

HVERFORD COLLEGE
Pre Health Advising
208 Chase Hall

**A Guide for First & Second Year Students Interested in the
Health Professions**

2008-2009

<http://www.haverford.edu/deptinfo/Premed.htm>

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I. INTRODUCTION

Haverford College is a fine institution in which to lay the foundation for a career in the health professions because of its academic excellence, plentiful opportunities for research and community service, and unique Quaker values. Medical, dental, osteopathic, veterinary, nursing, public health and other schools, look for applicants who have demonstrated academic aptitude in a rigorous undergraduate liberal arts curriculum. Although a pre-health student does not have to choose a science major in order to enter the health professions, he or she **does** have to demonstrate mastery of the material covered in prerequisite science courses. In addition, given the demanding nature of the health professions, successful applicants to health professions programs are typically well-rounded, mature, motivated, energetic, and intellectually and socially engaged individuals, with a capacity for intense hard work and discipline.

As undergraduates, pre-health students naturally seek to gain exposure to settings and activities that will prepare them for the many aspects involved in the practice of healthcare: social, ethical, economic, scientific. Medical schools, in fact, look for applicants with records demonstrating some combination of community service, clinical and/or research experience. Opportunities in these areas are numerous at Haverford, through such venues as Eighth Dimension, the Center for Global Peace and Citizenship, and the Marion E. Koshland Integrated Natural Science Center, among others.

Since our pre-health students are often concerned with global issues and display an interest in other cultures, they frequently take advantage of opportunities for a semester or year-long study abroad. Some also spend a year or two after college with such service organizations as the Peace Corps and Americorps, or they may study or work abroad funded by post-graduate fellowships. International experience is another way to develop resourcefulness and maturity, along with sensitivity to people from very different backgrounds. It is particularly attractive to graduate programs in the health sciences because of the current diversity of patient populations. Given all the skills and experiences that are expected of applicants to medical school, in particular, the average age of admissions is now 24.

THE HEALTH PROFESSIONS ADVISING STAFF AND OTHER RESOURCES

From first year onward, our Pre-Health Advisor, in conjunction with faculty on the Pre-Health Committee, provide information and advice about preparing for and pursuing professional, graduate-level studies for health careers.

Michele Taillon Taylor, Ph.D, can be found in 208 Chase Hall. Her phone is 610-896-1151 and her email is: mtaylor1@haverford.edu. She is in the office Mondays (9-5), Thursdays (9-1); Fridays (9-5). Contact her assistant, Ms. Cheryl Mathes (cmathes@haverford.edu, or 610-896-1148), to set up an appointment. Michele Taylor

meets with all freshmen thinking about becoming pre-health students during Customs Week and with Upper Class Advisors who live with groups of freshmen during their first year. She welcomes students at all stages with questions about pre-health coursework or the practice of medicine and urges them to make appointments with her throughout their time at Haverford. Students actually must work closely with her when they are ready to apply. Specifically, she helps them collect their letters of recommendation for their **Pre-Health Committee packet** which includes a letter in which Michele summarizes applicants' candidacies for the medical schools. Among other things, she helps advisees develop application strategies and make decisions during the application process.

Cheryl Mathes, administrative assistant, is available to answer questions and set up appointments with Michele Taillon Taylor from 8:30-12:30 Monday through Friday. Her phone is 896-1148 and her email is cmathes@haverford.edu.

In addition, there are several faculty on the Pre Health Committee who also advise undergraduates on pre-health coursework.

Jenni Punt, Department of Biology. (Dr. Punt also assists students who are interested in pursuing veterinary careers.)

Rob Fairman, Department of Biology

Andrea Morris, Department of Biology

Fran Blasé, Department of Chemistry

Terry Newirth, Department of Chemistry

Suzanne Amador, Department of Physics

Peter Love, Department of Physics

Jeff Tecosky-Feldman, Department of Mathematics, Director of Multicultural Scholars Program

Kaye Edwards, Associate Professor of General Programs

Throughout students' years at Haverford they may also want to take advantage of several other resources available to those interested in the health professions.

Health Professions Advising Web Site:

<http://www.haverford.edu/deptinfo/Premed.htm>

Pre-Health Listserv:

Contact Cheryl Mathes (cmathes@haverford.edu) to have your name added to the Pre-health listserv. This listserv will give you access to very useful information, including announcements about special pre-health events on the Tri-Co campuses, research and internship opportunities, application deadlines and suggestions, etc.

Pre-Health Office and Bulletin Board

Our office provides students with useful resources, including books about the medical, osteopathic, dental and other health professions schools application processes; binders listing volunteer opportunities in the area, nationally and abroad, summer and post graduation job opportunities (more of these are available through CDO); announcements of pre-health events and activities, etc.

Workshops, Panels and Speakers

The Health Professions Advising Office sponsors a variety of informative workshops and panels throughout the year, including panels of local health professions teams, workshops on applying to health professions programs and interviewing for medical school, and visits from medical school deans, etc.

Pre Health Club

Contact the Pre-Health Office for further information.

II.

III. PREPARING FOR MEDICAL & OSTEOPATHIC SCHOOL

VOCATIONAL CONSIDERATIONS FOR CAREERS IN MEDICINE

An undergraduate who plans a career in the health professions should take time to explore his or her vocational choices systematically in order to be sure that it will be a good fit. One way to do this is to talk with people who are working in the field. Many Haverford alumni in the health professions are happy to share information about their careers with HC undergraduates. (Go to: http://www.haverford.edu/cdo/alum_profiles.html) The Pre-Health Office also offers panels and workshops during the school year to inform students about different career options in healthcare and areas of practice in medicine. In addition, students can contact our Career Development Office (<http://www.haverford.edu/cdo/>) for career counseling, and to take the Myers Briggs Personality and Strong Interest Inventories, useful assessment tools for vocational exploration. Finally, the Association of American Medical Colleges offers an on-line career exploration program for potential applicants. (Go to: <http://www.aamc.org/students/cim/start.htm>). For information about health careers in general, go to: www.explorehealthcareers.org.

You may be surprised to learn that you can major in absolutely anything – and still go to medical school. This point has been made forcefully by the Association of American Medical Colleges:

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 graduation. 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 ... 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 ... In fact, practicing physicians often recommend that, during their college years, premedical students take advantage of what might be their last opportunity for the study of non-science areas (music, art, history and literature) that might become avocational interests later in life. (from Medical School Admission Requirements 2007-2008)

Many students prepare for medical school while pursuing a non-science major, but they also demonstrate an interest and facility in science. For those who want to do medical research (e.g, MD/PhD or DVM/PhD) however, there is a distinct advantage to a science major.

CORE PREMEDICAL COURSE REQUIREMENTS

By the time one applies to medical school, the following courses must have completed:

Two years of CHEMISTRY, with lab.

At Haverford, this can be fulfilled variously by:

General Chemistry, with lab (Chem 100a/101b) and Organic Chemistry, with lab (Chem 220a/221b); OR, Advanced General Chemistry (Chem 105a), Organic Chemistry (Chem 220a/221b), and Biochemistry of Proteins and Nucleic Acids (Bio 300a/Chem 300a)

One year of BIOLOGY, with lab.

Can be fulfilled with **Cell Structure and Function (Bio 200a, 200b)**

One year of PHYSICS, with lab.

Can be fulfilled with **Classical and Modern Physics I and II (Physics 101/102); OR Fundamental Physics (Physics 105/106)**

One year of English .

Can usually* be fulfilled with a **First Year Writing Seminar** and an additional course in the **English or another humanities department**, completed before matriculation into medical school.

*Each medical school has its own English or Writing requirement. Most schools will accept writing intensive courses from humanities or social sciences departments, but an occasional school will insist on courses taken strictly in an English department. For information on specific schools consult Michele; or check out 2008-9 Medical School Admissions Requirements (MSAR) available in the Pre-Health Office.

