THE COLLEGE OF MEDICINE
CATALOG
1990-91

THE UNIVERSITY OF ARIZONA
TUCSON, ARIZONA

This catalog is published by the College of Medicine and contains information provided by the departments of the College of Medicine as of March 5, 1990. For inquiries concerning this catalog, please notify the Office of Student Affairs (602) 626-6216.
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In accordance with the Privacy Act of 1974, applicants for admission and enrolled students are advised that the requested disclosure of their Social Security number is voluntary. Students who do not provide the University with their Social Security number will be assigned a special nine digit number. The student’s Social Security number, or an assigned number, will be used: a) to identify such student records as applications for admission; b) registration and course enrollment documents, grade reports, transcript requests, certification requests and permanent academic records; c) to determine eligibility, certify attendance and report student status; and d) as an identifier for grants, loans and other financial aid programs. The student’s Social Security number will not be disclosed to individuals or agencies except in accordance with The University of Arizona policy on student records. Use of the Social Security number as the student identification number will enable the University to comply with federal requirements mandated under IRS tax laws and Title IV student aid legislation, and enable the University to provide the best possible service to students.

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The University of Arizona Record (USPS 650-800) is published monthly in February, July and August, and twice in June by The University of Arizona, Tucson, AZ 85721-0001. Second-class postage paid at Tucson, AZ. POSTMASTER: Send address changes to The University of Arizona Record, Administration Building, Room 412, The University of Arizona, Tucson, AZ 85721-0001.
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# COLLEGE OF MEDICINE ACADEMIC CALENDAR 1990-91
(TENTATIVE)

## Year I

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<tbody>
<tr>
<td>Orientation</td>
<td>Wednesday, July 25-Friday, July 27, 1990</td>
</tr>
<tr>
<td>Classes Begin</td>
<td>Monday, July 30, 1990</td>
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<tr>
<td>Last Day of Registration</td>
<td>Friday, August 31, 1990</td>
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<tr>
<td>Labor Day (holiday)</td>
<td>Monday, September 3, 1990</td>
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<tr>
<td>Mid-Term Exams</td>
<td>Monday, October 1-Friday, October 5, 1990</td>
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<tr>
<td>Fall Recess</td>
<td>Saturday, October 6-Tuesday, October 9, 1990</td>
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<tr>
<td>Year I Retreat</td>
<td>Wednesday, October 10, 1990</td>
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<tr>
<td>Veterans Day (holiday)</td>
<td>Monday, November 12, 1990</td>
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<tr>
<td>Thanksgiving Day (holiday)</td>
<td>Thursday, November 22-Sunday, November 25, 1990</td>
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<tr>
<td>Final Exams</td>
<td>Thursday, December 13-Wednesday, December 19, 1990</td>
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<tr>
<td>Winter Recess</td>
<td>Wednesday, December 19, 1990-Tuesday, January 1, 1991</td>
</tr>
<tr>
<td>Classes Resume</td>
<td>Wednesday, January 2, 1991</td>
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<tr>
<td>Last Day of Registration</td>
<td>Thursday, January 17, 1991</td>
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<tr>
<td>Dr. Martin Luther King, Jr. Day (holiday)</td>
<td>Monday, January 21, 1991</td>
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<tr>
<td>Mid-Term Exams</td>
<td>Monday, March 4-Friday, March 8, 1991</td>
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<td>Spring Recess</td>
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<td>Memorial Day (holiday)</td>
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<tr>
<td>End of Year I</td>
<td>Thursday, May 30, 1991</td>
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<tr>
<td>Summer Vacation</td>
<td>Friday, May 31-Sunday, July 28, 1991</td>
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## Year II

<table>
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<tr>
<th>Event</th>
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<tbody>
<tr>
<td>Classes Begin</td>
<td>Monday, July 30, 1990</td>
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<td>Last Day of Registration</td>
<td>Friday, August 30, 1990</td>
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<tr>
<td>Labor Day (holiday)</td>
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<tr>
<td>Mid-Term Exams</td>
<td>Monday, October 1-Friday, October 5, 1990</td>
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<tr>
<td>Fall Recess</td>
<td>Saturday, October 6-Sunday, October 14, 1990</td>
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<td>Veterans Day (holiday)</td>
<td>Monday, November 12, 1990</td>
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<td>Thanksgiving Day (holiday)</td>
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<td>Final Exams</td>
<td>Thursday, December 13-Wednesday, December 19, 1990</td>
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<tr>
<td>Winter Recess</td>
<td>Thursday, December 20, 1990-Tuesday, January 1, 1991</td>
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<tr>
<td>Classes Resume</td>
<td>Wednesday, January 2, 1991</td>
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<tr>
<td>Last Day of Registration</td>
<td>Thursday, January 17, 1991</td>
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<tr>
<td>Dr. Martin Luther King, Jr. Day (holiday)</td>
<td>Monday, January 21, 1991</td>
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<tr>
<td>Mid-Term Exams</td>
<td>Monday, March 4-Friday, March 8, 1991</td>
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<tr>
<td>Spring Recess</td>
<td>Saturday, March 9-Sunday, March 17, 1991</td>
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<tr>
<td>Final Exams</td>
<td>Monday, April 29-Friday, May 3, 1991</td>
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<tr>
<td>End of Basic Science Classes</td>
<td>Friday, May 3, 1991</td>
</tr>
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<td>NBME Board Study</td>
<td>Saturday, May 4-Monday, June 10, 1991</td>
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<tr>
<td>Memorial Day (holiday)</td>
<td>Monday, May 27, 1991</td>
</tr>
<tr>
<td>NBME, Part I</td>
<td>Tuesday, June 11-Wednesday, June 12, 1991</td>
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<tr>
<td>Summer Vacation</td>
<td>Thursday, June 13-Sunday, June 16, 1991</td>
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COLLEGE OF MEDICINE ACADEMIC CALENDAR 1990-91  
(TENTATIVE)

Year III

Classes Begin .................................................. Monday, June 18, 1990
Period 1 ......................................................... Monday, June 18-Saturday, July 28, 1990
Independence Day (holiday) ............................. Wednesday, July 4, 1990
Period 2 ......................................................... Monday, July 30-Saturday, September 8, 1990
Last Day of Registration ......................................... Monday, July 30, 1990
Labor Day (holiday) ........................................... Monday, September 3, 1990
NBME, Part I .................................................. Wednesday, September 5-Thursday, September 6, 1990
Period 3 ......................................................... Monday, September 10-Saturday, October 20, 1990
Period 4 ......................................................... Monday, October 22-Saturday, December 1, 1990
Veterans Day (holiday) ........................................ Monday, November 12, 1990
Thanksgiving Day (holiday) .................................... Thursday, November 22, 1990
Period 5 ......................................................... Monday, December 3, 1990-Saturday, January 6, 1991
Winter Recess ................................................ Saturday, December 22, 1990-Sunday, January 6, 1991
Last Day of Registration ........................................ Thursday, January 17, 1991
Dr. Martin Luther King, Jr. Day (holiday) ......... Monday, January 21, 1991
Period 6 ......................................................... Monday, January 28-Saturday, March 9, 1991
Spring Recess ................................................ Sunday, March 10-Sunday, March 24, 1991
Period 7 ......................................................... Monday, March 25-Saturday, May 4, 1991
Period 8 ......................................................... Monday, May 6-Saturday, June 15, 1991
Memorial Day (holiday) ....................................... Monday, May 27, 1991

Year IV*

Classes Begin .................................................. Monday, June 18, 1990
Independence Day (holiday) ............................. Wednesday, July 4, 1990
Last Day of Registration ......................................... Friday, August 31, 1990
Labor Day (holiday) ........................................... Monday, September 3, 1990
NBME, Part II ................................................ Tuesday, September 25-Wednesday, September 26, 1990
Veterans Day (holiday) ........................................ Monday, November 12, 1990
Thanksgiving Day (holiday) .................................... Thursday, November 22, 1990
Winter Recess ................................................ Saturday, December 22, 1990-Sunday, January 6, 1991
Last Day of Registration ........................................ Thursday, January 17, 1991
Dr. Martin Luther King, Jr. Day (holiday) ......... Monday, January 21, 1991
NBME, Part II ................................................ Tuesday, April 2-Wednesday, April 3, 1991
Convocation ...................................................... Friday, May 10, 1991
Graduation ......................................................... Saturday, May 11, 1991

Elective Periods ................................................ See Electives Manual

* Year IV Students do not have Spring Recess. They may, however, schedule vacations as explained in the text of the Electives Manual available in the Office of Student Records.
COLLEGE OF MEDICINE ACADEMIC CALENDAR 1991-92
(TENTATIVE)

Year I

Orientation ........................................... Wednesday, July 24-Saturday, July 27, 1991
Classes Begin ........................................... Monday, July 29, 1991
Last Day of Registration ............................. Friday, August 30, 1991
Labor Day (holiday) ..................................... Monday, September 2, 1991
Year I Retreat ........................................... Wednesday, September 25, 1991
Fall Recess .............................................. Thursday, September 26-Saturday, September 29, 1991
Veterans Day (holiday) .................................. Monday, November 11, 1991
Thanksgiving Day (holiday) ......................... Thursday, November 28-Sunday, December 1, 1991
Winter Recess ........................................... Wednesday, December 18, 1991-Sunday, January 5, 1992
Classes Resume ........................................... Monday, January 6, 1992
Dr. Martin Luther King, Jr. Day (holiday) ........ Monday, January 20, 1992
Last Day of Registration ............................. Thursday, January 23, 1992
Spring Recess ........................................... Saturday, March 14-Sunday, March 22, 1992
Memorial Day (holiday) .................................. Monday, May 25, 1992
End of Year I ............................................. Wednesday, May 27, 1992
Summer Vacation ....................................... Thursday, May 28-Sunday, August 2, 1992

Year II

Classes Begin ........................................... Monday, July 29, 1991
Last Day of Registration ............................. Friday, August 30, 1991
Labor Day (holiday) ..................................... Monday, September 2, 1991
Fall Recess .............................................. Saturday, September 21-Sunday, September 29, 1991
Year II Retreat ......................................... Wednesday, September 25, 1991
Veterans Day (holiday) ............................... Monday, November 11, 1991
Thanksgiving Day (holiday) ......................... Thursday, November 28-Sunday, December 1, 1991
Winter Recess ........................................... Wednesday, December 14, 1991-Sunday, January 5, 1992
Classes Resume ........................................... Monday, January 6, 1992
Dr. Martin Luther King, Jr. Day (holiday) ........ Monday, January 20, 1992
Last Day of Registration ............................. Thursday, January 23, 1992
Spring Recess ........................................... Saturday, March 14-Sunday, March 22, 1992
End of Basic Science Classes ...................... Friday, May 8, 1992
NBME Board Study ...................................... Saturday, May 9-Monday, June 8, 1992
Memorial Day (holiday) ................................ Monday, May 25, 1992
NBME, Part I ............................................. Tuesday, June 9-Wednesday, June 10, 1992
Summer Vacation ....................................... Thursday, June 11-Sunday, June 14, 1992
COLLEGE OF MEDICINE ACADEMIC CALENDAR 1991-92
(TENTATIVE)

Year III
Classes Begin .............................................. Monday, June 17, 1991
Period 1 .................................................. Monday, June 17-Saturday, July 27, 1991
Independence Day (holiday) ............................ Thursday, July 4, 1991
Period 2 .................................................. Monday, July 29-Saturday, September 7, 1991
Last Day of Registration ............................... Friday, August 30, 1991
Labor Day (holiday) ...................................... Monday, September 2, 1991
NBME, Part I ........................................... Wednesday, September 4-Thursday, September 5, 1991
Period 3 .................................................. Monday, September 9-Saturday, October 19, 1991
Period 4 .................................................. Monday, October 21-Saturday, November 30, 1991
Veterans Day (holiday) .................................. Monday, November 11, 1991
Thanksgiving Day (holiday) ............................. Thursday, November 28, 1991
Period 5 .................................................. Monday, December 2, 1991-Saturday, January 25, 1992
Winter Recess ............................................. Saturday, December 21, 1991-Sunday, January 5, 1992
Dr. Martin Luther King, Jr. Day (holiday) .......... Monday, January 20, 1992
Last Day of Registration ............................... Thursday, January 23, 1992
Period 6 .................................................. Monday, January 27-Saturday, March 7, 1992
Spring Recess ............................................. Saturday, March 7-Sunday, March 22, 1992
Period 7 .................................................. Monday, March 23-Saturday, May 2, 1992
Period 8 .................................................. Monday, May 4-Saturday, June 13, 1992
Memorial Day (holiday) ................................. Monday, May 25, 1992

Year IV*
Classes Begin .............................................. Monday, June 17, 1991
Independence Day (holiday) ............................ Thursday, July 4, 1991
Last Day of Registration ............................... Friday, August 30, 1991
Labor Day (holiday) ...................................... Monday, September 2, 1991
NBME, Part II ........................................... Wednesday, September 25-Thursday, September 26, 1991
Veterans Day (holiday) .................................. Monday, November 11, 1991
Thanksgiving Day (holiday) ............................. Thursday, November 28, 1991
Winter Recess ............................................. Saturday, December 21, 1991-Sunday, January 5, 1992
Dr. Martin Luther King, Jr. Day (holiday) .......... Monday, January 20, 1992
NBME, Part II ........................................... Tuesday, April 14-Wednesday, April 15, 1992
Convocation ............................................... Friday, May 16, 1992
Graduation ................................................ Saturday, May 17, 1992

Elective Periods ........................................... See Electives Manual

*Year IV Students do not have Spring Recess. They may, however, schedule vacations as explained in the text of the Electives Manual available in the Office of Student Records.
THE UNIVERSITY OF ARIZONA

The University of Arizona is one of three publicly-supported institutions of higher learning in Arizona under the jurisdiction of the Arizona Board of Regents. It was established in 1885 as a land grant institution 27 years before Arizona was admitted to the Union as the 48th state. During its colorful history it has developed into one of the great universities of the southwestern United States with 10 colleges, four faculties, eight schools, 119 academic committees or departments, and 52 research and special service units.

Commensurate with the rapid growth of the state during the past two decades, the University has grown to its present enrollment of 36,676 full- and part-time students, 8,400 of whom are enrolled in graduate studies. The bachelor's degree is offered in 142 programs, the master's degree in 140, and the doctorate in 89, plus other degrees available in 12 fields. The University offers nearly 400 fields of study. Its more than 130,000 active alumni are represented in every community in Arizona, all of the United States, and in many foreign countries.

The University is located about one mile from the downtown area in Tucson - the center of a rapidly growing metropolitan area with a population of more than 650,000.
In 1962, the Arizona Board of Regents granted authorization to The University of Arizona to develop a College of Medicine. Ground was broken in May 1966 for the Basic Sciences Building which was completed in September 1967 and occupied that same month by the 32 students of the first class.

A second class of 32 students entered the College in the fall of 1968, and the first full class of 64 students was enrolled in September 1969. In May 1971, the M.D. degree was granted to the members of the first graduating class and to date more than 1,500 students have been graduated. Since 1976 the size of the entering class has been 88 students. The College of Medicine presently has an enrollment of more than 350 full-time medical students.

Through the sale of self-liquidating bonds and additional matching funds from the United States Public Health Services, planning was completed for the Clinical Sciences Building and 275-bed University Hospital (now called University Medical Center). Construction was begun in the summer of 1968 and completed in July 1971.

Mission of the College of Medicine

The primary mission of the College of Medicine is: “1) to educate physicians and other biomedical scientists, 2) to make nationally and internationally recognized contributions to both basic and clinical biomedical research, and 3) to provide models of excellence in patient care.” (Adopted at the General Faculty Meeting, May 15, 1984).
Physical Facilities

The Arizona Health Sciences Center complex consists of six interconnected buildings, and adjoining structures, on a 30 acre site just north of the main campus. These consist of the Basic Sciences Building, the Clinical Sciences Building, Outpatient Clinics, University Medical Center, the Arizona Cancer Center and Life Sciences North. The Family Practice Center, Faculty Office Building and Biomedical Research Laboratories, the Dermatology unit, the Radiology Research Building and the Division of Educational Development and Support are housed in adjacent buildings. Planned for construction in the near future or under construction are a Children’s Research Center, a Heart Center, a parking structure and additional office and laboratory space. The Colleges of Nursing and Pharmacy are located just South of the Basic Sciences Building.

A student wing of the Basic Sciences Building houses the multidisciplinary laboratories, Anatomy laboratories, medical computing center, lecture rooms, conference rooms, student lounge and support facilities. Centralized animal quarters, administrative services and part or all of the seven basic science departments are also housed in this building.

Library

The Arizona Health Sciences Center Library was one of the earliest units planned for the College of Medicine, opening its doors in September 1967 when the first class began studies. Currently serving the entire Health Sciences Center, the library occupies 33,000 sq. ft. and maintains a collection of 165,000 volumes, 3,400 media programs and subscribes to 3,500 journals and serials. It is open 24 hours every day, except Christmas and New Year’s Day.
The library is a member of the nationwide medical library network founded by the National Library of Medicine and serves as the designated resource library for Arizona through the Pacific Southwest Regional Medical Library Service. Its resources are available not only to students and faculty of the University, but also to health care providers throughout Arizona.

Reference librarians are available to provide assistance in using the resources of the library effectively, consult with library users to solve complex information queries, formulate and perform computerized literature searches and locate factual information. Sessions on medical bibliography and information retrieval are offered in the College of Medicine curriculum. The Field Office provides similar services to library users outside the Tucson area and consultation services to hospital libraries.

The services of the library are many and most are computer enhanced. The catalog to the collection is online, allowing users to search for material in a variety of ways with a greater degree of specificity. Databases encompassing the journal literature are available for use by library users themselves or through the expertise of a reference librarian. A wide assortment of audiovisual titles in various formats (audiotapes, videotapes, videodiscs, slide/sound programs, slides and models) and eight study carrels, especially equipped to accommodate these formats, are also available. Electronic links with other libraries are maintained so that material not available locally can be obtained quickly for library users. Finally, the library houses the Microcomputer Learning Center, operated by the Division of Educational Development and Support, and the Arizona Poison and Drug Information Center, administered by the College of Pharmacy.

Clinical Facilities

University Medical Center is the primary medical center for the education of medical students, but other settings are also utilized. University Medical Center (UMC) is a private, non-profit institution with a separate Board of Directors. UMC operates under a lease arrangement with the Arizona Board of Regents which guarantees that the educational, service and research missions of the Colleges of Medicine, Pharmacy and Nursing will not be compromised. UMC’s management structure is designed to meet the modern financing and practice methods in the medical care system.

UMC is a 300 bed hospital, originally built in 1971, with many units which have undergone renovation in recent years. Modern inpatient units, an extensive outpatient facility and support services are contained within the Clinical Sciences Building. The Arizona Cancer Center was opened in 1986 and is a modern multidisciplinary facility for patient care, teaching and research in cancer and related disorders. UMC contains the only lithotripsy unit in Tucson, a magnetic resonance imaging facility and other modern diagnostic and therapeutic modalities.

Portions of the educational program are conducted at other health care facilities, including: Tucson Veterans Administration Medical Center, Tucson Medical Center, Kino Community Hospital, Crippled Children’s Clinic, El Rio-Santa Cruz Neighborhood Health Center and other Tucson hospitals and clinics. In addition, health care facilities in many of Arizona’s counties are used, in part, for educational rotations for medical students. In Phoenix, regularly conducted clerkships and elective activities are carried out at: Maricopa Medical Center, Phoenix Children’s Hospital, Good Samaritan Medical Center, St. Joseph’s Hospital and Medical Center, Phoenix Veterans Administration Medical Center, Barrow Neurological Institute and other hospitals and health care facilities. Faculty of the College of Medicine conduct all educational experiences, both at UMC and all other sites.
Educational Philosophy and Curriculum

The curriculum of the College of Medicine is determined by the faculty with consideration given to student evaluations, course and clerkship evaluations conducted at regular intervals, and national needs and priorities. It is not a static program, but is altered as is appropriate, after adequate study and reflection, to match the changing and educational needs of students. The overall purpose of the educational program is to provide our students with the capacity to learn medicine for the rest of their professional careers. This is accomplished by supplying them with the opportunity to learn what is currently known and unknown; with study habits which permit continuous acquisition of new knowledge and modification of formerly acquired information; with skills to conduct patient care activities and with professional attitudes consonant with their charge to care for those persons for whom they provide preventive and curative advice and treatment.

The curriculum comprises three years of required studies and one year of elective rotations. Half of the curriculum deals with the basic sciences critical to modern medical understanding and practice and the other half to practical, patient contact and clinical science instruction. Biologic, cultural, psychosocial, economic and sociologic concepts and data are provided. Increasing emphasis is placed on problem-solving ability, beginning with initial instruction and carried through to graduation. Excellence in performance is encouraged and facilitated. Awareness of the milieu in which medicine is practiced is also encouraged.

The learning environment encompasses lectures, small group instruction, independent study, clinical clerkships, practicums in physical diagnosis, computer-based instruction and a variety of other modes for the learner. Students learn in the classroom, conference room, laboratory, clinic and physician’s office, bed units of hospitals, special sites for diagnostic and therapeutic maneuvers and a rich variety of community inpatient
and outpatient settings. The elective portion of the curriculum permits experiences within and beyond the above-described educational system and includes programs abroad as well as those closer to home. Students are encouraged to learn from individual patient contacts, from family settings and from groups as small as neighborhoods to communities as large as the State of Arizona. Exposure is available with individual physicians in a one-to-one relationship, with groups of physicians, with large health maintenance organizations, with public health facilities and other governmental health care systems.

Full-time instructors, which include primary and specialty care physicians and scientists, resident physicians and community physicians in a variety of health care delivery models, comprise the faculty which facilitates student learning. The concept of the physician as an integral part of a complex health care delivery team is emphasized in these clinical exposures.

Upon completion of the first four years of study, the graduate of our system is prepared to enter the next phase of medical education - the residency of his/her choice. Graduate medical education (residency training) is available in The University of Arizona based programs in all of the traditional disciplines from primary care to the specialties. The faculty assists the students in applying for and successfully competing for residency programs in Arizona and throughout the United States. Our graduates have been praised by programs throughout the country for their preparation and professional attitudes. A number of graduates have become local practitioners in the State of Arizona and others have joined the faculty at The University of Arizona College of Medicine and other medical colleges.

Our graduates are also prepared to continue the process of life-long learning, having achieved a framework of knowledge and the tools to adapt that knowledge to practice, and to add to and modify it as the dynamic discipline of medicine adds to its core of concepts and information. Continuing educational programs are provided at the College
and many of our alumni return to continue this process of education throughout their professional careers.

The Curriculum

Orientation

Orientation to the medical school is provided to each incoming class during several days prior to the start of the initial semester. Students are introduced to the educational philosophy of the College, to the curricular elements, to methods for achieving optimal learning, to basic computer skills and to self-management skills. The advisory system, financial aid, student governance and other topics are also introduced at this orientation. An annual retreat is conducted during the orientation and is attended by all first-year students and selected faculty and members of the administration.

Basic Sciences

During the first year, gross anatomy, microanatomy, biochemistry, physiology, molecular and cellular biology, and neurosciences are taught in tandem with a course designed to introduce the student to clinical skills, Preparation for Clinical Medicine. To ensure that global and humanistic concerns are integrated into the phase in which biologic knowledge is being learned, the course on Human Behavior and Development begins in the spring semester and introduces a wide variety of broad topics that influence medical care and its delivery.

In the second year, the basic sciences of pathology, microbiology and immunology, and pharmacology are introduced and more sophisticated experiences are provided in the Preparation for Clinical Medicine course. Human Behavior and Development continues through the fall semester.

Computer instruction, initiated during orientation, is also enhanced by course work during the first year. In addition, various software medical educational packages are offered for self-instruction, evaluation and as part of the regular curriculum.

This sequence in the first two years ensures that the biologic framework of the human body is grasped by the student and that this knowledge is placed into the whole of human medicine. The student learns the structure and function of the cells, tissues and organs in health and in disease, the influence that the environment has on the human organism, and the effect of medication and drugs. At the same time, the psychosocial influences are incorporated into this framework and the student begins the process of acquiring those skills and attitudes essential to the practice of medicine. All courses have non-lecture instructional units integrated into their allotted hours. These units are designed to encourage the student to exercise problem-solving abilities, analysis and critical thinking.

In addition to the required curricular elements, a wide variety of Enrichment Electives is offered each year. These electives are designed to augment student experiences. A list of such Enrichment Electives is published and distributed each year.

Clinical Sciences

The third year of our curriculum is devoted to clinical clerkships, during which the student learns, under faculty supervision, by daily patient contact in the various disciplines of medicine. There are 48 weeks of required rotations as follows: Internal Medicine (12 weeks); Pediatrics (6 weeks); Obstetrics and Gynecology (6 weeks); Psychiatry (6 weeks); Family Medicine (6 weeks); General Surgery (6 weeks); Specialty Surgery (3 weeks); Neurology (3 weeks). The Specialty Surgery (3 weeks) may be taken in the fourth year, in which case the student can select an additional rotation of 3 weeks in length. For
students who select the Specialty Surgery (3 weeks) rotation in the third year, at least 33 weeks of electives are required in the fourth year. For students taking the Specialty Surgery (3 weeks) in the fourth year, 30 weeks of electives are required in the fourth year.

The fourth year curriculum is comprised solely of elective rotations. This year is planned in concert with a faculty advisor taking into account the student’s career goals, educational needs and preferences. Clinical and non-clinical electives are available in a wide variety of disciplines; available electives are published and distributed to students each year. Upon approval of the faculty advisor and the corresponding department at the College of Medicine, students can take up to 15 weeks of electives in approved programs outside of the College of Medicine.

As indicated earlier, facilities other than University Medical Center (UMC) are used in the educational programs. Students may be required to take at least a portion of the required curriculum in the clinical years outside of Tucson.

See pages 17-18 for the Outline of the Curriculum.

Curriculum Policies

University policy expects students to be regular and punctual in class attendance and affirms that students themselves are primarily responsible for attendance. Each instructor will provide students with a written statement of his/her policy in respect to absences.

Students wishing to petition for exemption from basic science courses may do so by directing requests to the departments. Such requests will be considered on an individual basis according to departmental policies and will be granted only in exceptional cases. Students in the basic science portion of the curriculum may enroll in various elective courses for which they meet the prerequisites and as they have available time. Under special circumstances these electives may be used to fulfill clinical science or elective year requirements with prior permission of the Curriculum Committee.

As part of their education, all students will be required to participate in laboratory experiments in which experimental animals will be used.

Division Of Educational Development And Support (E.D.S.)

The Division of E.D.S. assists the faculty in all aspects of the medical education process. The range of educational assistance includes: course development; teaching effectiveness documentation; faculty teaching improvement; test development and scoring; medical education research; ongoing assessment of the college curriculum and its impact on students. The members of E.D.S. contribute to the Curriculum Committee, curriculum subcommittees and administrative educational committees. Members of this division are responsible for the computer-facility instruction for medical students and offer an Enrichment Elective in Medical Computing.

Student Research Opportunities

Students are encouraged to participate in basic and clinical research activities. Under a five-year grant from the National Institutes of Health and a three-year grant from the American Heart Association, research experiences with stipends are provided to qualified medical students. In addition, extracurricular experiences (i.e., seminars and clinics on medical ignorance, course in research methodology, clinical research correlation seminars, a student research club and a research mentor-career advisor system) are offered. Student research is also funded through the Dean’s Office in the form of summer stipends, supply monies and travel support to encourage students to present their results at scientific meetings. A house at 1809 E. Lee Street (La Residencia del Incognito) serves as the Center for Student Research.
Graduate Education

Basic Sciences

A formal program leading to the award of the combined Ph.D./M.D. degrees is available. Students wishing to pursue the combined degrees must be admitted to both the Graduate College and the College of Medicine. Admission to the combined degree program after beginning medical college studies is permitted. Graduate study may be in any of the sciences basic to medicine, interdisciplinary programs such as cancer biology or neurobiology or in any graduate program available on the campus for which the applicant presents a rationale that is acceptable to the Combined Degree Advisory Committee. Certain courses taken in the graduate and medical curricula are applicable toward both degrees. Completion of both degrees usually requires 6-7 years. Persons interested should contact the Admissions Office of the College of Medicine (by letter or telephone) because of requirements for dual acceptance by two colleges.

Residency Training

Specialty training in the clinical disciplines is provided by Anesthesiology, Dermatology, Emergency Medicine, Family Practice, Forensic Pathology, General Surgery, Internal Medicine, Neurology, Nuclear Medicine, Obstetrics and Gynecology, Occupational Medicine, Ophthalmology, Orthopedics, Pathology, Pediatrics, Preventive Medicine, Psychiatry, Psychiatry-Child, Radiology Diagnostic, Radiology Therapeutic, Radiology with Special Competence in Nuclear Radiology, Thoracic Surgery, Urology and Vascular
Surgery. Further information concerning these programs may be obtained by contacting the program director in each instance.

**Postgraduate Education**

Continuing Medical Education serves as a central resource for the coordination, integration, facilitation, accreditation and evaluation of continuing medical education for the faculty and the physicians of Arizona and elsewhere. The goals and objectives of the continuing education program include supporting the continuing professional development of physicians by offering opportunities to enrich and extend their medical education. Continuing Medical Education offerings communicate information about state-of-the-art medical practice to physicians throughout Arizona and disseminate to physicians elsewhere changes in medical practice resulting from research and development activities of the College of Medicine faculty.

The Mini-Residency Program: A departmentally based program that provides educational experiences in the academic setting of the College of Medicine for practicing physicians. An educational program utilizing conferences, rounds, appropriate elements of the undergraduate and graduate teaching programs and patient care activities is designed to meet the expressed interests and educational needs of each physician.

For information on specific programs, please contact Continuing Medical Education, The University of Arizona College of Medicine, Tucson, Arizona 85724 (602) 626-7832.
CURRICULUM OUTLINE

Basic Sciences

YEAR I

Fall Semester
- GROSS ANATOMY 190 hours
- MOLECULAR & CELLULAR BIOLOGY 70 hours
- NEUROSCIENCES 50 hours
- MICROANATOMY 75 hours
- SOCIAL & BEHAVIORAL SCIENCE 16 hours
- PREPARATION FOR CLINICAL MEDICINE 20 hours

Spring Semester
- NEUROSCIENCES 60 hours
- PHYSIOLOGY 92 hours
- BIOCHEMISTRY 72 hours
- SBS 113 hours

YEAR II

Fall Semester
- PATHOLOGY 152 hours
- MICROBIOLOGY & IMMUNOLOGY 124 hours
- PCM Preceptorship 60 hours
- PCM 36 hours

Spring Semester
- PATHOLOGY 157 hours
- PHARMACOLOGY 100 hours
- PCM 87.5 hours
- PCM 123 hours

Important events
- Orientation
- Christmas/New Year's Recess
- Two-Month Vacation
- Christmas/New Year's Recess
- Practice NBME Part 1

Breaks
- Fall Recess
- Spring Recess
- Fall Recess
- Spring Recess
- Board Study

17
CURRICULUM OUTLINE

Basic Sciences

YEAR III

Summer

CLERKSHIPS - 48 weeks required

YEAR IV

Summer

Late Spring

ELECTIVES - 33 weeks required

Of the 33 weeks required, 18 units must involve patient contact and 18 units must be supervised by College of Medicine faculty.

INTERNAL MEDICINE
12 weeks required

SURGERY
6 weeks required

SPECIALTY SURGERY
3 weeks required

PEDIATRICS
6 weeks required

OB/GYN
6 weeks required

FAMILY & COMMUNITY MEDICINE
6 weeks required

PSYCHIATRY
6 weeks required

NEUROLOGY
3 weeks required

ELECTIVE OFFERINGS

<table>
<thead>
<tr>
<th>Department</th>
<th>Number of Subjects</th>
</tr>
</thead>
<tbody>
<tr>
<td>Anatomy</td>
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<tr>
<td>Anesthesiology</td>
<td>8</td>
</tr>
<tr>
<td>Biochemistry</td>
<td>2</td>
</tr>
<tr>
<td>Family &amp; Community Medicine</td>
<td>37</td>
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<tr>
<td>Internal Medicine</td>
<td>52</td>
</tr>
<tr>
<td>Microbiology &amp; Immunology</td>
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<td>Molecular &amp; Cellular Biology</td>
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<td>Obstetrics &amp; Gynecology</td>
<td>11</td>
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<tr>
<td>Interdepartmental Seminars</td>
<td>10</td>
</tr>
</tbody>
</table>

(See Electives Manual for course details)

June

OSCE

NRMP Match

September

NBME Parts I & II

February

NBME Part II

Graduation

Vacation

Christmas/New Year's Recess

Spring Recess

Christmas/New Year's Recess

Twelve weeks of unscheduled time during the two Clinical Sciences years are available for vacations and interviews.
ADMISSIONS

Admission to the First-Year Class

GENERAL: The University of Arizona College of Medicine follows the recommended application and acceptance procedures of the Association of American Medical Colleges (AAMC). These may be found in the most recent copy of the Medical School Admissions Requirements book, published annually by the AAMC. Everyone interested in attending medical school should consult this book, as it contains a great deal of useful information. The most recent copy may be obtained for $10.00 by writing to the AAMC (address on page 25).

Acceptance to The University of Arizona College of Medicine is based upon an assessment of the applicant's intellectual and personal traits, fulfillment of certain prerequisites outlined below, and consideration of the applicant's state of residence. All applicants who wish to be considered must be U.S. citizens or have permanent resident visas. Preference is given first to residents of Arizona and Native Americans living on reservations contiguous with the state of Arizona. Preference is also given to highly qualified applicants who are residents of Alaska, Montana and Wyoming, and are certified and will receive full and uninterrupted funding by the Western Interstate Commission for Higher Education (WICHE). Applicants from states other than these cannot be considered. In evaluating applicants, the Admissions Committee considers ability and scholarship as indicated by the entire academic record, the results of the Medical College Admission Test (MCAT), personal statement, college preprofessional committee evaluations, letters of recommendation, health related experience and personal interviews. Also considered is breadth of the undergraduate education, whether in the humanities, social sciences, natural sciences, etc. No preference is given to any particular kind of undergraduate major (see Admission Process).

PREREQUISITES: The College of Medicine encourages applications from all interested students irrespective of their college major. However, the following minimum requirements must be met by the end of the Spring Semester prior to matriculation:

1. Applicants must successfully complete at least three full years of study (90 semester hours or 135 quarter hours) at an accredited college or university, including 30 semester hours (45 quarter hours) of upper division courses. Applicants educated outside the United States must have completed at least two full years of study in an accredited college or university in the United States or Canada prior to application.

