

# **PREPARING FOR MEDICAL SCHOOL: A GUIDE FOR FRESHMEN AND SOPHOMORES**

**2009-2010**

**HEALTH PROFESSIONS AND PRELAW CENTER**

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## GOOD BEGINNINGS

The Health Professions and Prelaw Center (HPPLC) advises students--freshmen through graduate students--who are preparing for medical school. Admission is highly competitive, and it is important for you to have correct and current information. Please do the following:

1. Read this document carefully. It contains a lot of solid information.
2. Read all information on the HPPLC website ([www.hpplc.indiana.edu](http://www.hpplc.indiana.edu)) related to careers in medicine and healthcare, the application process, and the HPPLC Recommendation Service.
3. Be aware that you will receive advice about premedical preparation from many sources – some good, some bad. Understand that some of the bad advice will be delivered with great confidence.
4. Make sure you are subscribed to the HPPLC mailing list for your area of interest. Through the list you will receive pertinent information about meetings, deadlines, and opportunities.
5. Attend educational meetings organized by HPPLC (watch for announcements on the HPPLC mailing list).

## COURSE REQUIREMENTS FOR INDIANA UNIVERSITY SCHOOL OF MEDICINE

The following science course work is required for admission to Indiana University School of Medicine; each course must include a lecture and a laboratory component:

IU SCHOOL OF MEDICINE REQUIREMENT	IU BLOOMINGTON EQUIVALENT
General/inorganic chemistry, 8-10 credit hours (one academic year)	CHEM-C 117 and CHEM-N 330*
Organic chemistry, 8-10 credit hours (one academic year)	CHEM-C 341,** 342, and 343
Physics, 8-10 credit hours (one academic year)	PHYS-P 201 and 202 <b>or</b> PHYS-P 221 and 222
Biological sciences, 8-10 credit hours (one academic year)	BIOL-L 111, 112, and 113 <b>or</b> BIOL-L 112, 113, and 211

### SEQUENCE OF CHEMISTRY COURSES FOR PREMED STUDENTS

CHEM-C 117 Principles of Chemistry and Biochemistry I
CHEM-C 341 Organic Chemistry I Lectures
CHEM-C 342 Organic Chemistry II Lectures
CHEM-C 343 Organic Chemistry I Laboratory***
CHEM-N 330 Intermediate Inorganic Chemistry

\* In order to obtain the best preparation to meet the requirements for all medical schools, students should complete the sequence of courses for chemistry majors through CHEM-N 330, including CHEM-C 341, 342, and 343. Students should complete CHEM-C 342 and 343 before CHEM-N 330. The Indiana University School of Medicine will accept CHEM-C 118 in place of CHEM-N 330. However, the IUB Department of Chemistry and HPPLC strongly recommend all premed students complete CHEM-N 330 instead of CHEM-C 118 to meet the general/inorganic requirements for admission to medical schools.

\*\* Premed students should not enroll in the alternate organic chemistry course CHEM-R 340. Students cannot obtain credit for both CHEM-R 340 and CHEM-C 341.

\*\*\* It is recommended that students enroll concurrently in CHEM-C 342 and 343.

The minimum requirement for entering the Indiana University School of Medicine is 90 credit hours, excluding physical education and ROTC courses. Any major from the traditional arts and sciences curriculum is acceptable. Applications of students with educational backgrounds in other fields will be evaluated based on a minimum of 90 credit hours (three academic years) of college course work of arts and sciences equivalence.<sup>1</sup>

<sup>1</sup> Note that **very few** students are admitted and enroll having completed only the minimum number of required credit hours (three years of college coursework).

The chart on the previous page lists the specific Indiana University Bloomington courses that we recommend that all premed students complete. These courses provide essential preparation for the Medical College Admission Test (MCAT). Students should be aware that some medical schools will not accept Advanced Placement or credit-by-examination towards meeting admission requirements, or accept such credit only under restricted circumstances. Students should also be aware that receiving an exemption from a requirement is not generally considered equivalent to Advanced Placement credit, credit-by-examination, or credit from coursework. College-level coursework is often preferable for preparation for the Medical College Admissions Test (MCAT).