ADDITIONAL SCIENCE AND MATH REQUIREMENTS

SCIENCE: Many medical schools require or strongly recommend additional upper level science courses beyond the basic requirements. Such classes are particularly helpful for non-science majors, enabling them to confirm their ability to master challenging coursework in science and solidifying their preparation for a medical school curriculum. Specifically, medical schools find students especially well prepared when they have taken **Biochemistry** (e.g. **Bio Superlab**, i.e. **Laboratory in Biochemistry and Molecular Biology - Biology 300a/Chem 300a**). Other undergraduate-level subjects that may strengthen applicants for medical school are **Genetics, Statistics** (e.g. at Haverford, **Statistical Methods & Their Applications, Math 203**,) and/or **Comparative Anatomy**.

If you are concerned about the requirements of individual medical schools, go to Bryn Mawr's up-to-date list of schools' science requirements at: <http://www.brynmawr.edu/healthpro/documents/MedSchAdvanSci-Requirements.pdf>. Or, you may check out the Medical School Admissions Requirements (MSAR) Manual in the Pre-Health Office, or go to www.aamc.org which links to websites of individual schools. Information on requirements for osteopathic schools is listed in the 2009 Osteopathic College Information Book.

Please note that, AP credits and semester abroad courses may **not** be used to satisfy science requirements. If you come to Haverford with several AP science credits, be sure to complete upper-level coursework in the following areas: **biology** (1 year), **chemistry** (2 years) or **physics** (1 year). An alternative is to relinquish the AP credit and retake the introductory courses. It may depend on your placement – please consult with the specific departments. You are allowed a total of eight non-Haverford courses on your transcript.

MATH: Medical and osteopathic schools' math requirements vary. In many cases you do not have to take a full year of calculus to enter medical school. A few schools do not require any math, others require up to one full year of calculus, some suggest or require a semester of statistics. And many schools will accept **AP credit** for one semester of the math requirement. (For specific schools go to: http://www.brynmawr.edu/healthpro/documents/MedSchoolMath_Requirements_2009.pdf. or check the Medical School Admissions Requirements (MSAR) Manual.)

At Haverford, a full year of calculus could be made up of **Calculus I (Math 113 = one credit)**, taught in a standard version in the **fall**, or as an intensive version for students requiring added support in the **spring**. The **second credit** could be made up of two half-credit sections: e.g. **Introduction to Integral Calculus (Math 114)**, and **Series and Complex Numbers (Math 115)**, or **Probability Distributions (Math 116)**. Math 116's focus on probability and statistics can prove useful for biomedical research and medicine. For those who want to take further coursework in statistics, **Statistical Methods and their Applications – Math 203** would be appropriate. (If you are planning on taking statistics in the Psychology or Economics department, it is important that you check with the websites of the medical schools to which you may apply. Some do and some do NOT accept statistics from a department other than mathematics.)

It is important to note that calculus is required for some science majors (e.g., **Chemistry** majors must take at least one semester of mathematics, e.g. **Math 114/116** or higher; and are encouraged to take an additional semester, e.g. **Math 121**.) Calculus is certainly a foundation for understanding physics, required by all medical schools. (Medical schools will accept algebra-based physics, however.) At Haverford, in particular, physics is calculus-based. **Physics** majors are, of course, required to take math classes; specifically **Math 121** and **204b**; or **216b** and **215a**. Students interested in science careers and research may want to obtain the equivalent of a full year of calculus in their first year. It is important to discuss these issues with your science and math departments.

FITTING REQUIREMENTS INTO A SCHEDULE

How quickly you complete premedical (dental, etc.) requirements depends on many factors, including high school science preparation, adjustment to college, major (s), research or extracurricular activities, post college plans, and vocational clarity. Keep in mind that your primary goal at Haverford should be to develop your intellectual and extracurricular interests. You may complete your pre-medical requirements at any time, but you will never have the opportunity to repeat your undergraduate experience. Don't think of your time at college solely as a means to an end and fail to enjoy your academic experience while you are here. Remember, the average age for admission to medical school is 24.

If you **do** wish to be positioned to enter medical school immediately upon graduation, however, your premedical requirements must be completed by the end of junior year. You would submit your application to medical schools during the summer before senior year. As always, there is more than one pathway to this goal.

SCENARIO ONE: SUITABLE FOR STUDENTS WHO DO NOT WISH TO MAJOR IN SCIENCE

Year One: Math as placed; Gen Chem 100a/100b; First Yr Writing Seminar

Year Two: Bio 200a/200b. (Organic Chemistry can be taken sophomore OR junior year)

Year Three: Chem 220a/221b; Physics 101a/102b. MCAT taken late spring.

Year Four: Complete additional science class, e.g. Bio 300a, major & English requirement

SCENARIO TWO: SUITABLE FOR STUDENTS WHO WISH TO MAJOR IN SCIENCE

Year One: Math 114/116 or 121; Chem 105b; Physics 101/102 or 105/106; First Year Writing Seminar

Year Two: Bio 200a/200b; Chem 220a/221b

Year Three: Bio 300a (=Chem 300a); science major continued. MCAT taken late spring

Year Four: Major and English requirement completed.

SAMPLE SCHEDULES OF STUDENTS COMPLETING PREMED REQUIREMENTS IN DIFFERENT WAYS

Applicants come to medical school from a variety of backgrounds and therefore follow different timetables. As you can see, there are many ways to get to where you want to go. Here are examples of what some students have done in the past:

ENGLISH MAJOR with AP credit in Calculus:

Year	Fall	Spring
First Year	<ul style="list-style-type: none">• Chemistry 100a• 1st Year Writing Seminar• Anthropology• Spanish	<ul style="list-style-type: none">• Chemistry 100b• English 150• Economics• Spanish
Sophomore	<ul style="list-style-type: none">• Bio 200a• Chem 220a	<ul style="list-style-type: none">• Bio 200b• Chem 221b

	<ul style="list-style-type: none"> • English 2xx • Spanish 	<ul style="list-style-type: none"> • English 2xx • Spanish
Junior	<ul style="list-style-type: none"> • Bio 300a (Superlab) • Physics 101a • English 2xx • Spanish 	Spring semester in Argentina
Senior	<ul style="list-style-type: none"> • Engl 399b (yr long) • Engl 2xx • Anthro • Engl 3xx 	<ul style="list-style-type: none"> • Engl 399b (yr long) • Engl 3xx • Phys 102b • Rel 2xx

MCAT taken end of senior year. During year-long application process Haverford grad worked in inner city clinic gaining exposure to health issues of underserved populations. Applicant also took additional biology classes at a local college. Entered medical school one year after graduation.

PSYCHOLOGY MAJOR who did a lot of neuroscience research as an undergraduate.

Year	Fall	Spring	Summer
First Year	<ul style="list-style-type: none"> • Chem 100 • History • Psych • 1st Yr. Writing Seminar • Psych 	<ul style="list-style-type: none"> • Chem 101 • Philosophy • Psych • Sociology • Math 114 & 116 	Organic Chem/Organic Chem at BMC
Sophomore	<ul style="list-style-type: none"> • Bio 101 (BMC) • English • Art • Psych (HC) 	<ul style="list-style-type: none"> • Bio 102 (BMC) • Psych (BMC) • French • Bio 2xx (BMC) 	
Junior	<ul style="list-style-type: none"> • Bio 3xx • Psych (BMC) • Psych • Psych 	Semester abroad in France in which took courses in French literature and history	Phys 101/102 (BMC)
Senior	<ul style="list-style-type: none"> • Bio 3xx(BMC) • Psych 3xx (BMC) • Psych 395 	<ul style="list-style-type: none"> • Bio 3xx (BMC) • Psych 3xx (BMC) 	

		• Psych 3xx	
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As an undergraduate, this student was heavily engaged in neuroscience research with undergraduate faculty and with a physician scientist at a lab in a local medical school. She also volunteered as a French-to-English translator at a nearby clinic serving a large immigrant African population. Entered into an MD/PHD program fall after graduation.

