

PREMEDICAL HANDBOOK
FOR
GS UNDERGRADUATE STUDENTS

Premedical Office
School of General Studies
404 Lewisohn Hall
Columbia University
212-854-2881
gs.columbia.edu

Contents

Introduction.....	3
Undergraduate Premedical Curriculum	3
▪ Coursework in the Social Sciences and the MCAT	
▪ Biochemistry	
▪ Science Electives	
▪ General Program Information	
Curriculum Planning.....	5
▪ Transfer Credit	
▪ A Note to Joint GS/JTS Program Students	
▪ A Note to Students in the Dual and Joint Degree Programs with Sciences Po, Trinity College, and CityU	
▪ A Note to International Students	
▪ Further Planning Tips	
▪ An Alternative Route to Medical School	
Healthcare Experience	9
▪ Volunteering in the Emergency Room	
▪ Clinical Research	
▪ Wet Lab Research	
▪ Medical Volunteering Abroad	
▪ Shadowing	
A Note on the Application Process	11
Letters of Recommendation	12
▪ Faculty Recommendations	
▪ Other Recommendations	
▪ Requesting Recommendations	
▪ Waivers	
Premedical Committee Letter: Eligibility Requirements	16
The Premedical Community at GS.....	16
Workshops and Information Sessions	16
Premedical Communications.....	16
Some Advice about Advising	17
Accessing Academic Help.....	18
Study Guidelines.....	19
Undergraduate Premedical Frequently Asked Questions	21

Premedical Curriculum Worksheet..... 23

Introduction

This handbook is designed for School of General Studies undergraduate students (including those enrolled in joint- and dual-degree programs) considering premedical studies in preparation to apply to medical, dental, or veterinary school or education in another health profession. Please note that we generally refer throughout to “premedical” and “medical school” because the large majority of our students interested in a health profession do plan to enter a medical school program. Much of what we say here, however, applies to significant, albeit varying, degrees to those preparing to pursue educations to become dentists and veterinarians, and much of it also pertains to the planning and preparation of future physician assistants, physical therapists, podiatrists, and nurses, among other allied health professions. We recommend this handbook be used as a complement to individualized advising from the staff of the GS Premedical Office.

Undergraduate Premedical Curriculum

Medical schools in the United States require students to complete a prescribed course of study before applying for admission. The Medical College Admission Test (MCAT) is designed on the assumption that students sitting for the examination have completed this preparation. Therefore, you must carefully plan your curriculum to ensure that you complete the proper science coursework for your application.

Columbia offers you a strong advantage in completing this coursework. Medical schools view Columbia students as strong applicants because they recognize how thoroughly our students are prepared in the sciences. This is especially true of biology. Medical schools highly value the fact that Columbia students are taught the most contemporary topics in molecular and cellular biology and study with faculty actively engaged in research. As a group, Columbia students score almost five points higher than the national average on the MCAT. And Columbia alumni currently in medical school frequently remark how much better prepared they are for the rigor of the medical school curriculum because of how biology is taught here.

The medical school admissions process has always been competitive, and with each passing year seems to become more so. For this reason, it is extremely important for premedical students to receive a rigorous grounding in the premedical sciences and earn excellent grades and MCAT scores. It is impossible, of course, to detail every contingency here, but what follows gives you a good deal of crucial information about the curriculum.

To be considered for admission to medical school, students must complete certain undergraduate courses in the arts and sciences. There are some slight variations in these requirements from school to school and from state to state. To prepare students as fully as possible, and to assure that they will be in a position to apply to the greatest range of schools, the GS Premedical Committee prescribes the following premedical curriculum for students seeking its support of their medical school applications:

- One year of college **English**.
- One year of **Mathematics**, including one semester of *Calculus* and one semester of *Statistics*.
- One year of **General Physics**, including laboratory.

- One year of **General Chemistry**, including laboratory.
- One year of **Organic Chemistry**, including laboratory.
- One year of **Biology**, including laboratory, and with an emphasis on molecular and cellular biology.

The worksheet at the end of this handbook indicates the bulletin numbers of these courses at Columbia.

Coursework in the Social Sciences and the MCAT

The Medical College Admissions Test (MCAT), the standardized test taken by virtually all applicants to American medical schools, includes a section devoted to the psychological, social, and biological foundations of behavior. (For more information, please consult the [Association of American Medical Colleges \(AAMC\) website](#).) The GS Premedical Committee does not require premeds to take psychology and sociology since coursework in these subjects is not generally required by the medical schools themselves. We do, however, recommend that students who have not yet taken a college-level introductory psychology course plan to take The Science of Psychology (PSYCH UN1001), the course at Columbia providing the most comprehensive introduction to pertinent topics on the MCAT. While we certainly encourage GS premeds to take sociology courses, there is no one course that we recommend. Furthermore, the MCAT puts greater emphasis on psychology than on sociology (in a proportion of roughly 80 percent to 20 percent). Many premeds may find they can learn the key sociology concepts through self-study.

Biochemistry

A number of medical schools require a semester of biochemistry and others will likely add it as a requirement in the future. Although Contemporary Biology I (BIOL UN2005/2401), the first semester of Columbia's introductory biology sequence, covers many of the foundational concepts of biochemistry (and therefore is sufficient preparation for the MCAT),¹ we cannot guarantee that all medical schools will accept this in fulfillment of a biochemistry course prerequisite. We continue to engage in conversations with individual schools to assess this and can provide updates regarding these conversations.

Science Electives

For some students, our premedical curriculum represents only the minimum program to be completed. In consultation with advisors, premed students may consider taking additional coursework in biology and biochemistry. Biochemistry is a course all premeds should consider taking because a number of medical (as well as dental and veterinary) schools require it (see above). While medical schools value a student's background in the humanities and social sciences, and do not necessarily encourage premedical students to major in the sciences, most students in medical school either completed science majors or took additional coursework in the sciences. One reason GS premed students are successful in gaining admission to medical school is their willingness to continue their preparation beyond the minimum requirements.