2. Applicants must successfully complete two full semesters (three quarters), or equivalent, in each of the following areas: general chemistry, organic chemistry, physics, general biology or zoology, and English.

3. Applicants are strongly urged to take the MCAT in the spring of the year of application and to have their premedical requirements completed at the time of application. The MCAT must have been taken no earlier than two years prior to application (April 1988) and no later than the fall prior to the year of anticipated entrance (September).

APPLICATION PROCEDURE: The University of Arizona College of Medicine participates in the American Medical College Application Service (AMCAS). Persons
seeking admission to the entering class must process their applications through AMCAS, even if this is the only school to which they apply. Those wishing to make application for the class entering in 1991 should follow the steps outlined below:

1. Arrange to take the Medical College Admission Test (MCAT), preferably in the Spring prior to application, by writing to the American College Testing Program (address on page 25).

**BETWEEN JUNE 1 AND NOVEMBER 1, 1990**

2. Obtain an AMCAS application packet. An application may be obtained either by using an AMCAS Application Request Card, available from any participating medical school or the AMCAS application packet itself which is available from most preprofessional advisors.

3. Complete and return the AMCAS application. Follow instructions in the application packet and return the completed application to the AMCAS office. (Please do not send this material to the medical school.) You must request that the registrar of every junior college, college and university you have attended forward official transcripts directly to the AMCAS office by November 1, 1990. All transcripts should arrive before your application reaches the AMCAS office to eliminate any delay in processing your materials. In your instructions to AMCAS, you designate the medical schools to which you wish to apply and pay a fee based on the number of those schools. Even if you have previously applied to this school, or any other school under AMCAS, you must submit an entirely new application and transcripts each year.

4. Return AMCAS application by November 1, 1990. The deadline for your application to The University of Arizona College of Medicine is November 1, 1990. Your AMCAS application and all transcripts must be received in Washington by this date. Please allow sufficient time for mail delivery since applications received in Washington after this date cannot be considered by this college.

5. Await notification of receipt of application. You will receive notice first from AMCAS and later from this college that your application has been received. The AMCAS application constitutes the preliminary application to this College of Medicine.

6. Initial screening of applications. After an initial screening to determine your state residency, you will be notified as to the disposition of your preliminary application. Those who will not be considered further are notified as soon as possible so they may concentrate their efforts on other schools.

7. Receipt of supplementary materials. Those who pass the initial screening process will receive a packet of supplementary materials that are specific to The University of Arizona College of Medicine. Instructions are provided with the packet, and all materials should be returned directly to the Admissions Office, College of Medicine, The University of Arizona, Tucson, Arizona, 85724. (Please do not send any of this material to AMCAS.)

8. Invitation to appear for personal interview. All applicants receiving supplementary materials will be invited to appear for a personal interview at the College of Medicine. All appointments are made by the Admissions Office. Since the personal interview is an integral part of the admission process, no applicant can be considered without it. At the time of the interview, you will have an opportunity to meet with a medical student and tour the Health Sciences Center. Interviews take place between October and January. Interviews are conducted over the Christmas holiday period primarily for those applicants attending schools outside Arizona. However, where travel to Tucson would result in an
undue financial burden, it may be possible to arrange for interview summaries to be sent from other schools where the applicant has been interviewed. Such requests may be made at the time you are invited for your interview.

9. Notification that file is complete. After all your materials have been received and you have had your interview, you will be notified that your application is complete. The Admissions Office will periodically review all files and notify you if any materials are still missing. We strongly recommend that you complete your file prior to December 31, 1990, since notification of Admissions Committee actions take place between January and March of 1991.

JANUARY 15 TO MARCH 15, 1991

10. Notification of action by the Admissions Committee. In early December 1990, the Admissions Committee will begin to take action on all applicants whose files are complete. Letters of acceptance will be sent on January 15, February 15 and March 15, 1991 (or the first working day thereafter). Notification of rejection or alternate status will be sent out on March 15, 1991.

11. Accepted applicants must submit a letter of intent within two weeks, to retain their place in the class. No deposit is required. Accepted students are encouraged to withdraw their application from medical schools of lower preference. Many well-qualified students are Alternates each year. It is the obligation of each accepted applicant to withdraw upon making a decision to go elsewhere, in order to give those not yet selected the opportunity to compete for a vacancy in the class.

AFTER MARCH 15, 1991

12. An applicant holding a position on the Alternate List may receive an acceptance at any time, if a place becomes available.

13. Final acceptance for enrollment for all accepted applicants is contingent upon a continued satisfactory level of academic and personal performance, completion of required course work by the end of Spring Semester, 1990 and all other requirements. Certified WICHE acceptees (Alaska, Montana, and Wyoming) must provide evidence of full and uninterrupted funding from their state of origin. Failure to meet these conditions will be cause for withdrawal of the acceptance.

14. Any student accepted for enrollment who wishes to be exempted from any medical school course may petition the appropriate department to be relieved of the necessity of taking the department's formal course. The decision rests with the individual department and is based on the merits of each request.

Admission Process

Applicants apply directly to the American Medical College Application Service (AMCAS). The application will be reproduced and sent to all the schools to which the applicant wishes to apply. When AMCAS applications are received at the College of Medicine, they undergo an initial screening. All Arizona residents are sent additional materials and invited for personal interviews. Highly qualified WICHE certified and funded applicants from Alaska, Montana and Wyoming, who have passed the initial screening, are sent additional materials and invited for a personal interview. All applicants who are residents of any other state are automatically sent a letter informing them they are not eligible. The deadline for applications is November 1, 1990.
The Admissions Committee uses five major criteria in the selection of students: academic record, Medical College Admission Test (MCAT) scores, personal statement, college preprofessional committee evaluations (or letters of recommendation), and results of personal interviews. Consideration of the academic record includes not only grades, but trends in the grade point average, course loads, work experience while going to school, breadth of the undergraduate education, extent of extracurricular interests and pursuits, and other factors which might directly or indirectly influence the individual's total academic performance. The MCAT scores provide a national comparison of each student with all those seeking admission to medical school. Applicants are asked to have letters of recommendation submitted from either a Preprofessional Committee at their university or from three individual faculty members. Use of the Committee at your school is very strongly recommended. If individual letters are submitted, they should be from two science faculty members and one nonscience faculty member. All must be from professors under whom you have taken courses.

Each applicant will have three interviews at the College of Medicine and one interview with a physician in practice. We encourage submission of a letter to document the extent and evaluation of the applicant's health-related activity. The four interviews are on a one-to-one basis. The interviewers are asked to evaluate the applicant's ability to relate to another individual in the interview situation and to ascertain, from the interview, their impression of the applicant's overall desirability as a future physician. The interviewers also attempt to gain some insight into the applicant's family background, outside interests, and the duration and depth of interest in medicine. The interviewers have no prior information about the applicant. They forward their impressions to the Admissions Committee, which has access to all other data.

The Admissions Committee reviews all completed applications. All facets of the record are considered. The amount of consideration given to the academic record, MCAT scores, MCAT essay, personal statement, preprofessional evaluation, or letters of
recommendation, health related experience, and results of the personal interviews, depends on each individual on the Committee. At Admissions Committee meetings, each applicant's file is reviewed and discussed by the members of the Committee. The vote of the Committee determines who is accepted. Acceptances are based on the evaluation by the members of the Admissions Committee regarding each applicant and the relationship of each applicant to every other applicant. In this way, an attempt is made to be as fair as possible to all persons applying to medical school by utilizing all the information available to the Committee.

The Committee selects sufficient applicants for acceptance to fill the class and a reasonable number to be placed on the Alternate List. All other applicants are notified that their applications are not competitive and, therefore, they are no longer under consideration.

Minority Applicants

The College of Medicine has an active program dedicated to the recruitment, admission, education, and graduation of an increased number of individuals from ethnic minority groups. Faculty members participate in all aspects of the program.

Rural Arizonans

Special consideration will be given to individuals who have lived half their lives in rural Arizona communities outside the state's major metropolitan areas and who desire to return to such an area to practice medicine. A form requesting this special consideration will be included with the supplementary materials.

Admission by Transfer

Applications for transfer to the College of Medicine are welcomed from students who satisfy the conditions outlined below. Applicants are treated as competitors for any available places. Positions become available only through attrition.

1. Applications will be considered from residents of the several states as follows:
   a. Arizona residents matriculated in four-year U.S. medical schools or U.S. schools of osteopathy.
   b. Residents of Alaska, Montana and Wyoming (who are WICHE certified and will receive full and uninterrupted funding) matriculated in foreign medical schools (WHO-listed).
   c. Arizona residents matriculated in foreign medical schools (WHO-listed).

2. Applicants must meet the following academic criteria:
   a. Applicants must successfully complete at least three full years of study (90 semester hours or 135 quarter hours) at an accredited college or university, including 30 semester hours (45 quarter hours) of upper division courses. Applicants educated outside the United States must have completed at least two full years of study in an accredited college or university in the United States prior to application.
   b. Applicants must successfully complete two full semesters (three quarters), or equivalent, in each of the following areas: general chemistry, organic chemistry, physics, general biology or zoology, and English.
   c. Must have taken the MCAT.
   d. Must have completed all of the basic sciences as a matriculant in a LCME accredited U.S. or Canadian, osteopathic, or WHO-listed foreign medical school and provide evidence (an official transcript is required) of having
successfully completed a course of study which includes the content of the following courses: anatomy, biochemistry, microbiology, pathology, pharmacology, physiology, and behavioral sciences.

3. Where adequate training in history-taking and physical examination is not apparent from the applicant's record, at the discretion of the Admissions Committee, the applicant will be required to participate in an especially prepared course of study in these areas.

4. Applicants whose credentials indicate deficiencies in other areas of study covered during the basic science curriculum will be held responsible for this material through self-study and will be expected to perform at the same level as the students who have completed the first two years at The University of Arizona College of Medicine.

5. All applicants must take Part I of the National Board Examination prior to being considered by the Admissions Committee. Please contact the AAMC for registration materials and deadlines (see page 25 for address).

6. Applicants who are on an official leave of absence of not more than one year will be considered. A letter substantiating this leave must be submitted from the applicant's medical school.

7. All accepted transfers will be required to pass Parts I and II of National Boards in order to graduate.

8. All applicants who meet the listed criteria and are under consideration will be interviewed at the College of Medicine.

9. All applicants must have official transcripts submitted from all undergraduate and graduate schools.

10. Applicants must have letters of recommendation sent directly to the Admissions Office from professors under whom they have taken courses, or from physicians
under whom they have done clerkships or externships. A minimum of three letters is required. If you are attending a U.S. medical school, a letter from the Dean of the school is also required, stating that you are currently enrolled and a student in good standing.

11. Applicants are advised that, if accepted, they will enter into the third year of our program and will be required to complete all of the last two years of our curriculum.

12. Applicants must apply directly to this College of Medicine. Applications will be available after November 1st - deadline for receipt of application and domicile affidavit is March 31st.

List of Important Addresses

The University of Arizona
College of Medicine
Tucson, Arizona 85724
Admissions Office (602) 626-6214 or 6215
Student Affairs (602) 626-6216

Association of American Medical Colleges
(AAMC)
Suite 200
One Dupont Circle, N.W.
Washington, D.C. 20036
(202) 828-0570

American Medical College Application Service (AMCAS)
Association of American Medical Colleges
Division of Student Services
Suite 301
1776 Massachusetts Avenue, N.W.
Washington, D.C. 20036-1990
(202) 828-0600

National Board of Medical Examiners (NBME)
3930 Chestnut Street
Philadelphia, Pennsylvania 19104
(215) 349-6400

Medical College Admission Test (MCAT)
c/o American College Testing Program
2255 N. Dubuque Road
Box 414
Iowa City, Iowa 52243
(319) 337-1276

Educational Commission for Foreign Medical Graduates (ECFMG)
3624 Market Street
Philadelphia, Pennsylvania 19104
(215) 386-5900
STUDENT AFFAIRS

Orientation

Orientation occurs on the three days prior to the start of classes and includes a one and a half day retreat. Its purpose is to acquaint the student with classmates, curriculum information, computer instruction, upperclassmen, members of the administration, faculty and staff. Activities will include registration and the procedural matters related to enrollment. Information and schedules of activities are sent to entering students during the preceding spring and summer.

Housing

Medical students must assume the responsibility for making their own living arrangements. However, assistance in finding accommodations in University housing is available from the Director of Residence Life. Rooms in the University residence halls are available through the Department of Residence Life for unmarried students on a space available basis, according to date of application.

Married students may apply for a unit at The University of Arizona’s Family Housing Project. The project consists of 420 one-story apartments, either furnished or unfurnished, located in northeast Tucson about a 15 minute drive from the Health Sciences Center. Students may have their names placed on the waiting list immediately after being accepted by the College of Medicine. Further information concerning married student
rental units may be obtained by contacting the Family Housing Office, The University of Arizona, 3401 North Columbus Boulevard, Tucson, Arizona 85712.

For additional information relevant to housing, consult the two daily Tucson newspapers and the daily student newspaper. The Associated Students' Office in the Student Union Memorial also maintains a list of available housing.

**Student Health Service**

All students matriculated in the College of Medicine are eligible for care at The University of Arizona Student Health Service. If an illness requires other than routine care or the services of an outside physician or consultant (major injury, complicated medical illness, major fractures or extraordinary services), the cost of such services must be borne by the student. For this reason, all students will be required to show documentation of valid health insurance coverage. Such supplemental insurance may be purchased at the time of registration. For a more complete description of the services available at the Student Health Center, the student is advised to consult the General Catalog of the University.

Students enrolled in the College of Medicine are required to submit proof of a tuberculosis skin test within six months of admission. Thereafter, repeat chest x-rays and skin tests will be done when deemed appropriate. Students must also submit proof of having had measles (rubeola) or been vaccinated against it. Hospital policy mandates immunity to rubella. Students who cannot document immunization will receive live rubella virus vaccine irrespective of age. Hepatitis B immunization is also required. In all instances, these tests and vaccinations will be provided by the Student Health Service and their cost will be borne by each student involved.

**The Code of Scholastic Conduct**

Students who enter the College of Medicine find themselves in the company of scholars, each of whom is working to expand his/her own knowledge, to extend the boundaries of human knowledge and to apply knowledge in the service to their fellowman. The faculty and students of the College of Medicine require that a man/woman shall act honorably in all the relations and phases of student life, and therefore, all work is conducted under an honor system. The essence of the system is that a student's word can be accepted without question as to truth and any violation of a student's word is an offense against the entire student body. The fundamental demand that the honor system makes on the individual is that each one resist less than honorable means to attain a desired end. The honor system is not an end in itself but is a framework for behavior and a means of inculcating a spirit of integrity which should sustain the student throughout his/her lifetime.

All scholastic behavior in the College of Medicine is regulated by a Code of Scholastic Conduct. Each accepted student, before matriculating, is required to read and sign a statement that he/she will abide by the Code. The Code of Scholastic Conduct shall be read to all entering students at Orientation.

**Advising and Counseling**

The Office of Student Affairs coordinates the advising and counseling functions for medical students. A systematic faculty advisory system is in place and is augmented by a committee advisory system. The advisory systems are designed to help students with academic decisions, provide guidance about professional behavior and career choices, and in general, help the student in the process of becoming a physician. The Assistant Dean
for Student Affairs is a family physician who provides counseling to students directly, and can also assist students in getting counseling services and therapy from mental health care professionals on campus and/or in the community. All services are provided on a strictly confidential basis.

Advisory Council

In order to assist students in developing their fourth year curriculum and obtaining advice regarding residency programs, an Advisory Council has been established made up of faculty representatives from each of the residency training programs as well as two basic scientists. This committee is responsible for reviewing the student's individual schedules and overseeing the advising of students who are interested in each of the residency programs. The committee is also the focal point for updated information regarding various residency programs and the NRMP.

Student Representatives

Students may actively participate in the affairs of the College of Medicine in a number of important and constructive ways. On a formal level, each class elects two representatives who are members of the College of Medicine Student Council. All other elected student representatives to other committees are also members of this body. The Class Representatives meet regularly with the Dean's staff to discuss issues of mutual concern. In addition, the Medical Student Council supervises the selection of student representatives to various faculty-student committees. Examples of these are the Curriculum Committee, Student Progress Committee, Committee of Nine, Honors and Awards Committee and various subcommittees of these. A number of departments actively seek student representation for various departmental decision-making and advisory groups.

The formal election of representatives in no way prevents a student from discussing with any member of the faculty or administration issues of concern to that student. All students are encouraged to participate in the affairs of the college to the extent of their time, interest and inclination.
FINANCIAL INFORMATION

Expenses

In considering the cost of attending medical school, the student must take into account not only educational expenditures but also subsistence and personal obligations such as dependents. The basic academic budget for a student living off-campus is approximately:

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<th></th>
<th>Year I (10 mos.)</th>
<th>Year II (12 mos.)</th>
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<td><strong>Tuition/Fees</strong></td>
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<td><strong>Resident</strong></td>
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<tr>
<td><strong>Books/Supplies</strong></td>
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<td>(Microscopes provided)</td>
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<tr>
<td><strong>Room/Board</strong></td>
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<tr>
<td>(includes $90 for Boards)</td>
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<td><strong>TOTAL</strong></td>
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*Budgets subject to final approval by the Financial Aid Office; Year III and Year IV budgets are available through the Medical Financial Aid Office.

Clearance of Accounts - All candidates for the M.D. or M.D./Ph.D. degree are required to clear any indebtedness to the University before a certificate of completion of degree requirements or diploma will be released.

Financial Assistance

The College of Medicine is fortunate in that many individuals and organizations have contributed scholarship and loan funds specifically designated for medical students. Among the many persons and organizations to whom we owe our sincere thanks are:

Scholarships

Robert F. Allen Memorial Award in Cancer
Elizabeth Allison Memorial Scholarship Fund
American Indian Scholarships, Inc.
American Medical Association/ERF Rock Sleyster Memorial Scholarship
John A. Noon and Helen Noon Anderson Memorial Scholarship
ARCS Foundation, Inc.
Arizona Medical Association Scholarship Program
Dr. Henry G. Atha and Grace L. M. Atha Memorial Scholarship
Robert Bergquist Memorial Fund

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Berkley Scholarship
Nelson C. Bledsoe Scholarship
Earl Bluestein Scholarship Fund
Dan Bright Scholarship Fund
Louis Cobb Memorial Scholarship
John S. Collins Scholarship
Joseph Collins Memorial Scholarship
Herman E. Demund Memorial Scholarship
Duncan Dietrich Medical Scholarship
E. Blois du Bois Foundation, Inc.
Eddie and Madelyn Earl Memorial Scholarship
Leon and Helen Feinberg Scholarship
Mary Margaret Fisher Scholarship Trust Fund
Charles W. Hall Memorial Scholarship
Howard Melville Hanna Memorial Scholarship
Dr. Cruz M. Hernandez Scholarship Fund
Josephine Hess Memorial Scholarship
Benjamin S. and Estella C. Hill Foundation
Nancy Jensen Scholarship in Medicine
Louis J. and Lois B. Kettel Endowment Scholarship Fund
Knights of Pythias Scholarship
Victor H. Lytle Book Scholarship
Josephine Madara Memorial Scholarship
Dr. Ruth Mahnken Memorial Fund
Marshall Foundation for Arizona Women
Salvador Mazza Scholarship
Fred C. McCormick Scholarship
Hilton J. McKeown Scholarship Fund
Medical Alumni Fund
Metzger Scholarship Fund
John A. Mulcahy Scholarship
National Medical Fellowships, Inc.
Leilani K. Parker Memorial Scholarship
Dr. Arthur J. Present Scholarship
Dr. George D. Reay Memorial Scholarship
Duncan Reid Memorial Scholarship
Alix K. Remillard Scholarship
Rosenthal-Gallagher Trust for Medical Education Endowment Fund
Francis A. Roy and Dorothy Roy Memorial Scholarship in Medicine
Schudder-Smith Scholarship in Medicine
M.A. and Greta Schuele Scholarship
Delbert L. Secrist, Sr., Memorial Scholarship
Sensory Research Foundation Scholarship
Milton L. Shifman Scholarship
Blake Shumway Memorial Fund
Bernice P. Simon Memorial Scholarship
Mary Woodman Smith Memorial Scholarship in Medicine
George F. Spaulding Scholarship
Special Assistance Fund-College of Medicine
Clara and Oliver Springer Scholarship Fund
Florence Thompson Scholarship Fund
Kathleen Thompson Book Fund
Tucson Community Foundation
William B. "Bill" and Dr. H. H. Varner Scholarship
Hans and Julia Voight Memorial Scholarship
Dr. Samuel Humes Watson Medical Scholarship
Clara Seippel Webster Memorial Scholarship
Alma L. Wilson Memorial Scholarship
Dr. Boris Zemsky Memorial Fund-Psychiatry

A number of other scholarships have been donated anonymously.

Loans

American Medical Association Loan Fund
Arizona Medical Association Auxiliary Loan Fund
State of Arizona Medical Student Loans
Josephine F. Bennett Foundation Loan Fund
College of Medicine Emergency Loan Fund
Dougherty Foundation, Inc.
Dr. Paul S. Gaddis Memorial Loan Fund
Health Professions Student Loan Fund
Elizabeth Banes Mann Loan Fund
Marshall Revolving Loan Fund
MEDLOANS Alternative Loan Program (ALP)
Charles W. Sechrist Emergency Loan Fund
University Medical Center Auxiliary Emergency Loan Fund
Roy Whitehead Memorial Fund
Awards

Alpha Omega Alpha Inductees for Academic Excellence
American Medical Women's Association Awards
The Arizona Medical Association Prize
The Arizona Medical Association Travel Awards
Brayton Memorial Family Practice Award
Edith Petrie Brown Community Service Award
Marshall Brucer Award in Radiation Medicine
Ciba Award for Community Service
Jeff Fulginiti Memorial Award in Adolescent Medicine
Grobe Award in Family Practice
Hewlett-Packard TopGrad Academic Award
Honors and Awards Committee Excellence in Research Award
Ishiyaku/Piccin Academic Excellence Book Award
Eleanor Johnson Academic Excellence Award
Robert Wood Johnson Health Policy Fellowships
The Roy Killingsworth Award for Psychiatry
The Alvin T. Kirmse Memorial Prize in Obstetrics
The Lange Book Award for Academic Excellence
Jack M. Layton, M.D. Award for Excellence
The Merck Manual Award for Academic Excellence
Milan and Dorothy Novak Pulmonary Awards
The Bernard Revisn Memorial Scholarship
Sandoz Award for Academic Excellence
The University of Arizona Foundation Outstanding Senior Award
Upjohn Award for Outstanding Academic Achievement

Allocations of financial assistance are made solely on the basis of need and according to the availability of funds with the exception of several awards which are given for a combination of academic achievement, community involvement, personal characteristics, etc. Only those students whose personal savings, earnings and aid from family sources are inadequate to meet their needs can be considered for financial assistance. Such determinations are made only after an applicant has been accepted to the College of Medicine.

Generally, the resources of the College of Medicine are insufficient to meet the total needs of the students. Outside sources must then be employed. Additional loans are available to Arizona medical students through Stafford Loans (formerly GSL), Health Education Assistance Loans, and Supplemental Loans for Students. The American Medical Student Association and the National Association of Residents and Interns offers loans to senior medical students. The Army, Navy and Air Force, as well as the Arizona Student Loan Board, offer financial assistance in return for service commitments. Applications may be obtained from the Student Financial Aid Office of the College of Medicine.

For emergency situations, special short-term loans can be obtained from the Student Financial Aid Office.
STUDENT PROGRESS

General

Student progress, in its broadest sense, includes not only the system used to evaluate academic performance, but also the guidelines for academic and nonacademic performance, the procedures used to monitor student progress, as well as the structure of the student counseling and advising systems. The faculty and administration of the College of Medicine continually review all aspects of student progress. From these reviews over the years, several basic features have become apparent. First, the grading and evaluation system must be fair and informative to both faculty and students and should minimize competition between students while encouraging the acquisition of skills and knowledge. Second, it is essential to identify, as early as possible, those students with potential academic or nonacademic problems and to provide appropriate constructive remedies. Third, mechanisms must be available to insure that only qualified candidates receive the M.D. degree. Finally, it is necessary to provide a fair and impartial method of appeal for those students against whom there is adverse action for academic or nonacademic reasons. Within this broad framework, information pertaining to each area is set forth below. This information represents a compilation from several source documents which are on file and may be reviewed in the Dean's Office.

Evaluation System

The College of Medicine utilizes an Honors-Pass-Fail grading system augmented by narrative evaluations of student performance in each medical school course or clerkship. Specific grades that may be awarded include:

- S = Honors; High performance based on individual course standards
- P = Pass; Satisfactory completion of course
- F = Fail; Unsatisfactory completion of course
- I = Incomplete; Awarded at the end of a course when a small portion of a student's work is incomplete and when the student would be required to complete only that portion to earn a passing grade. This grade reverts to a Fail if not completed within one year.
- W = Approved withdrawal
- K = Course in progress
- Y = Grade not reported

Prior to a specified time, which is approximately one-third of the way through each course, or ten days after the mid-term examination, a student will receive the grade of W, upon withdrawing from a course. After this time, however, the grade of W may be awarded only if the work is at a passing level; otherwise, the grade of F is recorded.

Any student whose performance is marginal or failing at any point during a course will be so notified in writing. The notification is intended to alert the student of potential problems and to encourage the use of tutorial or other appropriate assistance.

Written, narrative evaluations for each student are submitted to the Student Records Office at the conclusion of each course along with the specific grade. These narrative evaluations detail individual strengths and weaknesses of performance and are intended
to provide feedback to the student, data for the Student Progress Committee and information for the Dean's letters of recommendation. All students may request to see their own evaluations by contacting the personnel in the Student Records Office. Any student with questions about an evaluation may contact the course coordinator directly or consult with the Associate Dean for Student Affairs.

Under this system, no attempt is made to determine specific class standing. However, the College of Medicine Honors and Awards Committee reviews all written evaluations in order to identify outstanding student performance. Students so selected may receive an award at graduation and/or may be elected to the medical honor society, Alpha Omega Alpha.

**Student Progress Guidelines**

The Student Progress Committee is given the responsibility to monitor and evaluate student performance and to make decisions appropriate to each individual case. This committee consists of eight elected faculty members and one student from each class. The Committee is charged with reviewing the record of each student at least once each year. The purpose of such a review is: First, to identify performance problems sufficiently early to recommend appropriate action for the prevention of future problems and; second, to recommend actions for those who fail a course (or courses).

The academic guidelines utilized by the Student Progress Committee include the following:

1. To be academically qualified for graduation, a student must pass all required courses and the requisite number of elective courses, as well as pass Part I and Part II of the National Board of Medical Examiners examination.
2. Continued enrollment in the College shall be contingent on satisfactory academic performance as defined below.
3. The Student Progress Committee shall order dismissal in any case where a student fails one course for a second time or where a student fails three (or more) courses in medical school. A failure will be counted as such even if the student has subsequently passed the course.
4. In cases where a student fails a course not requiring an order of dismissal, the Student Progress Committee may recommend whatever action is deemed appropriate to the particular situation, including dismissal, although the latter would occur only under exceptional circumstances.
5. Transfer students. In the case of students who transfer to the College of Medicine for the clinical sciences portion of the curriculum, the Student Progress Committee shall order dismissal in any case when a student fails one course for the second time or when a student fails two (or more) courses in medical school. (For purposes of this paragraph, a failure will be counted as such even if the student has subsequently passed the course.) Failures incurred prior to transfer will not be considered. Other academic guidelines apply, unaltered, to transfer students.

There are certain time constraints on student progress, although these are intended to be sufficiently flexible to accommodate those students who choose to take advantage of educational experiences beyond the confines of the curriculum. These time constraints are as follows:

1. An entering student will normally take two years to complete the work in the basic sciences. Extended courses of study will be reviewed by the Student Progress Committee.
2. Students will normally be expected to register for a full course load. A student may schedule up to 12 weeks of free time during the clinical sciences.

3. Students desiring more or longer periods away from school may petition the Student Progress Committee for a formal leave of absence. Such leaves shall normally not exceed one year.

4. Students may take electives, for which they meet the prerequisites, prior to completion of the basic science years. However, these electives may be used to fulfill clinical science or elective requirements for graduation only with prior permission of the Curriculum Committee.

In addition to academic factors, satisfactory student progress also includes other factors. Those which may be considered as disqualifying for the M.D. degree include:

1. Chronic, disabling physical or emotional illness
2. Unethical conduct
3. Dishonest scholastic work (see The Code of Scholastic Conduct, page 27).

Other factors may be considered if, in the opinion of the Student Progress Committee, they would make it inappropriate to award the M.D. degree.

**Appeals**

Any student has the right to appeal an adverse decision of the Student Progress Committee to a separate faculty body, the Student Appeals Committee. This group consists of one appointed representative from each academic department in the College. The student may present to this Committee any information deemed pertinent to the case. The Student Appeals Committee will review charges, hear evidence and consider mitigating circumstances before rendering a decision. Such decisions may affirm, modify or reverse the original action of the Student Progress Committee, although the penalty, if any, may not be increased. Such decisions are binding within the College and may not be appealed further at that level.
KEY TO COURSE LISTINGS

Most medical students will find that registration in medical school is a relatively simple process. The basic curriculum for medical students is outlined on pages 17-18. However, for the information of the faculty and others concerned with scheduling and course numbering, this section explains the course numbering system used in the College of Medicine.

This catalog contains listings of courses offered by College of Medicine departments for advanced undergraduates and graduate students as well as courses offered for medical students.

The number by which a course is designated indicates the level of the course.

Courses numbered:

400-499 inclusive: Advanced level courses. Acceptable for graduate credit with the prior approval of the Graduate College (except 400 level individual studies courses 491, 493, 494 or 499 with or without subscripts).

500-599 inclusive: Graduate courses. Open to exceptionally well-qualified seniors with the prior written approval of the course instructor and the Graduate College.

600-699 inclusive: Graduate courses. Not open to undergraduate students.

700-799 inclusive: Graduate courses limited to doctoral students.

800-899 inclusive: Courses limited to students working toward degrees offered by the College of Medicine or the College of Pharmacy. Not available for credit toward any other degrees.


The following is a list of definitions of the University-wide “house-numbered” courses available to the College of Medicine departments as well as other departments throughout the University.

Colloquium (courses numbered 495, 595, 695, 795, 895): The exchange of scholarly information and/or secondary research, usually in a small group setting. The exchange of ideas may involve written as well as oral communication. Research projects need not be required of course registrants.

Proseminar (496) and Seminar (courses numbered 596, 696, 796, 896): The development and exchange of scholarly information, usually in a small group setting. The scope of work shall consist of research by course registrants, with the exchange of the results of such research through discussion, reports, and/or papers.

Note: The above listing does not include all “house-numbered” courses, as other “house-numbered” courses are generally not used by the College of Medicine. For further information regarding these listings, please refer to the current edition of The University of Arizona General Catalog.
The definitions listed below are general categories of courses offered within the College of Medicine.

**Clinical Clerkship (803):** Closely supervised clinical activities designed to teach basic clinical skills within a discipline to Year III medical students.

**Specialty Clerkship (807):** In addition to general surgery each student is required to have exposure to a Surgery Specialty Clerkship (as assigned by the Surgery Department). (Please note: this course applies to the Department of Surgery only.)

**Clerkship (810):** Elective courses designed to develop and refine the clinical skills of medical students. Often allow the opportunity to apply basic skills in a new location or to a special population while continuing to focus on the broad objectives of a discipline.

**Subinternship (811):** Elective allowing medical students to experience general subinternship roles of patient care in clinics and hospital wards under the direct supervision of a faculty member.

**Subspecialty (815):** Electives allowing advanced medical students the opportunity to explore subspecialty areas within a department.

**Supplementary Registration (830):** For students who are extending their curriculum in order to spend a year, or less, doing research relevant to their medical education.

**Preceptorship (891):** Specialized advanced work on an individual basis, consisting of instruction and practice in actual service in a department, program or discipline.

**Independent Study (599, 799, 899):** Qualified students work on an individual basis with professors who have agreed to supervise such work.

**Research (800/900):** Individual research by medical (800) or graduate (900) students, not related to a thesis or dissertation.

**Thesis (910):** Research for the master's thesis (whether library research, laboratory or field observation or research, artistic creation, or thesis writing).

**Dissertation (920):** Research for the doctoral dissertation (whether library research, laboratory or field observation or research, artistic creation, or dissertation writing).
Supplementary Registration (930): For students who have completed all course requirements for their advanced degree programs. May be used concurrently with other enrollments to bring the total number of units to the required minimum.

Key to Symbols

The standard course description includes a variety of symbols indicative of essential information. The following is a standard course description with the individual symbols explained in the order in which they appear in that description.

401. Ethics of Medicine (3) [Rpt.] I, II, 1990-91, Yr


Key to Symbols

401 ...................... Number of course.
Ethics of Medicine ........ Title of course.
(3) ....................... Number of units of course.
[Rpt.] .................... May be repeated for credit. A restriction regarding the number of times a course may be repeated for credit or the total number of units of credit permitted for a course may be designated. [Rpt./2] indicates that the course may be repeated for credit a maximum of two times; [Rpt./6 units] means that the course may be repeated until the student has received a total of six units of credit.
I, II ...................... Semester offered. I indicates Fall semester; II, Spring semester.
1990-91 ................... Year in which course is offered. If no year designation is given, the course is offered each year.
Yr ....................... Course offered throughout the year for various lengths of time other than semester(s).
Jones ...................... Professor in charge of course. If “Staff” is listed, then the departmental staff is in charge of the course.
A review of current topics pertaining to the ethics of medicine ................ Description of course.
P ......................... Prerequisite(s).
CR ........................ Concurrent Registration.
(Identical with Family and Community Medicine 401)
Other departments which give credit in their department for the same course. If no course description appears, please consult the cross-listed department.

Note: Not all of the above information may be noted in any individual course.

Elective Courses at the College of Medicine are listed and described in the Electives Manual, an in-house publication of elective offerings designed primarily for Year IV medical students. The Electives Manual is available each March.
INTERDEPARTMENTAL COURSES

495. Colloquium (2-4) 1990-91

y. Introduction to the Neurosciences I (2)  
   Staff
   An introductory overview of mammalian neural structure and function. Neuro-
   anatomical and neurophysiological principles are emphasized. P, permission of in-
   structor. (Identical with Anat. 495y, Phcl. 495y and Psio. 495y). May be jointly convened
   with 595y. For graduate-level requirements, see 595y.

z. Introduction to the Neurosciences II (2)  
   Staff
   An introductory overview of clinical conditions that affect the human nervous system.
   P, 495y or permission of the instructor. (Identical with Neur. 495z, Phcl. 495z, Psio. 495z
   and Psyi. 495z). May be jointly convened with 595z. For graduate-level requirements,
   see 595z.