CHEMISTRY MAJOR who took time after college to decide between MD; MD/PHD and PHD

Year	Fall	Spring
First Year	<ul style="list-style-type: none"> • Math 121 • German • 1st Year Writing Seminar • Physics 105 	<ul style="list-style-type: none"> • Chem 105 • German • Religion • Physics 106
Sophomore	<ul style="list-style-type: none"> • Chem 220 • Bio 200a • Math 215 • Religion 	<ul style="list-style-type: none"> • Chem 221 • Bio 200b • English • Econ
Junior	<ul style="list-style-type: none"> • Chem 301 (Superlab I) • Chem 304 • Chem 320 • Econ 	<ul style="list-style-type: none"> • Chem 311 & 312 (Superlab II) • Religion • Chem 35x • Econ
Senior	<ul style="list-style-type: none"> • Chem 305 (PChem II for ACS accreditation) • Chem 36x (Year-long research) • Chem 391 (Year-long seminar) 	<ul style="list-style-type: none"> • Chem 357 d+e • Chem 36x (Yr-long) • Chem 391 (Yr-long)

Student received a Howard Hughes Medical Institute fellowship for summer research between his junior and senior years. He continued in the same lab throughout senior year, then assisted in another lab at a teaching hospital for one year before deciding to pursue an M.D., rather than a Ph.D. degree. He took his MCAT in the spring, one year after graduation. During his post-graduate years he was also active as a volunteer with the homeless, and in various clinical settings in the hospital where he worked. He applied to

medical school in the summer, one year after graduation, and he entered medical school fall two years after leaving Haverford.

HISTORY MAJOR who applied to medical school three years after graduation

Year	Fall	Spring
First Year	<ul style="list-style-type: none"> • Chemistry 100a • Calculus 113a • Greek • History 1xx 	<ul style="list-style-type: none"> • Chemistry 101b • First Year Writing Seminar • Greek • History 1xx
Sophomore	<ul style="list-style-type: none"> • History • History 2xx (BMC) • Greek • English 	<ul style="list-style-type: none"> • History (200 level) • Music • Greek • Archeology (BMC)
Junior	Fall Semester in Athens	<ul style="list-style-type: none"> • History 2xx • Archeology • Cities (BMC) • History 3xx
Senior	<ul style="list-style-type: none"> • History 400a (Senior thesis) • Political Science • Cities (BMC) • History 3xx (BMC) 	<ul style="list-style-type: none"> • History 400b (Senior thesis) • English • Music • History 3xx

Candidate entered Haverford as premed, but early on developed a passion for ancient history and related course work in the Cities program at BMC. Not wanting to pass up the opportunity to explore these disciplines and to write an honors thesis on celebratory architecture and the Athenian Olympic tradition, the candidate tabled his plans for fulfilling his premed requirements.

After graduation, he joined the Peace Corps for two years, then entered a post-baccalaureate program, completing is requirements in one year. He was highly successful with medical school admissions due to his maturity, two years of service, and record of intense intellectual curiosity. He entered medical school four years after graduation.

Double major in BIOLOGY and SPANISH who applied to medical school two years after graduation.

Year	Fall	Spring	Summer
First Year	<ul style="list-style-type: none"> • Chemistry 100a • Math 114/116 • 1st Year Writing Seminar • Spanish • Economics 	<ul style="list-style-type: none"> • Chemistry 101b • Anthropology • Spanish • Spanish 	
Sophomore	<ul style="list-style-type: none"> • Biology 200a • Chemistry 220a • English • Spanish 2xx 	<ul style="list-style-type: none"> • Biology 200b • Chemistry 221b • Anthropology • Spanish 3xx 	Physics 1xx/1xx at state university near home
Junior	<ul style="list-style-type: none"> • Biology 300a • Bio 3xx/ 3xx (.5 credit courses) • Bio 3xx/Chem 3xx (.5 credit courses) • Spanish 3xx 	Student takes semester in Madrid where takes courses for Spanish major	Student remains in Spain over summer to improve Spanish fluency and cultural literacy
Senior	<ul style="list-style-type: none"> • Bio 300b • Bio 408 (Senior Research) • Bio 499 (Senior Seminar) • Chem 357 • Spanish 490 (Yr-long) 	<ul style="list-style-type: none"> • Bio 304/352 • Bio 408 • Spanish 490 (full year) • Religion 	

MCAT taken summer after graduation. After leaving Haverford, candidate served as an intern at a government agency contributing to research for a project on international science and technology exchanges. She subsequently worked in a laboratory at a university near her home town and concurrently volunteered as a medical translator at a clinic for immigrant Latinos. Also shadowed several doctors at the hospital where she was employed. She was very successful with the application process because of her very strong background in science, cultural sensitivity and maturity. Entered medical school two years after graduating.

Combining Pre med with a Physics Major:

There are many ways of combining pre-med requirements with the physics major. We outline some scenarios below. Here are some facts which can make combining the pre-med requirements with a physics major easier

1. The sophomore lab courses (Phys 211 and Phys 215) can be postponed until the junior year.
2. Organic Chemistry (Chem 220a and 221b) is no longer a pre-req or co-req for Bio 200 and so can be postponed until junior year.
3. Bio/Chem 300 (Bio Superlab) counts as an upper level Physics elective.

A direct approach to the pre-med requirements involves Phys 105/106 and Gen Chem I and II (Chem 100 and 101) and Math in freshmen year. Reasonably well prepared students with a strong interest in science who do not place out of any physics or chemistry courses should strongly consider this after consulting with the course instructors. Students may place ahead in Physics into either Physics 106 (second semester intro physics) or Physics 213 (First semester of sophomore physics course). Students may place ahead in Chemistry into the Advanced Gen Chem (Chem 105 -second semester freshmen year). Students who place ahead will have a wider range of courses available to them freshmen year, while still remaining on track to complete their requirements. See sample schedules below:

PHYSICS MAJOR Taking three sciences freshmen year and orgo junior year:

This applicant trained as an Emergency Medical Technician during summer after first year and volunteered sophomore and junior years with a local ambulance corps. Summer of sophomore year he applied for and received an REU looking at ionizing radiation applications in medical physics at the National Institute of Standards and Technology. Between junior and senior year, he worked in lab at Penn Med. Took MCAT May of senior year and worked for one year after graduation at Penn Med in a research lab, volunteering weekly in a clinic for indigent immigrants. He applied to medical school the year after graduation and entered the following fall.

Year	Fall	Spring	Summer
First Year	<ul style="list-style-type: none"> • Physics 105: Mechanics • Math 115/116: Calculus Applications • Chem 100 General Chemistry I • First Year Writing Seminar 	<ul style="list-style-type: none"> • Physics 106: Electricity & Magnetism • Math 121: Calculus III • Chem 101: General Chemistry II • Elective 	
Sophomore	<ul style="list-style-type: none"> • Physics 213: Waves & Optics • Bio 200a: Cellular and Molecular Biology • Physics 211: Electronics & Waves Lab (1/2 credit) 	<ul style="list-style-type: none"> • Physics 214: Intro Quantum • Bio 200b: Cellular and Molecular Biology • Math 204b 	

	<ul style="list-style-type: none"> • Elective • Elective 	<ul style="list-style-type: none"> • Elective 	
Junior	<ul style="list-style-type: none"> • Physics 3XX • Chemistry 220a: Organic Chemistry I • Elective • Elective 	<ul style="list-style-type: none"> • Physics 3XX • Physics 326 • Chemistry 221b: Organic Chemistry II • Elective 	
Senior	<ul style="list-style-type: none"> • Physics 3XX • Physics 3XX • Physics 399 (1/2 credit senior seminar) • Elective 	<ul style="list-style-type: none"> • Bio/Chem 300 (Bio Superlab-- counts as an upper level physics course) • Physics 399 (1/2 credit senior seminar) • Elective • Elective 	

PHYSICS MAJOR Taking three sciences freshmen year and orgo over the summer: Student worked at a summer camp for kids with cancer after freshman year and volunteered in the ER at Lankenau Hospital once a week for three years while at Haverford. She took Organic Chemistry at Bryn Mawr summer of her sophomore year, and worked on a fluid mechanics project in a lab on campus summer of junior year. Although she took her MCAT in June right after graduation, she spent two subsequent years doing as a research assistant in a lab. During that time she continued to volunteer regularly at a local hospital. After much thought as to whether to continue with a Ph.D. in physics or to pursue an M.D., she applied to medical school two years out, entering an MD/Ph.D. program three years after graduation.