General Program Information

Take **all** premedical courses for letter grades. No premedical course in which a P is earned satisfies a requirement. We recommend that premeds take all math and science courses, including electives, for letter grades.

¹ Please note, the introductory biology course sequence at Barnard does not cover biochemistry in any detail. Students who elect to take biology at Barnard should consider taking a semester of biochemistry before taking the MCAT.

Advanced Placement (AP) work will **not** fulfill the premedical requirements, even if your previous college or Columbia has awarded you credit for such work. Medical schools expect you to complete letter-graded university courses. High school work, however advanced, cannot be equated with college courses.

Required courses are offered at various times of the day, and frequently in the evening. For course descriptions, please see the Columbia University School of General Studies website. Many of the courses have course websites as well. These should be consulted before you register to assess the demands of the courses in both difficulty and time.

Placement tests in mathematics and chemistry are required before registering for courses in those subjects. Consult your advisor about this, if you have not already done so. In general, you take the math placement test if you have not completed pre-calculus in college for a passing grade. You take the chemistry placement test if you took chemistry in high school for a passing grade, but never took chemistry in college. If you prefer to begin with Pre-Chemistry, you are not required to take the placement test.

Pre-Chemistry, the course you must take if you do not place into General Chemistry I on the placement test, is offered in the summer and fall. Students pay for two points of tuition, but the course carries no degree credit. There is no placement test for physics; however, students who have had no significant prior exposure to physics should consider enrolling in Basic Physics to prepare for the required course sequence. Basic Physics is offered in the summer only. Again, students pay for two points of tuition, but the course carries no degree credit.

Please be reassured that that many GS students who began their premedical studies with these preparatory courses have gone on to gain admission to medical school.

Curriculum Planning

To plan your course of premedical studies at Columbia, you have several important resources. Your first resource is your undergraduate advisor in the Dean of Students Office, who will guide you in your course selection to ensure that you meet all of your degree requirements. Secondly, the GS premedical advisors will work with you and your advisor to plan your course of premedical study and to guide you through the application process. Students in the Joint Program with List College are also urged to consult with their JTS advisor about how best to fit the premedical requirements into the curriculum requirements of the Joint Program.

Once you have decided to begin pursuing the premedical or prehealth course of studies, you should notify your undergraduate advisor who will help you to identify your premed advisor and help you schedule an appointment with him or her. It is advisable to meet with a premed advisor before confirming any schedule involving required premed courses. Your premedical advisor will arrange for you to receive the premedical newsletter twice weekly and will review your academic records, including courses taken outside Columbia, to determine which premedical requirements, if any, you may have already satisfied. To facilitate your program planning, the premedical advisor can communicate his or her findings by means of the Premedical Course Clearance Form.

Thoughtful program planning is crucial, especially in the early stages of the premedical curriculum when you are learning how to study science, getting used to courses graded on a curve, and refining your time management skills.

When you are nearing completion of the required courses and are readying to take the MCAT exam, perhaps as early as the spring of your junior year, you will begin to work closely with your premedical advisor who will help you prepare your medical school applications. Keep an eye open for messages you receive through the premedical mailing list notifying you about general advising meetings to attend, and next steps to take and when to take them.

Note: *Medical schools do not require you to major in science. You should select a major of interest to you as you are more likely to do well in it. Admissions committees look for academic diversity when admitting a class in order to bring together a variety of opinions and perspectives.*

Medical schools expect that the basic premedical science courses be completed during regular terms of enrollment since the accelerated schedule of summer courses often results in a less thorough academic preparation. Please plan your program accordingly. Of the four basic premedical sciences, your grades in biology and organic chemistry will be weighted the most heavily. General Physics II and General Chemistry II are the only science lecture courses that students are routinely allowed to complete during Columbia's summer session in the specially designed 12-week course format. It is also acceptable to take math, psychology, and the lab courses for Physics II, General Chemistry, Organic Chemistry, and Biology in the summer.

Doubling up: Although it is not a requirement, we strongly recommend that premeds who are not science majors take at least two science lecture courses concurrently in at least two semesters. By doubling up on science lecture courses and earning strong grades you will provide admissions committees with a powerful demonstration of your capacity to manage the academic demands of medical school.

The medical school admissions calendar reflects the fact that the vast majority of medical school applicants are applying as they near the end of a "traditional" college career. Undergraduates typically sit for the MCAT in the spring or early summer of their junior year and complete their medical school applications, including secondary applications, that summer. During their senior year, students make themselves available for medical school interviews. Some schools will make their decisions in the fall, but most students are notified in the spring for admission to medical school for the fall following their college graduation.

This is an idealized timetable, and it may be difficult (unwise, even for General Studies undergraduate students (especially those enrolled in the Joint Program with List College) to adhere to it. Many undergraduates have a "gap" during their application year (applying as seniors, rather than as juniors). This provides students with the opportunity to gain experience in medical research, if desired.

Transfer Credit

Some students matriculate at the School of General Studies having already completed premedical coursework at another institution. The Premedical Committee routinely reviews such coursework and, at its discretion, may accept some or all of it in satisfaction of premedical requirements. A number of considerations enter into the review of such coursework: Where were the courses taken? How long ago were they taken? What grades were earned for them? Will they count toward your major at Columbia? Will they prepare you to take upper level courses at Columbia? To enjoy the support of the Premedical Committee when you apply to medical school, you must complete at least fifteen points of premedical study at Columbia (excluding English, psychology, and all preparatory coursework). (See [Premedical Committee Letter: Eligibility Requirements](#) for more on the eligibility requirements for support.)

If you earned strong grades in the entire premedical curriculum prior to matriculation at Columbia, you will (with rare exceptions) need to take introductory biology at Columbia and then complete at least another nine points of upper-level lecture courses in order to have the committee's support. Typically, a student in this situation would do so by majoring in biology or biochemistry. This approach is more likely to be successful the more there is consistency between the grades earned before Columbia and those earned at Columbia. Most undergraduates who completed a year of biology prior to matriculation at Columbia will be required to take an introductory biology sequence while enrolled at Columbia.

