Course Selection for Premedical Students
(revised May 2013)

Premedical students can choose any major, and many of the courses that an individual premedical student takes should be chosen based on his/her individual interests. However, all premedical students must take the courses that are required by the individual medical schools to which they will apply, and in addition, all premedical students must master the material that is tested on the MCAT.

Fortunately, there is a great deal of overlap between the courses required by many medical schools and the courses that cover the material required for the MCAT. Because the prerequisites for different medical schools vary, I will discuss the material on the MCAT first, and then comment on the courses that are required/recommended by the Virginia medical schools.

The MCAT:

The AAMC is conducting a review of the MCAT and has announced major changes to the exam that will be implemented after January 2015. Some premeds in the Class of 2014, many premeds in the Class of 2015, most premeds in the Class of 2016, and all premeds in the Class of 2017 will end up taking the new version of the exam.

Even the students who will not be taking the new version of the exam should strongly consider taking the courses listed below: given that the medical schools have identified the concepts covered by the new exam as important, mastering these concepts before starting medical school would be wise.

The AAMC has indicated that the new version of the exam will have four sections:

1. Molecular, Cellular and Organismal Properties of Living Systems
2. Physical, Chemical and Biochemical Properties of Living Systems
3. Social and Behavioral Sciences Principles
4. Critical Analysis and Reasoning Skills

The new MCAT will include questions on introductory biology, general chemistry, organic chemistry, biochemistry, introductory physics, introductory sociology, and introductory social psychology; in addition, students will need to be competent in basic statistics to succeed on the exam.

The William and Mary courses that cover the science and social science concepts to be tested on the new version of the MCAT are the following courses, in which linked lecture and lab courses are designated as lecture/lab:

Introductory biology: BIOL 220/BIOL 221 and BIOL 225/BIOL 226; BIOL 302 covers the physiology concepts that will be tested on the new exam; so does KINE 304.

General chemistry: CHEM 103/CHEM 103L and either CHEM 308/354 or CHEM 305/356

Organic chemistry: CHEM 206/206L and either CHEM 209/353 or CHEM 307/353

Biochemistry: CHEM 414 (this can also be taken as the cross-listed BIOL 414)

Introductory physics: PHYS 101/101L and 102/102L or PHYS 107/107L and 108/108L (Note that Chemistry and Physics majors must take Physics 101/101L and 102/102L)

Introductory sociology: SOCL 250

Introductory social psychology: PSYC 202

Statistics: according to the AAMC, the statistics content that is usually covered in the introductory biology, chemistry and physics courses will be tested by the new MCAT. Students who want to be certain that their
statistics background is strong should take a statistics course before taking the exam. Either MATH 106, PSYC 301, KINE 394, or BIOL 425 would be fine.

For more information on the new MCAT, see the following website: https://www.aamc.org/students/applying/mcat/mcat2015/. The Preview Guide for the 2015 MCAT, which can be downloaded from that site, discusses the structure and scope of the new MCAT in detail and provides sample test questions.

Undergraduate Prerequisite Courses for the Virginia Medical Schools:

Most medical schools specify prerequisite courses that students must complete before starting medical school, and even the medical schools that have no formal prerequisites often recommend particular undergraduate courses to their applicants. Complete information on the requirements of individual allopathic (MD-granting) medical schools is available in the annually updated AAMC publication Medical School Admissions Requirements, also known as the MSAR, which can be purchased from the AAMC as an inexpensive e-book at https://www.aamc.org/students/applying/requirements/msar/. A similar publication, the Osteopathic Medical College Information Book, available from AACOM, lists the courses required/recommended by individual osteopathic medical schools. Note that many medical schools are currently reconsidering their prerequisite courses, and that the 2016 application cycle, which begins in May 2015, may see particularly large changes. For this reason, students should pay close attention to the MSAR and to the websites of the medical schools that interest them.

Because most William and Mary students are Virginia residents, and because the Virginia medical schools also look favorably upon out-of-state applicants from the College, I will focus on the requirements of the Virginia medical schools in this section. Students from other states should consult the references listed above to see which additional courses their in-state schools might require.