Year	Fall	Spring	Summer
First Year	<ul style="list-style-type: none"> • Physics 105: Mechanics • Math 115/116: Calculus Applications • Chem 100 General Chemistry I • First Year Writing 	<ul style="list-style-type: none"> • Physics 106: Electricity & Magnetism • Math 121: Calculus III • Chem 101: General Chemistry II 	

	Seminar	• Elective	
Sophomore	<ul style="list-style-type: none"> • Physics 213: Waves & Optics • Bio 200a: Cellular and Molecular Biology • Physics 211: Electronics & Waves Lab (1/2 credit) • Elective • Elective 	<ul style="list-style-type: none"> • Physics 214: Intro Quantum • Bio 200b: Cellular and Molecular Biology • Math 204 • Elective 	Organic Chem/Organic Chem at BMC
Junior	<ul style="list-style-type: none"> • Physics 3XX • Physics 3XX • Elective • Elective 	<ul style="list-style-type: none"> • Physics 3XX • Physics 326 • Elective • Elective 	
Senior	<ul style="list-style-type: none"> • Physics 3XX • Physics 399 (1/2 credit senior seminar) • Elective • Elective 	<ul style="list-style-type: none"> • Bio/Chem 300 (Bio Superlab-- counts as an upper level physics course) • Physics 399 (1/2 credit senior seminar) • Elective • Elective 	

PHYSICS MAJOR who places into Phys 106 ONLY taking chemistry over the summer: Applicant volunteered in the Department of Surgery at Bryn Mawr Hospital once every two weeks during his sophomore and junior years, an experience that solidified his commitment to medicine as a career. Summer after freshman year he taught science to disadvantaged kids in his hometown, and he became a MAST tutor for high school students as a sophomore. He took Organic Chemistry at BMC over the summer of his sophomore year, and after junior year he did biophysics research in a biology lab on campus. He took the MCAT in June after his junior year and applied to medical school during his senior year. He entered fall after graduation.

Year	Fall	Spring	Summer
First Year	<ul style="list-style-type: none"> • Math 115/116: Calculus Applications 	<ul style="list-style-type: none"> • Physics 106: Electricity & Magnetism 	

	<ul style="list-style-type: none"> • Chem 100 General Chemistry I • First Year Writing Seminar • Elective 	<ul style="list-style-type: none"> • Math 121: Calculus III • Chem 101: General Chemistry II • Elective 	
Sophomore	<ul style="list-style-type: none"> • Physics 213: Waves & Optics • Bio 200a: Cellular and Molecular Biology • Physics 211: Electronics & Waves Lab (1/2 credit) • Elective • Elective 	<ul style="list-style-type: none"> • Physics 214: Intro Quantum • Bio 200b: Cellular and Molecular Biology • Math 204 • Elective 	Organic Chem/Organic Chem at BMC
Junior	<ul style="list-style-type: none"> • Physics 3XX • Physics 3XX • Elective • Elective 	<ul style="list-style-type: none"> • Physics 3XX • Physics 326 • Chem 353 • Elective 	
Senior	<ul style="list-style-type: none"> • Physics 3XX • Physics 399 (1/2 credit senior seminar) • Elective • Elective 	<ul style="list-style-type: none"> • Bio/Chem 300 (Bio Superlab-- counts as an upper level physics course) • Physics 399 (1/2 credit senior seminar) • Elective • Elective 	

PHYSICS MAJOR who places into Chem 105 ONLY: Applicant completed her pre med requirements by the end of her junior year, when she took the MCAT (May). She did research in a physics lab summer of her sophomore year, and in biophysics in a biology lab on campus summer after junior year. Due to a long-standing interest in sports medicine, she spent spring break of her sophomore and junior years shadowing a sports medicine doctor in her home town. She was a star member of the soccer team, became captain as a junior. In her senior year she won a student-athlete award. She applied to medical school as a senior and entered fall after graduation.

	Fall	Spring	Summer
First Year	<ul style="list-style-type: none"> • Physics 105: Mechanics • Math 115/116: Calculus Applications • Elective • First Year Writing Seminar 	<ul style="list-style-type: none"> • Physics 106: Electricity & Magnetism • Math 121: Calculus III • Chem 105: Advanced General Chemistry • Elective 	
Sophomore	<ul style="list-style-type: none"> • Physics 213: Waves & Optics • Chemistry 220a: Organic Chemistry I • Physics 211: Electronics & Waves Lab (1/2 credit) • Elective • Elective 	<ul style="list-style-type: none"> • Physics 214: Intro Quantum • Chemistry 221b: Organic Chemistry II • Math 204b • Elective 	
Junior	<ul style="list-style-type: none"> • Physics 3XX • Bio 200a: Cellular and Molecular Biology • Chem 301 (Superlab I) • Elective 	<ul style="list-style-type: none"> • Physics 3XX • Physics 326 • Bio 200b: Cellular and Molecular Biology • Elective 	
Senior	<ul style="list-style-type: none"> • Physics 3XX • Physics 3XX • Physics 399 (1/2 credit senior seminar) • Elective 	<ul style="list-style-type: none"> • Bio/Chem 300 (Bio Superlab-- counts as an upper level physics course) • Physics 399 (1/2 credit senior seminar) • Elective 	

		• Elective	
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PHYSICS MAJOR who places into Chem 105 ONLY: Applicant completed her pre med requirements by the end of her junior year, when she took the MCAT (May). She did research in a physics lab summer of her sophomore year, and in biophysics in a biology lab on campus summer after junior year. Due to a long-standing interest in sports medicine, she spent spring break of her sophomore and junior years shadowing a sports medicine doctor in her home town. She was a star member of the soccer team, became captain as a junior. In her senior year she won a student-athlete award. She applied to medical school as a senior and entered fall after graduation.

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	<ul style="list-style-type: none"> • Physics 3XX • Physics 399 (1/2 credit senior seminar) • Elective 	<p>300 (Bio Superlab-- counts as an upper level physics course)</p> <ul style="list-style-type: none"> • Physics 399 (1/2 credit senior seminar) • Elective • Elective 	
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WHEN TO APPLY TO MEDICAL SCHOOL?

Although most physicians from previous generations went to medical school immediately from college, it is now the rule rather than the exception for applicants to take at least a year or two off between college and medical school. In fact, candidates who are mature and bring experience from life and the working world to their medical studies are at an advantage in the application process. It can be quite challenging to develop oneself or gain experience in the many areas that prepare one for medical school during the four years of college: academics, community service, clinical and research experience. **Currently, that national average age of entering first year medical students is 24.**

There are many advantages to delaying medical school. Often students appreciate time for alternate activities between two very rigorous academic experiences. Some individuals seek to explore their career options to ascertain that medicine is the right choice – which may include working for a few years in a different field, such as teaching or business. Students who take time before applying to medical school acquire additional employment, academic or life experiences that make them appealing candidates. They may pursue graduate programs, or take post-baccalaureate courses in a formal program or while working in a laboratory at a university. Often, by taking extra time between undergraduate and medical school and spreading out the time-frame for completing pre-medical requirements, applicants are able to achieve stronger grades than if they had rushed through their required course work.