A Note to Students in the Joint Program with List College

Completion of the premedical curriculum poses special challenges for undergraduates in the Joint Program with List College for several reasons. First, these students are working to complete two degrees concurrently, toward which end they must complete two majors, as well as other general degree requirements. Secondly, they are less likely than their GS peers to matriculate having completed any of the premedical requirements. Completing the premedical requirements on top of the requirements for the two degrees is a precipitously tall order. In addition, there is a great deal of work involved in completing the application to the Premedical Committee, preparing for the MCAT, and applying to medical school. Joint Program students will need to consult their JTS dean, in addition to their GS advisor and premed advisor, regarding how to reasonably schedule JTS, GS, and premedical requirements. The availability of spring/summer course sequences in General Physics and General Chemistry may offer greater flexibility in planning their programs. In some cases, it may be advisable to allow themselves additional semesters so that they can excel in their work.

A Note to Students in the Dual and Joint Programs with Sciences Po, Trinity College, and City U

Students in the dual and joint degree programs with Sciences Po, Trinity College, and CityU face some special challenges in completing premedical studies at GS. Except where their programs allow them to pursue a major in one of the biological sciences, won't be able to apply any coursework completed abroad in the sciences in satisfaction of the requirements of the premedical curriculum. Consequently, it may not be feasible to complete all degree and premedical requirements within a two year period. Students with a strong commitment to becoming physicians should inquire to arrange for additional time in which to complete their requirements. We recommend that such students inform their advisors of their aspiration for medicine, dentistry, or veterinary medicine as early as possible to allow time for thoughtful planning. Those joint and dual degree students who are international students should also read the following note.

A Note to International Students

International students who must maintain an F1 Visa are required to register for a full-time course load of at least 12 points. This full-time status must be maintained in each semester of enrollment.

International students are also advised that most U.S. medical schools give preference in admissions to applicants from their own states or regions. It is therefore very difficult for an international student to gain admission to a U.S. medical school, unless he or she becomes a U.S. citizen or permanent resident. According to the American Association of Medical Colleges, a total of 52,777 applicants sought admission to medical school for the entering class of 2019 and a total of 21,622 matriculated (nearly 41% of applicants). Of these matriculants, only 280 were neither U.S. citizens nor permanent residents.

This number reflects several circumstances. For example, many public institutions may limit admission to state residents, and private institutions may require international applicants to pay the entire cost of their medical education up front (or place the funds in escrow). We therefore encourage every international student pursuing a course of study in premedicine at the School of General Studies to consider seeking permanent residence and eventually citizenship to improve their chances of admission to an American medical college. In any case, we urge you to be as informed as possible about the application process, admissions constraints, and alternative routes to medical school.

Further Planning Tips

- Do not feel that you must adhere to an artificial timeline to complete the required courses. You should take the courses when you are academically ready for them. Many GS graduates currently in medical school started with Pre-Calculus and/or Pre-Chemistry.
- You cannot begin Chemistry or Physics until you are ready to take Calculus. You will not succeed in Physics unless you have taken Calculus or are taking it as a co-requisite. If you have never taken Calculus or Physics before, it may be a good idea to complete Calculus before you start Physics.
- You cannot take Organic Chemistry or Biology at Columbia until you have successfully completed General Chemistry.
- Columbia's Organic Chemistry I and Biology I are offered only in the fall semester.
- Columbia's Organic Chemistry II and Biology II are offered only in the spring semester.
- EEEB majors may take Environmental Biology I (EEEE UN2001) to satisfy the first half of the biology sequence; they should plan to take BIOL UN2006 or UN2402 to complete the sequence. They should also take a course in biochemistry.
- Barnard College courses in biology and organic chemistry are compatible with committee support. Premeds who choose to take biology at Barnard are advised to take a separate biochemistry course to prepare for the MCAT.
- Barnard College courses in biology and organic chemistry may not count toward the majors in Columbia's Departments of Chemistry and Biological Sciences. Students planning to major in the sciences should plan to complete all their premedical prerequisites at Columbia.
- General Chemistry I and Physics I are offered in both the fall and spring semesters. If you take General Chemistry I or Physics I in the spring, you should take the 12-week summer session General Chemistry II or Physics II. General Chemistry II is sometimes offered in the fall semester, although in an accelerated format; Physics II is not.
- No science lecture courses may be taken in the summer except for the 12-week General Chemistry II and Physics II courses. Any exceptions to this must be approved by the Premedical Committee.

- Please be advised that, in general, successful applicants to medical school present an overall cumulative grade point average that is at least 3.4 and a science cumulative average that is at least 3.3. Preferably, both should be higher. According to the Association of American Medical Colleges, the mean science grade point average of a 2019 medical school matriculant was 3.65; the mean non-science grade point average was 3.81.
- Use the [course look-up tool](#) to research course workloads before registration. Many students who decide to drop a course, typically a lab, lament that they did not realize in advance how much work was involved. All of the premedical courses have websites; please consult them carefully before meeting with your advisor.
- Labs for biology and chemistry may be taken in the summer, but space may be limited.
- Physics labs ought to be taken concurrently with physics.

An Alternative Route to Medical School

The FlexMed Program at the Icahn School of Medicine at Mount Sinai is an option some GS undergraduates may wish to explore. This is an early assurance program to which interested students apply by October 1 of their sophomore year. It is intended to encourage undergraduates to pursue study in areas of interest to them without the medical school application process casting its long shadow over their undergraduate years. If accepted into this program, the premed goes on to complete an abridged form of the premedical curriculum, but also takes courses in medical ethics, health policy, public health, and translational medicine. If you are interested in this program, we recommend you discuss this with your premedical advisor early on. Be advised, however, that admission to this program is highly competitive. For more information, visit the [FlexMed page](#).