595. Colloquium (2-4) 1990-91

y. Introduction to the Neurosciences I (2)  
   Staff
   An introductory overview of mammalian neural structure and function. Neuro-
   anatomical and neurophysiological principles are emphasized. P, permission of in-
   structor. (Identical with Anat. 595y, Phcl. 595y and Psio. 595y). Maybe jointly convened
   with 495y. Graduate-level requirements include submission of two research papers,
   both of which are in greater depth than that of the one research paper required of
   undergraduates.

z. Introduction to the Neurosciences II (2)  
   Staff
   An introductory overview of clinical conditions that affect the human nervous system.
   P, 595y or permission of instructor. (Identical with Neur. 595z, Phcl. 595z, Psio. 595z and
   Psyi. 595z). May be jointly convened with 495z. Graduate-level requirements include
   submission of two research papers, both of which are in greater depth than that of the
   one research paper required of undergraduates.

596. Seminar (1-3) Yr. (See Electives Manual)  
   Staff
   These seminars are designed principally for medical students during the elective portion of
   their curriculum. Basic biological or behavioral science principles and their application in
   the medical setting are emphasized, with student participation in discussion and group
   leadership encouraged. Seminars may be combined with other part-time clinical or
   nonclinical electives to constitute a full-time academic load. An Electives Manual is
   available yearly in the Student Records Office of the College of Medicine which details
   specific course titles, numbers, prerequisites and descriptions for that academic year.

801. Preparation for Clinical Medicine (PCM) (1-12) I, II  
      Rutala-Staff
   Preparation for Clinical Medicine (PCM) is the clinical companion course to the basic
   sciences. The course begins the first week of medical school and continues until the
   beginning of the first clinical rotation. The overall objective is to provide students with
   skills, behavioral traits, attitudes and knowledge necessary to enter clinical clerkships.
   PCM is divided into three main course segments: 1. Patient evaluation, including physical
   examination, clinical interviewing, specialty examinations and write-ups. During these
   segments students interact with patient instructors and also spend one semester interacting
   with a physician preceptor; 2. Clinical correlations (clinical problem solving) with basic
   sciences courses; and 3. Free-standing course segments, including introduction to psychi-
   atry and psychopathology, clinical decision making (biostatistics and logic), community-
   oriented primary care, emergency medicine and patient care skills workshop. At the
   completion of PCM, students will have achieved a prescribed level of skill in data
   collection, definition of clinical problems and a logical approach to differential diagnosis.

802. Human Behavior and Development (HB&D) (6)  
      Fahey-Pollock-Staff
   This course is an interdepartmental, required course which is taught as part of the basic
   science curriculum. In the same way that the traditional basic sciences serve as the
background for understanding clinical medicine, HB&D serves as the “basic science” for understanding the psychosocial and emotional aspects of clinical medicine. The student will gain knowledge and understanding of the individual as a “total person,” and of biological, environmental, social and psychological factors which influence that person as a patient. Also explored are the principal age-specific life events, environmental stresses, biological processes and social behaviors which contribute to normal human development and to individual sickness. Panel discussions, lectures, patient interviews, small group discussions, field trips, etc., are utilized in this interdisciplinary course to achieve the objectives. Some of the topics included in the course are the doctor-patient relationship, major health problems for children and adults, substance abuse, issues in human sexuality, coping with chronic illness, health care and the elderly, death and dying, ethical issues in medicine and legal aspects of medical care.

805. Social and Behavioral Science (SBS) (6) Fahey-Moher-Pollock-Racy
This course is an interdepartmental, required course which is part of the basic science curriculum. In the same way that the traditional basic sciences serve as the background for understanding clinical medicine, this course serves as the “basic science” for understanding the psychosocial and emotional aspects of clinical medicine. The student will gain knowledge and understanding of the individual as a “total person,” and of biological, environmental, social and psychological factors which influence that person as a patient. Also explored are age-specific life events, environmental stresses, biological processes, social behaviors which contribute to normal human development and to individual sickness, community-oriented primary care, and introduction to psychiatry and psychopathology. Panel discussions, lectures, patient interviews, small group discussions, field trips, etc., are utilized in this interdisciplinary course to achieve the objectives. Some of the topics included in the course are the doctor-patient relationship, major health problems for children and adults, substance abuse, issues in human sexuality, coping with chronic illness, health care and the elderly, death and dying, ethical issues in medicine and legal aspects of medical care.

830. Supplementary Registration
To provide credit to medical students doing extended research for which they will gain no credit towards their M.D. degree while allowing medical students to participate in the benefits of being an enrolled student.

896. Seminar (1-3) Yr. (See Electives Manual) Staff
These seminars are designed principally for medical students during the elective portion of their curriculum. Basic biological or behavioral science principles and their application in the medical setting are emphasized, with student participation in discussion and group leadership encouraged. Seminars may be combined with other part-time clinical or nonclinical electives to constitute a full-time academic load. An Electives Manual is available yearly in the Student Records Office of the College of Medicine which details specific course titles, numbers, prerequisites and descriptions for that academic year.
DEPARTMENTAL COURSES

ANATOMY

Professors: Robert S. McCuskey, Head [Physiology], Jay B. Angevine [Adjunct Lecturer, Neurology], Joseph T. Bagnara, Bryant Benson, David E. Blask, Robert W. Gore [Physiology], Mac E. Hadley [Ecology & Evolutionary Biology; Molecular & Cellular Biology], Mary I. Johnson [Neurology; Pediatrics], Philip H. Krutzsch [Emeritus], Raymond B. Nagle [Pathology], Donald P. Speer [Surgery], Nicholas J. Strausfeld [Arizona Research Laboratories]

Associate Professors: Mary J. Hendrix, C. Ward Kischer, R. Clark Lantz, Albert V. LeBouton, Christopher A. Leadem, Mary E. Morbeck [Anthropology]

Assistant Professors: Gail D. Burd [Molecular & Cellular Biology], Nathaniel T. McMullen [Neurology], Mary C. Rykowski [Research Associate, Arizona Cancer Center], Paul A. St. John, Leslie P. Tolbert [Arizona Research Laboratories]

Lecturers: William D. Barber, Norman E. Koelling [Adjunct Lecturer, Pharmaceutical Sciences]

Research Associate Professor: Elliott J. Mufson [Neurology]

Research Assistant Professors: Elizabeth G. Crichton, Brenda V. Dawson [Molecular & Cellular Biology; Internal Medicine], Linda C. Meade-Tollin [Senior Lecturer, Biochemistry], Philip Scuderi, Jr. [Microbiology & Immunology; Research Associate, Arizona Cancer Center], Chun-Su Yuan

Senior Clinical Lecturer: James C. Dunn

Clinical Lecturer: H. Richard Claypool [Senior Clinical Lecturer, Radiology]

Research Lecturer: Arthur D. Craig, Jr.

Visiting Research Professors: Ana Maria Castrucci, Ietskina Ebels, Bernhard Urbaschek, Renate Urbaschek

Research Associates: Danny M. Burns, Hiroshi Eguchi, Toshihiko Fukuzawa, Ronald L. Miorowski [Research Associate Professor, Surgery], Richard E. B. Seftor, Karin H. Yohem

Senior Research Specialist: Patricia A. McCuskey [Physiology]

Associate Research Engineer: Michael Bosnos

Anatomy has central responsibility for the teaching of morphological sciences. Its contributions occur at the gross, microscopic and ultrastructural levels and have exerted strong influence on many areas of biology and medicine over the years. It is the desire and purpose of the Department of Anatomy to express a meaningful picture of the discipline and its relationship to the synthesis of chemical, physical and biological facts in a challenging and responsible program.

The Department of Anatomy offers a program of graduate study which leads primarily to the Doctor of Philosophy degree. The requirements for these degrees are those outlined by the Graduate College. Course work possibilities span the continuum of morphological investigation from subcellular to systems biology. Graduate study in anatomy primarily offers the candidate an opportunity to become proficient in research in areas such as: cell biology, reproductive biology, developmental biology, endocrinology, neurosciences and so on. A large number of possibilities exist regarding the minor subject in the doctoral program. A broad range of departmental facilities exist including
laboratories for microscopy, analytical chemistry, cell culture, electrophysiology and radioimmunoassay.

For detailed information concerning graduate programs in the Department of Anatomy, consult the catalog of the Graduate College and the departmental Graduate Advisor.

Course Descriptions

399H. Opportunities in Biomedical Research (1-3) (Honors) Leadem
Opportunity to provide upper-level undergraduate students with experience in designing, conducting and interpreting biomedical experiments. P, Admittance to Honors Program, Chem. 103b, 104b, 243b, 245b.

401. Human Gross Anatomy (3) II Staff
Survey of the gross structure of the human body. 1R, 6L. Open to pharmacy students only. (Identical with Pcol. 401).

415. Reproductive Biology (2) I Benson
Structure, function and control of the mammalian reproductive system with emphasis on human reproduction. May be convened jointly with 515 (3). For graduate level requirements see 515. P; One semester of biology course.

456. Developmental Biology (4) I Bagnara
An analysis of principles of development using vertebrate and invertebrate model systems. May be convened jointly with 556. For graduate level requirements see 556. (Identical with MCB 456 which is home).

457. Experiments in Developmental Biology (4) II Bagnara
Experimental analysis of the principles of development. May be convened jointly with 557. For graduate level requirements see 557. P, 456, Chem. 241b. (Identical with MCB 457 which is home).
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467L. Endocrinology - Laboratory (1) II
Hadley
Studies techniques in endocrinology. P, Anat. 467R (Identical with MCB 467L). May be convened with 567L. For graduate level requirements see 567L.

467R. Endocrinology (3) II
Hadley
Neural and endocrine integration in the regulation of mammalian physiological functions. P, MCB 103. (Identical with MCB 467R). May be convened with 567R. For graduate level requirements see 567R.

471. Human Embryology (3) II
Kischer
Normal and abnormal development of the human with functional aspects stressed. May be convened jointly with 571. For graduate level requirements see 571. Course with include maturation of germ cells to fertilization to birth. Lecture, discussion and demonstration format. (Identical with EEB 471 and MCB 471).

495. Colloquium (2) I
y. Introduction to the Neurosciences (2) I
An introductory overview of mammalian neural structure and function. Neuro-anatomical and neurophysiological principles are emphasized. P, permission of instructor. (Identical with Interdept. 495y which is home). May be jointly convened with 595y. Course offered every three years. For graduate level requirements see 595y.

495. Colloquium (2) II
z. Introduction to the Neurosciences (2) II
An introductory overview of clinical conditions that affect the human nervous system. P, 495y or permission of instructor. (Identical with Interdept. 495z which is home). May be jointly convened with 595z. Course offered every three years. For graduate level requirements see 595z.

498H. Honors Thesis (3)
Leadem
P, 399H.

499H. Independent Study, Honors Program (3)
Leadem
Literature review. P, Admittance to Honors Program.

502. Principles of Neuroanatomy (4) II
Angevine

515. Reproductive Biology (3) I
Benson
Structure, function and control of the mammalian reproductive system with emphasis on human reproduction. Graduate level requirements include an in-depth research paper and mini-reviews on selected papers in the field. May be convened jointly with 415 (2). P, One semester of biology course.

550. Topics in Pigment Cell Biology (2) I
Bagnara-Hadley
Selected topics on the development, function and control of normal and abnormal pigment cells in various pigmentary phenomena. (Identical with MCB 550).

555. Cancer Biology (3) II, Alternate Year
Bowden-Gerner
(Identical with M. Mic. 555 which is home).

556. Developmental Biology (4) I
Bagnara
An in-depth analysis of principles of development using vertebrate and invertebrate model systems. May be jointly convened with 456. Students registered for 556 will be expected to attain a deeper understanding of the subject through reading and discussion of original research reports. Students will be examined primarily on their ability to synthesize and evaluate information and ideas in the field. 3R, 3L, P, 181 (Identical with MCB 556 which is home).

557. Experiments in Developmental Biology (4) II
Bagnara
Experimental analysis of the principles of development. May be convened jointly with 457. Students registered for 557 will be expected to attain a deeper understanding of the subject
through reading and discussion of original research reports. Students will be examined primarily on their ability to synthesize and evaluate information and ideas in the field. 2R, 6L, P, 556, Chem. 241b. (Identical with MCB 557 which is home).

558. **Advanced Subjects in Endocrinology (2) [Rpt.] I**

Hadley

Selected topics in vertebrate and invertebrate endocrinology. P, 467R. (Identical with MCB 558).

567L. **Endocrinology (1) II**

Hadley

May be jointly convened with 467L. For course description see 467L. Graduate level requirements include an in-depth research paper on a specific hormone or other aspect of the endocrine system. P, Anat. 567R. (Identical with MCB 567L).

567R. **Endocrinology (3) II**

Hadley

May be jointly convened with 467L. For course description see 467R. Graduate level requirements include an in-depth research paper on a specific hormone or other aspect of the endocrine system. P, MCB 103. (Identical with MCB 567R).

571. **Human Embryology (3) II**

Kischer

Normal and abnormal development of the human with functional aspects stressed. May be convened jointly with 471. Students registered for 571 will be expected to attain a deeper understanding of the subject through reading and discussion of original research reports. Course will include maturation of germ cells to fertilization to birth. Lecture, discussion and demonstration format. (Identical with EEB 571 and MCB 571).

575. **Special Topics in Biological Imaging (2) II**

McCuskey/Lantz

This course is designed for graduate students in the biological and biomedical sciences to provide an understanding of biological imaging techniques. The course format is a combination of lecture and laboratory demonstrations/exercises. Students will be expected to participate in discussions of topics presented.

577. **Cell Biology (3) II**

St. John

The Cell Biology course will provide a basic curriculum for graduate students in cell biology with emphasis on structure and function. This is an interdisciplinary course which will be advantageous for students in Anatomy, Biochemistry, Molecular and Cellular Biology, Nutrition, Pharmacology, Physiology, etc. The Cell Biology curriculum offers a strong background in the basic biology of the cell which can be complemented with additional special seminar courses on various topics of the cell. (Identical with MCB 577).

582. **Topics in Neural Development (2) I**

Levine

An in-depth analysis of the cellular and molecular basis of neural development. Students will read and discuss journal articles dealing with the development of neurons and their synaptic connections. P, consent of instructor. (Identical with NRSC 582 which is home), MCB 582, Psio. 582).

583. **Topics in Neural Plasticity (2) II**

Burd

Readings and discussions of primary literature on cellular, biochemical, physiological and structural changes that occur in adult nervous systems. (Identical with NRSC 583, MCB 583 which is home).

584. **Cellular Neurobiology (2) II**

Burd

Readings and discussions of primary literature on selected topics in the cell biology of neurons and glial cells. P, permission of instructor and prior course in neurobiology or cell biology. (Identical with MCB 584, NRSC 584).

588. **Principles of Cellular and Molecular Neurobiology (4) I**

Hildebrand

Detailed introduction to biology of nerve cells emphasizing cellular, neurophysiology, synaptic mechanisms and analysis of neural development. P, consult program office before enrolling. (Identical with Bioc. 588, MCB 588, Psio. 588, NRSC 588 which is home).

589. **Principles of Systems Neurobiology (4) II**

Arbas

Detailed introduction to the organization, physiology and function of neural systems emphasizing sensory systems, motor control, integration and plasticity. P, consult program office before enrolling. (Identical with MCB 589, Psio. 589, NRSC 589 which is home).
595D. **Special Topics in Cell Biology (2) II**

Gerner

This course will use a journal club format to cover novel topics on molecular and cellular biology relevant to cancer research. P, Graduate status in biological sciences. (Identical with C Bio 595D which is home).

595Y. **Introduction to Neurosciences I (2) I**

Staff

An introductory overview of mammalian neural structure and function. Neuroanatomical and neurophysiological principles are emphasized. P, Permission of instructor. May be jointly convened with 495y. Course offered every three years. (Identical with Interdept. 495y which is home).

595Z. **Introduction to Neurosciences I (2) II**

Staff

An introductory overview of clinical conditions that affect the human nervous system. P, 495y or permission of instructor. May be jointly convened with 495z. Course offered every three years. (Identical with Interdept. 595z which is home).

599. **Independent Study (1-6) I, II**

Staff

Individual or independent work, directed reading or special problems under the supervision of a member of the faculty.

601. **Human Gross Anatomy (8) I**

Leadem-Staff

Comprehensive survey of the development and gross structure of the human body. P, Chem. 103b, 104b, 243b, 245b, Phys. 102b, MCB 181-182. Consult department before enrolling.

602. **Microscopic Anatomy (5) I**

LeBouton-Staff


603. **Microscopic Structure (1-3) I-II**

Staff

Selected concepts of structural organization at light and electron microscopic levels of the anatomy and development of the cells, tissues and organs of vertebrates. P, 601, 602.

604. **Gross Human Anatomy (2-6) [Rpt.] I-II**

Staff

Study in-depth of the gross human anatomy of selected areas or systems. P, 601, 602.

605A. **Human Neuroscience (3) II**

Barber-Hasan

Morphological organization of the human CNS. P, Chem. 103b, 243b, 245b, Phys. 102b, MCB 410a-b. Consult department before enrolling. (Identical with Psio. 605a and Pharm. 605a).

605B. **Human Neuroscience (3) II**

Barber-Hasan

Neurotransmitters and intrinsic regulatory functions. P, Anat. 605a or permission of instructor. (Identical with Psio 605b and Pharm. 605b).

606. **Advanced Vertebrate Neuroanatomy (4) I, II**

Angevine

Structure of the central nervous system in selected vertebrates. P, 605a-b.

610a- **Anatomical Techniques (1-4, 1-4) I, II**

LeBouton-Staff

Introduction of special techniques and procedures of analytical anatomy. P, 601, 602, consent of department.

612. **Biological Electron Microscopy (5) I**

Ferris

This course will provide the theoretical background and practical experience in transmission and scanning electron microscopy that is necessary for the efficient and effective application of ultrastructural and cytochemical techniques as research tools. (Identical with MCB 612 which is home, An. Sci. 612, Biochem. 612, Entomology 612, M&I 612, Path. 612, Pl. Path. 612, Phys. 612, Vet. Sci. 612).

616. **Introduction to Anatomical Literature (1) I, II**

Staff

A problem-oriented, bibliographic approach to basic anatomical references. Primarily for those students planning a career in anatomy and wishing to prepare themselves for further graduate study. 3L.

696. **Seminar (1) I-II**

801. Human Gross Anatomy (8) I
See 601 description.
Leadem-Staff

802. Microscopic Anatomy (5) I
See 602 description.
LeBouton-Staff

805. Human Neuroscience (6) I-II
Morphological organization of the human CNS and neurotransmitters and intrinsic regulatory functions. (Identical with Neurol. 805, Pharm. 805, Psio. 805).
Barber-Hasan

891. Preceptorship, Yr.
a. Anatomy (3-12)
See Electives Manual for course description.
Staff

899. Independent Study (1-6) I, II
See Electives Manual for course description.
Staff

900. Research (1-8) I, II
Individual research not related to a thesis or dissertation for an advanced degree.
Staff

910. Thesis (1-8) I, II
Research for the master's thesis.
Staff

920. Dissertation (1-9) I, II
Research for the doctoral dissertation.
Staff

930. Supplementary Registration (1-6) I, II
Staff
ANESTHESIOLOGY

Professors: Burnell R. Brown, Jr., Head [Pharmacology], A. Jay Gandolfi [Pharmacology; Associate Research Professor, Pharmacology & Toxicology], Charles W. Otto [Associate Professor, Internal Medicine], I. Glenn Sipes [Pharmacology; Head, Pharmacology & Toxicology]

Associate Professors: Randall C. Cork, Stuart R. Hameroff, Stuart F. Quan [Internal Medicine; Assistant Director, Respiratory Services; Research Associate, Respiratory Sciences]

Assistant Professors: Edward J. Frink, Jr., Paul J. Scipione

Clinical Professor: Jerry M. Calkins

Clinical Assistant Professors: Frank Bland, Jr., Mark V. Boswell, James A. DiNardo, Luis M. Dominguez, Daniel P. Ferry, T. Philip Malan, Jr., John F. Myers, Craig M. Palmer, Robin L. Prentice, Daniel Remen, W. Murray Smith

Senior Clinical Lecturers: Peter A. Raudzens, Elizabeth L. Wilkinson

Clinical Lecturers: R. Dennis Bastron, Conrad L. Wall, Thomas A. Webster, Alan E. Zehngut

Assistant Clinical Lecturers: James P. Angiulo, Alice R. Kowalsen, Fred H. Landeen, Kathleen M. Schrader

Adjunct Associate Professor: Kenneth C. Mylrea [Professor, Electrical & Computer Engineering; Director, Clinical Engineering]

Visiting Professor: Andre R. Coetzee

Visiting Research Assistant Professor: Samuel Cos Corral

Research Associates: Hanan N. Ghantous, Thomas H. Kramer [Research Assistant Professor, Pharmacology], Sandra M. Sylvester

Research Specialist: Richard C. Watt [Electrical & Computer Engineering]

The Department of Anesthesiology provides the clinical clerks with theoretic and practical instruction in the following areas: 1) management of surgical and obstetric anesthesia; 2) acute clinical pharmacology and physiology; 3) resuscitation and management of the comatose patient; 4) treatment of intractable pain; 5) management of the patient in the intensive care unit. The concepts taught are germane to acute therapy and catastrophic illness that may be encountered by the future physician regardless of field of practice.

Course Descriptions

800. Research (1-6) [Rpt./1] Yr. See Electives Manual for course description.

810. Clerkship, Yr. Brown-Staff

   a. Anesthesiology (4)

      Students participate in anesthesiology at UMC and VAMC.

815. Subspecialty, Yr. Otto-Staff


891. Preceptorship, Yr. Staff

   a. Anesthesiology and Sub specialties (3-18)

   c. General Anesthesiology (4-6)

      See Electives Manual for course descriptions.
UNIVERSITY DEPARTMENT OF BIOCHEMISTRY
(Colleges of Agriculture and Medicine and the Faculty of Science)

Professors: Michael A. Wells, Head, Hans J. Bohnert [Molecular & Cellular Biology], Michael F. Brown [Chemistry], Herbert E. Carter, Michael A. Cusanovich [Chemistry; Vice President for Research; Dean, Graduate College], Leslie S. Forster [Chemistry], Eugene W. Gerner [Radiation Oncology], William J. Grimes [Associate Professor, Molecular & Cellular Biology], Darrell E. Goll [Nutrition & Food Science], Richard B. Hallick [Molecular & Cellular Biology], David J. Hartshorne [Nutrition & Food Science], Mark R. Haussler, John G. Hildebrand [Molecular & Cellular Biology; Head, Neurobiology], Victor J. Hruby [Chemistry], Richard G. Jensen [Plant Science], Henry Koffler [Microbiology & Immunology, Molecular & Cellular Biology; President, The University of Arizona], John H. Law [Associate Dean, Instruction, College of Agriculture; Director, Biotechnology, Arizona Research Laboratories], David W. Mount [Microbiology & Immunology; Molecular & Cellular Biology], David F. O’Brien, John A. Rupley [Chemistry], Eugene G. Sander [Dean, College of Agriculture], Gordon Tollin [Chemistry], Henry I. Yamamura [Arizona Research Laboratories; Pharmacology]

Associate Professors: Don P. Bourque [Molecular & Cellular Biology], Louise M. Canfield [Family & Community Medicine], Robert J. Gillies [Radiology], Jennifer D. Hall [Molecular & Cellular Biology], Martinez J. Hewlett [Molecular & Cellular Biology], John W. Little [Assistant Professor, Molecular & Cellular Biology], Neil E. MacKenzie [Pharmaceutical Sciences], Roger Sunde [Nutrition & Food Science], Marc E. Tischler [Physiology]

Assistant Professors: Danny L. Brower [Molecular & Cellular Biology], James F. Deatherage [Molecular & Cellular Biology], Roger L. Miesfeld [Molecular & Cellular Biology; Research Associate, Arizona Cancer Center], Elizabeth Vierling [Molecular & Cellular Biology]

Research Professors: Robert G. Bartsch, Terrance E. Meyer
Research Assistant Professors: Jo M. H. Hazzard, Michael R. Kanost [Arizona Research Laboratories], Barry S. Komm, G. Kerr Whitfield, Gunter Wildner, Rolf Ziegler
Senior Lecturer: Linda C. Meade-Tollin [Research Assistant Professor, Anatomy]
Visiting Professors: Jerker Porath, Glenville Jones

Research Associates: Margaret Briehl [Arizona Cancer Center], Virittamulla Chamupathi, Naqian Cheng, Anita S. Chong, John C. Cushman, Diane Dowd, Rolf Flachmann, Don Frohlich, Jean Philippe Galons, John Gilkey [Biotechnology, Arizona Research Laboratories], Penny Graves, Eric Hanneman, James Hazzard, Kenneth Helm, Barbara B. Jones, Paul N. MacDonald, Beth McElwain, Gabriele Meyer, Fernando Noriega, Barbara L. Patterson, Kenneth L. Roland, Preminda Samaraweera, Peter Scherer, Alan Smith, Margaret H. Smith, Mitch Tarczynski, Jay Thomas, Kozo Tsuchida, Rik Van Antwerpen, Miranda C. Van Heusden, Mark Walker, Xiao-yu Wang, Catherine Wasmann, Xi-Ping Wu, Gloria Yepiz, Zhan-Gong Zhao

Research in biochemistry is carried out principally in Bioscience West and Arizona Health Sciences Center while teaching is carried out at various campus locations. The above-listed faculty members constitute the University Department of Biochemistry which is responsible for instruction in biochemistry in the Colleges of Agriculture, Liberal Arts and Medicine.
The University Department of Biochemistry offers the Bachelor of Science, Bachelor of Arts, Master of Science and Doctor of Philosophy degrees. Except in unusual circumstances, however, the department will only admit graduate students whose stated objective is the Doctor of Philosophy degree.

Research areas in which graduate studies may be pursued include: nucleic acid biochemistry, regulation of gene expression, enzymology, lipid metabolism and chemistry, membrane structure and function, amino acid metabolism, complex polysaccharides, mammalian cell culture, mechanism of hormone action, biochemistry of vitamins and coenzymes, protein structure and function, bioenergetics, muscle metabolism, biological oxidations, photosynthesis, rapid reaction kinetics, visual processes, plant biochemistry, biochemistry and genetics of cell organelles, insect biochemistry.

For detailed information, consult the catalog of the Graduate College.

Course Descriptions

460. General Biochemistry (5) Staff
Fundamentals of biochemistry, including proteins, nucleic acids, enzymes, carbohydrates and lipids and their metabolic relationships. Open to non-majors only. P, Chem. 241b. (Identical with Chem. 460 and NFS 460).

462a-b. Biochemistry (4-3) Staff

463. Biochemistry Laboratory (2) II Staff
Introduction to experimentation with biochemical systems, processes and compounds of biochemical importance. 1R, 5L. P, Bioc. 460 or CR 462a-462b.

494. Practicum (3) I, II Staff
Senior research experience in the laboratories of individual faculty members. P, CR 462a-462b.

496. Proseminar (1) [Rpt./1] I, II Staff
a. Biochemistry
Open to majors only. Consult department before enrolling. P, 462a-462b or CR.

501. Medical Biochemistry (5) I Staff
Comprehensive treatment of general biochemistry oriented towards human biology with emphasis on basic concepts. Protein and nucleic acid chemistry and metabolism, enzymology, metabolism of lipids and carbohydrates, metabolic regulation and closely related topics are covered. Open only to medical students except by permission. P, Chem. 103b, 104b, 241b, 245b; Phys. 102b.

510. Plant Molecular Biology (3) II 1990-91 Staff

555. Molecular Mechanisms of Development (3) II Brower
Detailed examination of molecular, genetic and cellular approaches to selected problems in developmental biology. P, consult department before enrolling. (Identical with MCB 555 which is home).

560. General Biochemistry (5) I Staff

561a-b. Introduction to Biochemical Literature (1-1) Staff
A discussion of the biochemical literature aimed at helping the student evaluate and report the published literature. Primarily for first-year graduate students planning a career in
biochemistry and desiring to prepare themselves for continued study. P, CR 462a-462b. 561a is not prerequisite to 561b. (Identical with Chem. 561a-561b).

562a-  Biochemistry (4-3)  Staff

563.  Biochemistry Laboratory (2) II  Staff
Introduction to experimentation with biochemical systems, processes and compounds of biochemical importance. 1R, 5L. P, 460 or 462a and CR 462b.

565.  Enzymes (3) II 1990-91  Staff
Advanced consideration of enzyme structure and function. Course to be taught alternate years beginning second semester 1990-91 academic year. P, 462a, Chem. 480b. (Identical with Chem. 565).

568.  Nucleic Acids (3) II  Staff
Chemistry, structure and function of nucleic acids; replication, transcription, translation, gene organization, regulation of gene expression and organelle nucleic acids. Both procaryotic and eucaryotic systems will be considered. P, 462b (Identical with MCB 568a-568b, NFS 568a-568b).

570.  Molecular Biology of the Cell Membrane (3) II 1990-91  Staff
Cell membrane functions including biosynthesis, structures of membrane components; importance of cell communication, differentiation, adhesion, immune response and cancer. Discussions on the use of monoclonal antibodies, recombinant DNA technology and DNA transfections in studies on the biology of the cell membrane. (Identical with Chem. 570 and Cell. 570).

572.  Metabolic and Hormonal Control of Cell Function (3) I 1990-91  Staff

573.  Recombinant DNA Techniques (3) II  Staff
(Identical with MCB 573).

575.  Biochemical Techniques (3) I  Staff
Survey of current techniques used in biochemical research including methods to study proteins, nucleic acids, membranes and metabolism. P, 462a-462b. (Identical with Chem. 575).

576.  Biophysical Techniques (3) I  Staff
Survey of current physical techniques used in biochemical research including solution properties of macromolecules, optical spectroscopy, magnetic resonance and x-ray and electron diffraction. P, 462a-462b, Chem. 480a-480b. (Identical with Chem. 576).

588.  Principles of Cellular and Molecular Neurobiology (4) I  Staff
(Identical with Nrsc. 588).

595.  Colloquium  Staff
b.  Topics in Electron Microscopy (2) [Rpt./2] II (Identical with MCB 595b which is home).

599.  Independent Study (1-5) I, II  Staff
Open to students who wish to pursue topics not covered in regularly scheduled courses. Arrangements must be made with the appropriate staff member and the biochemistry program chairman before registration.

665.  Chemistry of Food Proteins (3) II 1991-92  Staff
The chemical and physical properties of proteins important to their use as food; analysis and purification of proteins; biochemical properties of proteins in muscle, milk, eggs, cereals and other foods. P, Bioc. 462a preferred, Bioc. 460 or NFS 406a-406b acceptable. (Identical with NFS 665 which is home).
681. Introduction to Biochemical Research (1-2) I, II
   Supervised research experiences in the laboratories of individual faculty members. Open
   only to first-year majors. 3 or 6L. P; CR 561a-561b.

696. Seminar (1-3) I, II
   Student reports on current research topics. Participation required for all graduate students
   in biochemistry but registration not required in all semesters.
   a. Biochemistry I (1-3) I
   b. Biochemistry II (1-3) II

799. Independent Study (1-5) I, II
   Open to graduate students seeking a Ph.D. in biochemistry.

800. Research (1-6) Yr.
   See Electives Manual for course description.

801. Medical Biochemistry (5) I
   Comprehensive treatment of general biochemistry, oriented towards human biology with
   emphasis on basic concepts. Protein and nucleic acid chemistry and metabolism, enzymo-
   logy, metabolism of lipids and carbohydrates, metabolic regulation and closely related
   topics are covered. Open only to medical students. P; Chem. 103b, 104b, 241b, 245b; Phys.
   102b.

891. Preceptorship, Yr.
   a. Biochemistry (3-12)

900. Research (105) I, II
   Individual research by graduate students not related to a thesis or dissertation; the student
   will write for an advanced degree.

910. Thesis (1-5 max. total 8) I, II
   Research for the master's thesis.

920. Dissertation (1-9) I, II
   Research for the doctoral dissertation.

930. Supplementary Registration (1-6) I, II
FAMILY AND COMMUNITY MEDICINE

Professors: Anthony F. Vuturo, Head, Herbert K. Abrams, John T. Boyer [Internal Medicine; Director, Restorative Medicine], George D. Comerci [Pediatrics], Eric P. Gall [Surgery; Internal Medicine; Medical Director, Arthritis Center, Internal Medicine], Gail G. Harrison [Anthropology; Nutrition & Food Science; Acting Vice Dean, Graduate College; Assistant Vice-President, Research; Associate Professor, Pediatrics], Thomas E. Moon [Research Professor, Internal Medicine], Andrew W. Nichols, Arthur B. Sanders [Surgery; Clinical Lecturer, Internal Medicine], James R. Shaw, Paul H. Skinner [Co-Director, Native American Research & Training Center, Family & Community Medicine], William A. Stini [Head, Anthropology], Hugh C. Thompson [Emeritus; Pediatrics]

Associate Professors: Peter J. Attarian [Assistant Professor, Psychiatry], Louise M. Canfield [Biochemistry], Daniel O. Levinson, Ronald E. Pust, Cheryl K. Ritenbaugh [Adjunct Associate Professor, Anthropology; Research Associate, Arizona Cancer Center], Barry D. Weiss

Assistant Professors: Tamsen L. Bassford, Douglas E. Campos-Outcalt, Larry C. Clark, Dorian H. Cordes [Director, Occupational & Preventive Medicine Residency Programs, Family & Community Medicine], Paul R. Gordon, Jennie R. Joe [Director, Native American Research & Training Center, Family & Community Medicine], Evan W. Kligman, Richard L. Reed

Clinical Professors: Pedro L. Escobar [Internal Medicine; Chief, Physical Medicine & Rehabilitation, Restorative Medicine; Director, Rehabilitation Services], Augusto Ortiz

Research Professor: Ronald R. Watson [Research Specialist, Arizona Cancer Center]

Adjunct Professor: Paul B. Pearson [Nutrition & Food Science]

Clinical Associate Professors: Kay A. Bauman, Craig L. McClure, Lawrence M. Moher [Assistant Dean for Student Affairs, Medicine Administration; Coordinator, Social & Behavioral Science, Medicine Administration]

Research Associate Professor: Frank A. Hale

Clinical Assistant Professors: Murray M. DeArmond [Psychiatry; Adjunct Lecturer, Psychology; Director, Student Health Service], Robert G. Rhode [Clinical Lecturer, Psychiatry], Bernhardt E. Stein, Marjorie L. Tiedemann, Barbara H. Warren [Internal Medicine]

Research Assistant Professors: George H. Adams [Coordinator of Operations NADSAP, Family & Community Medicine], Scott S. Emerson [Research Associate, Arizona Cancer Center], Antonio L. Estrada, Rena J. Gordon, Barbara R. Hartmann, Joel S. Meister, Denise J. Roe [Research Specialist, Arizona Cancer Center; Research Associate, Internal Medicine], Janet H. Senf, Lee Sennott-Miller, Louise H. Warrick

Clinical Instructor: Adele M. O'Sullivan

Research Instructors: Brenda Cartmel [Research Associate, Arizona Cancer Center], Julie R. Erickson, Mary C. McEniry

Senior Clinical Lecturers: John T. Condon [Education Specialist, Health Education], Jerry L. Dodson, Melvin H. Goodwin, H. Winter Griffith

The Department emphasizes the values of family and community orientation to medical practice. By means of preceptorships, seminars, projects, lectures, community assignments and clinics, and in collaboration with other departments, students learn family medical practice, clinical preventive medicine, occupational medicine and the elements of epidemiology, nutrition, public health and medical care organization.