EVMS: Students are currently required to take two semesters of introductory biology with lab, two semesters of general chemistry with lab, two semesters of organic chemistry with lab, and two semesters of introductory physics with lab.

VCU: Students are currently required to take two semesters of introductory biology with lab, two semesters of general chemistry with lab, two semesters of organic chemistry with lab (one semester of organic chemistry can be replaced with a biochemistry course), and two semesters of introductory physics with lab; in addition, they must take two semesters of college mathematics (calculus and/or statistics) and two semesters of English. Starting in the spring of 2015, when the 2016 AMCAS application cycle begins, VCU will be adding biochemistry, psychology, sociology, and statistics to its requirements.

VTC: Students are currently required to take two semesters of introductory biology with lab, two semesters of general chemistry with lab, two semesters of organic chemistry with lab, and two semesters of introductory physics with lab; in addition, they must take two semesters of college calculus (our MATH 111 and MATH 112 or MATH 131 and MATH 132) and two semesters of English.

UVA: While UVA no longer has required prerequisite courses, they recommend that students take biochemistry, cell biology (our Molecular Cell Biology course), statistics, and behavioral science courses. Students interested in applying to UVA should plan to take these courses, even though they are only “recommended.”

VCOM: VCOM currently requires students to take two semesters of introductory biology with lab, two semesters of general chemistry with lab, two semesters of organic chemistry with lab, and two semesters of introductory physics with lab; they also require two semesters of English. Six additional biomedical credits at the 300 level or above are also required; see the VCOM website for details.

Additional courses to consider, based on the recommendations of the various in-state medical schools, include Integrative Biology: Animals, Molecular Genetics, Genetic Analysis, Molecular Cell Biology, Immunology, Microbiology, Virology, Human Physiology, Animal Physiology, and Human Anatomy.
So, What Should Premedical Students Take?

Briefly, in order to be prepared to apply to the Virginia medical schools, a William and Mary student should plan to take all of the courses needed for the 2015 MCAT plus two semesters of calculus, two semesters of English, and BIOL 310: Molecular Cell Biology. Here’s the full list; linked lectures and labs are designated as lecture/lab.

** BIOL 220/BIOL 221  
** BIOL 225/BIOL 226  
* (BIOL 302 or KINE 304: note that these will be helpful for the MCAT but are not required by any of the Virginia medical schools)  
** BIOL 310  
** CHEM 103/CHEM 103L  
** CHEM 305/356 or CHEM 308/354  
** CHEM 206/206L  
** CHEM 209/353 or CHEM 307/353  
** CHEM 414 (this can also be taken as the cross-listed BIOL 414)  
** PHYS 101/101L or 107/107L  
** PHYS 102/102L or PHYS 108/108L  
* (Note that Chemistry and Physics majors must take Physics 101/101L and 102/102L)  
** SOCL 250  
** PSYC 202  
** MATH 106 or PSYC 301 or KINE 394 or BIOL 425  
** MATH 111 or MATH 131  
** MATH 112 or MATH 132  

Two semesters/ six credits’ worth of English literature or composition courses

**Course Scheduling:**

Many premeds choose to start two of the premedical science sequences and take a math course as first-semester freshmen. This is a sensible approach for a student with a strong math and science background and good study and time management skills who would like to major in one of the sciences. This freshman schedule is not optimal for everyone, however. Premeds who are worried about the strength of their math and science backgrounds and students who are interested in medicine but have not committed themselves to the premedical path may want to consider a less demanding approach. Still, students who would like to go straight to medical school after college without taking a gap year should plan to finish all of the courses required for the MCAT by the end of junior year, as taking the MCAT no later than June of the year in which a student begins the medical school application process is highly recommended. Thus, it would be wise to start at least one of the premedical science sequences in the fall of the freshman year.