Healthcare Experience

Strong grades in science courses are not enough to make one a competitive applicant to medical school. Medical schools are also interested in what students do to help others and to learn about the day-to-day workings of medicine. Many institutions deem actual medically-related experience imperative; some see it as one of many ways to demonstrate a caring attitude, good interpersonal skills, and sincere motivation for a career in medicine. For information on specific schools' requirements, students should visit their websites or contact their admissions offices. Generally, volunteer work is definitely a plus and even more so if it involves patient contact. All medical schools agree that it is critically important that applicants know what they are getting into, and to test their aptitude for it. Health care work, usually as a volunteer, helps to address these concerns. Many students also find that service as a volunteer helps them keep their ultimate goal in sight while their attention is focused on the immediate demands of the premedical curriculum. All premedical students at GS are expected to have significant health care experience that runs throughout their academic career. While there is no requirement per se, we recommend that you complete no less than 80 hours of service. Upon completion of your service, or at least by the time you are about to apply to medical school, you should have your supervisor or the hospital's volunteer coordinator verify the sum total of your hours of work. The Premedical Office has a form available for this purpose; however, a brief statement on the hospital's letterhead stationery is also acceptable.

Volunteering in the Emergency Room

The most readily available opportunity is to serve as a volunteer in a hospital emergency room. Most hospitals look for a commitment of three or four hours (but sometimes more) each week. All students should begin volunteering as early as possible in their programs of study; a sudden flurry of

hours in your final semester may appear insincere. Volunteering in the private practice of a family member will look equally suspect, if it represents the majority of your experience. Please consult The Postbac News (a twice-weekly listserv for GS prehealth students) and the [Postbac Premed Program website](#) for a list of local hospitals and the contact information for their volunteer offices. Listings are also available for prevets and preidents. You are encouraged to seek your premed advisor's opinion of any health care work opportunity you have been offered.

Clinical Research

It is certainly possible to find opportunities beyond the emergency room setting. Be sure to consult the twice-weekly² Postbac Premed News & Announcements newsletter, which frequently contains announcements of such openings. Most commonly, students find clinical research volunteer positions, whether in an emergency room or elsewhere in the hospital, where they help physicians conduct research by recruiting eligible patients for research studies.

Wet Lab Research

Opportunities in basic science medical research (wet lab) are more limited. Wet lab research is valued highly by the most competitive medical schools, which, not surprisingly, are often those with large research enterprises, located within major medical centers. Admissions Deans at some top-tier schools report that applicants are more competitive if they have completed wet lab research by the time they file their applications. Please be aware, however, that many premeds matriculate at medical schools without wet lab experience.

Undergraduates majoring in the sciences can frequently get some exposure to research in advanced courses in their majors, through summer research fellowships, or as volunteer research assistants. With so many medical schools in New York City, many opportunities are available, although it takes some effort to identify openings. The Premedical Office will post many available openings in the Postbac Premed News & Announcements newsletter. Because of their positive experiences with GS premeds in the past, many researchers post their openings exclusively through the GS Premedical Office. Another good source are the human resources web pages at major medical centers where they may be listed as "technician" or "laboratory technician" positions. Leads from fellow students may be especially fruitful. Because of the nature of research work, students are usually asked to commit ten to twelve hours each week as a volunteer research assistant for one year, and sometimes longer. An added benefit of volunteering as a research assistant is that it sometimes leads to full-time paid employment as a research assistant during the application year.

Wet lab experience is something we recommend that every premed consider; however, we do not recommend you undertake such work, unless you are positively interested in, or very curious about, it.

Medical Volunteering Abroad

Many GS premeds are eager to volunteer in health care settings outside of the United States, where access to medical care may be extremely limited and avidly sought. We are all for helping others in need wherever in the world they may be. Be advised, however, that such work does not necessarily make an applicant to medical, dental, or veterinary school more competitive. There are several reasons admissions committees may be inclined to regard such work with diffidence; these include: the excessive cost of participating, which makes it prohibitive for many capable students, and the generally short duration of such volunteer commitments (one or two weeks is typical). Also, medical schools often feel they can make a better assessment of an applicant's commitment to the difficult profession of medicine on the basis of work undertaken in unglamorous settings in the United States

² Weekly in summer and over Winter Break.

rather than work done in an exotic locale. Postbac Premed students who wish to do service abroad should regard it as a supplement to the clinical and research work they complete domestically.

Students who pursue opportunities abroad should ensure that the tasks they assume are commensurate with their experience and training and the work is conducted under the supervision of a health care professional. Students should be advised that the School of General Studies has not vetted or endorsed any of the programs listed on our website under [Clinical and Research Opportunities](#); they therefore must investigate any program before joining it.

Students who arrange work abroad during their enrollment at GS should notify their advisor beforehand and register with [International SOS](#), an emergency services insurance program that provides worldwide assistance in the event of an emergency.

Prior to volunteering abroad, students are also encouraged to review the AAMC reference [Guidelines for Premedical and Medical Students Providing Patient Care During Clinical Experiences Abroad](#). The information in this document is general enough in nature that pre-dents, pre-vets, and allied health pre-professionals are also encouraged to consult them.

Shadowing

Many students are interested in shadowing physicians, and we think it's a great thing to do. Students who shadow often have opportunities to observe interactions and procedures that volunteers may not see. Some medical schools may even expect viable applicants to have done some shadowing. Even so, the majority of your work ought to be in a service-oriented role.³ Part of the purpose of volunteering is to enable you to show your commitment to service. As an admissions dean put it at a medical school admissions panel recently held at Columbia, "shadowing is for you; volunteering is for others."

Note: Please be advised that jobs and volunteer positions in healthcare posted on the website and sent via the premed mailing list have not been screened by anyone at the School of General Studies. The posting of a position does not constitute an endorsement or recommendation by the School of General Studies. Investigate all opportunities before committing.

A Note on the Application Process

A key function of the premedical advising program at the School of General Studies is to guide and support GS premeds through the complex and lengthy application process. Generally speaking, in the fall semester before applying to medical school over the following summer, premeds should attend a group advising session devoted to the application process. Thereafter they should become acquainted with the documents on the Postbac Program website describing the essays and other materials prehealth students must upload to their Prehealth Portfolios and with the timeline for submission of the portfolio and the common application, and for the taking of the standardized admissions test (MCAT, DAT, GRE).

