

PRE-MEDICAL: ACADEMIC AND CAREER INFORMATION



Health Professions Advising Office (HPAO) • Jensen Student Access to Science (SAS) and Mathematics Center

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NATURE OF THE WORK, EARNINGS AND OCCUPATIONAL OUTLOOK

Physicians are dedicated to serving the health care needs of society through diagnosing and treating illness, injury and disease. About one third of physicians in the U.S. work in primary care, acting as the first health professional consulted by patients. Most primary care physicians provide comprehensive health care to patients and families and tend to see the same patients over a long period of time. When necessary, primary care physicians refer patients to medical specialists and surgeons for further expertise. Most physicians work in small offices, clinics or in group medical practices where they see patients. Physicians often work long, irregular hours, and rotate shifts for emergency calls. Travel between the office and hospital to care for patients is common. Specialists such as anesthesiologists, pathologists, radiologists, surgeons, and emergency physicians, spend the majority of their time working in hospitals or surgical outpatient centers.

Though earnings vary according to number of years in practice, type of practice, geographical location, and specialty, the total median annual income of physicians is \$186,044. With changes in the health care system, there are fewer solo practices and more physicians joining medical groups or networks. As employees of these medical groups, more physicians are drawing a set salary, so earnings potential may be more limited than in the past when the most physicians worked for themselves. The Occupational Outlook Handbook reports that employment of physicians and surgeons will grow faster than average for all occupations through 2018 due to retirement, continued expansion of the health care industries and an aging population.

UNDERGRADUATE MEDICAL EDUCATION (MEDICAL SCHOOL) 4 DEMANDING YEARS

There are 132 accredited **allopathic** medical schools in the U.S. and 17 accredited Canadian medical schools that award the degree of Medical Doctor (M.D.). Medical school usually requires 4 academic years. Studies begin with 2 years of classroom instruction in the basic sciences. The normal structure and function of human systems are taught through gross anatomy, cell biology, biochemistry, medical genetics, behavioral science, physiology, and neuroscience. Subsequently, the education focus shifts to abnormalities of structure and function, disease, and general therapeutic principles through exposure to microbiology, immunology, pathology, and pharmacology (MSAR 2011-2012). The second two years involves a series of clinical rotations throughout inpatient and outpatient settings where students work with patients under the supervision of attending physicians and medical residents. During the clinical years, students also have an opportunity to take elective rotations. During the last year of medical school, students make decisions about medical specialty and apply for internship or residency programs in their desired area of expertise.

GRADUATE MEDICAL EDUCATION (RESIDENCY AND FELLOWSHIP TRAINING) 3 TO 8 YEARS

Following medical school, graduates begin their graduate medical education or residency, which is paid on-the-job training in a specialty. The training required varies from 3 to 8 years depending on the specialty selected. Family Practice, Emergency Medicine, Pediatrics, and Internal Medicine require 3 years. Training in Obstetrics and Gynecology, Pathology, Anesthesiology, Dermatology, Neurology, Nuclear Medicine, Ophthalmology, Physical Medicine, Psychiatry, Radiology and Radiation Oncology lasts 4 years. The surgical specialties including General, Neurological, Orthopedic,

Otolaryngology, and Urology require 5 years of residency. Most specialties also offer advanced training in a subspecialty usually requiring an additional 1 to 3 years of fellowship following residency.

PRE-MEDICAL PREPARATION

Due to the competitive nature of the medical school application process and rigorous training required, students should carefully consider their motivation and preparation for a career in medicine. In 2008-2009 a total of 42,269 applicants applied to medical school and 19,332 applicants were offered admissions to at least one school. The Fall 2009 entering class had a **MEAN SCIENCE** (all courses classified as Biology, Chemistry, Physics and Mathematics) **GPA of 3.60**, a **MEAN NON-SCIENCE GPA of 3.74** and **TOTAL GPA of 3.66**.

MAJOR:

No particular major is required or preferred for medical school admissions, thus students are advised to select a major they find interesting and in which they can excel. Students should also consider a major that may lead them to an alternate career, should they decide not to pursue a medical education. Whichever major a student declares, their course of study must incorporate the required pre-medical requirements. Many students who select a science major find a great deal of overlap between their major requirements and those required for medical school. Regardless of the choice in major, medical schools prefer that students have a well-rounded liberal arts education.

COURSE REQUIREMENTS FOR MEDICAL SCHOOLS:

Specific undergraduate course requirements vary from program to program. Thus, students should consult each school catalog, website, and the **Medical School Admission Requirements: U.S. and Canada, (MSAR)** published by the Association of American Medical Colleges (AAMC) for specific requirements. A copy of the MSAR is available to view in the HPAO Resource Library or purchase at www.aamc.org.

