



William & Mary Arts & Sciences

Course Selection for Premedical Students

Revised March 17, 2023 by Dr. Beverly Sher

Premedical students may 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 prerequisite 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 prerequisite courses required by many medical schools and the courses that cover the material on the MCAT. Because medical schools' prerequisite courses vary, I will discuss the courses that cover the material on the MCAT first, and then comment on the courses that are required/ recommended by the Virginia medical schools.

Very important note: DegreeWorks is not a useful tool for monitoring your progress through the premed course requirements. If you type "premed" into the DegreeWorks search box, the software will supply the course requirements for the Kinesiology premed concentration, not the actual premed courses. Note that the Kinesiology premed concentration was eliminated as of Fall 2022.

The MCAT:

In April 2015, the AAMC introduced a new version of the MCAT. The exam has 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 MCAT includes 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 & Mary courses that cover the science and social science concepts to be tested on the new version of the MCAT are the following, **in which, to save space, linked lecture and lab courses are designated as lecture/lab:**

Introductory biology: BIOL 203/203L and BIOL 204/204L (formerly BIOL 225/226 and BIOL 220/221)

General chemistry: CHEM 103/CHEM 103L and CHEM 208/254

Organic chemistry: CHEM 206 /206L and either CHEM 207/253 or CHEM 209/CHEM 253

Biochemistry: CHEM 314 (this could also be taken as the cross-listed BIOL 314)

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

Introductory sociology: SOCL 250: Principles of Sociology or SOCL 362: Medical Sociology or SOCL 310: Wealth, Power and Inequality

Introductory social psychology: PSYC 202

Statistics: According to the AAMC, the statistics content that is usually covered in introductory biology, chemistry and physics lab courses should suffice to prepare students for the MCAT. However, students who want to be certain that their statistics background is strong should take a statistics course before taking the exam. MATH 106, PSYC 301, KINE 394, or Biostatistics would all be acceptable. MATH 351 would also be acceptable.

Recommended additional courses:

In addition to the two introductory biology courses, there are additional, higher-level biology courses that students who have taken the MCAT have said were helpful as they prepared for the exam. These include BIOL 302: Integrative Biology: Animals; BIOL 310: Molecular Cell Biology; and BIOL 432: Animal Physiology.

The Kinesiology Department's physiology courses, such as KINE 304: Human Physiology, are also recommended by premeds who have taken the MCAT.

Note that Animal Physiology counts towards the Biology and Neuroscience majors, but Human Physiology does not. There is no need to take both Human Physiology and Animal Physiology.

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 AAMC's *Medical School Admissions Requirements*, also known as the MSAR, an AAMC website which is available by subscription. 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. 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 & Mary students are Virginia residents, and because the Virginia medical schools also look favorably upon out-of-state applicants from W&M, I will focus on the requirements of the Virginia MD-granting medical schools in this section. Students from other states should consult the references listed above to see which additional courses their in-state public medical schools might require. Students who are interested in some of the private medical schools should check these schools' requirements as well.

Note that most medical schools require that students earn a C or better in the prerequisite courses. Remember, though, that aiming for the minimum acceptable grade is unwise: GPA matters!

Also note that many medical schools require that students earn a C or better in the required

prerequisite courses. At William & Mary, it is not possible to retake a course for which you have already earned credit here, so if you earn a C- or worse in a required medical school prerequisite course at William & Mary, you will need to retake that course elsewhere in order to complete your medical school prerequisites.

Note also that the prerequisite courses must be completed before you matriculate into medical school, not before you apply to medical school. Still, the vast majority of the prerequisite courses should be on your transcript when you apply to medical school.

EVMS: Matriculants are currently required to have completed one year of introductory biology with lab, one year of general chemistry with lab, one year of organic chemistry with lab, and one year of introductory physics with lab. Biochemistry is highly recommended.

VCU: Matriculants are currently required to have completed eight credits of introductory biology with lab, eight credits of general chemistry with lab, eight credits of organic chemistry with lab, and eight credits of introductory physics with lab; in addition, they must have completed six credits of college mathematics (calculus/ statistics) and two semesters of writing-intensive courses. VCU also requires applicants to take upper-division biology courses; acceptable choices include biochemistry, cell biology, anatomy, embryology, genetics, microbiology, molecular biology, immunology, and neuroscience. VCU highly recommends introductory sociology and psychology courses but does not require them.

VTC: Matriculants are currently required to have taken two semesters of general biology with lab, two semesters of general chemistry with lab, two semesters of organic chemistry with lab OR one semester of organic chemistry with lab and one semester of biochemistry with lab (note that you cannot take Biochemistry at William & Mary unless you have already completed two semesters of organic chemistry), and two semesters of introductory physics with lab; in addition, they must have taken two semesters of college mathematics (calculus/ statistics) and two semesters of English/ Writing or one semester of English plus one semester of Philosophy.

UVA: While UVA no longer has required prerequisite courses, they recommend that potential applicants take biochemistry, cell biology (our BIOL 310: Molecular Cell Biology), statistics, and human behavior courses. Students interested in applying to UVA should plan to take these courses, even though they are only "recommended."

So, What Should William & Mary Premedical Students Take?

Briefly, in order to be prepared to take the MCAT and apply to the Virginia allopathic medical schools, a William & Mary student should plan to take, at minimum, all of the courses needed for the MCAT plus at least one semester of calculus, a semester of statistics, two semesters of English, and BIOL 310: Molecular Cell Biology. Here's the full list; to save space, **linked lectures and labs are designated as lecture/lab**.