For premedical students who are considering majoring in one of the sciences, taking the introductory sequence in that science during the freshman year is strongly recommended. For premedical students who have no idea what they will choose as a major, starting the chemistry sequence as a freshman is strongly recommended, since there are five semesters of required chemistry courses for premedical students that must be completed by the time the student takes the MCAT. Alternatively, undecided students might want to start with the biology sequence, as introductory biology courses are not available at the College in the summer, while all of the required premedical chemistry and physics courses are. Given that CHEM 103 is a strongly recommended prerequisite for BIOL 225, the spring introductory biology course, though, students who choose to take the introductory biology sequence as freshmen should either have a strong high school chemistry background or take CHEM 103 along with BIOL 220 in the fall of the freshman year.
Choosing a major:

In recent years, the most popular premedical majors at the College have been Biology, Chemistry, and Neuroscience. While premedical students can choose any college major or minor without negatively affecting their chances of getting into medical school, they must have a strong foundation in science and mathematics. Students who do not major in one of the sciences should plan to take additional upper-division science courses from the list recommended by the Virginia medical schools, rather than limiting themselves to only the required science prerequisite courses for medical school.

Additional recommended courses:

Other courses that could be helpful to a future physician include additional courses in the behavioral sciences, social sciences, and humanities, as many health problems have deep behavioral, socioeconomic, and cultural roots. Courses such as Health Psychology and Medical Sociology are thus of obvious interest to premedical students. Premedical students might also want to consider taking courses in public health, such as Introduction to Public Health and Epidemiology.

Which courses satisfy the medical school English requirement?

Many medical schools require a year (two semesters or six credits) of English. Freshman seminars with a “W” designation can be used to fulfill half of the English requirement. The English Department suggests that freshmen and sophomores who do not intend to become English majors consider taking ENGL 210; juniors and seniors are encouraged to take ENGL 352, 363, or 364. However, any English literature or composition course would be acceptable to the medical schools. Linguistics courses, such as The Study of Language, cannot be used to fulfill the premedical English requirement.

Advice for students who have earned AP or IB credit:

Most medical schools, including all of the medical schools in Virginia, accept AP and IB credit for the required mathematics, science, and English courses, but a few, including Vanderbilt, Boston University, Saint Louis University, and the UC system in California, do not. Students with AP or IB credit for the required premedical courses should check the policies of the medical schools that interest them. These policies are described in the MSAR.

The Biology Department encourages students who have earned exemptions from BIOL 220/221 and BIOL 225/226 to take those courses anyway, and this is good advice for premeds, too. Premedical students who elect to use their exemptions and skip the introductory courses will still need college credit for a year of introductory biology with lab in order to fulfill their premedical science requirements: the zero-credit exemptions given to students who earn a 5 on the exam are not enough to satisfy the medical schools that require introductory biology with lab. Thus, these students should plan to take Biology 302: Integrative Biology I: Animals along with either BIOL 432: Principles of Animal Physiology or KINE 304: Human Physiology plus KINE 305: Human Physiology Lab, as the medical schools have accepted these combinations in fulfillment of the introductory biology requirement in the past. Other upper-division lab science courses may not be accepted by individual medical schools in fulfillment of the introductory biology requirement, so it would be wise to stick with one of these time-tested combinations if you elect to use your AP/IB exemptions.

The Chemistry Department encourages students with a 4 or a 5 on the AP Chemistry exam, as well as students with comparable scores on the IB exam, to consider taking CHEM 335: Freshman Honors Chemistry in the fall of the freshman year; there is no lab for this course. CHEM 335 can be used as a substitute for the second semester of general chemistry for medical school purposes. Students who earned a 4 on the AP Chemistry exam and who take CHEM 335 will still need to take CHEM 354, the second semester of general chemistry lab, to complete the premedical chemistry requirements for medical school.
Course Selection Advice for Students Who Are Considering Majoring in Kinesiology and Health Sciences:

There are three different concentrations within this major, something that students may find confusing; premedical students should follow the catalog’s suggestions for the “premed” concentration. The department suggests that premeds begin the major by taking one of the public health courses, such as Introduction to Public Health, Introduction to Global Health, or Epidemiology, or by taking Science of Nutrition or Health-Related Exercise Prescription.

Premeds should NOT take KINE 200: Introduction to the Human Body or KINE 204: Introduction to Kinesiology, as these courses are inappropriate for premeds. In addition, the department discourages freshmen from taking KINE 303: Human Anatomy and KINE 304: Human Physiology.