If one takes a year between college and medical school, the requirements for medical school may be completed during the senior year. This allows students majoring in the humanities to take only one lab course per semester. After taking the MCAT in the spring or summer after senior year, a student could apply to medical school over the summer and matriculate one year after graduation as one option. Or s/he could work for a couple years, as demonstrated above.

Yet another option is to complete the premedical requirements **after** graduation, at a school near one's job, or at a university that offers tuition remission, or in a post-baccalaureate premedical program. This is a common strategy for students who pursue other interests as undergraduates, or for those who need to boost their record in science to become a successful applicant.

THINGS TO KEEP IN MIND AS A PRE-MEDICAL OR PRE-HEALTH STUDENT

1. Even if a student is planning to apply to medical school after junior year in order to enter after graduation, it is usually advisable to take just one science course with laboratory each semester as a first year student. As discussed above, there are many other options for when and how to apply. Prospective **science** majors may take two science courses with laboratories (physics and chemistry, for instance) and a course in mathematics in their freshman year. However, this should **only** be attempted if the individual has **very** strong high school science preparation, excellent time management skills and discipline, and really thrives in science classes. Science courses at Haverford are taught very differently from high school science classes. **Students should not overload on sciences classes if they are not ready. It may result in a discouraging struggle with the subject matter and poor grades which will be a challenge to make up.**
2. All premedical requirements should be taken for a grade. If possible, all courses should be taken for a grade since medical schools look for applicants who have consistently challenged themselves.
3. Unless planning to pursue a post-baccalaureate program, the bulk of premedical courses should be taken at Haverford College. Some undergraduates take science courses at Bryn Mawr or at other colleges and universities during the summer. The latter allows students to avoid doubling up on laboratory courses, and to pursue study abroad or other academic interests during the regular academic year. This option should not be overused, however, because medical schools want to see evidence that applicants can handle difficult science courses as part of a regular academic load. Generally it is best to take no more than two of the premedical science courses at summer school, e.g. Physics or Organic Chemistry.

It is important to take premedical required courses **only** at accredited four-year U.S. colleges or universities, to be sure that the courses include a **laboratory** and

that they are the ones normally taken by that school's premed students. In order to transfer the credits to Haverford, students must contact the appropriate academic departments:

For physics information can be found at <http://www.haverford.edu/physics-astro/summercredit.html>. Students should keep in mind that physics at Haverford is calculus-based, and although calculus-based physics is not required for medical school, it does provide a strong foundation for science majors or research careers.

For Chemistry, students should check http://www.haverford.edu/chemistry/resources/summer_courses.php. The chemistry department requires that summer courses be taken at an American Chemical Society approved school in order to receive credit. Information is available at: <http://portal.acs.org/portal/acs/corg/content>

For departmental approval of summer courses, all arrangements should be made before May 1 of a given year.

4. **None** of the core premedical requirements listed above should be taken abroad.

ACADEMIC SUPPORT

It is very important to understand that nearly every premedical student has struggled with a course from time to time. Those who succeed with premedical preparation are the ones who acknowledge their weaknesses **realistically** and get the **help** that they need to master the sometimes very challenging material in their classes. In fact, one important skill for a doctor to have is resourcefulness!

A good place to go for academic assistance is the Office of Academic Resources: <http://www.haverford.edu/deans/OAR/website/studyskillshome.html>

Undergraduates should also take advantage of the availability of faculty who are almost always quite willing to work with undergraduates. Professor/student mentoring is one of the wonderful assets of our small college. Students need to be pro-active, however, and **go to faculty office hours** with questions or difficulties with class material. Small problems become big problems if not attended to!

See also: <http://www.haverford.edu/writingcenter/>

TIME MANAGEMENT

One key factor for performing well in college is time management. Some courses require 15-20 hours of work per week – no way around it. It is imperative that students organize time effectively, study efficiently, work out all laboratory problems, and keep up with the material in class. **It is essential to attend every class session, go to clinics and review sessions even if one thinks one does not need it!** Weekends should be used wisely, to catch up on class work, socialize with friends, get exercise, de-stress. Procrastination with class work and assignments is a prescription for discouragement and poor performance.

If a student is feeling really stressed out about the balance of academics, social life and other activities, he or she can take advantage of the Counseling Center (www.haverford.edu/caps) where strategies for managing time, coping with social pressures, and dealing with test anxiety can be developed.

WHAT ARE MEDICAL SCHOOLS LOOKING FOR?

Medical schools are looking for candidates with strong academic backgrounds and intellectual potential, as evidenced by excellent grades and MCAT scores. They also want to see in their applicants such qualities as leadership, integrity, dedication, discipline and compassion, and a realistic understanding of medicine as a career. Students who excel in their course work and tackle research or other intellectual challenges, who are substantially involved in a couple of extracurricular activities such as community service, sports, music, student government, etc., and who spend time as volunteers in clinical settings, achieve these characteristics.

Medical schools must ensure that the people they admit can cope with the rigorous academics of their programs and since there are so many applicants they can choose their students from thousands of excellent students with strong grades and MCAT scores. This means that every year there are compassionate and dedicated people who do not get a chance to go to medical school. In fact, the reality is that there are many more people interested in medical school than places available.

There two academic factors that are key to successful admission: undergraduate grade point average (GPA) and MCAT score.

GRADE POINT AVERAGE

Medical schools look at two GPAs with their applicants. The first is the GPA averaged by AMCAS or AACOMAS. AMCAS is the application service used by applicants to U.S. medical schools. AACOMAS is the service for applicants to osteopathic schools. (Osteopaths or “D.O.s” are also doctors with comparable medical training to that of M.D.s but it is based on a more holistic educational philosophy and includes some hands-on diagnosis and treatment techniques.) These services compute the GPA using **all**

college-level courses taken at U.S. or Canadian colleges or universities, including summer school courses, exchange and cross-registration courses, and college courses taken in high school. This is the GPA that medical schools use to compare applicants from different institutions. AMCAS also computes the overall average and the average of all undergraduate courses taken in biology, chemistry, physics and math (“Science” or “BCPM GPA.”) Both GPAs are important to medical schools. In addition, medical school admissions consider the Haverford College transcript very carefully.

What grade point average is necessary to become a serious contender for admission to medical school? In 2007, the average AMCAS GPA of admitted Haverford students and alumni was 3.6, with only six out of thirty admitted students possessing a GPA below 3.4. To be competitive, the premedical student should target an average between A- (3.67) and B+ (3.33). For osteopathic schools, the national average for accepted students was 3.5 overall GPA and 3.25 Science GPA in 2006. Admission to these programs is slightly less competitive.

A 3.4 average is a solid basis for applying to medical schools, especially if the applicant’s transcript shows improvement in junior and senior years. Below a 3.4, chances of admission depend on (upward) trends in academic record, strength of science grades, state of residence, and such personal factors as extracurricular activities, leadership, etc. Alumni tend to have more of the intangible life and work experiences that can make them successful candidates despite a lower GPA. Grades in biology, chemistry, physics and math are scrutinized very carefully. Because the number of applications to individual medical schools is so great, medical schools play the numbers game, at least in their initial screening of candidates. For instance, in 2006, Boston University School of Medicine had 10,032 applicants for its first year class of 179. This meant that less than 2% of applicants actually matriculated at this school.