A primary focus of activity is the development of clinical teaching service resources in the rural and urban underserved areas of the state. This is reflected in programs of preceptorships and clerkships and other educational experiences for the students and residents. Many private family physicians in the community constitute a major teaching resource and a variety of health-related institutions and programs enrich the student's experience. The Department also collaborates with the Colleges of Agriculture, Business and Public Administration, Nursing, Pharmacy and the School of Health Related Professions in a variety of educational, research and service efforts.

The Department also offers a unique series of optional activities in our Commitment to Underserved People (CUP) program available to students beginning in their first year.

By participation in such varied programs and experiences, the medical students and residents are encouraged to enter family practice and to set up practices in areas of need. Special emphasis is given to knowledge and achievement of comprehensive quality medical care.

In addition to the specific courses listed below, the Department participates in the interdepartmental course, Preparation for Clinical Medicine (which includes physical
diagnosis, interviewing, primary care problems and selected seminars), and in a number of elective interdepartmental courses, many of which are open to graduate students (see Electives Manual or members of the Department).

The Department has approved residencies in Family Practice, General Preventive Medicine/Public Health and Occupational Medicine. Combined Residency programs in Family Practice and Preventive Medicine/Occupational Medicine are available. For Preventive Medicine and Occupational Medicine residents, completion of course requirement to obtain the Master of Science degree in Exercise Physiology, Toxicology or the Master in Public Health Equivalency is required. There is also an ongoing program of continuing education for community physicians developed in close collaboration with the Arizona Academy of Family Physicians. Fellowships in faculty development, geriatrics, community medicine, nutrition, toxicology, and basic and applied research are offered.

The Department directs a statewide Area Health Education Center in Yuma, Nogales, Flagstaff and Phoenix. The Native American Research & Training Center conducts health and training projects on reservations within the state and a multidisciplinary Alcohol Research Center is located in the Nutrition Section. Collaborative projects in international health are ongoing in Egypt, Jordan, Mexico, Kenya, Taiwan and China.
Course Descriptions

487. Poverty and Health (3) II  
Ritenbaugh-Staff  
Study of the relationship between poverty and health. Concepts and theories from anthropology, psychology and sociology will be used to analyze problems associated with poverty. P, six units of Social Science. (Identical with Nurs. 487 which is home).

500. Research (2-16) [Rpt/2] Yr.  
Hale  
Individual research not related to a thesis for an advanced degree. P, Completion of basic science courses.

515. Subspecialty, Yr.  
h. Cancer Epidemiology and Prevention I  
Moon  
i. Cancer Prevention and Control II  
Moon

588. Clinical Anthropology (3) II  
Ritenbaugh-Staff  
Application of principles from anthropological theory to the actual practice of patient care with emphasis on culture content of groups living in the greater Southwest. P, nine units of Behavioral Science. (Identical with Nurs. 588 which is home).

596. Seminar I, II  
a. International Health in the Third World (3) S  
Open to health majors only.  
b. Epidemiologic Methods (1-3)  
h. Prevention and Control of Disease (1) I  
k. Nutrition in Disease (2) [Rpt./1] P, Bioc. 501/801, Psio. 601/801  
m. Practice of Community-Oriented Medicine in Rural Areas (2) II  
n. International Nutrition (2)  
r. Basic Principles of Epidemiology (3)  
s. AIDS, Cancer, Nutrition Immunity (1) Yr.  
t. Tropical Disease Problems (2-3)  
u. Current Issues in Health Services (2)  
w. Diet and Prevention of Disease (2) Yr.  
z. Psychosocial Epidemiology (2)

599. Independent Study (1-12) I, II  
Hale-Staff  
In-depth studies of clinical and nonclinical topics.

800. Research (2-16) [Rpt/2] Yr.  
Senf-Staff  
Individual research not related to a thesis for an advanced degree. P, Completion of basic science courses.

803. Clinical Clerkship (6-9) Yr.  
Campos-Outcalt  
Students will develop and refine problem-solving skills in the ambulatory setting. Emphasis will be on the diagnosis and management of the illnesses presented to primary care facilities. Students will be taught to effectively use the health care team in patient assessment and to incorporate the principles of preventive and prospective medicine into clinical practice. A life-style curriculum is integrated into the didactic presentations. This clerkship is a required course for third year medical students.

811. Subinternship  
Hale-Staff  
a. Family Medicine (4-12) [Rpt/3] Yr.  
See Electives Manual for course description.

815. Subspecialty, Yr.  
b. The Dying Patient (3-6) [Rpt/1] Yr.  
c. Problems in Community Oriented Primary Care (3-12) [Rpt/4]  
ed. Personal Change in Lifestyle Related Behavior (3-6)  
g. Community Geriatrics (3-6) [Rpt/12 units]  
h. Cancer Epidemiology and Prevention  
i. Cancer Prevention and Control  
Consult department before enrolling.  
See Electives Manual for course descriptions.
891. **Preceptorship, Yr.**
A variety of Family Practice sites throughout the state and country are approved for preceptorship training. These include solo, group, community clinic and hospital-based practices in locations representative of Arizona’s cultural, economic and geographic diversity.

- a. Primary Care (4-12)  
  Stein-Staff

- b. Family Medicine (3-12)  
  Hale

- c. Epidemiology at CDC (4-8)  
  Hale

- d. Rural Care (4-12)  
  Hale

- e. Prison Health Care (3-12)  
  Hale-Spencer

- f. Clinical Preceptorship in International Health (6-12)  
  Nichols-Pust-Staff

- g. AHEC/Border Health (3-12)  
  Meister-Hale-Nichols-Ortiz

See Electives Manual for course descriptions.

896. **Seminar I, II**

- a. International Health in the Third World (3) I  
  Pust

- b. Epidemiologic Methods (1-3) II  
  Moon

- c. Approaches to Managing Behavior Problems of Children and Adolescents (2)  
  Attarian

- e. Principles and Practice of Home Health (6)  
  Vuturo

- f. The Doctor-Patient Relationship (2)  
  Attarian

- j. Crisis & Conflict: Health Services in Latin America-Brazil  
  Nichols

- k. Nutrition in Disease (2) [Rpt./1]P, Bioc 501/801, Psio 601/801  
  Harrison

- m. Practice of Community-Oriented Medicine in Rural Areas (2) II  
  Nichols

- n. International Nutrition (2)  
  Galal

- p. Prepaid Health Care  
  Warren

- r. Basic Principles of Epidemiology (3)  
  Moon

- s. AIDS, Cancer, Nutrition Immunity  
  Watson

- t. Tropical Disease Problems (2-3)  
  Nichols

- u. Current Issues in Health Services (2)  
  Nichols

- w. Diet and Prevention of Disease  
  Ritenbaugh

- z. Psychosocial Epidemiology (2)  
  Estrada

See Electives Manual for course descriptions.

899. **Independent Study (1-12) I, II**

In-depth studies of clinical and nonclinical topics.
Professors: Rubin Bressler, Head [Pharmacology], David S. Alberts [Pharmacology; Director, Cancer Prevention & Control Center, Arizona Cancer Center], F. Paul Alepa, Robert A. Barbee [Assistant Director, Respiratory Services], John T. Boyer [Family & Community Medicine; Director, Restorative Medicine], Benjamin Burrows [Director, Respiratory Sciences], James J. Corrigan, Jr. [Associate Head, Pediatrics], James E. Dalen [Vice Provost for Medical Affairs, Medicine Administration; Dean, College of Medicine], William F. Denny, Brian G. M. Durie, David L. Earnest, Gordon A. Ewy, Associate Head [Director, Cardiac Diagnostic Laboratory, Internal Medicine; Assistant Director, Physiological Testing, Internal Medicine], Eric P. Gall [Surgery; Family & Community Medicine; Medical Director, Arthritis Center, Internal Medicine], Steven Goldman, Evan M. Hersh [Microbiology & Immunology], David G. Johnson [Pharmacology], Murray A. Katz [Physiology], Ronald J. Knudson [Director, Respiratory Services; Associate Director, Respiratory Sciences], Michael D. Lebowitz [Associate Director, Environmental Programs, Respiratory Sciences], Frank I. Marcus [Assistant Director, ECG Laboratory, Internal Medicine], Eugene Morkin [Physiology; Pharmacology], Charles A. Nugent, Jr., David A. Ogden, Eskild A. Petersen, William R. Roeske [Pharmacology], Sydney E. Salmon [Director, Arizona Cancer Center], Jay W. Smith [Vice Dean for Academic Affairs], Lawrence Z. Stern
Associate Professors: Frederick R. Ahmann, John W. Bloom [Research Associate, Respiratory Sciences], Thomas W. Boyden, Sammy C. Campbell, William S. Dalton [Adjunct Assistant Professor, Pharmacology & Toxicology; Research Associate, Arizona Cancer Center], Timothy C. Fagan [Pharmacology], Paul E. Fenster, John N. Galgiani, Harinder S. Garewal [Research Associate, Arizona Cancer Center], Ronald C. Hansen [Pediatrics], Norman Levine, Thomas P. Miller [Research Associate, Arizona Cancer Center], Arshaq Mooradian [Director, Geriatric Research, Restorative Medicine], Charles W. Otto [Professor, Anesthesiology], Jacob L. Pinnas, Stuart F. Quan [Anesthesiology; Assistant Director, Respiratory Services; Research Associate, Respiratory Sciences], Richard E. Sampliner, Jeffrey M. Trent [Director, Basic Science Research, Arizona Cancer Center], David B. Van Wyck [Surgery], Alexander H. Woods [Emeritus]

Assistant Professors: Rodney D. Adam, Neil M. Ampel, Christopher P. Appleton, Samuel M. Butman [Director, Cardiac Catheterization Services, Internal Medicine], Anthony E. Camilli [Research Associate, Respiratory Sciences], Irene E. Edwards, M. Brian Fennerty, Karl B. Kern, Richard W. Lee, Alan F. List, Joy L. Logan, John D. Palmer [Professor, Pharmacology], Thomas E. Raya, David S. Shimm [Associate Professor, Radiation Oncology], Charles W. Taylor [Research Associate, Arizona Cancer Center], Gayle A. Traver [Associate Professor, College of Nursing; Clinical Nurse Specialist, Respiratory Sciences; Clinical Nurse Specialist, Respiratory Services], David E. Yocum

Clinical Professors: Robert O. Brandenburg, Pedro L. Escobar [Family & Community Medicine; Chief, Physical Medicine & Rehabilitation, Restorative Medicine; Director, Rehabilitation Services], Richard J. McCarty, Brendan P. Phibbs, Robert A. Sanowski

Research Professor: Thomas E. Moon [Professor, Family & Community Medicine]


Research Associate Professors: Robert T. Dorr [Research Assistant Professor, Pharmacology & Toxicology; Research Associate, Arizona Cancer Center], Marilyn J. Halonen [Microbiology & Immunology; Associate Professor, Pharmacology; Research Associate, Respiratory Sciences], Duane L. Sherrill [Research Associate, Respiratory Sciences]

Clinical Assistant Professors: Jack J. Applefeld, Thomas M. Bajo, Jerry L. Bangert [Pathology], Marlene Bluestein, Pamela J. Davis, J. Michael Darragh, Brenda V. Dawson [Research Assistant Professor, Anatomy; Research Assistant Professor, Molecular & Cellular Biology], Clifford D. DeBenedetti [Pediatrics], Mindy J. Fain, H. Lionel Faitelson, Mary L. Fines, Irwin L. Flink, P. Gregory Fouth, Jay Goldman, Michael Grossman, Michael P. Habib, Lee J. Hixson, Richard F. Hoffman, Peter C. Kelly, Mary E. Klink [Research Associate, Respiratory Sciences], Marcia G. Ko, Kit S. Lam, Nathan Laufer, Richard M. Mandel, Michael J. Maricic, Margaret M. Miller, Patrick S. Pasulka, Robert M. Rifkin, Paul J. Rutala [Coordinator, Preparation for Clinical Medicine, Medicine Administration]Mark S. Siskind, Paul E. Stander, Terence D. Valenzuela [Assistant Professor, Surgery], Barbara H. Warren [Family & Community Medicine], Carol A. Wolfe, Yei-Mei Peng [Research Associate, Arizona Cancer Center]

Research Assistant Professors: Joseph J. Bahl, Marianne B. Broome-Powell [Research Associate, Arizona Cancer Center]

Visiting Professor: Mordecai M. Popovtzer

Clinical Instructors: Catherine A. Azar, Steven J. Fonken, Paul G. Hurst, Manuel R. Modiano, Sally B. L. Thompson
The Department of Internal Medicine has developed a program designed to introduce undergraduate medical students to the responsibility of care of the patient. Together with the staff, students will interview and examine patients, explore what is known of the pathophysiology of the various disorders and observe the effect of appropriate therapeutic modalities. Students will be assigned patients on the inpatient wards and in the outpatient clinics.
Course Descriptions

500. Research (6-24) [Rpt./3] Yr.  Staff
555. Cancer Biology (3) II, Alternate Year, 1990-91  Staff
(Identical with M. Mic. 555 which is home).

596. Seminar, II  Staff
a. Pathophysiology and Immunology of the Clinical Manifestations of Coccidioidomycosis (2)  Staff

599. Independent Study (3-6) I, II  Staff

800. Research (3-30) [Rpt./30 units] Yr.  Staff
See Electives Manual for course description.

803. Clinical Clerkship (12) Yr.  Mandel-Staff
Required of all students during their first clinical year. Assignment is made to the inpatient medical wards at AHSC, Tucson VAMC and selected hospitals in Phoenix as well as the outpatient medical clinics at several of these aforementioned sites. Some students, 25%-45% of the class, will be required to spend the full 12 weeks in Phoenix. Emphasis is placed upon the development of clinical skills and problem solving and the provision of compassionate and humanistic medical care. Students are expected to obtain and record the complete medical histories, perform physical examinations, develop appropriate differential diagnoses and monitor the progress of assigned patients. They will participate in diagnostic and therapeutic procedures with other members of the patient care team and attend required departmental conferences and seminars. Students will spend eight weeks on the inpatient service and four weeks in the outpatient clinics.
810. **Clerkship, Yr.**
   a. Ambulatory Care (4-6) Yr.
   b. Ambulatory Diagnosis and Therapeutics (6) Yr.
   c. Geriatrics: The Continuum of Care (3-12) Yr.
   d. Ambulatory Geriatrics (3-12) Yr. P, 803
      Students are offered three or four to six week elective clerkships in hospitals in Tucson
      and Phoenix.
      See Electives Manual for course descriptions.

811. **Subinternship, Yr.**
   a. Internal Medicine (4) Yr.
   b. Intensive Care (4) Yr.
   c. Coronary Care Unit - Acting Internship (4) Yr.
   i. Medical Intensive Care Unit (4) Yr.
   m. General Medicine (4) Yr.
      See Electives Manual for course descriptions.

815. **Subspecialty, Yr.**
   a. Clinical Cardiology (4-8)
   b. Clinical Dermatology (3)
   c. Endocrinology (4-12)
   d. Clinical Gastroenterology (4-8)
   e. Hematology-Oncology (3-4)
   g. Infectious Diseases (4-12)
   h. Pulmonary Diseases (4)
   j. Pulmonary Laboratory and Consultation Service (3-6)
   k. Nephrology, Renal Diseases (3-6)
   l. Clinical Allergy (4-6) P, 803 (Identical with Ped. 815i)
   m. Medical Subspecialties (3-6) [Rpt./1] Yr.
   n. Physical Medicine and Rehabilitation (3-6) [Rpt./1] Yr.
   p. Critical Care Medicine (4-6) (Identical with Anes. 815p which is home)
   q. Cardiology Consultation (4) Yr.
   r. Neurological and Neuromuscular Disorders (3-6) P, 803.
   u. Clinical Endocrinology, Metabolism and Hypertension (3-6)
      See Electives Manual for course descriptions.

891. **Preceptorship**
   a. General Medicine and/or Subspecialties (3-12) [Rpt./2]
   b. Ambulatory Internal Medicine: Clinical Problems (6) Yr.
      See Electives Manual for course descriptions.

896. **Seminar, II**
   a. Pathophysiology and Immunology of the Clinical Manifestations of Coccidioidomycosis (2)
      See Electives Manual for course description.

899. **Independent Study (1-18)** I, II
   See Electives Manual for course description.
Graduate study in Microbiology and Immunology is concerned primarily with microbial structures and functions, as well as the nature of immune systems. Areas of current research emphasis are virology, microbial genetics, immunology, bacterial pathogenesis and environmental microbiology. Course programs are drawn from offerings in biochemistry, biological sciences, chemistry, mathematics, microbiology, molecular biology, anatomy, pharmacology, genetics and others.

Master of Science and Doctor of Philosophy degrees with a major in microbiology and immunology are offered by a program whose faculty includes members of the Department of Microbiology and Immunology and other departments in the University.

Some limitations of enrollments may be necessary. Medical students will be given preference in those courses that are required for the M.D. degree. All other students must obtain the permission of the instructor before enrolling.

Course Descriptions

501. **Medical Microbiology (6) I**
Staff
The biological characteristics of microorganisms of importance in human health and disease; the reaction of the host to infectious agents and the mechanisms of host defense; diagnosis and management of infectious disease. Lectures, discussions, demonstrations and laboratory experiments. P, G.Bio. 101b; Chem. 241b, 243b; Bioc. 501.

517. **Microbial Physiology (3) II**
Staff
Biochemical and physiological activities of microorganisms. P, 317, Chem. 241b, 243b

520R. **Pathogenic Bacteriology (3) II**
Songer
520L. Pathogenic Bacteriology Laboratory (2) II
Songer
Isolation and identification of pathogenic bacteria: Techniques in pathogenic bacteriology. P, 420R or CR. (Identical with V.Sci. 520L).

523R. General Pathology (3) II 1990-91
Staff
Pathogenesis, pathophysiology and morphologic changes of human and animal diseases. (Identical with V.Sci. 523R).

523L. General Pathology (1) II 1990-91
Staff
Gross and histologic changes occurring in tissues and organs in selected human and animal diseases and disease processes. P, 423R or CR. (Identical with V.Sci. 523L).

525. Environmental Microbiology (3) I
Sinclair

527R. General Mycology (3) I
Sinski
General mycology with emphasis on the microfungi. P, 205.

527L. General Mycology (2) I
Sinski
General mycology lab with emphasis on the microfungi. P, 527.

528R. Advanced Microbial Genetics (3) II
Mendelson
Modern concepts of microbial genetics; basic genetic theory, the molecular architecture, biosynthesis and genetic regulation of bacterial cell structure, control of growth and cell division. P, 103, Micr. 328, G.Bio. 320 or 321. (Identical with MCB 528R).

528L. Advanced Microbial Genetics (2) II
Mendelson
Individual research projects within the framework of microbial genetics with emphasis on the genetic system of Bacillus subtilis. P, CR. 528R. (Identical with MCB 528L).

530. Biophysical Theory (2) II
Kilkson
Physical concepts and theories describing biomolecular structure and function, molecular evolution, limits to structure, symmetry, oligomer and virus structure, organelle structure and function. (Identical with Phys. 530).
538. **Ecology of Infectious Diseases (3) II**  
Staff  

550. **Molecular Mycology**  
Sinski  

551. **Environmental Carcinogenesis (3) II 1990-91**  
Gerner  
Physical and chemical carcinogenesis. Special emphasis will be upon molecular aspects of the interaction of the carcinogenic agents with mammalian cells and the subsequent mutagenic and metabolic consequences of such interactions. Topics of metabolic activation of chemical carcinogens will be emphasized as well as biological and biochemical aspects of tumor initiation and promotion. Carcinogen testing and risk-benefit analysis in relationship to the human environment. (Identical with R.Onc. 551).

552. **Molecular Mechanisms of Microbial Pathogenesis (3) I 1990-91**  
Friedman  
Review of current concepts in specific areas of microbial pathogenesis including actions of exo-endotoxins, cell surface interactions, phagocytosis and host microbial functions. P,Bioc. 460.

555. **Cancer Biology (3) II 1990-91**  
Bowden/Cress  
Fundamental biological aspects of neoplastic growth at the organ, cellular and molecular levels. Emphasis on the etiology, behavior and therapy of neoplasms. (Identical with R.Onc. 555).

560. **Structure and Function of the Immunoglobulins (3) II 1990-91**  
G. Meinke  
Immunoochemical characterization of the isotypic, allotypic and idiotypic specificities of the immunoglobulins and their relationships to biological function. P, Bioc. 462a-462b.

561. **Immunobiology (3) II 1990-91**  
Staff  
Cells and cellular events involved in humoral and cell-mediated immune responses; morphologic, physiologic and biochemical characterizations of the lymphoreticular system. P, Bioc. 462a-462b.

570. **Molecular Genetics (3) I 1990-91**  
H. Bernstein/Ito  
Molecular genetics and biology of the bacterial viruses; molecular mechanisms of gene regulation, DNA replication, DNA repair, mutation and genetic recombination; current research in bacterial genetics (lysogeny, transduction, conjugation, use of transposons and gene fusions in genetic analysis and transformation); introduction to gene cloning and its uses in analysis of gene structure and regulation.

577. **Advanced Microbial Physiology (2) II 1990-91**  
Staff  
Studies of metabolic pathways of selected microorganisms with an emphasis on industrial applications. P, 517.

580. **Molecular Virology (3) II 1990-91**  
W. Meinke  
The current status of basic research in virology at the molecular level. P, Chem. 460.

582. **Immunotoxicology (2) I 1990-91**  
Staff  
Broad overview of the immune system with emphasis on how chemicals affect the immune system (immunomodulation) and the role of the immune system in chemical-induced tissue injury/allergic responses. P, 602, Micr. 419.

595. **Colloquium I**  
Staff  
a. Molecular Biology (1) I [Rpt./2]

596. **Seminar**  
Staff  
a. Current Problems in Molecular Biophysics (1) I, II  
(Identical with Phys. 596a)
h. Control of Proliferation in Animal Cells (1-2) II  
(Identical with R.Onc. 596h)
630. **Immunology (4) II 1990-91 I**

Olson

Immunological and immunochemical concepts and techniques. 2R, 6L. P, 12 units of Micr. Chem. 460 or NFS 406a.

695. **Colloquium**

Staff

a. Readings in Microbiology (1) [Rpt.] I, II

b. Immunopathology (1) II

c. Molecular Genetics of Microorganisms (1) I, II

d. Molecular and Cellular Immunology (1) I, II

g. Host-Parasite Interactions (1) II [Rpt.]

696. **Seminar**

a. Research Seminar (1) [Rpt.] I, II

Harris-Sinclair

801. **Medical Microbiology (6) I**

Staff

The biological characteristics of microorganisms of importance in human health and disease; the reaction of the host to infectious agents and the mechanisms of host defense; diagnosis and management of infectious disease. Lectures, discussions, demonstrations and laboratory experiments. P, G.Bio. 101b, Chem. 241b, 243b, Bioc. 501.

891. **Preceptorship, Yr.**

Staff

a. Microbiology and Immunology (3-12)

See Electives Manual for course description.

899. **Independent Study (6-12) I, II**

Staff

P, Microbiology and Immunology 501/801.

See Electives Manual for course description.

900. **Research (1-8) I, II**

Staff

910. **Thesis (1-6, max. total 8) I, II**

Staff

920. **Dissertation (1-9, max. total 18) I, II**

Staff

930. **Supplementary Registration (1-6) I, II**

Staff
UNIVERSITY DEPARTMENT OF MOLECULAR AND CELLULAR BIOLOGY

(Colleges of Agriculture and Medicine and the Faculty of Science)

Professors: Samuel Ward, Head [Ecology & Evolutionary Biology], H. Vasken Aposhian [Pharmacology], George T. Bowden [Pharmacology & Toxicology; Radiation Oncology; Coordinator, Research Training, Arizona Cancer Center], Wayne R. Ferris, William J. Grimes [Biochemistry], Mac E. Hadley [Anatomy, Ecology & Evolutionary Biology], Richard B. Hallick [Biochemistry], John G. Hildebrand [Director, Neurobiology, Arizona Research Laboratories], Henry Koffler [Biochemistry, Microbiology & Immunology; President, The University of Arizona], Brian A. Larkins [Head, Plant Science], Neil H. Mendelson, David W. Mount [Biochemistry, Microbiology & Immunology], James W. O’Leary [Research Horticulturist, Environmental Research Laboratory], Peter E. Pickens, Nobuyoshi Shimizu, Hans Van Etten [Plant Pathology]

Associate Professors: Hans J. Bohnert [Professor, Biochemistry], Don P. Bourque [Biocchemistry], Danny L. Brower, Jennifer D. Hall, Martinez J. Hewlett, Thomas J. Lindell, Associate Head [Pharmacology], John W. Little [Biochemistry], Kaoru Matsuda

Assistant Professors: Gail D. Burd [Anatomy], James L. Deatherage [Associate Professor, Biochemistry], Martha Hawes [Plant Pathology], Roger L. Miesfeld [Biochemistry; Research Associate, Arizona Cancer Center], Karen Oishi [Plant Science], Elizabeth Vierling [Biochemistry]

Research Assistant Professor: Brenda V. Dawson [Anatomy, Internal Medicine]

The Department of Molecular and Cellular Biology is a research-oriented department in which students may receive advanced training in all aspects of research which employ cellular, molecular, biochemical and genetic approaches. The department offers programs leading to the Master of Science and the Doctor of Philosophy degrees with majors in Molecular and Cellular Biology.

Applicants for admission should be prepared in chemistry, physics and mathematics and must submit scores on the aptitude test of the Graduate Record Examination. Applicants should communicate directly with the department regarding other admission requirements.

The deadline for completion of all application files for admission to the programs beginning with the fall semester is April 1 (March 15 for applicants desiring financial assistance).

Students are expected to specialize in areas of interest to the faculty. These include viral oncology, regulation of gene expression, neurobiology, cellular ultrastructure and function, stucture and function of nucleic acids, developmental biology of higher plants, plant molecular biology, molecular genetics, invertebrate developmental biology, enviironmental plant physiology and gene tranfer systems for mammalian cells. A listing of the faculty of the department and their research interests can be obtained from the department on request. A thesis is required for the Master’s degree.

Course Descriptions

404. Contemporary Biology in Human Affairs (3) II

Advances in biomedical research will be reviewed and their ethical, social and legal implications discussed. P, one course in bioc. or bio.; botany not acceptable.
410a-  Advanced Cell Biology (3-3)  Ferris-Staff
Regulation at the cellular and molecular levels; gene expression; nature, function and integration of organelles and ultrastructural components of the cell. P, 181 (for majors), Chem. 241b or 480a (Identical with Micr. 410a-410b).

410b. Regulation at the cellular and molecular levels; gene expression; nature, function and integration of organelles and ultrastructural components of the cell. P, 181 (for majors), Chem. 241b or 480a (Identical with Micr. 410a-410b).

413.  Advanced Cell Biology Laboratory (2) I Shimizu
Modern laboratory techniques for genetic and molecular analyses of mammalian cells in culture. 6L. P, CR 415. Maybe be convened with 513.

415.  Somatic Cell and Molecular Genetics (2) I Shimizu

418L. Advanced Microbial Genetics Laboratory (2) I Mendelson
Individual research projects within the framework of microbial genetics with emphasis on the genetic system of Bacillus subtilis. (Identical with Ecol. 428L and Micr. 428L).

428R. Advanced Microbial Genetics (3) II Mendelson
Modern concepts of microbial genetics; basic genetic theory, the molecular architecture, biosynthesis and genetic regulation of bacterial cell structure, control of growth and cell division. P, 181, Micr. 328, Col. 320 or 321. (Identical with Ecol. 428R and Micr. 428R).

437.  Vertebrate Physiology (4) I Staff

443. Insect Neurobiology (3) II Staff
(Identical with Ento. 443). May be convened with 543.

456. Developmental Biology (3) I Bagnara

457. Experiments in Developmental Biology (4) II Bagnara
460. **Plant Physiology (4) I** Matsuda

461. **Introduction to Neurobiology (3) I** Pickens
Physiology and anatomy of invertebrate and vertebrate nervous systems. P, eight units of biology.

462. **Neurobiology Laboratory (1) I** Pickens

465. **Neuroethology (2) II** Pickens
Selected topics in current neuroethological research on vertebrate and invertebrate nervous systems. P, 461 or consult department before enrolling.

467R. **Endocrinology (3) II** Hadley
(Identical with Anat. 467r).

467L. **Endocrinology Laboratory (1) II** Hadley
(Identical with Anat. 467l).

469. **Developmental Neurobiology (2) II** Pickens
Development of the nervous systems of invertebrates and vertebrates from embryonic stages to the adult. P, eight units of biology.

473. **Recombinant DNA Techniques (3) II** Lindell
Relevant techniques for the isolation, purification and cloning of genes in *E. Coli* hosts. Eucaryotic Lambda genomic DNA clones will be characterized by restriction mapping, hybridization analysis and sequence analysis. Consult department before enrolling. P, Bioc. 462a, MCB 410b. (Identical with Bioc. 473 and Micr. 473).

513. **Advanced Cell Biology Laboratory (2) I** Staff
For a description of course topics see 413. Graduate-level requirements include an oral presentation. P, CR 415. May be convened with 413.

515. **Somatic Cell and Molecular Genetics (2) I** Shimizu

528L. **Advanced Microbial Genetics Laboratory (2) I** Staff
Individual research projects within the framework of microbial genetics with emphasis on the genetic system of *Bacillus subtilis*. (Identical with Ecol. 528L and Micr. 528L).

528R. **Advanced Microbial Genetics (3) II** Staff
For a description of course topics see 428R. Graduate-level requirements include reading papers for the current literature coupled with oral presentations. P, 181, Micr. 328, Ecol. 320 or 321. (Identical with Ecol. 528R, Gene. 528R and Micr. 528R). May be convened with 428R.

543. **Insect Neurobiology (3) II** Staff
(Identical with Ento. 543). May be convened with 443.

550. **Topics in Pigment Cell Biology (2) I** Bagnara
(Identical with Anat. 550).

555. **Molecular Mechanisms of Development (3) II** Brower

556. **Developmental Biology (3) I** Staff
For a description of course topics see 456. Graduate-level requirements include a deeper understanding of the subject through reading and discussion of original research reports. Graduate students will be examined primarily on their ability to synthesize and evaluate information and ideas in the field. P, 181. (Identical with Anat. 556). May be convened with 456.

558. **Advanced Subjects in Endocrinology (2) [Rpt.] I** Hadley
Selected topics in vertebrate and invertebrate endocrinology. P, 467r. (Identical with Anat. 558).
560. **Plant Physiology (4) I**  
For a description of course topics see 460. Graduate-level requirements include an analytical paper on selected areas in plant physiology. P, Chem. 241a, 243a. (Identical with Ecol. 560). May be convened with 460.

562. **Plant Intermediary Metabolism (3) II 1990-91**  
Matsuda  

563. **Plant-Water Relations (3) II**  
O'Leary  
Analytic approach to the study of water movement into and through plants; development of internal water deficits and their significance to physiological processes. P, 460. (Identical with Ws.M. 563).

564. **Plant Growth and Development (3) II 1990-91**  
Matsuda  
Selected topics in growth and development. P, 460 (Identical with Pl.S. 564).

568. **Nucleic Acids (3)**  
Staff  
(Identical with Bioc. 568).

570. **Molecular Biology of the Cell Membrane (3) I 1990-91**  
Staff  
(Identical with Bioc. 570).

573. **Recombinant DNA Techniques (3) II**  
Oishi  
For a description of course topics see 473. Graduate-level requirements include presentation of a short seminar on an original research project involving recombinant techniques. Consult department before enrolling. P, 410a, Bioc. 462a. (Identical with Bioc. 573, Gene. 573 and Micr. 573). May be convened with 473.

582. **Topics in Neural Development (2) II**  
Staff  
(Identical with Nrsc. 582).

583. **Topics in Neural Plasticity (2) I**  
Staff  
Reading and discussion of primary literature on cellular, biochemical, physiological and structural changes that occur on the adult nervous system. P, A course in neurobiology, consult department before enrolling. (Identical with Anat. 583 and Nrsc. 583).

584. **Cellular Neurobiology (2) II**  
Staff  
(Identical with Anat. 584).

588. **Principles of Cellular and Molecular Neurobiology (4) I**  
(Identical with Nrsc. 588).

595a. **Colloquium (1) [Rpt.] II**  
Staff  
Topics of interest in molecular and cellular biology. Open to majors only.

596. **Seminar (3) I**  
Staff

696. **Seminar (1) [Rpt.] I, II**  
Staff

761. **Methods in Molecular and Cellular Biology (3) I,II**  
Staff  
Current techniques for qualitative and quantitative studies. 9L. Open to majors only.

801. **Molecular and Cellular Biology (3) I**  
Lindell  
Acquire a basic understanding of modern genetics, molecular biology and cell biology, and to learn how to apply that understanding to human disease. Open to medical students only.
Neurology is that discipline of medicine responsible for the diagnosis and treatment of diseases of the human nervous system. Courses are offered which are designed to teach students to interpret evidence of normal or abnormal neurologic functioning. Students have a three-week required clerkship and a six-week elective in neurology. Students receive an introduction to neurology during lectures in the neuroscience course during the basic science years.
A continuing neuroscience seminar series is presented by residents, physicians and graduate students in the Department of Neurology throughout the year. This series is offered to medical students as well as to postgraduate trainees and students in allied areas.

Course Descriptions

See Electives Manual for course description.

803. Clinical Clerkship (3-6) Yr.  
A three-week required course on the neurological wards at University Medical Center, Tucson Medical Center, Tucson VAMC and Barrow Neurological Institute in Phoenix. Cases are presented to members of the neurological staff and discussed in detail. Weekly teaching conferences are given by the neurology faculty.

