. (East Tennessee State, 1987); Myra McSwain-Kamran, M.D. (Medical College of Georgia, 1992); Paul D. Nagy, M.S. (Florida State, 1984); Carol J. Vander-Zwaag, M.D. (Mount Sinai, 1986); Kendall Warden, M.D. (Missouri, 1992).
Consulting Associates: Peter F. Adland, M.D. (Georgetown, 1975); Linwood R. Aillsbrook, M.D. (Kentucky, 1981); Peter T. Daniolos, M.D. (North Dakota, 1989); Bonny Gregory, M.D. (Medical College of Georgia, 1978); Bryon Herbel, M.D. (North Dakota, 1986); D. Randall Johnson, M.D. (South Carolina, 1983); Michael S. Lancaster, M.D. (Tulane, 1975); Nancy J. Livingston, M.D. (Duke, 1972); Vladimir Maletic, M.D. (Belgrade, 1981); William Mackey, M.D. (Tennessee, 1969); Karen M. Munstat, M.D. (Medical College of Ohio, 1990); Daphne Rosenblitt, M.D. (Duke, 1974); Donald L. Rosenblitt, M.D. (Duke, 1973); David A. Smith, M.D. (Alabama, 1980).
Instructors: Shelley Beason, M.S.W. (North Carolina, 1997); Leslie Council, M.S.W. (South Carolina, 1993); Karen L. Mulle, M.S.W. (North Carolina, 1996); Barbara J. Smith, M.Ed. (North Carolina Central, 1983).

DIVISION OF GENERAL PSYCHIATRY

Professor Jesse O. Cavenar, Jr., M.D. (Arkansas, 1963).
Clinical Professor: Steven Lipper, M.D. (Boston, 1972).
Associate Professor: Jean Hamilton, M.D. (Texas Health Science Center, 1977).
Associate Consulting Professor: Pedro J. Irigaray, M.D. (Mexico, 1955).
Adjunct Assistant Professor: Samuel B. Thielman, M.D., Ph.D. (Duke, 1980, 1986).
Assistant Clinical Professors: Conrad C. Fulkerson, M.D. (Missouri, 1969); Harold S. Kudler, M.D. (SUNY, 1979); Roy Stein, M.D. (Duke, 1980).
Assistant Consulting Professors: Christine Machermer, M.D. (Freiburg, 1959); Ervin Thompson, M.D. (Vanderbilt, 1972).
Associate: Rosa F. Merino, M.D. (Case Western Reserve, 1985).
Clinical Associates: Jeffrey R. Chambers, M.D. (Michigan, 1986); Robert E. Winton, M.D. (Vanderbilt, 1972).
Consulting Associates: Thomas W. Brown, M.D. (Case Western Reserve, 1978); Frances C. Greason, M.D. (East Carolina, 1991); Philip Hillsman, M.D. (Tennessee Memphis, 1987); Rose Shalom, M.D. (Harvard, 1978); Jonathan Weiner, M.D. (North Carolina, 1987).
Instructor: Becky Hanusa, M.S. (Indiana).

DIVISION OF GERIATRIC PSYCHIATRY

Professors: Dan G. Blazer, M.D. (Tennessee, 1969), Ph.D. (North Carolina, 1980); Daniel T. Giant-

urco, M.D. (Buffalo, 1960).

Research Professor: John C.S. Breitner, M.D., M.P.H. (Pennsylvania, 1970).

Associate Professor: Harold G. Koenig, M.D. (San Francisco, 1982).

Assistant Research Professor: Judith C. Hays, R.N., Ph.D. (Yale, 1991).

Clinical Associates: Peter Barboriak, M.D., Ph.D. (Duke, 1989); Sharon M. Wallsten, B.S.N., M.P.H. (Michigan, 1965).

Consulting Associates: Andree Allen, M.D. (Miami, 1982); Leslie Hocking, M.D. (Tufts, 1983).

Research Associate: Bruce Burchett, Ph.D. (Carleton, 1983).

Instructor: Cornelia B. Service, M.P.H. (North Carolina, 1979).

DIVISION OF MEDICAL PSYCHOLOGY

Professor Richard S. Surwit, Ph.D. (McGill, 1972), Division Head.

Professors: Irving Alexander, Ph.D. (Princeton, 1949); James A. Blumenthal, Ph.D. (Washington, 1975); Barbara J. Burns, Ph.D. (Boston College, 1972); Robert Carson, Ph.D. (Northwestern, 1957); C. Keith Conners, Ph.D. (Harvard, 1960); Herbert Crovitz, Ph.D. (Duke, 1970); Martin Lakin, Ph.D. (Chicago, 1955); Patrick Logue, Ph.D. (North Dakota, 1965); David Madden, Ph.D. (California at Davis, 1977); Susan Roth, Ph.D. (Northwestern, 1973); Susan Schiffrman, Ph.D. (Duke, 1970); Ilene C. Siegler, Ph.D. (Syracuse, 1973); Richard S. Surwit, Ph.D. (McGill, 1972); Robert J. Thompson, Ph.D. (North Dakota, 1971).

Clinical Professor: Scott Swartzwelder, Ph.D. (American University, 1980).

Research Professors: John C. Barefoot, Ph.D. (North Carolina, 1968); Gerda Fillenbaum, Ph.D. (London, 1956); Jed E. Rose, Ph.D. (California, San Diego, 1978); William Wilson, Ph.D. (Vanderbilt, 1973).

Adjunct Professors: Bernard T. Engel, Ph.D. (California, Los Angeles, 1956); Florence Kaslow, Ph.D. (Bryn Mawr, 1969); Francis J. Keefe, Ph.D. (Ohio, 1975); John Lochman, Ph.D. (Connecticut, 1976); Rune Simeonsson, Ph.D. (George Peabody College, 1971).

Associate Professors: Norman B. Anderson, Ph.D. (North Carolina at Greensboro, 1983); Elizabeth J. Costello, Ph.D. (London, 1981); John F. Curry, Ph.D. (Catholic, 1978); John A. Fairbank, Ph.D. (Auburn, 1980); Mark Feinglos, M.D. (McGill, 1973); Richard S.E. Keefe, Ph.D. (New York, 1990); Gail Marsh, Ph.D. (Iowa, 1968); Rochelle Schwartz-Bloom, Ph.D. (Georgetown, 1983); Robert Shipley, Ph.D. (Michigan State, 1972); Andrew Sherwood, Ph.D. (England); Karen C. Wells, Ph.D. (Georgia, 1978); Kathleen A. Welsh-Bohmer, Ph.D. (Virginia, 1985).

Adjunct Associate Professors: Paul T. Costa, Jr., Ph.D. (Chicago, 1970); Karen M. Gil, Ph.D. (West Virginia, 1985).

Associate Clinical Professors: James R. Clack, Ph.D. (Purdue, 1970); Jack D. Edinger, Ph.D. (Virginia Commonwealth, 1971); Rolffs S. Pinkerton, Ph.D. (Georgia, 1967); Clive J. Robins, Ph.D. (SUNY, 1982); Anna L. Stout, Ph.D. (South Carolina, 1980); Joseph E. Talley, Ph.D. (Virginia, 1977).

Associate Consulting Professor: Lenore Behar, Ph.D. (Duke, 1973); Paul Brinich, Ph.D. (Chicago, 1974).

Associate Research Professors: James Lane, Ph.D. (UCLA, 1979); William C. Wetsel, Ph.D. (Massachusetts Inst. Technology, 1983).

Assistant Professors: Jean Beckham, Ph.D. (Florida State, 1988); Kathryn Gustafson, Ph.D. (Ohio, 1988); Barbara R. Keith, Ph.D. (Alabama, 1992); Edward C. Suarez, Ph.D. (Miami, 1986).

Assistant Clinical Professors: Michael Babyak, Ph.D. (Kansas, 1995); Melanie J. Bonner, Ph.D. (Virginia Polytechnic Inst., 1995); John Barrow, Ph.D. (Houston, 1971); Randy Borum, Ph.D. (Melbourne Florida, 1992); Robin A. Buhrke, Ph.D. (Southern Illinois, 1982); Tracey Potts Carson, Ph.D. (Georgia, 1982); Jeanine M. Driscoll, Ph.D. (Maryland, 1996); Jeff N. Epstein, Ph.D. (South Carolina, 1994); Steve Herman, Ph.D. (Duke, 1977); Martin Ionescu-Pioggia, Ph.D. (North Carolina, 1985); Marlene R. Jacobs-Sandstrom, Ph.D. (Duke, 1995); Ronette L. Kolotkin, Ph.D. (Minnesota, 1978); Deborah C. Koltai, Ph.D. (California School-Professional Psychology, 1993); Albert D. Loro, Jr., Ph.D. (Washington, 1976); Thomas Lynch, Ph.D. (Kent State, 1996); Jerri M. Oehler, Ph.D. (Duke, 1984); Oliver Oyama, Ph.D. (Indiana, 1985); Rebecca Schein, Ph.D. (Fairleigh Dickinson, 1992); Gail A. Spiridigliozzi, Ph.D. (Kansas, 1988); Craig R. Stenberg, Ph.D. (Denver, 1982); Barbara K. Walters, Ph.D. (Alabama, 1992).

Assistant Research Professors: Lisa Brauer, Ph.D. (Chicago, 1994); Isaac M. Lipkus, Ph.D. (North Carolina); Karen O'Donnell, Ph.D. (North Carolina, 1983); Larry A. Tupler, Ph.D. (Emory, 1989); H. Ryan Wagner, Ph.D. (New Mexico, 1975); Lana Watkins, Ph.D. (North Carolina, 1991).

Adjunct Assistant Professors: Ralph Cooper, Ph.D. (Rutgers, 1973); William E. Schlenger, Ph.D. (North Carolina State, 1974).

Adjunct Assistant Research Professor: Maya McNeilly, Ph.D. (Georgia, 1987).

Assistant Consulting Professors: William D. Barley, M.D. (Texas Tech., 1980); William V. Burlin-

game, Ph.D. (Washington, 1967); Roni Cohen, Ph.D. (Columbia, 1977); Brian Esterling, Ph.D. (Miami, 1991); Susan Head, Ph.D. (Louisiana State, 1991); Richard L. Munger, Ph.D. (Michigan, 1979).

Clinical Associates: Teri Baldewicz, Ph.D. (Miami, 1997); Linda Barnett, Ph.D. (Kentucky, 1981); Loretta E. Braxton, Ph.D. (North Carolina, 1989); Anita Yvonne Bryant, Ph.D. (Maryland, 1991); Robert Carels, Ph.D. (North Carolina, 1995); Jill S. Compton, Ph.D. (Michigan State, 1989); Scott N. Compton, Ph.D. (Nevada, 1998); Renee H. Dunn, Ph.D. (Southern Mississippi, 1996); Barbara Eldredge, Ph.D. (Southern Illinois, 1996); David Fitzgerald, Ph.D. (Notre Dame, 1995); Rebecca F. Frank, Ph.D. (North Carolina, 1994); Patricia J. Gammon, Ph.D. (North Carolina, 1990); Mary Gifford-Smith, Ph.D. (Pittsburgh, 1998); Marylu Goldberg, Ph.D. (Miami, 1988); Jill L. Hazlett, Ph.D. (Indiana State, 1990); Pamela S. Hazlett, Ph.D. (North Carolina, 1991); Judith Holder, Ph.D. (Southern Illinois, 1995); Stephanie T. Jenal, Ph.D. (Southern California, 1996); Diane E. Johnson, Ph.D. (North Carolina, 1994); Parinda Khatri, Ph.D. (North Carolina, 1996); Robert Mankoff, Ph.D. (Georgia State, 1992); Stephanie Noll, Ph.D. (Duke, 1997); Jennifer Norten, Ph.D. (North Carolina, 1995); Ruth E. Quillian, Ph.D. (Miami, 1994); Lisa Reiter-Lavery, Ph.D. (Washington, 1996); Anthony J. Smith, Ph.D. (Southern Illinois, 1996); Joneis F. Thomas, Ph.D. (Virginia, 1997); Janet Whidby, Ph.D. (Duke, 1987); William K. Wohlgenuth, Ph.D. (Miami, 1995); Mark E. Wolever, Ph.D. (Toledo, 1997).

Consulting Associates: Steven J. Ashby, Ph.D. (Connecticut, 1976); Susanne E. Dunn, Ph.D. (Duke, 1989); Laura A. Gilliom, Ph.D. (North Carolina, 1997); Russell P. Hopfenberg, Ph.D. (Boston, 1992); Spencer Lyerly, Ph.D. (North Carolina State, 1987); Robert J. McCarthy, Ph.D. (South Carolina, 1972); Michael Murray, Ph.D. (South Florida, 1993); Richard R. Rumer, Ph.D. (North Carolina, 1982).

Adjunct Associates: Juesta M. Caddell, Ph.D. (VA Polytechnic Institute and State Univ., 1991); Anita P. Holmes, M.P.H., J.D. (North Carolina, 1972); Mareah Steketee, Ph.D. (California School of Professional Psychology, 1992).

Instructors: John T. Edwards, Ph.D. (Georgia, 1977); Elizabeth W. Jackson, Ph.D. (North Carolina, 1996); Susmita Kashikar-Zuck, Ph.D. (Wisconsin, 1995); Pamela Maxon, Ph.D. (Pennsylvania State, 1994); Desiree W. Murray, Ph.D. (South Florida, 1977).

Research Associates: Wenhong Cao, M.D. (Medicine Hunan Medical, 1983); Anastasia Georgiades, Ph.D. (Uppsala, 1998); Lawrence R. Gottlob, Ph.D. (Arizona State, 1992); Thomas Haney, M.S.P.H. (North Carolina, 1978); Celia F. Hybels, Ph.D. (North Carolina, 1997); Kari K. Lewis, Ph.D. (North Carolina State, 1996); Alexander V. Medvedev, Ph.D. (Institute Cytology, Russia, 1991); Daniel A. Cordoba Montoya, Ph.D. (Universidad Nacional de Cordoba, Argentina, 1998); William S. Sampson, IV, Ph.D. (North Carolina, 1998); Srinivasan Sudha, Ph.D. (Indian Institute of Science, India, 1997); Miranda A.L. van Tilburg, Ph.D. (Netherlands, 1997); Jennifer Zervakis, Ph.D. (Duke, 1997).

DIVISION OF OUTPATIENT SERVICES

Professors: H. Keith H. Brodie, M.D. (Columbia, 1965); Jonathan R.T. Davidson, M.D. (London, 1966).

Consulting Professor: Joseph DeVeough-Geiss, M.D. (SUNY-Upstate, 1972).

Adjunct Professor: Harold A. Pincus, M.D. (Albert Einstein College, 1975).

Associate Consulting Professors: David M. Hawkins, M.D. (Duke, 1966); Alan Metz, M.B.B.Ch. (Witwaterstand, South Africa, 1978).

Assistant Professor: Andrew Krystal, M.D. (Duke, 1987).

Adjunct Assistant Professor: Tana A. Grady, M.D. (Duke, 1986); Rajinder Judge, M.D. (Birmingham, 1984).

Assistant Clinical Professors: Leslie Forman, M.D. (Tufts, 1972); Kishore Gadde, M.D. (Guntur Medical College, India, 1978); Leonard Handelsman, M.D. (Albert Einstein College Medicine, 1980); Caroline Haynes, M.D., Ph.D. (Duke, 1983); David Naftolowitz, M.D. (Albany Medical Ctr., 1986); Suzanne Sutherland, M.D. (Michigan State, 1988); Patricia A. Ziel, M.D. (Michigan, 1968).

Assistant Consulting Professors: Jack W. Bonner, III, M.D. (Southwestern, 1965); Stephen Buie, M.D. (North Carolina, 1981); Martin G. Groder, M.D. (Columbia, 1964); Linda H. Jackson, M.D. (North Carolina, 1965); Eric Peterson, M.D. (Duke, 1971); Robert D. Phillips, M.D. (Pennsylvania, 1952); Leo Potts, M.D. (Adelaide, 1954); Richard Selman, M.D. (Emory, 1972); Cynia B. Shimm, M.D. (Yale, 1950); Pierre V. Tran, M.D. (Universite de Franche, Frances, 1987).

Assistant Research Professor: Kathryn M. Conner, M.D. (Maryland, 1993).

Clinical Associates: Eileen P. Ahearn, M.D. (Duke, 1990); Melinda L. Brown, M.D. (South Carolina, 1988); Barbara A. Crockett, M.D. (Hahnemann Medical College, 1968); Manish A. Fozdar, M.D. (MBBS, NHL Municipal Medical College, 1988); Marlene I. Robles, M.D. (Arizona, 1994); Nerine E. Tatham, M.D. (Howard, 1992); Grace Thrall, M.D. (Connecticut, 1991); Susan Wicke, M.D. (Ohio State, 1989).

Associates: Lou Ann Crume, M.D. (Kentucky, 1986); Theresa A. Yuschok, M.D. (Northwestern,

1986).

Consulting Associates: John A. Ascher, M.D. (North Carolina, 1980); Ernest R. Braasch, M.D. (SUNY, 1970); Lawrence Champion, M.D. (Wisconsin, 1973); John T. Clapacs, M.D. (Duke, 1992); Doris Iarovici, M.D. (Yale, 1992); Duncan McEwen, M.D. (Tulane, 1982); Rex Moody, M.D. (North Carolina, 1987); Mindy Oshrain, M.D. (Duke, 1983); Peter Z. Perault, M.D. (Vermont, 1977); Roger Perilstein, M.D. (Temple, 1982); William Price, M.D. (North Carolina, 1985); Ernest Raba, M.D. (Texas, 1972); Kathleen Seibel, M.D. (Minnesota, 1985); Philip M. Spiro, M.D. (Yale, 1983); Nathan R. Strahl, M.D. (North Carolina, 1983); David M. Susco, M.D. (Pennsylvania, 1983); Ronald L. Vereen, M.D. (Duke, 1981); James R. Weiss, M.D. (Louisiana, 1973); James S. Wells, Jr., M.D. (North Carolina, 1977); Floyd C. Weisman, M.D. (Texas at Houston, 1982).

Instructors: Elizabeth Nicholes, PA.-C. (Duke, 1979); Thomas Stephenson, M.D. (Michigan, 1972).
Research Associate: Rosario Hidalgo, M.D. (Universidad Buenos Aires, 1991).

DIVISION OF PSYCHIATRIC SOCIAL WORK

Associate Muki Fairchild, M.S.W. (North Carolina, 1976), Division Head.

Clinical Assistant Professors: Lisa Gwyther, M.S.W. (Case Western Reserve, 1969); William S. Meyer, M.S.W. (Illinois, 1977).

Associates: Maxine R. Flowers, M.S.W. (Columbia, 1964); Edward Lueth, M.S.W. (North Carolina, 1982); Patricia Meadows, M.S.W. (Cincinnati, 1979); Diane E. Meglin, M.S.W. (Yeshiva, 1982).

Clinical Associates: Edna M. Ballard, M.S.W. (North Carolina, 1980); Barbara A. Gau, M.S.W. (North Carolina, 1986); Gael McCarthy, M.S.W. (North Carolina, 1985); S. Kay Patterson, M.S.W. (Ohio State, 1967); Andrew Silberman, M.S.W. (North Carolina, 1982); Libby E. Webb, M.S.W. (Indiana, 1980).

Consulting Associates: Bess Autry, M.S.W. (North Carolina, 1976); Mary Ann Black, M.S.W. (North Carolina, 1970); Mary Jane Burns, M.S.W. (North Carolina, 1974); Mary C. Cole, M.S.S.W. (Tennessee, 1971); Renate P. Guttman, M.S.W. (North Carolina, 1969); Stephen Hawthorne, M.S.W. (California, 1974); Debbie Hill, M.S.W. (North Carolina, 1987); Cedar Koons, M.S.W. (North Carolina, 1993); Lois P. Minis, M.S.W. (North Carolina, 1981); Betty B. Parham, M.S.W. (Smith, 1971); Anne K. Parrish, M.S.W. (North Carolina, 1963); Joye Pursell, M.S.W. (North Carolina, 1978); Carolyn Thornton, M.S.W. (North Carolina, 1968); Stella Waugh, M.S.W. (North Carolina, 1986); Elinor T. Williams, M.S.W. (North Carolina, 1977); Margaret Wilner, M.S.W. (Columbia, 1977).

Instructors: Christine Bell, M.S.W. (North Carolina, 1977); Nan T. Birchall, M.S.W. (Pennsylvania, 1979); Mary Sue Cherney, M.S.W. (North Carolina, 1983); James Dolan, M.S.W. (Rutgers, 1981); Cooley Gaffigan, M.S.W. (North Carolina, 1996); M. Jane Howard, M.S.W. (Texas, 1979); Bohdan Hrynewych, M.S.W. (Catholic, 1987); Meryl Kanfer, M.S.W. (Pennsylvania, 1994); Karl K. Kanoy, M.S.W. (Atlanta School of Social Work, 1979); Robert Laws, M.S.W. (North Carolina, 1978); John McLain, M.S.W. (North Carolina); Ylana N. Miller, Ph.D. (California at Berkeley, 1975); Patrick J. Murphy, M.S.W. (Our Lady of the Lake, 1974); Maureen Murray, M.S.W. (Smith College, 1986); Twyla J. Peterson, M.S.W. (North Carolina, 1985); Marilyn D. Reedy, M.S.W. (Tulane, 1964); Mickey Tullar, M.S.W. (North Carolina, 1982); Bobby Williamson, M.S.W. (Michigan State, 1979); Ann S. Willoughby, M.S.W. (North Carolina at Chapel Hill, 1988).

DIVISION OF SOCIAL AND COMMUNITY PSYCHIATRY

Associate Professor Marvin S. Swartz, M.D. (Tufts, 1980), Division Head.

Professors: Kurt Back, Ph.D. (MIT, 1949); James H. Carter, M.D. (Howard, 1966); Linda K. George, Ph.D. (Duke, 1975).

Adjunct Professor: David B. Larson, M.D. (Temple, 1973).

Associate Clinical Professor: Keith G. Meador, M.D. (Louisville, 1982).

Associate Research Professor: Deborah T. Gold, Ph.D. (Northwestern, 1986).

Associate Consulting Professor: Nicholas Stratas, M.D. (Toronto, 1957).

Assistant Professor: Jeffrey W. Swanson, Ph.D. (Yale, 1985).

Adjunct Associate Professor: B. Kathleen Jordan, Ph.D. (Duke, 1986).

Assistant Consulting Professors: Sally Johnson, M.D. (Jefferson, 1976); Kathryn Magruder-Habib, MPH, Ph.D. (North Carolina, 1978); John G. Wagnitz, M.D. (Ohio State, 1971).

Assistant Research Professor: L. Richard Landerman, Ph.D. (Duke, 1978).

Adjunct Assistant Research Professor: Elizabeth M.Z. Farmer, Ph.D. (Duke, 1991).

Clinical Associates: Lucile D. Clotfelter, M.D. (North Carolina, 1986); James N. Finch, M.D. (South Florida, 1981); Holly B. Rogers, M.D. (Texas, 1990); Carol Saur, M.S.N. (America School of Nursing, 1965); Susan A. Van Meter, M.D. (Oklahoma, 1991).

Consulting Associates: B. Steven Bentsen, M.D. (Cincinnati, 1983); Bruce A. Berger, M.D. (Univ. Minnesota, 1977); Jeffrey Brantley, M.D. (North Carolina, 1977); Wiley Dickerson, M.D. (Medical

Univ. S.C., 1989); Eugene A. Douglas, M.D. (North Carolina, 1959); Amilda Horne, M.D. (Texas Biomedical Graduate School, 1979); Barbara Johnson, M.D. (Minnesota, 1991); Gordon Lavin, M.D. (Case Western Reserve, 1978); Robert A. Millet, M.D. (Louisiana State, 1991); Elizabeth Murry, M.D. (Arkansas, 1992); Thomas D. Owens, M.D. (LSU, 1985); Mark S. Reynolds, M.D. (Tulane, 1983); James A. Smith, III, M.D. (Howard, 1976).

Adjunct Associate: Mary Lou Melville, M.D. (Texas, 1971).

Instructor: Joanne B. Dellaero, M.Ed. (Houston, 1991).

Associate in Research: Sandra C. Leak, M.A. (Duke, 1979).

Lecturers: Robert Rollins, M.D. (Duke, 1956); N.P. Zarzar, M.D. (American University, Beirut, 1956).

Required Course

PSC-205C. Psychiatry. This course is a required six-week clerkship in clinical psychiatry for second year medical students. Students assume limited responsibility with supervision for the diagnosis and treatment of patients with common and severe psychiatric illnesses. Educational settings include inpatient psychiatry services at four different hospitals, psychiatry outpatient clinics, and the psychiatry emergency rooms of two hospitals. Students participate in a series of core didactic lectures and didactic modules which expose them to basic psychopathologic entities, differential diagnosis of psychiatric symptoms, practical application of treatment modalities, and issues of cost effectiveness in diagnosis and treatment. Students also participate in lectures, rounds, and clinical case conferences particular to their rotation site. Students are encouraged to observe psychotherapy and to participate in supervised psychological treatments wherever appropriate opportunities can be provided. Credit: 6. *Haynes*

Basic Science Electives

PSC-213B. Human Development: Birth-Adolescence. This course is a survey of the psychological development of the child from birth through adolescence. The first segment of the course is designed to provide the student with an awareness of some of the major theoretical orientations to child development including the psychoanalytic, Piagetian, and social learning positions. This is followed by a systematic study of the normal sequence of child development, focusing in particular on some of the major events in the cognitive, social, and emotional life of the child. The course is run in seminar fashion utilizing numerous theoretical and research papers as well as observation of children in naturalistic settings to facilitate class discussion. Students also are required to familiarize themselves with research in child development by doing a review of the literature in a defined area. Credit: 2. Enrollment: min 1. *Staff*

PSC-223B. Neurobiological Basis of Behavior. The course surveys neuroanatomical, neurophysiological, neurochemical and neuropharmacological evidence of central nervous system function as it relates to normal and abnormal behavior. Clinical description, measurements of function and laboratory models of function as well as the biological substrates of affective disorders and psychoses are emphasized. Scientific bases of current therapeutic procedures, especially psychopharmacological, are examined. Course format consists of assigned readings, study questions, and lectures by faculty and other active researchers. Mid-term and final examinations are given. Each student is expected to critique a circumscribed area of research literature focusing on the appropriateness of conceptualizations and experimental methods. Additionally, students have an opportunity to become acquainted with, and to participate in, ongoing research. Credit: 4. Enrollment: min 1. *Krystal*

PSC-297B. Ethnic and Minority Health Patterns and Problems. Descriptive and analytical focus on the literature about ethnic and minority health patterns in the United States, the issues inherent therein, and the implications thereof for the delivery of medical services. Credit: 4. Enrollment: min 1. *Carter and Anderson-Brown*

PSC-299B. Preceptorship in Behavioral Neurosciences. This course provides an opportunity for the student to work closely with a member of the faculty in an area of

mutual interest with emphasis upon research (see the booklet, Basic Science Elective Program for Students in the Third Year, Behavioral Neurosciences Study Program section, for partial list of interest areas; more complete descriptions available). Credit: 1-16.
Krystal

Clinical Science Electives

General questions regarding any of the clinical rotations should be referred to Carline Haynes, M.D., Ph.D., director of medical student education (684-6406).

PSC-227C. Behavioral Aspects of Pediatrics. This course offers medical students the opportunity to study, as a part of an interdisciplinary team, the diagnosis and treatment of children and adolescents (ages two to twenty-one) with a variety of psychiatric problems. This may include anorexia nervosa, bulimia, enuresis, encopresis, school phobia, psychosomatic disorders, Tourette syndrome, suicidal and acting-out adolescents, chronically or terminally ill children, and child abuse and neglect cases. Students study principles of psychological development, psychoanalytic, and family systems theory. The student participates in child, parent, and family interviews as an integral part of the treatment team. There is opportunity to be involved in the inpatient and outpatient treatment process on pediatric and adolescent psychiatric wards. C-L: PED-227C. Credit: 2-6. *McSwain-Kamran*

PSC-240C. Subinternship in Psychiatry. This course is an intensive clinical experience in the diagnosis and treatment of severe and incapacitating psychiatric disorders. The student is given more clinical responsibility than the comparable second year inpatient rotation. Patient care responsibilities include management of ward milieu. Treatment approaches emphasizing psychotropic medication and individual, family, and group psychotherapy are part of the clinical experience. Participation at selected patient care conferences and didactic lectures is expected. The rotation is available at Duke with specialty program experience that can be structured to include a survey of the variety of residential treatments available in this area. If desired, a student can arrange for a special reading tutorial in related topics (e.g., schizophrenia). Credit: 4 or 8. Enrollment: max 1. *VanMeter*

PSC-245C. Consultation-Liaison Psychiatry. The consultation-liaison services at both Duke Medical Center and VA Hospital offer clinical clerkships in the management of psychological problems of medical patients and somatic symptoms in psychiatric patients. The student does psychiatric consultations in various specialized medical and surgical services under supervision of residents and senior staff. Emphasis is placed on training the student in advanced interviewing techniques and in assessment and intervention for psychological reactions or depression due to medical illness. The site selected and the specific specialty area chosen depends on the availability and location of psychiatric consultants with those interests. The rotation is flexible. We try to match student interests with the interests of available consultants. Students need to check with Dr. Volow (VA) or Dr. Varia (Duke) four weeks in advance on the current availability on this rotation. Credit: 4 or 8. Enrollment: max 1. *Varia*

PSC-251C. Community Psychiatry. The student develops a course based on selections from a variety of community and special population settings. These include the Durham Mental Health Center and its component units (children's services, alcohol and drug abuse and dependency treatment programs, programs for the care and training of the mentally retarded, and adult psychiatry services), the Federal Corrections Center at Butner, and the psychiatric services and clinics at Duke and the Durham VA Hospital. Students interested in this elective must contact Dr. Marvin Swartz at least eight weeks prior to the term selected for this course in order to develop a program tailored to the student's interests. Credit: 4 or 8. Enrollment: max 2. *Swartz*

PSC-260C. Neuropsychiatry. Neuropsychiatry is the study of how alterations in brain structure and function produce disturbances in human behavior. In this course,

the student becomes familiar with the major neuropsychiatric syndromes: dementia, delirium, and selective organic mental syndromes such as organic personality syndrome (e.g., frontal lobe syndrome) and organic affective syndrome (e.g., post-stroke depression). The student develops an understanding of diagnosis and treatment based upon a multidisciplinary clinical approach including specialized clinical neuropsychiatric exams. The patient population is drawn from the Duke Medical Center and Durham VA Hospital psychiatry, neurology, and neurosurgery services. Depending on the site, the student may also have an opportunity to become familiar with specialized neuropsychiatric approaches including psychometric testing and neural imaging techniques such as EEG and computerized EEG, CT scan, MRI, cerebral blood flow, and PET scan. The student must contact Dr. Volow four weeks prior to the term selected to confirm availability. Credit: 4. Enrollment: max 1. *Volow*

PSC-280C. Modern Psychotherapy: Intensive Clinical Introduction. In this full-time (or near full-time) introduction, the student participates actively in assessment of outpatients for psychotherapy, short-term psychotherapy of inpatients, ongoing psychotherapy groups, and family therapy sessions. In addition he/she attends seminars on the various psychotherapeutic approaches: psychoanalytically oriented, cognitive, behavioral, interpersonal, systemic, etc. Readings are assigned and discussed. The student may pursue an area of special interest in greater depth with a selected preceptor. Permission of instructor is required to elect the course at any time other than section 41 of the fall term. Credit: 4. Enrollment: min 1. *H. Kudler*

PSC-343C. Clinical Aspects of Alcohol and Drug Abuse. This course offers a part-time or full-time experience at the Duke Alcoholism and Addiction Program or the VA Hospital in the diagnosis and treatment for patients who abuse alcohol and/or drugs. The interrelations of substance abuse with personality disorder and major psychiatric disorder is emphasized. Students may also choose to rotate on an inpatient/outpatient substance abuse program at the Duke Alcoholism and Addictions Program, the VA Hospital, or the Alcohol and Drug Addictions Treatment Center at John Umstead Hospital. Students must contact Dr. Stein four weeks in advance to confirm availability. Credit: 4-8. Enrollment: min 1, max 2. *Stein*

Radiation Oncology

Professor Edward C. Halperin, M.D. (Yale, 1979), Chairman.

Professors: Mark W. Dewhirst, D.V.M., Ph.D. (Colorado 1975, 1979); Gustavo S. Montana, M.D. (Bogota, Columbia, 1960); Randy Jirtle, Ph.D. (Wisconsin, 1975); Leonard Prosnitz, M.D. (SUNY, 1961).

Associate Professors: Mitchell S. Anscher, M.D. (Virginia, 1981); David Brizel, M.D. (Northwestern, 1983); Lawrence B. Marks, M.D. (Rochester, 1985); Thaddeus V. Samulski, Ph.D. (SUNY at Buffalo, 1975).

Assistant Professors: Shiva K. Das, Ph.D. (Duke, 1990); Patricia Hardenbergh, M.D. (Brown, 1991); Ellen L. Jones, M.D., Ph.D. (Dartmouth, 1992, 1990); Michael T. Munley, Ph.D. (Duke, 1993); Gregory Sibley, M.D. (Michigan, 1990); Kenneth B. Weeks, Ph.D. (Texas at Austin, 1978); Su-Min Zhou, Ph.D. (Chicago, 1992).

Associates: Gunilla C. Bentel (Orebro Lans Sjukskoterskeskola, 1961); M. Gray Bowen, M.D. (Eastern Virginia, 1990); Kellie S. Condra, M.D. (Tennessee, 1992); Carol A. Hahn, M.D. (Georgetown, 1990); Sally S. Ingram, M.D. (North Carolina, 1988); Catherine G. Lee, M.D. (South Florida, 1988); Sushma Patel, M.D. (Pennsylvania, 1993); Curtis S. Whiddon, Ph.D. (Indiana, 1993).

Basic Science Electives

RON-227B. General Radiobiology. This course provides a comprehensive overview of radiation's interactions with cells and/or tissues and is oriented toward gaining an understanding of such interactions as they relate to the therapeutic use of radiation alone or in combination with chemotherapeutic drugs. Topics that are covered include carcinogenesis; radiation protection mutagenesis; DNA damage and repair; oncogene, suppressor gene and growth factor expression; methods for quantitating radiation damage *in vitro* and *in vivo*; tumor and normal tissue models for radiation studies; solid tumor metabolism, microenvironment, and physiology; radiation sensitizers and

protectors; effects at the tissue and whole organ and whole organism level; time, dose, and fractionation; low dose rate radiotherapy, including use of radio labelled monoclonal antibodies; hyperthermia; radiation/drug and heat/drug interactions. Credit: 2. Enrollment: max 10. *DeWhirst*

RON-228B. The Basic Science of Oncology. In this course we discuss the molecular and cellular biology of cancer including oncogenes, tumor suppressor genes, growth factors, chromosomal abnormalities, cellular invasion and metastases, and the control of cell cycling. Tumor biology is considered including concepts of tumor doubling time, cell loss, tumor hypoxia, and fiber and foreign body, viral, and tobacco induced carcinogenesis/mutagenesis. The course concludes with a consideration of the basic science underlying cancer prevention, diagnosis, and therapy including the pharmacology of cancer chemotherapy, biologic and immunotherapy principles, radiobiology and hyperthermic oncology, and the scientific basis of surgical oncology practice. Credit: 3. Enrollment: min 3, max 25. *Halperin and guest lecturers*

RON-230B. Selected Topics in the Basic Science of Oncology. During the spring semester of the third year, students in the Cancer Biology Study Program are required to enroll in this seminar format course. Each week, students read a group of selected papers pertinent to the class. Then, at the ensuing class sessions, one of the researchers of the Cancer Center discusses the readings with the students and explores their application in his/her own laboratory. At the end of the semester, students are asked to review their own research in a format similar to a graduate seminar. Course grading is based on class participation and on a research paper which reviews the literature pertinent to the student's selected research topic. Credit: 1. *Halperin and staff*

Clinical Science Elective

RON-215C. Clinical Radiation Oncology. Radiation oncology plays a crucial role in the management of patients with cancer. The student begins this course with lectures, individual tutorials, and audio-visual education programs to review the crucial elements of radiation biology, medical radiation physics, and dosimetry. This is followed by clinical instruction based in the ambulatory clinics of the Radiation Oncology Department as well as participation in brachytherapy procedures, care of inpatients, and new patient consultations. This course provides an introduction to the role of radiation therapy in the treatment of malignant disease. Credit: 4 or 8. Enrollment: max 2. *Marks and staff*

Radiology

Professor Carl E. Ravin, M.D. (Cornell, 1968), Chairman.

Professors: George S. Bisset, III, M.D. (South Florida, 1975); James D. Bowie, M.D. (Oklahoma, 1967); Barbara Carroll, M.D. (Stanford, 1972); James T.T. Chen, M.D. (Natl. Defense Med. Ctr., Taiwan, 1950); R. Edward Coleman, M.D. (Washington Univ., 1968); Carey Floyd, Jr., Ph.D. (Duke, 1981); Philip C. Goodman, M.D. (California at Los Angeles, 1970); E. Ralph Heinz, M.D. (Pennsylvania, 1955); Clyde A. Helms, M.D. (Univ. Texas at San Antonio, 1972); Ronald Jaszczak, Ph.D. (Florida, 1968); G. Allan Johnson, Ph.D. (Duke, 1974); Salutarior Martinez, M.D. (Havana, 1961); Gregory McCarthy, Ph.D. (Illinois, 1980); Rendon C. Nelson, M.D. (Loma Linda, 1980); Edward F. Patz Jr., M.D. (Maryland, 1985); Tony P. Smith, M.D. (East Carolina, 1981); Leonard D. Spicer, Ph.D. (Yale, 1968); Michael R. Zalutsky, Ph.D. (Washington Univ., 1974).

Associate Professors: D. Lawrence Burk, Jr., M.D. (Pittsburgh, 1981); Hal Cecil Charles, Ph.D. (New Orleans, 1981); William Currie, Ph.D. (North Carolina, 1964); James Dobbins, III, Ph.D. (Wisconsin, 1985); William Foster, Jr., M.D. (Duke, 1973); Barbara Hertzberg, M.D. (Duke, 1980); Mark A. Kliewer, M.D. (Duke, 1985); Phyllis J. Kornguth, M.D., Ph.D. (Boston, 1976); Richard A. Leder, M.D. (Boston, 1984); Linda Gray Leithe, M.D. (Ohio State, 1982); James R. MacFall, Ph.D. (Maryland, 1976); Vincent McDermott, M.B., B.Ch., B.A.O. (Univ. College-Galway, 1982); Glenn E. Newman, M.D. (Duke, 1973); Erik K. Paulson, M.D. (Duke, 1985); James M. Provenzale, M.D. (Albany, 1983); Charles Spritzer, M.D. (Pittsburgh, 1981); Robert H. Wilkinson, Jr., M.D. (Washington Univ., 1958).

Associate Clinical Professor: Robert Vandemark, M.D. (Upstate Medical Center, 1980).

Associate Research Professors: Laurence Hedlund, Ph.D. (Pittsburgh, 1968); Ganesan Vaidy-

anathan, Ph.D. (Kentucky, 1987); Bruce Wieland, Ph.D. (Ohio State, 1973).

Assistant Professors: Daniel P. Barboriak, M.D. (Harvard, 1986); Salvador Borges-Neto, M.D. (Federal Fluminense University, 1981); Sunny Chung, M.D. (Northeastern Ohio Universities College of Medicine, 1992); Lane F. Donnelly, M.D. (Cincinnati, 1990); James D. Eastwood, M.D. (SUNY at Buffalo, 1992); David Enterline, (North Carolina, 1982); Jeremy Erasmus, M.B., Ch.B. (Witwatersrand, 1982); Kelly Freed, M.D. (Jefferson, 1991); Donald P. Frush, M.D. (Duke, 1985); Rosalie J. Hagge, M.D. (Washington University, 1988); Michael W. Hanson, M.D. (West Virginia, 1974); Joan P. Heneghan, M.B., B.Ch., B.A.O. (Dublin, 1988); Vincent Low, M.B.B.S., F.R.A.C.R. (Western Australia, 1983); Nancy Major, M.D. (Tufts, 1988); H. Page McAdams, M.D. (Duke, 1986); Cindy R. Miller, M.D. (George Washington, 1985); Sara M. O'Hara, M.D. (Georgetown, 1988); Jeffrey R. Petrella, M.D. (University of Medicine and Dentistry of New Jersey, 1987); Neil A. Petry, R.Ph., M.S., B.C.N.P., F.A.Ph.A. (Purdue, 1977); Eric L. Rosen, M.D. (California, San Francisco, 1991); J. Mark Ryan, M.B., B.Ch., B.A.O., B.A. (Trinity College, Dublin, 1988); Douglas Sheafor, M.D. (Washington Univ., 1992); Mary Scott Soo, M.D. (Wake Forest, 1987); Paul Suhocki, M.D. (Georgetown, 1985); Terence Z. Wong, M.D., Ph.D. (Dartmouth, 1990).

Assistant Clinical Professors: David Curtis, M.D. (Colorado, 1971); Ruth Walsh, M.D. (Oklahoma, 1987); Donald Wenzel, M.D. (Georgetown, 1968); Margaret Eileen Williford, M.D. (Duke, 1976); Terry Yoshiumi, Ph.D. (Cincinnati, 1980).