Premedical advisors want to do more than explain what applicants must do. They want to help you understand why the things you are required to do matter and provide some guidance in how to execute this work. Moreover, because the writing of the essays for your portfolio is such an important part of your preparation to apply, the premedical advisors want to encourage

³ In distinguishing between volunteering and shadowing, we are well aware that many volunteer positions include a significant amount of shadowing. This is perfectly acceptable and need not be debited from your hours. We recommend that you be less concerned with whether the Premedical Committee will audit your health care experience (we won't) than whether that experience makes you as compelling an applicant as you can be.

undergraduates to get started on them early on. Undergraduates are welcome to attending any of the workshops designed to help students undertake this task. While grades in science courses and standardized test scores are an important part of a premed's application, the bulk of it is a written account of the applicant's life experiences and motivations for a career in medicine. Getting to work on this task early on is a good way to prepare to be an applicant. Moreover, writing about yourself and your work can help to enrich your current experiences.

While we eschew providing an extended discussion of the application process here, it does seem useful to address the subject of letters of recommendation, since this is something many students may want to begin thinking about long before they enter the application phase.

Letters of Recommendation

Medical schools attach great weight to the recommendations submitted in support of your candidacy for admission. There are three principal kinds of recommendations: faculty recommendations, recommendations from employers or from volunteer activities, especially those related to medicine and health care, and the recommendation of the Premedical Committee (discussed separately below). Admissions committees are interested only in letters from people under whom you have studied or worked. With rare exceptions, character references or letters from family physicians and the like are not appropriate.

Note to Preverts: The process for compiling letters of recommendation is very different from that described here. It is recommended that you consult with your preveterinary advisor or with the Director of the Premedical Office regarding this matter before proceeding to request letters.

Faculty Recommendations

The medical school admissions process seeks to determine whether you possess the academic ability to succeed in medical school. For this reason, substantial weight is placed on the recommendations of your instructors. Most medical schools expect several references from science faculty; some ask that these be distributed across the premedical science curriculum.

Request three letters of recommendation from Columbia science faculty. While we require two such letters to complete the Committee Letter, it is advantageous to have letters to choose from. Also, requesting an additional letter or two may ensure you have back up, in case one of your referees falls behind. Request letters from science faculty immediately upon the completion of each course. Requesting letters of recommendation at the last minute will reflect poorly on you, needlessly inconvenience your referees, and possibly delay your medical school application. Be advised, however, that some faculty may prefer to wait until you are entering the application process before submitting a letter for your file. As in other aspects of the application process, be flexible in your expectations.

Some faculty members have specific requirements about letters. For example, they may not write for you if you take the course in the summer, or they may want you to submit a resume. Identify these requirements early so you can meet them.

Request at least one letter of recommendation from a faculty member not in the sciences, preferably from your major.

Request any letters from former faculty at your previous college early in the process. Any letter that is received will be held in your file until you apply.

Other Recommendations

Request at least one letter of recommendation from someone who has supervised your service as a volunteer (whether in a clinical or research setting).

Request a letter of recommendation from each of your previous employers in the field of medicine or health care.

If you have substantial work experience, outside of the field of medicine or health care, request letters of recommendation from your employers, past and present.

If you competed in organized sports or were active in one of the performing arts, you should consider requesting a letter from a former coach, teacher, director, or conductor.

If you intend to apply to MD/PhD programs, you should have letters of recommendation from each of the scientists under whom you have conducted research.

Requesting Recommendations

Begin to seek recommendations as early as possible. Failure to request letters of recommendation in a timely fashion is one of the greatest causes of delay in students' applications. When requesting letters from former employers and from instructors at previous schools, be sure to let them know what and how well you have done at Columbia to demonstrate the seriousness with which you are pursuing your premedical preparation.

It is important that your referees mention in their letters that they are writing specifically in support of your candidacy for admission to medical school. Medical schools want to know that when a letter was composed the writer knew exactly for what purpose his or her support was being solicited. That said, you should tell your referees that they need not feel obliged to comment upon your potential either for medical study or for professional success as a physician. It is sufficient for them to say simply what work you did for them and how well you did it, and that it is on that basis that they are recommending you for admission. Of course, if your referees are able to add further information based on their personal knowledge of you, admissions committees will be happy to have it.

Make sure your referees understand that they should address their letters generically "To the Admissions Committee," rather than to an advisor or a specific medical school. Be especially clear on this point with referees outside Columbia, who sometimes confuse the fact that you are a premedical student here with the idea that you may be applying to Columbia University's medical school. Letters of recommendation addressed to the Columbia School of Medicine will be returned to your referee for correction—a time-consuming process with an uncertain outcome.

If you have a dossier at another institution you should have it forwarded to the Premedical Office. If the letters in your dossier were not originally written for medical school applications, it is necessary that you ask your referees to write new letters specifically mentioning that they are recommending you for medical school.

In general, you should request letters from those who know you well. Obviously it would be best if each of your faculty referees knew you personally; but medical schools also recognize the reality of large lecture classes. Therefore, the expectation is that letters from science faculty will speak to the rigor of the course and your rank in the class. For example, an ideal letter from an undergraduate instructor would come from someone from whom you took more than one course, or under whom you completed a major research project or thesis. Many times in large lectures it will be difficult to

get to know the instructor, even if you seek additional help with the course material during office hours. In addition to expanding on the course requirements and the meaning of the grade, faculty will add personal observations when they can, sometimes relying on input from teaching assistants. In any case, the decision of whether to provide a reference, and with what enthusiasm, is exclusively the referee's prerogative. If you have not been in contact with instructors from your previous schools, you can refresh their memories with a letter, a resume, a photo, a copy of a paper completed for their class and, if feasible, a personal visit.

Inform your referees that recommendations should be typed on the referee's institutional letterhead, signed, and dated. Institutional letterhead and a signature help to authenticate the letter. Make sure to send along a recommendation waiver form (see below).

