

**COLUMBIA COLLEGE  
FU FOUNDATION SCHOOL OF ENGINEERING AND APPLIED SCIENCE**



# **PREMEDICAL HANDBOOK**

**2015-2016  
Edition**



**COLUMBIA COLLEGE**  
COLUMBIA UNIVERSITY IN THE CITY OF NEW YORK



**COLUMBIA ENGINEERING**  
The Fu Foundation School of Engineering and Applied Science

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## **INTRODUCTION**

This booklet is designed for all Columbia College and Fu Foundation of Engineering and Applied Science students who are considering a career in the health professions. While each undergraduate is assigned an Advising Dean in the Center for Student Advising, pre-health professions students are also expected to work directly with a premed adviser throughout their time at Columbia. We hope that you find this booklet helpful and look forward to getting to know you!

Medical education in the United States falls into three distinct stages: undergraduate studies, medical school, and residency training. The undergraduate education focuses on coursework which provides the foundational concepts necessary for your success in medical school. In addition to undergraduate coursework, premedical students are expected to test their motivation for a career in medicine by exposing themselves to different venues where clinical medicine is practiced. The content of medical school curricula is similar from program to program. However in recent decades, the structure for imparting that knowledge has undergone widespread reform. There is currently a good deal of difference in the way schools organize their four years of curriculum. However, it can be said that all programs deliver some combination of instruction in the basic medical sciences as well as training in clinical work and patient care. After graduation from medical school, the physician proceeds to a period of intensive clinical residency training of three to five years, sometimes longer, depending on specialty, before being certified to practice independently.

We are concerned here with describing the appropriate curriculum for a premedical student, discussing pertinent extracurricular options, and explaining the medical school application procedure. It should be noted that while a large number of premedical students have decided upon that track before entrance to Columbia and start right in with the required courses, it is entirely possible to drop into the program at any point in the undergraduate years, or, indeed, thereafter. This may well delay entrance to medical school but is in no way a bar to eventual acceptance. In fact, it is worth noting that the average age of first-year medical school students nationwide is 24.

It should be noted that although we refer throughout this publication to "premed" because the large majority of our students interested in a health profession do plan to enter an MD (and some MD/PhD) program, we also have students who apply to schools of osteopathy, dentistry, public health, veterinary medicine and other health professions. To obtain more detailed information about any of these professions, refer to the Preprofessional Advising Website: (<http://www.studentaffairs.columbia.edu/preprofessional>)

## **PREPROFESSIONAL ADVISING**

Preprofessional Advising is a part of the Center for Student Advising. We are here to serve as a resource to students and alumni during all phases of their premedical preparation. The advising team sponsors workshops and programs of interest to premeds and is available to meet one-on-one with any student interested in discussing his/her individual situation. We have prepared this booklet as an introduction, but as you will learn, there is no one "right" way to pursue a premedical path. We look forward to getting to know you over the next few years and hope that you will take full advantage of the resources available at Columbia. Good luck and we'll see you soon.

## ACADEMIC PREMEDICAL PREPARATION

It is very important to note that medical schools in the United States and Canada each individually determine their own entrance requirements, including prerequisite coursework or competencies. Each medical school also sets its own rules about acceptable courses or course equivalents. Therefore, it is essential that you check the premedical requirements both for your state school(s) and any other medical school where you think you may apply when planning your curriculum. We have compiled a current list of prerequisites by school which you can access on our website: [Medical School Prerequisites](#). In addition to medical school course requirements, all medical schools currently require that you sit for the [MCAT exam](#). A new format of this exam was introduced in April 2015 (for more information about the new MCAT see below). In preparation for the new MCAT, we recommend the following courses at Columbia:

1 year of General Chemistry and General Chemistry Lab  
1 year of Introductory Biology and Biology Lab  
1 year of Organic Chemistry and Organic Chemistry Lab  
1 year of General Physics and Physics Lab  
1 semester of Introductory Psychology

While these courses are those recommended to prepare you for the MCAT, there are indeed additional requirements set by individual schools.