Assistant Research Professors: Gamal Akabani-Hneide, Ph.D. (Texas A&M, 1990); Alan H. Baydush, Ph.D. (Duke, 1994); James Bowsher, Ph.D. (North Carolina, 1989); Michael J. Campa, Ph.D. (Florida, 1989); Timothy DeGrado, Ph.D. (Wisconsin at Madison, 1988); David Gilland, Ph.D. (North Carolina, 1989); Edward Hsu, Ph.D. (Johns Hopkins, 1996); Joseph Lo, Ph.D. (Duke, 1993); Bradley Smith, Ph.D. (Duke, 1988); Martin P. Tornai, Ph.D. (California, Los Angeles, 1997); Georgia Tourassi, Ph.D. (Duke, 1993); Timothy Turkington, Ph.D. (Duke, 1989).

Associate: Sheri Albers, D.O. (North Texas State, 1986).

Clinical Associate: Abdulaziz S. Al-Sugair, M.B.B.S. (Jordan, 1988).

Fellows: Ralf Barckhausen, M.D. (Francisco Marroquin, 1992); Brian Brodwater, M.D. (Dartmouth, 1993); Elaine Caoili, M.D. (Michigan, 1993); Ian Davey, M.B., Ch.B. (Capetown, 1984); Lara Eisenberg, M.D. (Medical College of Wisconsin, 1993); Michael Farrell, M.B., B.Ch., B.A.O. (Royal College of Surgeons, Dublin, 1990); Erica Guzalo, M.D. (Tufts, 1993); Laura Hedlund, M.D. (Minnesota, 1993); Marseea Howard, M.D. (Alabama-Birmingham, 1994); Thomas Jones, M.D. (Alabama, 1994); Lyndon Jordan, M.D. (Duke, 1993); Jeffrey Kaufman, M.D. (Duke, 1993); David Kim, M.D. (Michigan, 1993); Jennifer Kottra, M.D. (Duke, 1993); Robert Loeb, M.D. (Toronto, 1988); Steven Malchow, M.D. (Duke, 1994); Luke Matar, M.B.B.S., F.R.A.C.R. (Melbourne, 1988); Samuel Paglianite, M.D. (Arkansas, 1994); Anne Paterson, M.B.B.S., M.R.C.P. (London, 1990); Kathleen Sitarik, M.D. (Hahnemann, 1993); Andrew Wagner, M.D. (South Florida, 1992).

Basic Science Elective

RAD-250B. Research in Radiology. An individually arranged experience in which the student identifies with and participates in an established research program of a faculty member. Program should be arranged with DPA and proposed faculty member well in advance of starting date. Credit: 1-16. Enrollment: max 10. *G.A. Johnson*

Clinical Science Electives

RAD-210C. Pediatric Radiology. A specialized program of instruction and participation in the wide variety of radiographic examinations in the pediatric age group. Special correlation of these examinations to the problems of specific diagnosis and patient care is made. Prerequisite: must contact Dr. Miller prior to registration. Credit: 4 or 8. Enrollment: max 2. *Chung and staff*

RAD-211C. Clerkship in Neuroradiology. A specialized program of detailed instruction in neuroradiology. The program includes participation in many interdepartmental conferences and the performance and interpretation of a variety of examinations including cerebral angiography, computerized axial tomography, magnetic resonance images, and myelography. Prerequisites: must contact Dr. Provenzale prior to registration. Credit: 4 or 8. Enrollment: max 2. *Provenzale and staff*

RAD-229C. Basic Radiology Clerkship. This course is designed to provide an overview of the various imaging modalities of diagnostic radiology and their clinical utility. The elective consists of: (a) lectures and film interpretation sessions supplemented by

student presentations; (b) assignment to a variety of diagnostic radiology services during which students observe the performance of diagnostic and interventional studies; and (c) use of a teaching file of radiographs and diagnostic images. One week is spent on the thoracic radiology service. Additional rotations may include the musculoskeletal, neuroradiology, mammography, vascular/interventional, pediatric, CT/abdominal imaging, ultrasound, nuclear medicine, gastrointestinal, and VA Hospital services. Credit: 4. Enrollment: min 4, max 9. *Chung and staff*

Surgery

Professor Robert W. Anderson, M.D. (Northwestern, 1964), Chairman.

DIVISION OF GENERAL SURGERY

Professor Ralph R. Bollinger, M.D. (Tulane, 1970), Ph.D. (Duke, 1977), Chief.

Professors: Onyekwere Akwari, M.D. (Southern California, 1970); William G. Anlyan, M.D. (Yale, 1949); James B. Duke Professor Dani P. Bolognesi, Ph.D. (Duke, 1964), Experimental Surgery; J. W. and D. W. Beard Professor Eli Gilboa, Ph.D. (Weizmann Inst. Sci., 1977), Experimental Surgery; Gregory S. Georgiade, M.D. (Duke, 1973); John P. Grant, M.D. (Chicago, 1969); J. Dirk Iglehart, M.D. (Harvard, 1975); George S. Leight, Jr., M.D. (Duke, 1972); H. Kim Lysterly, M.D. (California at Los Angeles, 1983); Richard L. McCann, M.D. (Cornell, 1974); Joseph A. Moylan, M.D. (Boston, 1964); Theodore N. Pappas, M.D. (Ohio State, 1981); Hilliard F. Seigler, M.D. (North Carolina, 1960); David S. Warner, M.D. (Wisconsin, 1980); John L. Weinerth, M.D. (Harvard, 1967).

Research Professors: Per-Otto F. Hagen, F.H.W.C. (Watt Univ., Edinburgh, 1961), Experimental Surgery; Alphonse J. Langlois, Ph.D. (Duke, 1966), Experimental Surgery.

Associate Professors: Darell D. Bigner, M.D., Ph.D. (Duke, 1965, 1971), Experimental Surgery; Pierre A. Clavien, M.D. (Geneva, 1985), Ph.D. (Toronto, 1992); Thomas J. Matthews, Ph.D. (Missouri, 1971), Experimental Surgery; Emil R. Petrusa, Jr., Ph.D. (Utah, 1979); Debra A. Schwinn, M.D. (Stanford, 1983); Robert N. Sladen, M.B., Ch.B. (Cape Town, 1970); Kent J. Weinhold, Ph.D. (Pennsylvania, 1979), Experimental Surgery.

Associate Research Professors: Jeffrey R. Marks, Ph.D. (California, 1985), Experimental Surgery; David C. Montefiori, Ph.D. (Clemson, 1982).

Associate Clinical Professor: Norbertus P. DeBruijn, M.D., M.Sc. (Gronigen, 1976).

Assistant Professors: Gregory H. Botz, M.D. (George Washington, 1990); Steven J. Bredhoeft, M.D. (Kansas, 1974); W. Steve Eubanks, Jr., M.D. (Alabama, 1987); John L. Gray, M.D. (Duke, 1985); Robert C. Harland, M.D. (Duke, 1983); Andrew K. Hilton, M.B., B.S. (New South Wales, 1983); Lewis R. Hodgine, M.D. (SUNY, 1985); Walter J. Koch, Ph.D. (Cincinnati, 1990); Glenn E. Newman, M.D. (Duke, 1973); Scott K. Pruitt, M.D. (Columbia, 1987), Ph.D. (Duke, 1994); Mark W. Sebastian, M.D. (Rush, 1987); Harry W. Severance, Jr., M.D. (Duke, 1981); Bruce A. Sullenger, B.S. (Indiana), Experimental Surgery; Douglas S. Tyler, M.D. (Dartmouth, 1985); Steven N. Vaslef, M.D. (Virginia, 1984); Frances E. Ward, Ph.D. (Brown, 1965), Experimental Surgery; David K. Wellman, M.D. (Duke, 1971), Emergency Medicine; Christopher C. Young, M.D. (Duke, 1981).

Assistant Research Professors: Zeinab A. Abdel-Wahab, Ph.D. (Eastern Virginia, 1985), Experimental Surgery; Timothy L. Darrow, Ph.D. (SUNY, 1980); Yuping Deng, Ph.D. (Virginia Polytechnic Inst., 1991); Andrew P. Futreal, Ph.D. (North Carolina, 1993); Sanford C. Garner, Ph.D. (North Carolina, 1989); Michael L. Greenberg, Ph.D. (SUNY, 1984), Experimental Surgery; Jeffrey H. Lawson, M.D. (Vermont, 1991), Ph.D. (Vermont, 1992); Yiwen Li, M.D. (Zhejiang Medical, 1986); Smita K. Nair, Ph.D. (Tennessee, 1993); Emmanuel C. Opara, Ph.D. (London, 1984); William R. Parker, Ph.D. (Nebraska, 1992); James P. Vaughn, Ph.D. (Virginia, 1991).

Assistant Clinical Professors: David N. DuBois, M.D. (Georgetown, 1983), Emergency Medicine; Karen S. H. Frush, M.D. (Duke, 1986), Emergency Medicine; Paul C. Hendrix, B.S. (Coll. Charleston, 1970), B.H.S. (Duke, 1975); John A. Hoekstra, M.D. (Illinois, 1975), Emergency Medicine; Kirk A. Ludwig, M.D. (Cincinnati, 1988); C. Michael Schuch, B.A. (North Carolina, 1977); Richard K. Serra, M.D. (Michigan, 1977), Emergency Medicine; Catherine A. Share, M.D. (Emory, 1986).

Assistant Consulting Professors: Louis H. Barr, M.D. (Georgetown, 1973); Rollins S. Burhans, Jr., M.D. (Louisville, 1963); Walter W. Burns, M.D. (North Carolina, 1969); John T. Daniel, M.D. (Howard, 1964); Joel Horowitz, M.D. (Pittsburgh, 1988); Henry N. Ho, M.D. (Michigan, 1978); Robert W. Kieffer, M.D. (Johns Hopkins, 1978); Jane A. Kurucz, M.D. (West Virginia, 1983); Walter J. Loehr, M.D. (Cornell, 1963); Stephen K. Rerych, M.D. (Columbia, 1974); Phillip P. Shadduck, M.D. (California, 1986); Harvey A. Shub, M.D. (Rome, Italy, 1971); Peter S. Turk, M.D. (Indiana, 1985); David J. Vaughn, M.D. (Cincinnati, 1980); James P. Weaver, M.D. (Pennsylvania, 1969); James S. Wilson, Jr., M.D. (North Carolina, 1975).

Adjunct Assistant Professors: Enrique Craido, M.D. (Complutensis, Spain, 1978); Stephen R. Petteway, Jr., Ph.D. (Alabama, 1980), Experimental Surgery.

Clinical Associates: Janet J. Hsu-Lin, M.D. (Tufts, 1994), Emergency Medicine; Janet E. Tuttle-Newhall, M.D. (Bowman Gray, 1988); James E. Nicholson, III, M.D. (North Carolina, 1978).

Associates: John M. Brown, M.D. (Florida, 1984), Emergency Medicine; John J. Dallara, M.D. (Med. Col. of Virginia, 1987), Emergency Medicine; David A. Knapp, M.D. (California-San Diego, 1984), Emergency Medicine; John L. Morris, M.D. (Ohio State, 1986), Emergency Medicine; Bernadette R. Page, M.D. (Loyola, 1970), Emergency Medicine.

Research Associates: Alexander Miron, Ph.D. (Duke, 1993); Erik M. Clary, B.S. (Kansas State, 1991); Penelope L. Davis, Ph.D., (Birmingham, 1992); James F. Demarest Ph.D. (George Washington, 1985); Laurie A. Dempsey, Ph.D. (New York, 1988); Andrea D. Eckhart, Ph.D. (North Carolina, 1997); Guido Ferrari, M.D. (Genoa, 1985); Wenshi Gao, M.D. (Capital Inst., Beijing, China, 1982); Gonzalo V. Gonzalez-Stawinski, M.D. (Ponce Sch. of Med., 1994); Gudrun Huper, M.A. (Stuttgart, 1966); Yuzo Kodaria, M.D. (Nippon, Japan, 1989); Simon F. Lacey, Ph.D. (Imperial Coll. London, 1990); Celia C. LeBranche, Ph.D. (Pennsylvania, 1994); Brian St. John Manning, Ph.D. (Crumlin Hosp., Dublin, 1992); Lynn M. Milich, Ph.D. (North Carolina, 1994); Takeshi Nagayasu, M.D., Ph.D. (Nagasaki Univ., Japan, 1987, 1996); Coreen Q. H. Oei, Ph.D. (Natl. Inst. Singapore, 1992); Alice K. Pilgrim, Ph.D. (Clemson, 1995); Laurence T. Rimsky-Clarke, Ph.D. (Paris, 1984); Christopher P. Rusconi, Ph.D. (Colorado, 1996); Kazuko Shichijo, B.S. (Nagasaki Univ. Sch. of Pharmacy, 1980); Robert W. Storms, Ph.D. (Texas, 1991); Eric Wagner, Ph.D. (Laval Univ., 1994); Takashi Watanabe, M.D. (Chiba Univ., 1986), Ph.D. (Nagoya Univ., 1995); Si-Xun Yang, M.D. (Suzhou Med. Col., China, 1986); Rahima Zennadi, Ph.D. (Nantes, France, 1992); Jintao Zhou, Ph.D. (Shanghai, 1985); Jiyong Zhou, Ph.D., (Chinese Pharm. Univ., Shenyang, 1984).

DIVISION OF THORACIC SURGERY

Professor Peter K. Smith, M.D. (Duke, 1977), Chief.

Professors: Mary and Deryl Hart Professor of Surgery Robert H. Jones, M.D. (Johns Hopkins, 1965); James E. Lowe, M.D. (California at Los Angeles, 1973); James B. Duke Professor David C. Sabiston, M.D. (Johns Hopkins, 1947); Ross M. Ungerleider, M.D. (Rush, 1976); Walter G. Wolfe, M.D. (Temple, 1963).

Associate Professors: Donald D. Glower, Jr., M.D. (Johns Hopkins, 1980); David H. Harpole, M.D. (Virginia, 1984).

Associate Research Professor: Ares D. Pasipoularides, M.D., Ph.D. (Minnesota, 1971, 1972).

Associate Consulting Professor: Thomas J. Berger, M.D. (Tufts, 1971).

Assistant Professors: Thomas A. D'Amico, M.D. (College of Physicians and Surgeons, 1987); Robert D. Davis, M.D. (California, 1984); James Jaggars, M.D. (Nebraska, 1988); Kevin P. Landolfo, M.D. (Manitoba, 1985).

Assistant Research Professors: Salah M. Abdel-Aleem, Ph.D. (City University of New York, 1988); James W. Davis, Ph.D. (Duke, 1993); Lawrence H. Muhlbaier, Ph.D. (North Carolina, 1981), Experimental Surgery; Doris A. Taylor, Ph.D. (Texas, 1987).

Assistant Consulting Professors: Calvin P. Claxton, M.D. (Virginia, 1961); Robert Fietsam, M.D. (Wayne State, 1986); Charles A. Keller, Jr. (Louisiana State, 1959); John C. Lucke, M.D. (St. Louis, 1985); F. Maxton Mauney, Jr., M.D. (Duke, 1959); Amir A. Neshat, M.D. (Isfahan, Iran, 1960); Wayne H. Welsher, M.D. (SUNY at Upstate, 1975).

Research Associates: Stephen M. Langley, M.B.B.S. (London, 1989); Leslee J. Shaw, Ph.D. (St. Louis, 1994); Somaya H. Soloma, M.D. (Egypt, 1989).

DIVISION OF NEUROSURGERY

Professor Allan H. Friedman, M.D. (Illinois, 1974), Chief.

Professor: Robert H. Wilkins, M.D. (Pittsburgh, 1959).

Associate Professors: Cecil O. Borel, M.D. (Hahnemann, 1977); Herbert E. Fuchs, M.D., Ph.D. (Duke, 1984); Michael M. Haglund, M.D., Ph.D. (Washington, 1987, 1988); Dennis A. Turner, M.D. (Indiana, 1975).

Associate Research Professor: Roger Madison, Ph.D. (Duke, 1981), Experimental Surgery.

Assistant Professors: Timothy M. George, M.D. (New York, 1986); John P. Gorecki, M.D. (Queens, Canada, 1983); William J. Richardson, M.D. (Eastern Virginia, 1977); John Sampson, M.D., (Manitoba, 1998), Ph.D. (Duke, 1996); Bruno J. Urban, M.D. (Germany, 1960).

Assistant Research Professors: Rok Cerne, M.D. (Slovenia, 1987), Ph.D. (Iowa, 1993), Ashok K. Shetty, Ph.D. (India Inst. Med. Sciences, 1990).

Assistant Clinical Professor: Ziaur Rahman, M.B. (Prince of Wales Med. Coll., India, 1968).

Assistant Consulting Professors: Peter R. Bronec, M.D. (Duke, 1981); Charles S. Haworth, M.D.

(Duke, 1982); Bruce L. Kihlstrom, M.D. (North Carolina, 1972); Robert Lacin, M.D. (Lausanne, Switzerland, 1986); Robert E. Price, Jr., M.D. (North Carolina, 1964).

Research Associates: Weiyang Gao, M.D. (Harbin Med., China, 1986); Martha A. Keels, D.D.S., M.S., Ph.D. (North Carolina, 1984, 1990), Dentistry; Janice O. Levitt, Ph.D. (Temple, 1963); Robert D. Pearlstein, M.S. (North Carolina, 1978); Gowri K. Pyapali, Ph.D. (Nehru Univ., India, 1989); Darion Rapoza, Ph.D. (Chicago, 1990); Maria Rapazo, Ph.D. (Duke, 1994).

DIVISION OF ORAL SURGERY

Assistant Professor: Thomas A. McGraw, D.D.S. (Pennsylvania, 1985).

Assistant Clinical Professor: Edward A. Dolan, D.D.S. (Maryland, 1971).

Assistant Consulting Professor: George A. Walsh, D.D.S. (Georgetown, 1972).

DIVISION OF ORTHOPAEDIC SURGERY

Virginia Flowers Baker Professor James R. Urbaniak, M.D. (Duke, 1962), Chief.

Professors: John M. Harrelson, M.D. (Duke, 1964); James H. McElhaney, Ph.D. (West Virginia, 1964), Experimental Surgery; James A. Nunley, M.D. (Tulane, 1973).

Associate Professors: John A. Feagin, M.D. (Duke, 1961); Robert D. Fitch, M.D. (Duke, 1976); Richard D. Goldner, M.D. (Duke, 1974); William T. Hardaker, Jr., M.D. (Duke, 1973); L. Scott Levin, M.D. (Temple, 1982); William J. Richardson, M.D. (Eastern Virginia, 1977); Sean P. Scully, M.D., Ph.D. (Rochester, 1986).

Associate Research Professor: Long-en Chen, M.D. (Peking Med. Col., 1967), Ph.D. (Shanghai, 1983).

Assistant Professors: Carl J. Basamania, M.D. (George Washington, 1984); Lloyd A. Hey, M.D. (Harvard, 1988); Laurence D. Higgins, M.D. (SUNY, 1992); Salutarario Martinez, M.D. (Havana, 1961); Barry S. Myers, M.D., Ph.D. (Duke, 1991); Kevin P. Speer, M.D. (Johns Hopkins, 1985); T. Parker Vail, M.D. (Loyola, 1985).

Assistant Research Professor: Farshid Guilak, Ph.D. (Columbia, 1991).

Assistant Clinical Professors: George S. E. Aitken, M.D. (Case Western Reserve, 1982); Donald T. Kirkendall, Ph.D. (Ohio, 1979); Stephen N. Lang, M.D. (Illinois, 1965); Richard S. Moore, M.D. (North Carolina, 1991); Christopher Talley, M.D. (Virginia, 1991).

Assistant Consulting Professors: Quinn H. Becker, M.D. (Louisiana State, 1956); Edward W. Bray, III, M.D. (Med. Univ. South Carolina, 1971); William J. Callison, M.D. (Vanderbilt, 1953); Edwin B. Cooper, Jr., M.D. (Duke, 1966); Jon R. Davids, M.D. (Harvard, 1985); Rafael F. Escamilla, Ph.D. (Auburn, 1995); Robert W. Esposito, M.D. (Columbia, 1981); J. Lawrence Frank, M.D. (Duke, 1965); H. John Gerhard, M.D. (Harvard, 1981); Stephen A. Grubb, M.D. (Northwestern, 1974); James J. Hoskie, M.D. (Michigan); Ralph A. Liebelt, M.D. (Michigan, 1985); C. Robert Lincoln, M.D. (Med. Coll. Virginia, 1960); William J. Mallon, M.D. (Duke, 1984); Keith M. Maxwell, M.D. (Oral Roberts, 1982); Mark L. Moody, M.D. (Georgetown, 1987); Ronald J. Neimkin, M.D. (Cornell, 1975); William S. Ogden, M.D. (Med. Coll. Georgia, 1965); Thomas B. Pace, M.D. (Mississippi, 1982); Theodore M. Pitts, M.D. (Yale, 1977); Edwin T. Preston, Jr., M.D. (Duke, 1960); Glydon B. Shaver, Jr., M.D. (Tennessee, 1961).

Consulting Associates: Richard F. Bruch, M.D. (Illinois, 1972); Albert T. Jennette, M.D. (North Carolina, 1959); Ronald A. Pruitt, M.D. (Med. Coll. Virginia, 1959); William A. Somers, M.D. (Duke, 1972).

Research Associates: Wen-ning Qi, M.D. (Peking Union Med. Coll., 1967); Anthony V. Seaber.

DIVISION OF OTOLARYNGOLOGY

Professor William J. Richtsmeier, M.D. (Case Western Reserve, 1975), Ph.D. (Med. Coll. of Wisconsin, 1975), Chief.

Professor: Joseph C. Farmer, Jr., M.D. (Duke, 1962).

Associate Professor: Samuel R. Fisher, M.D. (Duke, 1975).

Associate Research Professor: David W. Smith, Ph.D. (Michigan, 1986).

Assistant Professors: Robert E. Clark, M.D. (Texas), Ph.D. (Illinois, 1981); Gregory F. Hulka, M.D. (Duke, 1988); Richard L. Scher, M.D. (Cincinnati, 1985); Debra L. Tucci, M.D. (Virginia, 1985); David L. Witsell, M.D. (Colorado, 1990).

Assistant Research Professor: Roger L. Miller, Ph.D. (California, 1993).

Assistant Consulting Professors: Charles E. Clark, III, M.D. (Michigan, 1968); Cameron A. Gillespie, M.D. (Virginia, 1974); Lynn A. Hughes, M.D. (Oklahoma, 1968); Johns F. P. Langford, M.D. (Mississippi, 1989); Robert E. Taylor, M.D. (Alabama, 1976); C. Emery Williams, M.D. (Louisiana, 1963).

Adjunct Assistant Professors: Charles C. Finley, M.D. (North Carolina, 1983); Dewey T. Lawson, Ph.D. (Duke, 1972); Christopher Van Den Honert, Ph.D. (Case Western Reserve, 1979).

Associate: Rowena J. Dolor, M.D. (Duke, 1991).
Consulting Associates: Peter G. Chikes, M.D. (North Carolina, 1972); Edward V. Hudson, M.D. (Bowman Gray, 1962).

DIVISION OF PEDIATRIC SURGERY

Associate Professors: Samuel M. Mahaffey, M.D. (West Virginia, 1979); Michael A. Skinner, M.D. (Rush, 1984).

Assistant Professor: Henry E. Rice, M.D. (Yale, 1988).

DIVISION OF PLASTIC AND MAXILLOFACIAL SURGERY

Associate Professor L. Scott Levin, M.D. (Temple, 1982), Chief.

Professor: Donald Serafin, M.D. (Duke, 1964).

Associate Professor: Gregory S. Georgiade, M.D. (Duke, 1973).

Associate Clinical Professor: Ronald Riefkohl, M.D. (Tulane, 1972).

Associate Consulting Professor: Verne C. Lanier, Jr., M.D. (Vanderbilt, 1966).

Assistant Clinical Professors: James A. Hoke, D.D.S. (Ohio State, 1972), M.S. (Michigan, 1976),
Dentistry; Salvatore C. Lettieri, M.D. (Bowman Gray, 1988); Gregory L. Ruff, M.D. (Michigan, 1978).

Assistant Research Professor: Bruce M. Klitzman, B.S.E. (Duke, 1974), Ph.D. (Virginia, 1979).

Consulting Associate: James T. White, D.D.S. (Loyola, 1966), M.S. (North Carolina, 1976),
Dentistry.

DIVISION OF UROLOGIC SURGERY

Professor David F. Paulson, M.D. (Duke, 1964), Chief.

Professors: E. Everett Anderson, M.D. (Duke, 1958); Glenn M. Preminger, M.D. (New York Med.
Coll., 1977); Philip J. Walther, M.D., Ph.D. (Duke, 1975); George D. Webster, M.B., Ch.B. (Univ. Coll.
Rhodesia, 1968); John L. Weinerth, M.D. (Harvard, 1967).

Associate Professor: Cary N. Robertson, M.D. (Tulane, 1977).

Associate Research Professor: Pei Zhong, Ph.D. (Texas-Southwestern, 1992).

Associate Consulting Professor: John H. Grimes, M.D. (Northwestern, 1965).

Assistant Professors: Craig F. Donnatucci, M.D. (Temple, 1979); David T. Price, M.D. (Louisiana
State, 1989); John S. Wiener, M.D. (Tulane, 1988).

Assistant Research Professors: John W. Day, Ph.D. (Iowa, 1972); Wendy Demark-Wahnefried,
Ph.D. (Syracuse, 1988).

Assistant Clinical Professor: Andrew F. Meyer, M.D. (New York, 1969).

Assistant Consulting Professors: Robert W. Andrews, M.D. (Bowman Gray, 1980); Niall J. Buckley,
M.B., B.Ch. (Univ. Coll. Dublin, 1979); Hector H. Henry II, M.D. (Tulane, 1965); G. Byron Hodge,
M.D. (Duke, 1977); Raymond E. Joyner, M.D. (Bowman Gray, 1968); Ignacio-Sarmine, M.D. (Med. Col.
of Ohio, 1982); Wade S. Weems, M.D. (Duke, 1962); Arthur W. Whitehurst, M.D. (Virginia, 1968).

Clinical Associate: Steven H. Herman, Ph.D. (Duke, 1977).

Research Associate: Karl B. Thor, Ph.D. (Pittsburgh, 1985).

DIVISION OF SPEECH PATHOLOGY AND AUDIOLOGY

Associate Clinical Professor Frank DeRuyter, Ph.D. (Washington, 1978), Chief.

Associate: Robert G. Paul, Ph.D. (Oklahoma, 1969).

Required Course

SUR-205C. Surgery. The required course in surgery is given in the second year and consists of an eight week clinical clerkship. The primary goal is the presentation of those concepts and principles which characterize the discipline of surgery. The fundamental features which form the foundation of surgical practice are presented at seminars three times weekly. The subjects discussed include antisepsis, surgical bacteriology, wound healing, inflammation, fluid and electrolyte balance, shock, the metabolic response to trauma, biology of neoplastic disease, gastrointestinal physiology and its derangements, and blood coagulation, thrombosis, and embolism.

The students are divided into two groups, one at Duke and the other at the Veterans Administration Medical Center, and each works with two members of the surgical faculty. Students are assigned patients on the surgical wards for diagnosis and management, and clinical rounds are made three times weekly with the faculty. A full-time teaching resident is assigned for the course in order to provide the students with continuous and readily available instruction at all times. A one hour session is devoted

daily to demonstrations by the surgical specialties including neurosurgery, orthopaedics, otolaryngology, plastic surgery, and urology. The students attend a weekly session in experimental surgery, during which each student serves in rotation as the anesthesiologist, first assistant, and operating surgeon in performance of surgical procedures on experimental animals. Credit 8. *Tuttle-Newhall*

Electives

SUR-228C. Clerkship in Pediatric Urology. The course is designed to give an overview of urologic problems in the pediatric population. It includes patient contact and seminar material as well as ward and operating room experience in the diagnosis, treatment, and long-term follow-up of children with urologic disease. Credit: 4. Enrollment: min 1, max 2. *Wiener*

SUR-230C. Seminar in Urologic Diseases and Techniques. Lecture/seminar course by members of the staff in Urology and Radiology providing an introduction to the spectrum of urologic diseases amplified by demonstration of urologic and radiologic diagnostic methodology. Clinical problems to be stressed include pediatric urology, obstructive uropathies, urinary calculi, male infertility, impotence, trauma, urodynamics, reconstructive urology, and urologic malignancies. Informal seminars given weekly. If permitted by the instructor, this clinical science course can be audited. Credit: 2. Enrollment: min 6, max 8. *Paulson, Anderson, Dontucci, Weinerth, Webster, Leder, Walther, Robertson, and Wiener*

SUR-233C. Basic Neurosurgery Course. Disease conditions commonly encountered by neurosurgeons are presented. Clinical presentation of a disorder such as brain tumor or head injury is made by a member of the staff. Clinical features and plan of diagnostic investigation are stressed. The clinical disorder is used as a focal point from which to carry the presentation into the basic sciences that are related to the clinical problem. Prerequisites: student must have the approval of Dr. Cook to register for this course. Credit: 1. Enrollment: min 3, max 20. *Cook, Friedman, Fuchs, Turner, and Wilkins*

SUR-235C. Clinical Neurosurgery. The course is designed for those students with a career interest in one of the neurological sciences. Duties include the work up and care of inpatients, work up of clinic patients, assistance in the operating room, daily rounds, and night call. Weekly conferences are held in neurosurgery, neurology, neuropathology, and neuroradiology. There are also special lectures. Prerequisites: student must have the approval of Dr. Wilkins to register for this course. Credit: 4 or 8. Enrollment: max 4. *Wilkins, Cook, Friedman, Fuchs, Nashold, and Turner*

SUR-236C. Intermediate Clinical Neurosurgery. This elective, intended as an intermediate experience between SUR-233C and SUR-235C, focuses on the clinical presentation of common neurosurgical disorders, radiographic evaluation, and therapeutic options including the indications and contraindications for surgical intervention. The student works up one to three patients and assists at their operations the following day either once or twice per week and attends the Saturday, neurosurgical conference. Prerequisites: permission of instructor. Credit: 1 or 2. Enrollment: max 1. *Wilkins*

SUR-237C. Investigative Neurosurgery. The student is assigned a project relating to neurologic sciences and, within reason, is provided with technical help, recording equipment, and experimental animals necessary for its completion. Each student plans and executes his own individual project with the help of the neurosurgery staff. Attendance at weekly conferences is also required. Prerequisites: SUR-235C suggested. The student must have the approval of Dr. Wilkins and Dr. Turner to register for this course. Credit: 8. Enrollment: max 2. *Turner, Fuchs, Madison, and Nashold*

SUR-239C. Clinical Otolaryngology. This course provides the student with a comprehensive survey of clinical otolaryngology. Duties include participation in both outpatient clinic activities and inpatient care in addition to assisting in the operating room. The student participates in ward rounds and in various conferences held by the division.

Credit: 4 or 8. Enrollment: max: 2. *Scher, Richtsmeier, Kenan, Farmer, and Fisher*

SUR-240C. Otolaryngology Seminar. This conference and demonstration course provides an introduction to a variety of clinical problems in otolaryngology. Lectures are supplemented with case presentations illustrating problems encountered in this field. If permitted by the instructor, this clinical science course can be audited. Credit: 1. Enrollment: min 4, max 6. *Richtsmeier*

SUR-241C. Surgical Intensive Care. This course is designed to broaden the student's knowledge and experience in dealing with critically ill patients. Under supervision, students function as sub-interns in the Surgical Intensive Care Unit (SICU). Students are assigned their own patients and actively participate in daily rounds as part of the SICU team. There is a morning lecture on aspects of critical care each day. Students take call one night in four and work on a one-on-one basis with SICU house staff in the supervised management of critically ill patients. Two weeks are spent in the SICU at Duke University Medical Center (trauma, vascular surgery, liver-kidney-pancreas transplantation, general surgery) and two weeks in the SICU at the Durham VA Medical Center (cardiothoracic and vascular surgery, general surgery). There is emphasis on teaching of procedures and techniques necessary for the management of all critically ill patients including hemodynamic assessment and monitoring, cardiovascular resuscitation and use of vasoactive drugs, ventilator management including ARDS, prevention and management of nosocomial infections, and nutritional support. Students are formally evaluated by the SICU house staff and the attending physician. C-L: ANE-241C. Credit: 5. Enrollment: max 8. *Sebastian, Vaslef, Tuttle-Newhall, and staff*

SUR-244C. Introduction to Plastic, Reconstructive and Maxillofacial Surgery. This course is designed for students who may have a future interest in plastic surgery. Duties include the preoperative evaluation of patients, assisting in the operating room, making daily ward rounds, and participation in conferences. Credit: 4. *Serafin, G. Georgiade, Ruff, Levin, and Lettieri*

SUR-246C. Clerkship in Plastic and Reconstructive Surgery. The student participates in evaluation and management of plastic surgery patients including preoperative assessment, surgical assistance, and postoperative follow-up in a private office and at Durham Regional Hospital. Daily seminars cover core topics such as skin and surgical techniques, wound healing, and scars. Prerequisite: permission of instructor. Credit: 4. Enrollment: max 1. *Levin, Serafin, Ruff, Georgiade, and Lettieri*

SUR-247C. Plastic Surgery Research. Students are engaged in scholarly activities which are active, in-depth learning experiences related to microvascular, plastic, and/or reconstructive surgery. The students are expected to design, execute, and analyze data and to formulate hypotheses and draw conclusions from their projects. Credit: 1-8 Enrollment: max 4. *Klitzman, Serafin, Levin, and Ruff*

SUR-255C. Directed Study in Speech/Language Pathology and Audiology. Individual directed study in selected topics concerning normal and abnormal hearing, language and speech. In consultation with a faculty member, each student selects one or more areas of study. Emphasis is on fundamentals of normal and abnormal function, principles of evaluation, and management of disorders. Prerequisite: permission of instructor. Credit: 1. *DeRuyter and Weber*

SUR-259C. General Principles of Orthopaedics. a full experience on the Orthopaedic Service with duties and responsibilities similar to a first year resident. Inpatient care, outpatient examination, and operating room experience are included. Conference attendance is required. Individual or group discussions are conducted each day with attending staff/residents. The purpose of the course is to present broad concepts of orthopaedics to students planning general practice, pediatrics, allied surgical specialties, or orthopaedics. Credit: 4 or 8. Enrollment: max 5 for 4 weeks. *Urbaniak, Bassett, Harrelson, Hardaker, Nunley, R. Goldner, Fitch, Lang, Richardson, Speer, Vail, Levin, Scully, Hey, Moore,*

Higgins, and Basamania

SUR-267C. Introductory Clinic Course in Children's Orthopaedics and Cerebral Palsy. This introductory clinic course is arranged for those interested in pediatric orthopaedic problems, neurological disease, and related fields. The course gives the student a working experience in the examination and evaluation of clinical out-patients, in-patients, and surgical patients. It demonstrates both the individual and multidisciplinary group approach to the whole patient with complex orthopaedic and neurologic conditions as they affect growth, development, and rehabilitation. Credit: 2 or 4. Enrollment: max 2. *Fitch and Lenox Baker Children's Hospital staff*

SUR-275C. Pediatric Cardiac Surgery. The student becomes an active member of the surgical team caring for infants and children with congenital heart defects. Responsibilities include ward work and participation during surgery. This student is involved in perioperative decision making. Weekly formal didactic sessions are conducted. Credit: 4. Enrollment: max 2. *Ungerleider*

SUR-276C. Advanced Clerkship in Pediatric Surgery. This course is designed to familiarize the student with the whole range of surgical problems in children, but with emphasis on the pathophysiology of surgical and related problems in the newborn infant and the total care of the child with a malignancy. The student is encouraged to participate fully in the patient care aspects of the service and is considered an integral part of the patient care team. Although the course may be taken for the full eight weeks, it is felt that a four week experience is probably optimal for most students. It may be combined with other advanced surgical clerkships such as SUR-299C or with four weeks of neonatology (PED-225C) or other courses depending on the interests of the student. Credit: 4 or 8. Enrollment: max 2. *Mahaffey*

SUR-277C. Orthopaedic Research. Individual projects are assigned for completion during a limited period of time. A student works with an investigator in the orthopaedic laboratory either at Duke Medical Center or the Durham Veterans Affairs Hospital. Clinical investigation studies are also available at both institutions. Prerequisite: SUR-259C. Credit: 8. Enrollment: max 4. *Urbaniak, orthopaedic senior staff, and house staff*

SUR-280C. General Surgical Oncology. The course is designed for the student interested in surgical oncology. The students are involved in patient care with a specific surgeon but, in addition, are expected to attend multidisciplinary conferences related to gastrointestinal and breast carcinoma. These multidisciplinary conferences involve medical and radiation oncology as well as surgical oncology. The student is also expected to evaluate surgical patients in an outpatient setting as well as participating in inpatient and operative patient care. This course is designed for students who have an interest in the basic sciences in relation to surgical oncology. Attendance at research conferences involved in the molecular and cellular biology of human cancers is also expected. Permission of instructor is required. Credit: 4. Enrollment: min 1, max 2. *Lyerly, Iglehart, Leight, Seigler, and Tyler*

SUR-281C. Introduction to Fractures and Musculoskeletal Trauma. Students participate in the emergency management of patients through the Duke or Durham Regional Hospital Emergency Rooms. Principles of fractures and trauma are given during emergency room assignment. Attendance at Fracture Conference is required on Wednesdays and Saturdays at 7:30 a.m. in addition to two nights on call in the emergency room. Seeing patients in the Out-Patient Clinic one day per week is required. Credit: 3. Enrollment: max 2. *Urbaniak and Duke orthopaedics staff and Durham Regional Hospital orthopaedics staff*

SUR-283C. Advanced Surgery—Emphasis Cardiovascular/Thoracic. Advanced concepts in surgery are presented in seminars and in ward, clinic, and operating room experiences. Fifty to seventy-five percent of the time is devoted to cardiovascular/thoracic surgery and related basic topics and the remainder to surgery generally. Credit: 8. Enrollment: min 2, max 5. *Wolfe, Anderson, Jones, Lowe, Sabiston, Smith, Ungerleider, and*

Young

SUR-299C. Advanced Surgical Clerkship. This course is structured to provide the student with a comprehensive approach to surgical disorders. Each student works in the clinics, on the wards, and in the operating rooms side by side with one senior surgeon to be selected from the approved list below. Credit: 5 or 10. *Pappas, Bollinger, G. Georgiade, Glower, Grant, Iglehart, Jones, Leight, Lowe, Lyerly, McCann, Sabiston, Sebastian, Seigler, Smith, Ungerleider, Vaslef, and Wolfe*

SUR-301C. Emergency Department Surgical Care. Students desiring additional experience working with care of emergency surgical patients are assigned to the Emergency Department one night per week for each credit desired. They participate in the diagnosis and care of acute and traumatic surgical emergencies. Credit: 1-3. Enrollment: max 8. *Wellman*

SUR-302C. Family Practice/Traumatology. The student spends a portion of each day in the ski clinic triaging acute ski injuries and seeing family practice type problems coincident with a small community clinic. In addition, there is office practice in the physician's offices contiguous with St. John's Hospital, Jackson Hole, Wyoming under the directorship of Dr. Richard Sugden and Dr. Kenneth Lambert. Both are board certified in their specialties and hold university appointments. The unique opportunities of this travel away experience are to see the excellence that can be accomplished in a setting of this nature, to benefit from the mentorship of these outstanding individuals, and to add to experience in both family practice and orthopaedic traumatology. Credit: 4. Enrollment: min 1, max 1. *Sugden and Lambert*

SUR-303C. Trauma Service. This course is designed to provide students interested in trauma care with further experience both in the Emergency Department and on the Inpatient Trauma Service. The course emphasizes both triage and resuscitation for major and minor emergency problems in the Emergency Department and also pre- and postoperative care on the Inpatient Trauma Service. The student has a full-time experience by assuming duties and responsibilities similar to a junior intern. Emphasis is placed on developing skills in the care of patients with multisystem injuries in the Emergency Department, Inpatient Service, and Operating Room. Students work in conjunction with the attending staff and the residents on the Trauma Service. Credit: 4. Enrollment: max 2. *Vaslef, G. Georgiade, and Sebastian*

SUR-304C. Nutrition in the Hospitalized Patient. This course is designed to acquaint students with the techniques of nutritional assessment including somatic protein, visceral protein mass, body fat mass, immune competence, and metabolic balance studies. Students learn to determine basal energy expenditure and nitrogen requirements. The metabolic effects of acute and chronic starvation as well as stress and infection and the role played by these events in the hospital course of patients are studied. Emphasis is placed on techniques of nutritional support including routine and specialized hospital diets, routine and modular tube feeding diets, peripheral intravenous protein sparing and total parenteral nutrition. At the completion of the course, students have a thorough grasp of clinical nutrition and are able to apply specialized oral diets, tube feeding diets, and intravenous nutrition. If permitted by the instructor, this clinical science course can be audited. Credit: 1. Enrollment: min 3, max 8. *Grant*

Special Interdisciplinary Study Programs

ANESTHESIOLOGY AND ENVIRONMENTAL PHYSIOLOGY STUDY PROGRAM (AEP)

PROGRAM DIRECTORS: Kathryn P. King, M.D. (Coordinating Director), Richard Moon, M.D., Bryant W. Stolp, M.D., Ph.D., and David S. Warner, M.D.

While the university offers a range of opportunities from biochemistry to organ physiology, anesthesiology and critical care integrates these multiple systems into a

larger perspective of human pathophysiology and pharmacology. Students have opportunities for research in cardiovascular and respiratory physiology, molecular pharmacology, neurobiology, and environmental science. Regardless of ultimate career choice, investigation in anesthesiology and critical care medicine provides strong basic science grounding and application of research principles.