Letters can be transmitted to the GS Premedical Office in several ways:

- A scanned copy of the signed and dated letter, accompanied by the waiver form, may be e-mailed to gs-letters@columbia.edu.
- The letter and waiver form may be mailed to the GS Premedical Office (the mailing address is on the waiver form). Some Columbia faculty members prefer to hand-deliver it, and that is also acceptable. Please provide referees with stamped envelopes preaddressed to our office to facilitate the mailing of their letters to us.
- Once you have established your Prehealth Portfolio, you will be able to make entries for referees. When you do so, the system will send each referee an e-mail with a unique link at which to upload their letter. We encourage you to use this system; however, it is advisable to communicate with your referees about your desire for a letter before entering them into your portfolio. You will be able to track online the arrival of those letters submitted directly to your portfolio.

N.B. You may not function as the courier for your letters. We will discard any letters received from you, whether by hand, US Mail, or e-mail.

Thank-yous: We encourage you to consider sending your referees a brief note to thank them for writing on your behalf. Referees will also be delighted to learn where you plan to matriculate. Please consider letting them know.

Waivers

The Federal Family Education Rights and Privacy Act of 1974, as amended (the "Buckley amendment"), provides students with the right of access to educational records. In the case of recommendations, the law provides that a student, if he or she chooses, may waive that right. You should determine for yourself whether your interests will be best served by recommendations that are accessible to you. Confidential recommendations will be written and submitted by faculty and others with the explicit understanding that they will be read only by the Premedical Committee and medical school admissions committees. The presumption is that letters to which you have waived your right of access are more candid assessments of your ability and potential as a medical student. For this reason, if you do not trust that a reference will be satisfactory, you would probably do better not to request it, rather than to retain your right to review it.

Whether you choose to waive your right of access or not, your decision must apply consistently to all your letters. Your decision to waive or not to waive your right of access also extends to your Premedical Committee Letter. In other words, you cannot waive access to individual letters of recommendation, but retain it for the Committee Letter, or vice versa. Furthermore, when you

waive your right of access to your letters, you also waive your right to know which letters the Premedical Committee chooses to attach to your Committee Letter.

Every recommendation you request should be accompanied by a statement of its status as a confidential or non-confidential evaluation. These waivers forms are available in the waiting area outside the Premedical Office and on the [Postbac Premed Program website](#). You should supply one to each of your referees when you request their support. (However, if you are arranging for letters to be submitted online, the waiver statement will be incorporated into the system-generated e-mail sent to your referees.)

Premedical Committee Letter: Eligibility Requirements

Most medical schools expect applicants to have the support of the Premedical Committee of the institution at which they completed their premedical requirements. At the School of General Studies, this support is given by the Premedical Committee and is commonly referred to as the “Committee Letter.” To be eligible for a Premedical Committee Letter, the following conditions must be met:

- Completion of the premedical curriculum, including one year of English; at least 15 points of premedical science coursework should be completed while enrolled at GS
- All of the premedical courses must be completed by the summer of the application year
- You must be in good academic standing
- To satisfy a course requirement, you must earn a grade of at least C
- Completion of a minimum of two semesters at GS
- You must have the support of two Columbia faculty members, or instructors, from the premedical sciences and mathematics departments. Toward this end, we urge you to request at least three such letters
- Timely completion and submission of the online prehealth portfolio, in effect, your application for committee support, along with all the other materials required by the committee (letters of recommendations, certification of volunteer work, a copy of your submitted common application, etc.)
- An interview with a member of the Premedical Committee (Portfolio Review)

GS does not provide Committee Letters for students who, having begun studies at Columbia, subsequently complete required premedical coursework elsewhere. If you defer application to medical school beyond your last semester at GS, the Committee will provide a letter of support only if you apply within three years of graduation under the following conditions:

- You have completed most of your premed requirements within two years prior to graduation
- You have met the eligibility requirements for a letter
- You meet the internal deadlines for a committee letter

If you do postpone application to medical school after completing your undergraduate degree, you are advised to keep active in a health-related field.

Reapplication: Should you need to reapply to medical school, the Premedical Committee will support up to two reapplications (i.e., a total of three applications). Reapplicants are required to submit additional materials to the Premedical Committee by the published deadlines. This includes a brief supplement to your portfolio, verification of additional hours of health care work, additional letters of recommendation, and a copy of the submitted common application for the new application cycle. Please see the Postbac Premed website for details or consult with your premed advisor.

The Premedical Community at GS

In addition to the undergraduate premeds, the School of General Studies is home to more than 400 Postbaccalaureate Premedical Program students who take the same premedical courses as their undergraduate peers through a non-degree program. These students give shape and energy to the premedical community at GS and are represented by their own student organization, the Premedical Association (PMA). While you, as an undergraduate, are not eligible to run for office in the PMA, you will receive invitations to all kinds of events the PMA sponsors throughout the year. We urge you to attend as many as appeal to you. The social events give you a chance to meet other premedical students who, like you, are facing the challenges of completing premedical preparation while leading independent lives. Events such as the Medical School Fair Deans' Panel give you a chance to hear from medical school admissions deans, while the MCAT Panel, the Application Year Panel, and similar events allow you to learn about aspects of the premedical experience from the perspective of current and former students who are further along in the process.

Workshops and Information Sessions

Throughout the academic year, the GS Premedical Office offers workshops and information sessions to augment students' classroom experience and the support they receive from their premedical advisor. Workshops and information sessions are held on a variety of topics including application preparation, personal statement writing, interviewing skills, and glide year planning.

Dates and additional information on these workshops and information sessions may be found in the twice-weekly Postbac Premed News & Announcements newsletter and on the [Postbac Premed calendar](#).

Premedical Communications

As a premedical student, you will be added to the premedical e-mailing list, which will provide:

- Crucial information about deadlines, medical school visits, changes in the medical school admissions process and events of interest to premeds
- Notices of group advising meetings, panels on the MCAT, workshops on interviewing, etc.
- Clinical and research opportunities, both paid and volunteer, to help you acquire direct experience of medicine and patient care.

The primary vehicle for this information is the twice-weekly Postbac Premed News & Announcements newsletter. We urge you to read it regularly. We also recommend you look at the Postbac website; please do not be put off by the term "Postbac": most of the information applies to undergraduates also.