Haverford has a rigorous grading environment and very challenging courses. Medical schools are aware of this. In our applicants’ Pre-health committee letters we lay out in detail our students’ various accomplishments and talents. Most medical schools know that anyone with a 3.4 average from this institution has demonstrated a solid track academic track record. Many medical schools rate undergraduate institutions on selectivity and competitiveness and Haverford is in the top group in these categories.

It is also important to keep in mind that students do not need to achieve a 3.4 average by the end of first year. In fact, individuals who obtain a B average at that point are off to a solid start because first year is a notoriously tough transitional period, requiring the most difficult adjustments in many areas, both academic and social. Typically, students’ GPAs increase during the junior and senior years as individuals become more accustomed to college-level work and take courses in majors where they can display intellectual talents and pursue interests.

Students often despair if they receive a C in one of their classes, such as the first semester class in Organic Chemistry, for instance. They assume that it will preclude them from getting into medical school altogether. If the student goes on to obtain mostly As and B+s

in the rest of his or her science classes, however, he or she will be a solid candidate for medical school, assuming complementary strengths in extracurricular areas. Usually, the best strategy is not to repeat a first semester of Organic class, but to perform well in the second semester. Very occasionally a student has retaken the whole year of organic chemistry because of initial low grades and really grasped the material second time around. In that case the grades for both series are averaged. We have seen some students go on to excel in science majors once they have mastered the fundamental concepts of introductory courses, such as organic chemistry. **Grades of D+ and below must be retaken.**

MCAT or Medical College Admission Test

The Medical College Admission Test (MCAT) is a computer-based test currently given 25 times a year and it is required by both medical and osteopathic schools, (it can often be used *lieu* of the GRE for public health programs too. Be sure to check individual programs.) The MCAT covers the material of all the required sciences courses in biology, chemistry and physics and **so this course work should be completed before the exam is taken.** Test-takers presently receive their scores within 30 days of the examination. The optimal time to take the test is in the spring or very early summer of the application year. September is the absolute latest for taking the MCAT in an application cycle and can negatively impact admission outcomes at schools with rolling admission. Scores are typically valid for two to three years, depending on the school. In most cases, it is not recommended that you take the MCAT before the end of junior year.

The MCAT includes multiple choice sections on Verbal Reasoning, Physical Sciences test based on physics and general chemistry; and Biological Sciences (see <http://www.aamc.org/students/mcat/preparing/start.htm>). There are also two essays required for a Writing Sample. Each multiple choice section is graded on a 15 point scale from 1 (low) to 15 (high) and the Writing sample is graded on an alphabetical scale from J (low) to T (high). In 2007, the average for Haverford College's 2007 graduates entering medical school was 31.76 out of 45. In general, students who receive less than a 30 on their MCAT should consider retaking the test. Please make an appointment to talk with Michele about MCAT scores.

There are commercial review courses to prepare students for the MCAT. These include:

Kaplan ([//www.kaptest.com](http://www.kaptest.com))

Examcrackers ([//www.examcrackers.com](http://www.examcrackers.com))

Princeton Review ([//www.princetonreview.com/home.asp](http://www.princetonreview.com/home.asp))

Berkeley Review ([//www.berkeley-review.com](http://www.berkeley-review.com))

For free MCAT study support materials and tips, check out: Study Guide Zone ([//www.studyguidezone.com](http://www.studyguidezone.com))

In general, these courses are expensive (from about \$1200 to \$4000 for private tutoring). They are designed for 5- or 10- week periods, but are only successful for those who put in the time to do the assigned work. It is important to attend all their classes and to visit their “Test Center” as often as possible to complete practice tests and review correct answers.

The American Association of Medical Colleges also provides materials for MCAT preparation.

- **MCAT Essentials** (online, free at www.aamc.org/students/mcat/mcatessentials.pdf) contains all the information for registration, what to bring, whom to contact, how to obtain and send scores, and the basic design of the exam.
- **MCAT Discussion Board** (online, free). If you enroll in either of the AAMC’s free or paid MCAT practice tests, you are allowed to participate in this discussion board which covers general topics, test content, and web resources for the MCAT.
- **MCAT PRACTICE TEST** (Online, free). Accessed through the MCAT “Practice Tests” webpage, the test requires free online registration before you can use it. It contains questions used on recent MCATs that can be taken timed, and provides feedback. Even without signing up for the entire free practice test, you can see representative questions at “MCAT sample” on the MCAT homepage.
- **MCAT PRACTICE TESTS ONLINE** (for a cost which changes yearly). Provides updated versions of the test and automated scoring and diagnostic reports to help you focus your studying. Can be order through the “MCAT Shopping Cart” on the MCAT “Practice Tests” webpage.

EXTRACURRICULAR AND VOLUNTEER ACTIVITIES

Pre-health students are involved in a broad range of **extracurricular activities**: athletics, musical groups, community service, social and political action groups, Customs, college committees, student government, religious organizations and more. A significant, on-going contribution to a couple of organizations or activities is interpreted by medical school admissions committees as evidence of someone who cares about his or her community, is engaged in the world around him or her, is able to multi-task and manage time efficiently, and is team-spirited with strong interpersonal skills.

At Haverford, students can pursue opportunities for community service engagement in many areas. The Center for Peace and Global Citizenship makes available internships for undergraduates to do service work in the U.S. and abroad (see

<http://www.haverford.edu/CPGC/index/index.htm>.) The Office of Community Service provides information and opportunities for service locally and regionally (<http://www.haverford.edu/eightd/>.)

Since medical schools look for applicants who have had some exposure to **health care and clinical settings**, it is important for pre-health students to seek out opportunities to volunteer in these environments. This is becoming an increasingly important factor in admissions. Committees believe that individuals with this type of experience are more informed about their decisions to pursue a medical career. In addition to shadowing physicians and osteopaths (a very important thing to do if one wants to apply to osteopathic school), pre-medical Haverfordians have volunteered at local Philadelphia hospitals, hospices, clinics for women, street people and other underserved populations, AIDS programs, and with ambulance services locally or in their home towns.

Our pre health office provides a binder with information about local, national and international volunteer organizations, along with some contact information. We send out notices of opportunities to our list servs. Students should also check out:

Eighth Dimension (<http://www.haverford.edu/eightd>). In particular, check out Haverford to Hospitals, Students to Seniors, AIDS Service Network.

Career Development Office (<http://www.haverford.edu/cdo>) every spring students can apply for the **Jaharis or Primary Care Fellowship** to offset some of the cost of volunteering in a primary care setting as a summer project. Keep in mind also that Haverford alumni in the health professions have been quite forthcoming in agreeing to be shadowed, providing informational interviews, and even agreeing to work with students to set up externships over summer or winter break. CDO also provides information about internships and national and international volunteer opportunities.

USEFUL LINKS

Volunteer Match (<http://www.volunteermatch.org/>)

Yellowpages.com of **Philadelphia Hospitals** (<http://yellowpages.aol.com/healthcare-facilities/hospitals/pa/philadelphia>)

American Red Cross Southeastern Chapter (<http://www.redcross-philly.org/>)

Philadelphia Ronald McDonald House (<http://www.philarmh.org/volunteer.php>)

Children's Crisis Treatment Center (<http://www/cctckids.org/how.htm>)

ActionAIDS (<http://www.actionaids.org/volunteer.htm>)

Magee Rehabilitation (<http://www.mageerehab.org/>)

Children Crisis Treatment Center (<http://www.cctckids.org/how.htm>)

Philadelphia FIGHT (<http://www.fight.org/section.php?cat=3&sec=15>)

Planned Parenthood (<http://www.plannedparenthood.org/centerDetails.asp?id=916>)

A binder with much more information on health-related volunteer organizations is available in the Pre-health Office.