An area of independent study is defined and a hypothesis proposed as part of an ongoing interaction between the student and the laboratory mentor. Necessary methodological skills are learned by the student early in the course of study to allow data acquisition for subsequent analysis and interpretation. As the year progresses, students participate in weekly "work in progress" seminars, also attended by members of the program faculty, that focus on the development of scientific information using the students' projects as examples. Emphasis is placed on experimental design and statistical analysis. At the end of the year, each student is expected to have completed a project of sufficient merit to warrant presentation and publication. Further, the Department offers a unique opportunity for the students to present their projects in a formal setting moderated by an external reviewer of national stature.

All students are required to take ANE 243B/ANE 244B, Research Methodology/Experimental Design I (fall) and II (spring). Additional courses in Advanced Diving Physiology and Medicine are available for interested students.

Students meet with the coordinating director weekly to monitor progress in the laboratory. The course directors meet on a monthly basis regarding course direction and the individual progress of students in the laboratories. The department chairman meets with the coordinating director and co-directors annually to discuss objective data such as publications, examinations and unpublished papers, and subjective data obtained in exit interviews.

FACULTY: Richard L. Auten, Jr., Ph.D.; Peter B. Bennett, Ph.D., D.Sc.; Helene D. Benveniste, M.D., Ph.D.; Cecil O. Borel, M.D.; Steve Eubanks, M.D.; Wayne A. Gerth, Ph.D.; Peter S. Glass, M.B., Ch.B.; Kathryn P. King, M.D.; Madan M. Kwatra, Ph.D.; Richard Moon, M.D.; David Needham, Ph.D.; Donald H. Penning, M.Sc., M.D.; Claude A. Piantadosi, M.D.; James D. Reynolds, Ph.D.; Debra A. Schwinn, M.D.; Sidney A. Simon, M.D.; Thomas F. Slaughter, M.D.; Bryant W. Stolp, M.D., Ph.D.; Richard D. Vann, Ph.D.; Steven N. Vaslef, M.D., Ph.D.; David S. Warner, M.D.

BEHAVIORAL NEUROSCIENCES STUDY PROGRAM (BSP)

PROGRAM DIRECTOR: Andrew D. Krystal, M.D., M.S.

This study program is designed to help third year medical students obtain an integrative understanding of the basic processes underlying normal and pathological human and laboratory animal behavior. The course and preceptorship offerings familiarize students with significant developments in the behavioral neurosciences, investigative methodology used to examine human behavior and its neurobiological underpinnings, and the application of these findings to medicine. As an example, they are provided with the neuroanatomical, histochemical, neuroimmunological, neuropharmacological, and neurobehavioral basis of prescribing anxiolytics, antidepressants, and other neurotropic drugs.

Students are encouraged to select an area of research concentration and then arrange to match their interests with a faculty member as a research preceptor by discussing the array of options with the study program director. They are given the opportunity to focus on some determinant of human behavior which may include neurobiological, developmental, or psychosocial factors. Students may choose to spend a significant portion of their time in a closely supervised laboratory with associated library research in an area of the student's interest resulting in a published report of the work. Specific science interests can be augmented through seminars, guided readings, and appropriate courses providing a greater familiarity with current issues in the biobehavioral sciences. The following course work is required of all students: PSC 223B, Neurobehavioral Basis of Behavior.

The courses listed below, although not required, are recommended for consider-

ation:

PSC-360B Neuropharmacology

PHR-372B Cellular Endocrinology

NBI-270B Neurobiology

PSC-213B Human Development I. Birth through Adolescence

PSC-215B Comparative Personality Theory

Alternatives to the intensive laboratory research concentration are also offered. In addition to courses in the Department of Psychiatry, students may take courses offered through the Medical and Graduate Schools.

FACULTY: James A. Blumenthal, Ph.D.; Sheila Collins, Ph.D.; Everett H. Ellinwood, Jr., M.D.; Jau-Shyong Hong, Ph.D.; K. Ranga Krishnan, M.B., Ch.B.; Andrew D. Krystal, M.D., M.S.; Cynthia M. Kuhn, Ph.D.; Edward D. Levin, Ph.D.; David J. Madden, Ph.D.; Roy J. Mathew, M.B.; Jed E. Rose, Ph.D.; Saul M. Schanberg, M.D., Ph.D.; Susan S. Schiffman, Ph.D.; Rochelle D. Schwartz-Bloom, Ph.D.; Andrew Sherwood, Ph.D.; Kamaraju S. Sundar, Ph.D.; Richard S. Surwit, Ph.D.; Marvin S. Swartz, M.D.; Richard D. Weiner, M.D., Ph.D.; Redford B. Williams, M.D.

BIOMEDICAL ENGINEERING STUDY PROGRAM (BES)

PROGRAM DIRECTORS: Donald D. Glower, M.D. and James H. McElhaney, Ph.D.

This interdepartmental study program is designed to provide third year students with an opportunity to perform basic science research in the broad area of biomedical engineering. The program is designed to provide research opportunities to students interested in the quantitative understanding of the physiology of organs and organ systems. The majority of the faculty have research laboratories which investigate these areas at the macroscopic level. The course of study usually emphasizes either the employment of whole animal models or *in vitro* simulation of disease states. The development and employment of new instrumentation may be a component of the research effort, but not its exclusive objective. Emphasis in the student experience is placed upon the teaching of the quantitative method of understanding biological systems. The student is expected to learn to formulate hypotheses regarding biologic systems, develop appropriate methods to test such hypotheses, and use statistical methods to resolve the information obtained. Each student selects a faculty preceptor in consultation with the program director(s) and an individual research plan is developed. Students who wish to enter this program are not required to have an engineering background.

FACULTY: Roger C. Barr, Ph.D.; John A. Feagin, Jr., M.D.; Robert D. Fitch, M.D.; Farshid Guilak, Ph.D.; Donald D. Glower, M.D.; Craig S. Henriquez, Ph.D.; Bruce M. Klitzman, Ph.D.; Bruce J. Leone, M.D.; E. Scott Levin, M.D.; James E. Lowe, M.D.; James H. McElhaney, Ph.D.; Barry S. Myers, M.D., Ph.D.; Ares D. Pasipoularides, M.D., Ph.D.; Robert Plonsey, Ph.D.; Debra A. Schwinn, M.D.; Lori A. Setton, Ph.D.; Peter K. Smith, M.D.; George A. Truskey, Ph.D.; Ross M. Ungerteider, M.D.; James R. Urbaniak, M.D.; Olaf T. von Ramm, Ph.D.; Patrick D. Wolf, Ph.D.

BIOPHYSICS STUDY PROGRAM (BBP)

PROGRAM DIRECTOR: G. Allan Johnson, Ph.D.

This interdepartmental program provides an opportunity for medical students in the elective year to participate in research areas of basic and clinical medicine where quantitative and engineering methods are employed. The range of subject material included in the program is broad, ranging from the development of instrumentation to theoretical studies on chemical and physical mechanisms in biomedical systems. Some example areas are the development and application of new imaging techniques and the application of computer simulation to the study of biochemical and physiological systems.

Each student selects a faculty preceptor in consultation with the program directors and designs an individual plan in cooperation with the preceptor and directors. The primary emphasis of each student's plan is expected to be research. Students may, however, also be advised to take an existing course or to set up a tutorial with a faculty

member to fill in deficient areas or to acquire needed quantitative or engineering skills. Depending on the subject area selected, a student may initiate a new research project of limited scope or take over a well-defined part of an existing project. Students are expected to produce a written summary of their work, possibly (but not necessarily) a paper suitable for publication in a scientific journal.

Students taking this program should have some prior training or experience in one or more of the following areas: mathematics, computer science, physics, chemistry, or engineering (electrical, mechanical, biomedical, etc.).

FACULTY: H. Cecil Charles, Ph.D.; James T. Dobbins, III, Ph.D.; Carey E. Floyd, Jr., Ph.D.; Laurence W. Hedlund, Ph.D.; Ronald J. Jaszczak, Ph.D.; G. Allan Johnson, Ph.D.; James R. MacFall, Ph.D.; Edward F. Patz, Jr., M.D.

CANCER BIOLOGY STUDY PROGRAM (CBP)

PROGRAM DIRECTOR: Edward C. Halperin, M.D.

The Cancer Biology Study Program offers third year medical students a thirty-two credit program of basic science instruction. Each student has an opportunity to focus on an area of interest and pursue a scholarly activity. Through a combination of research preceptorship and classroom work, students are introduced to cancer research. The students may choose to investigate oncogenes, tumor suppressor genes, growth factors, chromosomal abnormalities, cellular invasion and metastases, tumor doubling time, cell loss, tumor hypoxia, tumor angiogenesis, chemical/radiation/foreign body/viral/tobacco carcinogenesis, biologic and immunotherapy principles, radiobiology and hyperthermic oncology, and the pharmacology of cancer chemotherapy.

All students are required to take the three credit course RON 228B, "The Basic Science of Oncology", during the fall semester. In the spring semester, students are required to take RON 230B, Selected Topics in the Basic Science of Oncology. In this one credit seminar, students review selected topics in cancer biology. The remaining twenty-eight credits are earned through CBP 301B, Research in Cancer Biology.

FACULTY: Andrew Berchuck, M.D.; Patrick J. Casey, Ph.D.; Mark W. Dewhirst, D.V.M., Ph.D.; Henry S. Friedman, M.D.; Stephen D. Garrett, Ph.D.; Eli Gilboa, Ph.D.; James M. Grichnik, M.D., Ph.D.; Edward C. Halperin, M.D.; Yusuf A. Hannun, M.D.; Maureen R. Hoffman, M.D., Ph.D.; Jonathan M. Horowitz, Ph.D.; Randy L. Jirtle, Ph.D.; Sally A. Kornbluth, Ph.D.; Joanne Kurtzberg, M.D.; Jeffrey R. Marks, Ph.D.; Lawrence B. Marks, M.D.; Joseph R. Nevins, Ph.D.; Michael C. Ostrowski, Ph.D.; Ann Marie Pendergast, Ph.D.; Salvatore V. Pizzo, M.D., Ph.D.; Hilliard F. Seigler, M.D.

CARDIOVASCULAR STUDY PROGRAM (CVS)

PROGRAM DIRECTOR: Samuel E. George, M.D.

This interdepartmental study program is designed to provide third year medical students with an in-depth basic science research experience in one area of the broad discipline of cardiovascular science. The program is directed at those students potentially interested in a career in cardiovascular research. Faculty members in this study tract come from numerous departments including biochemistry, cell biology, immunology, pathology, and pharmacology. Students who elect this study program undertake a research project in a laboratory under the guidance of a faculty preceptor. In addition, students are encouraged to take course work each term to complement their research interests. Because a wide range of research opportunities is available, course work is individually tailored by the faculty preceptor to the interests of the student.

FACULTY: Page A. W. Anderson, M.D.; G. Vann Bennett, M.D., Ph.D.; Marc G. Caron, Ph.D.; Frederick R. Cobb, M.D.; Neil J. Freedman, M.D.; Samuel E. George, M.D.; Augustus O. Grant, M.B., Ch.B.; Joseph C. Greenfield, Jr., M.D.; Diane L. Hatchell, Ph.D.; Barton F. Haynes, M.D.; Bruce M. Klitzman, Ph.D.; Walter J. Koch, Ph.D.; William E. Kraus, M.D.; Madan M. Kwatra, Ph.D.; Robert J. Lefkowitz, M.D.; Ann LeFurgey, Ph.D.; Melvyn Lieberman, Ph.D.; Anthony R. Means, Ph.D.; Kevin G. Peters, M.D.; Claude A. Piantadosi, M.D.; Keith A. Reimer, M.D., Ph.D.; Debra A. Schwinn, M.D.; Jonathan S. Stamler, M.D.; C. Frank Starmer, Ph.D.; Gary L. Stiles, M.D.; Harold C. Strauss, M.D.; Antonius M. J. VanDongen, Ph.D.; Xiao-Fan Wang, Ph.D.; A. Richard Whorton, Ph.D.

CELL AND REGULATORY BIOLOGY STUDY PROGRAM (CRB)

PROGRAM DIRECTOR: George M. Padilla, Ph.D.

The CRB program is based on the application of contemporary experimental approaches of cell biology and genetics to the study of regulatory mechanisms in health and disease. It seeks to bridge the gap between research at the cellular/molecular and the tissue/organ level of organization.

Research areas represented in the CRB program fall into four broad categories:

- *Molecular properties and actions of peptide hormones, growth factors and their receptors:* Studies on membrane biology, ligand-receptor interactions, and signal transduction; molecular mechanisms of insulin action and related growth factors (EGF and PDGF); and mechanisms of action of regulatory peptides on gastrointestinal target organs.

- *Genetic and biochemical regulation of membrane function, cytoskeletal elements, intracellular motility, and macromolecular trafficking:* Studies on the motor complexes which drive organelle movements within cells during endocytosis, exocytosis, and axonal transport; intracellular function of unconventional myosins encoded by abm genes; and regulation of nucleocytoplasmic trafficking.

- *Genetic regulation of cell proliferation, growth, and development:* The biochemical and functional properties of the recessive retinoblastoma oncogene; hormonal regulation of malignant cell growth; the molecular basis of cytokinesis; the role of fetal and placental hormones in the regulation of fetal growth and oogenesis; molecular basis of morphogenetic changes using genetic and transgenic methods; and the role of cyclins in mitotic and meiotic events in relation to cell cycle specific kinases.

- *Regulation of integrated physiological processes:* Investigations on the role of atrial natriuretic factors in blood volume and arterial pressure regulation; the role of intracellular second messengers in ionic and metabolic regulation; regulation of chloride channels in epithelial cells; regulatory mechanisms of tissue oxygen concentration and oxidant damage; organization and control of intermediary metabolism pathways; neural regulation of gonadotropin function; and genetic regulation of intermediary metabolism in response to metabolic demands on striated muscle (myocytes).

The major emphasis of the CRB program is on student-generated, independent study/research projects conducted in a close association with a faculty preceptor. Students are encouraged to enroll in basic science courses or relevant clinical offerings which contribute to their research projects or their future career goals. The research colloquia and self-learning course offerings, as described below, are equally important components of the CRB program.

For all students, the program consists of the following:

Individual Tutorial (CBI 219). This is carried out under the supervision of a faculty preceptor selected by each student with the approval of the program director. Students are expected to complete their tutorial arrangements before entering the program. The program director directs the students to appropriate faculty preceptors and evaluates the proposed research projects.

Research Presentations. At the beginning of the fall semester, students give a brief presentation on their proposed research to the CRB participants. This presentation and a short research report is a formal requirement of all participants. Toward the end of spring semester, students present their research results before the group in the form of a platform presentation.

Research Reports. Coincident with the research presentations, students submit two written reports to the program director on their research projects. The preliminary report is submitted before the end of the fall semester. It consists of a brief review of the literature, a discussion of the hypothesis to be tested, specific aims of the proposed research, and a brief assessment and justification of the methodologies that are to be employed. The final report, submitted towards the end of the spring semester, is written in

the form of a research paper being submitted for publication. It should include a more extensive review of the literature and an evaluation and discussion of the results obtained. The colloquia and research reports provide an opportunity for medical students to develop communication and presentation skills for their biomedical careers.

FACULTY: Onyekwere E. Akwari, M.D.; Nels C. Anderson, Jr., Ph.D.; Peter B. Bennett, Ph.D., D.Sc.; Andrew T. Canada, Jr., Ph.D.; Marc G. Caron, Ph.D.; Jonathan A. Cohn, M.D.; Michael Freemark, M.D.; William E. Garrett, M.D., Ph.D.; J. Dirk Iglehart, M.D.; Daniel P. Kiehart, Ph.D.; John Klingensmith, Ph.D.; William E. Kraus, M.D.; Cynthia M. Kuhn, Ph.D.; Rodger A. Liddle, M.D.; Haifan Lin, Ph.D.; Tobias Meyer, Ph.D.; Thomas M. Murphy, M.D.; Christopher V. Nicchitta, Ph.D.; Theresa J. O'Halloran, Ph.D.; Emmanuel C. Opara, Ph.D.; George M. Padilla, Ph.D.; Patricia Saling, Ph.D.; David W. Schomberg, Ph.D.; Sean P. Scully, M.D., Ph.D.; Michael P. Sheetz, Ph.D.; Shirish Shenolikar, Ph.D.; Bryant W. Stolp, M.D., Ph.D.; E. Lee Tyrey, Ph.D.; Steven R. Vigna, Ph.D.; Judith A. Voynow, M.D.; David K. Walmer, M.D., Ph.D.; Jo Rae Wright, Ph.D.; Heather N. Yeowell, Ph.D.

CLINICAL RESEARCH STUDY PROGRAM (CRP)

PROGRAM DIRECTOR: William E. Wilkinson, Ph.D.

This study program offers students the opportunity to explore the quantitative and methodological principles of clinical research. Under the direction of two preceptors, a clinical investigator and a statistician, students use the methods and techniques of biostatistics and related disciplines to address a clinical research question.

During the fall term, students are required to take two courses: Introduction to Statistical Methods (CRP 241B) and Principles of Clinical Research (CRP 242B). Other courses may be taken with the approval of the student's preceptors.

FACULTY: Robert M. Califf, M.D.; G. Ralph Corey, M.D.; Elizabeth R. DeLong, Ph.D.; Christopher Granger, M.D.; Robert A. Harrington, M.D.; Victor Hasselblad, Ph.D.; James Jollis, M.D.; Kerry L. Lee, Ph.D.; Daniel B. Mark, M.D.; David B. Matchar, M.D.; Lauren M. McIntyre, Ph.D.; Lawrence H. Muhlbaier, Ph.D.; L. Kristin Newby, M.D.; Eugene Z. Oddone, M.D.; E. Magnus Ohman, M.D.; Eric D. Peterson, M.D.; Gregory P. Samsa, Ph.D.; Daniel J. Sexton, M.D.; Sandra S. Stinnett, Dr.P.H.; Barbara E. Tardiff, M.D.; Gail E. Tudor, Ph.D.; William E. Wilkinson, Ph.D.

EPIDEMIOLOGY AND PUBLIC HEALTH STUDY PROGRAM (EPH)

PROGRAM DIRECTOR: Laurence G. Branch, Ph.D.

The Epidemiology and Public Health Study Program is designed to provide to third year Duke medical students knowledge regarding research tools to design prospective clinical trials and to analyze the resultant health services research data. Participants also learn the essentials of research design, statistical analyses, health policy, and comparative health systems so that they can be contributors to the improvement of the system of health care, beginning with the improved health of the patient but extending to local, state, and national issues. Each student selects a faculty preceptor in consultation with the program director.

Courses. Two courses are required: Introduction to Statistical Methods (CRP 241) and Principles of Clinical Research (CRP 242).

Practicum. Each student works in an epidemiology/health services/public health independent research activity (for example, illness causology and outcome, decision analysis, health economics, or medical center financial operations). This occupies at least 50% of the student's time through the nine months and usually occupies more depending on the election of courses.

Required Research. In conjunction with the practicum, each student is required to produce an in depth research paper analyzing an area of epidemiology, health service research, finance, health systems, or health policy, most probably related to the student's practicum experience. He or she works with an advisor to determine and investigate the topic. This research activity extends throughout the nine months, accumulating with the acceptance of the completed paper.

Dual Degree Programs. In some instances, third year students may opt to enter one of

several approved programs for dual degrees or study away from this campus. A student must apply both to the other school and to the Medical School by completing the Duke Third Year Elective Form. The approved dual degree programs include the M.D./M.P.H. program which allows third year students to enroll in one of several approved M.P.H. programs (Biostatistics; Environmental Sciences and Engineering; Epidemiology; Health Care and Prevention; Health Policy and Administration; and Maternal and Child Health) at the University of North Carolina at Chapel Hill and to complete all requirements for the M.P.H. degree during one academic year in fulfillment of their third year requirement. Dr. Branch is the director of this M.D./M.P.H. Program. Other dual degree programs include the Duke master's degree in Public Policy from the Sanford Public Policy Institute (M.D./M.P.P. program), and the Duke Master's in Business Administration from the Fuqua School of Business (M.D./M.B.A. program). Dr. Broedehoeft is the director of the latter program. Some of these other programs may take more time, thereby necessitating an extension of the time required for completing the third year requirement. In addition, students may propose an individually-tailored Study Away option. Study away proposals are reviewed and approved individually by the Third Year Study Program Committee. Placements in the Cloisters Program at the National Institutes of Health and at the National Institute of Environmental Health Sciences in Research Triangle Park are options; the supervision of students in the study away programs can be carried out by faculty from a number of study programs.

FACULTY: Lori A. Bastian, M.D.; Dan G. Blazer, M.D., Ph.D.; Laurence G. Branch, Ph.D.; Steven J. Bredehoeft, M.D., M.P.H.; Barbara J. Burns, Ph.D.; Robert M. Califf, M.D.; Dennis A. Clements, M.D., Ph.D.; John M. Dement, Ph.D.; Linda K. George, Ph.D.; Deborah T. Gold, Ph.D.; Judith C. Hays, Ph.D.; Ronnie D. Horner, Ph.D.; Robert H. Jones, M.D.; George L. Maddox, Ph.D.; David B. Matchar, M.D.; Joellen M. Schildkraut, Ph.D.; David L. Simel, M.D., M.H.S.; Marvin S. Swartz, M.D.; Emmanuel Walter, M.D., M.P.H.

HUMAN GENETICS STUDY PROGRAM (HGP)

PROGRAM DIRECTORS: Marcy C. Speer, Ph.D. (Coordinating Director), Margaret Pericak-Vance, Ph.D., and Jeffrey M. Vance, M.D., Ph.D.

Our genetic makeup to a large extent dictates our health. The promise of the Human Genome Initiative is a greater understanding of the genetic components to health. Once the genetic contributions to common diseases like osteoarthritis, heart disease, and cancer are understood, the physician will have a powerful means at his or her disposal for identifying individual risk factors and offering lifestyle modifications. The study program in human genetics offers third year medical students an integrated program for understanding research in human genetics, its application to human genetic disease for risk assessment, genetic counseling, and potential therapeutics, and ethical and legal implications for this research on the patient, the family, and society. We anticipate that students in this program will follow one of several broad paths, utilizing either a molecular approach or a statistical approach to understanding and treating human genetic disease.

Research opportunities are available in laboratories studying such diverse topics as positional cloning of human disease genes, apoptosis, gene therapy, biochemical genetics, animal models of genetics and development, and genetic epidemiology. Students are expected to produce a written summary of their work at the end of the program, which may be a scientific manuscript.

In addition to the laboratory work, the program requirements include a 2 credit course Genetic Analysis for Human Disease offered in the fall semester and a year-long seminar series held weekly targeting current topics in human genetic research. Other elective courses may be taken with the permission of the program director and the student's preceptor.

FACULTY: Andrea Amalfitano, D.O., Ph.D.; Rose-Mary Boustany, M.D.; Yuan-Tsong Chen, M.D., Ph.D.; John R. Gilbert, Ph.D.; John Klingensmith, Ph.D.; Virginia B. Kraus, M.D., Ph.D.; Douglas Marchuk, Ph.D.; Margaret Pericak-Vance, Ph.D.; Joellen Schildkraut, Ph.D.; Marcy C. Speer, Ph.D.; Jeffrey M. Vance, M.D., Ph.D.; Fulton Wong, Ph.D.

IMMUNOLOGY STUDY PROGRAM (ISP)

PROGRAM DIRECTOR: Frances E. Ward, Ph.D.

This program is designed for students whose career goals lie in one of the many clinical specialties that interface broadly with immunology, allergy-immunology, infectious diseases, rheumatology, hematology, transplantation, and oncology. A basic but thorough introduction to immunology is developed in IMM 291B, which also emphasizes critical discussion of original research papers. Each student chooses a faculty preceptor with whom to work on an original research project. It is encouraged that the student not be merely injected into the continuum of the preceptor's research interests, but rather that an individual project be developed which can be completed during the study program. The primary goals of the program are to encourage and develop the student's own creativity, to expose him or her to the research interests and philosophies of the entire Department of Immunology, and to help gain a useful personal perspective on current immunologic thought with an emphasis on clinical relevance. The student's efforts and time are generally divided as follows:

Preceptorship. The major emphasis of the program during which the students function much as graduate students in the Department of Immunology. (30 hours or more per week).

Comprehensive Immunology (IMM 291B). An optional in-depth course in the basic concepts of immunology. Analysis of antigens and antibodies is followed by an emphasis on the organization and cellular and molecular aspects of the immune system, its regulation, and effector mechanisms. (4 hours per week, spring term).

Seminars for Research Progress. Throughout the year, fellows and students in the department present brief informal seminars on their ongoing research. The discussion that follows is of great help to the presenter and allows the student to observe and participate in critical analysis of research before it is at the publication or formal seminar stage. (1 hour per week).

Immunology Department Seminars. A series of formal seminars by department faculty and visiting scientists. (1-2 hours per week).

Additional Course Work. The student may elect to take any of several courses in immunology and related fields, but is generally discouraged from excessively diluting his laboratory experience.

FACULTY: R. Randal Bollinger, M.D., Ph.D.; Dani P. Bolognesi, Ph.D.; Rebecca H. Buckley, M.D.; Jeffrey R. Dawson, Ph.D.; Lisa Denzin, Ph.D.; Carolyn Doyle, Ph.D.; Eli Gilboa, Ph.D.; Russell P. Hall, III, M.D.; Barton F. Haynes, M.D.; Maureen R. Hoffman, M.D., Ph.D.; Donna D. Kostyu, Ph.D.; Michael S. Krangel, Ph.D.; Virginia B. Kraus, M.D., Ph.D.; Roger J. Kurlander, M.D.; Joanne Kurtzberg, M.D.; M. Louise Markert, M.D., Ph.D.; Michael G. McHeyzer-Williams, Ph.D.; William Parker, Ph.D.; David S. Pisetsky, M.D., Ph.D.; Jeffrey L. Platt, M.D.; William J. Richtsmeier, M.D., Ph.D.; Wendell F. Rosse, M.D.; Hilliard F. Seigler, M.D.; Ralph Snyderman, M.D.; Herman F. Staats, Ph.D.; Thomas F. Tedder, Ph.D.; Marilyn J. Telen, M.D.; Frances E. Ward, Ph.D.; Yuan Zhuang, Ph.D.

INFECTIOUS DISEASES STUDY PROGRAM (IDP)

PROGRAM DIRECTOR: Thomas G. Mitchell, Ph.D.

Knowledge of infectious diseases is relevant to care of patients of all ages and in each clinical specialty from surgery, pediatrics, and medicine to obstetrics-gynecology and family medicine. This study program provides students with the opportunity to directly explore infectious diseases in a laboratory setting coupled with lecture/seminar courses designed to provide some breadth of knowledge of the host, microorganisms, and their interactions. The goals of the program are to instill a critical assessment of information, to provide the opportunity for creative acquisition of data, to encourage independent thinking, and to provide insight into modern technology and the interrelationship of clinical infectious diseases with basic microbiology and immunology. Most of the participating faculty members are involved in research that relates to mi-

crobial pathogenesis.

Each student selects a faculty preceptor with whom to work on an original research project. The student is expected to develop her or his own project within the framework of an existing laboratory, but designs her or his own experiments, critically assesses the relevant literature, learns to evaluate data, and has the opportunity to solve the problems associated with the project. Appropriate guidance and assistance are provided by the faculty and others within the laboratory setting.

- *Preceptorship.* This is the major emphasis of the program with students functioning essentially as graduate students. 30 hours or more per week.

- *Courses.* During the spring term, students may take either Medical Immunology (MIC 330B), Virology and Viral Oncology (MIC 252B), or Microbial Pathogenesis (MIC 282B), depending on the student's laboratory research interests.

- *Seminars.* Students in the Infectious Diseases Study Program attend seminars in which faculty members, fellows, and students present their ongoing research. Such presentations enable the student to observe and participate in critical analysis of research before it reaches the publication stage.

- *Additional Course Work.* Although other basic science electives in microbiology and immunology may be taken upon approval by the program director, the student is discouraged from excessively diluting her or his laboratory experience.

FACULTY: Kenneth Alexander, M.D., Ph.D.; Dani P. Bolognesi, Ph.D.; Rebecca H. Buckley, M.D.; Vickers Burdett, Ph.D.; Richard Frothingham, M.D.; Mariano A. Garcia-Blanco, M.D., Ph.D.; Carol Dukes Hamilton, M.D.; John D. Hamilton, M.D.; Joseph Heitman, M.D., Ph.D.; Jack D. Keene, Ph.D.; Kenneth N. Kreuzer, Ph.D.; Roger J. Kurlander, M.D.; John H. McCusker, Ph.D.; Thomas G. Mitchell, Ph.D.; Joseph R. Nevins, Ph.D.; John R. Perfect, M.D.; David J. Pickup, Ph.D.; Christian R.H. Raetz, M.D., Ph.D.; Daniel J. Sexton, M.D.; Herman F. Staats, Ph.D.; J. Brice Weinberg, M.D.; Kenneth H. Wilson, M.D.

NEUROBIOLOGY STUDY PROGRAM (NBP)

PROGRAM DIRECTORS: Dennis A. Turner, M.D. and Miquel Nicoletis, M.D., Ph.D.

Through the Neurobiology Study Program, students may examine the nervous system at many levels. Areas of study include neuroanatomy, neurochemistry, neuropharmacology, neurophysiology, and developmental neurobiology as well as the neurobiology of a number of important diseases. Faculty in the study program are engaged in research that ranges from the molecular to the systems level. The program emphasizes a basic research experience or tutorial under the guidance of a preceptor, a weekly research seminar, and the opportunity to audit appropriate neurobiology courses during the year.

- *Research Experience.* The basic component of the NBP Study Program is an in-depth research experience in a basic science laboratory under the supervision of one of the participating faculty. Involvement in the research process can be at several levels. Most students wish to work full-time in a laboratory pursuing an independent research project, including an analysis of experiments and communication of the results. Students in this category who wish to attend courses are usually advised to audit them. Other students may wish to combine a part-time research experience with extensive course work. The appropriate level for each student should be determined in consultation with the study program directors and the research mentor. All students are expected to prepare written statements of their goals for the year with a detailed plan for accomplishing these goals. This could take the form of stating the problem to be studied, the hypotheses, and an outline of the work to be done. A final report is required and may take the form of a research paper or literature review. Publication is not required, but many students have been successful in publishing a report with their preceptors.

- *Seminar.* Students enrolled in the program meet weekly with the program directors and mentors for an informal seminar. In the beginning of the fall term, seminars fo-

cus on the planned projects of each student. At the end of the spring semester, the seminar focuses on work accomplished as each student presents a report of her or his research. During the rest of the year, invited speakers are asked to address particular topics of interest to be decided upon by the group.

FACULTY: George J. Augustine, Ph.D.; Jorge V. Bartolome, Ph.D.; Rose-Mary Boustany, M.D.; Nell B. Cant, Ph.D.; Joseph M. Corless, M.D., Ph.D.; Robert P. Erickson, Ph.D.; Robert P. Erickson, Ph.D.; David Fitzpatrick, Ph.D.; William C. Hall, Ph.D.; Michael M. Haglund, M.D., Ph.D.; David A. Hosford, M.D., Ph.D.; Lawrence C. Katz, Ph.D.; Julie C. Kauer, Ph.D.; Cynthia M. Kuhn, Ph.D.; Anthony S. LaMantia, Ph.D.; Darrell V. Lewis, Jr., M.D.; Donald C. Lo, Ph.D.; Roger D. Madison, Ph.D.; William D. Matthew, Ph.D.; James O. McNamara, Sr., M.D.; J. Victor Nadler, Ph.D.; Dale Purves, M.D.; Peter H. Reinhart, Ph.D.; Allen D. Roses, M.D.; Saul M. Schanberg, M.D., Ph.D.; Donald E. Schmechel, M.D.; Rochelle D. Schwartz-Bloom, Ph.D.; Sidney A. Simon, Ph.D.; J. H. Pate Skene, Ph.D.; Theodore A. Slotkin, Ph.D.; George G. Somjen, M.D.; John E.R. Staddon, Ph.D.; Warren J. Strittmatter, M.D.; Dennis A. Turner, M.D.; E. Lee Tyrey, Ph.D.; Jeffery M. Vance, M.D., Ph.D.; Wilkie A. Wilson, Jr., Ph.D.; Fulton Wong, Ph.D.

OPHTHALMOLOGY AND VISUAL SCIENCE STUDY PROGRAM (OVS)

PROGRAM DIRECTORS: David L. Epstein, M.D. and Fulton Wong, Ph.D.

- *Description.* The purpose of this study program is to provide third year medical students with research skills and experience that can be applied to future careers as clinician scientists in ophthalmology and other fields. Although there is a primary emphasis on laboratory science, clinical research programs of inquiry based on strong scholarship are also possible. There is a focus on clinical investigators forming a true partnership with basic science researchers in attempting to advance the understanding and therapy of ocular diseases. There is an emphasis on hypothesis formation and the planning and execution of experiments that can address and then redefine the hypothesis.

- *Curriculum.* Each student chooses a preceptor according to her/his interests. Together they determine a topic of investigation which requires hands-on laboratory or clinical research by the student. Joint preceptors (for example, a clinical investigator and a basic science researcher) are acceptable and, in fact, encouraged. The course of study must be approved by the study program directors. At the end of the year, each student is expected to produce an in-depth paper based on the research. Throughout the year students attend: a) regular lectures on topics about ophthalmology and visual science given by Duke faculty as well as outside lecturers; b) participate in bimonthly research workshops in which students and faculty make presentations of hypotheses, assumptions therein, methods, and results, and c) give formal presentations of research work at the conclusion of the year.

- *Research Opportunities.* Opportunities include research in physiology, pathology, and molecular and cell biology of the eye as they relate to eye diseases. Opportunities also exist in biophysics and instrumentation, laser cell biology, and scientific basis of glaucoma, corneal, and retinal diseases.

FACULTY: R. Rand Allingham, M.D.; Tereté Borrás, Ph.D.; Edward G. Buckley, M.D.; Joseph M. Corless, M.D., Ph.D.; De La Paz, M.D.; David L. Epstein, M.D.; W. Craig Fowler, M.D.; Diane L. Hatchell, Ph.D.; Glenn J. Jaffe, M.D.; Gordon Klintworth, M.D., Ph.D.; Brooks W. McCuen II, M.D.; Alan D. Proia, M.D., Ph.D.; Judy H. Seaber, Ph.D.; Cynthia A. Toth, M.D.; Fulton Wong, Ph.D.

PATHOLOGY STUDY PROGRAM (PSP)

PROGRAM DIRECTORS: William D. Bradford, M.D. (Coordinating Director), Keith A. Reimer, M.D., Ph.D., and Maureen R. Hoffman, M.D., Ph.D.

Pathology is the study of disease through the utilization of structural and functional changes to gain information about the human organism's response to injury. The goal of the Pathology Study Program is to provide the medical student with a thorough learning experience in pathology and laboratory medicine under the guidance of a senior faculty preceptor. The essential elements of this program are: a) organized course work, b) independent, but guided research experience (bench or library), and c) active participa-

tion in small group seminars.

To meet the diverse interests and needs of Duke medical students, there are three tracks within the Pathology Study Program. All curriculum plans must be approved and signed by Dr. Bradford prior to registration.

PSP Track I

Required Courses: Systemic pathology; didactic lectures (PTH 241B); student seminar
Elective Courses: None
Independent Study: Research with thesis/project report require
Advisor: Dr. Keith A. Reimer (684-3659)
Max number students: 4

PSP Track II

Required Courses: Systemic pathology; didactic lectures (PTH 241B); autopsy, surgical, or cytopathology rotation (PTH 223B, PTH 348B, PTH 281B); student seminars
Elective Courses: Limited
Independent Study: Thesis/project report required
Advisor: Dr. Maureen R. Hoffman (684-6925)
Max number students: 4

PSP Track III

Required Courses: Systemic pathology; didactic lectures (PTH 241B); student seminars; autopsy, surgical or cytopathology rotation (PTH 223B, PTH 348B, PTH 281B)
Elective Courses: A carefully planned selection of preceptorships, e.g., molecular pathology, microbiology, surgical pathology, autopsy pathology, or transfusion medicine selected with the advice of Dr. Bradford
Independent Study: Thesis/project report required
Advisor: Dr. William Bradford (684-5112)
Max number students: 2

Advisory Plan for Pathology Study Program

The Department of Pathology participates in the Medical School orientation to the third year. Following the general information session, interested students may meet with advisors to establish interviews for individual mentors. Every student must have a study program advisor and an individual mentor. The curriculum plan, academic schedule, and registration cards of each student selected for the Pathology Study Program must be reviewed and approved by Dr. Bradford prior to registration.

FACULTY: Soman N. Abraham, Ph.D.; Rex C. Bentley, M.D.; Darell D. Bigner, M.D., Ph.D.; Sandra H. Bigner, M.D.; Edward H. Bossen, M.D.; William D. Bradford, M.D.; Stephen J. Bredehoeft, M.D.; Dennis A. Clements, M.D., Ph.D.; Stephen M. Denning, M.D.; Mark W. Dewhirst, D.V.M., Ph.D.; Marcia R. Gottfried, M.D.; Charles S. Greenberg, M.D.; Laura P. Hale, M.D.; David H. Harpole, M.D.; Maureen R. Hoffman, M.D., Ph.D.; David Howell, M.D., Ph.D.; Peter D. Issitt, Ph.D.; Randy L. Jirtle, Ph.D.; William H. Kane, M.D., Ph.D.; Gordon Klintworth, M.D.; Virginia B. Kraus, M.D., Ph.D.; Ph.D.; Roger J. Kurlander, M.D.; James E. Lowe, M.D.; Herbert K. Lyerly, M.D.; Neil R. MacIntyre, M.D.; John F. Madden, M.D., Ph.D.; Karen P. Mann, M.D., Ph.D.; Sara E. Miller, Ph.D.; Salvatore V. Pizzo, M.D., Ph.D.; Victor G. Prieto, M.D., Ph.D.; Alan D. Proia, M.D., Ph.D.; L. Darryl Quarles, M.D.; Keith A. Reimer, M.D., Ph.D.; Nancy L. Reinsmoen, Ph.D.; L. Barth Reller, M.D.; Gregory J. Riggins, M.D.; Victor L. Roggli, M.D.; Wendell F. Rosse, M.D.; Frank Sedor, Ph.D.; Christopher Shea, M.D.; John D. Shelburne, M.D., Ph.D.; Charles Steenbergen, M.D., Ph.D.; Timothy T. Stenzel, M.D.; Ph.D.; John G. Toffaletti, Ph.D.; Robin T. Vollmer, M.D.; Philip J. Walther, M.D., Ph.D.; J. Brice Weinberg, M.D.; Peter Zwadyk, Jr., Ph.D.