CSULB Courses that fulfill admission requirements for allopathic (MD) medical schools:

Pre-medical Coursework	CSULB Courses
One year of General Chemistry with lab	Chemistry 111A & 111B
One year of Organic Chemistry with lab	Chemistry 320A & 320B (<i>Chem. & Biochem. majors</i>) OR 322A w/ 323A & 322B w/ 323B (<i>Biology & other majors</i>)
One year of General Biology with lab	Biology 211 & 212 & 213* (Biology 111 w/ 111L & 212 w/ 212L & 213 w/ 213L if taken prior to catalog year 2010-11)
One year of General Physics with lab	Physics 100A & 100B OR 151 & 152 & 254*
One year of English (Composition and Literature preferred)	Any 2 courses numbered 100 and above

*Required or **Highly** Recommended

Strongly recommended courses (required at some schools):

Pre-medical Coursework	CSULB Courses
One semester to one year of college-level Math (Calculus)	Math 119A & 119B OR 122 & 123
One course in Statistics	Biology 260 OR Stat 108 (required at UCLA & UC Irvine)
One upper division molecular/cell biology course	Biology 340 (required at UC Irvine & USC)
One course in Biochemistry	Chemistry 441A OR 448 (required at UC Irvine & USC)
Genetics	Biology 370
Mammalian Physiology	Biology 342

Other courses for consideration include: anatomy, immunology, histology, microbiology, social sciences, humanities, speech, and a foreign language. We recommend pre-health students enroll in courses that meet the following General Education requirements to help you develop a broad understanding of the health professions in relation to other disciplines of study. Visit our website and download our handout, General Education Courses for Pre-Health Students.

Additional information:

Various U.S. medical schools do not accept AP units toward the satisfaction of stated pre-requisite courses- see HPAO for details. All required courses must be taken for a letter grade, not for Credit/No Credit. If courses are repeated, both grades will be calculated in your AMCAS (American Medical College Application Service) grade-point average, which is contrary to the CSULB grade-forgiveness policy.

MCAT:

The Medical College Admission Test (MCAT) is a standardized exam consisting of three multiple-choice sections (**VERBAL REASONING**, **PHYSICAL SCIENCES**, and **BIOLOGICAL SCIENCES**) and a **WRITING SAMPLE** (two thirty-minute essays). The MCAT is required by most medical schools and is used in combination with other criteria to evaluate an applicant's potential for success in medical school. Before attempting the MCAT, students should have completed at least one year each of biology, general chemistry, organic chemistry, and physics. The MCAT is administered in a computer-based format only. The exam is administered 28 times from late January through early September. Visit <http://www.aamc.org/students/mcat/start.htm> for important information.

OTHER FACTORS CONSIDERED FOR ADMISSIONS TO MEDICAL SCHOOLS:

CLINICAL EXPERIENCE is strongly recommended for admission to most medical schools. This can include a paid or volunteer position in a doctor's office, local clinic, or a hospital. Most hospitals and clinics gladly accept volunteers (contact the volunteer services office at your local hospital for more information). Medical school admission committees want to know that you have the desire and ability to work with patients. The successful participation in clinical volunteer or job experience can demonstrate this.

RESEARCH experience is increasingly important. Options include volunteering in a lab for a professor, getting a job as a lab assistant at a local university, hospital or pharmaceutical company, or participating in a summer biomedical research program. Visit <http://www.aamc.org/members/great/summerlinks.htm> for summer undergraduate research programs.

COMMUNITY SERVICE experience is highly valued by medical schools. Future doctors should be able to demonstrate compassion and a willingness to give back to their communities. Getting involved in community service efforts on or off campus that are of interest to you can enhance a medical school application. CSULB has a number of academic, service and health professions organizations to join.

WORK EXPERIENCE can also be valuable in demonstrating your potential to succeed in medical school. Past success in a work environment can reveal meaningful information to admissions committees. Depending on the setting, work experience can help develop and showcase a variety of skills including communication (oral and/or written) time management, and problem solving.

LETTERS OF RECOMMENDATION are required for application to medical school. The typical letter packet consists of three to five letters, two from science professors, one from a non-science professor and one, or more, from supervisors of relevant work, research, or clinical activities. The purpose of the letters is to provide medical schools with an impression of the applicant from respected academics or persons who are in a position to observe the applicant's work

as it relates to the study of medicine. Students are encouraged to create and maintain positive contacts with prospective recommenders early in their academic career.

APPLICATION

The American Medical College Application Service (AMCAS) is a non-profit, centralized application processing service for applicants to the first-year entering classes at participating U.S. medical schools. Most medical schools use AMCAS as the primary application method. Visit www.aamc.org/amcas for applicant information.

For more information about Allopathic Medicine, visit www.aamc.org/students and see your HPAO advisor for further information on the application process, application assistance, and a list of upcoming workshops and events.