## ADMISSION REQUIREMENTS FOR OTHER SCHOOLS

Requirements for many other medical schools are similar to the requirements of the Indiana University School of Medicine, but there can be important variations. Most medical schools require one year of lecture and lab in biology, general/inorganic chemistry, organic chemistry, and physics. Additional common requirements include one year of English composition and a semester or year of math (see below). An increasing number (13) of medical schools require Biochemistry, and most medical schools now strongly recommend it. Many schools also require two semesters of organic chemistry lab. Students should review the individual school entries in *Medical School Admission Requirements 2010-2011*, or the school websites for detailed information.

### MATH

Of the 130 allopathic medical schools, 33 require college math and an additional 18 specifically require Calculus. In some cases the requirement is for one semester; in some cases it is for one year. Many schools that do not specifically require math or calculus strongly recommend knowledge in those subjects as a useful tool in medical education. Many undergraduate degree programs will include required math courses.

### MAJOR

Medical schools do not have a preference for any specific majors. There is neither a preference for science majors or for non-science majors. Therefore, you may major in almost anything. If you question this, read Chapter 3 "Undergraduate Premedical Preparation" in *Medical School Admission Requirements 2010-2011*, available at the HPPLC front desk. This book is published by the medical schools and is the most authoritative source for preparation for and admission to medical school. One passage from Chapter 3 of the book may interest you:

Medical schools recognize the importance of a strong foundation in the natural sciences -- biology, chemistry, physics, and mathematics -- and most schools have established minimum course requirements for admission. These courses usually represent about one-third of the credit hours needed for degree completion. This approach deliberately leaves room for applicants from a broad spectrum of college majors, including those in the humanities and social sciences. No medical school requires a specific major of its applicants or matriculants. Admission committee members are aware that medical students can develop the essential skills of acquiring, synthesizing, applying, and communicating information through a wide variety of academic disciplines.

Nevertheless, many premedical students choose to major in a science discipline. Ideally, they do so because they are fascinated by science and perceive that such a major can be the foundation for a variety of career options. Choosing science primarily to enhance one's chances for admission to medical school is not in a student's long-term best interest. Medical school admission committees seek students whose intellectual curiosity leads them to a variety of disciplines and whose intellectual maturity assures that their efforts are persistent and disciplined.<sup>2</sup>

You should consider a major which you enjoy, in which you perform well, or which might serve as a basis for further graduate work or for employment in the event you choose not to apply or you are not admitted to medical school. Admission committees expect variety in an educational program, including a significant number of humanities and social and behavioral science courses in addition to science courses. The majority of our

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<sup>2</sup> Association of American Medical Colleges, *Medical School Admission Requirements, 2010-2011*, (Washington, D.C.2009) p. 11

premedical students major in science; however, many applicants majoring in non-science areas are successful applicants to the Indiana University School of Medicine as well as to other medical schools. All applicants must meet the schools' specific requirements, regardless of major. At IU-Bloomington, premedical students usually choose a major in the College of Arts and Sciences, although majors from other schools may be selected.

## FACTORS IN ADMISSION

A number of factors may be considered by medical school admission committees. These differ in importance by school, but generally include academic credentials (GPA, course load, and grade trends), MCAT scores, a personal interview, and letters of evaluation, perception of personal character, interpersonal skills, as well as demonstrated knowledge of and commitment to the profession and knowledge of the school and its program. Some schools interview only those applicants meeting certain initial standards based on residency, GPA, and MCAT.

The Indiana University School of Medicine Bulletin states: "Students are offered places in the class on the basis of scholarship, character, personality, references, performance on the Medical College Admission Test, and personal interview."<sup>3</sup> It should be noted that a low GPA and MCAT cannot be overcome by an excellent interview; however, a low grade or one semester of poor grades will probably not keep a good candidate out of most medical schools. Schools look at applicants' attributes and judge whether they are ready for the rigors of medical school.