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 Ellis, Matthew J. (Davidson), Albuquerque, New Mexico
 Feldman, Zachary W. (Virginia), Dunwoody, Georgia
 Ficklin, Mary B. (Stanford), San Mateo, California
 Fields, Ryan C. (Michigan), Bloomfield Hills, Michigan
 Finn, Alexander J. (Brown), San Francisco, California
 Freidinger, Brad A. (North Carolina at Chapel Hill), Winston-Salem, North Carolina
 Gaillard, Stephanie (Virginia), Chicago, Illinois
 Givens, Raymond C. (Georgia), Stone Mountain, Georgia
 Grossi, Peter M. (Amherst), McLean, Virginia
 Hall, Allison H. (Stanford), Denver, Colorado
 Hawkins, Yolanda C. (Florida A&M), Des Moines, Iowa
 Higgins, Steven P. (Duke), Centreville, Virginia
 Hirsch, Dana L. (Duke), Mount Kisco, New York
 Howard, Brandon A. (Swarthmore), Lovettsville, Virginia
 Hsu, Michael C. (Harvard), Burr Ridge, Illinois
 Hwang, Eugene I. (William Marsh Rice), College Station, Texas
 Jenkins, Jarrod D. (Morehouse), Madison, Tennessee
 Jones, Kermit L. (Clark Atlanta), Marietta, Georgia
 Kelly, Bridget B. (Williams), Scranton, Pennsylvania
 Khurana, Rahul (Stanford), Monte Sereno, California
 Kim, Soo H. (Duke), St. Louis, Missouri
 Knab, Brian R. (Virginia), Great Falls, Virginia
 Kuniholm, Erin F. (Brown), Durham, North Carolina
 Lee, Edward (North Carolina at Chapel Hill), Burlington, North Carolina
 Lee, Shelly T. (Harvard), Yucaipa, California
 Lighvani, Arash (Massachusetts Institute of Technology), Rockville, Maryland
 Lima, Brian (Cornell), Kearny, New Jersey
 Linden, Diane C. (Middlebury), Los Angeles, California
 Lo, Wayne R. (Yale), Tucker, Georgia
 Lynn, Stephanie D. (Princeton), Boston, Massachusetts
 Maercks, Rian A. (Florida), Miami, Florida
 Mavropoulos, John C. (Chicago), Atlantic City, New Jersey
 McCoy, Allison N. (Duke), Durham, North Carolina
 McGirt, Matthew J. (Duke), Charlotte, North Carolina
 Miksad, Rachel E. (Duke), Charlottesville, Virginia
 Molino, Arlene C. (Northwestern), Chicago, Illinois
 Morgan, Katherine S. (Yale), Maysville, North Carolina
 Morgan, Marcello A. (Harvard), Upper Nyack, New York
 Mummery, Heather J. (Rochester), Aiden, New York
 Nimjee, Shahid M. (Yale), Brampton, Ontario, Canada
 Norris, Regina D. (Duke), Gaffney, South Carolina
 O'Halloran, Elizabeth K. (Chicago), Spokane, Washington
 Odunze, Millicent J. (Harvard), Orem, Utah
 Parker, Rodney D. (Harvard), Durham, North Carolina
 Pasquali, Sara K. (Michigan), Ann Arbor, Michigan
 Pickering, Trevor R. (California at Berkeley), Durham, North Carolina
 Rohatgi, Anand D. (Duke), Durham, North Carolina
 Rovak, Jason M. (Michigan), Ann Arbor, Michigan
 Sabo, Gregory J. (Notre Dame), Colorado Springs, Colorado

Sanchez, Carlos D. (Dartmouth), Highland Park, New Jersey
Sandler, Aaron J. (Yale), Gaithersburg, Maryland
Schweigler, Lisa M. (Harvard), Bethesda, Maryland
Scott, Lisa M. (William & Mary), Richmond, Virginia
Serlin, Scott B. (Texas A&M), Bowie, Maryland
Sharps, Stephanie K. (Hampton), Columbia, Maryland
Simpson, Amanda E. (Cornell), Latham, New York
Singh, Rakesh K. (Cornell), Coram, New York
Smith, Monica L. (North Carolina at Chapel Hill), Durham, North Carolina
Sufka, Susan A. (St. Mary's), St. Cloud, Minnesota
Sweis, Ranya N. (Wheaton), Carol Stream, Illinois
To, Binh K. (California at San Diego), Alhambra, California
Trinh, Jane V. (Rice), Lake Charles, Louisiana
Van de Ven, Thomas J. (Canisius), Grand Island, New York
Walton, Geoffrey B. (North Carolina State), Raleigh, North Carolina
Wang, Alice M. (Duke), Chester Spring, Pennsylvania
Wang, Emily A. (Harvard), Houston, Texas
Wang, George T. (Rice), Sugar Land, Texas
Wang, Gin R. (Oklahoma), Apex, North Carolina
Wellman, Samuel S. (North Carolina at Chapel Hill), Raleigh, North Carolina
West, Jesse L., IV (North Carolina at Chapel Hill), Asheville, North Carolina
Wickham, Michael Q. (Duke), Raleigh, North Carolina
Wirk, Shaheen A. (Duke), Beaver Creek, Ohio
Woo, Joan S. (California at Berkeley), Glendale, California
Wood, William A., Jr. (Harvard), Newport Beach, California
Ye, Qing B. (Fudan, China), Chicago, Illinois
Yesus, Ambeshie (Yale), Columbia, Missouri

Class of 1998 with Postgraduate Year One Appointment*

Key: *Student, Name, Hometown, Internship Institution and Discipline (if applicable), City and State, Residency Institution and Discipline, City and State, Ultimate Career Choice*

Ahuja, Vinita (Raleigh, North Carolina) Robert Wood Johnson Medical Center, New Brunswick, New Jersey-Internal Medicine
Allen, Jayme D. (Salem, Indiana) University of North Carolina - North Carolina Memorial Hospital, Chapel Hill, North Carolina- Pediatrics
Anderson, Scott Robert (Reston, Virginia) St. John's Mercy Medical Center (St. Louis, Missouri) - Transitional, Washington University - Mallinckrodt Institute of Radiology (St. Louis, Missouri) - Radiology, - Interventional NeuroRadiology
Baek, Peter S. (James Island, South Carolina) Duke University Medical Center - Anesthesiology, Durham, North Carolina
Bartholomew, Marnie Beth (Shillington, Pennsylvania) Stanford University Hospital - General Surgery, Palo Alto, California, Stanford University Hospital - Otolaryngology - Head and Neck Surgery, Otolaryngology, Neurotology and Skull Base Surgery
Batten, Dean (Selma, North Carolina) Crozer-Chester Medical Center - Transitional, Philadelphia, Pennsylvania, Hospital of the University of Pennsylvania - Diagnostic Radiology, Philadelphia, Pennsylvania
Berry, Garland Keith (Lebanon, Tennessee) Wilford Hall United States Air Force Base Medical Center - Transitional, San Antonio, Texas- Aerospace Medicine
Beutler, Anthony Ivan (Orem, Utah) David Grant Air Force Base Medical Center - Family Practice, Fairfield, California- Family Practice/Sports Medicine
Bienstock, Alan Marc (East Windsor, New Jersey) Baylor College of Medicine - Plastic Surgery, Houston, Texas
Black, Stephanie (Olympia, Washington) Carilion Health System - Transitional, Roanoke, Virginia
Blatt, Ellen R. (Scarsdale, New York) Residency Deferred
Bloom, Matthew B. (Chappaqua, New York) Duke University Medical Center - Surgery, Durham, North Carolina- Surgery
Bolden, Jason E. (Bismark, North Dakota) Morris Mount Sinai Medical Center - Internal Medicine- New York, New York, Mount Sinai Medical Center - Emergency Medicine, New York, New York
Bolognesi, Michael P. (Durham, North Carolina) Duke University Medical Center - Surgery, Durham, North Carolina, Duke University Medical Center - Orthopaedic Surgery, Durham, North Carolina- Academic Orthopaedic Surgery
Bowman, Brian P. (St. Louis, Missouri) Duke University Medical Center - Pediatrics, Durham, North Carolina
Brown, Francesca D. (Myrtle Beach, South Carolina) Wilford Hall Air Force Base - Pediatrics, San Antonio, Texas
Bryce, Thomas J. (Belle Harbor, New York) St. Vincent's Hospital - Transitional, New York, New York, University of California Medical Center - Radiology, San Francisco, California- Diagnostic Radiology
Byerley, Julie S. (Spartanburg, South Carolina) University of North Carolina - North Carolina Memorial Hospital - Pediatrics, Chapel Hill, North Carolina- General and Public Health Pediatrics
Camacho, Daniel L. (Gretna, Louisiana) Residency Deferred
Chandler, Damon B. (New Hyde Park, New York) Massachusetts General Hospital - Surgery, Boston, Massachusetts- Surgery
Cooper, Leslie (Durham, North Carolina) Northwestern University - McGaw Medical Center - General Surgery, Chicago, Illinois
Criscione, Lisa G. (Durham, North Carolina) Duke University Medical Center - Internal Medicine, Durham, North Carolina- Rheumatology
Drayer, Jeffrey (East Brunswick, New Jersey) Mercy Hospital - Transitional, San Diego, California, Boston University Medical Center - Dermatology, Boston, Massachusetts- Dermatologic Surgery
Durgin, Kristi (Garner, North Carolina) University of Michigan Hospitals - Internal Medicine, Ann Arbor, Michigan- Internal Medicine
Farooki, Aamer Z. (Demarest, New Jersey) St. Barnabas Medical Center - Transitional, Livingston, New Jersey, Washington University - Barnes Jewish Hospital - Radiology, St. Louis, Missouri

* Hometown does not denote legal residence

Fields, Michael J. (Silver Spring, Maryland) The Johns Hopkins University Medical Center - Pediatrics, Baltimore, Maryland- Pediatric Cardiology

Gagliardi, Jane P. (Athol, Massachusetts) Duke University Medical Center - Medicine/Psychiatry, Durham, North Carolina- Medicine/Psychiatry

Garg, Seema (Durham, North Carolina) University of North Carolina - North Carolina Memorial Hospital - Pediatrics, Chapel Hill, North Carolina, Duke University Medical Center - Ophthalmology, Durham, North Carolina- Ophthalmology

Garges, Harmony K. (Danville, Pennsylvania) Duke University Medical Center - Pediatrics, Durham, North Carolina- Academic Pediatrics

Gratz, Brett I. (Miami Beach, Florida) Carilion Health System - Transitional, Roanoke, Virginia, Washington University - Mallinckrodt Institute of Radiology - Radiology, St. Louis, Missouri- Radiology

Green, Johnathan (Burnsville, North Carolina) Duke University Medical Center - Internal Medicine, Durham, North Carolina

Gulotto, Carmelo (Homestead, Florida) Duke University Medical Center - Internal Medicine, Durham, North Carolina, Cardiology - Internal Medicine

Halvorson, Eric G. (Maplewood, New Jersey) Brown University - Rhode Island Hospital - General Surgery, Providence, Rhode Island - Academic General Surgery

Hanft, Valerie N. (Miami, Florida) Carilion Health System - Transitional, Roanoke, Virginia

Hanley, Matthew L. (Dhahran, Saudi Arabia) Carolinas Medical Center - Emergency Medicine, Charlotte, North Carolina - Emergency Medicine

Harris, Jason B. (Northampton, Massachusetts) Massachusetts General Hospital - Pediatrics, Boston, Massachusetts- Pediatric Infectious Disease

Higgins, Peter D. (Fairfield, Connecticut) Duke University Medical Center - Internal Medicine, Durham, North Carolina

Horton, Clarie K. (Springfield, Missouri) University of California Medical Center - Internal Medicine, San Francisco, California - Internal Medicine

Hsia, Amie (Potomac, Maryland) California Pacific Medical Center - Internal Medicine, San Francisco, California, Stanford University Medical Center - Neurology, Stanford, California- Neurology

Hu, Gang (Durham, North Carolina) University of California Medical Center - Transitional, Fresno, California, Duke University Medical Center - Ophthalmology, Durham, North Carolina - Ophthalmology

Huffman, George R., III (Orlando, Florida) University of California Medical Center - Surgery, San Francisco, California, University of California Medical Center - Orthopaedic Surgery, San Francisco, California - Orthopaedic Surgery

James, Martha L. (Winston Salem, North Carolina) University of California Neuropsychiatric Institute - Psychiatry, Los Angeles, California

Kalady, Matthew F. (Allentown, Pennsylvania) Duke University Medical Center - General Surgery, Durham, North Carolina - General Surgery

Kamiretzky, Catherine P. (Columbia, Missouri) Duke University Medical Center - Internal Medicine, Durham, North Carolina - Internal Medicine

Kihlstrom, Laura J. (Chapel Hill, North Carolina) Duke University Medical Center - Anesthesiology, Durham, North Carolina - General Anesthesiology

King, Wendalyn (Peachtree City, Georgia) Emory University Medical Center - Pediatrics, Atlanta, Georgia

Knize, Leihsa (Englewood, Colorado) Washington University Medical Center/St. Louis Children's Hospital - Pediatrics, St. Louis, Missouri- Pediatrics

Kong, James A. (Dayton, Ohio) Duke University Medical Center - Internal Medicine, Durham, North Carolina

Lager, Joanne J. (Westford, Massachusetts) University of North Carolina - North Carolina Memorial Hospital - Anesthesiology, Chapel Hill, North Carolina

Lahey, Timothy P. (Salt Lake City, Utah) Duke University Medical Center - Internal Medicine, Durham, North Carolina, Academic Primary Care Medicine

LaRocque, Regina C. (Merritt Island, Florida) Brigham and Women's Hospital - Internal Medicine, Boston, Massachusetts - Infectious Disease

Lee, Linda H. (Glendale, Wisconsin) University of Washington Affiliated Hospitals - Internal Medicine, Seattle, Washington, Duke University Medical Center - Dermatology, Durham, North Carolina - Dermatology

Levinson, Bari E. (Sacramento, California) Mercy Hospital of Pittsburgh - Internal Medicine, Pittsburgh, Pennsylvania - Private Practice Internal Medicine

Littman, Eva D. (New Bern, North Carolina) Duke University Medical Center - Obstetrics and Gynecology, Durham, North Carolina - Obstetrics and Gynecology

Locklear, Robert (Red Springs, North Carolina) East Carolina University Medical Center - Internal Medicine, Greenville, North Carolina

Lovdal, Jamie A. (Raleigh, North Carolina) Residency Deferred

Luo Xurong (Shanghai, China) Cornell Medical Center - The New York Hospital - Internal Medicine, New York, New York

Lyons, Michael S. (Libertyville, Illinois) University of Cincinnati Hospitals - Emergency Medicine, Cincinnati, Ohio - Emergency Medicine

Massenburg, Donald (Durham, North Carolina) Lutheran General Hospital - Internal Medicine, Park Ridge, Illinois - Clinical Research

McClure, Matthew W. (Las Vegas, Nevada) Duke University Medical Center - Internal Medicine, Durham, North Carolina

McFadden, Dwight J., III (New Holland, Pennsylvania) St. Joseph Hospital - Family Medicine, Denver, Colorado

Meine, Elizabeth K. (Shrewsbury, New Jersey) University of North Carolina - North Carolina Memorial Hospital - Pediatrics, Chapel Hill, North Carolina - General Pediatrics

Meine, Frederick J. (Columbus, Georgia) Duke University Medical Center - Internal Medicine, Durham, North Carolina - Academic Cardiology

Merchant, Audrea K. (Tampa, Florida) East Carolina University Medical Center - Medicine/Psychiatry, Greenville, North Carolina

Michelson, Kelly N. (St. Louis, Missouri) University of Chicago Hospitals - Pediatrics, Chicago, Illinois

Morgan, Nancy S. (Clemson, South Carolina) Duke University Medical Center - Pediatrics, Durham, North Carolina - Pediatric Genetics

Morowitz, Michael J. (Cherry Hill, New Jersey) Hospital of the University of Pennsylvania - General Surgery, Philadelphia, Pennsylvania

Neimat, Joseph S. (Potomac, Maryland) Massachusetts General Hospital - Surgery, Boston, Massachusetts, Massachusetts General Hospital - Neurosurgery, Boston, Massachusetts - Neurosurgery

Nettles, Richard (Wadsworth, Ohio) Duke University Medical Center - Internal Medicine, Durham, North Carolina - Infectious Diseases

Park, Eun-Ha (Pebble Beach, California) Santa Clara Valley Hospital - Transitional, Santa Clara, California, University of California Medical Center - Ophthalmology, San Diego, California- Pediatric Ophthalmology and Oculoplastics

Patil, Chandrashekar Y. East Carolina University Medical Center - Family Practice, Greenville, North Carolina - Family Physician

Peterson, Cathleen L. (Phoenix, Arizona) Duke University Medical Center - Internal Medicine, Durham, North Carolina, Duke University Medical Center - Anesthesiology, Durham, North Carolina - Anesthesiology

Price, Nicole (Houston, Texas) Tulane University Hospital - General Surgery, New Orleans, Louisiana, General Surgery

Reeck, Jay B. (Mercer Island, Washington) University of California Medical Center - General Surgery, San Francisco, California, University of California Medical Center - Otolaryngology - Head and Neck Surgery, San Francisco, California

Reuter, Nancy (Vero Beach, Florida) University of Massachusetts Medical Center - General Surgery, Worcester, Massachusetts - General Surgery

Rougier- Chapman, Duncan P., (East Grand Rapids, Michigan) Duke University Medical Center - Radiology, Durham, North Carolina - Radiology

Samuelson, David W. (Birmingham, Alabama) Virginia Mason Hospital - Transitional, Seattle, Washington, Emory University Hospital - Radiology, Atlanta, Georgia- Interventional Radiology

Scarborough, John E. (Raleigh, North Carolina) Duke University Medical Center - Surgery, Durham, North Carolina - Cardiothoracic Surgery

Schreiber, Jonathan L. (Dix Hills, New York) Boston University Medical Center - Internal Medicine, Boston, Massachusetts, Boston University - Tufts Medical Center - Dermatology, Boston, Massachusetts - Dermatology

Smoak, Charles K. (Charlotte, North Carolina) University Hospital of Cincinnati - Cincinnati Children's Hospital - Pediatrics, Cincinnati, Ohio - Pediatrics

Soltani, Lisa F. (Seattle, Washington) Duke University Medical Center - Medicine/Pediatrics, Durham, North Carolina

Song, Alice (Oak Brook, Illinois) MacNeal Hospital - Transitional, Berwyn, Illinois, University of Miami - Bascom Palmer Eye Institute - Ophthalmology, Miami, Florida

Sorenson, Carsten M. (Greensboro, North Carolina) University of Colorado Health Science Center - Surgery, Denver, Colorado, University of Colorado - Urology, Denver, Colorado - Urology



Stolker, Joshua M. (Gaithersburg, Maryland) Hospital of the University of Pennsylvania - Internal Medicine, Philadelphia, Pennsylvania- Cardiology

Taylor, Jennifer L. (Aurora, Colorado) Duke University Medical Center - Medicine/Pediatrics, Durham, North Carolina- Academic Medicine/Pediatrics

Thornburg, Courtney D. (Okemos, Michigan) Duke University Medical Center - Pediatrics, Durham, North Carolina - Academic Pediatrics

Vanscoy, Lori L. (French Creek, West Virginia) San Diego Naval Hospital - Pediatrics, San Diego, California

Wadleigh, Martha (Manchester, New Hampshire) Duke University Medical Center - Internal Medicine, Durham, North Carolina - Internal Medicine

Walker, David H. (Lee's Summit, Missouri) Barnes Hospital - Washington University - General Surgery, St. Louis, Missouri, Barnes Hospital - Washington University - Neurosurgery, St. Louis, Missouri - Neurosurgery

Weaver, Carolyn J. (Linden, New Jersey) Duke University Medical Center - Internal Medicine, Durham, North Carolina

Weiser, Lori G. (New York, New York) Columbia University - Presbyterian Hospital - Orthopaedics, New York, New York

Wheeler, Kevin G. (Fort Myers, Florida) Boston University Medical Center - Internal Medicine, Boston, Massachusetts, Boston University Medical Center - Emergency Medicine, Boston, Massachusetts - Emergency Medicine

White, Wendy M. (Cleveland, Ohio) Residency Deferred - Obstetrics and Gynecology

Whitener, Tracy R. (Lenoir, North Carolina) Brigham and Women's Hospital - Obstetrics and Gynecology, Boston, Massachusetts - Primary Care Women's Health

Wiener, Douglas J. (Great Neck, New York) Mercy Hospital - Transitional, San Diego, California, Manhattan Eye, Ear and Throat Hospital - Ophthalmology, New York, New York - Ophthalmology

Williamson, John A. (Austin, Texas) San Diego Naval Hospital - Surgery, San Diego, California

Wilson, Russell C. (Irving, Texas) Crozer-Chester Hospital - Internal Medicine, Philadelphia, Pennsylvania, Brigham and Women's Hospital - Radiology, Boston, Massachusetts - Musculoskeletal Radiology

Wong, David (York, Pennsylvania) Philadelphia Children's Hospital - Pediatrics, Philadelphia, Pennsylvania

Wood, Carrie E. (Memphis, Tennessee) University of Tennessee - Pediatrics, Memphis, Tennessee - Pediatrics

Yoder, Daniel (Mt. Pleasant, Iowa) Carilion Health System - Transitional, Roanoke, Virginia, University of Miami/Bascom Palmer Eye Institute - Ophthalmology, Miami, Florida - Ophthalmology

Zidar, David A. (Pittsburgh, Pennsylvania) The Johns Hopkins Hospital - Internal Medicine, Baltimore, Maryland - Academic Medicine

Doctor of Physical Therapy Program



The Doctor of Physical Therapy (DPT) Program

The Duke University Medical Center Doctor of Physical Therapy curriculum is a program for entry into the profession of physical therapy. Upon successful completion of both didactic and clinical components of the curriculum, the student is awarded the Doctor of Physical Therapy (DPT) degree by the School of Medicine. The fully accredited three year program, located in the medical center, provides a comprehensive foundation in the art and science of physical therapy, preparing graduates to serve as primary clinical care practitioners for patients with neuromusculoskeletal dysfunction throughout their continuum of care.

Faculty

Chairman/Professor:	J. K. Richardson, Ph.D., P.T., O.C.S.
Director of Graduate Studies/ Associate Clinical Professor:	J. Gwyer, Ph.D., P.T.
Associate Professors:	E. Villanueva, P.T., A.M.; M. Schenkman, Ph.D., P.T.
Assistant Clinical Professors:	D. Dore, M.P.A., P.T.; C.C. Figuers, Ed.D., P.T.; L.M. Lawrence, M.S., P.T.; M.E. Riordan, M.S., P.T.;
Clinical Associates:	E. Ross, M.M.S., P.T.; L. Fishman, M.S., P.T., N.C.S.;
Adjunct Associates:	J. Cavanaugh, M.S., P.T., N.C.S.; L. Case, M.S., P.T., P.C.S.; R. Crouch, M.S., P.T., D. Bongiorne, M.S., P.T.; S. Harryman, M.S., P.T.;
	W.D. Roy, III, P.T., K. Varvel, M.P.H., P.T.

Program of Study. The curriculum is comprised of 126 credits of academic work, completed over 8 academic semesters, requiring 33 months of full-time attendance. Course work includes didactic courses in basic sciences, clinical sciences, patient management, research, administration, education, and two five month clinical internships. The clinical internships are conducted in selected practice sites in North Carolina and across the country. Two elective courses and a required research project provide opportunity for the student to pursue areas of physical therapy in-depth.

Curriculum. The curriculum is presented in an integrated fashion, such that successful completion of all courses in each semester is required prior to progressing on to the next semester.

Year One

Fall Semester

PT 301. Human and Clinical Anatomy	5 credits
PT 302. Human Physiology and Histology	3 credits
PT 303. Cell Biology and Embryology	2 credits
PT 304. Normal Human Development	2 credits
PT 305. Physical Therapist Interventions I	2 credits
PT 306. Practice Management/Health Service Delivery	2 credits
PT 307. Movement Sciences I/Biomechanics	3 credits
PT 308. Clinical Experience I	1 credit
Total	20 credits

Spring Semester

PT 311. Neurosciences	4 credits
PT 312. Pathology and Tissue Biomechanics	3 credits
PT 313. Physical Therapist Intervention II	4 credits
PT 314. Integumentary Practice Management	2 credits
PT 315. Cardiopulmonary Practice Management	3 credits
PT 316. Clinical Examination, Evaluation, Diagnosis and Prognosis	3 credits
PT 317. Scientific Inquiry I	3 credits
PT 318. Clinical Experience II	1 credit
Total	23 credits

Summer Semester

PT 321. Movement Science II/ Motor Control	2 credits
PT 322. Arthrological and Pathological Movement Science I	2 credits
PT 323. Diagnostic Imaging	3 credits
PT 324. Musculoskeletal Practice Management I	4 credits
PT 325. Medical Practice Management	3 credits
PT 326. Physical Therapist Intervention III	3 credits
PT 327. Integrated Health Care Seminar I	2 credits
PT 328. Clinical Experience III	1 credit
Total	20 credits

Year Two

Fall Semester

PT 401. Neuropathology	2 credits
PT 402. Arthrological and Pathological Movement Science II	4 credits
PT 403. Musculoskeletal Practice Management II	4 credits
PT 404. Neurological Practice Management I	4 credits
PT 405. Educational Theory and Practice	2 credits
PT 406. Integrated Health Care Seminar II	2 credits
Total	18 credits

Spring Semester (8 weeks)

PT 411. Psychosocial Aspects of Care	2 credits
PT 412. Neurological Practice Management II	4 credits
PT 413. Scientific Inquiry II	3 credits
PT 414. Administration I	3 credits
PT 415. Integrated Health Care Seminar III	2 credits
Total	14 credits

Spring/Summer Semester (20 weeks)

PT 416. Clinical Internship I

4 credits**Year Three****Fall Semester (8 weeks)**

PT 501. Clinical Pharmacology and Nutrition

2 credits

PT 502. Administration II

3 credits

PT 503. Primary Care Practice

3 credits

PT 504. Advanced Practice Elective I

3 credits

PT 505. Advanced Practice Elective II

3 credits

Total**14 credits****Fall/Spring Semester (20 weeks)**

PT 506. Clinical Internship II

4 credits**Spring Semester (6 weeks)**

PT 507. Professional Practice, Development and Evaluation

3 credits

PT 508. Scientific Inquiry III

3 credits

PT 509. Health Promotion and Injury Prevention

3 credits

Total**9 credits**

In addition to the above courses, students must successfully complete written and practical comprehensive examinations as part of PT 507 and a research paper as part of PT 508.

Program Policies and Grading Standards. Enrolled students may make reference to the 1999-2000 DPT Student Handbook for program policies and grading standards. Students in the Doctor of Physical Therapy degree program are participants in a professional educational program whose graduates assume positions of responsibility as primary clinical care practitioners in health practice. Accordingly, students are evaluated on their academic and clinical performance and also on their interpersonal communication abilities, appearance, and professional conduct. Deficiencies in any of these areas are brought to the student's attention in the form of a written evaluation; failure to correct these performance issues may result in probation, suspension, or expulsion from the program.

Satisfactory Academic Progress. The student is expected to make continuous and successful progress towards the requirements for graduation throughout the curriculum. The student must register for all required courses during each semester of the curriculum and may carry into succeeding semesters no more than one incomplete course grade. Under extraordinary circumstances, a student may apply for an exception to the typical pattern of progress towards degree requirements. The standard required length of time to complete the academic requirements is 8 successive academic semesters of full-time study completed over 33 calendar months. Under extreme conditions, a student may be permitted a time limit of 2 semesters of full or part-time enrollment beyond the standard required length of study to complete the program. The student must apply in writing for such consideration, and the faculty reviews each case on its merit.

For financial aid purposes, federal regulations establish the maximum time frame for completion of the program at 150 percent of the minimum time required to complete the program. Any student exceeding the 150 percent maximum time frame is ineligible for Title IV (Stafford) student financial aid funds.

Attendance and Excused Absences. Students are expected to attend all classes and clinical internship hours and are excused only for illness or personal emergency. The faculty may approve a student's written request for a Leave of Absence for personal, medical, or academic reasons for a period not to exceed one year. The program director provides written notification of the approved time frame of the leave of absence to the

student, the medical school registrar and the director of financial aid. The student must provide written notification of her or his intent to return to the program at least 90 days prior to the anticipated date of re-entry. The student requesting an extension beyond one calendar year may be required to apply for readmission to the program and/or to repeat some or all course work. For purposes of deferring repayment of student loans during a school approved leave of absence, federal regulations limit the leave to six months.

Prerequisites for Admission. Requirements for admission to the physical therapy program include a baccalaureate degree, completion of prerequisite courses, Graduate Record Examination (G.R.E.) Aptitude Test scores from within the last five years, the filing of an application (including essays and reference letters) and, upon invitation, a personal interview. The G.R.E. must be taken no later than the November test date.

Prerequisite course work: 3 semester hours of biological sciences (recommended courses include embryology, histology, microbiology); 3 semester hours of cell biology; 3 semester hours of human anatomy; 3 semester hours of human physiology; 6 semester hours of chemistry; 6 semester hours of physics (including principles of light, heat, electricity, mechanics and sound); 3 semester hours of statistics; 6 semester hours of psychology (recommended courses include abnormal psychology, child or developmental psychology); and 9 semester hours of humanities/social sciences (recommended courses include scientific and technical writing, social anthropology). Human anatomy and human physiology courses must be completed within five years of the date of the application. All prerequisite courses must be completed with a grade of C or better. No prerequisite credit can be given to advanced placement courses or to those showing a Pass/Fail grade. A baccalaureate degree in the natural sciences is not a requirement for admissions; however, a background of coursework in the natural sciences is strongly recommended.

Application Procedures. Application materials are available from July through December 1 each year, and may be obtained by writing: Admissions Secretary, Graduate Program in Physical Therapy, Box 3965, Duke University Medical Center, Durham, NC 27710. Telephone: 919-684-3135. The application and all supporting documents must be post-marked no later than December 31 of the year preceding admission. The application must be received in the Department within 14 days of the December 31 postmark. The application fee is \$75. An early application deadline of December 1 requires a reduced application fee of \$65. Fall semester transcripts containing any prerequisite course work must be submitted as soon as they are available. Only students for full-time study are accepted. State residence does not influence admissions policies or tuition costs.

Tuition and Expenses. The Graduate Program in Physical Therapy practices a need-blind admissions process, with adequate financial aid for those students with financial need. Tuition is set at a level competitive with physical therapy programs of comparable quality and selectivity for admission. The tuition for the 126 credits of the program is budgeted in three annual payments of 42 credits per year. Estimated tuition for the 2000-2001 DPT curriculum is \$475 per credit. The 2000-2001 school-approved costs will be available from the Office of Financial Aid in February prior to admissions in the fall, and detailed student budgets are provided for all interviewed applicants.

Financial Aid. Qualified applicants may be eligible for federal educational loan programs or institution based loans. A small amount of need based scholarship awards is available for selected matriculated students. Financial aid information is available for all interested applicants by contacting the Office of Financial Aid, Box 3067, Duke University Medical Center, Durham, NC, 27710, or at the School of Medicine's Office of Financial Aid website: <http://www2.mc.duke.edu/som/finaid.html>.

Courses of Instruction

PT-301. Human and Clinical Anatomy. This course involves a detailed study of the human body through lecture, laboratory presentations, and cadaver dissection. The emphasis is on gross anatomy and the relationships between the musculoskeletal, neurological, and vascular systems of the human body. In addition, the course introduces the student to the surface anatomy and palpation skills of clinically pertinent anatomical structures of the head, trunk, and upper and lower limbs. Emphasis is placed on the location and differentiation of bony landmarks, muscle bellies, tendons, ligaments, bursas, nerves, arteries, and joint cavities of a live subject.

PT-302. Human Physiology and Histology. This course covers tissue structure and major physiological systems of the human body. Topics in this course include: structure and function of the cells and tissues of the body, tissue diversity, histology of major organs, and organ physiology of the cardiovascular, respiratory, musculoskeletal, renal, gastrointestinal, lymphatic, endocrine, and immune systems.

PT-303. Cell Biology and Embryology. This course covers basic cellular anatomy and developmental biology/embryology. Cell structure, function, cell diversity and communication are covered. The course covers topics of embryology from conception through birth.

PT-304. Normal Human Development. This course covers normal human development from birth to death including the physical, psychological, cognitive, social, and economic aspects. Emphasis in the course is on physical development. This course highlights the diversity of development among individuals and cultures.

PT-305. Physical Therapist Interventions I. In this course, students are introduced to the basic physical therapist patient interventions and examinations used to ensure safe patient interaction, including: patient communication, safe and effective patient positioning and movement, monitoring of vital signs, use of assistive ambulatory devices, protective bandaging/taping. An emphasis is placed on psychomotor performance including transfers, gait training, positioning, and basic patient handling skills.

PT-306. Practice Management/Health Delivery Systems. In this course, students are introduced to the role and function of the physical therapist in contemporary health care with an awareness of ethical principles, historical foundations of the profession, current health care issues, and health economics. Introduction to the patient management model in physical therapy including patient examination, evaluation, diagnosis, prognosis, intervention and outcomes. The course includes a discussion of practice policies, models of disability, models of clinical decision-making and documentation. Students develop initial skills in patient interviewing.

PT-307. Movement Sciences I/Biomechanics. This course addresses basic concepts relating to the architectural design and function of synovial and non-synovial joints, the morphology and function of skeletal muscle, observational joint and movement analysis, anthropometry, and biomechanical force systems. Free body diagrams as well as trigonometric and algebraic functions are used to solve biomechanical problems related to physical therapy practice. Emphasis is on static analysis of both stationary and moving bodies.

PT-308. Clinical Experience I. This course serves as the initial entry point into the clinical environment. A variety of patient types and settings are observed during eight half-day (4 hour) experiences. Emphasis is placed on integrating didactic information and developing psychomotor skills in the clinical setting. Students also are exposed to a variety of professional practice issues and roles of physical therapists. Licensed clinical and/or academic faculty provide direct supervision of the students. The supervisory model for this experience does not exceed 3 students : 1 clinical instructor.

PT-311. Neurosciences. This course covers the anatomy and physiology of the nervous system. The student is introduced to concepts and terminology. Detailed neuroanatomy of the peripheral and central nervous system is presented. The neurophysiological basis of motor control is addressed including sensory and motor systems, memory, cognition, and neural plasticity. Lectures, laboratory exercises, and problem-solving sessions are included.

PT-312. Pathology and Tissue Biomechanics. In this course, an introduction to diseases commonly seen in patients receiving physical therapy is presented. Body responses to injury and disease is traced from the cellular level to the systems level. Typical disease processes in these areas are covered: pulmonary, cardiac, neurological, infectious, genetic, immunosuppressive, metabolic, and metastatic. The course also presents the basic science of tissue biomechanics, and the response of muscle, bone, joints, and soft tissue to disease and injury. The normal repair process and the effects of physical therapist's interventions including rest, stress, stretch, resistance, immobilization and work is discussed. Complications and benefits of interventions, the effects of nutrition, aging, exercise and immobility are discussed.

PT-313. Physical Therapists Intervention II. This course covers strategies and techniques to manage pain, edema, loss of normal motion, soft tissue dysfunction and weakness through direct interventions. Interventions include: basic exercise, soft tissue mobilization, relaxation, splinting and compression garments, athermal modalities, cryotherapy, deep thermal modalities, electrotherapeutic modalities, and hydrotherapy.

PT-314. Integumentary Practice Management. The practice management model for patients with pathology or impairments to their integumentary system is presented. Medical lectures and clinical physical therapist lectures combine to present current management of patients who have skin lesions. Direct physical therapist intervention for wound examination, evaluation, diagnosis, prognosis, and intervention is presented.

PT-315. Cardiopulmonary Practice Management. This course gives an overview of the related pathologies of the cardiopulmonary system, examination and evaluation procedures, diagnostic procedures, goal setting, interventions, and patient management. A major focus of this course is laboratory sessions with cardiac and pulmonary patients, applying examination and evaluation procedures, and the direct interventions related to exercise and airway clearance. This course covers the principles of training, exercise and health promotion as related to the cardiovascular system.

PT-316. Clinical Examinations, Evaluations, Diagnosis and Prognosis. This course gives students skill in observation, communication, gross screening of posture, gait, function, integument, neurological, and musculoskeletal status. Additionally, students acquire skill in specific examination of flexibility, joint range (goniometry), anthropometric measures, and muscle strength (MMT). This course further provides opportunity for students to integrate material in determining patient problems and establishing an initial plan of care.

PT-317. Scientific Inquiry I. This course covers the theory and methods of the research process in physical therapy including research designs, research methods, and basic data analysis. The course emphasizes the student's ability to access literature, read and critically evaluate research findings.

PT-318. Clinical Experience II. This course continues to reinforce principles learned in the classroom to date. Under the guidance of licensed clinical faculty, students integrate concepts, principles, and techniques with emphasis on interventions learned during the first Spring semester. The structure of this phase of clinical education is four full days of clinical education. The focus is on the practice areas of cardiopulmonary care and integumentary care. Each student spends two consecutive days in a prac-

tice setting in which they can experience and learn in these practice areas. The supervisory model for this experience does not exceed 3 students : 1 clinical instructor.

PT-321. Movement Science II/Motor Control. Current concepts of motor control and motor learning are synthesized from multiple disciplines to provide a framework for physical therapy practice. Neurological mechanisms are examined and integrated with other physiological, psychological, and biomechanical contributions to movement and function. The role of task and environment in the control of movement also is analyzed.

PT-322. Arthrological and Pathological Movement Science I. A critical examination of the morphology and function of the articulations of the axial skeleton, including the temporomandibular and lumbosacral joints. Course content stresses normal musculoskeletal biomechanics of the cervical, thoracic, and lumbar segments as well as the pathomechanics of common spinal deformities. The course exposes student to normal and pathological orthopedic radiology of the trunk pertinent to clinical practice.

PT-323. Diagnostic Imaging. This course covers the study of the principles, procedures and interpretation of diagnostic imaging techniques. Emphasis is on plain film radiography, myelograms, CT scans, magnetic resonance imaging and nuclear medicine.

PT-324. Musculoskeletal Practice Management I. This course starts with the introduction to principles of orthopedic medicine, the general concepts of selective tissue evaluation, and joint mobilization. The course goes on to cover the etiology, pathology, specific evaluation treatment prognosis, and prevention of common musculoskeletal problems of the trunk, temporomandibular joint, headaches, and sacroiliac regions. Included is the basis of medical and surgical treatment of patients with spinal and TMJ pathologies as well as physical therapist intervention. The course includes lecture, laboratory, mock practicals, clinical hours, case problems, and outside projects.

PT-325. Medical Practice Management. This course covers medical and physical therapy management of patients with general medical conditions. A systems approach is utilized to cover the following areas: metabolic, malignancies, psychiatric, connective tissue, immunosuppressive, and organ transplantation.

PT-326. Physical Therapist Intervention III. The final physical therapist intervention course introduces the direct interventions of therapeutic exercise and ambulation, functional training in self-care and home management, functional training in community and work integration, and the prescription and application of assistive/orthotic/prosthetic devices and equipment. The effects of exercise across the lifespan is discussed. Specific patient populations is discussed as they are impacted by exercise training.

PT-327. Integrated Health Care Seminar I. This seminar provides the student with an opportunity to integrate and present medical and physical therapy management related to patients with general medicine conditions, cardiopulmonary and musculoskeletal diseases. Students contrast different approaches to examination and intervention. They analyze the influence of medical, social, and behavioral issues as well as age and developmental stage and discuss the clinical decision making process for specific patients.

PT-328. Clinical Experience III. This first full-time clinical experience consists of a four week exposure in an inpatient setting, including: acute care, subacute, or skilled nursing. The focus of the experience is the development of psychomotor skills, professional behaviors, gross and specific examination and intervention procedures and documentation skills. Exposure to the multiple roles of the PT is emphasized (e.g., administration, case management, consultation). The student is supervised by a licensed physical therapist. The supervisory model for this experience does not exceed 2 students : 1 clinical instructor.

PT-401. Neuropathology. In this course the pathological mechanisms of acute and chronic neurological disorders is presented. Physiological mechanisms are analyzed for

peripheral, central, and autonomic nervous system dysfunction. Major neurological disorders representative of each category are included. Rationale for current medical management is presented.

PT-402. Arthrological and Pathological Movement Science II. A critical examination of the structure, morphology, and functions of each of the articulation of the upper and lower limbs. Course content stresses normal and pathological musculoskeletal biomechanics of each region and provides exposure to clinically pertinent orthopedic radiology of each segment. The last section of the course addresses the kinematics and kinetics of normal and pathological locomotion and provides opportunities for gait analysis of normal subjects and patients.

PT-403. Musculoskeletal Practice Management II. This course covers the etiology, specific evaluation, diagnosis, assessment, prognosis, treatment, and prevention of common musculoskeletal problems of the upper and lower extremities. The class includes specific joint testing, joint mobilizations, medical and surgical management, prevention, and physical therapy intervention. The class is composed of lecture, laboratory, mock practicals, written patient evaluations and clinical cases.

PT-404. Neurologic Practice Management I. An introduction to management of children and adults with neuromuscular disorders is presented. Examination, evaluation, diagnosis, prognosis, and intervention is discussed. Both concepts and skills are addressed. Peripheral neuromuscular (e.g., muscular dystrophy, brachial plexus injury) and spinal cord disorders (e.g., spinal cord injury, spina bifida) are included.

PT-405. Educational Theory and Practice. In this course, principles of teaching and learning are covered and applied to the health care setting. Students learn to use a variety of teaching methods selected and developed for a specific audience. Students formulate and implement a plan for personal and professional development as well as techniques for facilitating behavioral change.

PT-406. Integrated Health Care Seminar II. This seminar provides the student with an opportunity to integrate and present medical and physical therapy management related to patients who have disorders of several systems (e.g., musculoskeletal, cardiovascular, and neuromuscular). Students meet with an instructor to present a patient, including the patient history, examination, evaluation, diagnosis, prognosis, and intervention as well as objective determination of success of intervention. Students articulate and justify their clinical reasoning as they contrast different approaches to examination and treatment.

PT-411. Psychosocial Aspects of Care. In this course students survey the various factors affecting the patient, the family, and the patient therapist relationship in situations of chronic illness and loss. Students increase their skills in developing an effective helping relationship with other people. Experiential learning experiences and self-observation are used to promote this development.

PT-412. Neurological Practice Management II. The study of management of children and adults with neuromuscular disorders is continued with emphasis on more complex CNS and multisystem disorders. Examination, evaluation, diagnosis, prognosis, and intervention is discussed. Both concepts and skills are addressed. Acquired injuries (e.g., cerebrovascular disease, traumatic brain injury), degenerative disorders (e.g., Parkinson's disease, multiple sclerosis) and congenital disorders (e.g., cerebral palsy) are included.

PT-413. Scientific Inquiry II. In this course students develop a proposal for their curriculum research requirement. Each student develops a plan for implementation of either an empirical research study or a clinical case study. Content on epidemiological research and advanced statistical analysis also is presented.

PT-414. Administration I. Administration topics include concepts and methods for the recruitment and effective utilization of personnel in a team atmosphere and identification of factors encompassing professional practices.

PT-415. Integrated Health Care Seminar III. This seminar provides the student with an opportunity to present studies to demonstrate integration of medical and physical therapy management of patients with medical, musculoskeletal or neurologic disorders. Students identify sequelae of these disorders, e.g., musculoskeletal impairments with neurological injury, and articulate management approaches that encompass both the acute management and the sequelae to the disease process.

PT-416. Clinical Internship I. This twenty-week clinical internship may occur in varied settings under the supervision of a selected and trained clinical instructor. The required focus of this clinical experience is in either the musculoskeletal or neuromuscular practice area. Students practice all clinical and administrative aspects of their professional roles during the internship.

PT-501. Clinical Pharmacology and Nutrition. This course introduces students to the basic principles of pharmacology and nutrition. Study of pharmacologic intervention and nutritional practices for patients commonly seen in physical therapy are included.