Some Advice about Advising

The premedical path is a difficult one to follow; however, if you are sincerely interested in a career in medicine, we encourage you to pursue it. Every premed comes to the task with different experiences and different strengths. It is good to know what yours are. We encourage you to work on the assumption—one that we make—that you can do it. From there it is all (well, perhaps not quite all) a matter of strategy, planning, hard work, and the exercise of good sense. This is where your advisor can be helpful. We encourage you to speak with your advisor to discuss a workable plan of action. We also ask you to consider carefully your advisor's advice.

Accessing Academic Help

Prepared by the Premedical Association (PMA)

Welcome to the Premedical Program at Columbia. There are many resources available for guidance and assistance in your class work and we urge you to use them.

Peers

You are each other's best resource. Do not feel shy about approaching your classmates for help, to form a study group, or just to ask advice. Everybody has different academic strengths and weaknesses, so it's a good idea to pool your knowledge—everyone learns more that way. If you have no academic weaknesses (lucky you), it's still to your benefit to help others. The best way to test your knowledge is to teach someone else. Your peers are also your best source for information about course requirements, professors' styles, and scheduling.

Professors and Teaching Assistants (TAs)

Professors and TAs have office hours to answer questions or clarify material. Some people feel more comfortable approaching TAs, while some like speaking with professors. Both are useful sources of information. TAs and professors are generally very accommodating; if you can't meet them during office hours (due to work, etc.), call or email them for an appointment. TAs will also hold recitation (an hour-long review of lecture material and homework) at least weekly, and it is a mandatory part of some courses. For many students, this is an extremely useful supplement to attending lecture.

Departmental Help Rooms

The physics, math, and statistics departments have **free** [help rooms](#). The hours vary, but your professors will announce them at the beginning of the semester. They are staffed by graduate students who are willing to answer all your questions.

Academic Resource Center (ARC)

The [Academic Resource Center](#) offers **free** academic support in all premedical subjects, including tutor-led study groups, a weekly premed work room, and traditional tutoring appointments. These resources are designed to help students at all levels of mastery: whether you're struggling with an entire subject or trying to turn an A to an A+, the ARC can help!

In addition to tutoring services, the ARC also offers support consultations on study skills, test taking strategies, time management, critical reading skills, optimizing your study group, and more. Services are constantly evolving based on student needs and requests—so if there's something you'd like to see that isn't offered, your input is always welcome.

Paid Tutors

You can find a paid tutor in two ways. First, look around for advertisements on campus. Alternatively, department offices will provide you with a list of graduate students who tutor for a fee. The tutors from the biology, chemistry, and math departments have departmental approval. Many tutors offer group rates.

Study Guidelines

By Professor Deborah Mowshowitz

[Professor Deborah Mowshowitz has written the following guidelines for her biology class. We believe they can be applied to any course.]

1. *Come to class.* In some courses all you have to do is read the book, but that is not the case here. There is too much stuff in the book, and the lecture will key you in to what is important and what isn't; it will also provide a framework to stuff all the facts into. If you have to miss a class, get the notes from a fellow student. Get the phone number of at least one other student now, so that you'll have someone to call if necessary.
2. *Take notes.* Everything that really matters will be discussed in the class; the book is really just for back up (this may not make sense, but this is how we do it). There are many styles of taking notes—some people prefer to get all down word-for-word and some people prefer to just write down the critical points. Either way is fine, but be sure you get the point (if you are concentrating on transcribing every word) and be sure you understand the necessary details (if you are concentrating on the point). Taping is permitted, but the transcribing of tapes is very time consuming and we don't recommend it. You are probably better off forming a study group and going over notes together to fill in the holes. We do not give out notes because we believe you learn more from taking your own.
3. *Form a study group or partnership.* Don't try to do it alone. (If you are too shy to ask anyone, we will help you find a partner.) Study groups are generally good because they help you go over the material (see above), give you an opportunity to practice explaining your answers (see below), and provide moral support.
4. *Do the problems.* Seriously and carefully. This is probably the most important thing. All the other advice is just to get you in shape to do this. Do the unstarred problems first and leave the starred ones for later (to test yourself). Go over the unstarred problems until you feel confident with the material; go over them more than once if necessary, but don't do the starred ones until you understand the others. Once you feel on top of the material, do the starred ones as if it were a test—write out the answers and write out the explanations of how you got your answers.
5. *Make pictures, diagrams, summary charts, concept maps, etc.* The ones in the book (and the ones we hand out in class) may be good, but for best results, you should make your own. Don't copy over your notes or outline the book word-for-word; digest each section of the notes or text first and write your own, private, condensed version (in whatever form you prefer—use diagrams, charts, etc.).
6. *Keep up.* The current material is always based on what came before, so once you get behind it is very difficult to catch up.
7. *Read one of the texts before class if the material is new to you.* It is very hard to follow the lecture if every word and concept is unfamiliar. It probably does not pay to spend too much time on the text(s), as explained above in point 2, but some people learn better from books than they do from lectures.

8. *Ask questions.* If you don't understand something, **ask**. That is what the TAs are here for and that is how the lecturer finds out if he or she is going at the right pace. Don't wait for the class bigmouth to speak up—do it yourself. Don't be afraid of looking stupid—looking dumb before the exam is a lot smarter than looking dumb afterwards. To get the most out of recitations and office hours, go through the problems and/or notes first and come prepared with a list of questions. The more effort you put into asking questions, the more you will get out of the answers.
9. *Master the vocabulary.* The stress in this course may be on using the vocabulary, but you won't get anywhere until you learn it first. So try to master all the new terms as fast as possible. Be especially careful about words that seem similar, but mean different (often related) things (such as peptide/protein, chromosome/chromatic, gene/allele, etc.). Once you get the vocabulary down pat, you will find it much easier to follow the lectures and do the problems.
10. *A word or two about grades.* The two most common complaints about grades heard in this class are “the exam grade doesn't reflect my knowledge of the material” and “my grade doesn't reflect the amount of time and effort I put into this course.” Sometimes these complaints are justified, but often they mean the student does not understand what is expected of him or her, or is concentrating on (and spending too much time on) the wrong things. In this course you have to know how to use the material, not just repeat it. If you think your performance on the exam does not reflect your knowledge, it often means you have memorized the facts but have not practiced enough at selecting the right ones and applying them to whatever problem is presented to you.