810. Clerkship, Yr.  
This three-, four- or six-week clerkship is offered on the neurology wards at University Medical Center, Tucson Medical Center and Tucson VAMC. Students work closely with the attending and resident staff in an effort to become proficient in the techniques of the neurological examination and management of neurological disorders.

815. Subspecialty, Yr.  
   b. Behavioral Neurology / Higher Cortical Functions (4) Yr.  
   c. Cerebrovascular Disease (4-6) Yr. P, 803.

891. Preceptorship, [Rpt./2] Yr.  
   a. Neurology (4-6) [Rpt./2] Yr.  
   See Electives Manual for course description.
Obstetrics and Gynecology is that discipline of medicine which encompasses reproductive biology and the ultimate application thereof to human reproduction. In the natural evolution of medical care in the United States the obstetrician-gynecologist has become the primary physician for women. The courses of study available in Obstetrics and Gynecology are designed to provide a clinical substrate for the medical student in this branch of medicine. The means to this end are by precept and example of patient diagnosis, care and therapeusis as well as didactic and tutorial sessions.

Course Descriptions

800. Research (1-18) [Rpt./1] Yr. Heine-Staff
Experience in each of the research areas listed below is available with programs up to six weeks in length individually designed. P, 803.
1. Diagnostic Ultrasound Shenker-Weinstein
2. Endocrine Laboratory Grosso
3. Perinatal Medicine Weinstein-Shenker-Reed
4. Gynecologic Oncology Hatch
5. Fertility Control Heine
7. Gynecology Pearson

803. Clinical Clerkship (6-9) Yr. Heine-Staff
Medical students will be assigned to outpatient clinics and hospital wards to become members, along with the attending physician, of the team responsible for the patient's care.

810. Clerkship, Yr. Heine-Staff
a. Preparation for Practice (4-6)
This elective course for Year IV students will essentially be an externship in a Phoenix or Tucson hospital to include exposure to the full gamut of obstetrical and gynecological care conducted under direct supervision of a faculty member. The elective period may be for three or six weeks. P, 803.

b. Preparation for Private Practice (3-6) Heine-Yuma Faculty
This elective course for Year IV students is to provide patient care experience in a rural and/or underserved area of Arizona. Closely supervised preceptorship in Ob/Gyn in a private practice setting removed from the University. P, 803.
815. Subspecialty, Yr.
a. Clinical Infertility (4-6) Yr.

891. Preceptorship (3-12) Yr.
b. Gynecology-Endocrinology (3-6) P, 803.
See Electives Manual for course descriptions.
OPHTHALMOLOGY

Professor: Barton L. Hodes
Associate Professor: Johan T. W. Van Dalen [Neurology]
Assistant Professor: Robert W. Snyder, Acting Head
Clinical Professor: Robert M. Dryden
Clinical Assistant Professors: Richard W. Allinson, Denis M. Carroll, Leonard Joffe, George S. Novalis
Senior Clinical Lecturer: John E. Harris
Clinical Lecturer: Joel S. Meyers

Ophthalmology, the College of Medicine’s newest department, offers two electives for medical students. One is a research elective in which experience in laboratory research in ophthalmology will be obtained with programs of a minimum of four weeks in duration. The other is a clinical elective in which medical students will be assigned to outpatient clinics and inpatient wards at University Medical Center, Tucson VAMC and Kino Community Hospital as well as surgery which will give them an overview as to how the ophthalmologist relates to his/her patient population.

The graduate program in Ophthalmology offers residents extensive inpatient and outpatient experiences at University Medical Center, Tucson VAMC and Kino Community Hospital.

Course Descriptions

800. Research (6-18) I, II
See Electives Manual for course description.

815. Subspecialty, Yr. [Rpt./3]
a. Ophthalmology (3-6) Yr.
   See Electives Manual for course description.

891. Preceptorship I, II
   a. Ophthalmology (4-12) Yr.
      See Electives Manual for course description.
The Department of Pathology has responsibility for both anatomical and clinical pathology. The objective of the study of pathology is to gain increased understanding of disease—the causes, mechanisms and secondary alterations which occur in body structure and function—exploiting whatever methods will provide the physician with a solid body of facts from which to reason, deduce and prognosticate.
Course Descriptions

489. Introduction to Forensic Science: Pathology, Anthropology, Toxicology and Law (2) I, II
    Birkby-Jones-Henry-Parks
The course provides opportunity for the criminal investigator and attorney with a background in forensic pathology to better understand the end results of trauma, toxic substances and environmental catastrophies.

801. General and Systemic Pathology (10) I, II
    Graham-Staff
Lectures, conferences, demonstrations and laboratory investigations relating to disease. Use of current autopsy, biopsy and clinical pathology material. P, Anat. 801, 802, 805; Biochem. 501/801; Physiol. 601/801; M. Mic. 801 (medical) or CR; Phcl. 501/801 or CR; Med. 801 or CR.

810. Clerkship, Yr.
    Staff
   a. Anatomic Pathology (4-6) Yr.
      An intern type program with students participating in surgical pathology, autopsies and cytopathology. Instruction is strongly clinically oriented. P, Path. 801 and 12 weeks of clinical clerkships.
   b. Clinical Pathology (4) Yr.
      An interpretive approach to the evaluation of laboratory data in the diagnosis and management of clinical disorders. Topics include bacteriology, blood component therapy, body fluid analysis, clinical chemistry, coagulation, hematology, immunohematology, mycology, toxicology, urinalysis and virology. P, Path. 801 and 12 weeks of clinical clerkships.
   c. Special Topics (3-18) [Rpt.] Yr.
      Opportunities for intensive studies during a six-week period in one of the following fields: computer use, cytopathology, cytogenetics, immunohematology, immunopathology, microbiology-virology, neuropathology, pulmonary pathology, hematopathology, clinical chemistry and oncology. May be taken more than once for credit. P, Path. 801, prior arrangement and approval by the department.

891. Preceptorship, Yr.
    Byers-Staff
   a. Pathology (3-18) [Rpt./2]
Professors: Lynn M. Taussig, Head [Medical Director, Children’s Research Center, Pediatrics; Assistant Director, Respiratory Sciences], George D. Comerci [Family & Community Medicine], James J. Corrigan, Jr., Associate Head, Pediatrics [Internal Medicine], Burris R. Duncan, Peggy C. Ferry [Neurology], Stanley J. Goldberg, Mary I. Johnson [Anatomy, Neurology], Otakar Koldovsky [Physiology], Richard J. Lemen [Assistant Professor, Physiology; Research Associate, Respiratory Sciences], Elmer S. Lightner, Anthony F. Philipp, C. George Ray [Acting Head, Pathology], Hugh C. Thompson [Emeritus, Family & Community Medicine]

Associate Professors: Alan D. Bedrick, Assistant Head, Ronald C. Hansen [Internal Medicine], Gail G. Harrison [Acting Vice Dean, Graduate College; Professor, Nutrition & Food Science, Anthropology, Family & Community Medicine], John J. Hutter, Jr., Michael J. Schumacher, Elsa J. Sell, John N. Udall, Aylen Yates [Professor, Psychiatry]

Assistant Professors: Richard L. Donnerstein, Carlos A. Flores, Daniela Lax, Thomas R. Lloyd, Paul S. Meltzer [Research Associate, Arizona Cancer Center], Wayne J. Morgan [Physiology; Research Associate, Respiratory Sciences], William A. Scott

Clinical Professor: Anna Binkiewicz

Clinical Associate Professors: Suzanne B. Cassidy, Michael W. Cohen, John L. Ey, M. Eleanor Grimm, H. Eugene Hoyne [Obstetrics & Gynecology], Devyani S. Raval, Mary E. Rimsza, Ziad M. Shehab

Clinical Assistant Professors: Robert A. Berg, Kathryn A. Bowen, Tamison Jewett, Courtney R. Johnson, Clifford D. DeBenedetti [Internal Medicine], Catherine J. Locke [Psychiatry], William N. Marshall, Jr., Eve C. Shapiro

Research Assistant Professor: Anne L. Wright [Research Associate, Respiratory Sciences]

Clinical Instructors: Donna M. Capin, Roni Grad, Victoria E. Lasala, Mark M. Stevenson


The unique concerns of pediatrics as a medical discipline are: 1) the period of life between conception and the first month of life, loosely termed perinatology; 2) the fact that children are growing and developing constantly which results in unique physiological, biochemical, pathological and psychosocial considerations; and 3) the period of life known as adolescence with its characteristic physiologic and psychologic changes. The objectives of the department are to provide all students of medicine, from freshmen in medical school to the accomplished physician, an opportunity to learn of our best understanding of health and disorders in relation to the above concerns. We also have as a goal the contribution of new knowledge by appropriate research activities and the application of all available knowledge by models of health care. These objectives are achieved by the following list of courses, by active participation in regular postgraduate programs, and by the research and clinical activities in the department.
Course Descriptions

800. **Research (4-6) Yr.**

Staff


803. **Clinical Clerkship (6-9) Yr.**

Shehab-Ruggill

This six-week clerkship is required of all students in their initial clinical year; an additional three weeks may be selected. Stress is placed upon acquisition and refinement of basic data collection, upon problem solving and accumulation of factual knowledge and achieving those attitudes associated with being a physician.

810. **Clerkship, Yr.**

Staff

a. Externship in Inpatient Pediatrics (4-6) Yr.

d. Inpatient Pediatrics (4) Yr.


811. **Subinternship, Yr.**

Staff

a. Ambulatory Pediatrics (3-6) Yr.

d. Adolescent Medicine (4-6)


815. **Subspecialty, Yr.**

Staff

a. Advanced Neonatology (4-6) Yr.

b. Pediatric Infectious Diseases (4-6) Yr.

c. Neurodevelopmental Follow-up of High-Risk Infants (4) Yr.

d. Cardiac Ultrasound Echo & Doppler (4-6) Yr.

e. Pediatric Cardiology (4-6) Yr.

f. Pediatric Neurology (4-6) Yr.

g. Pediatric Hematology/Oncology (4-6) Yr.

h. Poison Center (4-12) Yr.

l. Clinical Allergy (4-6) Yr.

(Identical with I.Med. 8151 which is home).

p. Pediatric Endocrinology (4-6) Yr.

r. Pediatric Clinical Research in a Cross-Cultural Setting (4) Yr.

s. Clinical Genetics/Dysmorphology (4) Yr.

t. Pediatric Rural Ambulatory Elective (4) Yr.

u. Child With Complex Chronic Illness (4) Yr.

These four to twelve-week elective courses are organized by various staff and sections of the Department of Pediatrics. P, 803. See Electives Manual for course descriptions.

891. **Preceptorship, Yr.**

Lightner-Staff

a. Pediatrics (4-6) Yr.


899. **Independent Study (3-18) Yr.**

Staff

See Electives Manual for course description.
PHARMOACOLOGY

Professors: Thomas F. Burks, II, Head [Associate Dean for Research, Medicine Administration], David S. Alberts [Internal Medicine; Director, Cancer Prevention & Control Center, Arizona Cancer Center], H. Vasken Aposhian [Molecular & Cellular Biology], Klaus Brendel, Rubin Bressler [Head, Internal Medicine], Burnell R. Brown, Jr. [Head, Anesthesiology], A. Jay Gandolfi [Anesthesiology; Associate Research Professor, Pharmacology & Toxicology], Ryan J. Huxtable, David G. Johnson [Internal Medicine], Eugene Morkin [Physiology, Internal Medicine], John D. Palmer [Assistant Professor, Internal Medicine], Charles W. Putnam [Associate Head, Surgery], William R. Roeske [Internal Medicine], I. Glenn Sipes [Anesthesiology; Head, Pharmacology & Toxicology], Henry I. Yamamura [Biochemistry, Arizona Research Laboratories]

Associate Professors: Dean E. Carter [Professor, Pharmacology & Toxicology], Thomas P. Davis, Timothy C. Fagan [Internal Medicine], Edward D. French, Marilyn J. Halonen [Research Associate Professor, Microbiology & Immunology, Internal Medicine; Research Associate, Respiratory Sciences], David L. Kreulen [Physiology], Frank Porreca

Assistant Professor: Laurel A. Fisher

Instructor: Alan D. Barreuther [Clinical Associate Professor, Pharmacy Practice]

Research Professor: Richard M. Herman

Research Associate Professor: Raymond C. Duhamel

Research Assistant Professors: John J. Duffy [Radiation Oncology], Thomas H. Kramer [Research Associate, Anesthesiology]

Research Lecturers: John C. Gilkey [Assistant Research Scientist, Arizona Research Laboratories-Intercollegiate]


Pharmacology is a broad discipline involving the investigation of the actions of drugs and chemicals upon living material at all levels of organization. The discipline occupies an important interface between the basic medical sciences and the clinical sciences, drawing strongly upon the former for its contribution to the latter. Research in pharmacology utilizes all appropriate techniques of modern biology from the molecular to the clinical levels. In the health professions, pharmacologic knowledge is applied to the diagnosis, prevention, cure or relief of symptoms of disease, and in the promotion of optimal health. The basic pharmacologic principles are emphasized in both the medical and graduate student teaching. This will permit the student to develop techniques of problem solving to keep abreast of advances in pharmacology through his/her professional career.

Course Descriptions

501. The Pharmacological Basis of Therapeutics (6) II Palmer
Action of chemical agents upon living material at all levels of organization with emphasis on mechanisms of action of prototype drugs. Foundation for a rational approach to human therapeutics and toxicology. P, Psio. 601; Bioc. 501/801. (Identical with Tox. 501).
<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Instructor(s)</th>
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<tbody>
<tr>
<td>550</td>
<td>Drug Disposition and Metabolism (2) II</td>
<td>Staff</td>
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<tr>
<td></td>
<td>Principles of absorption, distribution and excretion of drugs with particular emphasis on mechanisms of drug metabolism and pharmacokinetics. P, 462a, 462b or 501; Bioc. 501/801; Tox. 602a. (Identical with Tox. 550).</td>
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<tr>
<td>551</td>
<td>Molecular Biology of Pharmacological Agents (3) I</td>
<td>Staff</td>
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<td></td>
<td>The molecular mechanism of drugs and toxins at the cellular and subcellular levels including effects on control mechanisms, cell-cell interactions, organelles and nucleic acid and protein synthesis. P, 501, 550, 561b; Bioc. 501/801. (Identical with Tox. 551).</td>
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<tr>
<td>554</td>
<td>Cardiovascular Pharmacology (3) I</td>
<td>Huxtable-Fisher</td>
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<tr>
<td>561a-</td>
<td>Introduction to Pharmacological and</td>
<td>Fisher-Liebler</td>
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<tr>
<td>561b</td>
<td>Toxicological Literature (1-1)</td>
<td>Fisher-Liebler</td>
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<td></td>
<td>Designed to broaden the background of students in pharmacology and toxicology and to improve scientific communication skills. P, 501. (Identical with Pcol. 561a-561b).</td>
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<tr>
<td>576</td>
<td>Environmental Toxicology (3) I</td>
<td>Staff</td>
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<tr>
<td></td>
<td>Toxicity of natural toxins and of agricultural and industrial chemicals with emphasis on air and water pollutants; decision-making in environmental issues. P, six units of biology and organic chemistry; Chem. 325, 326. (Identical with Tox. 576 which is home).</td>
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<tr>
<td>586a-</td>
<td>Introduction to Pharmacology and Toxicology Research (1-1)</td>
<td>Staff</td>
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<tr>
<td>586b</td>
<td>Introduction to basic research techniques in pharmacology and toxicology through supervised laboratory rotations; student-initiated and faculty-structured laboratory exercises in modern pharmacological and toxicological techniques. P, CR 501; Bioc. 563; Psio. 601.</td>
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<tr>
<td>596</td>
<td>Seminar (1-3) [Rpt./3] I, II</td>
<td>Staff</td>
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<td></td>
<td>Student reports on current research topics by local and visiting scholars. Required of all predoctoral graduate students in Pharmacology &amp; Toxicology. a. Advanced Graduate Research (1-3) [Rpt./3] I, II</td>
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<td>Required of all graduate students once per year after the first year. P, 561b. (Identical with Pcol. 596a).</td>
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<tr>
<td>599</td>
<td>Independent Study (1-5) I, II</td>
<td>Staff</td>
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<tr>
<td>601</td>
<td>Analytical Toxicology (2-3) I</td>
<td>Carter</td>
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<tr>
<td></td>
<td>Lecture and lab in the qualitative and quantitative determination of toxic substances in body fluids. Modern instrumental techniques will be employed whenever appropriate. Lecture may be taken separately by non-majors. 2R, 4L. P, Chem. 400a. (Identical with Tox. 601 which is home).</td>
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<tr>
<td>602</td>
<td>Biotoxicology (2-3) II</td>
<td>Sipes-Staff</td>
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<td>Lecture and lab emphasizes the mechanisms of organ directed toxicities in animals. Included are chemical carcinogenesis, teratogenesis and mutagenesis. Lecture may be taken separately by non-majors. 2R, 4L. P, two semesters of general biology. (Identical with Tox. 602 which is home).</td>
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<tr>
<td>653</td>
<td>Neuropharmacology (3) II</td>
<td>Laird-Yamamura</td>
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<td>Role of various neurochemicals in the autonomic and central nervous systems and the effect of drugs on the nervous system including their influence on synthesis, storage and release of neurochemicals. P, 501/801, or Pcol. 471b, 561a, 596. (Identical with Pcol. 653 which is home).</td>
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<tr>
<td>800</td>
<td>Research (1-6) Yr.</td>
<td>Staff</td>
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<td>See Electives Manual for course description.</td>
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<tr>
<td>801</td>
<td>The Pharmacological Basis of Therapeutics (6) II</td>
<td>Palmer</td>
</tr>
<tr>
<td></td>
<td>Action of chemical agents upon living material at all levels of organization with emphasis on mechanisms of action of prototype drugs. Foundation for a rational approach to human therapeutics and toxicology. P, Psio. 601; Bioc. 501/801. (Identical with Tox. 501).</td>
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<tr>
<td>815</td>
<td>Subspecialty, Yr.</td>
<td>Staff</td>
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<tr>
<td></td>
<td>a. Clinical Pharmacology (3) P, Phcl. 801</td>
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</tbody>
</table>
See Electives Manual for course description.

891. Preceptorship, Yr.
   a. Pharmacology (3-12) Staff
      See Electives Manual for course description.

899. Independent Study (1-5) I, II Staff
900. Research (1-5) I, II Staff
      Individual or independent work, directed reading or special problems under the supervision of a member of the faculty with whom specific arrangements have been made. Must be taken for graduate credit by Pharmacology & Toxicology graduate students.

910. Thesis (1-8) I, II Staff
920. Dissertation (1-9) I, II Staff
930. Supplementary Registration (1-6) I, II Staff
PHYSIOLOGY


Associate Professors: Janis M. Burt [Research Associate Professor, Surgery], Andreas M. Goldner [Associate Dean, Student Affairs, Medicine Administration; Director, Alumni Affairs, Medicine Administration; Director, Multidiscipline Laboratories, Medicine Administration], Ziaul Hasan, David L. Kreulen [Pharmacology], L. Claire Parsons [Dean, College of Nursing; Professor, Nursing], Timothy W. Secomb [Associate Research Professor, Arizona Research Laboratories; Adjunct Assistant Professor, Mathematics], Marc E. Tischler [Biochemistry], Stephen H. Wright

Assistant Professors: Edmund A. Arbas [Arizona Research Laboratories-Intercollegiate], Roger M. Enoka [Associate Professor, Exercise & Sport Sciences], Patricia B. Hoyer, Richard J. Lemen [Professor, Pediatrics; Research Associate, Respiratory Sciences], Richard B. Levine [Arizona Research Laboratories], Wayne J. Morgan [Pediatrics; Research Associate, Respiratory Sciences], Douglas R. Seals [Exercise & Sport Sciences], Mark E. Wise [Animal Sciences]

Research Professor: James R. Bloedel

Research Associate Professor: Alan R. Gibson

Research Assistant Professors: Ann L. Baldwin, Carol A. Beuchat [Research Associate, Ecology & Evolutionary Biology], Thomas M. Hamm, Richard C. Schaeffer, Jr.

Visiting Associate Professor: Henry J. Harlow


Senior Research Specialist: Patricia A. McCuskey [Anatomy]

Research Specialist: Olga H. Brokl

Research Engineers: Robert M. Reinking, Roy A. Tucker

Laboratory Teaching Associate: E. Patricia Goggans

The Department of Physiology teaches and does scholarly work on physiological mechanisms of significance to medicine. In both teaching and research the orientation of the department is broad, encompassing single cell, organ and total body function.

Students interested in a Ph.D. in Physiology should apply through the graduate program in Physiological Sciences (see the Graduate Catalog or contact the Department of Physiology office for further information).

Course Descriptions

418. Physiology for Engineers (4) I

Gore

Designed to bring to engineering students awareness of the structure and function of whole organisms, their component organs and organ systems. Open to nonmajors only. (Identical with AME 418, Ch.E. 418 and ECE 418).

419. Physiology Laboratory (2) I

Gore

Lab experiments in physiology intended to provide experience with organ systems and measurement techniques. Designed for engineering students enrolled in the clinical
engineering and biomedical engineering options. 6L. Open to nonmajors only. P, 418 or CR.
(Identical with AME 419, Ch.E. 419 and ECE 419).

466. **Physiology Laboratory (2) II**

Laboratory techniques and investigation of physiological mechanisms. P, Either EEB 462, Vet. Sci. 400a, b, or Psio. 480. (Identical with EEB 466, MCB 466, Vet. Sci. 466, An. Sci. 466). May be jointly convened with 566. For graduate level requirements see 566.

480. **Human Physiology (4) II**

Principles of physiology with emphasis on the human; designed primarily for students in pharmacy and health related sciences. Open to pharmacy majors; others consult department before enrolling. P, Chem. 243b, Math. 123, Phys. 102b, CR 481. (Identical with Tox. 480). May be jointly convened with 580. For graduate-level requirements see 580.

481. **Physiology Laboratory (1) II**

Experiments intended to reinforce principles of physiological phenomena; designed primarily for students in pharmacy and health related sciences. Open to pharmacy majors; others consult department before enrolling. P, Chem. 243b, Math. 123, Phys. 102b, CR 480. (Identical with Tox. 481). May be jointly convened with 581. For graduate-level requirements see 581.

495. **Colloquium**

y. Introduction to the Neurosciences I (2)

An introductory overview of mammalian neural structure and function. Neuro-anatomical and neurophysiological principles are emphasized. P, permission of instructor. (Identical with Interdept. 495y which is home). May be convened with 595y. For graduate-level requirements see 595y.

z. Introduction to the Neurosciences II (2)

An introductory overview of clinical conditions that affect the human nervous system. P, 495y or consent of department. (Identical with Interdept. 495z which is home). May be jointly convened with 595z. For graduate-level requirements see 595z.

499. **Independent Study (1-5) I, II**

503. **Cellular Physiology (4)**

Fundamental responses of living organisms to environmental changes by examining mechanisms which operate at the cellular level. Topics include organelle structure and function, transmembrane homeostasis and transport phenomena, excitability, intercellular and intracellular communication, cellular motility and nerve/muscle/synapse function. P, Chem. 103b, 104b, 241b, 243b; Phys. 102b; Math. 125a-125b; Biochem. 460.

566. **Physiology Laboratory (2) II**

Laboratory techniques and investigations of physiological mechanisms. P, Either EEB 462, 468, Vet. Sci. 400a-b or Psio. 480. (Identical with EEB 566, Tox. 566, Vet. Sci. 566, An. Sci. 566). May be jointly convened with 466. Graduate level requirements include students completing a series of directed laboratory exercises, then designing and carrying out an experiment of their own.

580. **Human Physiology (4) II (First Offering Spring 1990)**

Principles of physiology with emphasis on the human; designed primarily for students in pharmacy and health related sciences. Open to pharmacy majors; others consult department before enrolling. P, Chem. 243b, Math. 123, Phys. 102b, CR 581. (Identical with Tox. 580). May be jointly convened with 480. Graduate-level requirements include demonstration of in-depth understanding of human physiology through several written assignments.

581. **Physiology Laboratory (1) II (First Offering Spring 1990)**

Experiments intended to reinforce principles of physiological phenomena; designed primarily for students in pharmacy and health related sciences. Open to pharmacy majors; others should consult department before enrolling. P, Chem. 243b, Math. 123, Phys. 102b, CR 580. (Identical with Tox. 581). May be jointly convened with 481. Graduate-level requirements include demonstration of in-depth understanding of human physiology through several written assignments.
582. Topics in Neural Development (2) I
Levine
An in-depth analysis of the cellular and molecular basis of neural development. Students will read and discuss journal articles dealing with the development of neurons and their synaptic connections. P, consent of instructor. (Identical with MCB 582 & NSC 582 which is home).

588. Principles of Cellular and Molecular Neurobiology (4) I
Hildebrand
The structure, physiology, biochemistry and development of nerve cells and synapses. P, Chem. 103b, 104b, 243b, 245b; Phys. 102b, MCB 410a-410b; Bio. 462a-462b. (Identical to MCB 588, Bio. 588, NSC 588 which is home).

589. Principles of Systems Neurobiology (4) II
Arbas
Detailed introduction to the organization, physiology and function of neural systems emphasizing sensory systems, motor control, integration and plasticity. P, consult program office before enrolling. (Identical with MCB 589 and NSC 589 which is home).

595/895 Colloquium (2) [Rpt/12 units]
Staff
a. Mathematical Techniques in Physiology
Secomb
Review of mathematical techniques commonly used in physiology with examples and applications in selected areas. Use of mathematical modeling in physiological research. P, Math. 125a-b, 160, not appropriate for math majors.

b. Muscle Physiology
Burt
Structure-function relationships in skeletal, cardiac and smooth muscles are examined with emphasis on mechanisms of excitation-contraction coupling, energetics, regulation of contractile strength, organization and composition of contractile proteins (gene expression and developmental aspects) and integrative behavior of muscle in the organisms. P, Psio. 503 or equivalent.

c. Endocrinology
Hoyer
General survey of endocrine regulation at the level of the hypothalamus and pituitary using the female reproductive system as an example. This overview provides an appreciation of the role of the endocrine system in regulating physiological homeostasis.

d. Renal Physiology
Dantzler
Detailed analysis of the mechanisms of glomerular filtration, tubular reabsorption and tubular secretion and their regulation. Treatments may be at the organ, epithelial or membrane level and will involve comparative analyses among and between species where appropriate. P, Psio. 601/801, 602, or equivalent.

e. Molecular and Cellular Excitability
Gruener
An in-depth examination of ion channel behavior including discussion of the techniques used in the study of channels, mechanisms of channel gating, second messenger regulation and channel-lipid interactions. Expression of channel behavior in a variety of excitable cell types will be examined.

f. Peripheral Vascular Physiology
Gore
Detailed study of peripheral vascular structure-function relationships and the mechanisms that underlie the phenomena of blood flow and blood pressure relation, transvascular exchange, blood vessel mechanics and reactivity and the rheological properties of blood and blood-microvessel interactions. Treatments may be at the whole animal, the organ, the cellular and subcellular levels. P, Psio. 601/801 or equivalent.

g. Membranes and Transport
Wright
In-depth coverage of topics pertaining to the physiology of membrane transport including kinetics, energetics, regulation and molecular mechanisms of specific processes.

h. Systems Neurophysiology
Hasan
Properties of neuronal networks in relation to the control of movement, detection of stimuli and reflex responses.

i. Introduction to Personal Computers in Physiology
Secomb
Introduction to the use of personal computers in Physiology. Operating system, commonly used software packages, programming in BASiC will be discussed.

595. Colloquium
Staff
y. Introduction to the Neurosciences I (2)
May be jointly convened with 495y. Graduate-level requirements include submission of two research papers, both of which are in greater depth than that of the one research paper required of undergraduates.

2. Introduction to the Neurosciences (2)
   May be jointly convened with 495z. Graduate-level requirements include submission of two research papers, both of which are in greater depth than that of the one research paper required of undergraduates.

601. Systems Physiology (8) II  
**Staff**  
Comprehensive coverage of systemic physiology with emphasis on the underlying principles of function. Course provides overview of systems level neuroscience and in conjunction with PSIO 602 and 801 overviews of cardiovascular, renal, respiratory, gastrointestinal and endocrine physiology; concludes with an integrative section. P, Chem. 103b, 104b, 241b, 243b; Phys. 102b. May enroll for credit in 601 or 602, but not both. Consult department before enrolling.

602. Systems Physiology for Neuroscience Students (7) II  
**Staff**  
Comprehensive coverage of systemic physiology with emphasis on the underlying principles of function. Includes overviews of cardiovascular, renal, respiratory, gastrointestinal and endocrine physiology; concludes with an integrative section. Offered in conjunction with PSIO 801 and 601. P, Chem. 103b, 104b, 241b, 243b, Phys. 102b. May enroll for credit in 601 or 602, but not both. Consult department before enrolling.

605A. Human Neuroscience (3) I  
**Barber-Hasan**  
(Identical with Anatomy 605a which is home).

605B. Human Neuroscience (3) II  
**Barber-Hasan**  
(Identical with Anatomy 605b which is home).

610. Research Methods in Physiology (1-3) [Rpt./10 units] I, II  
**Staff**  
Lab courses providing students with an understanding of the types of research available in the department. Consult department before enrolling.

695. Colloquium  
**Enoka**  
a. Motor Control (2) [Rpt./8 units] II  
(Identical with ExSS 695a).

696. Seminar I, II  
**Staff**  
a. Physiology Seminar Series (1) [Rpt./3] I, II  
Open to majors only. Exposure of state-of-the-art topics in physiology through regular attendance at departmental seminars.

b. Physiology Seminar: Preparation and Presentation (1) [Rpt./1] I, II  
Open to majors only. Provides experience in preparation and delivery of a scientific seminar. Consent of instructor.

c. Physiology Open Forum (1) [Rpt./3] I, II  
Open to majors only. Students and faculty participate in discussion of current topics in physiology. Students gain experience in preparing and presenting critiques of current literature. Consent of instructor.

697. Workshop  
**Staff**  
a. Physiology Tutorial (3) [Rpt./4] I, II  
A detailed examination of the literature pertaining to dissertation research. In general, tutorials are taken with the major advisor. P, 503, 601 or 602. Consult department before enrolling.

699. Independent Study (1-5) I, II  
**Staff**

801. Human Physiology (8) II  
**Staff**  
Principles of physiology with emphasis on that of the human. P, Chem. 104b, 241b, 243b; Phys. 102b. Consult department before enrolling.

805. Human Neuroscience (6) I, II  
**Barber-Hasan**  
(Identical with Anatomy 605/805 which is home).

891. Preceptorship, Yr.  
**Staff**  
a. Physiology (3-13)
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<thead>
<tr>
<th>Code</th>
<th>Course Description</th>
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<tbody>
<tr>
<td>899.</td>
<td>Independent Study (1-6) I, II</td>
<td>Staff</td>
</tr>
<tr>
<td>900.</td>
<td>Research (1-6) I, II</td>
<td>Staff</td>
</tr>
<tr>
<td></td>
<td>Individual research not related to a thesis or dissertation for advanced degree.</td>
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<tr>
<td>920.</td>
<td>Dissertation (1-9) I, II</td>
<td>Staff</td>
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<tr>
<td></td>
<td>Research for the doctoral dissertation.</td>
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<tr>
<td>930.</td>
<td>Supplementary Registration (1-6)</td>
<td>Staff</td>
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</tbody>
</table>
Professors: Alan J. Gelenberg, Head, Allan Beigel [Vice President, University Relations & Development; Psychology], Larry E. Beutler [Psychology], Richard R. Bootzin [Psychology], Henry W. Brosin, Alfred W. Kaszniak [Psychology], Mary L. P. Koss [Psychology], Alan I. Levenson, John C. Racy [Coordinator, Social & Behavioral Science, Medicine Administration], Gary E. Schwartz [Psychology], Alayne Yates [Associate Professor, Pediatrics]

Associate Professors: Harold Arkowitz [Psychology], Diane S. Fordney [Obstetrics & Gynecology], David L. Nelson [Pharmacology & Toxicology], Catherine M. Shisslak [Psychology]

Assistant Professors: Peter J. Attarian [Associate Professor, Family & Community Medicine], Shirley N. Fahey [Associate Dean of Admissions, Medicine Administration; Director, Social Perspectives in Medicine, Medicine Administration; Coordinator, Human Behavior & Development/Social & Behavioral Science, Medicine Administration; Affirmative Action Officer, College of Medicine, Milton Frank [Chief Social Worker, Psychiatry]

Clinical Professor: Elliott M. Heiman

Clinical Associate Professors: John J. Misiaszek, Jose M. Santiago [Adjunct Professor, Psychology], Betty Jo Tricou

Research Associate Professor: Eric M. Reiman

Clinical Assistant Professors: James R. Allender [Research Associate, Family & Community Medicine], Sydney W. Arkowitz, Murray M. DeArmond [Family & Community Medicine; Director, Student Health Service; Adjunct Lecturer, Psychology], Martha Fankhauser [Pharmacy Practice], Mary V. Fox [Research Associate, Surgery, Psychology], Timothy L. Harvey, Richard M. Hinton, Catherine J. Locke [Pediatrics], Russell D. Martin, Bernard M. Morenz, III, Rebecca L. Potter, David L. Stoker, D. Kinne Tevis, Robert A. Van Putten


Visiting Professor: Leona L. Bachrach
Research Associates: G. Maureen Chaisson-Stewart, Roger J. Daldrup, David E. Engle, Patricia E. Penn [Adjunct Lecturer, Psychology], Elizabeth B. Yost [Associate Professor, Psychology]
Education Specialist: Elizabeth M. Segerstrom

The program of the Department of Psychiatry is designed to help students develop an understanding of the variety, range and determinants of both normal and abnormal forms of human behavior. In addition, the student is helped to develop those skills that are needed in recognizing and dealing with mental disorder whether primary or secondary to other illness.

To meet these goals, both didactic courses and clinical instruction are offered in the College of Medicine curriculum. After students have been introduced to normal personality functions and to abnormal processes which form the basis of psychopathology, they are given an opportunity to work directly with patients in a variety of clinical settings, both psychiatric and medical.

In addition to clinical training, the students are helped to develop an understanding of the current social, economic and legal issues relevant to the organization and delivery of mental health services.
Course Descriptions

495. Colloquium
   z. Introduction to the Neurosciences II (2)  Staff
      An introductory overview of clinical conditions that affect the human nervous system.
      P, 495y or permission of the instructor. (Identical with Interdept. 495z which is home).