PT-502. Administration II. The knowledge and skills required for planning and implementing a physical therapy practice in multiple settings, is covered in this course. Students are introduced to the primary legal and management issues required of physical therapy practices, including strategies to ensure safe and effective delivery of high quality services.

PT-503. Primary Care Practice. This seminar provides the student with an opportunity to present, analyze, and integrate case studies of physical therapy practice as primary care clinical providers. Case studies are drawn from patient's with simple to complex problems in the general medicine, cardiopulmonary, musculoskeletal, and neurologic systems, and who present to the physical therapist as a first point of contact for health care. Emphasis is placed on the physical therapist's role, responsibilities, and risks when practicing as an entry point into the health care system.

PT-504/505. Advanced Practice Electives I and II. In these courses students choose two electives in which to deepen their knowledge base for practice. Advanced practice electives are offered in: Pediatrics, Geriatrics, Orthopedics, Sports, Cardiopulmonary, Neurology, Education, Research, and Administration.

PT-506. Clinical Residency II. This twenty-week clinical internship may occur in varied settings under the supervision of a selected and trained clinical instructor. The required focus of this clinical experience is in either the musculoskeletal or neuromuscular practice area. Students practice all clinical and administrative aspects of their professional roles during the internship.

PT-507. Professional Practice Development and Evaluation. This course integrates the didactic, clinical, and research components of the student's experience in preceding course work with the goal of evaluating the student's strengths and weaknesses for practice. During this course, the student undergoes extensive summative practical evaluations in an assessment center format. They also complete a written comprehensive examination.

PT-508. Scientific Inquiry III. In this third course in the sequence, the student will finalize their research or scholarly project in written form, and will complete a formal research presentation of their project results. Class time will also be spent discussing the role of critical inquiry in the first few years of practice.

PT-509. Health Promotion and Injury Prevention. In this course the student learns to identify and assess the health needs of individuals, groups, and communities through screening for prevention of injury, developing wellness programs, and triaging appropriate patients for physical therapy. The student is able to design and execute programs to promote optimal health by providing information or consultation on many aspect of health risks and disability. The student is exposed to a multidisciplinary approach to health promotion and injury prevention and participates in an existing program.

The Allied Health Programs



The Allied Health Programs

There are several health-service related educational programs offered through the Division of Allied Health of the Duke University Medical Center that are neither medicine nor nursing. Currently, the Allied Health Division is comprised of three master's degree programs and several certificate programs. Every effort is made to keep each of these Allied Health programs closely related to the Medical School departments whose fields they serve. Today, there are approximately 226 students enrolled in such programs at Duke University.

Resources for Study

All of the study facilities available to medical students are available to allied health students. See descriptions for Library/Communications Center, the Thomas D. Kinney Central Teaching Laboratory and Division of Educational Media Services which may be found in a foregoing section of this bulletin.

Several of the allied health programs have affiliations with other hospitals and medical institutions for clinical instruction.

Student Life

Living Accommodations. Because of the shortage of residential space, students enrolled in allied health certificate programs are not eligible for student housing. Students enrolled in the Master's Programs, however, are eligible. The Department of Housing Management maintains a listing of rental apartments, rooms, and houses provided by property owners or real estate agencies in Durham. These listings are available in the department only; during the summer an assistant is available to answer questions and to aid students in their attempt to obtain housing off campus. Information on commercial complexes in the Durham area may be obtained by writing to the Off-Campus Housing Office, 217 Anderson Street, Durham, NC 27705. Except for assuring that owners sign a statement of nondiscrimination, off-campus property is in no way verified and neither the university nor its agents negotiate between owners and interested parties. The search for accommodations should begin as soon as possible after

acceptance. A visit of two or three days provides students with the opportunity to make use of the off-campus service and to inspect personally the availabilities.

Dining Facilities. Duke Dining Services operates a variety of dining facilities including cafeterias, snack bars, restaurants, salad bars, and more. Students may make food purchases in dining establishments with cash, or they may choose to open a pre-paid account. Information about dining plan accounts and flexible spending accounts is available from the DukeCard Office, 024 Union West, Box 90911, Durham, North Carolina 27708-0911, 919/684-5800.

Cafeterias operated by the hospital are available both in the Medical Center and the Veterans Administration Medical Center.

Student Financial Aid. Duke University recognizes the responsibility of students and their families to provide funds according to their ability to achieve the educational objective. Students are encouraged to pursue every available source of support through their local and state student assistance programs.

All programs are approved for veterans' education benefits for those individuals who are eligible. Some of the programs have limited student support available through stipends or special scholarships.

Financial aid is available through Duke in limited amounts in the form of loans. When all institutional funds are pooled, the amount available to a totally needy student is inadequate to meet the school's recognized costs. A Free Application for Federal Student Aid (FAFSA) is required in addition to the Duke University Financial Aid Application. A copy of the student's (and spouse's, if applicable) federal income tax return for the previous taxable year is required. In the case of the dependent student, a copy of the parent's federal income tax return for the last taxable year also is required. Duke University reserves the right to decline to approve loan applications for those applicants who do not have a satisfactory credit history. U.S. citizenship or permanent residence visa is required of all students receiving loans through the school.

It is the responsibility of financial aid recipients to keep the Medical Center Office of Financial Aid informed of any outside financial assistance they may receive. It must be understood that Duke reserves the right to reconsider its offer of financial assistance in the event of a major outside award to a recipient. No financial aid funds may be used during a period when the recipient is not involved with work toward the degree or certificate. Less than half-time or special students are not eligible for financial aid.

Students who have been accepted for matriculation routinely receive financial aid applications. Annual reapplication is required of all financial aid recipients.

Federal Stafford Student Loans (see description on page 63).

North Carolina Student Incentive Grant (NCSIG) is available to residents of North Carolina who are enrolled in any postsecondary educational program in North Carolina. The applicant must demonstrate substantial financial need and must not have earned a baccalaureate degree. Application deadline is March 1st for the following academic year. To apply, the applicant completes a Free Application for Federal Student Aid (FAFSA) requesting that the information be sent to College Foundation, Inc., P.O. Box 12100, Raleigh, North Carolina 27605-2100. FAFSAs may be obtained from a high school guidance counselor or any financial aid office.

North Carolina Student Loan Program for Health, Science, and Mathematics.

These loans provide financial assistance to North Carolina residents who demonstrate need as determined by the board. Loans are available for study in the medical fields, mathematics, and science programs that lead to a degree. The applicant must be a domiciliary of North Carolina and accepted as a full-time student in an accredited associate, baccalaureate, master's, or doctoral program leading to a degree. Loan recipients in professional or allied health programs may cancel their loans through

approved service in shortage areas, public institutions, or private practice. Medical students may receive up to \$8,500 per year for each of the four years; master's degree students are eligible for two loans of up to \$6,500 each; bachelor's degree students are eligible for three loans of up to \$5,000 each. For application forms and more information write: Executive Secretary, Board for Need-Based Student Loans, P.O. Box 20549, Raleigh, North Carolina 27619-0549, or telephone (919) 571-4178.

Every effort is made to assist the student with tuition and living expenses within the framework of school policies which may be in effect at the time. However, as funds are limited, prior indebtedness is not be given favorable consideration as part of the student's budget. Any applicant having further questions may write to Office of Financial Aid, 126 Davison Building, Box 3067 DUMC, Durham, North Carolina 27710.

Judicial System and Regulations. Duke University expects and requires of all its students full cooperation in developing and maintaining high standards of scholarship and conduct. Each student is subject to the rules and regulations of the university which are currently in effect or which are, from time to time, put into effect by the appropriate authorities of the university. At the same time, the individual is responsible for decisions and choices within the framework of the regulations of the community as Duke does not assume *in loco parentis* relationships.

Any student, in accepting admission, indicates a willingness to subscribe to, and be governed by, these rules and regulations and acknowledges the right of the university to take such disciplinary action, including suspension or expulsion, for failure to abide by these regulations or for other conduct adjudged unsatisfactory or detrimental to the university. A copy of the Allied Health Judicial System including a code of ethics, rules of conduct, and judicial procedures is provided each student.

Fees for Transcripts. Requests for transcripts of academic records should be directed to the Office of the Medical Center Registrar. A fee of three dollars, payable in advance, is charged for each copy. However, the transcript fee is waived for financially needy students who require transcripts to apply for external funding.

Student Health Service. Student health service, health insurance, and counseling and psychological services, fully described in an earlier portion of this bulletin, are available to all allied health students.

Student Health Fee. All regular full-time students and part-time degree candidates are required to pay a health fee that is nonrefundable after the first day of classes in the semester. The student health fee entitles the student to outpatient treatment through the Student Health Service, inpatient treatment in the Infirmary, and use of Counseling and Psychological Services. The health fee is not to be confused with the Duke Student Accident and Hospitalization Insurance (the premium for this insurance is minimized due to the existence of the Student Health Services) which covers a large number of medical costs above and beyond the treatment available through the Student Health Services. The identification of a separate student health fee in no way changes the policy concerning the additional Student Accident and Hospitalization Insurance Plan. Student Health brochures are available in the bursar's office and in the Student Health Service Clinic.

Student Accident and Hospitalization Insurance. At the beginning of each fall semester, medical and allied health students must provide proof to the bursar's office of coverage under an accident and hospitalization insurance policy or purchase the Duke Student Accident and Hospitalization Insurance policy. If hospital services outside of the Student Health Service are needed, this insurance policy provides protection twenty-four hours per day during the twelve-month term of the policy of each student insured. Students are covered on and off the campus, at home, while traveling between home and school, and during interim vacation periods.

Refunds*

If a student withdraws, tuition is refunded according to the following schedule:

Withdrawal from Master's Programs	Refund
Before classes begin	full amount
During first or second week	80 %
During third to fifth week	60 %
During sixth week	20 %
After sixth week	None

Withdrawal from Certificate Programs	Refund[†]
Before classes begin	full amount
During first week	80 %
After first week of classes	None

* The Clinical Research Program observes an alternate refund policy as noted in the Clinical Research section under "Withdrawal from a Course."

[†] Includes involuntary withdrawal for academic reasons.



The Master of Health Sciences in Clinical Research

THE CLINICAL RESEARCH TRAINING PROGRAM

Program Director: William E. Wilkinson, Ph.D.

Associate Directors: Eugene Z. Oddone, M.D. and Linda S. Lee, Ph.D.

This training program meets an existing need at Duke University Medical Center for formalized academic training in the quantitative and methodological principles of clinical research. Designed primarily for Duke clinical fellows who are training for academic careers, the program offers formal courses in research design, statistical analysis, decision analysis, research ethics and research management. Students who complete a prescribed course of study in the training program are awarded a Master of Health Sciences in Clinical Research degree by the School of Medicine.

The Clinical Research Training Program is offered by the faculty of the Division of Biometry in the Department of Community and Family Medicine with the participation of other members of the Medical Center faculty having expertise in relevant areas.

Degree and Non-degree Admission. All persons wishing to take courses in the Clinical Research Training Program, even on a non-degree basis, must be admitted to the program or be currently enrolled in a graduate degree-granting program at Duke. A bachelor's degree (or the equivalent) from an accredited institution is a prerequisite for admission either as a degree candidate or as a non-degree student.

A student seeking admission to the Clinical Research Training Program should obtain an application packet which contains the necessary forms and detailed instructions on how to apply. Requests for application forms or for additional information about the training program should be directed to the Clinical Research Training Program, Box 3827, Duke University Medical Center, Durham, North Carolina 27710, (919) 681-4560 or by e-mail to crtp@mc.duke.edu.

A complete application for admission, either as a degree candidate or as a non-degree student, consists of the application form and the following supporting documents: (1) an official transcript from each post-secondary institution attended; (2) three letters of evaluation written by persons qualified to testify to the applicant's capacity for graduate work; (3) official scores on the Graduate Record Examination (GRE) General Aptitude Test. (GRE scores are not required for applicants having an M.D., Ph.D. or equivalent degree.) Applicants with an advanced degree in a health profession who are currently medical residents, fellows, or faculty members at Duke or at the National Institutes of Health (NIH) are required to submit only the application form for non-degree admission. Medical students at Duke and at the NIH may substitute MCAT scores for GRE scores.

In the event that a non-degree student is subsequently admitted as a degree candidate, relevant course work is accepted for degree credit.

Program of Study. The degree requires 24 units of graded course work and a research and thesis project for which 12 units of credit are given. Seven courses (241 - 247) constituting 22 units are required for all degree candidates (see Courses of Instruction below). The student's clinical research activities provide the setting and the data for the project; the thesis serves to demonstrate the student's competence in the use of quantitative methods in medical research.

The program is designed for part-time study, allowing the fellow/student to integrate the program's academic program with his or her clinical training. The course work can be completed in one academic year consisting of two 16-week semesters. (The exact dates are determined by the Medical School's calendar for fourth year medical students.)

Examining Committee. The faculty member who directs the student's research project and two other faculty members constitute an examining committee to certify

that the student has successfully completed this degree requirement. The chairperson and at least one other member of this committee must be on the faculty of the Clinical Research Training Program or in the Division of Biometry; the constitution of each examining committee must be approved by the program director.

Grades. Grades in the Clinical Research Training Program consist of H (High Pass), P (Pass), L (Low Pass) and F (Fail). In addition, an I (Incomplete) indicates that some portion of the student's work is lacking for a reason acceptable to the instructor at the time grades are reported. The instructor who gives an Incomplete for a course may specify a date by which the student must make up the deficiency. In exceptional circumstances, an Incomplete that is not resolved within one calendar year from the date the course ended may be extended for one additional year with the written approval of the course instructor and the program director. If an Incomplete is not resolved within the approved period, the grade of I becomes permanent and may not be removed from the student's record.

A student's enrollment as a degree candidate is terminated if he or she receives a single grade of F or two grades of L in the program. For these purposes, WF (see below) and a permanent I are both considered to be failing grades.

Withdrawal from a Course. A course may be dropped at the student's discretion during the first three weeks of class; no grade is recorded and all tuition is refunded. If a course is dropped later in the term, no tuition is refunded and the status of the student at the time of withdrawal is indicated on the permanent record as WP (Withdrew Passing) or WF (Withdrew Failing).

Tuition. Tuition for the 1999-2000 academic year is \$450 per unit. Faculty may be eligible for the University's Educational Assistance Program. Other sources of support exist in some clinical departments; prospective students should consult with program directors and division chiefs regarding potential funding sources.

Transfer of Credit. Transfer of credit for graduate work completed at another institution is considered only after a student has earned a minimum of 12 units in the Clinical Research Training Program. A maximum of 6 units of credit may be transferred for graduate courses completed at other institutions. Such units are transferred only if the student received a grade of B (or its equivalent) or better. The transfer of graduate credit does not reduce the required minimum registration of 36 units for the degree. However, a student who is granted such transfer of credit may be permitted to register for as much as 18 units of thesis research instead of the usual 12 units.

Time Limitations. A degree candidate is expected to complete all requirements within six calendar years of matriculation. Degree credit for a course (including one for which transfer credit is given) expires six years after the course is completed by the student; in this case, degree credit can be obtained only by re-taking the course.

Courses of Instruction

CRP-241. Introduction to Statistical Methods. An introduction to the concepts of statistical estimation and hypothesis testing as applied in clinical research. Topics include probability distributions, descriptive statistics, graphical displays, parametric and non-parametric tests for differences in central tendency, paired comparisons and correlation, simple linear regression, one-way analysis of variance, and logistic regression. Types of study designs and epidemiological concepts are woven into the statistical presentation. Several medical articles are critiqued to foster evaluation of the literature and to demonstrate proper application of statistical techniques. In addition, basic concepts and procedures of SAS are presented for computation of the statistical measures presented in the course. 4 units.

CRP-242. Principles of Clinical Research. General principles and issues in clinical research design. Formulating the research objective and the research hypothesis; specifying the study population, the experimental unit and the response variable(s). Classification of studies as experimental or observational, prospective or retrospective, case-control, cross-sectional, or cohort; their relative advantages and limitations and the statistical methods used in their analysis. Emphasis is placed on the traditional topics of clinical epidemiology such as disease etiology, causation, natural history, diagnostic testing, and the evaluation of treatment efficacy. Corequisite: CRP-241. 4 units.

CRP-243. Ethical Issues in Clinical Research. An introduction to the considerations necessary in designing and conducting clinical research that meets current ethical and regulatory guidelines. Topics include the emergence of research ethics, the underlying ethical principles relevant to the conduct of research, selection of subjects (e.g., the inclusion of women and minorities in research), informed consent, compensation, confidentiality, regulatory requirements, termination of clinical trials, conflict of interest and scientific integrity. Corequisite: CRP-242. 2 units.

CRP-244. Health Economics in Clinical Research. A practical foundation in economic evaluation of medical diagnostic procedures and therapeutic interventions. The focus is on the development, analysis, and communication of economic data in the context of clinical research. Topics include: basic finance and organization of health care, evidence tables, utility theory, tree-structured decision models, health care cost accounting, cost-effectiveness, cost-utility and cost-benefit analysis, special statistical issues in analysis of economic data. Corequisite: CRP-242. 2 units.

CRP-245. Statistical Analysis. This course extends CRP 241 (Introduction to Statistical Methods) to more advanced topics relevant in clinical research. Topics include regression models (linear and logistic regression models, their practical applications in assessing multivariable relationships and formulating predictive models, and the interpretation of model parameters), categorical data analysis (methods for analyzing nominal and ordinal response variables) and survival analysis (inferences from time-to-event data with censored observations, including Kaplan-Meier curves, hazard functions, and the Cox proportional hazards regression model). Prerequisite: CRP-241. 4 units.

CRP-246. Research Management. An introduction to the critical issues and methods in the management of clinical research. The focus is on the understanding of concepts and skills related to the complex, multidisciplinary environment in which clinical research is conducted. Topics include budget construction and financial management, project management, regulatory affairs, negotiating skills, conflict resolution, manuscript preparation, public relations, presentation skills, and alternative means of disseminating medical information. Prerequisite: CRP-242. 4 units.

CRP-247. Clinical Research Seminar. This seminar integrates and builds on the core courses (CRP 241, 242, and 245) to provide practical experience developing and critiquing the methodological aspects of clinical research protocols and the clinical research literature. Assigned readings are drawn from contemporary literature and include both exemplary and flawed studies. Prerequisite: CRP-242. Corequisite CRP-245. 2 units.

CRP-248. Clinical Trials. Fundamental concepts in the design and analysis of clinical trials. Topics include protocol management, sample size calculations, determination of study duration, randomization procedures, multiple endpoints, study monitoring, and early termination. Corequisite: CRP-245. 2 units.

CRP-249. Health Services Research. Research methods in health services research. Topics include measurement of health-related quality of life, case mix and comorbidity, and quality of health care; analysis of variations in health care practice; physician profiling. Application of traditional research designs (e.g., randomized trials) to address health services research questions. The interface between health services research and health policy. Prerequisite: CRP-242. Corequisite CRP-245. 2 units.

CRP-250. Analysis of Genetic Data. An introduction to the use of statistics for analysis of genetic data, with a focus on human genetics. The course provides an overview of modern statistical techniques for dealing with correlated data in the context of genetic issues. Topics include: measuring genetic variation, estimating heritability, testing Hardy-Weinberg equilibrium, estimating linkage maps, detection and location of genes, and DNA fingerprinting. Students are introduced to specialized software and Internet-based resources for the analysis of genetic data. Prerequisite: CRP-241 and basic knowledge of genetics. 2 units.

CRP-251. Psychometrics and Reliability. An introduction to the elements of psychometric theory that are relevant to the conduct of clinical research. Topics include reliability and validity; the definitions and use of intraclass correlation, classical test theory and generalizability theory as models of reliability; questionnaire design and scale construction; methods for assessing the psychometric properties of scales such as factor analysis and Cronbach's alpha; the use of reliability in sample size estimation. Prerequisite: CRP-242. Corequisite CRP-245. 2 units.

The Pathologists' Assistant Program

MASTER OF HEALTH SCIENCES CURRICULUM

Professor and Chairman, Department of Pathology: Salvatore V. Pizzo, M.D., Ph.D.

Director, Pathologists' Assistant Program: James G. Lewis, Ph.D.

Medical Director: Alan D. Proia, M.D., Ph.D.

Medical Director for Surgical Pathology: Marcia Gottfried, M.D.

Surgical Pathology Training Coordinator: Pamela Vollmer, B.H.S.

Director, Autopsy Service, Veterans Affairs Medical Center: Jane Gaede, M.D.

Director of Surgical Pathology, Veterans Affairs Medical Center: Robin Vollmer, M.D.

Chief, OB-GYN Pathology: Stanley Robboy, M.D.

Chief, Pediatric Pathology: William D. Bradford, M.D.

Program of Study. This is a twenty-four month program beginning with the start of the medical school academic year in August of each year. It provides a broad, graduate level background in medical sciences in support of intensive training in anatomic pathology. With the background in anatomy, histology, physiology, and microbiology, the students learn pathology at the molecular level in the classroom and are trained and given experience in the microscopic and gross morphology of disease in close one-on-one training with pathology department faculty. They learn dissection techniques and all technical aspects of anatomic pathology in summer rotations. The curriculum is designed to produce individuals who fill the gap between the pathologist on the autopsy and surgical pathology services and other technical personnel who work in the tissue processing laboratory.

Accreditation. The curriculum, faculty, facilities, and administration of the program are accredited by the National Accrediting Agency for Clinical Laboratory Sciences (NAACLS). Graduates are able to sit for the American Association of Pathologists' Assistants fellowship examination.

Degree Requirements. Passage of sixty-nine units of graduate credit is required for the M.H.S. degree. An additional eleven credits are required to receive a certificate at the end of the program, there are mandatory comprehensive written, oral, and practical examinations administered by a panel of pathology department faculty which all students must pass for successful completion of the program.

Grading Policies. Grades for courses except the comprehensive final examination are assigned as follows: Excellent/High Pass (H), Good/Pass (P), Satisfactory/Low Pass (L), Failing (F), and Incomplete (I). In some medical school courses grades of H (Honors), P (Pass), and F (Fail) may be assigned. Failure in any course may result in removal from the program. If a student receives two Ls, the student is placed on academic probation and is required to perform additional studies for the director. All incomplete grades automatically revert to F if work is not completed within one semester or one summer session following award of the grade. The comprehensive final examination is pass/fail with the award of honors for outstanding students. Students who fail the final can register for one semester to prepare and take the examination again. Any student who fails the final twice cannot complete the program.

Curriculum

Year 1 Fall

CBI-200. Cell and Tissue Biology	3 credits
CBI-201. Microscopic Anatomy	3 credits
CBI-202. Medical Physiology	4 credits
BAA-200. Human Anatomy	3 credits
PTA-205. Immunology	3 credits

Year 1 Spring

PTH-250. General Pathology	4 credits
PTH-251. General Pathology Laboratory	4 credits
MIC-221. Medical Microbiology	4 credits
PTA-200. Introduction to Dissection	2 credits
PTA-201. Basic Neuroanatomy	1 credit

Year 1 Summer

PTA-210. Introduction to Autopsy Pathology	4 credits
PTA-220. Introduction to Surgical Pathology	4 credits
PTA-215. Histology Techniques	1 credit

Year 2 Fall

PTH-364. Systemic Pathology	3 credits
PTH-361. Autopsy Pathology	4 credits
PTA-230. Surgical Pathology	4 credits
PTH-258. Cellular and Subcellular Pathology	2 credits
PTA-216. Histology Techniques	1 credit
PTA-240. Photography	1 credit

Year 2 Spring

PTH-364. Systemic Pathology	3 credits
PTA-231. Surgical Pathology	4 credits
PTH-362. Autopsy Pathology	4 credits
PTA-217. Histology Techniques	1 credit
PTA-241. Photography	2 credits

Year 2 Summer

PTA-300. Autopsy Practicum	4 credits
PTA-301. Surgical Pathology Practicum	4 credits
PTA-302. Forensic Rotations	3 credits

Total	80 credits
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Prerequisites for Admission

1. A baccalaureate degree in a biological or chemical science from an accredited institution.
2. A baccalaureate degree in a non-science major but at least 12 credit hours in biological sciences and six credit hours in chemistry.
3. Scores for the Graduate Record Examination (G.R.E.) taken within the last five years.

Candidates who receive their baccalaureate degrees from institutions outside the United States must submit a transcript evaluation showing degree equivalency and subject matter description.

Application Procedures. Application materials are mailed to prospective candidates for admission up to January 31st of the year of expected matriculation. Applications can be obtained by writing to: Dr. James G. Lewis, Director, Pathologists' Assistant Program, Department of Pathology, Box 3712, Duke University Medical Center, Durham, NC 27710. Telephone: (919) 684-2159. All applications must be received by February 28.

Applications must include:

1. A completed application form and a nonrefundable application fee of \$35;
2. Official transcripts of all colleges and universities attended;
3. G.R.E. scores;
4. Three letters of recommendation.

Candidates are notified of the admission committee's decision no later than April 15. Accepted candidates are required to submit a nonrefundable deposit of \$300 to retain their places in the class. This deposit applies to tuition.

Tuition, Fees and Estimated Costs for Year One

Tuition	\$12,400 (40 credits at \$310/credit)
Fees	500
Books	434
Lab coats	127
Student health fee	(\$215/semester) 645
Student accident and hospitalization insurance	\$685 (single) \$2,163 (family)
Vehicle registration	120
Lodging	4,644
Food	3,732
Miscellaneous	4,019
Total	28,784

Financial Aid. Please refer to the section on student aid in the chapter, The Allied Health Programs. For more detailed information contact the Office of Financial Aid, Box 3067, Duke University Medical Center, Durham, NC 27710.

Courses of Instruction

BAA-305. Gross Human Anatomy. This is the medical school and anatomy graduate course in human anatomy. Students participate in a complete lecture series and in laboratory dissections of cadavers. Lectures and laboratory work are supplemented by conferences which emphasize biological and evolutionary aspects. 3 credits. *Staff*

CBI-200. Cell and Tissue Biology. This is the introductory medical school and graduate course in microscopic anatomy. Students participate in lectures and laboratories on the structure and function of cells and tissues of the body. The courses provides practical experience in the use of the light microscope analyzing an extensive slide collection of mammalian tissues. 3 credits. *McIntosh and staff*

CBI-201. Microscopic Anatomy. Histology of all major organs of the body. Structure and cell biology at both the level of the light and electron microscope. 3 credits. *McIntosh and staff*

CBI-202. Medical Physiology. Medical and graduate level course on organ and cell physiology. Human and medical aspects are stressed. 4 credits. *Anderson and staff*

MIC-221. Medical Microbiology. Intensive study of common bacteria, viruses, fungi, and parasites that cause human disease. The didactic portion focuses on the nature and biological properties of microorganisms causing disease, the manner of replication, and their interaction with the entire host as well as specific organs and cells. 4 credits. *Staff*

PTH-250. General Pathology. This is the medical school core course in pathology. Lectures deal with broad concepts of disease and underlying molecular mechanisms. 4 credits. *Staff*

PTH-251. Laboratory Course in General Pathology. Fundamentals of pathology are presented by correlating gross and microscopic material to illustrate the structural changes in disease. Laboratories are broken into small groups of students and are held under the guidance of staff pathologists. 4 credits. *Staff*

PTH-258. Cellular and Subcellular Pathology. The course consists of lectures and seminars on the alterations of cellular structure and associated functions that accompany cell injury. 2 credits. *Shelburne and staff*

PTH-361, 362. Autopsy Pathology. A detailed consideration of the morphologic, physiologic, and biochemical manifestations of disease. Includes gross dissection, histologic examinations, processing, analyzing of all autopsy findings under tutorial supervision. 6 credits each course. *Lewis and staff*

PTH-364. Systemic Pathology. This is the medical school and graduate course in the detailed pathology of major organ systems. The course consists of lectures and seminars presenting the latest scientific concepts of disease. 6 credits. *Bradford and staff*

PTA-200. Introduction to Dissection. This is a course in basic tissue dissection techniques taught through participation in autopsies and using autopsy tissues. 3 credits. *Lewis and staff*

PTA-205. Immunology. This is a basic survey course in immunology that includes lectures on the function and interaction of the cells of the immune system, cytokine secretion and function, and the generation of humoral and cellular immune responses. 3 credits. *Kostyu*

PTA-210. Introduction to Autopsy Pathology. This is a summer rotation given during the first summer session. It is designed to acquaint the student with autopsy prosection and workup. Students assist residents in full autopsy dissections. 4 credits. *Lewis and staff*

PTA-220 Introduction to Surgical Pathology. This is a rotation conducted during the first summer session. It is designed to acquaint students with the techniques of gross dissection, descriptions, and submission of tissue samples from surgical specimens. 4 credits. *Vollmer and staff*

PTA-215, 216, 217. Histology Techniques. These are rotations through various histology laboratories. These are designed to acquaint students with the various techniques used in tissue processing and special procedures. 1 credit each. *Dotson and staff*

PTA-230, 231. Surgical Pathology. These courses consist of thorough laboratory training in the orientation, description, and dissection of gross surgical specimens. Students follow many of the cases through to signout by the pathologist. 4 credits each. *Vollmer and staff*

PTA-240, 241. Photography. This is an introduction to medical photography. Students become familiar with photography equipment and the fundamentals of gross specimen photography. 1 credit each. *Reeves and Conlon*

PTA-300. Autopsy Practicum. This is the final autopsy rotation in which the students must perfect their dissection skills, demonstrate the ability to conduct full autopsy prosecutions in all possible situations, and write full preliminary autopsy reports. In addition, special dissection skills are taught in this course. 4 credits. *Lewis and staff*

PTA-301. Surgical Pathology Practicum. This is the final surgical pathology rotation in which the students must perfect their dissection skills and demonstrate the ability to orient, dissect, describe, and submit appropriate tissue samples from all commonly encountered surgical pathology specimens. 4 credits. *Vollmer and staff*

PTA-302. Forensic Rotation. Students rotate through the laboratories of the Chief Medical Examiner assisting in forensic autopsies. 3 credits. *Butts and staff*

The Physician Assistant Program

MASTER OF HEALTH SCIENCES CURRICULUM

Department of Community and Family Medicine

Chairman: James L. Michener, M.D.

Education Division

Division Chief: Justine Strand, M.P.H., P.A.-C.

Program Director: Reginald D. Carter, Ph.D., P.A.

Medical Director: Joyce A. Copeland, M.D.

Associate Program Director: Patricia M. Dieter, M.P.A., P.A.-C.

Director of Preclinical Education: J. Victoria Scott, M.H.S., P.A.-C.

Director of Clinical Education: Philip A. Price, M.H.S., P.A.-C.

Director of Recruitment and Minority Affairs: Lovest Alexander, M.H.S., P.A.-C.

Surgical Coordinator: Paul C. Hendrix, M.H.S., P.A.C.

Clinical Laboratory Coordinator: Margaret Schmidt, Ed.D., M.T. (A.S.C.P.)

Clinical Medicine Coordinator: John C. Lord, B.H.S., P.A.-C.

S.E. AHEC Clinical Coordinator: Gloria J. Jordan, M.H.S., P.A.-C.

Emergency Department Coordinator: Robert Giggey, B.A., P.A.-C.

Instructor: Peggy R. Robinson, M.H.S., P.A.-C.

The physician assistant (P.A.) concept originated at Duke over three decades ago. Dr. Eugene A. Stead Jr., then chairman of the Department of Medicine, believed that midlevel practitioners could increase consumer access to health services by extending the time and skills of the physician. Today, physician assistants are well-recognized and highly sought-after members of the health care team who, working interdependently with physicians, provide diagnostic and therapeutic patient care in virtually all medical specialties and settings. They take patient histories, perform physical examinations, order laboratory and diagnostic studies, and develop patient treatment plans. In forty-two states, including North Carolina, P.A.s have the authority to write prescriptions. Their job descriptions are as diverse as those of their supervising physicians, and also may include patient education, medical education, health administration, and research.

The role of the graduate P.A. has evolved substantially over the past thirty years. While the majority of P.A.s in clinical practice continue to provide primary care services, the percentage serving in solo practice or private group settings has declined while the percentage practicing in institutional settings has risen. Today, over half of all graduate P.A.s are employed in large clinics, hospitals, and institutional settings. There are also more nonclinical positions developing for P.A.s; while these positions do not involve patient care, they depend on a strong clinical knowledge base (e.g., drug study coordinator, clinical services coordinator, etc.).

In recognition of the increased responsibilities and expanded roles of P.A.s, the increased number of applicants with college degrees, and the quality of the P.A. educational program, the university began offering the Master of Health Sciences

(M.H.S.) degree to graduates in 1992. The M.H.S. curriculum is designed to provide P.A.s with a greater depth of knowledge in the basic medical sciences and clinical medicine, as well as skills in administration and research. With these expanded skills, graduates can take advantage of the wide diversity of positions available to P.A.s.

Program of Study. The curriculum is twenty-five consecutive months in duration and is designed to provide an understanding of the rationale for skills used in patient assessment, diagnosis, and management. The first twelve months of the program are devoted to preclinical studies in the basic medical and behavioral sciences, and the remaining thirteen months to clinical experiences in primary care, medical and surgical specialties, and research study. Laptop computers are leased to each student for both the first and second years. Computers are used for a variety of in-class and clinical assignments and activities, as well as for communications and Internet Services.

The preclinical curriculum is integrated in such a way as to introduce the student to medical sciences as they relate to specific organ systems and clinical problems. Learning strategies include the traditional lecture format and basic science laboratory, small group tutorials, and computer-assisted diagnostics using simulated patients. Regular patient contact is an important part of the first year curriculum. Students begin to see patients during the spring semester as part of the Patient Assessment course; this patient contact continues throughout the summer term of the first year.

As part of the clinical practicum, students are required to take rotations in inpatient medicine, surgery, emergency services, outpatient medicine, pediatrics, obstetrics/gynecology, and behavioral medicine. In addition, two elective clinical rotations are included in the clinical year schedule, as is a four-week period devoted to development of a written research protocol. At least one clinical rotation must be completed in a medically underserved site. The final four weeks of the clinical year are spent in a final preceptorship which often serves as a bridge to employment as a practicing P.A..

Because the clinical teaching is carried out in many practice settings throughout North Carolina, students should plan on being able to travel away from the Durham area for many of their clinical experiences.

Curriculum. Before proceeding into the clinical phase of the curriculum, students must satisfactorily complete the following:

Preclinical Year

Fall Semester

PAP-200. Basic Medical Sciences	5 credits
PAP-205. Anatomy	4 credits
PAP-210. Laboratory Medicine	4 credits
PAP-215. Physical Diagnosis	3 credits
PAP-220. Clinical Medicine I	4 credits
Total	20 credits

Spring Semester

PAP-211. Laboratory Medicine II	1 credit
PAP-221. Clinical Medicine II	9 credits
PAP-230. Fundamentals of Surgery	5 credits
PAP-235. Patient Assessment I	2 credits
PAP-240. Behavioral Aspects of Medicine	2 credits
Total	19 credits

Summer Term

PAP-222. Clinical Medicine III	7 credits
PAP-236. Patient Assessment II	1 credit

PAP-245. Perspectives on Health	2 credits
PAP-250. Health Systems Organization	2 credits
PAP-255. Introduction to Research and Epidemiologic Principles	3 credits
Total	15 credits

Clinical Year

Following successful completion of the preclinical courses, students enter the clinical phase of the program, completing the following experiences:

PAP-300. Outpatient Medicine	8 credits
PAP-305. Research Period	3 credits
PAP-310. Behavioral Medicine	4 credits
PAP-320. Inpatient Medicine	8 credits
PAP-340. General Surgery	4 credits
PAP-350. Emergency/Outpatient Surgery	4 credits
PAP-360. Pediatrics	4 credits
PAP-370. Obstetrics/Gynecology	4 credits
Elective	4 credits
Elective	4 credits
PAP-390. Preceptorship	4 credits
Total	51 credits

The student receives four credits for rotations which are four weeks in length, and eight credits for rotations which are eight weeks in length.

In addition to successful completion of the preclinical and clinical phases of the program, the P.A. student must also complete B.L.S., A.C.L.S., and the research period. The four-week research period is scheduled during the clinical year.

Program Policies and Grading Standards. Grades for all courses and clinical rotations within the Physician Assistant curriculum are assigned on the basis of the following: Honors (H), Pass (P), Low Pass (L), and Fail (F). The Physician Assistant Program is designed to integrate classroom and clinical learning experiences considered necessary for competency as health care providers. Therefore, the failure of any required course prevents a student from continuing in the program. Also, a student can receive no more than a total of three grades of "Low Pass" in the twenty-seven required courses during the clinical and preclinical phases of the program. Determination of satisfactory academic progress is made by the P.A. faculty at the conclusion of each semester/term.

A grade of "Incomplete" (I) may remain on a student's transcript for one year only. After one year, a grade of "Incomplete" automatically is converted to an F (Fail). An extension to this one year limit may be granted by the program director; a request must be submitted in writing to the program director no later than thirty days prior to the expiration of the one year time limit.

Students in the Physician Assistant Program are participants in a professional training program whose graduates assume positions of high responsibility as providers of health care. Accordingly, students are evaluated not only on their academic and clinical skills, but also on their interpersonal skills, reliability, appearance, and professional conduct. Deficiencies in any of these areas are brought to the student's attention in the form of a written evaluation and may result in probation, suspension, or expulsion from the program.

Satisfactory Academic Progress. Satisfactory academic progress for students in the Physician Assistant Program is construed as the successful completion of all requirements necessary for the advancement from one semester to the next. These requirements are as follows:

Preclinical Year: Completion of all required courses (a total of 54 credits) during the fall, spring, and summer terms within the scheduled semester or term and within one year of initial matriculation.

Clinical Year: Completion of all required core rotations, elective rotations, and a final preceptorship (a total of 51 credits) during the fall, spring, and summer terms; these rotations begin in the semester immediately following the completion of the preclinical year and must proceed as scheduled without interruption for three semesters/terms (thirteen and one-half months).

In unusual circumstances (including illness, academic remediation or irregular sequencing of courses) the determination of satisfactory progress for academic purposes is made by the program director of the Physician Assistant Program.

For financial aid purposes, federal regulations establish the maximum time frame for completion of the program at 150 percent of the minimum time required to complete the program. Any student exceeding the 150 percent maximum time frame is ineligible for Title IV (Stafford) student financial aid funds.

Attendance and Excused Absences. Students are expected to attend all lectures, laboratories, and seminars. Absences are excused only for illness or personal emergency, and students are expected to notify program faculty in advance of an expected absence.

Leave of Absence. A P.A. student, after presenting a written request to the P.A. program director, may be granted an official leave of absence for personal, medical, or academic reasons for a period not to exceed one calendar year. If the leave of absence is approved, the program director provides written notification including applicable beginning and ending dates to the student, the medical school registrar, and the director of financial aid. The student must apprise the program director in writing of his or her wish to return to the P.A. Program or to extend the personal leave at least sixty calendar days prior to the anticipated date of re-entry. The student desiring an extension beyond one calendar year may be required to apply for readmission to the P.A. Program. When a leave of absence is taken, the program director may require the student to repeat some or all of the courses completed prior to the leave of absence. In all cases of leave of absence, the student is required to complete the full curriculum to be eligible to earn the P.A. certificate.

For purposes of deferring repayment of student loans during a school approved leave of absence, federal regulations limit the leave to six months.

Prerequisites for Admission. The prerequisites for admission to the M.H.S. physician assistant curriculum include:

1. A baccalaureate degree from an accredited institution. College seniors are eligible to apply, provided they receive the baccalaureate degree prior to the August starting date for the P.A. Program. Those candidates who received their baccalaureate degrees from colleges and institutions outside of the United States must complete at least one year (30 semester credits) of additional undergraduate or graduate study at a U.S. college or university prior to application to the program.
2. At least 11 semester credits in the biological sciences, including at least 3 credits each in anatomy and physiology. Courses in human anatomy and human physiology are recommended. At least 8 semester credits in chemistry are also required. These courses must be completed with grades of "C" or better (not C minus). Courses in microbiology and statistics are recommended, and preference is given to candidates who have completed these courses. Applicants from all academic disciplines are welcome, provided they meet the preparatory science course prerequisites.
3. Scores of the Graduate Record Examination (G.R.E. general test), taken within the last four years. No other test scores are accepted in lieu of the G.R.E.
4. A minimum of six months (1,000 hours) of patient care experience, with direct "hands-on" patient contact.

Application Procedures. Application materials are mailed to prospective applicants from June 1 through October 18 each year, and may be obtained by writing to: Admissions Coordinator, Physician Assistant Program, Box 3848 DUMC, Duke University Medical Center, Durham, NC 27710, telephone: (919) 681-3155. Applications are accepted by the university no earlier than July 1 and no later than November 1 for the new class which enters in August each year. Applications must contain:

1. A completed official application (diskette or paper), including a nonrefundable application fee of \$40 (applications postmarked by November 1) or \$60 (applications postmarked November 2 - December 1);
2. Official transcripts from all colleges/universities and other postsecondary institutions attended;
3. Scores of the Graduate Record Examination (G.R.E.). Applicants should take the G.R.E. well in advance of the application deadline, so that scores are available for reporting by the application deadline;
4. Three letters of recommendation, including one from a health care provider with whom the applicant has worked.

Selection Factors. The program has a specific interest in enrolling students from diverse social, ethnic, and educational backgrounds. Emphasis is placed upon personal maturity, quality of health care experience, dedication to the health field, and academic potential. Information submitted by each applicant is carefully reviewed by the Committee on Admissions and selected applicants are invited to Duke University for personal interviews. These interviews take place in January and February; forty-four students are chosen from among those interviewed. Only full-time students are admitted.