RESEARCH

Many of our students have experience with lab research by the time they apply to medical school. Individuals interested specifically in MD/PhD programs need significant research experience beyond what most premedical students engage in, a solid two-years' worth. (For more information on the **MD/PHD** track, go to:

<http://www.aamc.org/research/dbr/mdphd/applicantfaq.pdf>) See also:

www.mdphds.org/dev; www.studentdoctor.net (has forum); intransit.us/guidebook

Some undergraduates may not be sure of their career path, MD, MD/PhD, or PhD, in which case spending another year or two after graduation in a research lab may help clarify their goals. Faculty are also great resources for Haverford students. They are available to students to discuss different careers in science and research and can point them to colleagues working in research areas of interest, or to internships and programs to which they should apply. For those undergraduates who are focused primarily on pursuing the MD and doing clinical work, it is a plus to have had research experience, but not a necessity.

Haverford provides excellent opportunities for summer research, both at the College and at labs in Philadelphia where collaborative work is taking place (e.g.

<http://www.haverford.edu/biology/offcampus.htm>)

To check out research opportunities (summer and other) both at Haverford and elsewhere go to:

Biology – <http://www.haverford.edu/biology/resources/student.php>

Chemistry - <http://www.haverford.edu/chem/dept/sresearch.html>;
<http://www.haverford.edu/chemistry/research/summer.php>

Physics - <http://www.haverford.edu/physics-astro/physsummerjobs.html>

Marion E. Koshland Integrated Natural Sciences Center:

<http://www.haverford.edu/KINSC/research.htm>

National Science Foundation, Research Experiences for undergraduates –
http://www.nsf.gov/funding/education.jsp?org=NSF&fund_type=1

Association of Medical Colleges Summer Research -
<http://www.aamc.org/members/great/summerlinks.htm>

Premed and dental student internship database (from Rochester Institute of Technology site, accessible to students from other schools.) –
<http://www.people.rit.edu/gtfsbi/Symp/premed.htm>

See also: www.yale.edu/yser/links/extramural.html

And: <http://www.swarthmore.edu/x8853.xml>

Association of Schools of Public Health –<http://www.asph.org/document.cfm?page=1002>

Students from disadvantaged or underrepresented backgrounds should also look at:

<http://naahp.org/resourcesminopp.htm>

<http://www.smdep.org/start.htm>

<http://hpap.syr.edu/SPstate.htm> (not the most up-to-date, but does have programs listed by state. Syracuse University site.)

<http://www.doorsofopportunity.org/>

Please pay attention to deadlines and timing. Many of these programs begin to admit applicants in advance of deadline and are filled up by final submission date. It is a good idea to look these opportunities over beginning fall semester. Note that some deadlines are in the fall.

DIVERSITY IN THE MEDICAL PROFESSION AND HEALTH CARE

A number of racial and ethnic populations are increasingly under-represented in the medical and health professions relative to their numbers in the general population. Historically these include four under-represented groups: African-Americans, Chicanos, Native Americans and Puerto Ricans. The designation of these groups in medical school admissions has recently been expanded to include a broader range of ethnicities and a greater focus on regional demographics so as to improve the cultural competencies of graduating physicians and access to care for underserved populations.

For definitions and information about the terminology of diversity, go to:
www.aamc.org/meded/urm/start.htm

The Association of American Colleges of Medicine (AAMC) is dedicated to the goal of addressing the skewed ratio of under-represented doctors to members of the population. There is extensive information on this subject on their website:
<http://www.aamc.org/students/minorities/start.htm>

Other useful websites to consult are:
www.aspiringdoctors.org/site/apps/nl/newsletter2.asp?c=lutul9mujte8b=2892829&printmode=1, and www.explorehealthcareers.org

For information about undergraduate research and other pre health programs specifically targeting under-represented groups, see <http://www.naahp.org/resourcesminopp.htm>

See also:

Summer Medical and Dental Education Program (SMDEP, deadline March 1, but be aware of **rolling acceptance!**) <http://www.smdep.org/start.htm>. Freshmen and sophomores are eligible to apply to this program. It is a free, (full tuition, housing and meals) six-week summer medical and dental school preparatory program that offers eligible students intensive and personalized medical and dental school preparation. Yale's program is particularly receptive to Haverford students, BUT you need to get your application in a couple of months before the deadline!

See **Research** section above for more summer research and enrichments programs

Many institutions have developed **post-baccalaureate** programs to target students from underrepresented groups to help them prepare for the MCAT, to add to their undergraduate course work in the sciences and thus to provide them the opportunity to demonstrate their academic ability. For specific programs geared to under-represented groups go to:

<http://services.aamc.org/postbac/>

Some well known post-baccalaureate programs but be sure to discuss them with Michele before you apply:

Drexel University College of Medicine, Medical Science Programs
Drexel Pathways to Medical School Program (DPMS program)
215-762-4692
imsinfo@drexel.edu
<http://www.drexelmed.edu/med/ims/dpms.asp>

Georgetown University- Georgetown Experimental Medical Studies Program (GEMS)
Joy P. Williams, Program Coordinator

202-687-1406 (leave a message)
<http://www.gems.georgetown.edu>

Southern Illinois University- Medical/Dental Education Preparatory Program
(MEDPREP)

Vera R. Felts, Admissions Coordinator
MEDPREPadmissions@siumed.edu, 618-536-6671
<http://www.siumed.edu/medprep>

TUSM PREP- Post-Baccalaureate Research Education Program for Minority Students in
Science

Diana Pierce, Director
diana.pierce@tufts.edu, 617-636-6836
<http://www.tufts.edu/sackler/programs/postbac.html>

University of Connecticut Health Center Health Career Opportunity Programs- College
Enrichment Program & Medical/Dental Preparatory Program

<http://medicine.uchc.edu/prospective/enrichment/hcop/index.html>

Wake Forest University School of Medicine- Post-Baccalaureate Development Program
The Office of Diversity and Development, 336-716-4271

<http://www1.wfubmc.edu/MDProgram/Student+Services/Diversity/Post+Graduate+Students>

An inspirational story of one of America's premier pediatric surgeon's who overcame
adversity as a member of an under-represented group is Ben Carson's *Gifted Hands,
the Ben Carson Story*. Grand Rapids, MI: Zondervan Publishing House, 1991

INTERNATIONAL STUDENTS

Please note that it is extremely **difficult** for international students (non-citizens,
individuals who are not permanent residents) to get into medical schools in this country.
(For a useful article on the subject go to:

http://www.naahp.org/resources_InternatMed_Article.htm) Many schools will not even
consider their applications (check out the Medical School Admissions Requirements
MSAR manual, mentioned above for information on individual schools.)

International students are not eligible for federal financial aid upon which so many medical students rely, and if accepted must often escrow one or more years of tuition payments in advance. Nevertheless, on rare occasions, a handful of extremely gifted, foreign students have been admitted to (private) medical schools over the past few years. This is a bit more likely to happen with MD/PhD programs in which the funding comes from the medical school itself since foreign students do not qualify for government funding.

If you have questions on this issue, please make an appointment to discuss it with Michele.

MD/PhD

Students interested in obtaining joint graduate degrees, MD/PhD or VMD/PhD, must engage in serious research as undergraduates. Most combined degrees involving biomedical research will expect applicants to have at least two years of research experience. Some students are able to achieve this before graduation, but others need one or two years beyond college, working in a lab, to meet this goal. Students should discuss their graduate plans with their faculty. For more information on the MD/PhD track, go to:

FAQs for potential MD/PhD applicants:

<http://www.aamc.org/research/dbr/mdphd/applicantfaq.pdf>

A Guidebook for M.D./Ph.D. Applicants: <http://intransit.us/guidebook>

Database of MD/PhD programs: <http://www.aamc.org/research/dbr/mdphd/programs.htm>

Medical Scientist Training Program:

<http://www.nigms.nih.gov/Training/InstPredoc/PredocDesc-MSTP.htm>

Information on MD/PhD programs based on submissions by current applicants:

www.mdphds.org

III - PREPARING FOR DENTAL SCHOOL

A good “bedside manner,” ability in the sciences, excellent small motor muscle control, and a touch of the engineer AND the artist, are all required in the successful applicant to dental school. Much of the information about planning for medical school applies to planning for dental school, so please read Chapter II, paying special attention to sections on fitting course requirements into your schedule. In recent years there has been an increased interest in careers in dentistry and getting into dental school has become more competitive. As with medical school, you should have significant exposure to clinical settings and a good sense as to why you want to become a dentist.