599. Independent Study (1-6) I, II  Staff

800. Research (1-12) I, II  Staff
     See Electives Manual for course description.

803. Clinical Clerkship (6-9) Yr.  Staff
     Students are assigned patients in inpatient clinical settings. They obtain and record a
     complete history, mental status and physical examination. The students are expected to
     study the course of their patients and record their observations in daily progress notes.
     They work closely with clinical staff in the diagnosis, specific treatment, ward management
     and discharge planning involving their patients. In addition, they are introduced to
     community and legal services for the chronically ill, the suicidal and the violent patient.
     Those students wishing to take an additional three- or six-week clerkship in psychiatry
     may elect to do so (see 810 description).

810. Clerkship, Yr.  Staff
     a. Clinical and Community Psychiatry (6) Yr.
     b. Child Psychiatry (6) Yr.
        See Electives Manual for course descriptions.

815. Subspeciality, Yr.  Staff
        See Electives Manual for course descriptions.

891. Preceptorship I, II  Staff
        See Electives Manual for course description.

899. Independent Study (1-18) I, II  Staff
Radiation Oncology is that discipline of medicine concerned with the application of radiation in the treatment of patients, the majority of whom have benign and/or malignant neoplasms. The discipline is also concerned with the interactions and modifiers of radiation in tissues, as well as subcellular, cellular and organ effects of such treatment. The department consists of four divisions including the Division of Cancer Biology, Division of...
Physics, Division of Biostatistics and Clinical Division. The department is also active in research and clinical application of hyperthermia for patients with malignant disease.

Course Descriptions

501. Radiation Biology (3) II  
Gerner
Basic principles of radiation effects in mammalian cell and tissue systems with emphasis on biochemical aspects such as DNA damage and DNA repair, and cellular responses such as cell kinetics defects and radiation repair and recovery; radiation and chemical (especially radiomimetic drugs) carcinogenesis. P, Intro. Bio. and Chem.

505. Eukaryotic DNA Replication (3)  
Cress
The molecular and biochemical aspects of DNA replication in mammalian cells will be described in conjunction with discussions of recent journal articles on selected topics. The topics will include the regulation of S phase within the eukaryotic cell cycle; nuclear organization during DNA synthesis; DNA replication enzymes; viral, yeast and embryo models of DNA replication; the initiation of DNA replication; DNA replication origins and the reconstitution of DNA replication complexes. (Identical with Bio. 505, Micr. 505 and MCB 505).

515. Subspecialty, Yr.  
Staff
h. Cancer Epidemiology and Prevention (3) I  
P, none; statistics helpful (Identical with FCM 515h/815h which is home).
i. Cancer Prevention and Control (3) II  
P, none (Identical with FCM 515i/815/i which is home). See Electives Manual for course descriptions.

551. Environmental Carcinogenesis (3) II 1990-91  
Bowden
See 851 for description. (Identical with Micr. 551).

555. Cancer Biology (3) II 1990-91  
Bowden
(Identical with Micr. 555).

595. Colloquium  
Gerner
d. Special Topics in Cell Biology (2) II  
Objectives of this course are attempts to prepare students to effectively use the current research literature in the biological sciences and focusing attention on topical issues in cancer research, striving to develop new understandings of topics that are beyond the scope of even advanced textbooks in cell biology. (Identical with MCB 595d).

596. Seminar (see 896 for description).  
See Electives Manual for course descriptions.

815. Subspecialty, Yr.  
Staff
a. Introduction to Radiation Oncology (6) Yr.
h. Cancer Epidemiology and Prevention (3) I  
P, none; statistics helpful (Identical with FCM 515h/815h which is home).
i. Cancer Prevention and Control (3) II  
P, none (Identical with FCM 515i/815/i which is home). See Electives Manual for course descriptions.

851. Environmental Carcinogenesis (3) II 1990-91  
Staff
Phenomenological and mechanistic aspects of cancer etiology as induced by physical and chemical agents in our environment with special emphasis on possible molecular and cellular mechanisms involved in cancer etiology. P, consult department before enrolling. (Identical with Micr. 851).

896. Seminar  
Gerner
h. Control of Proliferation in Animal Cells (1-2) II  

899. Independent Study (1-12) I, II  
Staff
See Electives Manual for course description.
Professors: M. Paul Capp, Head [Director, Clinical Radiology], Harrison H. Barrett [Optical Sciences], Theodore Bowen [Physics], William J. Dallas [Optical Sciences], Bruce J. Hillman, Tim B. Hunter, Theron W. Ovitt [Radiologist, Clinical Radiology], Dennis D. Patton [Optical Sciences; Chief, Nuclear Medicine], Michael J. Pitt [Surgery; Assistant Director, Clinical Radiology; Radiologist, Clinical Radiology], Gerald D. Pond, Joachim F. Seeger, William L. Wolfe, Jr. [Optical Sciences], James M. Woolfenden

Associate Professors: John C. Bjelland, Raymond F. Carmody, Robert J. Gillies [Biochemistry], Robert E. Henry, Bryan R. Westerman [Director/Radiation Safety Officer, Radiation Safety]

Assistant Professors: Arthur F. Gmitro [Optical Sciences], Evan C. Unger, Walter H. Williams

Clinical Professor: George R. Barnes, Jr.

Clinical Associate Professors: Lawrence W. Keefe, James R. Standen

Research Associate Professor: Hans Roehrig

Clinical Assistant Professors: K. Rebecca Hunt, Pamela J. Lund, Cathy S. Tyma, Mark T. Yoshino

Research Assistant Professors: H. Bradford Barber, George W. Seeley [Optical Sciences]

Clinical Instructor: Jason L. Stemmer


Research Lecturers: Ammar Darkazanli, W. Brent Mockbee

Assistant Clinical Lecturers: Charles T. Bonstelle, Richard R. Boyle, Jr., Andre J. Bruwer, Anthony Lomonaco, Susan Minker, James A. Schnur, Jim N. Stewart, T. Bryson Struse, III

Research Specialist: Kevin M. McNeill

The Department of Radiology includes University Medical Center Divisions of Diagnostic Radiology and Nuclear Medicine.

Course Descriptions

800. Research (1-6) [Rpt./1] Yr. See Electives Manual for course description.

815. Subspecialty, Yr. Staff
   b. Nuclear Medicine (6) Yr.
      See Electives Manual for course descriptions.

891. Preceptorship, Yr. Staff
      See Electives Manual for course description.

899. Independent Study (1-12) I, II Staff
Professors: Leonard F. Peltier, Acting Head, Victor M. Bernhard, L. Philip Carter, Milos Chvapil, Jack G. Copeland, George W. Drach, Eric P. Gall [Family & Community Medicine, Internal Medicine; Medical Director, Arthritis Center, Internal Medicine], Theodore J. Glattke [Speech & Hearing Sciences], William R. Hodgson [Speech & Hearing Sciences; Assistant Supervisor, Audiology Services, Surgery], Douglas Lindsey [Emeritus], Noel D. Matkin [Speech & Hearing Sciences; Supervisor, Audiology & Speech Services, Surgery], Harvey W. Meislin [Director, Emergency Services, Surgery, Michael J. Pitt [Radiology; Assistant Director/Radiologist, Clinical Radiology, Radiology], Charles W. Putnam [Pharmacology; Associate Head, Surgery], Arthur B. Sanders [Family & Community Medicine; Clinical Lecturer, Internal Medicine], Gulshan K. Sethi, Donald P. Speer [Anatomy], Robert F. Spetzler, Thomas H. Stanisic, Charles M. Tipton [Head, Exercise & Sport Sciences; Director, Health Related Professions], Hugo V. Villar [Radiation Oncology], Robert G. Volz, Charles L. Witte, Marlys H. Witte, Charles F. Zukoski, III

Associate Professors: Robert M. Anderson [Emeritus], Glenn C. Hunter, Kenneth V. Iserson, Kenneth E. McIntyre, Jr. [Director, Trauma Services, Surgery], Edward C. Percy [Exercise & Sport Sciences], John B. Sullivan, Jr. [Adjunct Assistant Professor, Pharmacology & Toxicology; Medical Director, University Physicians, Inc.], David B. Van Wyck [Internal Medicine]

Assistant Professors: James B. Benjamin, Robert P. Iacono, Daniel W. Spaite, Terence D. Valenzuela [Clinical Assistant Professor, Internal Medicine], Fred C. Williams, Jr.

Clinical Professors: Stanley W. Coulthard, Donald M. Gleason, Stanley I. Glickman, Harry W. Hale, Jr., Alfred Heilbrunn [Associate Dean, Veteran Affairs, Medicine Administration], James M. Malone, Eric G. Ramsay, Martin Schiff, Jr., Peter J. Whitney, MacDonald Wood

Research Professor: A. Norman Guthkelch


Research Associate Professors: Janis M. Burt [Associate Professor, Physiology], Donald W. DeYoung [Chief, Experimental Surgery/Clinical Services, University Animal Care, Arizona Health Sciences Center; Adjunct Associate Professor, Veterinary Sciences; Veterinary Surgeon, University Animal Care, Arizona Health Sciences Center], Cleamond D. Eskelson [Research Associate, Family & Community Medicine; Research Associate, Pharmacology & Toxicology], Ronald L. Misiorsowski [Research Associate, Anatomy]

Clinical Assistant Professors: Richard H. Carmona [Physician Consultant, Student Health Service], Willard R. Carnahan, Robert J. Guerra, John A. Guisto, Irwin E. Harris, Peter N. Harrington, Kenneth R. Johnson, Stanley P. L. Leong [Research Associate, Arizona Cancer Center], Jerry D. Mohr, Neopito L. Robles, Lawrence A. Schneider, H. Thomas Sethney, Del V. Steinbronn [Radiation Oncology], William L. White, Joseph M. Zabramski

Research Assistant Professors: David W. Montgomery [Research Associate, Pharmacology], Judith B. Ulreich

Instructors: Richard C. Dart, Francisco G. Valencia
Clinical Instructors: William J. Brooks, Michael E. Moran
Senior Clinical Lecturers: Merrill W. Brown, Mack L. Clayton, C. Herbert Fredell, Herbert J. Louis, Newton C. McCollough, Clovis J. Snider, Martin Snyder [Internal Medicine], Thomas L. Wachtel, Richard A. Walsh, Julius Wolkin
Research Lecturers: Floyd E. Anderson, Stephen Harkins, Ann Kerwin [Lecturer, Humanities], Ruth L. Smothers
Visiting Associate Professor: John C. Sutherland
Visiting Scientist: Charles P. Bever
Research Associates: John K. Barberii, Pushpa P. Deshmukh [Arizona Cancer Center], Mary V. Fox [Clinical Assistant Professor, Psychiatry; Psychology], Kullervo H. Hynynen [Assistant Professor, Radiation Oncology; Aerospace & Mechanical Engineering], Bertha M. Leis [Clinical Lecturer, Family & Community Medicine], Lorraine H. Manciet, Arlene W. Scadron, Ti-Fen Wang [Arizona Cancer Center], Kyozo Yamada
Research Specialist: Russell W. Lee
Health Care Associate: Janette D. LeBouton
Specialist in Cardiothoracic Surgery: Joan L. Barnes
Specialists in Cardiac Transplant: Martha C. Herde, Suzanne N. MacDonald
Specialist in Neurosurgery: David H. Tallman

The Department of Surgery provides a broad general exposure to surgery during a six week basic clinical clerkship and a three week specialty clerkship. The specialty clerkship requirement can also be met by registering for Surgery 807 in Year IV. The basic clerkship stresses preoperative evaluation in the emergency and ambulatory settings, proper
operating room conduct and postoperative management. Basic operative skills are practiced in the animal laboratory. An awareness of the nature and management of surgical disease is developed by case-oriented small group sessions, rounds and weekly conferences. The surgery Specialty Clerkship reinforces these basic skills by application to specialty areas such as urology, orthopedics, neurosurgery, cardiothoracic surgery and otorhinolaryngology.

Elective courses in general and specialty surgery and various aspects of surgical biology are offered. Increased clinical responsibility is assured on hospital services by assigning the elective student to the patient care team. Special courses designed around specific clinical activities and research programs in the Department of Surgery and other departments are available on an individual basis.

The graduate program in surgical sciences includes hospital training in general and specialty surgery with a strong emphasis upon the five-year graduate program. It emphasizes training of the clinical surgeon but encourages elective surgical study for future community, academic or research surgery.

Course Descriptions

800. Research (3-12) Yr.  
See Electives Manual for course descriptions.
Clinical Clerkship (6) Yr.  
Introduction to clinical surgery through hospital clerkship on surgical wards.

Specialty Clerkship (3) Yr.  
Introduction to clinical surgery through exposure to a surgery Specialty Clerkship (as assigned by the Surgery Department).

Clerkship, Yr.  
a. General Surgery (4-8) Yr.  
See Electives Manual for course description.

Subinternship, Yr.  
a. Emergency Medicine (4-6) Yr.  
See Electives Manual for course description.

Subspecialty, Yr. [Rpt./3]  
a. Urinary Stone Disease (6) Yr. 
b. Cardiothoracic Surgery (4-12) Yr. 
c. Neurosurgery (3-6) Yr. 
d. Surgical and Medical Problems in Fluid and Electrolyte Balance (3) [Rpt./1] Yr. 
e. Urology (4-6) Yr. 
f. Orthopedics (3) Yr. 
g. Cardiovascular Physiology and Research (6-12) Yr. 
h. Lymphvascular System in Health and Disease (6-12) Yr. 
i. Otorhinolaryngology (3) Yr. 
j. Sports Medicine (Section of Orthopedic Surgery) (3-8) [Rpt./1] Yr. 
k. Orthopedic Bioengineering (3-6) Yr. 
l. Trauma (3-6) Yr. 
m. Spinal Cord Injury (3) Yr.  
o. Surgical Critical Care (3-6) Yr. 
p. Pediatric Orthopedic Surgery (3-6) Yr. 
q. Plastic Surgery (3-4) Yr. 
r. Clinical Experience in Rehabilitation Medicine (4) Yr. 
s. Vascular Clinical Management (4-8) Yr. 
t. Emergency Medicine (4-12) Yr. 
v. Clinics in Medical Ignorance (3-4) Yr. 
w. Pediatric Urology (4) Yr. 
See Electives Manual for course descriptions.

Preceptorship, [Rpt./3] Yr.  
a. Surgery and Subspecialties (4-12) [Rpt./3] Yr. 

Seminar (1-18) [Rpt./1] Yr.  
a. Medical Ignorance (2) 

Independent Study (1-18) I, II  
Rappaport
DIVISIONS

DIVISION OF BIOMEDICAL COMMUNICATIONS

Richard A. McNeely, M.A., Director
John R. Hall, M.A., Associate Director

The Division of Biomedical Communications is an academic support unit providing comprehensive communications media planning and production services for the Arizona Health Sciences Center. A professional staff provides medical photography, illustration, television, instructional materials design and development, print publication services and media utilization services in support of the teaching, in-service training, research and public service programs of the College of Medicine.

The primary goal of the Division is to provide quality, creative and cost-effective media products and services in an innovative, accurate and responsive manner to the faculty, staff and students.
CANCER CENTER DIVISION

Sydney E. Salmon, M.D., Director

The Arizona Cancer Center was established in 1976 and has as its mission to significantly contribute to research related to the understanding, diagnosis, treatment and prevention of cancer. To attain its goal, the Arizona Cancer Center pursues the following objectives:

1. Serve as a major geographic resource identified as a Cancer Research Center which is comprehensive in the scope of its activities
2. Promote excellence in clinical and laboratory cancer research, patient care and education
3. Facilitate and coordinate cancer-related programs at The University of Arizona
4. Develop an outreach program to serve the State of Arizona

The Arizona Cancer Center has been involved with planning educational, clinical and scientific activities. The Center’s commitments have included educational programs for medical and graduate students as well as teaching of practitioners and allied health professionals at local and national continuing medical education programs. Graduate degree programs in cancer biology were opened at The University of Arizona in 1988 with the support of faculty from the Arizona Cancer Center. Medical Student Cancer Programs have been awarded to students to work in cancer-related projects with faculty throughout the College of Medicine and other health professionals throughout the state. The monthly Tumor Board at University Medical Center is open to all interested persons and discusses aspects of cancer patient management and cancer prevention. As part of the required curricula of medical students, individual lectures in cancer education are presented in the Departments of Biochemistry, Microbiology & Immunology and Pharmacology.
The clinical oncology and clinical research programs of the Arizona Cancer Center have continued to draw an increasing cancer patient volume to the Arizona Health Sciences Center which is now the acknowledged leading resource for provision of cancer care in the state.

Multidisciplinary cancer research expertise is continually developed and expanded in numerous clinical and laboratory programs that include basic research studies on oncogenes and on carcinogenesis; the study of heat, radiation, biological modifiers, bone marrow transplantation and drugs in cancer therapy; the interaction of Vitamin A and its synthetic derivatives with pre-neoplastic and neoplastic states; the definition of the pathophysiology of clonal growth of human tumors; clinical pharmacology of anticancer drugs; tissue kinetics; tumor virology; cellular and molecular biology; medical imaging of cancer; tumor immunology, cancer prevention; cytogenetics; and carrying out clinical trials of promising approaches to cancer prevention, diagnosis and treatment.

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**CHILDREN’S RESEARCH CENTER**

*Lynn M. Taussig, M.D., Medical Director*

The Children’s Research Center, established in 1986, represents a multidepartmental and interdisciplinary approach to research related to various medical problems facing children. The goals of the Center include:

1. Coordinate, focus, facilitate and increase research related to children’s health
2. Foster multidisciplinary research on medical problems related to children
3. Expand research training and education programs, thereby facilitating the training of future researchers
4. Enhance the rapid application of research observations to patient care

Special emphasis will be placed on molecular genetics, immunology, neurology, gastroenterology and nutrition, behavioral sciences and developmental biology.

The Center’s research programs are closely tied to the educational and clinical activities of the Department of Pediatrics which include extensive outreach programs in numerous communities throughout the state, and general and subspecialty pediatric clinics and inpatient services at University Medical Center, Tucson Medical Center and Kino Community Hospital.

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**DIVISION OF LIBRARY SCIENCE**

*Thomas D. Higdon, B.A., M.S.L.S., Director*

The Arizona Health Sciences Center Library was one of the earliest units planned for the College of Medicine, opening its doors in September 1967 when the first class began studies. Currently serving the entire Health Sciences Center, the library occupies 33,000 sq. ft. and maintains a collection of 165,000 volumes, 3,400 media programs and subscribes to
3,500 journals and serials. It is open 24 hours every day, except Christmas and New Year’s Day.

The library is a member of the nationwide medical library network founded by the National Library of Medicine and serves as the designated resource library for Arizona through the Pacific Southwest Regional Medical Library Service. Its resources are available not only to students and faculty of the University, but also to health care providers throughout Arizona.

Reference librarians are available to provide assistance in using the resources of the library effectively, consult with library users to solve complex information queries, formulate and perform computerized literature searches and locate factual information. Sessions on medical bibliography and information retrieval are offered in the College of Medicine curriculum. The Field Office provides similar services to library users outside the Tucson area and consultation services to hospital libraries.

The services of the library are many and most are computer enhanced. The catalog to the collection is online allowing users to search for material in a variety of ways with a greater degree of specificity. Databases encompassing the journal literature are available for use by library users themselves or through the expertise of a reference librarian. A wide assortment of audiovisual titles in various formats (audiotapes, videotapes, videodiscs, slide/sound programs, slides and models) and eight study carrels, especially equipped to accommodate these formats, are also available. Electronic links with other libraries are maintained so that material not available locally can be obtained quickly for library users. Finally, the library houses the Microcomputer Learning Center, operated by the Office of Medical Education, and the Arizona Poison and Drug Information Center, administered by the College of Pharmacy.
LONG TERM CARE GERONTOLOGY CENTER

Theodore H. Koff, Ed.D., Director

Kristine M. Bursac, M.P.A., Associate Director

Established in 1980 at The University of Arizona College of Medicine, the Arizona Long Term Care Gerontology Center is devoted to development of a more effective, comprehensive and humane system for delivering health and social services to vulnerable and chronically ill elderly persons. Initially funded by the federal Administration on Aging, the Center has assumed a leadership role in helping shape policies and programs related to aging in Arizona and as a result has been made a state-funded component of the University.

The four project areas addressed by the Center are: 1) education and training, 2) research, 3) service demonstration projects, and 4) technical assistance. Working cooperatively with the other state universities, it has designed and established educational/training programs for professionals, paraprofessionals and family caregivers and has developed research methodologies and demonstration projects that address the major public policy issues affecting the aging population. By forging links between academic institutions and the state’s aging network, the Center serves as a catalyst for stimulating basic and applied research in geriatrics/gerontology as well as for expanding the network’s capacity to deliver services in an efficient and cost-effective manner.

DIVISION OF MULTIDISCIPLINE LABORATORIES

Andreas M. Goldner, Ph.D., Director

The University of Arizona College of Medicine utilizes multidiscipline laboratories for the teaching of the laboratory aspects of the basic science courses. In contrast to the more traditional medical schools wherein each of the six basic science departments has its own teaching facility, this institution uses a central teaching facility which serves as the home base for the students enrolled in the preclinical years of the curriculum. Thus, instead of the students coming to the faculty, the faculty comes to the students in the multidiscipline laboratories. The student laboratory wing of the Basic Sciences Building also includes the lecture halls used by the medical students. In a single wing of the building, the medical students receive the majority of their preclinical education.

The Multidisciplinary Laboratories also provide educational support for all activities. This includes audiovisual services including television production and display. Additional audiovisual resources are available for the research activities of the basic science faculty. These are coordinated through the Division of Biomedical Communications.
DIVISION OF RESPIRATORY SCIENCES
(Respiratory Sciences Center)

Benjamin Burrows, M.D., Director
Ronald J. Knudson, M.D., Associate Director
Michael D. Lebowitz, Ph.D., Associate Director, Environmental Programs
Lynn M. Taussig, M.D., Assistant Director

The Division of Respiratory Sciences has members from many different academic departments. It is responsible for interdisciplinary pulmonary-allergy programs in research, training and clinical services. It coordinates activities of the Adult-Pediatric Chest-Allergy Clinic as well as University Medical Center’s Adult and Pediatric Pulmonary Function Laboratories, Blood Gas Laboratory and Respiratory Therapy Service. It is also responsible for collaborative postdoctoral training programs in Adult and Pediatric Pulmonary Medicine.

A major function of the Division is to coordinate multidisciplinary research programs in pulmonary disease with a special emphasis on airways obstructive diseases (asthma, chronic bronchitis and emphysema). It is responsible for the Specialized Center Of Research (SCOR) in Airways Obstructive Diseases established at the College of Medicine with funding from the National Institutes of Health. Many of the research programs of the Division are carried out in a “Chest Center” addition to the Clinical Sciences Building which opened in 1975. The Division is widely known for its epidemiologic studies, including a longitudinal study of a representative sample of the Tucson population (The Tucson Epidemiologic Study of Airways Obstructive Diseases), a longitudinal study of newborns and their families (The Children’s Respiratory Study) and studies of the health effects of environmental pollution. It is also increasingly involved in more basic research, particularly in regard to the immunological, biochemical and physiological mechanisms which affect airway function and which may be relevant to the pathogenesis of airways obstructive diseases.

DIVISION OF RESTORATIVE MEDICINE

John T. Boyer, M.D., Director

The Division of Restorative Medicine, a collaborative and coordinating unit established in 1984 within The University of Arizona College of Medicine, brings research, education and service emphases to the increasingly important problems of geriatrics and rehabilitation. The Division has a special role in the development of multidisciplinary programs involving college faculty, allied health professionals, university scientists and health administrators in the public sector.

The Division operates geriatric assessment and care management clinics where difficult geriatric cases are referred, a home visitation program, specialty clinics including incontinence and geriatric rheumatology, an acute care unit for the elderly and an academic geriatric nursing home. These programs are offered through University Physicians, Inc., University Medical Center and the Veterans Administration Medical Center. The Division is also responsible for the direction of physical medicine and rehabilitation in
a program that coordinates with University Medical Center, Veterans Administration Medical Center and Carondelet Health Systems.

Comprehensive geriatric and rehabilitation education is provided by the Division to medical students, residents and fellows at the University. Statewide training opportunities in geriatrics and rehabilitation are available for community health professionals in the form of continuing medical education programs, mini-residencies, on-site consultation and a Journal Club.

A major role of the Division is to encourage and develop multidisciplinary research activity related to aging. Research areas which are being emphasized include investigation of basic mechanisms of the aging process, dementias, depression in the elderly and environmental contributors to the well-being of the elderly. Multiple studies are ongoing related to these areas of emphasis as well as other specific issues of aging.

DIVISION OF SOCIAL PERSPECTIVES IN MEDICINE

Shirley Nickols Fahey, Ph.D., Director

The Division of Social Perspectives in Medicine was established within the College of Medicine in recognition of the increasingly complicated cultural, social, economic, legal and ethical influences affecting the institution of medicine in American society. The efforts
of this Division are aimed at expanding and exciting the thinking of medical students and faculty in the area of human values and the role of medicine in contemporary society.

The activities of the Division include symposia, seminars and workshops on such topics as cultural and economic factors in health and disease, ethical issues in medicine, medical jurisprudence, health needs of the elderly, care for the terminally ill, holistic medicine, innovations in medical education and other current issues. Local and national authorities are invited to participate in these programs from such fields as psychology, law, politics, sociology, anthropology, economics, theology and philosophy in addition to medicine.

UNIVERSITY ANIMAL CARE
ARIZONA HEALTH SCIENCES CENTER

John B. Mulder, D.V.M., M.S., M.Ed., Director
Susan E. Wilson-Sanders, D.V.M., M.S., Associate Director
Donald W. DeYoung, D.V.M., Ph.D., Chief, Experimental Surgery & Clinical Services
Michael S. Rand, D.V.M., Senior Clinical Veterinarian
Kathleen Henry, D.V.M., Veterinarian

University Animal Care is the organization which provides services for care and use of all animals used for teaching and research at the University. The unit reports to the Office of the Vice President for Research.

The Animal Care Unit of the Arizona Health Sciences Center is located on the first floor of the Basic Sciences Building and houses all animals used by the Colleges of Medicine, Pharmacy and Nursing. The facility has held accreditation by the prestigious American Association for Accreditation of Laboratory Animal Care since 1969. Five veterinarians and a staff of trained laboratory animal technologists and technicians provide high quality animal care.

University Animal Care staff and faculty are available to train and assist investigators, research technicians and students on proper methods of animal handling and use. Expertise in the use of specific animal models is provided to investigators, thus eliminating unnecessary use of animals. A Student Manual for Animal Research is available by contacting the University Animal Care Office-AHSC Office (602) 626-6702.

Federal and local policy requires that all research, teaching and/or testing protocols involving the use of animals must be reviewed and approved by the Institutional Animal Care and Use Committee. The IACUC as well as the staff of University Animal Care-AHSC is involved in the assurance that all laboratory animals receive humane treatment. Concern for the welfare of animals, plus recognition of the need for quality biomedical research are the primary objectives of University Animal Care.
UNIVERSITY HEART CENTER DIVISION

Eugene Morkin, M.D., Director

The University Heart Center (1986) is a new interdisciplinary organization intended to further research into cardiovascular biology and disease. The Center’s major objectives include conduct of basic and clinical research, provision of medical and surgical care to individuals, and provision of graduate, postgraduate, and continuing educational programs, both regionally and nationally. Coordination of cardiovascular research in the state and region is a major aim; close ties with investigators are fostered. Research areas include transplant immunology, echocardiography, clinical electrophysiology, molecular biology, experimental pharmacology and cell physiology, all applicable to cardiovascular problems.

The University Heart Center operates as a Division of the College of Medicine, reporting to the Dean of the College. Its programs are linked to faculty and staff in the College, in University Medical Center, and in other colleges and units in the University.
ARIZONA BOARD OF REGENTS

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Rose Mofford ........................................... Governor of Arizona
C. Diane Bishop ......................................... Superintendent of Public Instruction

Appointed

Edith S. Auslander, Ph.D., President ............................ July, 1990
Andrew D. Hurwitz, Secretary ................................. January, 1996
Donald Pitt, J.D., Treasurer .................................. July, 1990
Peggy Steffens, Assistant Treasurer ............................. July, 1990
Herman Chanen ............................................. January, 1992
Douglas J. Wall ............................................. January, 1996
Chapa Arthur ................................................ January, 1998
Basha Edie .................................................. January, 1998

Assistants

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John Kelly .............................................. Associate Director for Public Affairs
Edward Johnson ........................................ Special Assistant to Executive Director
Jacqueline Schneider J.D. .................................. Counsel
Joel Sideman, J.D. ..................................... Associate Counsel
Judy Garza ............................................... Secretary to Board of Regents
OFFICERS OF THE UNIVERSITY

Henry Koffler, Ph.D. .................................................. President of the University
Jack R. Cole, Ph.D. ................................. Senior Vice President for Academic Affairs & Provost
Holly Smith, Ph.D. .......................................................... Acting Vice Provost
George H. Davis, Ph.D. ............................... Interim Vice President for Business Affairs
Michael A. Cusanovich, Ph.D. ....................... Vice President for Research & Dean of the Graduate College
Dudley B. Woodard, Jr., Ph.D. ....................... Vice President for Student Affairs
Celestino Fernandez, Ph.D. .......................... Vice President for Undergraduate Academic Affairs
Allan Beigel, M.D. .................................................. Vice President for University Affairs
William R. Noyes, Ph.D. .......................... Associate Vice President for Academic Affairs
L. Rapagnani, Ph.D. ............................. Associate Vice President, Center for Computing & Information Technology
Charles A. Geoffrion, M.A. .......................... Associate Vice President for Research
Joseph (Jay) H. Stauss, Ph.D. ..................... Assistant Vice President for Academic Affairs & Affirmative Action Officer
J. Gregory Fahey, M.A. ............................. Assistant Vice President for Planning & Budgeting
Gail G. Harrison, Ph.D. .................... Assistant Vice President for Research
James T. Wheeler, M.B.A. ...................... Assistant Vice President for Research
Don A. Aripoli, Ph.D. ......................... Assistant Vice President for Student Affairs
FACULTY TEACHING AWARDS

April 17, 1989

Basic Sciences

Thomas F. Burks, II, Ph.D. ............................................ Basic Science Educator of the Year
Anna R. Graham, M.D. .................................................. Dean’s List for Excellence in
Norman E. Koelling, M.S. ................................................ Teaching in the Basic Sciences
Kenneth J. Ryan, M.D.

Department of Anatomy .... Outstanding Achievement in Teaching in the Basic Sciences

John M. Delaney .................. Outstanding Teaching by a Teaching Assistant

Clinical Sciences

William D. Rappaport, M.D. ............................................. Clinical Science Educator of the Year
Gary L. Dunnington, M.D. ................................................ Dean’s List for Excellence in
John C. Racy, M.D. ......................................................... Teaching in the Clinical Sciences
Rickey L. Williams, M.D.

Stephen P. Thomson, M.D. ............................................... House Officer Educator of the Year
Michael P. Dohm, M.D. ..................................................... Dean’s List for Excellence in
Philip E. Jaffe, M.D. ........................................................ Teaching by a House Officer
Daniel A. Ladin, M.D.

Department of Pediatrics .................. Outstanding Achievement in Teaching by a
Clerkship or Elective in the Clinical Sciences

Founders Day Lectureships

Henry I. Yamamura, Ph.D. ............................................. November 16, 1979
David J. Sahn, M.D. ...................................................... November 17, 1980
Mark R. Haussler, Ph.D. ............................................... November 17, 1981
Diane H. Russell, Ph.D. ............................................... November 17, 1982
Robert G. Volz, M.D. .................................................... November 17, 1983
Benjamin Burrows, M.D. ............................................. November 16, 1984
M. Paul Capp, M.D. ....................................................... November 15, 1985
Paul C. Johnson, M.D. .................................................. November 17, 1986
Rubin Bressler, M.D. ..................................................... November 17, 1987
Sydney E. Salmon, M.D. ............................................... November 17, 1988
Douglas G. Stuart, Ph.D. ................................................ November 17, 1989
COLLEGE OF MEDICINE FACULTY

Vice Provost for Medical Affairs & Dean James E. Dalen

ADMINISTRATION

(Year of first appointment to faculty in parentheses after each name)

DALEN, JAMES E. (1988) Vice Provost for Medical Affairs & Dean, College of Medicine; Professor, Internal Medicine
  B.S., 1955, Washington State University; M.A., 1956, University of Michigan; M.D., 1961, University of Washington; M.S., 1972, Harvard School of Public Health

SMITH, JAY W. (1970) Vice Dean, Academic Affairs; Professor, Internal Medicine
  B.A., 1958, Columbia University; M.D., 1962, Washington University

BROWN, BURNELL R., JR. (1971) Acting Associate Dean, Phoenix Campus; Professor and Head, Anesthesiology; Professor, Pharmacology
  B.S., 1954, Springhill College; M.D., 1958, Tulane University; Ph.D., 1969, University of Texas
BURKS, THOMAS F., II (1977) Associate Dean, Research; Professor and Head, Pharmacology
B.S., 1962, M.S., 1964, University of Texas; Ph.D., 1967, University of Iowa

FAHEY, SHIRLEY NICKOLS (1970) Associate Dean, Admissions; Director, Social Perspectives in Medicine; Coordinator, Human Behavior & Development/Social & Behavioral Science, Medicine Administration; Assistant Professor, Psychiatry; Affirmative Action Officer, College of Medicine

GOLDNER, ANDREAS M. (1975) Associate Dean, Student Affairs; Director, Multidiscipline Laboratories, Alumni Affairs; Associate Professor, Physiology
B.A., 1956, Oberlin College; M.A., 1957, Stanford University; Ph.D., 1966, George Washington University

HEILBRUNN, ALFRED (1977) Associate Dean, Veteran Affairs; Clinical Professor, Surgery
B.S., 1952, University of Missouri; M.D., 1954, University of Kansas

MOHER, LAWRENCE M. (1986) Assistant Dean, Student Affairs; Coordinator, Social & Behavioral Science, Medicine Administration; Clinical Associate Professor, Family & Community Medicine
B.A., 1968; M.D., 1973, Michigan State University

ST. GERMAIN, PATRICIA A. (1988) Associate Dean, Medicine Administration
B.S., 1977, The University of Arizona

SCHLOSS, ERNEST P. (1980) Assistant Dean, Planning; Clinical Lecturer, Family & Community Medicine
VUTURO, ANTHONY F. (1971) Associate Dean, Health Affairs; Professor and Head, Family & Community Medicine
B.A., 1962, Bellarmine College; M.D., 1966, University of Kentucky; M.P.H., 1971, Harvard University

ENDOWED CHAIRS

The C. Leonard Pfeiffer Chair in Cardiology
Eugene Morkin, M.D.