Additional Information on Requirements:

- Most medical schools require a year of English – emphasizing skill acquisition in writing.
- Many medical schools currently require mathematical competency focused in areas covered in calculus and statistics. We therefore recommend that all students complete one semester of calculus and one of statistics.
- A rapidly increasing number of medical schools require a semester of biochemistry and even more will likely add it as a requirement in the future. Although our introductory biology sequence covers many of the foundational concepts of biochemistry, we cannot at this time guarantee that medical schools will accept this in fulfillment of a prerequisite requirement. We will be continuing to engage in conversations with individual schools to assess this and will keep you updated regarding these conversations.
- A smaller subset of schools require more than one year of introductory biology. Many recommend specific advanced level classes. If you are a Texas or California resident, you should pay particular attention to your state school requirements as they are among the schools that require the additional biology.
- A few schools have also begun to add social and behavioral science courses into their requirements including, but not limited to, psychology and sociology.

**PLEASE NOTE:** It is your responsibility to keep up to date with prerequisite requirements for the schools to which you intend to apply. These are subject to change from year to year. Check the current edition of the [MSAR](#) (Medical School Admission Requirements, subscription required to access prerequisite information), which is updated annually and released in April, for the most up-to-date information. Most medical schools also list their requirements in greater detail on their individual websites. For links to these pages (no subscription required), please go here: <https://services.aamc.org/30/msar/home>.

## **The Major**

Medical schools genuinely do not have a preference regarding a student's choice of undergraduate major. They like to see a range of interests in their student body and are just as happy with the art history major (assuming good performance in the required science courses) as they are with the biologist or chemical engineer. They would not want a class consisting entirely of either. Your choice of major should be guided solely by your own intellectual interests and aptitudes. Premed is not a major and therefore in addition to completing coursework to prepare for medical school, students will all choose a major or concentration.

**Columbia College (CC)** has two graduation options: the major and the concentration. Specifics of each are outlined in the department listings in the Bulletin. You should choose the one that best suits your own interests. Both are equally respected by the College and by medical schools. We have seen no evidence that full majors are more likely to win acceptance to medical school. Any way you look at it, you will be taking a minimum of 124 credits in order to graduate. Medical schools are interested in the variety and difficulty of your courses, your course load, and your grades. Whether or not it adds up to a major or concentration is immaterial as long as you are challenging yourself along the way.

**The Fu Foundation School of Engineering and Applied Science (SEAS)** has one graduation option: the major. Students in SEAS who wish to do so, can also declare a minor. Students from every major have been accepted to medical school, so you need not think that you must major in Biomedical Engineering if you are planning to attend medical school. However, you should consider a plan for completing required prerequisite courses alongside your major, for there is more limited freedom in engineering course plans.

## PREMEDICAL COURSES AT COLUMBIA

This list of courses combines those which may be required by medical schools and those that will help you to prepare for the new MCAT.

|  | Required by most medical schools | Required by some medical schools | Recommended for preparation for MCAT |
|--|----------------------------------|----------------------------------|--------------------------------------|
| 1 Year of English  | x                                |                                  |                                      |
| 1 Year General Chemistry with Lab                            | x                                |                                  | x                                    |
| 1 Year of Introductory Biology (Cell and Molecular) with Lab | x                                |                                  | x                                    |
| Additional Biology   |                                  | x                                |                                      |
| 1 Year of Physics with Lab                                   | x                                |                                  | x                                    |
| 1 Year of Organic Chemistry with Lab                         | x                                |                                  | x                                    |
| 1 Year of Mathematics (Calc and Stat)                        |                                  | x                                |                                      |
| 1 Semester Biochemistry                                      |                                  | x                                |                                      |
| 1 Semester of Introductory Psychology                        |                                  | x                                | x                                    |

The following lists the most appropriate course options at Columbia for both CC and SEAS students.