Candidates are notified of the admissions committee's decision as soon as possible after the interview, and no later than April 1. Those candidates who have been accepted are asked to respond in writing with their decision and to confirm their place in the class by submitting the nonrefundable registration and deposit fees by May 1. Each year, a ranked alternate list of 10-15 candidates is selected from those candidates who have been interviewed for a position in the class. Should an accepted candidate withdraw from the program prior to the start of classes, the position is offered to the highest ranked candidate on the alternate list.

Tuition and Fees.¹ On notification of acceptance, prospective P.A. students are required to pay a nonrefundable first registration fee of \$55, as well as a nonrefundable program deposit of \$275. For those who do matriculate, the program deposit is applied to the cost of tuition.

Estimated expenses for the 1999 entering class of the Master of Health Sciences Physician Assistant Program are:

Tuition	\$390/credit (average annual tuition \$20,475 per year)
Books, uniforms, and instruments	1,342
Laptop computer rental fee	1,620
Food	3,814
First Year Fee (laboratory, etc.)	800
Lodging	4,797
Student Health Fee	645
Student Accident and Hospitalization Insurance	685 per year-single 2,163 per year-family
Miscellaneous (travel, clothing, etc.)	4,110

1. These are estimated figures only. Tuition and fees are subject to change without notice.

Health Insurance. All students are required to carry adequate health insurance throughout their enrollment in the P.A. program. If the student does not elect to take the Duke Student Accident and Hospitalization Insurance policy, evidence of other comparable health insurance coverage must be provided. The Student Health Fee is mandatory for all students.

Financial Aid. Qualified students may be eligible for Stafford Loans up to \$8,500, and up to \$18,200 in Perkins/P.A. Tuition Loans. Physician Assistant students may be eligible for up to \$10,000 in unsubsidized federal Stafford Student Loans. The North Carolina Student Loan Program for Health, Science, and Mathematics provides financial assistance in the form of loans up to \$6,500 per year for North Carolina residents; these loans may be cancelled through approved service in shortage areas, public institutions, or private practice. Applicants may call 919-571-4182 for further information about this loan program. Limited scholarship funds are also available. All financial aid awards are made on the basis of documented financial need. Financial aid application packets are distributed on the admissions interview date.

The U.S. Public Health Service has several programs which offer scholarships, stipends, and loan repayment to P.A. students who commit to varying periods of employment within U.S.P.H.S. facilities. Interested applicants can call the National Health Service Program directly at 1-800-221-9393 for further information.

Applicants are encouraged to request information and application forms from clubs, organizations, foundations, and agencies as soon as possible after applying for admission to the program. Many libraries have information on sources of financial aid. Also, the financial aid offices at nearby colleges and universities often have information on sources of funding.

Some first year students are employed part-time; however, the rigor of the academic curriculum may prevent the student from maintaining part-time employment. **Because of the demands of the clinical year, it is difficult or impossible for the second-year student to work.**

More detailed information regarding financial aid can be obtained from the Office of Financial Aid, Box 3067, Duke University Medical Center, Durham, NC 27710.

Commencement. To receive the M.H.S. degree at the May commencement ceremony, the physician assistant student must successfully complete 89 credits including all preclinical courses, the research period, and all clinical rotations scheduled to that date. The P.A. program certificate of completion is awarded four months later in early September, following the student's completion of a total of 105 credits, the remaining clinical rotations, and the final preceptorship.

P.A. students should be aware that failure to begin or complete a clinical rotation as scheduled could delay receipt of both the M.H.S. degree and the P.A. program's certificate of completion. Furthermore, any incomplete rotations must be completed prior to receiving the P.A. Program certificate.

Courses of Instruction

Course credits are the recognized units for academic work in the P.A. Program. All courses are required and no transfer credit is accepted.

Preclinical Year Courses

PAP-200. Basic Medical Sciences. The basic facts, concepts, and principles that are essential in understanding the fundamental mechanisms of human physiology, pathology, pharmacology, and nutrition. This course presents the basic methods of clinical problem solving and serves as a prerequisite to the clinical medicine course by emphasizing the underlying principles of the etiology, management, and prevention of disease processes. 5 credits. *Carter*

PAP-205. Anatomy. Functional and applied anatomy stressing normal surface landmarks and common clinical findings. Topics for this course are sequenced with physical diagnosis (PAP-215). Cadaver prosections, anatomic models, lectures, and computer software are utilized in teaching this course. 4 credits. *Hendrix*

PAP-210, 211. Laboratory Medicine I, II. An introduction to the performance and interpretation of routine hematologic, urinary, microbiologic, and other laboratory procedures commonly used in practice. This course is taught by faculty/staff from the Department of Pathology and the hospital laboratories. 5 credits. *Schmidt*

PAP-215. Physical Diagnosis. An introduction to the techniques for performing and recording the physical examination. Taught in small-group format; lectures and audiovisuals are used, as well as extensive small group practice sessions. The final weeks of this course focus on orthopaedic physical diagnosis and common orthopedic problems. 3 credits. *Price*

PAP-220, 221, 222. Clinical Medicine I, II, III. The essentials of diagnosis and management of the most common clinical problems seen by primary care practitioners. Using an organ systems approach, clinical information is presented in conjunction with appropriate correlative lectures and labs in pathophysiology, pharmacotherapeutics, radiology, and nutrition. Patient simulations are used in the small group setting to enhance readings and lectures. This is a core course around which most other courses are organized. 20 credits. *Lord and Scott*

PAP-230. Fundamentals of Surgery. The basic surgical concepts needed for the P.A. to function in primary care settings as well as major surgical areas. The course emphasizes surgical technique and emergency procedures as well as asepsis, minor procedures, and anesthesia. The animal surgery laboratory is an essential component of this course. 5 credits. *Hendrix*

PAP-235, 236. Patient Assessment I, II. An introduction to medical interviewing and the recording and presentation of clinical information. Teaching methods include lectures, small groups, and clinical assignments to inpatient areas as well as outpatient settings. In January and February, students concentrate primarily on history-taking, and are assigned by their small-group instructors to interview patients on the wards. From March through May, students are assigned in small groups to fellows from the Department of Medicine. Weekly, each student is assigned to a hospitalized patient to perform a complete history and physical examination. 3 credits. *Dieter*

PAP-240. Behavioral Aspects of Medicine. An introduction to the skills, knowledge, and sensitivity needed to communicate and intervene effectively in a wide variety of psychosocial situations. 2 credits. *Proffitt*

PAP-245. Perspectives on Health. A professional issues review. This course emphasizes current issues facing the profession, including legal and ethical problems and the unique place of PAs within the health care system. 2 credits. *Scott*

PAP-250. Health Systems Organization. An introduction to the structure and administrative principles in use in health care organizations. A lecture series taught by an interdisciplinary faculty and by community experts in health care organization. Topics include the patient as consumer, third-party payment, public policy trends, and organizational behavior. 2 credits. *Strand and Carter*

PAP-255. Introduction to Research and Epidemiologic Principles. Foundations of research methodology related to the study of disease distribution and issues in study design, data collection, and methods of analysis. The P.A. student develops a critical review of the literature pertaining to an assigned clinical research question. 3 credits. *Yankaskas*

Clinical Year Courses

COMMUNITY AND FAMILY MEDICINE

PAP-300. Outpatient Medicine. This eight-week rotation emphasizes the outpatient evaluation and treatment of conditions common at the community and family medicine level, and the appropriate health maintenance measures for different age groups. An alternative track in outpatient medicine is also available for those students who have a specific interest in interdisciplinary training. 8 credits. *Staff*

PAP-305. Research Period. During a four-week research period in the clinical year, the student attends weekly seminars and develops a written research protocol. This course is a practical application of principles learned in PAP-255. 3 credits. *Yankaskas*

PAP-310. Behavioral Medicine. The student is assigned to a psychiatric and/or behavioral clinical setting, either inpatient or outpatient. This rotation facilitates the acquisition of communication and behavioral modification skills which is useful in the primary care setting. 4 credits. *Staff*

MEDICINE

PAP-320. Inpatient Medicine. During this eight-week rotation, the student learns to apply basic medical knowledge to the problems and situations encountered on an inpatient service. By collecting a data base, formulating a complete problem list, and participating in daily rounds and in the management of patient problems, the student develops an awareness of the complexity of disease processes and differential diagnosis. 8 credits. *Staff*

OBSTETRICS/GYNECOLOGY

PAP-370. Obstetrics/Gynecology. The student learns about common gynecological problems, pregnancy, and delivery. Assisting at the operating table may be a significant aspect of the rotation. The rotation emphasizes clinical experience with cancer detection techniques, abnormal menstruation and bleeding, infections, and contraception counseling. 4 credits. *Staff*

PEDIATRICS

PAP-360. Pediatrics. In this rotation, the student is assigned to either an institutional setting or a community-based pediatric site. Special emphasis is placed on communication skills and relating sensitively to both children and parents. The student gains familiarity with normal growth and development, pediatric preventive medicine, and evaluation and management of common childhood illnesses. 4 credits. *Staff*

SURGERY

PAP-340. General Surgery. This rotation emphasizes preoperative evaluation and preparatory procedures, assisting at the operating table, and management of patients through the postoperative period to discharge. 4 or 8 credits (4 or 8 weeks). *Staff*

PAP-350. Emergency/Outpatient Surgery. This rotation stresses the evaluation and management of surgical problems of the ambulatory patient. In the emergency room, the student gains experience in the initial evaluation of potential surgical conditions and performing problem-specific examinations. Orthopedic evaluation and minor surgical technique are emphasized. There is also the opportunity to follow up patients on return visits. 4 credits. *Giggey*

In addition to the above required core rotations, each student is required to complete two electives that can be chosen from among the following rotations. All are four weeks long.

COMMUNITY AND FAMILY MEDICINE

PAP-301. Occupational Medicine

PAP-302. Geriatrics

MEDICINE

- PAP-321. Cardiology
- PAP-322. Dermatology
- PAP-323. Endocrinology
- PAP-324. Emergency Medicine
- PAP-325. Hematology/Oncology
- PAP-326. Hyperbaric Medicine
- PAP-327. Infectious Diseases
- PAP-331. Nephrology
- PAP-332. Neurology
- PAP-333. Pulmonary Medicine
- PAP-334. Rheumatology
- PAP-335. AIDS Clinical Trials Unit
- PAP-336. Medical ICU
- PAP-337. Coronary Care Unit

OPHTHALMOLOGY

- PAP-381. Ophthalmology

PEDIATRICS

- PAP-361. Pediatric Cardiology
- PAP-362. Pediatric Surgery/Cardiothoracic Surgery
- PAP-363. Pediatric Hematology/Oncology
- PAP-364. Pediatric Allergy/Respiratory
- PAP-365. Pediatric Endocrinology
- PAP-366. Pediatric Infectious Disease
- PAP-367. Intensive Care Nursery

SURGERY

- PAP-341. Cardiothoracic Surgery
- PAP-342. Otolaryngology
- PAP-343. Neurosurgery
- PAP-344. Orthopedics
- PAP-345. Plastic Surgery
- PAP-346. Sports Medicine
- PAP-347. Urology
- PAP-351. Emergency Medicine
- PAP-352. Trauma
- PAP-353. Adult Surgical ICU

Each of these electives is 4 credits. More detailed information on elective and required rotations may be obtained from the director of Clinical Education of the Physician Assistant Program.

The final rotation in the P.A. program, immediately prior to receiving the program certificate of completion in September, is the preceptorship (PAP-390, 4 credits). This required rotation must be completed by all students. Students are encouraged to select a preceptor in the area of their anticipated employment and, during this period of time, to explore the tasks and team aspects of functioning as a mid-level practitioner.

Duke/ECU Master of Health Science Option Program

In May, 1997 an affiliation agreement was established between the Duke University Medical Center and East Carolina University (ECU) School of Allied Health Sciences to offer qualified students enrolled in the Physician Assistant Program of ECU the opportunity to earn the Master of Health Science Degree from Duke University. ECU students enrolled in this optional program must meet all academic and experimental pre-requisites established for the ECU P.A. Program and possess a baccalaureate degree

from an accredited institution at the time of their matriculation at ECU. Other eligibility criteria also apply for entrance to this optional program. In addition to ECU program requirements, the successful completion of three courses at Duke is required to earn the MHS degree. These are PAP 250, PAP 255, and PAP 305 described elsewhere in this Bulletin. Financial Aid is available for the Option Program students. Option students must meet all continuation requirements and remain in good academic standing at ECU throughout the program. For further information about this degree option program, contact the MHS Option Program, Division of Physician Assistant Education, Department of Community and Family Medicine, Box 3848, Duke University Medical Center, Durham, NC 27710, 919-684-3872.



Certificate Programs

Duke University Medical Center has responded to the increased need for qualified individuals at all levels in the health care system by developing educational programs designed to equip people for a variety of positions. These programs, which vary in admission requirements and length of training, offer students both clinical and didactic experience. Graduates of these programs are awarded certificates.

Clinical Psychology Internship

Director of Clinical Training: Karen C. Wells, Ph.D.

The Division of Medical Psychology, Department of Psychiatry, Duke University Medical Center, offers internship training in clinical psychology to students who are currently enrolled in A.P.A.-approved Ph.D. programs in clinical psychology and who have already completed three years of graduate study. The program, approved by the American Psychological Association, provides experience in many contexts with a wide diversity of patients. Internship training provides experience in the traditional activities of clinical psychologists: assessment, consultation, treatment, and research.

Those successfully completing the requirements for the internship are awarded a Duke University Medical Center certificate. Requests for additional information and correspondence concerning admission to the program should be directed to the Director, Clinical Psychology Internship Program, Box 3362, Duke University Medical Center, Durham, North Carolina 27710.

Ophthalmic Medical Technician

Medical Director: W. Banks Anderson, M.D.

Program Director: Judy H. Seaber, Ph.D.

Clinical Coordinator: Lois Duncan, C.O., C.O.M.T.

The Ophthalmic Medical Technician program is sponsored by the Department of Ophthalmology, Duke University Medical Center. This is a one-year certificate program designed to prepare the student to perform adequately as an ophthalmic medical technician. The program consists of didactic lectures designed to provide the basic clinical background necessary for the student to understand and perform the technical tasks designated to them by an ophthalmologist. The educational program begins July 1, and consists of fifty-two instructional weeks including twelve days of personal leave. The core curriculum is covered within the first three months supplemented by clinical experience under close supervision of clinical support staff and faculty. The following nine months consist of clinical rotations with the student working under the close supervision of qualified clinical support staff and faculty. Students are evaluated on a routine basis as their skills develop.

Upon satisfactory completion of the curriculum, students receive a certificate from Duke University Medical Center and are eligible to sit for the national certification examination offered by the Joint Commission of Allied Health Personnel in Ophthalmology at the level of ophthalmic medical technician.

Prerequisites for Admission. Applicants to the program must have two years of college or the equivalent. Priority is given to students with a college degree or extensive work experience in some field of ophthalmology.

Application Procedures. Applications are reviewed between January 1 and May 1 of the year for which admission is requested and must contain the following:

1. The completed Duke University Medical Center Allied Health application form, including a nonrefundable processing fee;
2. Official transcript(s) from all colleges and universities attended;
3. Three letters of recommendation; and
4. A personal interview with members of the admissions committee may be requested following receipt of the application and other information.

The deadline for applications is May 1 of the year for which admission is requested. It is strongly recommended that applications be submitted as early as possible. Applicants are notified no later than June 1 regarding admission to the program. Requests for further information and application forms should be directed to the Program Director, Judy H. Seaber, Ph.D., Box 3802, Duke University Eye Center, Durham, North Carolina 27710.

Fees and Expenses. Tuition for the program is \$2,800. The student is responsible for housing, board, books, the student health fee, and medical insurance. Fifty percent of the tuition is due at matriculation with the balance being due in January.

Transportation Required. It may be necessary for students to rotate at clinical sites other than at Duke University Medical Center and transportation may be necessary. It is the responsibility of the student to provide a means of transportation to and from the facility selected for learning experiences.

Financial Aid. Please refer to the section on student aid in the chapter, The Allied Health Programs.

Courses of Instruction. Students must satisfactorily complete the following courses. The curriculum includes but is not limited to the following:

COURSE TITLE	CLOCK HOURS
Orientation Lectures	50
Basic Science Lecture	125
Visual Acuity Assessment	10
Physiology and Anatomy of the Eye	15
Physical History	24
Cardiopulmonary Resuscitation	8
Instrument Maintenance	5
Visual Fields	24
Optics and Refractometry	40
Medical Terminology	12
Spectacles	10
Pharmacology	5
Glaucoma and Tonometry	15
External Ocular Diseases	8
Physiology of Systemic Diseases	12
Contact Lens and Keratometry	14
Ocular Motility	15
Neuro-Ophthalmology	5
General Psychology	5
Clinical Rotations	1172
Total	1574

Pastoral Care and Counseling

Associates in Instruction: Claude V. Deal, M.Div.; M. Susan Nance, Th.M.; James A. Rawlings, Jr., Th.M.; James L. Travis, Ph.D.

A graduate program in pastoral care and counseling is available to clergy, theological students, members of religious orders, and lay persons of all religious faith groups. There are five distinct program structures of Clinical Pastoral Education offered at Duke University Medical Center. All programs are designed to train individuals who desire to specialize in pastoral care, to enhance their skills as parish clergy, or to broaden their understanding of ministry. With the exception of the Parish-Based Extended Basic C.P.E. Program, all who enroll in any of the programs of Clinical Pastoral Education are required to serve as chaplains in the Medical Center. All programs are accredited by the Association for Clinical Pastoral Education, Inc.

Programs of Study. One unit of Clinical Pastoral Education is offered in three forms: summer full-time C.P.E. (June-August), hospital-based extended C.P.E., and parish-based extended C.P.E. The extended units are offered concurrently with the fall and spring semesters of Duke Divinity School. The year-long residency program (June-May) earns four progressing units of C.P.E. Supervisory C.P.E. is designed for those seeking to be certified as a clinical pastoral education supervisor and is offered as available.

Requests for application and further information about any of the programs should be directed to the Director, Pastoral Services, Box 3112, Duke University Medical Center, Durham, North Carolina 27710. Admission procedures to each program include:

1. Completion and submission of written application materials;
2. An admission interview by a qualified interviewer;
3. Acceptance by the Duke University Medical Center C.P.E. Center.
In addition to the above admission procedures, requirements for admission to specific C.P.E. programs include:
 1. Completion of a consultation process between a Duke University Medical Center C.P.E. supervisor and a church board (Parish-Based Extended C.P.E.);
 2. Graduation from college and seminary (equivalences may be considered); and adequate ministry formation/development and experience in ministry which indicates readiness for this program (Residency C.P.E. Program);
 3. A personal interview with Duke University Medical Center faculty (Residency and Supervisory C.P.E.);
 4. Ecclesiastical endorsement; pastoral experience of usually not less than three years; completion of program objectives of A.C.P.E.; residency and consultation by the appropriate committee in the region with respect to his/her readiness to pursue supervisory training (Supervisory);
 5. Submission of previous basic C.P.E. unit(s) final evaluation by student and supervisor(s) (Residency and Supervisory C.P.E.).

Salary and Fees. Stipends are available for students in the Residency Program and the Supervisory C.P.E. Program. For 1999-2000, the salary for the Residency Program is \$21,000. For the Supervisory C.P.E. Program the salary is \$22,000. There is no salary available for summer full-time and extended C.P.E. units. Salaried students are eligible for the same benefit package as Duke University employees of comparable levels.

Tuition is \$425 per unit when enrolled through the Allied Health Division of Duke University Medical Center (\$325 for two or more consecutive units), and \$2,550 per unit when enrolled through Duke University Divinity School for academic credit. (A unit of C.P.E. equals two academic courses.)

Fees include the following:

1. An application fee of \$30 must accompany an Allied Health form unless applying with intention of enrolling through Duke University Divinity School;
2. \$40 for admission interviews when requested;
3. \$100 tuition deposit for those accepted into the year-long Residency Program;
4. \$50 tuition deposit for students accepted into the summer full-time and extended C.P.E. programs;
5. \$55 per unit for mid-Atlantic region fee.

Residency in Pharmacy Practice

Director, Pharmacy Practice Residency: D. Byron May, Pharm.D., B.C.P.S.
Director of Pharmacy Services: Steven C. Dedrick, M.S.

The Pharmacy Practice Residency is a twelve-month postgraduate program conducted by the Department of Pharmacy at the Duke University Medical Center. The residency is designed to give the graduate pharmacist extensive training in pharmacy practice.

Admission Standards. Applicants must be graduates of accredited schools of pharmacy and must have a Doctor of Pharmacy (Pharm.D.) degree. Residency candidates must demonstrate superior academic and leadership capabilities and be eligible for licensure in North Carolina. It is preferable that the applicant have previous hospital experience.

Application Procedures. Applications must be submitted by early January of the year for which admission is requested and include the following:

1. A.S.H.P./National Matching Services resident matching program application code number;
2. Official transcript from pharmacy school and other professional programs attended;
3. Completed residency application forms; and
4. Letters of recommendation from a minimum of four persons who have known the applicant professionally at least two of which should be from clinical preceptors.

Applicants are notified in April regarding admission to the program. Requests for further information and application forms should be directed to D. Byron May, Pharm.D., B.C.P.S., Director for Residency Training, Box 3089, Duke University Medical Center, Durham, North Carolina 27710. E-mail: byron.may@duke.edu or visit our website at: <http://pharmacy.mc.duke.edu>.

Stipend. A stipend of \$32,400 is granted for the twelve-month residency.

School of Nursing



The Duke University School of Nursing

The Duke University School of Nursing provides leadership in the health care of people through education, research, and health care delivery. We provide advanced and comprehensive education to prepare students for lifetimes of learning and careers as leaders, practitioners, or as researchers. In addition, faculty and students conduct research that adds to our understanding of health promotion and illness prevention, human responses to illness, and systems of care that facilitate better patient outcomes; and through their practice faculty and students provide compassionate, research-based nursing care. Through such work, Duke faculty, students, and graduates are shaping the future of professional nursing practice.

Programs

THE MASTER OF SCIENCE IN NURSING PROGRAM

The School of Nursing offers a flexible, 39 to 45 credit program leading to the Master of Science in Nursing degree. The school offers, in conjunction with the Fuqua School of Business, a joint M.S.N./M.B.A. degree. Graduates are prepared as clinical nurse specialists in gerontology, oncology, pediatrics, or neonatal care; as adult nurse practitioners (with specialization in primary care, cardiovascular care, or oncology/HIV), as gerontological nurse practitioners, family nurse practitioners, acute care nurse practitioners, neonatal nurse practitioners ERS, pediatric acute care nurse practitioners, or pediatric nurse practitioners; and as nurse administrators. Students pursue their educational endeavors with faculty and clinical/consulting associates who have expertise and research in the student's chosen area of specialization. The curriculum is designed to provide maximum flexibility for full-time or part-time study.

The integration of education, practice, and research undergirds the entire curriculum and the behavior of those individuals involved in the educative process. Upon completion of the program, the graduate is able to:

1. synthesize concepts and theories from nursing and related disciplines to form the basis for advanced practice,
2. demonstrate expertise in a defined area of advanced practice,
3. utilize the process of scientific inquiry to validate and refine knowledge relevant to nursing,
4. demonstrate leadership and management strategies for advanced practice,
5. demonstrate proficiency in the use and management of advanced technology related to patient care and support systems,
6. analyze socio-cultural, ethical, economic, and political issues that influence patient outcomes, and
7. demonstrate the ability to engage in collegial intra- and inter-disciplinary relationships in the conduct of advanced practice.

A student may choose to major in one of the following areas: (1) health systems leadership and outcomes (with the option of an informatics focus); (2) adult nurse

practitioner (with primary care, acute care, cardiology, or oncology/HIV focus); (3) family nurse practitioner; (4) oncology/HIV (clinical nurse specialist); (5) gerontology (nurse practitioner or clinical nurse specialist); (6) pediatrics (nurse practitioner or clinical nurse specialist); and (7) pediatric acute care nurse practitioner.

THE POST-MASTER'S CERTIFICATE PROGRAM

The School of Nursing offers a post-master's certificate to students who already have an earned M.S.N. from a National League for Nursing accredited program and are seeking specialized knowledge within a major offered in the school's master's program. The number of credits required to complete the certificate program varies by major; the student must successfully complete the required courses in the chosen nursing major. Completion of the certificate program is documented in the student's academic transcript. Depending upon the major, the student may then meet the qualifications for advanced practice certification in the specialty area. For example, students who complete the post-master's certificate in the nurse practitioner majors are eligible to sit for certification examinations.

Admission and Progression

ADMISSION REQUIREMENTS FOR THE MASTER'S DEGREE

1. Bachelor's degree with an upper division nursing major from a program accredited by the National League for Nursing. The bachelor's or post-bachelor's course work must include satisfactory completion of a course in descriptive and inferential statistics.
 2. It is recommended that applicants have a minimum of one year of nursing experience before matriculation. Students for whom an exception is made will be advised to take core courses in the first year of study and to work to meet the experience requirement.
 3. Undergraduate grade point average of 3.0 on a 4.0 scale.
 4. Satisfactory performance on the Graduate Record Examination (G.R.E.) or Miller Analogies Test (M.A.T.).
 5. Eligibility to be licensed as a professional nurse in North Carolina.*
 6. Documentation of the acquisition of physical assessment knowledge and skills, for those applicants choosing a clinical specialty.
 7. Three references attesting to personal and professional qualifications. At least two references must be from former employers, faculty members, or deans.
 8. Personal interview. Other arrangements may be considered when distance is a factor.
 9. Basic computer skills are required prior to matriculation.
- Selection will be based on the applicant's qualifications, intellectual curiosity, potential for professional growth, and contributions to the profession. Exception to any of the admission requirements will be considered on an individual basis.

*Candidates for admission to the Duke University School of Nursing must obtain a license to practice in the state of North Carolina before matriculation. Offers of admission to the School of Nursing cannot be considered final until matriculants present proof of licensure to the Office of Admissions no later than the end of the first day of class during the semester of matriculation. Students enrolled in the Graduate School of Nursing must maintain a current North Carolina license and are required to show proof of licensure, or status of renewal of license, to the Student Services Office on a yearly basis (January). Information on licensure procedures for the state of North Carolina may be obtained from the North Carolina Board of Nursing, P. O. Box 2129, Raleigh, North Carolina 27602, or by calling 919-782-3211 or 919-733-5356.

ADMISSION REQUIREMENTS FOR THE POST-MASTER'S CERTIFICATE OPTION

1. A master's degree from an N.L.N. accredited school of nursing.
2. Completion of application for certificate program including undergraduate and graduate transcripts. The bachelor's or post-bachelor's course work must include satisfactory completion of a course in descriptive and inferential statistics.
3. Minimum of one year's experience in nursing.
4. Licensure or eligibility for licensure as a registered nurse in North Carolina.
5. Documentation of the acquisition of physical assessment knowledge and skills, for those applicants choosing a clinical specialty.
6. Two letters of academic and/or professional reference.
7. Interview with a faculty member in the specialty area.

HEALTH AND IMMUNIZATION RECORD

North Carolina law requires all new students to present proof of certain immunizations before matriculation. The Duke University Student Health Immunization Form and Report of Medical History, furnished by Duke University, should be completed and returned to the Director of Student Health Services, Box 2899 DUMC, Duke University, Durham, North Carolina 27710 (919-684-3367).

It is preferable for students to arrive on campus with complete, verified immunization forms. For those who are unable to do so, the Durham County Health Department (560-7600) on Main Street provides some of the necessary inoculations free of charge. On-campus inoculations are available through Student Health Services (684-3367). A special immunization clinic is held during the days when new students arrive on campus, with a nominal charge for on-campus immunizations.

ADDITIONAL ADMISSION REQUIREMENTS FOR INTERNATIONAL APPLICANTS

International students provide a unique cultural and personal addition to Duke. They are encouraged to apply early in the academic year prior to the year they wish to attend Duke to ensure time to complete the following additional requirements:

1. evidence of adequate financial support for the duration of the program;
2. a minimum score of 550 on the Test of English as a Foreign Language (T.O.E.F.L.) if English is not the primary language;
3. a passing score on the Commission on Graduates of Foreign Nursing Schools (C.G.F.N.S.) examination.

The Commission on Graduates of Foreign Nursing Schools (C.G.F.N.S.) examination is a prerequisite for taking the Registered Nurse Licensing examination in the state of North Carolina and for obtaining a nonimmigrant occupational preference visa (H1-A) from the United States Immigration and Naturalization Service. C.G.F.N.S. offers a two-part certification program that includes a credentials review, followed by a test of nursing and English language skills. The C.G.F.N.S. examination is given in March, August, and November. Application materials may be requested from C.G.F.N.S., 3624 Market Street, Philadelphia, Pennsylvania 19014 (215-349-8767). The registration deadlines for these exams are approximately four months prior to their administration. Early application is therefore essential. For further information, contact the School of Nursing Office of Admissions.

ADMISSION PROCEDURE

An applicant to the Duke University School of Nursing Graduate Program must

obtain an application form from the School of Nursing Office of Admissions. A check or money order for the nonrefundable processing fee of \$50 must accompany each application. In addition, the applicant should provide the following supporting documents:

1. two copies of the official transcript from each college or university attended, to be sent directly to the School of Nursing Office of Admissions;
2. two supplementary transcripts showing completion of work that was in progress when the earlier transcripts were obtained, if necessary;
3. three letters of recommendation (on forms provided by the School of Nursing) by persons qualified to judge the applicant as a prospective graduate student, to be mailed directly to the Office of Admissions (at least two must be from current or former employers, faculty members, or deans); and,
4. for master's degree applicants, scores from the Graduate Record Examination (G.R.E.) or Miller Analogies Test (M.A.T.) that are not more than five years old.

Testing dates and locations for the Graduate Record Examination can be obtained from most colleges or from the Educational Testing Service, P. O. Box 6000, Princeton, New Jersey 08541-6000 (609-771-7670 or 510-654-1200). Information for the Miller Analogies Test can be obtained from The Psychological Corporation, 555 Academic Court, San Antonio, Texas 78204-3956 (210-921-8801 or 800-622-3231). Information also may be obtained from Duke University's Office of Counseling and Psychological Services (C.A.P.S.) (919-660-1020). The number to use on the G.R.E. to indicate that you want a copy of your scores sent to the School of Nursing is R5173. The number to use on the M.A.T. is 2734.

Once all of the above information is received by the Office of Admissions, a faculty member will contact the applicant and arrange a personal interview.

CONSIDERATION OF APPLICATION

The application will be considered when all forms have been received by the School of Nursing Office of Admissions. Complete applications to the Duke University School of Nursing Graduate Program must be submitted by the following dates:

- April 1 (fall and summer semesters);
- October 1 (spring semester).

It is the responsibility of the applicant to ensure that the School of Nursing Office of Admissions receives all required materials before the deadline.

Notification of Status. Admission may be approved, deferred, or rejected. If admission is approved, the applicant will receive a letter of admission and acceptance forms. The process of admission is not complete until the acceptance forms and nonrefundable tuition deposit of \$100 have been received by the School of Nursing Office of Admissions. This fee will be credited toward tuition or forfeited if the student decides not to matriculate. Applicants whose admission is deferred or rejected will be notified by letter. Applicants who wish to be considered for financial assistance are highly encouraged to complete and submit a Free Application for Federal Student Aid as soon as possible before applying for admission.

FULL-TIME AND PART-TIME DEGREE STATUS

Opportunities for part-time and full-time study are available. Full-time status is defined as taking a minimum of nine (9) credits or three (3) courses per semester, except when fewer credits are needed to complete program requirements. Students who wish to change from full-time or part-time status must notify both their academic advisor and the Student Services Office.

NONDEGREE STUDENTS

Individuals may take graduate level courses as a nondegree student, provided they have a bachelor of science in nursing degree from a National League for Nursing accredited school. Nondegree students are admitted to individual classes by permission of the instructor on a space available basis. To apply, an official copy of all undergraduate nursing transcripts must be sent to the School of Nursing Office of Admissions along with a completed Application for Admission as a nondegree student and a \$50 application fee. Students who register for clinical courses also must submit two letters of reference from their employer and evidence of licensure as a nurse in the state of North Carolina.

All nondegree application requirements must be received by the deadline for the semester during which the course will be offered (cf. "Consideration of Application" in this book). Requests for nondegree status will be considered within two weeks after the appropriate deadline. If permission is granted by the faculty, the student will be notified by the Office of Admissions. (Nondegree students requesting a second course make the request to the School of Nursing Office of Admissions.) Credits earned as a nondegree student are accepted for credit towards the M.S.N. degree if the applicant is later admitted to the master's program.

TRANSFER OF GRADUATE CREDITS

A maximum of six units of graduate credit may be transferred for graduate courses completed at other accredited institutions (or in other graduate programs at Duke). Transfer credit will be given only for academic work completed within five years before matriculation at Duke. Such units are transferable only if the student has received a grade of B (3.0 or its equivalent) and after the student has earned a minimum of 6 units of graduate credit at Duke University School of Nursing. A student wishing to transfer course work should make a written request, and provide a syllabus or some other description of the course to his/her academic advisor.

TRANSFER TO ANOTHER GRADUATE NURSING MAJOR

A change of graduate nursing major may be made, contingent upon approval of the faculty involved. Should a change be made, a student must meet all requirements of the new major.

TIME FOR COMPLETION OF THE MASTER'S DEGREE

The master's degree student should complete all requirements for the degree within five calendar years from the date of initial matriculation. No full-time residence is required; however, all students enrolled in the school who have not been granted a leave of absence by the dean must register each fall, spring, and summer until all degree requirements are completed.

ADVISEMENT

An interim academic advisor for each student is assigned on admission to the program. After consultation with the interim and proposed advisors, students select their permanent advisor according to their clinical and research interests. This advisor assists the student in planning and implementing his/her course of study throughout the master's program.

GRADES

All courses counting toward the master's degree must be taken for the following grades: A (4.0); A- (3.7); B+ (3.3); B (3.0); B- (2.7) C+ (2.3) C (2.0).

Master's Degree students with a GPA of less than 2.7 after completing 20 credits will be asked to withdraw from the program. Post-Master's Certificate students with a GPA of less than 2.7 after completing 10 credits will be asked to withdraw from the

program. An F (0.0) in any graduate level course will result in administrative withdrawal from the program at the end of the semester in which the grade is received.

In case of illness or other nonacademic problems, it is the student's responsibility to negotiate with the professor for an I (incomplete grade). In the case of an I, the professor issuing the I will specify the date by which the student is to remove the deficiency; in no case will this be more than one calendar year from the date the course ended.

WITHDRAWAL FROM A COURSE

Students may make changes in their schedule during the two week drop/add period at the beginning of the semester. A fee is charged by the university if changes are made after that period. If a student withdraws from a course after the drop/add period, the progress of the student at the time of withdrawal from the course will be indicated on the record as Withdrew Passing (WP) or Withdrew Failing (WF).

INTERRUPTION OF PROGRAM AND WITHDRAWAL FROM THE GRADUATE PROGRAM

The School of Nursing reserves the right, and matriculation by the student is a concession of this right, to request the withdrawal of any student whose performance at any time is not satisfactory to the School of Nursing. If a student for any reason wishes to withdraw from the school, notification should be made to the dean before the expected date of withdrawal. Students who have withdrawn from the program must apply for readmission according to regular admission policies.

Students who find it necessary to interrupt their program of study should request in writing a leave of absence addressed to the dean of the School of Nursing. A maximum of one calendar year's leave may be granted; this will be counted toward the total time allowed to complete the program.

COMMENCEMENT

Graduation exercises are held once a year, in May, when degrees are conferred and diplomas issued to students who have completed all requirements. Students who complete degree requirements by the end of the fall or by the end of the summer term receive diplomas dated December 30 or September 1, respectively. There is a delay in the mailing of September and December diplomas because diplomas cannot be issued until they are approved by the Academic Council and Board of Trustees. All graduates, including those receiving degrees in December and September, are expected to attend graduation exercises in May.

Requirements for the Master's Degree

Each of the school's majors requires the completion of 39 to 45 units of credit. These units include core courses required of all master's students, the research option (either the thesis, a research project, or a course in research utilization), courses in the major, and electives. Each major requires the student to complete a clinical residency.

Required Core Courses	Credits
N301. Population-Based Approaches to Health Care	3
N302. Nursing Informatics	2
N303. Health Services Program Planning and Outcomes Analysis	3
N307. Research Methods	3
N308. Applied Statistics	2
Total	13

Research Options (Select One)*	Credits
N312. Research Utilization in Advanced Nursing Practice	3
N313. Thesis	6
N314. Nonthesis Option	6
Total	3-6

Major Fields of Study

The following course numbers reflect changes proposed for the School of Nursing curriculum effective Fall 1999.

HEALTH SYSTEMS LEADERSHIP AND OUTCOMES

The major in Health Systems Leadership and Outcomes focuses on changes in the health care delivery system, models of nursing care delivery, financial management, and patient outcomes. Additionally, a minor in Informatics is also offered. The total minimum number of credits required for graduation is 39. Course work in the major includes the following:

HEALTH SYSTEMS LEADERSHIP AND OUTCOMES	Credits
N400. Organizational Theory for Integrated Health Care Delivery Systems	3
N401. Dynamics of Management	3
N402. Financial Management and Budget Planning	4
N419. Leadership Residency	4
Electives/Independent Study	9
Total	23

TOTAL MINIMUM NUMBER OF CREDITS FOR GRADUATION 39

Informatics Option	Credits
N410. Informatics Issues in Nursing Systems	3
N411. Nursing Informatics Theory and Application	3
N418. Nursing Informatics Residency	3-9
Total	9-15

The School of Nursing also offers, in conjunction with the Fuqua School of Business, a joint MSN/MBA degree. Course work for the joint MSN/MBA includes the following:

MSN-MBA PROGRAM	Credits
YEAR 1 – Fall Semester	
N301. Population-Based Approaches to Health Care	3
N303. Health Services Program Planning and Outcomes Analysis	3
N400. Organizational Theory for Integrated Health Care Delivery Systems	3
YEAR 1 – Spring Semester	
N307. Research Methods	3
N308. Applied Statistics	2
N401. Dynamics of Management	3
YEAR 1 – Summer Semester	
N312. Research Utilization in Advanced Nursing Practice	3
N419. Leadership Residency	4
Total	24
YEAR 2 – Fall Semester	
<i>ILE I: Team Building and Leadership Development</i>	2

* Required of all M.S.N. candidates

Term 1:	
BA 300. Managerial Economics	3
BA 311. Probability and Statistics	3
BA 320. Managerial Effectiveness	3
BA 395. Individual Effectiveness	2
Term 2:	
BA 301. Global Economic Environment of the Firm	3
BA 312. Decision Models	3
BA 340. Financial Accounting	3
BA 396. Individual Effectiveness	2
YEAR 2 - Spring Semester	
Term 1:	
BA 350. Global Financial Management	3
BA 360. Marketing Management	3
BA 370. Operations Management	3
BA 397. Individual Effectiveness	2
<i>ILE II: Competitive Business Strategy</i>	2
Term 2:	
BA 330. International Business Management	3
BA 341. Managerial Accounting	3
BA Elective	3
BA Elective	3
YEAR 3 - Fall Semester	
<i>ILE III: Competitive Advantage Through People and Processes</i>	
Term 1:	
BA Elective	3
BA Elective	3
Term 2:	
BA Elective	3
YEAR 3 - Spring Semester	
Term 1:	
BA Elective	3
BA Elective	3
<i>ILE IV: Complex Management Problems: Age of Asia</i>	2
Term 2:	
BA Elective	3
Total	71
TOTAL MINIMUM NUMBER OF CREDITS FOR GRADUATION	95

NURSE PRACTITIONER MAJORS

The majority of nurse practitioner majors focus on the knowledge and skills necessary to provide primary care across settings, including care of individuals in rural and underserved areas. The total minimum number of credits required for graduation varies by major. Course work in the major generally includes 18 credit units of practitioner core courses and 9 to 11 additional credits including the residency in the major.