Undergraduate Premedical Frequently Asked Questions

How does GS come to recognize that I'm premed?

Once you realize you are premed, pre-dent, or otherwise “prehealth,” be sure to tell your advisor and schedule an initial three-way meeting with your undergraduate and our premedical advisors. Your premedical advisor will thereupon review transcripts of coursework completed before Columbia to determine whether any requirements have been satisfied and add you to the premed mailing list. After this three-way meeting, you are encouraged to meet one-on-one with your premed advisor to discuss your premed academic track, academic preparation, health care experiences, and medical school applications.

Who does the premed advising?

GS has an excellent premed advising staff which also advises non-degree students in the Postbaccalaureate Premedical Program, the oldest and largest of its kind in the U.S. All premed students at GS are assigned a premed advisor from the GS Premedical Office. Your premed advisor will work with you on the specific order and combination of courses to be taken to fulfill the premed requirements, guide you through the process of applying to professional schools, and, for students who qualify, provide written support in the form of a committee letter.

Can I substitute previous coursework at other schools or other courses at Columbia or Barnard for any of the premedical requirements?

Students are expected to fulfill the specified premedical course requirements at Columbia. Any substitution or equivalent coursework to be used, whether taken at Columbia or elsewhere, must be officially approved in writing by your GS premedical advisor.

What if I have completed some of these required courses elsewhere?

Premeds must complete at least fifteen points of required premedical coursework at Columbia. It is also recommended that they double up in their science lecture courses over the course of two semesters. Students who have completed some of these basic courses prior to matriculation at GS may be advised by the Premedical Committee to take advanced level science courses in order to fulfill eligibility requirements for a committee letter as well as to be more competitive applicants for medical school. These decisions will be made on a case-by-case basis.

What summer session courses can be taken to satisfy premedical requirements?

Only the following summer session courses may count toward completion of the premed requirements prior to applying to medical school with committee support: the 12-week General Chemistry II course (CHEM S1404); the 12-week General Physics II course (PHYS S1202); general chemistry laboratory; organic chemistry laboratory; biology laboratory; and courses taken in fulfillment of the math-related requirement. It is also acceptable to take the Science of Psychology (PSYC S1001), a course recommended to premeds who will eventually take the MCAT.

What if the premed courses are included in the requirements for my major?

Students who satisfactorily complete the premedical requirements are eligible for committee support even if some of the premed courses satisfy major requirements.

Can premedical courses count toward the fulfillment of the GS core requirements?

Yes, required premedical courses may be counted toward fulfillment of the GS science core requirement.

If I did hospital volunteer work before matriculating at GS, must I continue to volunteer?

There is no requirement that you continue to volunteer; however, we strongly recommend that you do so. There is always more to learn about medicine, and New York City, with its many health care facilities, is a great place to do so. By continuing to volunteer, you will demonstrate to medical schools the extent of your knowledge about, and your enthusiasm for, medicine.

What if I am interested in veterinary or dental medicine or other healthcare professions?

The basic premedical curriculum will prepare most students who are interested in going on to other kinds of health care professional programs. Students interested in other health care professions, such as veterinary medicine, should consult with their premedical advisor about additional, particular, or substitutional prerequisites for admission to other professional programs.

Additional Questions?

Please consult with your GS premed advisor.

Premedical Curriculum Worksheet

Course	Course Number	Points	Semester	Grade
English (University Writing)	GS1010	3		
Literature (in English)	3000-level or higher	3 or 4		
Pre-Calculus*	UN1003	3		
Calculus I	UN1101	3		
Statistics <i>or</i> Calculus II	STAT UN1101 <i>or</i> MATH UN1102	3		
Introductory Psychology**	PSYC UN1001 <i>or</i> equivalent	3		
Pre-Chemistry*	UN0001	0		
General Chemistry I	UN1403	4		
General Chemistry I Recitation	<i>variously numbered</i>	0		
General Chemistry II	UN1404	4		
General Chemistry II Recitation	<i>variously numbered</i>	0		
General Chemistry Lab	UN1500***	3		
Basic Physics*	UN0001	0		
Physics I Lecture	UN1201	3		
Physics I Lab	UN1291	1		
Physics II Lecture	UN1202	3		
Physics II Lab	UN1292	1		
Intro Biology/Contemporary Biology I [♣]	UN2005 <i>or</i> UN2401	3 or 4		
Intro Biology/Contemporary Biology II [◇]	UN2006 <i>or</i> UN2402	3 or 4		
Contemporary Biology Lab [◇]	UN2501	3		
Organic Chemistry I [◇]	UN2443	4		
Organic Chemistry I Recitation	<i>variously numbered</i>	0		
Organic Chemistry II [◇]	UN2444	4		
Organic Chemistry II Recitation	<i>variously numbered</i>	0		
Organic Chemistry Lab I [◇]	UN2493 [§]	1.5		
Organic Chemistry Lab II [◇]	UN2494 [§]	1.5		

* This is a prerequisite for a required course, but not itself a requirement for medical school. Neither Preparation for College Chemistry nor Basic Physics may be taken toward the degree.

** This course is not required for premedical study, but it is recommended as preparation for the MCAT.

*** The lab course is accompanied by a lab lecture (UN1501).

[§] The lab course is accompanied by a lab lecture (UN2495, UN2496).

[◇] The biology and organic chemistry requirements may be satisfied with Barnard College coursework; however, premeds who choose to take biology at Barnard are advised to take a separate biochemistry course to prepare for the MCAT. They are also advised that they should not take the Barnard College courses, if they plan to major in one of the sciences.

[♣] Students who plan to major in ecology, evolution, and environmental biology may take Environmental Biology I: Elements to Organisms (EEEE UN2001) in place of BIOL UN2005/UN2401; however, they are advised to take a separate biochemistry course to prepare for the MCAT.