### **ENGLISH:**

University Writing and either Literature Humanities or Contemporary Civilization will generally fulfill this requirement. SEAS students would be well served by choosing one of these options. SEAS students may also take another English literature course to fulfill this requirement in addition to University Writing.

**ENGL C1010x or y University Writing 3 pts.** Teaches general techniques and strategies for academic reading and writing.

**HUMA C1001x-C1002y Masterpieces of Western Literature and Philosophy 4 pts.** Taught by members of the Departments of Classics, English and Comparative Literature, French, German, Italian, Middle East and Asian Languages and Cultures, Philosophy, Religion, Slavic Languages, and Spanish; and members of the Society of Fellows. Major works by over twenty authors, ranging in time, theme, and genre from Homer to Virginia Woolf. Students are expected to write at least two papers, to complete two examinations each semester, and to participate actively in class discussions.

**COCI C1101x-C1102y Introduction to Contemporary Civilization 4 pts.** Taught by members of the Departments of Anthropology, Classics, English and Comparative Literature, French, German, History, Middle East and Asian Languages and Cultures, Philosophy, Political Science, Religion, Slavic Languages, and Sociology; and members of the Society of Fellows. A study in their historical context of major contributions to the intellectual traditions that underpin contemporary civilization. Emphasis is on the history of political, social, and philosophical thought. Students are expected to write at least three papers to complete two examinations, and to participate actively in class discussions.

### **CHEMISTRY:**

Chemistry should be taken in the first year. Most premedical students will take General Chemistry. Students who want to be considered for an advanced chemistry sequence **MUST** take the placement exam during New Student Orientation to determine which sequence is most appropriate. The placement exam results will indicate which lecture is recommended. You may choose to register for a lower level course, but you may not register for a higher level course which you did not place into.

**The one semester General Chemistry laboratory is equivalent to a year of lab for medical school purposes and can be taken during either term.**

#### Option 1:

**CHEM W1403-1404 General Chemistry I and II**

**7 pts.**

**CHEM W1500 General Chemistry Laboratory**

**3 pts.**

**CHEM W1403x-W1404y General Chemistry (Lecture) 3.5 pts.** **Prerequisites:** concurrent registration in *MATH V1101*; for *W1404*: *CHEM W1403*. Preparation equivalent to one year of high school chemistry is assumed and concurrent registration in Calculus I. Students lacking such preparation should plan independent study of chemistry over the summer or take *CHEM W0001* before taking *W1403*. Topics include stoichiometry, states of matter, chemical equilibria, acids and bases, chemical thermodynamics, nuclear properties, electronic structures of atoms, periodic properties, chemical bonding, molecular geometry, introduction to organic and biological chemistry, solid state and materials science, polymer science and macromolecular structures, chemical kinetics, coordination chemistry, and electrochemistry. Although *W1403* and *W1404* are separate courses, students are expected to take both terms sequentially. The order of presentation of topics may differ from the order presented here, and from year to year. Recitation Section Required.

**CHEM W1500x or y General Chemistry Laboratory** 3 pts. Corequisites: *CHEM W1403*. Laboratory Fee: \$140. An introduction to basic techniques of modern experimental chemistry, including quantitative procedures and chemical analysis.

Option 2:

**CHEM W1604 Second Semester General Chemistry (Intensive)** 4 pts.

**CHEM W2507 Intensive General Chemistry Laboratory** 3 pts.

Or

**CHEM W1500 General Chemistry Laboratory** 3 pts.

Second Semester General Chemistry (Intensive) (CHEM W1604) is appropriate for students who have a 4 or 5 on AP and an acceptable score on the placement exam. Completion of this course with a grade of C or better will enable a CC or SEAS student to receive 3 credits of AP credit in Chemistry (if they scored a 4 or 5 on AP exam) **These AP credits are important to fulfill your one-year Chemistry requirement for some medical schools.** Students who complete this sequence are still encouraged to go forward and take additional chemistry at the advanced level (biochemistry and/or other upper level chemistry) so that they may strengthen skills and background and meet requirements for schools that are less open to accepting AP credit (including some of the state schools in California).