The Indiana University School of Medicine emphasizes the development of nine competencies in its curriculum: effective communication; basic clinical skills; using science to guide diagnosis, management, therapeutics, and prevention; lifelong learning; self-awareness, self-care, and personal growth; social and community contexts of health care; moral reasoning and ethical judgment; problem solving; and professionalism and role recognition. It is recommended that premedical students begin to incorporate the development of the nonclinical competencies above into their preparation for medical school. For instance, taking courses in ethics can help premedical students develop moral reasoning and ethical judgment, or volunteering in a free medical clinic provides an opportunity for premedical students to develop a broader understanding of the social and community contexts of health care.

## MEDICAL COLLEGE ADMISSION TEST (MCAT)

The MCAT plays a significant role in medical school admissions decisions. You cannot substitute a sparkling personality or excellent volunteer work for an acceptable MCAT. The MCAT exam is a standardized test that measures aptitude and reasoning skills in science and other areas related to the study of medicine.

We recommend that you look at the test format and content as you begin to take your first science classes so you may see how material from these courses will be used on the MCAT. Some will say this is too early. Nevertheless there are too many who prepare in one semester while carrying a full load of courses and who subsequently perform poorly on the exam. If a trial MCAT confirms that Einstein's brain pales in comparison to yours, you can relax. If you detect possible problems, you can address them early prior to taking the real MCAT.

Understanding the type of skills measured by the test can help you study more effectively in your coursework. Many freshman students are aware that science skills are tested, but they do not realize that reading comprehension and writing skills are also evaluated. The four sections of the test are: Verbal Reasoning, Physical Sciences, Writing Samples, and Biological Sciences.

**Verbal Reasoning:** The Verbal Reasoning section of the test measures your ability to ". . . understand, evaluate, and apply information and requirements found in prose texts."<sup>4</sup> If your ACT or SAT verbal score is weak, pay special attention to the Verbal Reasoning section of the MCAT. Rather than avoid reading courses, it might be a good idea to take some. Skill in reading is not a skill quickly acquired. It is interesting to note how many students with excellent grade point averages have poor verbal reasoning scores. Perhaps they assume that they are better readers than they are. Perhaps their success in sciences causes them to avoid humanities and social sciences courses that require a different kind of reading.

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<sup>3</sup> *Indiana University School of Medicine Bulletin 2007-2009*, p.7

<sup>4</sup> *Explanation of Scores for Advisors*, Association of American Medical Colleges, September 1994, p. 1.

**Sciences:** Within the science portions of the MCAT, the test measures your ability to think critically and analytically, employing science concepts. Reliance on your memory alone is not sufficient in doing well in this portion of the exam.

Underestimate this test at your peril.

## ACADEMIC EVALUATIONS

1. Academic evaluations, which reflect your professors' knowledge of your abilities in comparison to other students, are very important in the admissions process.
2. Evaluations are usually requested from professors in the sophomore and junior years and at the conclusion of the class, rather than a year later. If you have had particularly noteworthy achievements in a freshman class, these too may provide a valuable evaluation.
3. Be sure to start a file at HPPLC as soon as you are ready to ask a teacher for an evaluation.
4. We strongly urge enrollment in some small size or seminar-type classes in which you work closely with your professors. Make yourself known to instructors if they have time to talk during office hours – even if you think you understand all the material. Taking more than one small class from a teacher may be helpful. Getting an evaluation from an instructor in a small upper-level class in which you have demonstrated exemplary work is ideal.
5. You cannot be Mr. or Ms. Anonymous in your classes and expect to receive substantive academic evaluations. Professors who don't know you and who haven't talked with you usually can comment only on the grade, and that is on the transcript. If you are a shy person it may take a semester or two, but you simply must become comfortable talking with your teachers. Detailed, comparative academic evaluations are important and may provide a convincing argument for your medical school admissions – given that your academic performance shines - particularly at some of the most competitive schools. In addition to science evaluations, academically challenging courses in a non-science subject of interest will be one excellent means to demonstrate your intellectual versatility. Undergraduate research provides another wonderful opportunity for interested students to develop relationships with faculty. Do not underestimate the importance of these letters, and do not leave this task until late in your junior year.