The Endowed Chair in Electrophysiology Funded Primarily by the Flinn Foundation and the Arizona Affiliate of the American Heart Association
Frank I. Marcus, M.D.

The Robert S. and Irene Paul Flinn Chair in Medicine
Rubin Bressler, M.D.

The Douglas S. Holsclaw Family Chair in Genetics and Inherited Diseases
Robert P. Erickson, M.D.

The Chalfant-Moore Chair in Pulmonary Medicine
Benjamin Burrows, M.D.

The George and Sally Lindholm Chair in Genetics
Unfilled

FACULTY

ABDELLA, THOMAS N. (1988) Clinical Lecturer, Obstetrics & Gynecology
B.S., 1971, M.D., 1976, University of Miami

ABRAHAM, MARILYN M. (1975) Assistant Clinical Lecturer, Internal Medicine; Associate, Nursing
B.S., 1954, University of Cincinnati; M.S., 1962, Case Western Reserve University

ABRAMS, HERBERT K. (1968) Professor, Family & Community Medicine
B.S., 1936, Northwestern University; M.D., 1940, University of Illinois; M.P.H., 1947, Johns Hopkins University

ACKERMAN, ALAN H. (1983) Research Lecturer, Family & Community Medicine
B.A., 1970, Clark University; Ph.D., 1974, Massachusetts Institute of Technology

ADAM, MARY BETH (1989) Assistant Clinical Lecturer, Pediatrics

ADAM, RODNEY D. (1988) Assistant Professor, Internal Medicine
B.A., 1976, Trinity College; M.D., 1981, University of Illinois

B.S., 1953, United States Naval Academy; M.D., 1963, Ph.D., 1966, University of Pennsylvania

AGUILA, ERNESTO L. (1976) Assistant Clinical Lecturer, Internal Medicine
B.S., 1968, M.D., 1973, The University of Arizona

AHL, NORMAN C. (1980) Assistant Clinical Lecturer, Ophthalmology
B.S., 1965, The University of Arizona; M.D., 1969, University of California

AHMANN, FREDERICK R. (1980) Associate Professor, Internal Medicine
B.A., 1970, Duke University; M.D., 1974, University of Missouri
AHRENS, WALTER E. (1969) Senior Clinical Lecturer, Pediatrics
B.S., 1949, Swarthmore College; M.D., 1954, Boston University

AICKIN, MIKEL (1987) Research Lecturer, Family & Community Medicine
B.S., 1966, Ph.D., 1976, University of Washington

ALBERTS, DAVID S. (1975) Professor, Pharmacology, Internal Medicine; Director,
Cancer Prevention & Control Center, Arizona Cancer Center
B.S., 1962, Trinity College; M.D., 1966, University of Virginia

ALEPA, F. PAUL (1979) Professor, Internal Medicine
B.S., 1954, Lebanon Valley College; M.D., 1958, Georgetown University

ALFARO, ARMANDO J., JR. (1983) Assistant Clinical Lecturer, Surgery
B.S., 1972, Arizona State University; M.D., 1976, The University of Arizona

ALLENDER, JAMES R. (1985) Clinical Assistant Professor, Psychiatry; Research
Associate, Family & Community Medicine
B.A., 1975, Stanford University; M.A., 1982, Ph.D., 1984, University of New Mexico

ALLINSON, RICHARD W. (1986) Clinical Assistant Professor, Ophthalmology
B.S., 1975, The University of Arizona; M.D., 1980, University of Texas

ALMGREN, RONALD C. (1970) Senior Clinical Lecturer, Pediatrics
B.A., 1951, University of Louisville; M.D., 1955, University of Louisville

ALTSCHLER, GERALD (1974) Assistant Clinical Lecturer, Internal Medicine
B.S., 1950, Wagner College; M.D., 1954, Albany of Union University

ALY, HEKMAT EL-SAYED (1983) Clinical Lecturer, Family & Community Medicine
M.B.Ch.B., 1952, Cairo University; M.S., 1966, Columbia University; M.P.H., 1968, Alexandria
University; Ph.D., 1969, Cornell University

AMBERG, JOHN R. (1989) Senior Clinical Lecturer, Radiology
B.S., 1946, M.D., 1949, University of Minnesota

AMPEL, NEIL M. (1985) Assistant Professor, Internal Medicine
B.S., 1975, Oregon State University; M.D., 1977, University of Oregon
ANDERSON, A. DUANE (1982) Research Associate, Pharmacology; Research Associate, Pathology
B.S., 1963, University of Wyoming; Ph.D., 1970, University of Colorado

ANDERSON, CAROLINE F. (1985) Clinical Lecturer, Obstetrics & Gynecology

ANDERSON, FLOYD E. (1980) Research Lecturer, Surgery
B.S., 1939, University of Wisconsin; M.S., 1946, Ph.D., 1949, University of Michigan

ANDERSON, LLOYD S. (1971) Clinical Lecturer, Surgery
B.A., 1955, University of Michigan; M.D., 1959, Wayne State University

ANDERSON, ROBERT M. (1962) Associate Professor Emeritus, Surgery
M.D., 1946, Marquette University

ANGEL, ELLINOR M. (1989) Clinical Assistant Professor, Pathology
M.D., 1979, The University of Arizona

ANGEVINE, JAY B. (1967) Professor, Anatomy; Adjunct Lecturer, Neurology
B.A., 1949, Williams College; M.A., 1952, Ph.D., 1956, Cornell University

ANGIULO, JAMES R (1984) Assistant Clinical Lecturer, Anesthesiology
B.S., 1968, St. John’s University; M.D., 1972, New York Medical College; J.D., 1985, The University of Arizona

APOSHIAN, H. VASKEN (1975) Professor, Pharmacology, Molecular & Cellular Biology
B.S., 1948, Brown University; M.S., 1950, Ph.D., 1953, University of Rochester

APPLETON, CHRISTOPHER P. (1988) Assistant Professor, Internal Medicine; Assistant Clinical Scientist, University Heart Center
B.A., 1975, Stanford University; M.D., 1979, University of Washington

ARBAS, EDMUND A. (1988) Assistant Professor, Physiology; Assistant Professor, Arizona Research Laboratories-Intercollegiate
B.A., 1973, University of California; Ph.D., 1980, University of Oregon

M.D., 1971, Porto Medical School; Ph.D., 1982, Enamus University

ARISTIZABAL, SILVIO A. (1973) Clinical Lecturer, Radiation Oncology
A.B., 1955, Colegio San Jose; M.D., 1962, University of Antioquia

ARKOWITZ, HAROLD (1977) Associate Professor, Psychiatry, Psychology

ARKOWITZ, SYDNEY W. (1977) Clinical Assistant Professor, Psychiatry

ATTARIAN, PETER J. (1974) Associate Professor, Family & Community Medicine; Assistant Professor, Psychiatry

AUERBACH, BRYAN N. (1982) Clinical Lecturer, Pediatrics
B.S., 1968, University of Michigan; M.D., 1972, University of Illinois

B.S., 1973, University of Wyoming; M.L.S., 1977, University of Washington; B.S., 1980, University of Wyoming

AZAR, CATHERINE A. (1989) Clinical Instructor, Internal Medicine
A.B., 1977, Princeton University; M.D., 1983, Albert Einstein University

BACHRACH, LEONA L. (1988) Visiting Professor, Psychiatry
B.A., 1953, M.A., 1954, Kent State University; Ph.D., 1960, University of Connecticut

BACHUS, BRUCE F. (1986) Senior Clinical Lecturer, Internal Medicine
B.S., 1967, M.D., 1971, University of Nebraska
B.A., 1952, University of Rochester; Ph.D., 1956, University of Iowa

BAHL, JOSEPH J. (1979) Research Assistant Professor, Internal Medicine; Assistant Research Scientist, University Heart Center  
B.S., 1971, University of Washington; Ph.D., 1976, The University of Arizona

BAILEY, ROBERT B., JR. (1988) Assistant Clinical Lecturer, Surgery  
A.B., 1977, Harvard University; M.D., 1981, Yale University

BAJO, THOMAS M. (1987) Clinical Assistant Professor, Internal Medicine  
B.S., 1971, St. Procopius College; M.D., 1974, Loyola University

BAKERMAN, PAUL R. (1989) Assistant Clinical Lecturer, Pediatrics  
B.A., 1979, Dartmouth College; M.D., 1983, East Carolina University

BALDREE, MARK E. (1985) Assistant Clinical Lecturer, Surgery  
B.A., 1974, Southern Methodist University; M.D., 1977, Loyola University

BALDWIN, ANN L. (1983) Research Assistant Professor, Physiology  
B.S., 1975, University of Bristol; M.S., 1976, Ph.D., 1979, University of London

BAMFORD, COLIN R. (1976) Associate Professor, Associate Head, Director, Diagnostic Neurology, Neurology  
B.S., 1966, M.D., 1971, Royal College of Surgeons

BANGERT, JERRY L. (1984) Clinical Assistant Professor, Internal Medicine; Clinical Assistant Professor, Pathology  
B.A., 1972, M.D., 1975, The University of Arizona

BARANKO, PAUL V. (1975) Senior Clinical Lecturer, Pediatrics  
A.B., 1962, M.D., 1965, Indiana University

BARBEE, ROBERT A. (1969) Professor, Internal Medicine; Assistant Director, Respiratory Services  
B.A., 1954, Yale University; M.D., 1958, University of Chicago

BARBER, H. BRADFORD (1982) Research Assistant Professor, Radiology  

BARBER, WILLIAM D. (1973) Lecturer, Anatomy  
D.V.M., 1954, Colorado State University; Ph.D., 1973, University of California

B.S., 1980, M.D., 1984, The University of Arizona

BARNES, GEORGE R., JR. (1986) Clinical Professor, Radiology  
B.S., 1943, Wheaton College; M.D., 1947, Yale University

A.A., 1981, Pima Community College

BARNET, RONALD W. (1987) Assistant Clinical Lecturer, Ophthalmology  
M.D., 1963, Washington University

BARRETT, HARRISON H. (1974) Professor, Optical Sciences, Radiology  
B.S., 1960, Virginia Polytechnic Institute; M.S., 1962, Massachusetts Institute of Technology; Ph.D., 1969, Harvard University

BARREUTHER, ALAN D. (1976) Clinical Associate Professor, Pharmacy Practice; Instructor, Pharmacology  
B.S., 1973, The University of Arizona; D.Pharm., 1975, University of Michigan

BARTELS, PETER H. (1983) Professor, Pathology, Optical Sciences  
Ph.D., 1954, University of Goettingen

BARTHOLOMEW, KARLA S. (1989) Research Specialist, Physician Assistant, Arizona Cancer Center  
B.S., 1985, University of Maryland; B.M.S., 1987, Emory University
B.A., 1979, M.D., 1981, Hahnemann University

B.S., 1973, Virginia Polytechnic Institute; M.D., 1977, Virginia Commonwealth University

BASSFORD, TAMSEN L. (1989) Assistant Professor, Family & Community Medicine
B.A., 1979, Bryn Mawr College; M.D., 1983, M.D., 1983, University of Southern California

BASTRON, R. DENNIS (1983) Clinical Lecturer, Anesthesiology
A.A., 1958, Wentworth Military Academy; B.A., 1960, M.D., 1964, University of Iowa

BAUMAN, KAY A. (1981) Clinical Associate Professor, Family & Community Medicine

BEAN, JOHN R. (1979) Senior Clinical Lecturer, Pediatrics
B.S., 1972, M.D., 1975, University of Texas

BECKER, WILLIAM (1976) Assistant Clinical Lecturer, Radiation Oncology
D.D.S., 1961, Marquette University; M.S., 1966, Baylor University

BECKER-SCHALLER, RUTH M. (1985) Clinical Lecturer, Family & Community Medicine
B.S., 1972, M.S., 1974, The University of Arizona

BEEDRICK, ALAN D. (1983) Associate Professor, Assistant Head, Pediatrics
B.S., 1974, M.D., 1978, Pennsylvania State University

BEEAFF, DANIEL E. (1985) Assistant Clinical Lecturer, Internal Medicine
B.S., 1970, Arizona State University; M.D., 1974, The University of Arizona

BEIGEL, ALLAN (1970) Vice President, University Relations & Development; Professor, Psychiatry, Psychology
B.A., 1961, Harvard University; M.D., 1965, Albert Einstein University

BEIGEL, JOAN K. (1988) Assistant Clinical Lecturer, Psychiatry

BELL, MARVIN M. (1989) Clinical Lecturer, Family & Community Medicine
B.A., 1977, Occidental College; M.D., 1981, University of Southern California

BELLAMY, WILLIAM T. (1989) Research Associate, Arizona Cancer Center
B.A., 1976, University of Virginia; B.S., 1984, Virginia Commonwealth University; Ph.D., 1988, The University of Arizona

BENJAMIN, JAMES B. (1985) Assistant Professor, Surgery
B.S., 1976, M.D., 1979, The University of Arizona

BENNETT, PETER H. (1968) Clinical Lecturer, Family & Community Medicine
B.S., 1958, Bolton School; M.B.Ch.B., 1961, Manchester University

BENSON, BRYANT (1973) Professor, Anatomy
B.S., 1957, Tennessee Technical University; Ph.D., 1964, Vanderbilt University

BERG, ROBERT A. (1983) Clinical Assistant Professor, Pediatrics
B.S., 1971, University of Michigan; M.D., 1975, University of California

BERGESON, PAUL S. (1973) Senior Clinical Lecturer, Pediatrics
B.S., 1962, M.D., 1966, University of Utah

BERK, FLOYD K. (1975) Clinical Lecturer, Surgery; Adjunct Assistant Professor, Speech & Hearing Sciences
B.S., 1957, Ursinus College; M.D., 1961, Temple University

BERLIN, SANFORD S. (1979) Clinical Lecturer, Psychiatry
D.O., 1963, College of Osteopathic Medicine & Surgery

BERNES, SAUNDER M. (1988) Assistant Clinical Lecturer, Pediatrics
B.S., 1973, Tulane University; M.D., 1977, M.D., 1977, Northwestern University
BERNHARD, VICTOR M. (1984) Professor, Surgery; Senior Clinical Scientist, University Heart Center
B.S., 1947, M.D., 1951, Northwestern University

BERNSTEIN, CAROL (1970) Research Associate Professor, Microbiology & Immunology
B.S., 1961, University of Chicago; M.S., 1963, Yale University; Ph.D., 1967, University of California

BERNSTEIN, HARRIS (1968) Professor/Associate Head, Microbiology & Immunology
B.S., 1956, Purdue University; Ph.D., 1961, California Institute of Technology

BERREN, MICHAEL R. (1979) Clinical Lecturer, Psychiatry
B.A., 1969, M.A., 1971, California State University; Ph.D., 1974, Texas Tech University

BETHANCOURT, BRUCE A. (1986) Senior Clinical Lecturer, Internal Medicine
B.S., 1973, Arizona State University; M.D., 1980, The University of Arizona

BEUCHAT, CAROL A. (1986) Research Assistant Professor, Physiology; Research Associate, Ecology & Evolutionary Biology

BEUTLER, LARRY E. (1979) Professor, Psychology, Psychiatry
B.S., 1965, M.A., 1966, Utah State University; Ph.D., 1970, University of Nebraska

BEYDA, DAVID H. (1983) Assistant Clinical Lecturer, Pediatrics
B.S., 1973, University of Pittsburgh; M.D., 1978, Loyola University

BIANCHI, HENRY E. (1986) Clinical Lecturer, Pediatrics
B.S., 1974, Autonomous University of Guadalajara; M.D., 1978, University of California

BIEBER, CHARLES P. (1989) Visiting Scientist, Surgery
B.A., 1962, M.D., 1966, University of Oklahoma

BIERNY, JEAN-PAUL (1988) Clinical Lecturer, Radiology
M.D., 1962, Brussels University

BINKIEWICZ, ANNA (1986) Clinical Professor, Pediatrics
B.A., 1961, Clark University; M.D., 1965, Tufts University

BITTKER, THOMAS E. (1979) Clinical Lecturer, Psychiatry

BJELLAND, JOHN C. (1973) Senior Clinical Lecturer, Radiology
B.S., 1968, Creighton University; M.D., 1973, University of Tennessee

BLAND, FRANK, JR. (1989) Clinical Assistant Professor, Anesthesiology
B.S., 1950, University of Akron; M.D., 1954, Northwestern University

BLASK, DAVID E. (1978) Professor, Anatomy
B.S., 1969, Syracuse University; Ph.D., 1974, M.D., 1978, University of Texas

BLOEDEL, JAMES R. (1986) Research Professor, Physiology
B.A., 1962, St. Olaf College; Ph.D., 1967, M.D., 1969, University of Minnesota

BLOOM, JOHN W. (1982) Associate Professor, Internal Medicine; Research Associate, Respiratory Sciences
B.A., 1967, Williams College; M.D., 1971, Thomas Jefferson University

BLOUIN, LEONARD T. (1986) Research Associate, Internal Medicine
B.S., 1954, M.S., 1956, Michigan State University; Ph.D., 1959, University of Tennessee

BLUESTEIN, MARLENE (1981) Clinical Assistant Professor, Internal Medicine
B.A., 1968, Brandeis University; M.D., 1976, State University of New York

BLUTE, JAMES F., III (1971) Clinical Lecturer, Obstetrics & Gynecology
B.S.M.D., 1971, The University of Arizona

BONSTELLE, CHARLES T. (1986) Assistant Clinical Lecturer, Radiology
B.S., 1962, University of Akron; M.D., 1966, Case Western Reserve University

BOOTZIN, RICHARD R. (1987) Professor, Psychiatry, Psychology
B.S., 1963, University of Wisconsin; M.S., 1966, Ph.D., 1968, Purdue University
BORCHERS, ALEXANDER H. (1989) Research Associate, Radiation Oncology
B.S., 1984, University of Cincinnati; Ph.D., 1989, George Washington University

BORGES, PETER (1989) Research Specialist, Surgery
B.Sc., 1983, M.Sc., 1985, University of Toronto; Ph.D., 1990, Australian National University

BOROWSKI, ANIELA J. (1984) Clinical Lecturer, Pediatrics
B.S., 1976, M.D., 1979, The University of Arizona

BOSNOS, MICHAEL (1987) Associate Research Engineer, Anatomy
B.S., 1974, The University of Arizona

BOSWELL, MARK V. (1989) Clinical Assistant Professor, Anesthesiology
B.S., 1975, Portland State University; Ph.D., 1982, M.D., 1984, Case Western Reserve University

BOWDEN, GEORGE T. (1978) Professor, Molecular & Cellular Biology, Pharmacology & Toxicology, Radiation Oncology; Coordinator, Research Training, Arizona Cancer Center
B.A., 1967, Ohio Wesleyan University; Ph.D., 1974, University of Wisconsin

BOWEN, KATHRYN A. (1989) Clinical Assistant Professor, Pediatrics
B.A., 1975, University of Colorado; M.D., 1979, St. Louis University

BOWEN, THEODORE (1975) Professor, Radiology, Physics
Ph.B., 1947, M.S., 1950, Ph.D., 1954, University of Chicago

BOXER, MICHAEL A. (1985) Assistant Clinical Lecturer, Pediatrics
A.B., 1967, Amherst College; M.D., 1971, Albany of Union University

BOYDEN, THOMAS W. (1975) Associate Professor, Internal Medicine
B.A., 1967, University of California; M.D., 1971, Loyola University

BOYED, JAMES R. (1984) Clinical Lecturer, Family & Community Medicine
B.S., 1977, University of California; M.D., 1981, Loyola University

BOYER, JOHN T. (1968) Professor, Family & Community Medicine, Internal Medicine; Director, Restorative Medicine
B.S., 1951, Denison University; M.D., 1955, Harvard University

BOYLE, RICHARD R., JR. (1988) Assistant Clinical Lecturer, Radiology
B.S., 1978, Brigham Young University; M.D., 1982, University of Utah

BOYSE, EDWARD A. (1989) Distinguished Professor, Microbiology & Immunology
M.B., B.S., 1952, M.D., 1957, University of London

BOZZO, PAUL D. (1972) Clinical Lecturer, Pathology; Assistant Clinical Lecturer, Internal Medicine
B.A., 1960, M.D., 1964, Marquette University

BRADLEY, RICHARD T. (1982) Clinical Lecturer, Psychiatry
B.A., 1972, Yale University; M.D., 1976, Tufts University

BRADY, JAMES E., JR. (1971) Clinical Lecturer, Family & Community Medicine
B.S., 1948, The University of Arizona; M.D., 1953, Medical College of Wisconsin

BRADY, PRISCILLA M. (1990) Research Specialist, Arizona Cancer Center, Internal Medicine
B.S., 1984, Anna Maria College

BRANDENBURG, ROBERT O. (1985) Clinical Professor, Internal Medicine
B.S., 1940, North Dakota State University; B.S., 1942, University of North Dakota; M.D., 1943, University of Pennsylvania; M.S., 1954, University of Minnesota

BRAUN, ELDON J. (1972) Professor, Physiology
B.A., 1960, Concordia College; M.S., 1965, Ph.D., 1969, The University of Arizona

BRAZIE, ROBERT W. (1973) Clinical Lecturer, Family & Community Medicine
B.S., 1950, M.Ed., 1953, The University of Arizona; M.D., 1959, University of Colorado

BRENDEL, KLAUS (1970) Professor, Pharmacology
B.S., 1957, M.S., 1959, Ph.D., 1962, Free University of Berlin
BRESLOW, MICHAEL F. (1989) Clinical Lecturer, Psychiatry
  B.S., 1980, Pennsylvania State University; M.D., 1982, Thomas Jefferson University

BRESSLER, RUBIN (1970) Professor/Department Head, Internal Medicine; Professor, Pharmacology; Senior Clinical Scientist, University Heart Center
  B.S., 1951, McGill University; M.D., 1957, Duke University

BREWEL, WILLIAM M. (1986) Assistant Clinical Lecturer, Pediatrics
  B.S., 1959, M.D., 1963, University of Kansas

BRICK, DEAN C. (1980) Assistant Clinical Lecturer, Ophthalmology
  B.A., 1968, Northwestern University; M.D., 1972, University of Health Science

BRODIE, TODD D. (1990) Clinical Lecturer, Internal Medicine
  B.S., 1975, M.D., 1979, University of Southern California

BROKL, OLGA H. (1980) Research Specialist, Physiology
  M.S., 1965, Purkyne University

BRONNIMANN, DANETTA (1987) Research Instructor, Internal Medicine

BROOKS, ROBERT J. (1982) Clinical Lecturer, Internal Medicine
  B.S., 1974, Loyola University; M.D., 1977, The University of Arizona

BROOKS, WILLIAM J. (1989) Clinical Instructor, Surgery
  D.O., 1980, Chicago College of Osteopathic Medicine

BROOME-POWELL, MARIANNE B. (1987) Research Assistant Professor, Internal Medicine; Research Associate, Arizona Cancer Center
  B.A., 1972, Florida State University; M.A., 1975, State University of New York; M.Phil., 1981, Ph.D., 1985, Yale University

BROSIN, HENRY W. (1970) Professor, Psychiatry
  A.B., 1927, M.D., 1933, University of Wisconsin

BROWN, BUNELL R., JR. (1971) Professor/Head, Anesthesiology; Associate Dean, Phoenix Program, Medicine Administration; Professor, Pharmacology; Senior Clinical Scientist, University Heart Center
  B.S., 1954, Spring Hill College; M.D., 1958, Tulane University; Ph.D., 1969, University of Texas

BROWN, MERRIL W. (1983) Senior Clinical Lecturer, Surgery
  B.S., 1943, Iowa State University; M.D., 1950, Johns Hopkins University

BROWN, RICHARD C. (1969) Senior Clinical Lecturer, Pediatrics
  A.B., 1950, De Pauw University; M.D., 1955, Thomas Jefferson University

BROWNING, JOSEPH A. (1985) Senior Clinical Lecturer, Pediatrics
  A.B., 1937, M.D., 1941, University of Cincinnati

BRUCKER, EDWARD A., JR. (1971) Clinical Lecturer, Pathology
  B.S., 1946, M.D., 1951, Loyola University

BRUNER, JOHN A. (1986) Senior Clinical Lecturer, Internal Medicine
  B.A., 1957, The University of Arizona; M.D., 1961, Stanford University

BRUWER, ANDRE J. (1971) Assistant Clinical Lecturer, Radiology
  M.B.Ch.B., 1942, University of Cape Town; M.S., 1953, Mayo Foundation

BUCHSBBAUM, HARVEY W. (1972) Clinical Professor, Neurology
  A.B., 1957, Hamilton College; M.D., 1961, Albany of Union University

BUCON, KIRK A. (1989) Clinical Lecturer, Radiology
  B.A., 1977, University of California; M.D., 1981, University of Southern California

BUNT, THEODORE J. (1989) Clinical Associate Professor, Surgery
  B.S., 1969, Western Reserve University; M.D., 1973, University of Michigan

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<th>Position</th>
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University of Kansas, M.D. 1989

CROGHAN, MARILYN K.
University of Washington, M.D. 1982

CROWLEY, MICHAEL A.
University of Rochester, M.D. 1989

CULLEN, THERESA A.
The University of Arizona, M.D. 1983

CUROSH, NANCY A.
The University of Arizona, M.D. 1986

DALLER, JOHN
State University of New York at Brooklyn, M.D. 1987

DAMRON, DANAP.
St. Louis University, M.D. 1989

Emergency Medicine
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DAUBS, MICHAEL D.  
University of Nevada, M.D. 1989

DEAN, GEORGE E.  
The University of Arizona, M.D. 1989

DECK, CARLOS C.  
Pontificia University, M.D. 1989

DELANEY, PATRICK A.  
St. Louis University, M.D. 1987

DIAZ, MARIA L.  
University of Kansas, M.D. 1989

DiGIOVANNI, DAVID A.  
The University of Arizona, M.D. 1988

DILLMAN, ANNETTE M.  
McGill University, M.D. 1988

DITOMASSO, JOHN P.  
Oregon Health Sciences University, M.D. 1989

DO, SON T.  
University of Kansas, M.D. 1986

DOB RATZ, STEPHEN C.  
Eastern Virginia Medical School, M.D. 1990

DOHM, MICHAEL P.  
The University of Arizona, M.D. 1987

DONOHUE, STEVE W.  
The University of Arizona, M.D. 1988

DOUD, DEBRA K.  
University of Nebraska, M.D. 1985

DOW, SEAN B.  
University of Kansas, M.D. 1986

DUFFEY, JAMES P.  
The University of Arizona, M.D. 1990

DUMAS, JAMES G.  
The University of Arizona, M.D. 1989

EHRET H, JEFFREY T.  
University of Virginia, M.D. 1989

EISENFELD, STEVEN H.  
The University of Arizona, M.D. 1990

EK LUND, DIANE K.  
The University of Arizona, M.D. 1988

ELAM, ERIK A.  
Loyola University, M.D. 1986

ELLIS, JENNIFER L.  
Vanderbilt University, M.D. 1989

ELLIS, RANDALL E.  
Vanderbilt University, M.D. 1989

ESPARZA, EZEQUIEL T.  
Texas A & M University, M.D. 1990

ESPARZA, LUIS  
University of California at Los Angeles, M.D. 1989

ESTES, GEORGE W.  
University of Missouri, M.D. 1982

Orthopedic Surgery
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Infectious Diseases
EVANS, JERRY C.  
University of Nebraska, M.D. 1990  
Internal Medicine

FANTE, ROBERT G.  
Boston University, M.D. 1988  
Ophthalmology

FARBER, HAROLD J.  
State University of New York at Stony Brook, M.D. 1987  
Pediatrics-Pulmonary

FASS, RONNIE  
Ben Gurion University, M.D. 1987  
Internal Medicine

FAURE, BRUCE T.  
University of Wisconsin, M.D. 1985  
Orthopedic Surgery

FELDERMAN, JANET A.  
University of Iowa, M.D. 1990  
Pediatrics

FELIX, HECTOR R.  
The University of Arizona, M.D. 1985  
Anesthesiology (Phx)

FLAVILL, PAUL  
University of New Mexico, M.D. 1987  
Neurology

FONDRIEST, JOSEPH E.  
University of Cincinnati, M.D. 1989  
Diagnostic Radiology

FOUTY, BRIAN W.  
University of Washington, M.D. 1988  
Internal Medicine

FRAMM, DAVID J.  
George Washington University, M.D. 1986  
Cardiology

FRIEDMAN, DEBORAH L.  
Washington University, M.D. 1987  
Diagnostic Radiology

FULTS, MIRIAM A.  
Oregon Health Sciences University, M.D. 1989  
Pediatrics

GALLOWAY, JAMES  
Medical College of Virginia, M.D. 1982  
Cardiology

GANIBAN, GARY J.  
Hahnemann University, M.D. 1990  
Internal Medicine

GARTNER, GARY S.  
University of North Carolina, M.D. 1990  
Pediatrics

GENOVA, RONALD T.  
State University of New York at Buffalo, M.D. 1988  
Emergency Medicine

GERHAUSER, RICHARD H.  
University of Nevada, M.D. 1981  
Preventive Medicine

GIBSON, JAMES H.  
The University of Arizona, M.D. 1988  
Anesthesiology (Phx)

GIESLER, BRADY G.  
University of Texas Southwestern, M.D. 1987  
Orthopedic Surgery

GOLL, LAURENE E.  
The University of Arizona, M.D. 1989  
Obstetrics/Gynecology

GONZALEZ, MARK S.  
University of Texas, M.D. 1985  
Cardiology

GONZALEZ-OSETS, GUILLERMO  
Universidad Autonoma, M.D. 1976  
Hematology/Oncology

GOODMAN, TORREY L.  
The University of Arizona, M.D. 1990  
Emergency Medicine

GRADE, CHARLES M.  
University of Wisconsin, M.D. 1989  
Psychiatry
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<td>Family Practice</td>
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<td>Pediatrics - Pulmonary</td>
<td>Medical University of South Carolina, M.D. 1981</td>
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<td>Internal Medicine</td>
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<td>Preventive Medicine</td>
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University of Kansas, M.D. 1989  
Surgery

HUEMPFNER, WENDY A.  
University of Minnesota, M.D. 1987  
Obstetrics/Gynecology

HUNT, SUSAN T.  
Oregon Health Sciences University, M.D. 1989  
Pediatrics

HURLBUT, KATHERINE M.  
Eastern Virginia Medical School, M.D. 1985  
Emergency Medicine

HUSODO, INDRAWAN  
Monash University, M.D. 1979  
Anesthesiology (Phx)

HUSTED, JOHN D.  
University of California at San Francisco, M.D. 1988  
Surgery

HUSTON, CASEY L.  
The University of Arizona, M.D. 1984  
Thoracic Surgery

HUTCHINS, TY W.  
The University of Arizona, M.D. 1987  
Anesthesiology

ISNER, R. JOSEPH  
University of Washington, M.D. 1988  
Anesthesiology

JAFFE, PHILIP E.  
Albert Einstein University, M.D. 1985  
Gastroenterology

JEANETTE, MICHELLE  
University of Massachusetts, M.D. 1990  
Family Practice

JENNINGS, CHARLES E.  
Meharry Medical College, M.D. 1980  
Urology

JERIAN, SUSAN M.  
George Washington University, M.D. 1988  
Internal Medicine

JOHNSON, BRADLEY R.  
The University of Arizona, M.D. 1990  
Psychiatry

JOHNSON, STEPHEN L.  
The University of Arizona, M.D. 1989  
Emergency Medicine

JOHNSON, VALDEN  
Stanford University, M.D. 1983  
Psychiatry

JONES, DONALD V.  
Johns Hopkins University, M.D. 1987  
Surgery

JONES, KENDALL M.  
George Washington University, M.D. 1985  
Diagnostic Radiology

JONES, RONALD D.  
Baylor College of Medicine, M.D. 1988  
Pediatrics

JOSHUA, SUSAN C.  
University of Louisville, M.D. 1986  
Psychiatry

JUDY, C. GERALD  
University of Oklahoma, M.D. 1974  
Pediatrics - Pulmonary

KASPER, LAWRENCE M.  
University of Missouri, M.D. 1987  
Hematology/Oncology

KATZ, JERRY F.  
Chicago Medical School, M.D. 1989  
Obstetrics/Gynecology

KAZEMI, ZOHREH  
The University of Arizona, M.D. 1990  
Obstetrics/Gynecology

KEATING, LYNN M.  
The University of Arizona, M.D. 1988  
Emergency Medicine
KEMPLE, STEVEN C.
Texas College of Osteopathic Medicine, D.O. 1987

KENNEDY, COLLEEN M.
University of Texas, M.D. 1988

KERN, WILLIAM F., III
State University of New York at Brooklyn, M.D. 1979

KERSHENOVICH, SERGIO
Universidad National Autonoma, M.D. 1984

KERWIN, JAMES P.
University of Michigan, M.D. 1989

KHAN, TALIN Z.
Fstima Jinnah Medical College, M.D. 1989

KNUTSON, CYNTHIA A.
St. Louis University, M.D. 1988

KNUTSON, JOHN W.
St. Louis University, M.D. 1988

KONCHAN, FRANK G.
University of Texas, M.D. 1987

KREISLE, WILLIAM H.
Baylor College of Medicine, M.D. 1985

KUNZ, KENNETH R.
University of Manitoba, M.D. 1986

KURTTS, TERRY A.
University of Alabama, M.D. 1989

KURYLAS, CAROLYN E.
University of South Dakota, M.D. 1989

LACE, JOHN W.
University of Pittsburgh, M.D. 1986

LAMBERT, WILLIAM D.
Medical University South Carolina, M.D. 1989

LANE, JOHN C.
University of Texas, M.D. 1990

LANGERAK, ALAN D.
The University of Arizona, M.D. 1990

LAUX, LINDA C.
St. Louis University, M.D. 1990

LAWRENCE, COURTNEY N.
University of Texas, M.D. 1990

LEIGH, BRYAN R.
University of California at San Francisco, M.D. 1989

LEWIS, DONALD R., JR.
University of Maryland, M.D. 1985

LEWIS, KENNETH C.
The University of Arizona, M.D. 1990

LICK, SCOTT D.
University of Minnesota, M.D. 1987

LINDEN, HANNAH M.
University of Massachusetts, M.D. 1989

LINDNER, PETER J.
Louisiana State University, M.D. 1988

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LINFIELD, JANAL T.
University of Washington, M.D. 1990
Family Practice

LIPPINCOTT, DAVID B.
College of Osteopathic Medicine, D.O. 1988
Neurology

LITWIN, SHELDON E.
Washington University, M.D. 1985
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LLOYD, FARRELL J.
University of Utah, M.D. 1989
Internal Medicine