**CHEM W1604x Second Semester General Chemistry (Intensive)** 3.5 pts. Prerequisites: A grade of "B" or better in *CHEM W1403* or acceptable performance on the Department placement exam. **Corequisites: Calculus II.** Topics include: Gases (Kinetic Theory of Gases); Binary Collision Model for Chemical Reactions; Chemical Kinetics; Acid-base Equilibria; Thermochemistry (Thermodynamics I); Thermodynamics II Spontaneous Processes; Chemical Bonding in Polyatomic Molecules. Recitation Section Required.

**CHEM W2507y Intensive General Chemistry Laboratory** 3 pts. Prerequisites: *CHEM W1604* or *W3045*. Laboratory Fee: \$140. An introduction to basic techniques and practices of modern experimental chemistry, including qualitative procedures and chemical analysis. This course differs from *CHEM W1500* in its emphasis on instrumentation and methods.

Option 3:

**CHEM W3045- 3046 Intensive Organic Chem for First Year Students** 7 pts.

**CHEM W2507 Intensive General Chemistry Laboratory** 3 pts.

**CHEM W3545 Intensive Organic Chemistry Lab** 3 pts.

Intensive Organic Chemistry is appropriate for students who have score of 4 or 5 on Chemistry AP and an appropriate score on placement exam. After successful completion of this sequence students will receive 6 credits of AP for General Chemistry. **These AP credits are important to fulfill the General Chemistry requirement for some medical schools.** Students who complete this sequence are still encouraged to go forward and take additional chemistry at the advanced level (biochemistry and/or other upper level chemistry) so that they may strengthen skills and background and meet requirements for schools that are less open to accepting AP credit (including some of the state schools in California).

**CHEM W3045x-W3046y Intensive Organic Chemistry for First-Year Students (Lecture) 3.5 pts.** Prerequisites: A grade of 5 on the Advanced Placement Examination and an acceptable grade on the placement examinations given during new student orientation. Not open to students who have taken other courses in college-level chemistry. Premedical students may take *CHEM W3045*, *W3046*, and *W3545* to meet the minimum requirements for admission to medical school. This course covers the same material as *CHEM W3443-C3444*, but is intended for students who have learned the principles of general chemistry in high school. The level of instruction is appropriate for those who have not had a college course in general chemistry. Students enrolled in *CHEM W3045-W3046* are expected to enroll concurrently in *CHEM W2507*.

**CHEM W2507y Intensive General Chemistry Laboratory 3 pts.** Corequisite: *CHEM W3045* or Prerequisite: *CHEM W1604*. An introduction to basic techniques and practices of modern experimental chemistry, including qualitative procedures and chemical analysis. This course differs from *CHEM W1500* in its emphasis on instrumentation and methods. The lab should be taken in the fall semester.

**CHEM W3545x Intensive Organic Chemistry Laboratory 3 pts.** Prerequisites: *CHEM W3045* and *W3046* and *W2507*. Laboratory Fee: \$125. The course covers the same material as *CHEM W3543*, but is intended for those students who have taken Intensive Organic Chemistry for First-Year Students, *CHEM W3045-W3046*.

## ORGANIC CHEMISTRY

Those students who took General Chemistry or Intensive General Chemistry in their first year will take Organic Chemistry in either their sophomore or junior year.

**CHEM W3443-3444 Organic Chemistry**

**7 pts.**

**CHEM W3493-3494 Organic Chemistry Lab**

**3 pts.**

**CHEM W3443x-3444y Organic Chemistry (Lecture) 3.5 pts.** Prerequisites: *CHEM W1404* or *W1604*, and *W1500*. The principles of organic chemistry. The structure and reactivity of organic molecules are examined from the standpoint of modern theories of chemistry. Topics include stereochemistry, reactions of organic molecules, mechanisms of organic reactions, syntheses and degradations of organic molecules, and spectroscopic techniques of structure determination. Recitation Section Required.