**In addition to questions from students about major, requirements for admission, the MCAT and recommendation letters, here are a number of additional questions frequently asked, with our answers.**

### **IS THERE A PREFERENCE SHOWN FOR THE BACHELOR OF SCIENCE OR BACHELOR OF ARTS DEGREE?**

No. Each applicant's record is evaluated on an individual basis. Both Bachelor of Science and Bachelor of Arts degrees are acceptable for premedical programs. Often a B.S. program in the sciences requires a student to delve into the subject in greater depth, and an admission committee will be aware of this fact. However, an admission committee would expect an applicant to do well with either degree. The B.A. degree leaves room for a greater breadth of study and this, too, may be attractive to all admission committees. Committees look at the quality of the transcript rather than the name of the degree.

### **SHOULD I ENROLL IN AN HONORS PROGRAM?**

If it interests you, yes. Admission committees look at the level of difficulty of an applicant's course work. In many instances, the greater depth and breadth of honors programs/courses are reflected in a greater knowledge of the subject area in question. Classes are often smaller, and classmates are similarly motivated achievers. Many successful medical school applicants have enrolled in honors programs; however, many successful applicants have completed rigorous curricula which did not include honors courses.

### **DO MEDICAL SCHOOLS PREFER DOUBLE MAJORS OR MULTIPLE MINORS?**

Medical schools look for quality in an undergraduate curriculum. A double major or an added minor are only two of many ways to develop your academic interests and abilities. Rather than create a long list of possibilities we suggest that you undertake an adventurous approach to the curriculum, designing what will challenge and interest you.

## DO MEDICAL SCHOOLS REQUIRE A FOREIGN LANGUAGE FOR ADMISSION?

The College of Arts and Sciences at Indiana University Bloomington requires the study of a foreign language. We know of no medical school that does; however, medical students and practicing physicians have found working knowledge of a second language very helpful.

## WHAT'S SO DIFFICULT ABOUT BEING A PREMEDICAL STUDENT?

For many freshmen, the most difficult task is to acquire the study skills and self-discipline required to attain academic excellence. Many freshmen premed students have been highly successful in high school. They have been accustomed to being "stars", frequently without having developed systematic study habits. The success of your academic transition to Indiana University Bloomington depends not only on ability, but also strongly upon motivation, organization, and the learned skills of studying effectively. Some of you will initially be discouraged and will have to have the determination to learn how to study more systematically. Demands of the premedical curriculum are rigorous. You may have to work harder than students who are not aiming for competitive admission graduate programs.

## IS IT BECOMING MORE DIFFICULT TO GET INTO MEDICAL SCHOOL?

Note below the nationwide trends in applications to allopathic (M.D.) medical schools:

CLASS	NUMBER OF APPLICANTS	NUMBER OF ACCEPTED APPLICANTS
2001	34,859	17,456
2002	33,625	17,592
2003	34,786	17,539
2004	37,735	17,662
2005	37,364	17,978
2006	39,109	18,441
2007	42,315	18,858
2008	42,231	19,135

Obviously there are implications. There are far fewer seats available in medical schools than qualified applicants. Medical school admission committees are able to ask for high standards. Freshman students should anticipate that by the time they apply they may need to meet higher admission standards than were in effect when they started college. You must be determined, well prepared, and well informed. You should actively explore alternative approaches and alternative careers – keep your options open!

## IS IT ALL OVER IF I HAVE A BAD SEMESTER?

There is a false but persistent rumor among freshman premedical students that if you have a bad science grade or a bad semester you will have to give up. That's not true. Medical school admission committees look carefully at student abilities and development. They realize that not every student enters college with a burst of academic brilliance. They expect an excellent academic record, but will make allowances for problem semesters or a slow start---**some** allowances.