AP/IB credit may be substituted for these courses but check to see whether the medical schools that interest you accept AP/IB credit! Most medical schools do, but some do not.

BIOL 203/203L

BIOL 204/204L

BIOL 310

CHEM 103/CHEM 103L

CHEM 206/206L

CHEM 207/253 or CHEM 209/253

CHEM 208/254

CHEM 314 (this can also be taken as the cross-listed BIOL 314)

(Note that the chemistry sequence at William & Mary is Gen Chem I (fall) -> Orgo I (spring) -> Orgo II (fall) -> Gen Chem II (spring); you can take Biochemistry at the same time as you take Gen Chem II.)

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 or SOCL 362 or SOCL 310

PSYC 202

MATH 106 or PSYC 301 or KINE 394 or Biostatistics or MATH 351

MATH 111 or MATH 131

Important note: MATH 108 is NOT a premed calculus course!

In addition, taking MATH 112 or MATH 132 is worth considering, as some medical schools still require two semesters of calculus, and others are happy to see it, even though they do not require it. Medical schools value applicants who have challenged themselves!

English requirement: Two semesters/ six credits' worth of English literature or composition courses; all COLL 150 seminars count towards this requirement.

Additional W&M courses to consider, based on the recommendations of the various in-state medical schools, include Integrative Biology: Animals, Molecular Genetics, Genetic Analysis, Immunology, Microbiology, Neurobiology, Developmental Biology, Animal Physiology or Human Physiology, and Human Anatomy with its lab.

Course Scheduling:

Some premeds choose to start two of the premedical science sequences and take a math course as first-semester freshmen. This "classic" premed schedule can work well for a student who plans to major in one of the sciences and who has both a very strong math and science background and well-developed study and time management skills.

The "classic" freshman premed schedule is not optimal for everyone, however, and many pre major advisors suggest that even strong, dedicated science students consider taking either two lab science courses or a lab science course plus a math course, but not two lab science courses plus a math course, in the fall of freshman year.

Premeds who are worried about the strength of their math/science backgrounds and students who are somewhat interested in medicine but not yet committed to the premedical path may want to consider an even less intense freshman schedule.

Nationally, the vast majority of premedical students now take one or more "opportunity years" between college and medical school. Popular activities include working in a clinical setting (scribing, medical assisting); doing research; or participating in community service programs. Students who plan to take time away from academia between college and medical school have the luxury of being able to spread their pre-MCAT coursework across all four years of college.

For premedical students who are considering majoring in one of the sciences, taking the introductory sequence in that science as a freshman is strongly recommended. For premedical students who have no idea what they will choose as a major, starting the chemistry sequence early in college could make sense, since there are five semesters of required premedical chemistry courses that must be completed by the time the student takes the MCAT.

Note that all of the premedical physics, chemistry, and mathematics courses are offered in the summer at William & Mary. However, summer is also an excellent time to acquire clinical, research, service, and other kinds of experience, so it might be best to plan to take your premed courses at William & Mary during the school year and leave your summers free for other activities.

VCU has informed us that they would prefer that William & Mary students take their organic chemistry, biochemistry, and physics courses at William & Mary.

Students should plan to take the MCAT no later than June (and May would be better) of the year in which they intend to start applying to medical school, so all MCAT-related courses should be completed by that time.

Choosing a major:

Premedical students can choose any major or minor, but they must have a strong foundation in science and mathematics. Thus, students who do not major in one of the sciences should plan to take additional upper-division science courses, rather than limiting themselves to only the required premedical science courses. Currently, the four most popular premed majors at William & Mary are Biology, Chemistry, Kinesiology, and Neuroscience.

Additional non-STEM recommended courses:

Other courses that could be helpful to a future physician include those in the behavioral sciences, social sciences, and humanities, as many health problems have deep behavioral, socioeconomic, and cultural roots. Courses such as Health Psychology 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. All COLL 150 courses can be used to fulfill half of the English requirement. To fulfill the second half of the requirement, any two or three-credit literature or composition (but NOT linguistics) course taught in the English Department would be acceptable. Some medical schools accept writing-intensive courses from other departments, but such acceptance is not universal, so I recommend choosing from the English Department's course offerings rather than branching out.

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 some 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 and on the individual schools' websites.

Biology:

As of the Fall 2022 semester, the Biology Department began awarding AP/IB credit for BIOL 203/203L and BIOL 204/204L to students who earned a 5 on the AP Biology exam or an equivalent score on the IB exam.

If you have any concerns about the strength of your pre-William & Mary biology background, talk with a Biology Department advisor about which Biology course would be the best starting point for you.

If you started your college career at William & Mary before Fall 2022, and you earned a 5 on the AP Biology exam (or an equivalent score on the IB exam), you may request that the biology elective credit and zero-credit intro bio exemptions you were given under the old Biology Department policy be converted into credit for BIOL 203, 203L, 204, and 204L, consistent with the new Biology Department policy. Email the Biology Department chairman, Professor Allison (laalli@wm.edu), who will work with the Registrar's Office to make the change for you.

Chemistry:

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 205 in the fall of the freshman year; there is no lab for this course. CHEM 205 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 205 will still need to take CHEM 254, the second semester of general chemistry lab, to complete the premedical chemistry lab requirements for medical school.