Practitioner Core Courses for the above majors	Credits
N330. Selected Topics in Advanced Pathophysiology	3

N331. Clinical Pharmacology and Interventions for Advanced Nursing Practice	3
N332. Diagnostic Reasoning and Physical Assessment in Advanced Nursing Practice	4
N333. Managing Common Acute and Chronic Health Problems I	3
N334. Managing Common Acute and Chronic Health Problems II	3
Total	16

**ACUTE CARE, ADULT, GERONTOLOGY, FAMILY, AND ONCOLOGY
NURSE PRACTITIONER**

NURSE PRACTITIONER MAJORS

Acute Care Nurse Practitioner Credits

N450. Management of Critically Ill Adult Patients I	3
N451. Management of Critically Ill Adult Patients II	3
N458. Nurse Practitioner Residency: Adult Acute Care	3
Total	9

Adult Nurse Practitioner – General Primary Care Credits

Clinical Elective	3
Elective	3
N459. Nurse Practitioner Residency: Adult Primary Care	3
Total	9

Adult Nurse Practitioner – Cardiovascular Credits

N459. Nurse Practitioner Residency: Adult Primary Care	3
N460. Advanced Management of Patients with Cardiovascular Diseases	3
N461. Care Management of Patients with Selected Cardiovascular Illnesses	3
N469. Nurse Practitioner Residency: Adult Cardiovascular	2
Total	11

Adult Nurse Practitioner – Oncology/HIV Credits

N459. Nurse Practitioner Residency: Adult Primary Care	3
N470. Oncology/HIV AIDS Nursing I: Epidemiology and Pathophysiology	3
N471. Oncology/HIV AIDS Nursing II: Symptom and Problem Management	3
N479. Nurse Practitioner Residency: Adult Oncology/HIV AIDS	2
Total	11

Family Nurse Practitioner Credits

N440. Well Child Physical and Developmental Assessment for Family Nurse Practitioners	1
N441. Child Health in Family Care	4
N442. Sexual and Reproductive Health	4
N449. Nurse Practitioner Residency: Family	4
Total	13

Gerontology Nurse Practitioner Credits

N480. Social Issues, Health, and Illness in the Aged Years	3
N481. Managing Care of the Frail Elderly	3
N489. Nurse Practitioner Residency: Gerontology	3
Total	9

TOTAL MINIMUM NUMBER OF CREDITS FOR GRADUATION 41-48

PEDIATRIC AND NEONATAL NURSE PRACTITIONER

Practitioner Core Courses for the Pediatric and Neonatal Programs Credits

N320. Neonatal and Pediatric Pathophysiology	3
N321. Neonatal and Pediatric Pharmacology	3
N332. Diagnostic Reasoning and Physical Assessment in Advanced Nursing Practice	4

Total **10**

Pediatric Nurse Practitioner Credits

N322. Common Pediatric Management Issues I	4
N323. Common Pediatric Management Issues II	4
N430. Issues in Infant and Young Child Development	3
N431. Issues in School Age Child and Adolescent Development	3
N439. Nurse Practitioner Residency: Pediatrics	3

Total **17**

Pediatric Acute Care Nurse Practitioner Credits

N426. Managing Acute and Chronic Health Conditions in Children: I	4
N427. Managing Acute and Chronic Health Conditions in Children: II	4
N428. Nurse Practitioner Residency: Pediatric Acute Care	4
N430. Issues in Infant and Young Child Development	3
Elective	3

Total **18**

Neonatal Nurse Practitioner Credits

N420. Managing Acute and Chronic Health Conditions in the Newborn: I	4
N421. Managing Acute and Chronic Health Conditions in the Newborn: II	4
N423. Nurse Practitioner Residency: Neonatal	4-6
N430. Issues in Infant and Young Child Development	3
Electives	2-3

Total **19-20**

TOTAL MINIMUM NUMBER OF CREDITS FOR GRADUATION **43-49**

CLINICAL NURSE SPECIALIST

The clinical nurse specialist majors focus on the knowledge and skills necessary to provide care to patients with complex health problems and their families in a variety of settings. The total minimum number of credits required for graduation will vary between 39 to 42. Course work includes work in the clinical nurse specialist core courses and 9 to 14 credit units in the major. Elective credits are used to support the major.

CNS – Gerontology Credits

N330. Selected Topics in Advanced Pathophysiology	3
N331. Clinical Pharmacology and Interventions for Advanced Nursing Practice	3
N332. Diagnostic Reasoning and Physical Assessment in Advanced Nursing Practice	4
N333. Managing Common Acute and Chronic Health Problems I	3
N334. Managing Common Acute and Chronic Health Problems II	3

N480. Social Issues, Health, and Illness in the Aged Years	3
N481. Managing Care of the Frail Elderly	3
Total	22
CNS – Oncology/HIV	Credits
N330. Selected Topics in Advanced Pathophysiology	3
N331. Clinical Pharmacology and Interventions for Advanced Nursing Practice	3
N332. Diagnostic Reasoning and Physical Assessment in Advanced Nursing Practice	4
N470. Oncology/HIV AIDS Nursing I: Epidemiology and Pathophysiology	3
N471. Oncology/HIV AIDS Nursing II: Symptom and Problem Management	3
N478. Clinical Nurse Specialist Residency: Oncology Electives/Independent Study	4
Total	23
CNS – Pediatrics	Credits
N320. Neonatal and Pediatric Pathophysiology	3
N321. Neonatal and Pediatric Pharmacology	3
N332. Diagnostic Reasoning and Physical Assessment in Advanced Nursing Practice	4
N430. Issues in Infant and Young Child Development	3
N431. Issues in School Age Child and Adolescent Development	3
N438. Clinical Nurse Specialist Practicum: Pediatrics Electives/Independent Study	4
Total	23
CNS – Neonatal	Credits
N320. Neonatal and Pediatric Pathophysiology	3
N321. Neonatal and Pediatric Pharmacology	3
N332. Diagnostic Reasoning and Physical Assessment in Advanced Nursing Practice	4
N420. Managing Acute and Chronic Health Conditions in the Newborn: I	4
N421. Managing Acute and Chronic Health Conditions in the Newborn: II	4
N424. Clinical Nurse Specialist Residency: Neonatal	3
N430. Issues in Infant and Young Child Development	3
Total	24
TOTAL MINIMUM NUMBER OF CREDITS FOR GRADUATION	39-42

POST MASTER'S CERTIFICATE PROGRAM

The purpose of the post master's certificate program is to provide opportunities for students who already have an MSN degree to gain specialized knowledge within a major provided at Duke University School of Nursing. The post MSN certificate represents the student's successful completion of the required courses in the chosen nursing major. Course requirements for the post MSN certificate are listed below.

HEALTH SYSTEMS LEADERSHIP AND OUTCOMES	Credits
N400. Organizational Theory for Integrated Health Care Delivery Systems	3
N401. Dynamics of Management	3
N402. Financial Management and Budget Planning	4
N419. Leadership Residency	4
Total	14
INFORMATICS	Credits
N410. Informatics Issues in Nursing Systems	3
N411. Nursing Informatics Theory and Application	3
N418. Nursing Informatics Residency	3-9
Total	9-15
ACUTE CARE NURSE PRACTITIONER	Credits
N330. Selected Topics in Advanced Pathophysiology	3
N331. Clinical Pharmacology and Interventions for Advanced Nursing Practice	3

N332. Diagnostic Reasoning and Physical Assessment in Advanced Nursing Practice	4
N333. Managing Common Acute and Chronic Health Problems I	3
N334. Managing Common Acute and Chronic Health Problems II	3
N450. Management of Critically Ill Adult Patients I	3
N451. Management of Critically Ill Adult Patients II	3
N458. Nurse Practitioner Residency: Adult Acute Care	3
Total	25
ADULT NURSE PRACTITIONER – GENERAL PRIMARY CARE	Credits
N330. Selected Topics in Advanced Pathophysiology	3
N331. Clinical Pharmacology and Interventions for Advanced Nursing Practice	3
N332. Diagnostic Reasoning and Physical Assessment in Advanced Nursing Practice	4
N333. Managing Common Acute and Chronic Health Problems I	3
N334. Managing Common Acute and Chronic Health Problems II	3
N459. Nurse Practitioner Residency: Adult Primary Care Clinical Elective	3
Elective	3
Total	25
ADULT NURSE PRACTITIONER – CARDIOVASCULAR	Credits
N330. Selected Topics in Advanced Pathophysiology	3
N331. Clinical Pharmacology and Interventions for Advanced Nursing Practice	3
N332. Diagnostic Reasoning and Physical Assessment in Advanced Nursing Practice	4
N333. Managing Common Acute and Chronic Health Problems I	3
N334. Managing Common Acute and Chronic Health Problems II	3
N459. Nurse Practitioner Residency: Adult Primary Care	3
N460. Advanced Management of Patients with Cardiovascular Diseases	3
N461. Care Management of Patients with Selected Cardiovascular Illnesses	3
N469. Nurse Practitioner Residency: Adult Cardiovascular	2
Total	27
FAMILY NURSE PRACTITIONER	Credits
N330. Selected Topics in Advanced Pathophysiology	3
N331. Clinical Pharmacology and Interventions for Advanced Nursing Practice	3
N332. Diagnostic Reasoning and Physical Assessment in Advanced Nursing Practice	4
N333. Managing Common Acute and Chronic Health Problems I	3
N334. Managing Common Acute and Chronic Health Problems II	3
N440. Well Child Physical and Developmental Assessment for Family Nurse Practitioners	1
N441. Child Health in Family Care	4
N442. Sexual and Reproductive Health	4
N449. Nurse Practitioner Residency: Family	4
Total	29
GERONTOLOGICAL NURSING	
<i>Clinical Nurse Specialist</i>	Credits
N330. Selected Topics in Advanced Pathophysiology	3

N331. Clinical Pharmacology and Interventions for Advanced Nursing Practice	3
N332. Diagnostic Reasoning and Physical Assessment in Advanced Nursing Practice	4
N333. Managing Common Acute and Chronic Health Problems I	3
N334. Managing Common Acute and Chronic Health Problems II	3
N480. Social Issues, Health, and Illness in the Aged Years	3
N481. Managing Care of the Frail Elderly	3
Total	22
<i>Nurse Practitioner</i>	Credits
N330. Selected Topics in Advanced Pathophysiology	3
N331. Clinical Pharmacology and Interventions for Advanced Nursing Practice	3
N332. Diagnostic Reasoning and Physical Assessment in Advanced Nursing Practice	4
N333. Managing Common Acute and Chronic Health Problems I	3
N334. Managing Common Acute and Chronic Health Problems II	3
N480. Social Issues, Health, and Illness in the Aged Years	3
N481. Managing Care of the Frail Elderly	3
N489. Nurse Practitioner Residency: Gerontology	3
Total	25
ONCOLOGY NURSING	
<i>Clinical Nurse Specialist</i>	Credits
N330. Selected Topics in Advanced Pathophysiology	3
N331. Clinical Pharmacology and Interventions for Advanced Nursing Practice	3
N332. Diagnostic Reasoning and Physical Assessment in Advanced Nursing Practice	4
N470. Oncology/HIV AIDS Nursing I: Epidemiology and Pathophysiology	3
N471. Oncology/HIV AIDS Nursing II: Symptom and Problem Management	3
N478. Clinical Nurse Specialist Residency: Oncology	3
Total	19
<i>Adult Nurse Practitioner - Oncology/HIV</i>	Credits
N330. Selected Topics in Advanced Pathophysiology	3
N331. Clinical Pharmacology and Interventions for Advanced Nursing Practice	3
N332. Diagnostic Reasoning and Physical Assessment in Advanced Nursing Practice	4
N333. Managing Common Acute and Chronic Health Problems I	3
N334. Managing Common Acute and Chronic Health Problems II	3
N459. Nurse Practitioner Residency: Adult Primary Care	3
N470. Oncology/HIV AIDS Nursing I: Epidemiology and Pathophysiology	3
N471. Oncology/HIV AIDS Nursing II: Symptom and Problem Management	3
N479. Nurse Practitioner Residency: Adult Oncology/HIV AIDS	2
Total	27
NEONATAL NURSING	
<i>Clinical Nurse Specialist</i>	Credits
N320. Neonatal and Pediatric Pathophysiology	3

N321. Neonatal and Pediatric Pharmacology	3
N332. Diagnostic Reasoning and Physical Assessment in Advanced Nursing Practice	4
N420. Managing Acute and Chronic Health Conditions in the Newborn: I	4
N421. Managing Acute and Chronic Health Conditions in the Newborn: II	4
N424. Clinical Nurse Specialist Residency: Neonatal	3
N430. Issues in Infant and Young Child Development	3
Total	24
<i>Nurse Practitioner</i>	Credits
N320. Neonatal and Pediatric Pathophysiology	3
N321. Neonatal and Pediatric Pharmacology	3
N332. Diagnostic Reasoning and Physical Assessment in Advanced Nursing Practice	4
N420. Managing Acute and Chronic Health Conditions in the Newborn: I	4
N421. Managing Acute and Chronic Health Conditions in the Newborn: II	4
N423. Nurse Practitioner Residency: Neonatal	6
N430. Issues in Infant and Young Child Development	3
Total	27
PEDIATRIC NURSING	
<i>Clinical Nurse Specialist</i>	Credits
N320. Neonatal and Pediatric Pathophysiology	3
N321. Neonatal and Pediatric Pharmacology	3
N332. Diagnostic Reasoning and Physical Assessment in Advanced Nursing Practice	4
N430. Issues in Infant and Young Child Development	3
N431. Issues in School Age Child and Adolescent Development	3
N438. Clinical Nurse Specialist Practicum: Pediatrics	3
Total	19
<i>Pediatric Nurse Practitioner</i>	Credits
N320. Neonatal and Pediatric Pathophysiology	3
N321. Neonatal and Pediatric Pharmacology	3
N322. Common Pediatric Management Issues I	4
N323. Common Pediatric Management Issues II	4
N332. Diagnostic Reasoning and Physical Assessment in Advanced Nursing Practice	4
N430. Issues in Infant and Young Child Development	3
N431. Issues in School Age Child and Adolescent Development	3
N439. Nurse Practitioner Residency: Pediatrics	3
Total	27
PEDIATRIC ACUTE CARE NURSE PRACTITIONER	Credits
N320. Neonatal and Pediatric Pathophysiology	3
N321. Neonatal and Pediatric Pharmacology	3
N332. Diagnostic Reasoning and Physical Assessment in Advanced Nursing Practice	4
N426. Managing Acute and Chronic Health Conditions in Children: I	4
N427. Managing Acute and Chronic Health Conditions in Children: II	4
N428. Nurse Practitioner Residency: Pediatric Acute Care	3
N430. Issues in Infant and Young Child Development	3
Elective	3
Total	28

Courses of Instruction

The following course numbers reflect changes proposed for the School of Nursing curriculum effective Fall 1999.

301. Population-Based Approaches to Health Care. Provides an overview of population-based approaches to assessment and evaluation of health needs. Selected theories are the foundation for using scientific evidence for the management of population-based care. Enables the health care professional to make judgements about services or approaches in prevention, early detection and intervention, correction or prevention of deterioration, and the provision of palliative care. Fall. 3 units. *Staff*

302. Nursing Informatics. An introduction to computer technology in health care with a focus on computer applications commonly used in managing health care information. The effects of automated data management on nursing administration, education, practice, and research are addressed in the context of information systems and nursing informatics. Fall, spring. 2 units. *Hewitt*

303. Health Services Program Planning and Outcomes Analysis. An analysis of theory and practice in the design, implementation, and evaluation of the outcomes of health services programs within an integrated health care system. From a health services planning paradigm, students conduct organizational and community needs assessments, determine priorities, plan and monitor implementation, manage change, evaluate outcomes, and provide planning reports. Fall, summer. Prerequisites: Nursing 301, 302, 307, and 308. 3 units. *Anderson*

307. Research Methods. Focuses on research methods needed for systematic investigation and expansion of nursing knowledge. Critical appraisal of research and development of a research proposal are covered. Fall, spring. 3 units. *Turner and Wallsten*

308. Applied Statistics. Emphasizes the application and interpretation of statistical procedures used in health care and nursing research. Data management and the relationship between research design and statistical techniques are also studied. Spring, fall. Prerequisite: or concurrent: Nursing 307 or consent of instructor. 2 units. *Champagne, Coombs, and McConnell*

312. Research Utilization in Advanced Nursing Practice. Focuses on methods of implementing research findings to solve identified clinical problems. Students develop skill in creating and writing research-based protocols and in using research methods to evaluate nursing care. Summer. Prerequisites: Nursing 302, 307, and 308, or consent of instructor. 3 units. *Wallsten and staff*

313. Thesis. 1 to 6 units. Fall, spring, summer. Variable credit. *Staff*

314. Nonthesis Option. 1 to 6 units. Fall, spring, summer. Variable credit. *Staff*

320. Neonatal and Pediatric Pathophysiology. Focuses on advanced pathophysiologic knowledge as a basis for understanding alterations in biologic processes in the developing organ systems of neonatal and pediatric patients. With this foundation, students learn to differentiate normal from abnormal findings in patients from birth through eighteen years. 3 units. *Bradshaw and Turner*

321. Neonatal and Pediatric Pharmacology. Designed for all students in the neonatal or pediatric specialty tracks in the School of Nursing. Focuses on principles of pharmacologic management of pediatric patients with various conditions. Data collection and diagnostic reasoning are emphasized in relation to drug selection,

delivery, monitoring, and evaluation of pharmacologic interventions. Family education is incorporated. Spring. 3 units. *Bradshaw, Miller-Bell, and Turner*

322. Common Pediatric Management Issues I. Focuses on comprehensive assessment and management of selected primary care pediatric problems. Course content includes information on common acute and chronic illnesses, health maintenance issues, and recognition of circumstances that require interdisciplinary collaboration or referral. Pathophysiology and the pharmacological management of common problems are systematically integrated into the content. Advanced practice role development is emphasized in care management discussions and supervised clinical practice. Clinical practice opportunities in a variety of settings are arranged with the course instructor. Consent of instructor required. Spring. 104 clinical hours. Prerequisites: Nursing 330, 331 (may be taken concurrently), and 332; current BCLS certification including the Heimlich maneuver; PALS certification recommended. 4 units. *Blood-Siegfried and Lorimer*

323. Common Pediatric Management Issues II. A continuation of Nursing 322. Focuses on comprehensive assessment and management of selected primary care pediatric problems. Course content includes information on common acute and chronic illnesses, health maintenance issues, and recognition of circumstances that require interdisciplinary collaboration or referral. Pathophysiology and the pharmacological management of common pediatric problems are systematically integrated into the content. Advanced practice role development is emphasized in care management discussions and supervised clinical practice. Clinical practice opportunities are offered in a variety of pediatric settings. Consent of instructor required. Summer. 104 clinical hours. Prerequisites: Nursing 301, 322, 330, 331, and 332; current BCLS certification including the Heimlich maneuver; PALS certification highly recommended. 4 units. *Blood-Siegfried and Lorimer*

330. Selected Topics in Advanced Pathophysiology. Focuses on developing advanced pathophysiological knowledge sufficient for understanding alterations in biological processes that affect the body's dynamic equilibrium or homeostasis. With this knowledge, students learn to differentiate normal from abnormal physiological function and to consider the causality of pathophysiological alterations in illness. Topics covered include the pathophysiology of common health problems and complex physiological alterations encountered in advanced clinical practice. Fall. 3 units. *McHugh*

331. Clinical Pharmacology and Interventions for Advanced Nursing Practice. Combines lecture and case analyses to increase skills in assessment and pharmacological management of patients with a variety of common acute and chronic health problems. Data collection and diagnostic reasoning are emphasized in relation to drug selection, patient/family education, monitoring, and evaluation of pharmacological interventions. Spring. 3 units. *McHugh*

332. Diagnostic Reasoning and Physical Assessment in Advanced Nursing Practice. Combines lecture and laboratory experiences to develop advanced skills in assessment of physical, cognitive, nutritional, cultural, and functional domains. Practitioner-patient interactions, data collection, diagnostic reasoning, and oral and written presentation of data are emphasized. Consent of instructor required. Fall. 4 units. *Ouimette and staff*

333. Managing Common Acute and Chronic Health Problems I. Emphasizes assisting adult patients to reach or maintain the highest level of health and functioning, with a focus on health promotion, health maintenance, and primary care management of common acute or chronic respiratory, cardiac, genitourinary, endocrine,

dermatological, and musculoskeletal problems encountered by patients and families. Pharmacological management is systematically integrated. Clinical practice is in a variety of primary care settings including public and private internal and family medicine practices and community health clinics. Advanced practice role development is examined in seminars and supervised clinical practice. Spring. 104 clinical hours. Prerequisites: Nursing 330 and 332; prerequisite or concurrent: Nursing 331. 3 units. *Adinolfi, Denman, Friedman, Ouimette, Pietrangelo, Price, and staff*

334. Managing Common Acute and Chronic Health Problems II. Emphasizes assisting adult patients to reach or maintain the highest level of health and functioning, with a focus on primary care management of less common acute or chronic respiratory, cardiac, gastrointestinal, musculoskeletal, neurological, and mental health problems encountered by patients and families. Pharmacological management is systematically integrated. Clinical practice is in a variety of primary care settings including public and private internal and family medicine practices and community health clinics. Advanced practice role development is examined in seminars and supervised clinical practice. Summer. 104 clinical hours. Prerequisites: Nursing 330, 331, 332, and 333. 3 units. *Adinolfi, Denman, Friedman, Ouimette, Pietrangelo, Price, and staff*

351. Scientific Writing. This course provides a review of the principles and practice of scientific writing, with emphasis on research proposals, theses, other scientific papers, and articles for publication. Students are expected to complete a proposal for a thesis or a nonthesis option, an article, or other scientific work as part of the course. Fall. 3 units. *Tornquist*

353. Advanced Physiology. Focuses on developing advanced knowledge for understanding normal human physiological phenomena with an emphasis on cellular and molecular mechanisms of homeostasis. Summer. Prerequisite: Bachelor of Science in Nursing or consent of instructor. 3 units. *McHugh*

355. Concepts of Teaching and Learning. Focuses on the key concepts and principles that form the bases for the teaching and learning process. Educational theories of teaching and learning and real-life situations and issues serve as the framework for developing instructional strategies used in advanced nursing practice roles. Spring, summer. 3 units. *McIntire*

356. Ethics in Nursing. Focuses on the historical development of ethics in nursing, analysis of moral language, codes of ethics, frameworks for ethical decision making with case analysis, and strategies for discussion of ethics in nursing. Summer. 3 units. *Staff*

357. Physiological Monitoring. Provides an in-depth understanding of selected invasive and noninvasive physiologic monitors used in clinical settings. Emphasis is placed on monitors used in intensive care. Content on the reliability, validity, sensitivity, stability, drift, and artifacts with respect to mechanisms of measurement assists students to interpret output. Highly recommended for students in acute care majors. Summer. 2 units. *Turner*

358. Genetics, Embryology, and Fetal Development. This course is designed to give the neonatal nurse practitioner student knowledge and understanding of genetic and fetal development. Particular emphasis is placed on patterns of inheritance, multifactorial influences on fetal development, the interrelationship of genetics and patterns of fetal development. Societal issues arising from gene research/alternation/replacement will be incorporated using Duke University's pioneering research in this area. 2 units. *Staff*

359. Selected Topics or Independent Study. Students select a topic of professional interest within the specialty area or in support of the specialty area, to be studied with

a faculty member. Specific objectives, evaluation method, and other requirements are determined prior to registering for the course of study. Consent of instructor required. 1 to 3 units. Fall, spring, summer. Prerequisite: matriculation into nursing curriculum. Variable credit. *Staff*

400. Organizational Theory for Integrated Health Care Delivery Systems. Focuses on organizational behavior theory and research as the foundation for managerial and leadership interventions in integrated health care systems. Students learn how patient care system behaviors, structures, processes, and outcomes are affected by the actions of health system leaders. Consent of instructor required. Fall. 3 units. *Allred*

401. Dynamics of Management. This course is an in-depth analysis of selected organizational behavior topics and management practices related to patient care systems administration within a larger, integrated health care system. From a well developed theoretical orientation, students will critically identify issues, formulate questions, and pursue managerial interventions that will result in high quality, aggregate patient care and organizational outcomes that are socially relevant and clinically cost-effective. Spring. Prerequisite: Nursing 400 and/or consent of instructor. 3 units. *Allred*

402. Financial Management and Budget Planning. Designed for managers in complex organizations. Focuses on the knowledge and skills needed by the nurse manager to plan, monitor, and evaluate budget and fiscal affairs for a defined unit or clinical division. Health care economics, personnel, and patient activities are analyzed from a budgetary and financial management perspective within an environment of regulations and market competition. Spring. Prerequisite: Nursing 303 suggested. 4 units. *Zelman*

407. Leadership for Ethical Decision Making in Health Care. Applies ethical principles and decision-making models to complex healthcare organizations and administrative structures. Course content assists students to understand the relationships between the current state of patient care, organizational and administrative functions, and the complex issues involved in health care leadership. Research, ethical, social, cultural, economic, privacy/confidentiality, professional standards, and legal issues are discussed. Consent of instructor required. Summer. 3 units. *Goodwin*

408. New Ventures in Health Care. Focuses on imparting personal, organizational, and/or economic value to an idea in the current health care environment. The conditions and actions necessary for successful entrepreneurial and/or intrapreneurial endeavors in a managed care environment will be examined. Consent of instructor required. Summer. Prerequisite: demonstrated computer competency. 3 units. *Allred*

410. Informatics Issues in Nursing Systems. Focuses on the field of "nursing informatics" which combines nursing science, computer science, and information/decision science. Students examine issues in applying nursing informatics in complex health care organizations and administrative structures and master problem-solving skills on selected issues. Research, ethical, social, cultural, economic, privacy/confidentiality, and legal issues are included. Consent of instructor required. Summer. Prerequisites: Nursing 302 and 303. 3 units. *Goodwin*

411. Nursing Informatics Theory and Application. Focuses on nursing informatics and examines both theoretical and practical issues for nursing. Students develop theoretical knowledge and technology skills through laboratory application of didactic content and a real world project involving systems analysis, information specification, and project management. Consent of instructor required. Fall. Prerequisites: Nursing 302, 303, and 410. 3 units. *Goodwin*

418. Nursing Informatics Residency. Builds the student's knowledge and experience in nursing informatics within the context of advanced nursing practice. Students develop independent problem-solving skills in the synthesis of advanced practice nursing and informatics under the guidance and mentorship of a practicing informatics specialist (preceptor). Consent of instructor required. 3 to 9 units. Spring. Prerequisites: Nursing 410 and 411. Variable credit. *Goodwin*

419. Leadership Residency. Provides the student an opportunity to develop beginning competence in the role of nurse manager/administrator/executive under the guidance of a preceptor. Emphasis on incorporation of clinical and business skills into the role of health systems leader in an integrated health care delivery system. Students make a comprehensive assessment of the organizational setting and design strategies for agenda setting, network building, problem resolution, and outcome attainment. Experiential learning is emphasized. Summer. Prerequisite: Nursing 301, 302, 303, 307, 308, 400, 401, 402, and/or consent of instructor. 4 units. *Allred*

420. Managing Acute and Chronic Health Conditions in the Newborn: I. Comprehensive assessment and management of the newborn from birth through hospitalization and discharge. Course content includes anatomical, pathophysiological, and pharmacological management of the newborn with a focus on high-risk delivery, transport, and cardiorespiratory alterations. Integration of the newborn into the family is an overarching theme. Clinical practice opportunities in a variety of settings. Spring. 104 clinical hours. Prerequisite: Nursing 320 or consent of instructor. 4 units. *Bozzette and Turner*

421. Managing Acute and Chronic Health Conditions in the Newborn: II. Continuation of Nursing 420. Comprehensive assessment and management of the newborn infant during hospitalization. Course includes anatomical, pathophysiological, and pharmacological management of the newborn with varying conditions. Advanced practice role development is emphasized. Clinical practice opportunities in a variety of settings. Summer. 104 clinical hours. Prerequisites: Nursing 320, 332, and 420. 4 units. *Bozzette and Turner*

423. Nurse Practitioner Residency: Neonatal. Focuses on the synthesis of theory and clinical management skills for the neonatal nurse practitioner within a collaborative model of practice in Level I, II, and III newborn units as well as follow-up clinics and transport. 4 to 6 units. Fall, spring, summer. 400 to 600 clinical hours. Prerequisites: Nursing 320, 321, 332, 420, 421, and 430. Variable credit. *Bozzette and Turner*

424. Clinical Nurse Specialist Residency: Neonatal. Focuses on the synthesis of theory and clinical skills for the clinical nurse specialist within a collaborative practice. Emphasis is placed on education, consultation, research, and clinical practice. Summer. 300 clinical hours. Prerequisites: Nursing 320, 321, 332, 420, 421, and 430. 3 units. *Bozzette and Turner*

426. Managing Acute and Chronic Health Conditions in Children: I. Focuses on the pathophysiological mechanisms, clinical decision making, and treatment modalities in managing health problems seen in acutely, intensively, and chronically ill pediatric patients in the hospital, home, or long-term care facility. Integration of the family into the health care plan is an overarching theme. Primary care issues such as immunization and minor illness and health promotion are emphasized. Students have clinical rotations in a variety of settings. Fall. 104 clinical hours. Prerequisites: Nursing 320, 321, and 332. 4 units. *Cameron and staff*

427. Managing Acute and Chronic Health Conditions in Children: II. Addresses complex management issues with critically, chronically, and acutely ill children cared for in hospitals, the home, or long-term facilities. Complex technology used in the

management of pediatric patients is integrated into the course. The role of the family in the child's illness and developmentally appropriate care are emphasized. Spring. 104 clinical hours. Prerequisites: Nursing 320, 321, and 332. 4 units. *Cameron and staff*

428. Nurse Practitioner Residency: Pediatric Acute Care. Provides the students an opportunity to synthesize theory and clinical management skills in the management of acutely and intensively ill pediatric patients in a collaborative model of practice. Residency sites and preceptors are individually arranged based on the needs of the students and the availability of clinical sites. The emerging role of nurse practitioners in tertiary care settings is discussed. Consent of instructor required. 2 to 4 units. Fall, spring, summer. 200 to 400 clinical hours. Prerequisites: Nursing 320, 321, 332, 426, 427, and 430. Variable credit. *Cameron*

430. Issues in Infant and Young Child Development. The discussion of important issues related to health maintenance and of complex medical and social problems in the first five years of life. Normal cognitive, motor, social/emotional, and language development, and the usual developmental challenges of each age group are addressed. Spring. Prerequisite: Nursing 332 or consent of instructor. 3 units. *Blood-Siegfried*

431. Issues in School Age Child and Adolescent Development. The discussion of important issues related to health maintenance and of complex medical and social problems in children from school age through adolescence. Normal cognitive, motor, social/emotional, and language development, and the usual developmental challenges of each age group are discussed. Summer. Prerequisites: Nursing 332 and 430 or consent of instructor. 3 units. *Blood-Siegfried*

438. Clinical Nurse Specialist Practicum: Pediatrics. Supervised clinical practicum exploring the role of the clinical nurse specialist in a pediatric setting of the student's choice. Fall, spring, summer. Minimum 300 clinical hours. Prerequisites: Nursing 330, 331, 332, 430, and 431 (431 may be taken concurrently). 3 units. *Blood-Siegfried and Lorimer*

439. Nurse Practitioner Residency: Pediatrics. Supervised clinical practice in setting, which allows opportunities for practice as a pediatric nurse practitioner. 1 to 4 units. Fall, spring, summer. Minimum 400 clinical hours. Prerequisites: Nursing 322, 323, 330, 331, 332, 430, and 431. Variable credit. *Blood-Siegfried and Lorimer*

440. Well Child Physical and Developmental Assessment for Family Nurse Practitioners. Focuses on the physical and developmental assessment of well children from infancy through adolescence. Lectures and course assignments are designed to increase assessment skills needed in the care of children in the primary care setting. The newborn nursery, developmental evaluation centers, schools, clinical facilities that treat pediatric patients, and daycare centers are used as settings to increase pediatric assessment skills. Summer. Prerequisite: Nursing 332. 1 unit. *Friedman, Messick, and Sanford*

441. Child Health in Family Care. Focuses on children from infancy through adolescence within the contextual frameworks of family, school, and community. The course addresses growth and development, health maintenance, and anticipatory guidance needs of various age groups. The role of the family nurse practitioner in the management of common primary health care problems of children is emphasized. Clinical practice is in primary care settings that serve children: public health departments, school-based clinics, public and private family and pediatric practice sites, and rural/urban community health clinics. 104 clinical hours. Prerequisites: Nursing 330, 331, 332, 333, 334, and 440. 4 units. *Blood-Siegfried and staff*

442. Sexual and Reproductive Health. Focuses on women and men from adolescence through old age within the context of their sexual and reproductive development. The course addresses developmental, family, and health maintenance

issues, as well as common sexual and reproductive health problems of various age groups. The role of the family nurse practitioner in the management of preconceptional, prenatal, and postnatal care of women and their families is included. Clinical practice is in primary care settings that serve women and men at different points in the sexual and reproductive continuum: public health departments, school-based clinics, public and private family and obstetric/gyn practice sites, and rural/urban community health clinics. 1 to 4 units. 104 clinical hours. Prerequisites: Nursing 330, 331, 332, 333, and 334. Variable credit. *Adinolfi, Denman, Friedman, and Price*

449. Nurse Practitioner Residency: Family. Supervised practice in family primary care nursing. Management of common acute and chronic illnesses of patients across the life span. Development of the domains and competencies of nurse practitioner practice in family health care settings. Intense clinical practice under the mentorship of experienced clinicians including performing health assessments; ordering, performing, and interpreting diagnostic tests; determining a plan of care for patients and families; collaborating with the health care team; and referring patients to other health care providers. Seminars encourage the synthesis of clinical learning and the transition to the role of family nurse practitioner. 1 to 4 units. Fall, spring, summer. 100 to 400 clinical hours. Prerequisites: Nursing 330, 331, 332, 333, 334, 440, 441, and 442. Variable credit. *Friedman*

450. Management of Critically Ill Adult Patients I. Focuses on pathophysiological mechanisms, (cardiovascular, pulmonary, and hepatic), clinical decision making, and treatment modalities for managing common problems seen in acutely/critically ill patients. Integration of technological aspects of care is emphasized in both didactic and clinical components. Consent of instructor required. Fall. 104 clinical hours. Prerequisites: Nursing 330, 331, 332, 333, and 334. 3 units. *Cheek, Harshaw, and McFetridge*

451. Management of Critically Ill Adult Patients II. Focuses on pathophysiological mechanisms, (neurologic, endocrine, abdominal, trauma), clinical decision making, and treatment modalities for the management of health problems seen in acutely/critically ill patients. Consent of instructor required. Spring. 104 clinical hours. Prerequisites: Nursing 330, 331, 332, 333, 334, and 450. 3 units. *Cheek, Harshaw, and McFetridge*

458. Nurse Practitioner Residency: Adult Acute Care. Focuses on the synthesis of theory and clinical management skills with implementation of the acute care nurse practitioner role in a collaborative model of practice. Consent of instructor required. 1 to 4 units. Fall, spring, summer. Minimum 300 residency hours. Prerequisites: Nursing 330, 331, 332, 333, 334, 450, and 451. Variable credit. *Cheek, Harshaw, and McFetridge*

459. Nurse Practitioner Residency: Adult Primary Care. Supervised practice in adult primary care nursing. Management of common acute and chronic illnesses of adult patients. Development of the domains and competencies of nurse practitioner practice in primary care settings. Intense clinical practice under the mentorship of experienced clinicians including performing health assessments; ordering, performing, and interpreting diagnostic tests; determining a plan of care for patients and families; collaborating with the health care team; and referring patients to other health care providers. Seminars encourage the synthesis of clinical learning and the transition to the role of adult nurse practitioner. 1 to 3 units. Fall, spring, summer. 100 to 300 clinical hours. Prerequisites: Nursing 330, 331, 332, 333, and 334. Variable credit. *Adinolfi and staff*

460. Advanced Management of Patients with Cardiovascular Diseases. Focuses on the pathophysiology and management of patients with major cardiovascular disorders. Content includes diagnostic and treatment options, recovery of patients following major cardiac events, symptom management during chronic illness, and

prevention of disease. Students also obtain skill in ECG interpretation and cardiac physical exam. Spring. Concurrent 331 and 333. Prerequisites: Nursing 330 and 332. 3 units. *Cheek, Harshaw, and McFetridge*

461. Care Management of Patients with Selected Cardiovascular Illnesses. Provides the student with supervised experience in care management of adult patients with selected cardiovascular illnesses in a variety of clinical settings. Students use the knowledge and critical thinking skills developed in Nursing 460 in patient evaluations and care management. Weekly seminars focus on paradigm cases from clinical practice and provide students opportunities for experience in making case presentations. Summer. 104 clinical hours. Prerequisites: Nursing 330, 331, 332, 333, 334 (concurrent), and 460. 3 units. *Cheek, Harshaw, and McFetridge*

469. Nurse Practitioner Residency: Adult Cardiovascular. Provides the student with supervised practice as a nurse practitioner. Clinical experiences focus on the management of common acute and chronic illness through transitions in care. Emphasis is on development of the domains and competencies of nurse practitioner practice in the care of cardiovascular patients. Consent of instructor required. 1 to 4 units. Fall. Minimum 200 residency hours. Prerequisites: Nursing 330, 331, 332, 333, 334, 460, and 461. Variable credit. *Cheek, Harshaw, and McFetridge*

470. Oncology/HIV AIDS Nursing I: Epidemiology and Pathophysiology. Focuses on the epidemiology, pathophysiology, and biobehavioral aspects of cancer/HIV AIDS across the adult years. Major topics include cancer physiology, prevention, detection, role of the immune system, treatment, and responses to cancer/HIV AIDS. Spring. 3 units. *Adinolfi and McIntire*

471. Oncology/HIV AIDS Nursing II: Symptom and Problem Management. Provides the student with a broad framework for coordinating the domains and competencies of advanced practice roles in adult oncology/HIV AIDS nursing. The Oncology Nursing Society (ONS) Guidelines for Advanced Oncology Nursing Practice and Competencies in Advanced Practice Oncology Nursing, including HIV/AIDS and rehabilitation, serve as a framework for examination of problems and symptom management in patients. Case management and case studies are used to explore clinical problems. 3 to 4 units. Summer. 20 to 124 clinical hours. Prerequisite: Nursing 470. Variable credit. *Adinolfi and McIntire*

478. Clinical Nurse Specialist Residency: Oncology. Provides the student with supervised practice as a clinical nurse specialist in a specialized area of interest including ambulatory/clinic care, inpatient care, bone marrow transplant care, community/preventive care, home or hospice care, and care of persons with HIV and AIDS. Case management, care maps, case studies, and ONS Guidelines for Oncology Nursing Practice serve as frameworks for the practicum and seminars. 2 to 3 units. Fall, spring, summer. 200 to 300 clinical hours. Prerequisites: Nursing 330, 331, 332, 470, and 471. Variable credit. *Adinolfi and McIntire*

479. Nurse Practitioner Residency: Adult Oncology/HIV AIDS. Supervised practice in adult oncology nursing. Management of the care of patients with cancer/HIV AIDS in ambulatory and inpatient settings. Development of the domains and competencies of nurse practitioner practice in oncology settings. Intense clinical practice under the mentorship of experienced clinicians including performing health assessments; ordering, performing, and interpreting diagnostic tests; determining a plan of care for patients and families; collaborating with the health care team; and referring patients to other health care providers. Seminars encourage the synthesis of clinical learning and the transition to the role of adult nurse practitioner. 1 to 3 units. Fall, spring, summer. Prerequisites: Nursing 330, 331, 332, 333, 334, 470, and 471.

Variable credit. *Adinolfi and McIntire*

480. Social Issues, Health, and Illness in the Aged Years. Examines diversity in development and adaptation to environmental, social, psychological, and biological changes. Theories of aging, health and aging, intimacy and sexuality, rural/urban health care patterns, minority health care patterns, demographic trends, and death, dying, and loss are discussed. Spring. 3 units. *Wallsten*

481. Managing Care of the Frail Elderly. Emphasizes assessment, rehabilitation, and management of complex problems of elders who reside in community and institutional settings. Research projects and innovative care strategies are explored. Organizational and managerial effectiveness and consultative roles of the geriatric nurse practitioner/clinical nurse specialist are examined. Fall. 104 clinical hours. Prerequisites: Nursing 330, 331, 332, 333, and 334. 3 units. *Ouimette and Wallsten*

489. Nurse Practitioner Residency: Gerontology. Supervised practice in gerontological nursing. Management of common acute and chronic illnesses of the elderly. Development of the domains and competencies of nurse practitioner practice in geriatric care settings. Intense clinical practice under the mentorship of experienced clinicians including performing health assessments; ordering, performing, and interpreting diagnostic tests; determining a plan of care for patients and families; collaborating with the health care team; and referring patients to other health care providers. Seminars encourage the synthesis of clinical learning and the transition to the role of gerontological nurse practitioner. 1 to 3 units. Fall, spring, summer. 100 to 300 clinical hours. Prerequisites: Nursing 330, 331, 332, 333, 334, 480, and 481. Variable credit. *Ouimette*

Graduate Medical Education



Graduate Medical Education

Accreditation Council for Graduate Medical Education Programs. Appointments are from July 1 through June 30 with a few exceptions. Residents receive stipends, professional liability insurance, disability insurance, life insurance, health insurance, parking, on-call meals, psychological counseling, uniforms, and laundry of uniforms.