LLOYD, ROBIN M.
University of Utah, M.D. 1989
Pediatrics

LOPEZ, ANA MARIA
Jefferson Medical College, M.D. 1988
Internal Medicine

LORENZ, KRISTIN W.
New England College of Osteopathic Medicine, D.O. 1988
Family Practice

LUCIO, RICHARD W., II
George Washington University, M.D. 1986
Diagnostic Radiology

LUHN, ROGER D.
University of California at San Diego, M.D. 1986
Child Psychiatry

LeBEAUMONT, RONALD W. R.
University of Rochester, M.D. 1987
Anesthesiology (Phx)

MA'ANI, SAHBA E.
Ohio State University, M.D. 1984
Pulmonary

MACIAS, J. CARLOS
University of Nebraska, M.D. 1990
Pediatrics

MACK, CURTIS F.
University of Michigan, M.D. 1989
Radiation Oncology

MADDEN, CYNTHIA
University of Kentucky, M.D. 1989
Emergency Medicine

MAGUIRE, JAMES P.
Royal College of Surgeons, M.D. 1981
Surgery

MAHAFFEY, KENNETH W.
University of Washington, M.D. 1989
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MAHESH, VINIT K.
Medical College of Georgia, M.D. 1985
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MAHONEY, W. MARK
The University of Arizona, M.D. 1989
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MAJDA, JOHN A.
University of California at San Diego, M.D. 1987
Radiation Oncology

MANRIQUEZ, GUADALUPE
University of Minnesota, M.D. 1986
Pathology

MANSILLA, LAURA
Universidad National Autonoma, M.D. 1972
Psychiatry

MARCH, MICHAEL
University of Missouri, M.D. 1988
Anesthesiology

MARCUS, DAVID S.
University of California at San Diego, M.D. 1987
Diagnostic Radiology

MARJAMA, JILL M.
State University of New York at Syracuse, M.D. 1988
Neurology

MARQUEZ, CAROL M.
University of New Mexico, M.D. 1988
Family Practice
MARTIN, BERNADETTE M.
Tufts University, M.D. 1988
Internal Medicine

MARTINEZ, ARTHUR N.
The University of Arizona, M.D. 1983
Occupational Medicine

MATHews, DIANNE S.
University of South Dakota, M.D. 1985
Preventive Medicine

MAURER, GREGORY G.
St. Louis University, M.D. 1987
Anesthesiology

MAYER, PATRICIA A.
The University of Arizona, M.D. 1985
Rheumatology

MAZURSKY, JON E.
Emory University, M.D. 1989
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MEAKEM, THOMAS J.
George Washington University, M.D. 1987
Diagnostic Radiology

MEALMAN, TERENCE L.
Washington University, M.D. 1982
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MEDEL, NOEL M.
University of Santo Tomas, M.D. 1981
Nephrology

MELcer, STUART I.
Chicago Medical School, M.D. 1988
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MILAVETZ, JAMES J.
University of Minnesota, M.D. 1989
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MILLARD, SUSAN L.
Michigan State University, M.D. 1986
Pediatrics - Pulmonary

MILLER, JEFFREY D.
University of California at Los Angeles, M.D. 1988
Family Practice

MILLER, JEFFREY I.
Johns Hopkins University, M.D. 1987
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MILLER, JESS A.
UMDNJ-New Jersey, M.D. 1977
Neurology

MILLER, MELISSA M.
The University of Arizona, M.D. 1988
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MILLER, MICKEY W.
The University of Arizona, M.D. 1988
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MIRANDA, EDUARDO
Universidad Autonoma, M.D. 1982
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MOLLOY, THOMAS A.
Dartmouth College Medical School, M.D. 1981
Thoracic Surgery

MONK, JOE E.
University of Texas, M.D. 1985
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MORALEs, THOMAS G.
Jefferson Medical College, M.D. 1989
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MORTON, BRYce A.
University of Southern California, M.D. 1988
Anesthesiology (Phx)

MOSCHONAS, CONSTANTINE
St. George's University, M.D. 1987
Neurology

MOSS, KENNETH A.
University of California at San Diego, M.D. 1987
Obstetrics/Gynecology

MOVVA, SASHIDHAR S.
Gandhi Medical College, M.D. 1983
Neurology
MOY, MITCHELL A.  
University of Hawaii, M.D. 1989  
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McALEESE, KELLY A.  
Dartmouth College Medical School, M.D. 1990  
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McBEATH, ROBERT B.  
University of Nevada, M.D. 1988  
Urology

McCARVER, LAUREN S.  
The University of Arizona, M.D. 1990  
Pathology

McCARVER, ROBERT R., III  
The University of Arizona, M.D. 1990  
Internal Medicine

McCORD, MATTHEW M.  
Wayne State University, M.D. 1989  
Anesthesiology

McGHEE, ANGELA M.  
The University of Arizona, M.D. 1987  
Dermatology

McKENZIE, DEAN W.  
University of Michigan, M.D. 1987  
Psychiatry

NAGAPPAN, ALAMELUS S.  
Madurai Medical College, M.D. 1981  
Anesthesiology (Phx)

NGUYEN, TUAN A.  
Texas Tech University, M.D. 1989  
Surgery

NICHOLSON, DOUGLAS A.  
Oregon Health Sciences University, M.D. 1987  
Obstetrics/Gynecology

NOGAMI, WALLACE M.  
University of Hawaii, M.D. 1979  
Anesthesiology

NYBERG, THOMAS A.  
George Washington University, M.D. 1987  
Anesthesiology (Phx)

NYE, BRET  
Eastern Virginia Medical School, M.D. 1988  
Family Practice

NEUMAYER, LEIGH A.  
Baylor College of Medicine, M.D. 1985  
Surgery

O'MEARA, CLIFTON B.  
University of Texas, M.D. 1986  
Orthopedic Surgery

O'NEIL, CYNTHIA A.  
Tufts University, M.D. 1988  
Dermatology

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University of Utah, M.D. 1987  
Surgery

OLSON, CYNTHIA L.  
Georgetown University, M.D. 1988  
Obstetrics/Gynecology

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The University of Arizona, M.D. 1990  
Psychiatry

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University of Texas, M.D. 1990  
Internal Medicine

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University of Heidelberg, M.D. 1987  
Internal Medicine

PAIGE, ELLEN M.  
Eastern Virginia Medical School, M.D. 1988  
Obstetrics/Gynecology

PARIKH, TEJAL M.  
University of Miami, M.D. 1990  
Family Practice

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University of Colorado, M.D. 1987  
Pathology
PATEL, ANIL S.  
B J Medical College of India, M.D. 1983  
Child Psychiatry

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University of Cincinnati, M.D. 1988  
Family Practice

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The University of Arizona, M.D. 1990  
Surgery

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Washington University, M.D. 1987  
Internal Medicine

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University of Cincinnati, M.D. 1988  
Emergency Medicine

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The University of Arizona, M.D. 1988  
Diagnostic Radiology

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Emergency Medicine

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Internal Medicine

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Pediatrics

PFAFF, John K.  
University of Texas, M.D. 1984  
Pediatrics-Pulmonary

PIEHLER, MARK D.  
University of Colorado, M.D. 1986  
Anesthesiology

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University Je Purkinje, M.D. 1978  
Pathology

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University of Colorado, M.D. 1988  
Anesthesiology (Phx)

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University of Southern California, M.D. 1986  
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Northwestern University, M.D. 1986  
Urology

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Northwestern University, M.D. 1985  
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The University of Arizona, M.D. 1989  
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Bowman Gray School of Medicine, M.D. 1988  
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Medical College of Wisconsin, M.D. 1986  
Anesthesiology

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University of Miami, M.D. 1989  
Radiation Oncology

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Surgery

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University of California at San Diego, M.D. 1989  
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Michigan State University, M.D. 1982  
Psychiatry
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University of Missouri, M.D. 1987
Anesthesiology

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Washington University, M.D. 1988
Internal Medicine

RUFFENACH, STEPHEN J.  
University of Medicine & Dentistry, D.O. 1986
Nephrology

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University of Nevada, M.D. 1988
Internal Medicine

RUZKOWSKI, CHARLES J.  
Chicago Medical School, M.D. 1982
Gastroenterology

SACKS, ELLIOT M.  
University of Southern California, M.D. 1975
Diagnostic Radiology

SALAS, STEVEN M.  
University of California at San Diego, M.D. 1989
Internal Medicine

SALVA, PAUL S.  
Texas Tech University, M.D. 1988
Pediatrics

SCHIEF, VICKY L.  
University of Texas, M.D. 1988
Surgery

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University of Washington, M.D. 1989
Pediatrics

SCHLOSSER, RANDAL R.  
Wayne State University, M.D. 1989
Anesthesiology

SCOTT, MICHAEL E.  
The University of Arizona, M.D. 1977
Pathology

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Oklahoma College of Osteopathic Medicine, D.O. 1986
Psychiatry

SERRANO, LAWRENCE P.  
The University of Arizona, M.D. 1986
Child Psychiatry

SHAMDAF, GLENN J.  
University of Malaga, M.D. 1980
Anesthesiology

SHAWER, CARYL S.  
University of Minnesota, M.D. 1987
Hematology/Oncology

SHEN, GARY K.  
University of Rochester, M.D. 1988
Occupational Medicine

SHORT, WELLAND F.  
Temple University, M.D. 1960
Surgery

SIBLEY, M. ANDREW  
McGill University, M.D. 1989
Radiology

SIEGEL, RONALD S.  
Universidad Autonoma, M.D. 1977
Pathology

SILVERMAN, ERIC S.  
The University of Arizona, M.D. 1989
Psychiatry

Anesthesiology
SLAGIS, SCOTT V.
University of Southern California, M.D. 1982
Orthopedic Surgery

SMIDT, WESLEY R.
University of Iowa, M.D. 1989
Orthopedic Surgery

SOUTHWICK, KAREN L.
Johns Hopkins University, M.D. 1988
Pediatrics

SOVELL, PAUL J.
University of Minnesota, M.D. 1989
Emergency Medicine

SPEER, ISABELLE E.
The University of Arizona, M.D. 1988
Pathology

STANKO, MICHAEL L.
University of Nevada, M.D. 1988
Ophthalmology

STATHOS, THEODORE H.
University of Nebraska, M.D. 1988
Pediatrics

STEFFENS, JOSEPH, III
University of Utah, M.D. 1986
Pathology

STENSHOEL, TAMARA A.
Oregon Health Sciences University, M.D. 1988
Obstetrics/Gynecology

STERN, PETER
Faculte Libre Medicine, M.D. 1989
Internal Medicine

STEWART, CHARLES V.
University of Oklahoma, M.D. 1986
Anesthesiology

STEWART, W. MARSDEN
University of Utah, M.D. 1987
Anesthesiology

STONE, JENNIFER A.
University of Texas, M.D. 1990
Pediatrics

STRUTHERS, WILLIAM B.
The University of Arizona, M.D. 1987
Anesthesiology

STUMBAUGH, VICKI B.
University of Oklahoma, M.D. 1990
Psychiatry

SZEWC, WILLIAM J.
University of Oklahoma, M.D. 1989
Anesthesiology (Phx)

TAM, TONY Y. M.
The University of Arizona, M.D. 1985
Surgery

TANOURA, TAD T.
University of California at Los Angeles, M.D. 1988
Diagnostic Radiology

TARO, NICHOLAS L.
Creighton University, M.D. 1984
Anesthesiology

TAYLOR, KIMBALL B.
University of Utah, M.D. 1989
Diagnostic Radiology

TEICH, DOUGLAS L.
Stanford University, M.D. 1982
Hematology/Oncology

THOMAS, DAVID R.
The University of Arizona, M.D. 1990
Pediatrics

THOMASSON, KAREN L.
University of New Mexico, M.D. 1986
Child Psychiatry

THURMAN, ALAN R.
University of Cincinnati, M.D. 1986
Surgery

TINGEY, J. MARTIN
University of Washington, M.D. 1987
Anesthesiology
TODD, RUSSELL H.
University of Utah, M.D. 1990

TOLANDER, LYNN M.
University of Iowa, M.D. 1988

TRUJILLO, MICHAEL A.
University of New Mexico, M.D. 1987

TSEN, ANDREW C.
University of Kansas, M.D. 1988

TUOHY, CRAIG D.
McGill University, M.D. 1987

VALDEZ, JOSEPH G.
University of Monterrey, M.D. 1984

VALENT, SCOTT R.
University of Vermont, M.D. 1990

VALENT, JOHN F.
University of California at San Francisco, M.D. 1987

VALENT, SUZANNE N.
University of California at San Francisco, M.D. 1987

VANDELIST, CRAIG L.
University of Wisconsin, M.D. 1987

VANDERKIN, DAVID D.
Medical College of Wisconsin, M.D. 1990

VASQUEZ, JUAN A.
University of Michigan, M.D. 1990

VENERUS, BRYAN J.
Chicago Medical School, M.D. 1990

VERDI, CHRISTOPHER J.
The University of Arizona, M.D. 1987

VERNASCO, DEBORAH M.
Indiana University, M.D. 1987

VIZE, BARBARA J.
University of Minnesota, M.D. 1990

WALKER, BRUCE E.
Medical College of Wisconsin, M.D. 1987

WALSH, TRAVIS K.
Chicago College of Osteopathic Medicine, D.O. 1983

WARNER, ALBERTA L.
The University of Arizona, M.D. 1984

WATAHA, JOSEPH F.
University of Utah, M.D. 1987

WATSON, GORDON K.
The University of Arizona, M.D. 1989

WEINTRAUB, PAUL D.
University of Pennsylvania, M.D. 1990

WEINZAPFEL, THOMAS A.
Indiana University, M.D. 1990

WEISSMAN, SETH D.
University of Miami, M.D. 1987

WEIST, DAVID J.
Tulane University, M.D. 1990

Surgery

Neurology

Internal Medicine

Surgery

Gastroenterology

Preventive Medicine

Internal Medicine

Surgery

Preventive Medicine

Anesthesiology

Internal Medicine

Psychiatry

Surgery

Hematology/Oncology

Anesthesiology (Phx)

Internal Medicine

Gastroenterology

Nuclear Medicine

Cardiology

Anesthesiology

Internal Medicine

Family Practice

Pediatrics

Internal Medicine

Emergency Medicine
WIDMAN, RONALD J.
The University of Arizona, M.D. 1990

WILCOX, GEORGE E.
University of Louisville, M.D. 1990

WILDER, RICHARD B.
University of Maryland, M.D. 1988

WILLIAMS, NOEL R.
Ohio State University, M.D. 1990

WILSON, JOHN R.
The University of Arizona, M.D. 1986

WINCH, ROBERTA L.
University of Washington, M.D. 1989

WONG, PATRICIA L.
University of California at San Francisco, M.D. 1982

WONG, RANDOLPH W. Y.
Jefferson Medical College, M.D. 1988

WYMAN, RHONDA L.
The University of Arizona, M.D. 1989

YOUNG, MARK F.
Eastern Tennessee State University, M.D. 1985

YUNG, CHRISTIANNE M.
University of California at San Diego, M.D. 1988

ZIEBERT, JOHN J.
University of Wisconsin, M.D. 1990

ZUKAITIS, JAMES L.
University of Nebraska, M.D. 1989

Emergency Medicine
Pathology
Radiation Oncology
Obstetrics/Gynecology
Orthopedic Surgery
Pediatrics
Dermatology
Surgery
Anesthesiology
Gastroenterology
Internal Medicine
Internal Medicine
Anesthesiology (Phx)
RESIDENCY APPOINTMENTS

CLASS OF 1990

ALCARAZ, VERONIQUE TERESITA
Good Samaritan Regional Medical Center, Phoenix, AZ 85006
Internal Medicine/Pediatrics

ANDERSON, LLOYD RODERICK
The University of Arizona Affiliated Hospitals, Tucson, AZ 85724
Surgery-Preliminary

AXELROD, MIRIAM RUTH
Maine Dartmouth Family Practice Residency, Augusta, ME 04330
Family Practice

BAKER, KAREN GAIL
1990-Tucson Hospitals Medical Education Program, Tucson, AZ 85733
1991-St. Joseph's Hospital, Phoenix, AZ 85013
Transitional
Diagnostic Radiology

BENTLEY, BURTON, II
1990-Medical College of Wisconsin, Milwaukee, WI 53226
1991-Medical College of Wisconsin, Milwaukee, WI 53226
Internal Medicine-Preliminary
Emergency Medicine

BLUM, BENNETT ARMAND
University of California-Los Angeles, Sepulveda, CA 91343
Psychiatry

BOYLE, JAY OWEN
No Residency in 1990

BOYLE, JUDITH MARIE
CMHC/St. Joseph Mercy Hospital, Ypsilanti, MI 48197
Internal Medicine/Pediatrics

BRAINARD, CATHERINE PAIGE
The University of Arizona Affiliated Hospitals, Tucson, AZ 85724
Obstetrics & Gynecology

BUOT-SMITH, TERESA LYNN
Good Samaritan Regional Medical Center, Phoenix, AZ 85006
Psychiatry

BYERLY, MATTHEW JOHN
University of Florida Medical Center-Shands Hospital, Gainesville, FL 32610
Psychiatry

CARLTON, MICHAEL WARREN
Good Samaritan Regional Medical Center, Phoenix, AZ 85006
Internal Medicine/Pediatrics

CELAYA, GREGORY J.
St. Joseph's Hospital and Medical Center, Phoenix, AZ 85013
Family Practice
CHRISTENSEN, JANICE DIANE  
The University of Arizona Affiliated Hospitals, Tucson, AZ 85724  
Internal Medicine

COLLINS, DANIEL JOHN  
Internal Medicine, Spokane, WA 99220  
Internal Medicine

COLLINS, ROSEANNE KELTON  
Good Samaritan Regional Medical Center, Phoenix, AZ 85006  
Family Practice

CONDIT, BRIAN EDWIN  
St. Francis Medical Center, Pittsburgh, PA 15201  
Physical Medicine & Rehabilitation

CORTESI, SUSAN ROSE  
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CRINNIAN, CHARLES THOMAS  
1990-St. Joseph’s Hospital and Medical Center, Phoenix, AZ 85013  
1991-University of Colorado Health Science Center, Denver, CO 80262  
Internal Medicine-Preliminary, Neurology

DAMSTRA, DAVID JAMES  
Puget Sound Naval Station, Bremerton, WA 98314  
Family Practice

DAVIDSON, JEFFERY ALAN  
Maricopa Medical Center, Phoenix, AZ 85008  
Emergency Medicine

DeLORENZI, IRENE FLAHLIE  
Good Samaritan Regional Medical Center, Phoenix, AZ 85008  
Family Practice

DUARTE, IRENE GUADALUPE  
No Residency in 1990  

DUARTE, LIONEL RENTERIA  
Maricopa Medical Center, Phoenix, AZ 85008  
Surgery

EARLE, DAVID BRYAN  
Kings County Hospital Center, Brooklyn, NY 11203  
Surgery

ECKES, DARRYL WILLIAM  
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Surgery

EISENFELD, STEVEN HARRIS  
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Surgery-Preliminary

FRY, STEPHEN EUGENE  
1990- Good Samaritan Regional Medical Center, Phoenix, AZ  
1991-University of Southern California, Los Angeles, CA 90033  
Transitional, Radiation Oncology

GIANGOBBE, MITCHELL JAMES  
University of Iowa Hospitals, Iowa City, IA 52242  
Surgery
GOODMAN, TORREY LISA
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Emergency Medicine

GRANT, JAMES DAVID
1990-St. Joseph's Hospital and Medical Center, Phoenix, AZ 85013
1991-University of California, Los Angeles, CA 90024
Internal Medicine-Preliminary Anesthesiology

GREISMAN, RICHARD ALAN
The University of Arizona Affiliated Hospitals, Tucson, AZ 85724
Orthopedic Surgery

GRIEGO, ROBERT DAVID
The University of Arizona Affiliated Hospitals, Tucson, AZ 85724
Internal Medicine

GAULTIERE, CHRISTOPHER JOSEPH
Mercy Hospital, San Diego, CA 92103-2180
Transitional

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The University of Arizona Affiliated Hospitals, Tucson, AZ 85724
Family Practice

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The University of Arizona Affiliated Hospitals, Tucson, AZ 85724
Pathology

HARRISON, JESSICA ANNE
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Psychiatry

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Family Practice

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Diagnostic Radiology

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Transitional Ophthalmology

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Psychiatry

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Obstetrics & Gynecology
KAZEMI, ZOHREH  
The University of Arizona Affiliated Hospitals, Tucson, AZ 85724  
Obstetrics & Gynecology

LANGERAK, ALAN DAVID  
The University of Arizona Affiliated Hospitals, Tucson, AZ 85724  
Internal Medicine

LEBER, JEF NATHAN  
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Pediatrics

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Washington Hospital Center, Washington, DC 20010  
Surgery-Preliminary

LESNIK, IVAN KENNETH  
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Transitional

LEWIS, KENNETH CHARLES  
1990-The University of Arizona Affiliated Hospitals, Tucson, AZ 85724  
1991-The University of Arizona Affiliated Hospitals, Tucson, AZ 85724  
Internal Medicine-Preliminary  
Anesthesiology

LUNT, CHAD CURTIS  
Wilford Hall USAF Medical Center, San Antonio, TX 78236  
Obstetrics & Gynecology

LYDON, MARY LYNN  
No Residency in 1990

LYLE, SARAH KATHRYN  
University of Washington Affiliated Hospitals, Seattle, WA 98195  
Family Practice

McCARVER, LAUREN SCOTT  
The University of Arizona Affiliated Hospitals, Tucson, AZ 85724  
Pathology

McCARVER, ROBERT ROY, III  
1990-The University of Arizona Affiliated Hospitals, Tucson, AZ 85724  
1991-The University of Arizona Affiliated Hospitals, Tucson, AZ 85724  
Internal Medicine  
Diagnostic Radiology

MEDINA, DAVID MICHAEL  
1990-St. Joseph's Hospital and Medicine Center, Phoenix, AZ 85013  
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Internal Medicine  
Diagnostic Radiology

MOLINA, JOHN WARD  
Phoenix Integrated Residency in Obstetrics & Gynecology, Phoenix, AZ 85008  
Obstetrics & Gynecology-Preliminary

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1990-Methodist Hospital, Memphis, TN 38104  
1991-Texas Tech University Affiliated Hospitals, El Paso, TX 79905  
Transitional  
Emergency Medicine
PEDERSEN, DAVID ANDREW
The University of Arizona Affiliated Hospitals, Tucson, AZ 85724
Surgery

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Harvard University, Brigham and Women’s Hospital, Boston, MA 02115
Obstetrics & Gynecology

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Family Practice

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Case Western Reserve University, Cleveland, OH 44100
Urology

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1990 - Good Samaritan Regional Medical Center, Phoenix, AZ 85006
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Internal Medicine-Preliminary Neurology

SCHNITZER, CARY MICHAEL
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Internal Medicine

SCHULZKUMP, LINDA MARIE
Mercy Medical Center, Denver, CO 80206
Family Practice

SCHWARTZBERG, ROSS EPSTEIN
1990 - St. Mary’s Medical Center, Long Beach, CA 90801
1991 - Stanford Affiliated Hospitals, Stanford, CA 94305
Internal Medicine-Preliminary Diagnostic Radiology

SHAPIRO, STEVEN AARON
Texas A&M White Hospital, Temple, TX 76508
Orthopedic Surgery

SHARMA, SANJEEV KUMAR
Oregon Health Sciences University, Portland, OR 97201
Surgery-Preliminary

SHERIDAN, DONALD CHARLES
Mayo Graduate School of Medicine, Rochester, MN 55905
Orthopedic Surgery

SILVERMAN, ROD SPENCER
Roanoke Memorial Hospitals, Roanoke, VA 24033
Transitional

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Internal Medicine

STERRETT, MARTY JAYSON
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Emergency Medicine

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Pediatrics
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RESPIDENCY APPOINTMENTS / 207

Internal Medicine-Preliminary
Anesthesiology
Diagnostic Radiology
Obstetrics & Gynecology
Emergency Medicine
Family Practice
Surgery
STUDENTS

CLASS OF 1991

Allen, Bradley A. - Paradise Valley
Anderson, John - Tucson
Aslamy, Wazhma - Scottsdale
Avery, Charlene - Brimhall, NM
Batiste-Milton, Sharlene - Tucson
Bhardwaja, Nand - Mesa
Bianchi, Lynn - Tucson
Bishop, Maria - Tucson
Bohay, Gary - Tempe
Bozzo, Andrea - Tucson
Chen, Victor T. - Tempe
Cohen, Russell - Phoenix
Crosswell, Susan - Tucson
Cullen, John - Scottsdale
D’Alli, Richard - Tempe
Dalrymple, Alison - Tucson
Denton, John - Paradise Valley
Diez de Pinos, Steven - Tucson
Durbin, David - Phoenix
Dyne, Pamela - Phoenix
Earle, Margaret E. - Tucson
Eckes, A. Michelle - Glendale
Ence, Wendalyn - Tolleson
Evans, Katie - Second Mesa
Flouras, Katherine - Tucson
Fulton, William - Apache Junction
Funk, Dory - Tucson
Garcia, Lawrence - Tucson
Gibson, David - Tucson
Goldberg, Cynthia - Paradise Valley
Goldberg, Steven - Tucson
Granberry, Michael - Phoenix
Green, Mary - Flagstaff
Hadley, Susan - Phoenix
Heck, Richard - Sierra Grande
Hughes, Jeffrey - Phoenix
Hum, Peter - Marana
Hunt, Judith - Tucson
Ince, Simone - Tucson
Joseph, Mark - Tucson
Kelly, James - Phoenix
Kendle, Eric - Tucson
King, David - Phoenix
Klassen, Cathlyn - Tucson
Klewer, Scott - Tempe
Krahl, Leslie - Scottsdale
Kumagai, Steven - Paradise Valley
Kutob, Randa - Glendale
Lamb, Deryl - Chandler
Lanter, Patricia - Chandler
Lauber, Caleb - Tucson
Lewis, Wesley - Phoenix
Lieberman, Daniel - Phoenix
Lieurance, Robert - Tucson
Linford, Jennifer - Tucson
Loftus, Terrence - Tempe
Lucio, Linda - Phoenix
Mancini, Anthony - Tucson
Matsu, Marc S. - Tucson
Maxey, Vada - Tucson
Maxwell, Mark - Tucson
Mayberry, J. Carter - Tucson
Michael, Katherine - Phoenix
Miller, William - Globe
Miller, Rick - Phoenix
Morse, Marc - Tucson
Mulcahy, Marybeth - Tucson
Napier, Shelly - Tempe
Neville, Christopher - Gilbert
Nielsen, Sandra - Chandler
Pease, David - Tempe
Perez, Violet - Tucson
Peters, Brian - Tucson
Powers, Robin M. - Tucson
Purdy, Beth - Phoenix
Qualtiere-Burcher, Paul - Scottsdale
Rice, Sydney - Somerton
Richards, Roxanne - Phoenix
Rockow, Jeffrey - Phoenix
Rosales, Ramy - Tucson
Rose, Catherine - Tucson
Sabbagh, Marwan - Tucson
Samoy, Sarah - Tucson
Schroder, Derek - Tempe
Sigala, Sharon - Flagstaff
Smaltz, Robert - Phoenix
Smith, Stephen - Scottsdale
Stuntz, Michael E. - Phoenix
Alcott, Sally B. - Phoenix
Alfandre, Joanne H. - Tucson
Arambula, Patrick J. - Phoenix
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Barnes, Christopher F. - Phoenix
Bejarano, Paul E. - Tucson
Belzer, Suzanne L. - Tucson
Benekos, Emily L. - Los Angeles
Bennett, Randal - Tucson
Bhat, Raj K. - Tempe
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Bresnahan, Carole A. - Phoenix
Broughton, Kathryn A. - Tuba City
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Chase, Peter B. - Tucson
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Davenport, Michele P. - Mesa
Dennham, Carla - Tempe
DeRosier, Lynn - Tempe
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Embry, Travis D. - Tucson
Erb, Amy L. - Phoenix
Escalante, Carlos V. - Tucson
Ford, Debbie L. - Tucson
Garcia, Francisco - Tucson
Gater, David - Tucson
Geyman, Troy W. - Glendale
Gibson, Kathleen E. - Tucson
Gmelich, Anne M. - Tempe
Goodall, Scott T. - Tempe
Gordon, Paul H. - Flagstaff
Gossler, Kenneth B. - Tucson
Graeme, Kimberly A. - Tucson
Greenlee, Rebecca - Tucson
Gundry, Kathleen R. - Phoenix
Hallier, Stephen J. - Tucson
Hamblin, Scott R. - Eager
Harrison, Jeffrey D. - Phoenix
Hartline, Jane E. - Tempe
Heiland, Kurt E. - Phoenix
Hippenmeyer, Carol L. - Tucson
Howell, Shannon P. - Prescott
Jones, John S. - Tempe
Jordan, Beth A. - Tucson
Kastre, Tammy Y. - Mesa
Kates, Daniel E. - Phoenix
Kidwell, Stella M. - Tucson
Kucharski, Donna A. - Tempe
LaBenz, Gregory L. - Cheyenne
Lanauze, Philippe - Scottsdale
Lane, David J. - Phoenix
Larsen, Peggy - Scottsdale
Lattari, Donna M. - Tucson
Lee, Derek S. - Scottsdale
Lee, Robert P. - Tucson
Levine, Melissa P. - Phoenix
Levinsky, Dale M. - Scottsdale
Lille, Sean T. - Scottsdale
Limstrom, Scott A. - Paradise Valley
Lujan, William B. - Lake Havasu City
McDonald, Skye D. - Phoenix
McIsaac, Shauna L. - Tempe
Nair, Rajan V. - Phoenix
Nelson, Douglas P. - Phoenix
Nguyen, Tuan H. - Phoenix
Noth, Imre - Scottsdale
Packer, Bruce P. - Tucson
Park, Hyun Soo - Phoenix
Peterson, Dallas E. - Snowflake
Reid, John M. - Scottsdale
Reinecke, Wendy L. - Tucson
Rimsza, Lisa M. - Scottsdale
Rockwell, Jeffrey J. - Mesa
Roeske, Lisa C. - Tucson
Rutherford, Kim C. - Tucson
Saba, Phillip - Litchfield
Salcido, Paul A. - Phoenix
Saldarriaga, Angela M. - Mesa
Sarid, Rami - Tucson
Schlar, Lisa P. - Phoenix
Shinn, Joe R. - Tempe
Siegel, Diane - Tuba City
Singh, Gurinder P. - Phoenix
Sochacki, Michael A. - Scottsdale
Stuart, Kara L. - Phoenix
Sullivan, Jonathon M. - Mesa
Taylor, Carol S. - Tucson
Terpstra, Jan I. - Glendale
Thai, Hoang M. - Phoenix
Topete, Reyes - El Mirage
Tumpkin, Christopher - Sierra Vista
Villar, Rodrigo G. - Tucson
Welsh, Lisa K. - Mesa
Wintergalen, Edward H. - Phoenix
Wolfe, Joy G. - Phoenix
CLASS OF 1993

Allen, Victoria Jean - Tucson
Amjadi, Kimiya - Tempe
Andrews, Michael Raymond - Phoenix
Aslamy, Zaki - Scottsdale
Bagatell, Rochelle - Phoenix
Baldwin, Amy Caroline - Casa Grande
Barr, Roland James - Tempe
Bartlett, Thomas Jesus - Phoenix
Becker, Lisa Anne - Denver, CO
Bernert, Richard Alan - Tucson
Bowey, Claire Nicol - Tucson
Budnick, Paul Alexander - Fountain Hills
Byerly, Tanya - Tucson
Cartsonis, Jonathan Zed - Litchfield
Caserta, Frank Peter, IV - Scottsdale
Clothier, John (Lewis) - Tucson
Crowley, William Joseph - Tucson
Delgado, Arnulfo Marquez - Tucson
Dodd, Laurie Rose - Tucson
Don, Scott Anthony - Coolidge
Dubry, Seth Marion - Tucson
Edwards, Wayne Ross - Bozeman, MD
Eicher, Martha Lee - Tucson
Erickson, Steven Maynard - Tucson
Evans, Billy Joe, III - Glendale
Fassett, Michael John - Phoenix
Fischer, Brett William - Tempe
Freedberg, Douglas B. - Phoenix
Friedman, Diana Beth - Tucson
Gin, Robert - Tucson
Gonzales, Deborah Anne - Phoenix
Hahn, Mary (Frances) - Mesa
Hiscox, Perry Steven - El Cajon
Holmgren, Shannon M. - Paradise Valley
Hou, Damon - Tucson
Hurt, Cathy Ann - Tucson
Innis, Connie Ann - Tucson
Kane, Patricia Perea - Tucson
Kersey, Robert Charles - Phoenix
Killion, Susan Lynn - Tempe
Koehler, Cyenthia Louis - Tucson
Lines, Ruskin R. - Tucson
Lloyd, Janel Dusenberry - Tucson
MacFarlane, Melanie Kay - Tucson
Mackey, Sean Charles - Tucson
McCall, Caroline P. - Tucson
McLaughlin, Wendy Jane - Tucson
Miller, Katherine E. - Tucson
Moffat, Robert John - Tucson
Morfitt, Wendi Sue - Tucson
Moynahan, Kevin F. - Phoenix
Mulcahy, Maureen Molly - Tucson
Myers, Pamela Ann - Tucson
Otte, Valerie Jo - Scottsdale
Paullette, Laurie Ann - Glendale
Pierpont, John Weltmer - Tucson
Pollak, Rebecca Irene - Phoenix
Rivera, Mirza Arelly - Mesa
Robles, Ramon Angel - Tucson
Russell, Melinda L. - Anchorage, AK
Russell, Rosemary - Paradise Valley
Ryan, Kristin Marie - Milwaukee, WI
Salek, Mehdi David - Tucson
Salmon, Julia Valerie - Tucson
Santa Cruz, Karen Sterling - Tucson
Schlecht, Kerry G. - Paradise Valley
Shah, Hetalkumar C. - Scottsdale
Sipes, Brenda Lue - Tucson
Sirianni, Peter A. - Tucson
Siwik, Steven Anthony - Tucson
Stephens, Kevin - Tucson
Strong, Benjamin Waite - Tucson
Tannous, John Kennedy - Tucson
Thomas, Maxwell - Tempe
Trier, Todd Timothy - Tempe
Urquides, Hector F. - Tucson
Vega, Maria Teresa - Tucson
Villarreal, Yvonne M. - Tucson
Ward, Beth Ellen - Tucson
Willis, Roger Cecil - Gilbert
Wrigley, Linda C. - Anchorage, AK
Zaludek, Timothy - Tempe
## INDEX

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