**CHEM W3493x-3494y Organic Chemistry Laboratory 1.5 pts.** Prerequisites: *CHEM W1500*. Corequisites: *CHEM W3443-3444*. Laboratory Fee: \$125. Techniques of experimental organic chemistry, with emphasis on understanding fundamental principles underlying the experiments in methodology of solving laboratory problems involving organic molecules.

## BIOLOGY

Biology is most often taken by students in their sophomore year. Although you may receive AP credit for Biology, this does not place you out of this introductory class. We recommend all students take this course.

### Option 1

#### **Lecture:**

**BIOL C2005-C2006 Intro to Biology I and II**

**8 pts.**

**BIOL C2005 Introductory Biology I: Biochemistry, Genetics & Molecular Biology 4 pts.** Prerequisite: One year of college chemistry, or a strong high school chemistry background. Lecture and recitation. Recommended as the introductory biology course for biology and related majors, and for premedical students. Fundamental principles of biochemistry, molecular biology, and genetics. Website:

[https://courseworks.columbia.edu/access/content/group/BIOLC2005\\_001\\_2014\\_3/index.html](https://courseworks.columbia.edu/access/content/group/BIOLC2005_001_2014_3/index.html)

**BIOL C2006 Introductory Biology II: Cell Biology, Development & Physiology 4 pts.** Prerequisites: *EEEB W2001* or *BIOL C2005*, or the instructor's permission. Lecture and recitation. Recommended second term of biology for majors in biology

and related majors, and for premedical students. Cellular biology and development; physiology of cells and organisms. Website: [https://courseworks.columbia.edu/access/content/group/BIOLC2006\\_001\\_2015\\_1/menu.html](https://courseworks.columbia.edu/access/content/group/BIOLC2006_001_2015_1/menu.html)

## **Biology Lab Options:**

### **BIOL W2501 Contemporary Biology Lab**

**3 pts.**

**BIOL W2501 Contemporary Biology Laboratory** 3 pts. Corequisites: Strongly recommended prerequisite or required corequisite: [BIOL C2005](#) Enrollment limited to 24 students per section. Attendance at the first class is mandatory. Fee \$150. Emphasis on experimental techniques and data analysis in a variety of biological disciplines.

BIOL W2501 is the most common lab taken by premedical students, but students may also pursue any lab options accepted by the Biology Department in fulfillment of the lab requirement for the Biology major.\* The one semester laboratory is equivalent to a year of lab for medical school purposes.

A student may also fulfill the laboratory requirement by taking:

- a 5-point biology laboratory; or
- two terms of *BIOL C3500* taken for 3 credits and a letter grade, including the submission of a satisfactory research report; or
- *BIOL W3002*; or
- with permission of the Summer Undergraduate Research Fellowship (SURF) director or director of undergraduate studies, one summer of research as part of the Columbia SURF program (see below), plus one term of *BIOL W3500* in the same laboratory. \*This is the one departure from the Biology Department lab requirements. For the Biology major a summer of SURF is sufficient, but for the premedical requirement you must also take a semester of 3500 for 3 credits and a letter grade.

Note: Biomedical Engineering students may fulfill their Biology lab prerequisite with the completion of their three BME labs.

### Option 2

This option is appropriate for those students who are primarily interested in majoring in Environmental Science or Sustainable Development. However, students who choose this option may need to self-study some of the content in BIOL C2005 in order to be prepared for the MCAT.

#### **Lecture:**

**EEEEB W2001 Environmental Biology I: Molecules to Cells**

**4 pts.**

**BIOL C2006 Intro to Biology II: Cell Biology and Physiology**

**4 pts.**

**EEEEB W2001x Environmental Biology I: Molecules to Cells** 3 pts. Introductory biology course for majors in biology or environmental biology, emphasizing the ecological and evolutionary context of modern biology.