## WHEN SHOULD I TAKE THE MCAT?

The best advice is to take the MCAT when you have thoroughly prepared and are ready to perform well on the exam. We generally recommend that students complete all basic premed science requirements and do significant preparation through review and practice testing before taking the exam. If you are planning to begin medical school directly following graduation, then you should plan to complete all basic premed requirements by the spring of your junior year, and take the MCAT early in the summer between junior and senior year. You will want to take the MCAT by early summer of whatever year you plan to apply to medical school. For example, if you are applying for the entering medical school class of fall 2013, we would recommend that you complete all premed requirements by spring semester of 2012 and take the MCAT in the early summer of 2012.

Some students attempt to take the exam in the summer after sophomore year if they have already completed the premed requirements, but we find that they sometimes do not obtain the level of score they are seeking because they have not had as much time to prepare for the exam. If you are considering taking the exam this early in your college career it is critical that you consult with an advisor in HPPLC first, in order to discuss your goals for admission to medical school.

### **WHAT IS THE MEAN GRADE-POINT AVERAGE (GPA) OF STUDENTS ADMITTED TO MEDICAL SCHOOLS?**

It varies from school to school. The average GPA for the Indiana University School of Medicine usually is around a 3.7 or 3.8. Talk with an advisor about this. While numbers are important, trends, courseloads, and personal circumstances all may enter into admissions decisions. Preserving a 4.0 GPA by taking a light courseload, spreading science courses out, or completing them over the summer or at other campuses can be self-defeating, as admissions committees are on the lookout for students who are pursuing such strategies to artificially inflate their GPA's. Beware of advice to take certain courses that are thought to be "easy" in order to boost your GPA (such advice can often be faulty, anyway). If premedical students on our campus have determined that they are "easy" courses, medical school admissions committees might make the same determination.

### **WHAT IS THE MD/PHD DEGREE?**

The M.D./Ph.D. is a joint degree program available to those who would like to pursue their strong research interests. These programs train students both through a medical school education and a research-based doctorate as a foundation for their future careers. Such training would appeal to those who want to teach in medical school or in a college environment, or pursue a career in medical research as a physician-scientist. Graduates are also well represented in industry research and in administration. The training is typically between seven and ten years. Excellent financial support is typically available for those students who have been admitted to an M.D./Ph.D. program.

### **ARE EXTRACURRICULAR ACTIVITIES IMPORTANT?**

1. In addition to high levels of academic achievement, medical schools look for many traits in applicants, including motivation, evidence of humanism, responsibility, maturity, leadership, communication skills, breadth of interests, and ability to manage multiple tasks.
2. Students are encouraged to participate actively, but not to substitute activities for academic excellence. Moreover, a list of organization memberships means little to experienced committees. An admissions committee will be interested to know what you have contributed.
3. There is no list of preferred activities. However, volunteer activities through which you develop your interpersonal skills and gain experience working with people from a wide variety of backgrounds (not just fellow college students), are especially relevant. Any volunteer activity that requires you to provide support for people facing distress will especially be valued by admission committees as helping you to prepare for the role of a physician.
4. A good beginning resource for finding appropriate volunteer activities can be found in the medicine section under "Community Service Experience" on the HPPLC website (<http://www.hpplc.indiana.edu/medicine/med-coexp.shtml>). This section provides information on the types of activities you may wish to seek and web resources for locating volunteer agencies. Also, a central location for those seeking these activities may be found in the Bloomington Volunteer Network website at <http://bloomington.in.gov/volunteer/>. Community activities related to social concerns or health issues, such as the Adult Day Care Center, Big Brothers and Big Sisters, the Community Kitchen, Habitat for Humanity, Hospice, Volunteers in Medicine, and many more, might be of particular interest to those with an interest in health careers.
5. When you apply to medical school, you may be asked about achievements during your undergraduate years, and that question will relate to attainments inside and outside the classroom. Medical schools expect that you can talk about more than your grade point average, your social life, the current television schedule, and your favorite brand of beer.
6. Why not sketch a plan for what you want to have accomplished by the end of your senior year? Then, systematically start to live that plan.