PRE-DENTAL COURSE REQUIREMENTS are comparable to science prerequisites for medical school. Note that most dental schools require additional upper-level biology and math courses. Check with the [ADEA Official Guide to Dental Schools](#) available in the Pre Health Office for information on individual schools, or look at the schools' websites.

For a website with further science or math requirements for dental schools, go to: www.brynmawr.edu/healthpro/docuementns/Dentalschool_Additional_Requirements2009.pdf

Dental schools seek the same qualities as medical schools in their applicants: strong academic records, experience in clinical settings, a demonstrated commitment to service, and knowledge of the profession. In addition, successful applicants must demonstrate perceptual ability in solving two and three dimensional problems on the DAT exam. For more information on the growing field of dentistry, see the website for the American Dental Education Association at www.adea.org.

APPLICATION TIMETABLE AND THE DAT

All dental school applicants must take the Dental Admission Test (DAT). It is a nearly day-long computerized test consisting of four parts: the natural sciences (introductory biology, chemistry); perceptual ability; reading comprehension; quantitative reasoning. It can be taken almost any day of the year, but you must register in advance. Information about the DAT and registration procedures can be accessed at www.ada.org. The timing of the dental school application and admissions process is similar to that of medical school. If you wish to go straight to dental school after college, you should take the DAT and submit your application during the summer before you begin your senior year. **Be sure to work closely with the Pre-Health Advisor spring before applying in order to obtain a committee letter.** See the schedule for premedical students applying in their junior years.

USEFUL LINKS:

American Dental Education Association (site with AADSAS application and information), go to: www.adea.org

Summer Medical and Dental Education Program (SMDEP): <http://www.smdep.org>

American Dental Association: www.ada.org/index.asp

Dental Admissions Test (DAT) registration and information: www.ada.org/prof/ed/testing/dat

IV. PREPARING FOR VETERINARY SCHOOL

Dr. Jenni Punt, VMD/PhD, advises Haverford students for veterinary school. Please contact her in the Biology Department (jpunt@haverford.edu). It is also important to give your name to Cheryl Mathes (cmathes@haverford.edu, or 896-1148) so that she can keep track of pre-veterinary students at the College.

The general course requirements for veterinary school are similar to those for medical school, but each program may have additional class requirements so it is important to check with individual schools. Pre-vet students should develop a record of volunteer work in various veterinary-related settings. Research experience is also a positive factor for successful admission. For further information, be sure to discuss your plans with Jenni Punt.

USEFUL LINKS:

Links to individual veterinary schools:

http://www.aavmc.org/students_admissions/vet_schools.htm

The Association of American Veterinary Medical Colleges: <http://aaavmc.org/>

American Veterinary College Application Service: <http://aaavmc.org/vmcas/vmcas.htm>

V. PREPARING FOR PUBLIC HEALTH

The field of Public Health addresses, through organized interdisciplinary approaches, the physical, mental and environmental health of communities. Unlike doctors, who focus on improving the health of individuals, public health professionals focus primarily upon ameliorating the physical and/or mental health of populations. The discipline emphasizes disease prevention and health promotion, employing a spectrum of interventions aimed at the environment, human behavior and lifestyle and medical care. Assessment is an essential component of public health research: tools of analysis are both qualitative and quantitative. Public health methodologies are inter-disciplinary, derived primarily from the social and biological sciences.

Public health has several core areas, including:

- **Health services administration:** Persons seeking careers in administration or resource management in the public or private sectors of health service delivery can specialize in health planning, organization, policy formulation and analysis, finance, economics or marketing.
- **Biostatistics:** Work in this area involve the application of statistical procedures, technologies and assessment methodologies to characterize or investigate health problems and programs.
- **Epidemiology:** this field uses systematic analysis of the distribution and determinants of disease or disability in population groups.

- **Behavioral sciences/health education:** These specialists use specific methods and program strategies to help people adapt healthier lifestyles, make more efficient use of health services, adopt self-care prevention techniques, and to participate actively in the design and implementation of health-related programs.
- **Environmental Health Sciences:** This field includes such diverse disciplines as chemistry, toxicology, environmental engineering, and is concerned with the identification and control of factors in nature and the man-made environment (air, water, land, housing) which affect the health of populations.

Other fields of study include: Occupational Safety & Health, Maternal and child health, Nutrition, Public health practice & program management, Biomedical & laboratory practice, Public health dentistry, and International/ global health.

TYPES OF DEGREES

Professionals working in public health get a range of degrees. The Masters of Public Health (M.P.H.) is a two-year program. Beyond that, individuals sometimes obtain a Doctor of Philosophy in public health (Ph.D.) or a Doctorate of Public Health. These latter two degrees require three years of course work, and a capstone dissertation project usually involving field or laboratory work under the guidance of a dissertation advisor.

Another related degree is the Masters in Biostatistics, with an obvious quantitative focus. In addition to an M.P.H., it is possible to obtain joint degrees such as M.D./M.P.H., M.B.A/M.P.H., J.D./M.P.H. It is essential to have very specific goals for such a course of study.

ADMISSIONS

Typically, individuals work in clinical programs or are involved in health research for two or more years before matriculation in a public health program. Sometimes Masters in Public Health are obtained by mid-career professionals seeking to change the direction of their work. A field dominated by women numerically, the ratio of women to men is 3:1. The application requirements for most (but not all) public health programs are as follows:

- Bachelor of Arts, with a year of coursework in college-level mathematics (statistics or calculus) and biology. Chemistry or physics, while not usually required, are useful. Students can come from any major, although individuals in the social and hard sciences predominate.
- GRE scores (some schools accept MCAT, GMAT, or LSAT in lieu of the GRE).
- Three letters of recommendation (from faculty or individuals supervising one's work.)
- Personal statement
- Resume or Curriculum vitae
- Transcripts of all courses
- Proven dedication to the field evident from substantive experience (articulated in the personal statement, resume and letters of recommendation.) Typically, public health schools want their students to be committed to the field, rather than to use their degree as a stepping-stone into medical school (-which won't work anyway if the student's undergraduate science G.P.A. is weak.)

Deadlines vary from fall to spring, depending upon when matriculation can take place, but most schools have fall deadlines.

USEFUL LINKS:

- www.asph.org (Association of Schools of Public Health)
- www.apha.org (American Public Health Association)
- www.whatispublichealth.org
- Centralized Application for Applying to Schools of Public Health: www.sophas.org
- Public Health Opportunities <http://www.asph.org/document.efm?page=1002>

VI. FOR STUDENTS INTERESTED IN NURSING

American Association of Colleges of Nursing: www.aacn.nche.edu

Second degree BSN programs: <http://www.allnursingschools.com/featured/second-degree-bsn/>

Accelerated BSN programs: <http://www.allnursingschools.com/featured/accelerated-bsn/>

Nurse/midwifery programs:

<http://www.allnursingschools.com/find/results.php?st=&prog=nurse-midwife&sub>

Nursing schools listing: www.allnursingschools.com

For students interested in Physician Assistants: www.aapa.org

VII – OTHER HEALTH PROFESSIONS

For information on numerous other health professions, check the Health Professions link on our Pre-Health website. See also:

www.explorehealthcareers.org

www.vpul.upenn.edu/careerservices/gradprof/otherhealth.html

http://www.naahp.org/prof_links.htm