Programs offered with the program training director of each service are as follows:

Allergy and Immunology	Dr. Rebecca Buckley
Anesthesiology: Critical Care	Dr. Christopher Young
Anesthesiology: Pain Management	Dr. Joel Goldberg
Anesthesiology	Dr. Catherine Lineberger
Cardiovascular Disease	Dr. Gary Stiles
Child Neurology	Dr. Darrel Lewis
Child Psychiatry	Dr. Charles Keith
Clinical Cardiac Electrophysiology	Dr. J. Marcus Wharton
Critical Care Pediatrics	Dr. Jon Meliones
Dermatology	Dr. Sarah Myers
Dermatopathology	Dr. Christopher Shea
Endocrinology/Metabolism	Dr. Marc Drezner
Family Practice	Dr. Margaret Gradison
Gastroenterology	Dr. Rodger Liddle
General Pediatrics	Dr. Dennis Clements
Hematology/Oncology	Dr. Marilyn Telen
Infectious Diseases	Dr. John Hamilton
Internal Medicine: Geriatric Medicine	Dr. Harvey Cohen
Internal Medicine	Dr. Ralph Corey
Internal Medicine: Neurology	Drs. Ralph Corey/Joel Morganlander
Medical Microbiology	Dr. Barth Reller
Medicine: General	Dr. Harvey Cohen (acting)
Medicine/Pediatrics	Drs. Ralph Corey/Deborah Kredich
Medicine/Psychiatry	Drs. Ralph Corey/Grace Thrall
Neonatal/Perinatal Medicine	Dr. Ronald Goldberg
Nephrology	Dr. Thomas M. Coffman
Neurological Surgery	Dr. Allan Friedman
Neurology	Dr. Joel Morganlander
Neuropathology	Dr. Roger McLendon
Nuclear Medicine	Dr. Edward Coleman
Obstetrics-Gynecology	Dr. Charles Hammond
Ophthalmology	Dr. Stephen Pollock
Orthopaedic Hand Surgery	Dr. James Urbaniak
Orthopaedic Surgery	Dr. James Urbaniak
Otolaryngology	Dr. William Richtsmeier
Pathology: Cytopathology	Dr. Leslie Dodd
Pathology: Hematology	Dr. Karen Mann
Pathology	Dr. William Bradford
Pediatric Cardiology	Dr. Stephen Sanders

Pediatric Endocrinology	Dr. Michael Freemark
Pediatric Hematology-Oncology	Dr. Philip Rosoff
Pediatric Nephrology	Dr. John Foreman
Pediatric Rheumatology	Dr. Deborah Kredich
Pediatric Pulmonology	Dr. Thomas Murphy
Pediatric Radiology	Dr. George Bissett
Pediatrics	Dr. Deborah Kredich
Plastic Surgery	Dr. Scott Levin
Preventative Medicine: Occupational	Dr. Woodhall Stopford
Psychiatry	Dr. Grace Thrall
Psychiatry: Geriatric	Dr. John Breitner
Pulmonary Diseases/Critical Care Medicine	Dr. William Fulkerson
Radiology: Neuroradiology	Dr. James Provenzale
Radiation Oncology	Dr. Ed Halperin
Radiology: Diagnostic	Dr. Linda Gray
Radiology: Diagnostic (Nuclear)	Dr. Edward Coleman
Rheumatology and Genetics	Dr. David Pisetsky
General Surgery	Dr. Theodore Pappas
Surgery: Critical Care	Dr. Lawrence Reed II
Thoracic Surgery	Dr. Walter Wolfe
Urology	Dr. Glenn Preminger

Duke University Medical Center is a participating member of the National Resident Matching Program, 2450 N Street N.W., Suite 201, Washington, DC 20037-1141. All applicants for first-year postmedical school appointments must register with this program.

Both men and women graduates of any L.C.M.E.-accredited medical school are eligible for appointment. All applicants are considered without regard to race, color, religion, national origin, handicap, veteran status, sexual orientation or preference, sex, or age (except when sex and age are *bona fide* occupational qualifications).

Requests for application forms and information about residencies should be addressed to the program training director of the service under which training is desired. A transcript of the medical school record is required and must either accompany the application or be furnished by the dean of the medical school.

Graduates of medical schools outside the United States and Canada must hold a valid standard or interim certificate from the Educational Commission for Foreign Medical Graduates (E.C.F.M.G.), 3624 Market Street, Philadelphia, Pennsylvania 19104, to be considered for appointment to residencies. Physicians who are not U.S. citizens or permanent residents and who need sponsorship as J-1 exchange visitors must have passed required exams to be eligible for a visa. The required exams are: the United States Medical Licensing Exam (U.S.M.L.E.), Steps 1 and 2; the National Board of Medical Examiners Exam (N.B.M.E.E.), Parts I and II; the Foreign Medical Graduate Examination in the Medical Sciences (F.M.G.E.M.S.); the Visa Qualifying Examination (V.Q.E.); or a combination of these which is acceptable to E.C.F.M.G. plus an English language exam acceptable to E.C.F.M.G. Visas other than the J-1 may be available to physicians who have passed additional exams and hold additional qualifications. Applications should be sent directly to a department or division. An application which does not include a copy of a valid E.C.F.M.G. certificate and evidence of passage of the required exams is considered incomplete and may be discarded without further notice to the applicant. For further information contact Catheryn Cotten, International Office, Box 3882, Duke University Medical Center, Durham, North Carolina 27710, cotte002@mc.duke.edu.

Reasonable requests for reduced scheduling are considered. Inquiries should be directed to the program training directors of approved residencies.

The Durham Veterans Administration Medical Center adjoins the Duke University Campus and is affiliated with Duke University Medical Center. The full-time professional staff of the V.A. Medical Center are all faculty members of the School of Medicine. All training programs are integrated with corresponding programs at the Duke Univer-

sity Medical Center, including rotation of house officers at each hospital.

All trainees are required to be licensed by the State of North Carolina. This may be accomplished by: (1) a residency training license that covers only training by Duke and is not convertible to a full North Carolina license, or (2) a full North Carolina license that is a complete medical license. A complete medical license is obtained either by state boards (North Carolina Boards can only be taken upon completion of internship) F.L.E.X., U.S.M.L.E. Step III, or National Boards. North Carolina is not reciprocal with other states for full licenses. Duke University Medical Center cannot make applications for full license. Since house staff members must have a license before beginning duties, arrangements for the license should be made in advance. All incoming house staff must contact the House Staff Office, Box 3951, DUMC, Durham, North Carolina 27710 for current licensure requirements, and to make application for a training license.

Application forms and information for residencies or fellowships may be obtained by writing the program training director of the appropriate department, Duke University Medical Center, Durham, North Carolina 27710.

Auditing of Courses by House Staff. Residents and fellows at the Medical Center may audit courses through the undergraduate and graduate divisions of Duke University by obtaining the written permission of the course instructor and the dean for continuing education and by paying the current audit fees. House staff members are not permitted to take courses offered through the division of undergraduate medical education. For more information, please contact Dr. Paula Gilbert, Academic Dean for Continuing Education, The Bishop's House, Duke University, Durham, North Carolina 27708, (919) 684-2621; Website: www.learnmore.duke.edu.

ROSTER OF HOUSE STAFF BY DEPARTMENTS

Anesthesiology

Chief Residents 1997-98: Timothy Angelotti, M.D. (Michigan, 1996); Brock Milliken, M.D. (Kentucky, 1995).

Senior Residents: John Campbell, M.D. (Pittsburgh, 1995); Christopher East, M.D. (SUNY-Buffalo, 1995); Maribel Gamoso, M.D. (Albany, 1995); Timothy Stanley, M.D. (FUHS, Chicago, 1995).

Junior Residents: Randall Brewer, M.D. (Louisiana, 1993); Jason Burke, M.D. (UNC, 1996); Andrea Crawford, M.D. (Stanford, 1996); Will Curtis, M.D. (Ohio, 1996); Holly Davis, M.D. (Texas - San Antonio, 1997); Peter DeBalli, M.D. (Pennsylvania, 1996); Tarsha Garvin, M.D. (ECU, 1997); Jon-Paul Harmer, M.D. (Texas - San Antonio, 1997); Adil Kamal, M.D. (K.A.U. Jeddah, 1992); Christopher Kerr, M.D. (Kansas, 1996); Kurt Knauth, M.D. (Texas - Houston, 1997); Graham Lashley, M.D. (Utah, 1997); James McCurdy, M.D. (Oklahoma, 1997); Robert Panten, M.D. (Virginia, 1996); Annie Prochera, M.D. (SUNY - Syracuse, 1996); Garrett Sacles, M.D. (Texas - San Antonio, 1996); David Schinderle, M.D. (Michigan, 1997); Julie Woosley, M.D. (Oklahoma, 1997); Bo Wu, M.D. (China Med. U, 1985).

Interns: Peter Baek, M.D. (Duke, 1998); Keith Hanson, M.D. (Wisconsin, 1998); Laura Kihlstrom, M.D. (Duke, 1998); Marcella Lanzinger, M.D. (T.U.M. Munich, 1995); Bill Norcross, M.D. (Pennsylvania, 1998); Mildred Ridgway, M.D. (Tulane, 1998); Adrienne Wells, M.D. (Rush, 1998).

Community and Family Medicine

Chief Residents: Sara B. Beyer, M.D. (North Carolina, 1995); Adrienne M. Kelly, M.D. (Texas A & M, 1996); Peter C. Vitanzo, M.D. (Temple, 1996).

Residents: Stephen P. Arles, M.D. (Duke, 1996); Anu R. Bommarreddi, M.D. (Ohio, 1997); David M. Bronstein, M.D. (Duke, 1997); Anthony J. Choe, M.D. (Wayne State, 1998); Michael C. Diem, M.D. (UMDNJ, 1996); Andrew J. Fallis, M.D. (Albany, 1996); George E. Harrison, M.D. (Morehouse, 1998); Frederick K. Hilton, Jr., M.D. (Louisville, 1993); Michelle F. Jones, M.D. (East Carolina, 1996); Rajya L. Kanuri, M.D. (India, 1992); Jamie A. Lovdal, M.D. (Duke, 1998); Christine A. McDevitt, M.D. (Georgetown, 1995); Leila C. Morris, M.D. (Boston, 1997); Anelia Rose Petree, M.D. (Bowman Gray, 1998); Alexei Radiontchenko, M.D. (Russia, 1988); Steven L. Sanderson, M.D. (Cincinnati, 1997); Wendy M. Scinta, M.D. (SUNY, 1998); Valarmathi Sundar, M.D. (India, 1987); David B. Tsai, M.D. (Temple, 1996); Kevin Brewer Yow, M.D. (North Carolina, 1997); Guangbin Zeng, M.D. (China, 1985).

Medicine

Chief Residents: Amy Abernethy, M.D. (Duke 1991); Christopher H. Cabell, M.D. (Duke, 1994); Cathleen Colon-Emeric, M.D. (Johns Hopkins, 1994).

Senior Assistant Residents: Anjali S. Advani, M.D. (Duke, 1996); Abdullah Al-Enezi, M.D. (King Saud Univ., 1993); Benjamin Atkeson, M.D. (Georgetown University, 1996); Paul Baird, M.D. (Duke University, 1996); Suzanne A. Boyer, M.D. (Washington University, 1996); Stephen Y-C Chui, M.D. (Duke, 1996); Steven D. Crowley, M.D. (Duke, 1996); John J. Engemann, M.D. (Wayne State, 1996); Nurum F. Erdem, M.D. (Michigan, 1996); Ahmed A. Farag, M.D. (Cairo, 1987); Gregory P. Gerschutz, M.D. (Ohio State, 1996); Susan E. Hardy, M.D. (Pittsburgh, 1996); Caroline L. Hebert, M.D. (Ohio State, 1996); Consuelo L. Hopkins, M.D. (Howard, 1996); Gregory D. Huhn, M.D. (Tulane, 1996); Shaker H. Itani, M.D. (American, 1995); Christopher P. Jordan, M.D. (East Carolina, 1995); Maria J. Joyce, M.D. (Boston, 1996); Kevin D. Lanclos, M.D. (Medical College of Georgia, 1996); Gandis G. Mazeika, M.D. (California-Davis, 1993); Kimberly S. Mohs, M.D. (Uniformed Services University, 1996); Kristina E. Norvell, M.D. (Duke, 1996); John G. Pazin, M.D. (Duke, 1996); Robert L. Percell, M.D. (Johns Hopkins, 1996); Cathy A. Petti, M.D. (Duke, 1995); John F. Plankeel, M.D. (Ohio State, 1996); Joseph W. Poku, M.D. (Tufts, 1996); Sunil V. Rao, M.D. (Ohio State, 1996); Abdallah G. Rebeiz, M.D. (Amerian, 1996); Sara E. Roobol, M.D. (Wayne State, 1966); William J. Sayre, M.D. (Virginia, 1996); Laura L. Sessums, M.D. (Vanderbilt, 1996); Manish A. Shah, M.D. (Harvard, 1996); Jason E. Stout, M.D. (SUNY at Syracuse, 1996); Mark H. Strong, M.D. (Mississippi, 1996); Mark A. Weinberg, M.D. (Duke, 1996); Alvin F. Wells, M.D. (South Florida, 1996); Sally J. York, M.D. (Washington, 1996).

Senior Assistant Residents-Medicine/Pediatrics: Deanna K. Branscom, M.D. (Virginia, 1994); Shannon L. Hader, M.D. (Columbia, 1995); Keith G. Harkins, M.D. (Georgetown, 1995); Elizabeth A. Hunt, M.D. (Albany, 1995); Thomas A. Owens, M.D. (SUNY at Buffalo, 1995).

Senior Assistant Residents-Medicine/Neurology: John R. Lynch, M.D. (Duke, 1994); Augusto Parra, M.D. (Escuela Colombiana, 1988).

Senior Assistant Residents-Medicine/Psychiatry: Kristen A. Tyzkowski, M.D. (Med. Coll. of Ohio, 1994).

Junior Assistant Residents: Jamy D. Ard, M.D. (Duke, 1997); Marvin W. Ashford, M.D. (Stanford, 1996); John W. Cronin, M.D. (Vanderbilt, 1997); Jephtha P. Curtis, M.D. (Columbia, 1997); Timm M. Dickfeld, M.D. (J.W. Goethe, 1995); Anedi Eme-Akwari, M.D. (Nigeria, 1989); Nishan H. Fernando,

M.D. (Duke, 1997); Diane Gesty-Palmer, M.D. (Duke, 1997); N. Joan Glavan, M.D. (Hopkins, 1997); Ali Haddadzadeh, M.D. (Chicago Med. Sch., 1997); John F. Heitner, M.D. (Albert Einstein, 1997); Denise M. Hilliard, M.D. (Hahnemann, 1997); JoAnn Hong-Curtis, M.D. (Columbia, 1997); Danny D. Hu, M.D. (East Carolina, 1997); Alice T. Hughes, M.D. (Mount Sinai, 1997); Christian M. Hull, M.D. (Michigan, 1997); George N. Ioannou, M.D. (Oxford, 1996); Kimberly S. Johnson, M.D. (Johns Hopkins, 1997); David K. Johnston, M.D. (Kentucky, 1997); Geoffrey A. Kunz, M.D. (Ohio State, 1997); Manjula Kurella, M.D. (Albany, 1997); David R. Levitan, M.D. (Ohio, 1997); W. Lance Lewis, M.D. (Miami, 1997); Mallory L. McClure, M.D. (Virginia, 1997); Phillipa H. Miranda, M.D. (Duke, 1997); Jennifer L. Muller, M.D. (Northwestern, 1997); S-H Ig Ou, M.D. (Southwestern, 1997); Manesh R. Patel, M.D. (Emory, 1997); Josh F. Peterson, M.D. (Vanderbilt, 1997); Neeraja Peterson, M.D. (Vanderbilt, 1997); Xiao Yan Qian, M.D. (Shanghai, 1987), (Medical College, Pune, India, 1995); Troy D. Schmidt, M.D. (Southwestern, 1997); Rahman Shah, M.D. (Aga Khan, 1994); Joseph C. Shanahan, M.D. (Robert Wood Johnson, 1997); Jonathan A. Stiber, M.D. (New York Univ., 1997); Amy J. Stough, M.D. (South Carolina, 1997); Gordana Vlahovic, M.D. (Zagreb, 1985); Jason F. Vollweiler, M.D. (Northwestern, 1997).

Junior Assistant Residents-Medicine/Pediatrics: Cynthia W. Brown, M.D. (Med. Coll. Georgia, 1997); Alexander W. Chen, M.D. (SUNY at Buffalo, 1997); Wayne J. Franklin, M.D. (UCLA, 1997); Eric A. Higginbotham, M.D. (Texas, Houston, 1996); Rajiv K. Jain, M.D. (SUNY-Buffalo, 1996); Keri L. Livingstone, M.D. (Miami, 1997); Michael G. Mullooney, M.D. (Georgetown, 1997); Russell Rothman, M.D. (Duke, 1996); Ann M. Valente, M.D. (Vermont, 1996); Lisa R. Young, M.D. (Duke, 1997).

Junior Assistant Residents-Medicine/Psychiatry: Jude R. Alexander, M.D. (Miami, 1996); Eric J. Christopher, M.D. (Med. Coll. of Wisconsin, 1996); Gregory C. Lunceford, M.D. (Chicago, 1990); Henry Radziewicz, M.D. (SUNY - Brooklyn, 1996).

Interns: Daniel R. Bensimhon, M.D. (Pittsburgh, 1998); James B. Brugarolas, M.D. (Navarra, 1993); Jason T. Call, M.D. (Vanderbilt, 1998); Anna Lisa Chamis, M.D. (Ohio State, 1998); Christine Chen, M.D. (Duke, 1997); Lisa Criscione, M.D. (Duke, 1998); Chandan M. Devireddy, M.D. (Michigan Med. School, 1998); W. Lane Duvall, M.D. (Yale, 1998); Rhonda W. Gabr, M.D. (West Virginia, 1998); Amanda L. Green, M.D. (Baylor, 1998); Jonathan S. Green, M.D. (Duke, 1998); Nathan E. Green, M.D. (Univ. of Washington, 1998); Carmelo Gullotto, M.D. (Duke, 1998); Susan B. Gurley, M.D. (Washington Univ., 1998); S. Susan Hedayati, M.D. (George Washington, 1998); Todd E. Helton, M.D. (East Carolina, 1998); Peter D. Higgins, M.D. (Duke, 1998); Kimberley J. Johnson, M.D. (UMDNJ, 1998); Glenn C. Jones, M.D. (Chicago, 1998); Catherine P. Kaminetzky, M.D. (Duke, 1998); James A. Kong, M.D. (Duke, 1998); Timothy P. Lahey, M.D. (Duke, 1998); David A. Martin, M.D. (Rochester, 1998); Matthew W. McClure, M.D. (Duke, 1998); Jay R. McDonald, M.D. (Oregon Health Sciences, 1998); Trip J. Meine, M.D. (Duke, 1998); Bennett H. Myers, M.D. (SUNY at Buffalo, 1998); Christopher G. Nelson, M.D. (St. Louis, 1998); Richard E. Nettles, M.D. (Duke, 1998); Cathleen L. Peterson-Layne, M.D. (Duke, 1998); W. Jeff Petty, M.D. (North Carolina, 1998); Duncan P. Rougier-Chapman, M.D. (Duke, 1998); Cheryl A. Russo, M.D. (SUNY at Syracuse, 1998); Mark A. Scheurer, M.D. (Tennessee, 1998); Thomas R. Smarz, M.D. (Georgetown, 1998); Srikanth Sola, M.D. (Louisville, 1998); Jeremy Spector, M.D. (Vanderbilt, 1998); Nadine D. Tanenbaum, M.D. (Miami, 1998); Gina M. Vaccaro, M.D. (Louisiana State, 1998); Martha Wadleigh, (Duke, 1998); Carolyn J. Weaver, M.D. (Duke, 1998); Amy C. Weintrob, M.D. (Virginia, 1998).

Interns-Medicine/Pediatrics: Danielle E. Bowen, M.D. (Tennessee, 1998); Adam M. Bressler, M.D. (Med. Coll. Of Georgia, 1998); Edward A. Evans, M.D. (UMDNJ, 1998); Karen M. Kiang, M.D. (Yale, 1997); Lisa F. Soltani, M.D. (Duke, 1998); Jennifer L. Taylor, M.D. (Duke, 1998).

Interns-Medicine/Psychiatry: Jane P. Gagliardi, M.D. (Duke, 1998); John Paul Gomez, M.D. (Temple, 1998); M. Ojinga Harrison, M.D. (Tennessee, 1997); Wei Jiang, M.D. (Binzhou, 1982); Jonathan E. Leinbach, M.D. (Louisiana State, 1998); Robert E. Nelson, M.D. (Duke, 1997); Eric J. Park, M.D. (Maryland, 1998); Pritham M. Raj, M.D. (Maryland, 1997).

Fellows: Mark D. Aldous, M.D. (Duke, 1995); John H. Alexander, M.D. (Pennsylvania, 1993); Sana M. Al-Khatib, M.D. (Beirut, 1993); Luis Amador, M.D. (Univ. of Central del Caribe, Puerto Rico, 1995); Alan S. Ament, M.D. (Chicago, 1992); Manish D. Assar, M.D. (California at San Francisco, 1992); Wayne B. Batchelor, M.D. (Queens, 1990); Michael P. Battaglini, M.D. (New York Med., 1994); Judy K. Battle, M.D. (Louisiana State, 1993); Kimberly L. Blackwell, M.D. (Mayo, 1994); Richard S. Bloomfield, M.D. (Washington Univ., 1994); Paul R. Bohjanen, M.D. (Michigan, 1993); Jeffrey D. Bornstein, M.D. (McGill, 1994); Patrick H. Bowen, M.D. (Duke, 1995); S. Maynard Bronstein, M.D. (Duke, 1992); Cynthia D. Brown, M.D. (SUNY at Brooklyn, 1994); Deborah L. Bursey, M.D. (Arkansas, 1992); Susan Bryne-O'Shea, M.D. (University College Cork, 1993); Warren J. Cantor, M.D. (Western Ontario, 1991); Hector Castro, M.D. (National Autonomous Univ. of Mexico, 1991); Vijay S. Chauhan, M.D. (Ottawa, 1992); Emma Cifaloni, M.D. (Milan, 1989); Mauricio G. Cohen, M.D. (Tucuman, Argentina, 1991); Jeanine Connolly, M.D. (Florida, 1995); Christopher Deitch, M.D. (Hahnemann, 1993); Fernando de la Serna, M.D. (Tucuman, Argentina, 1983); Christopher K. Dyke, M.D. (Texas, Southwestern, 1995); Mark A. East, M.D. (North Carolina, 1995); Mohamad Ali Eloubeidi, M.D. (Beirut, 1993); Stefan Engelter, M.D. (Freiburg, 1991); Pang-Chieh "Jerry" Eu, M.D. (Chicago, 1992); Maria C. Fernando, M.D.

(St. Louis, 1989); Lisa W. Forbess, M.D. (Harvard, 1991); Vance G. Fowler, M.D. (North Carolina, 1993); Nora Franceschini, M.D. (Univ. de Federal Do Rio, 1996); Peter L. Gallagher, M.D. (Nebraska, 1994); Cristina Gasperetto, M.D. (Rome, 1986); T. David Gbadebo, M.D. (Emory, 1994); Thomas R. Gehrig, M.D. (Florida, 1994); Michael J. Golioto, M.D. (UMDNJ, 1995); Magnus Gottfredsson, M.D. (Iceland, 1991); Adam B. Greenbaum, M.D. (New York, 1992); Vidhu B. Gupta, M.D. (Sampurnanand, India, 1988); Karen E. Hansen, M.D. (Wisconsin, 1993); Nancy M. Hardy, M.D. (Washington, 1995); Eric B. Haura, M.D. (Duke, 1994); Mitchell T. Heflin, M.D. (Virginia, 1993); Aaron B. Hesselson, M.D. (Robert Wood Johnson, 1994); Michael P. Hudson, M.D. (Illinois, 1991); Raghuram Jagadesan, M.D. (Trinity College, Dublin, 1990); Kandaswamy Jayaraj, M.D. (Stanley Med. Coll., 1992); David E. Kandzari, M.D. (Duke, 1995); J. Benjamin Khoury, M.D. (Virginia, 1994); Preston S. Klassen, M.D. (Nebraska, 1994); David F. Kong, M.D. (Johns Hopkins, 1993); Waitak Kong, M.D. (Toronto, 1992); Richard A. Krasuski, M.D. (Harvard, 1994); Khuda-Dad Khan, M.D. (Nishtar Med. Coll., 1984); Andreas Klein, M.D. (Yale, 1996); Peter Kwon, M.D. (Minnesota, 1994); Thu H. Le, M.D. (George Washington, 1993); Marc C. Levesque, M.D. (Yale, 1989); Weei-Chin Lin, M.D. (Natl. Taiwan, 1986); Dongjie Liu, M.D. (China Med. Univ., 1994); A. Craig Lockhart, M.D. (Texas at Dallas, 1993); Yuan Lu, M.D. (Shanghai, 1987); Minakshi Madan, M.D. (McGill, 1991); William I. Mariencheck, M.D. (Washington Univ., 1994); Robert E. Martell, M.D. (Wayne State, 1993); David O. Martin, M.D. (Alabama, 1992); Steven T. Mast, M.D. (California, San Francisco, 1993); Dean S. McGaughey, M.D. (Chicago, 1994); Darren K. McGuire, M.D. (Johns Hopkins, 1993); Timothy J. McMahon, M.D. (Tulane, 1993); Farrell O. Mendelsohn, M.D. (Johns Hopkins, 1992); Debra L. Millert, M.D. (Albert Einstein, 1994); Julie M. Miller, M.D. (Minnesota, 1992); David R. Murdoch, M.D. (Otago, 1985); Andrew Muir, M.D. (Duke, 1993); Kavita Nanda, M.D. (Albany, 1990); Nirjaleswar K. Nikhar, M.D. (Armed Forces Med. Coll, 1987); Daniel A. Nikkevich, M.D. (Rush, 1995); John C. O'Shea, M.D. (University Cork College, 1989); Scott M. Palmer, M.D. (Duke, 1993); John L. Petersen, M.D. (Univ. of Washington, 1995); Thomas J. Povsic, M.D. (Harvard, 1995); Robert C. Quackenbush, M.D. (Washington Univ., 1992); Mukaila A. Raji, M.D. (Univ. of HE, 1987); Donal Reddan, M.D. (Dublin, 1992); Joshua Rubin, M.D. (Cornell, 1993); Paula Ryan, M.D. (Rochester, 1994); Karl W. Sash, M.D. (Saskatchewan, 1993); Monica R. Shah, M.D. (Brown, 1989); Heather S. Shaw, M.D. (Duke, 1993); June Tan, M.D. (Mahidol, 1990); Thaddeus R. Tolleson, M.D. (Texas at Houston, 1993); Eric J. Velazquez, M.D. (Albert Einstein, 1994); Ismael A. Vergara, M.D. (Pontificia, 1989); Amit Verma, M.D. (Government Medical Coll., India, 1992); John J. Warner, M.D. (Vanderbilt, 1992); David J. Whellan, M.D. (Washington Univ., 1994); James D. Whitehouse, M.D. (Emory, 1993); Stephen Wilson, M.D. (Duke, 1992); Michelle P. Winn, M.D. (East Carolina, 1992); Kelly Wood, M.D. (SUNY at Buffalo, 1993); Dannah W. Wray, M.D. (Duke, 1993); Sibyl E. Wray, M.D. (Bowman Gray, 1994).

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Ophthalmology

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Pathology

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Fellows: Barbara Alexander, M.D. (East Carolina, 1993); Susan L. Eliason, M.D. (South Dakota, 1993); Cynthia D. Guy, M.D. (South Carolina, 1993); Katharine Liu, M.D. (Duke, 1991); Eoghan E. Mooney, M.B., M.R.C.P.I. (Dublin, 1988); Steven M. Ruhoy, M.D. (Albany, 1993); John F. Toso, M.D. (Pittsburgh, 1992).

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Fellows: Paul Adholla, M.D. (Nairobi, 1987); Ayesha Ahmad, M.D. (Aga Khan, 1991); Dursun Alehan, M.D. (Istanbul, Turkey, 1987); Susan Boutilier, M.D. (California at Davis, 1993); Michael Cannon, M.D. (East Carolina, 1992); Michael Carboni, M.D. (Northeastern, 1990); Sharon Castellino, M.D. (Duke, 1992); Pantipa Chatchatte, M.D. (Thailand, 1987); Kenji Cunnion, M.D., M.P.H. (Duke, 1993); Michael Daines, M.D. (St. Louis, 1993); Yamo Deniz, M.D. (Massachusetts, 1994); Peter Gaskin, M.D. (West Indies, 1988); Barbara Hipp, M.D. (Vanderbilt, 1993); Richard Howrey, M.D. (Michigan, 1991); Shao-Hsuan Hsia, M.D. (Taiwan, 1989); Chris Hubble, M.D. (South Florida, 1993); Alicia Johnston, M.D. (SUNY, 1994); Troy Johnston, M.D. (Virginia, 1991); Hilary Klonin, M.D. (Nottingham, 1982); Mary Lacaze, M.D. (Mount Sinai, 1991); Dietrich Matern, M.D. (Ludwig-Maximilians, Germany, 1991); Lufuno Mathivha, M.D. (Natal, South Africa, 1982); Michelle Miller, M.D. (Minnesota, 1994); Martin Moya, M.D. (National Univ., Argentina, 1992); Rita Ongjoco, D.O. (New York Coll. Osteopath. Med.,

1990); Brenda L. Parker, M.D. (Western Ontario, 1991); Rebecca Passon, M.D. (Pennsylvania, 1994); Anna Petryk, M.D. (Dundee, Scotland, 1991); Jose A. Pineda, M.D. (Francisco Marroquin, 1993); Marat Plotkin, M.D. (Minsk, Belarus, 1992); James Powell, M.D. (Pennsylvania State, 1992); Karen Richards, M.D. (Johns Hopkins, 1993); David Riester, M.D. (San Antonio, 1992); Lisa Robinson, M.D. (Toronto, 1991); Kenji Suda, M.D., Ph.D. (Shimane, Japan, 1985, 1993); Christopher Turner, M.D. (Rochester, 1994); Suwannee Uthaisangsook, M.D. (Mahidol, Bangkok, 1987); Mark Wainwright, M.D. (Chicago, 1995); Michael Womack, M.D. (Texas at Southwestern, 1991).

Psychiatry

Chief Residents: Nives Antolovic-Stanfel, M.D. (Zagrebh Med. Facility, 1983); Ayesha Chaudhary, M.D. (Aga Khan Univ. Med. Coll., Karachi, Pakistan, 1991); Paul Grant, M.D. (Bowman-Gray, 1973); Beverley Grimm, M.D. (Miami, 1994); Kristen Tyszkowski, M.D. (Temple, 1994).

Fifth Year Residents: Ayesha Chaudhary, M.D. (Aga Khan Univ. Med. Coll., Karachi, Pakistan, 1991); Paul Grant, M.D. (Bowman-Gray, 1973).

Fourth Year Residents: Nives Antolovic-Stanfel, M.D. (Zagrebh Med. Facility, 1983); Maureen Chamberlain, M.D. (SUNY at Syracuse, 1994); Erik Lindfors, M.D. (Texas at Galveston, 1994); Kristen Tyszkowski, M.D. (Temple, 1994).

Third Year Residents: Trina Allen, M.D. (SUNY at Buffalo, 1995); Moira Artigues, M.D. (South Carolina, 1995); Shannon Barnett, M.D. (Colorado HSC, 1995); Christine Chruiscicki, M.D. (SUNY at Buffalo, 1995); Charles Conway, M.D. (Missouri, 1995); Margaret Dean, M.D. (Brown, 1995); Cassandra Harewood, M.D. (Oklahoma, 1995); C. Lawrence Horn, M.D. (Georgetown, 1995); Eric Kirchmann, M.D. (Washington, 1995); Patricia Knaudt, M.D. (Oklahoma Coll. of Med., 1995); Michelle Kramer, M.D. (Tufts, 1995); Alpa Patel, M.D. (Rush, 1995); Javier Prado, M.D. (Rochester, 1995); Neil Scheurich, M.D. (Michigan, 1995).

Second Year Residents: Jude Alexander, M.D. (Miami, 1996); Samina Aziz, M.D. (Aga Khan Univ. Karachi, Pakistan, 1994); Roy D. Book, M.D. (MUSM Macon, GA, 1996); Eric Christopher, M.D. (Wisconsin, 1996); Jennifer Kern, M.D. (Ohio State, 1996); Gregory Lunceford, M.D. (Chicago, 1996); Ajay Makhija, M.D. (Alabama, 1996); Catherine McCarthy, M.D. (Virginia, 1996); Thomas McCormack, Jr., M.D. (Emory, 1996); Sharon Meglathery, M.D. (Oregon Health Sciences, 1996); Samantha Meltzer-Brody, M.D. (Northwestern, 1996); Henry Radziewicz, M.D. (SUNY at Brooklyn, 1996); Ewa Sikora, M.D. (Pomeranian Med. Academy, Szczycew, Poland, 1992); Warren Taylor, M.D. (Florida, 1996); Laura Tuttle, M.D. (New Mexico, 1996).

First Year Residents: Drew Barzman, M.D. (SUNY at Buffalo, 1997); Charles Cloutier, M.D. (Wayne State, 1997); Anna Marie Gonzaga, M.D. (Ohio, 1997); Myleme Ojinga Harrison, M.D. (Tennessee, 1997); Cynthia Higgins-Owsinski, M.D. (South Florida, 1997); George Jackson, M.D. (UCLA at Drew, 1995); Wei Jiang, M.D. (Qingdao Med. Coll., China, 1982); Omar S. Manejwala, M.D. (Maryland, 1997); Robert Nelson, M.D. (Duke, 1997); Pritham Raj, M.D. (Maryland, 1997); Purvi Sangani, M.D. (SUNY at Syracuse, 1997); Arif Shoaib, M.D. (SIND Med. Coll., Karachi, Pakistan, 1990).

Child Psychiatry Chief Resident: John Heintzman, M.D. (Queens, Canada, 1993).

Child Psychiatry Residents: Suvrat Bhargava, M.D. (Georgia, 1994); Hector DeLeon-Miranda, M.D. (Central De Caribe, Puerto Rico, 1994); Amy Jones, M.D. (South Carolina, 1994); Helen Egger, M.D. (Yale, 1991); John Heintzman, M.D. (Queens, Canada, 1993); John Markus, M.D. (Nebraska, 1993); Bruce Riggins, M.D. (Georgia, 1992); J. Lindsey Tweed, M.D. (Duke, 1987).

Geriatric Psychiatry Residents: Barbara Davenport, M.D. (Wayne State, 1980); Abayomi Jaji, M.D. (Coll. of Med. Univ. of Ibadan, Nigeria, 1986).

Substance Abuse Fellow: Lawrence M. Raines, III, M.D. (North Carolina, 1993).

Forensic Psychiatry Resident: Charles Vance, M.D. (Duke, 1993).

Radiation Oncology

Chief Resident: Timothy Jamieson, M.D., Ph.D. (Virginia, 1994, 1993).

Residents: Sylvia Bovio, M.D. (Texas, 1997); Suresh Dutta, M.D. (Oklahoma, 1994); Joel Elconin, M.D. (Ohio State, 1995); Bobby Harrison, M.D. (East Carolina, 1997); Patrick Maguire, M.D. (Penn State, 1995); Carmen Vermont, M.D. (Romania, 1988); Philip Villiotte, M.D. (Dartmouth, 1995).

Radiology

Residents: Todd Aho, M.D. (Wayne State, 1997); Michael A. Arata, M.D. (California at San Francisco, 1994); L. Neal Beard, M.D. (Virginia, 1997); Jeffrey Behar, M.D. (Tulane, 1996); S. Douglas Brown, M.D. (Utah, 1996); Taylor Chen, M.D. (Southern California, 1996); R. Lee Cothran, Jr., M.D. (Duke, 1995); Curtis Coulam, M.D. (Utah, 1994); Robert Cranley, M.D. (Boston Univ., 1995); Steven Crawford, M.D. (Indiana, 1996); Stephen A. Fine, M.D. (Massachusetts, 1995); David J. Fiorella, M.D. (State Univ. New York-Buffalo, 1996); Christopher Gaskin, M.D. (Florida-Gainesville, 1997); Sujata V. Ghate, M.D. (North Carolina, 1994); William Lee Hall, M.D. (Duke, 1995); Daniel J. Hatch, M.D. (Utah,

1994); Allyson A. Haymes, M.D. (Harvard, 1994); J. Joseph Hewett, M.D. (California-San Francisco, 1996); Lynn Hurwitz, M.D. (Duke, 1997); John Jackson, M.D. (Utah, 1997); M. Todd Jacobs, M.D. (Duke, 1996); Jim Killius, M.D. (State Univ. New York at Buffalo, 1995); H. Stanley Lambert, M.D. (North Carolina, 1997); Lynn Lecas, M.D. (Univ. of Miami, 1995); Lisa J. Lee, M.D. (Medical College of Ohio, 1995); Melissa Lipton, M.D. (Texas-Houston, 1997); Michael J. Miller, M.D. (Hahnemann, 1994); Ryan Nielsen, M.D. (Creighton Univ., 1995); John Pappas, M.D. (Albert Einstein, 1996); Thomas Presson, Jr., M.D. (Wake Forest Univ., 1995); Ana Quinones, M.D. (Tufts, 1997); Eric Rohren, M.D. (Mayo, 1996); Andrew M. Schneider, M.D. (Duke, 1994); Brandt Schraner, M.D. (George Washington, 1995); Brooke Spencer, M.D. (Vermont, 1995); Bertram Stemmler, M.D. (Texas-Southwestern, 1997); Shannon Turner, M.D. (Arkansas, 1997); Joseph E. Wagner, M.D. (North Carolina, 1995); Matthew Wagner, M.D. (Ohio State, 1996); Sybille Woel, M.D. (Pittsburgh, 1995); Michael J. Workman, M.D. (Iowa, 1994); Zenon Zarewych, M.D. (Wayne State, 1996).

Surgery

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Subject Index

A

Academic Calendar, School of Medicine 4
Academic Standards 24
Accommodations 37
Administrative Officers, Duke University 8
Administrative Officers, Medical Center and Health System 8
Admission, M.D. Program 45
Admission, Master of Science Nursing Program 192
Admissions Committee, Regional Representatives 48
Advanced Placement 46
Allied Health Programs 165
Alpha Omega Alpha Medical Honor Society 41
Anesthesiology and Environmental Physiology Study Program 130
Anesthesiology, Department of 63
Application for Admission, M.D. Program 45
Audit and No Credit Courses 26
Auditing of Courses by House Staff 217
Awards and Prizes 42

B

Behavioral Neurosciences Study Program 131
Biochemistry, Department of 66
Biological Anthropology and Anatomy, Department of 67
Biomedical Engineering Study Program 132
Biophysics Study Program 132
Bookstore 16
Buildings and Facilities, Medical Center 14

C

C. V. Mosby Book Award 43
Calendar 4
Cancer Biology Study Program 133
Cardiovascular Study Program 133
Cell and Regulatory Biology Study Program 133
Cell Biology, Department of 68
Certificate Programs 186
Class Rosters 141
Clinical Psychology Internship 186
Clinical Research Study Program 135
Combined Degree Programs 29
Commencement 27
Community and Family Medicine, Department of 69
Conduct of Students 37
Continuing Medical Education 225

Course Load 26
Course Requirements, M.D. Program 23

D

Davison Scholarship 43
Davison Society 41
Dining Facilities 38
Doctor of Medicine Degree 23
Doctor of Physical Therapy Program 154
Due Process Guidelines 26
Duke Hospital 18
Duke/ECU Master of Health Science Option Program 184
Durham Regional Hospital 19

E

E. Eugene Owen, M.D. Clinical Awards 43
Education Records 28
Educational Media Services 18
Engel Society 42
Epidemiology and Public Health Study Program 135

F

Family Medicine Center 39
Fees and Expenses, M.D. Program 51
Financial Aid 56

G

Genetics, Department of 78
Grading 25
Graduate Medical Education 215

H

Health Fee, Services Covered by 40
History 13
House Staff, Roster of 218
Housing Options 37
Human Genetics Study Program 136

I

Immunology Study Program 136
Immunology, Department of 78
Infectious Diseases Study Program 137
Interdisciplinary Courses 80
Interdisciplinary Study Programs 130
Interinstitutional Program 27

J

Joseph Eldridge Markee Memorial Award 43

L

Leave of Absence 27
Lenox Baker Children's Hospital 19
Library, Medical Center 16
Living Accommodations 37
Loans 59

M

Master of Health Sciences in Clinical
Research 169
Master of Science, Nursing Program 191
Medical Alumni Association 42
Medical Center Commons 16
Medical Education Research and Development,
Office of 17
Medical Historian Program 32
Medical Licensure 27
Medical Scientist Training Program 29
Medicine and Business Administration
Program 32
Medicine and Juris Doctor Program 33
Medicine and Public Health Program 34
Medicine and Public Policy Program 34
Medicine, Department of 80
Microbiology, Department of 98

N

Neurobiology Study Program 138
Neurobiology, Department of 99
Nursing, School of 191

O

Obstetrics and Gynecology, Department of 100
Ophthalmic Medical Technician 186
Ophthalmic Medical Technician Program 186
Ophthalmology, Department of 103
Ophthalmology and Visual Science Study Pro-
gram 139

P

Pastoral Care and Counseling Program 187
Pathologists' Assistant Program 172
Pathology Study Program 139

Pathology, Department of 104
Pediatrics, Department of 107
Pharmacology and Cancer Biology, Department
of 112
Pharmacy Practice Residency Program 189
Physical Therapy Program, Doctor of 154
Physician Assistant Program 176
Postgraduate Education 225
Primary Care Program 31
Promotion 25
Psychiatry, Department of 113
Psychology, Clinical Internship 186

R

Radiation Oncology, Department of 120
Radiology, Department of 121
Requirements for Admission, M.D. Program 45
Roster of House Staff 218
Roster of Students 141

S

Satisfactory Academic Progress 26
Scholarship Prizes and Awards 42
Scholarships and Awards 54
School of Nursing 191
Searle Conference Center 16
Standing Committees of the School of Medicine
and Medical Center 9
Student Health Service 39
Student Life, Allied Health Programs 165
Student Life, Medical 36
Student Personal and Professional Advisory Pro-
gram 39
Surgery, Department of 123

T

Thomas D. Kinney Central Teaching Laboratory
17
Thomas Jefferson Award 43
Transfer Students 46
Trent Prize 43
Tuition, M.D. Program 51

V

Veterans Administration Medical Center 19
Visiting Students 28