## **WHAT IS OSTEOPATHIC MEDICINE?**

Osteopathic Physicians (DOs) are fully licensed physicians and share the same privileges as MDs. They can analyze, diagnose, prescribe drugs and therapy, perform surgery, and pursue all of the medical specialties available to MDs. In addition, they receive hundreds of hours of additional training in manipulative medicine techniques and diagnosis. With Osteomaniulative Treatment (OMT), Osteopathic Physicians use their hands to diagnose injury and illness and encourage the body's natural healing processes.

Osteopathic schools hold that their underlying philosophy is based on a holistic approach to medicine. The patient is viewed as a whole rather than a collection of parts. Special attention is focused on the musculoskeletal system as it reflects and influences the condition of all other body systems. This training makes possible a better understanding of the ways that an injury and illness in one part of your body can affect another.

## **WHAT CHANCE DOES A NONRESIDENT HAVE AS AN APPLICANT TO THE INDIANA UNIVERSITY SCHOOL OF MEDICINE?**

Many state-supported schools show preference to their own state residents. It is not unusual for the Indiana University School of Medicine to offer places to 100 or more nonresidents per year, and non-resident Indiana University students with good records are encouraged to apply.

## **HOW DO I KNOW IF MEDICINE IS THE RIGHT CAREER FOR ME?**

Read, talk, listen, observe, and compare. Shadow physicians to learn what they do on a day-to-day basis. Read about healthcare issues and the changes occurring in the profession of medicine. Talk with physicians about what they like and don't like about their profession. Attend HPPLC and AED (Alpha Epsilon Delta) meetings and listen to health professionals who come to talk about their careers and answer student questions. Observe your progress in the sciences. Are you a good science student? Observe through volunteer opportunities what it will be like to work with people requiring medical assistance. Investigate other careers so you have some comparisons. That's a lot of work--but if you enter the medical profession, you may be a physician for forty or more years. Make sure that you like doing what physicians do.

## **HOW CAN THE HEALTH PROFESSIONS AND PRELAW CENTER HELP ME?**

Preparing for medical school requires careful, long-range planning and accurate information. Advisors at the Center specialize in helping students prepare for medical careers. Course selection, course sequencing, minors, MCAT preparation, how to request recommendations, completing applications through the American Medical College Application Service (AMCAS) and the American Association of Colleges of Osteopathic Medicine Application Service (AACOMAS) are among the subjects that we can address with you. Our website contains useful information on preparing for medical school and other health professions. The Center also works closely with Alpha Epsilon Delta, the premedical honorary society. AED sponsors a number of speakers every year to discuss issues in the dental and medical professions.

## **APPLYING TO MEDICAL SCHOOL**

Applying to medical school is a time-intensive, detailed process. We have prepared an extensive document entitled "A Guide for Applicants to Medical Schools" for IU Bloomington applicants. Students who know they are going to apply should acquire and read this document in their sophomore year.

## **SOME OTHER SUGGESTIONS**

1. Listen (with discretion) to advice upper class students and students presently in medical school may give.
2. Shadow and talk with practicing physicians about the profession and the changes and forecasts for the future.
3. Arrange opportunities to work or volunteer in some health professional or community service area over the summer. Most communities have many agencies that care for patients. Contact hospital(s), health care agencies or summer camps to learn what volunteer or paid positions are available.

4. Read the relevant sections on the HPPLC website and HPPLC listserv announcements. Explore and learn about other health professions and attend the annual Health Programs Fair to meet with representatives of medical schools and health programs. Email questions to HPPLC advisors. Make an appointment to meet with a HPPLC advisor. Remember that we want to contribute toward your successful entry to a program of your choice.

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We encourage you to use e-mail to ask questions, check your recommendation files, and to communicate with our premed advisors. Send e-mail to an individual premed advisor or to [hpplc@indiana.edu](mailto:hpplc@indiana.edu). Please check the HPPLC website for notices of upcoming meetings, campus visits by admissions representatives, and other items of interest.

This document has been prepared for Indiana University - Bloomington students by the Health Professions and Prelaw Center. Please note that specific requirements and policies can change at any time without notice. Students are responsible for obtaining the most current information directly from the application services, schools, and programs in which they have an interest.