**BIOL C2006 Introductory Biology II: Cell Biology, Development & Physiology** 4 pts. Prerequisites: *EEEEB W2001* or *BIOL C2005*, or the instructor's permission. Lecture and recitation. Recommended second term of biology for majors in biology

and related majors, and for premedical students. Cellular biology and development; physiology of cells and organisms. Website: [https://courseworks.columbia.edu/access/content/group/BIOLC2006\\_001\\_2015\\_1/menu.html](https://courseworks.columbia.edu/access/content/group/BIOLC2006_001_2015_1/menu.html)

**Lab:**

**BIOL W2501 Contemporary Biology Lab**

**3 pts.**

**BIOL W2501 Contemporary Biology Laboratory** 3 pts. Corequisites: Strongly recommended prerequisite or required corequisite: *BIOL C2005* or *F2401*. Enrollment limited to 24 students per section. Attendance at the first class is mandatory. Fee \$150. Emphasis on experimental techniques and data analysis in a variety of biological disciplines.

**BIOL W2501** is the most common lab taken by premedical students, but students may also pursue any lab options accepted by the Biology Department in fulfillment of the lab requirement for the Biology major.\* The one semester laboratory is equivalent to a year of lab for medical school purposes. A student may fulfill the laboratory requirement by taking:

- a 5-point biology laboratory; or
- two terms of *BIOL C3500* taken for 3 credits and a letter grade, including the submission of a satisfactory research report; or
- *BIOL W3002*; or
- with permission of the Summer Undergraduate Research Fellowship (SURF) director or director of undergraduate studies, one summer of research as part of the Columbia SURF program (see below), plus one term of *BIOL C3500* in the same laboratory. \*This is the one departure from the Biology Department lab requirements. For the Biology major a summer of SURF is sufficient, but for premedical requirement you must also take a semester of 3500 taken for 3 credits and a letter grade.

Note: Biomedical Engineering students may fulfill their Biology lab prerequisite with the completion of their three BME labs.

**PHYSICS**

All SEAS students and any CC students interested in majors in Physics should take Physics during their first year. Other CC students generally take Physics either sophomore or junior year. There are four different Physics sequences. Students should choose a sequence based on their planned course of study (major(s)/concentration(s)/minor(s))

Option 1

**PHYS W1201-1202 General Physics**

**6 pts.**

**PHYS W1291-1292 General Physics Laboratory**

**2 pts.**

This option is appropriate for all premedical students with the **exception of SEAS students, and those interested in majors or concentrations in Chemistry, Physics, Biophysics, Chemical Physics, and Astronomy.**

**PHYS W1201x-W1202y General Physics** 3 pts. Prerequisites: Prerequisite for PHYS W1202: PHYS W1201 The course will use elementary concepts from calculus. Students should therefore have some basic background in calculus or should be concurrently taking *MATH V1101, Calculus I*. The accompanying laboratory is *PHYS W1291-1292*. Basic introduction to the

study of mechanics, fluids, thermodynamics, electricity, magnetism, optics, special relativity, quantum mechanics, atomic physics, and nuclear physics. Science Requirement: Partial Fulfillment.

**PHYS W1291x-W1292y General Physics Laboratory 1 pt.** Corequisite: *PHYS W1201-1202*. This course is the laboratory for the corequisite lecture course and can be taken only during the same term as the corresponding lecture.

### PHYSICS Option 2 – 4

These options are appropriate for all SEAS students and some CC students who are considering majors that would require a higher level physics. Students should choose a lecture sequence and choose a lab based on their program/major area of study.

### LECTURE OPTIONS

#### **2. PHYS W1401-1402 Physics**

**6 pts.**

**PHYS W1401x Introduction To Mechanics and Thermodynamics 3 pts.** Corequisite: *MATH V1101 or V1105*, or the equivalent. Fundamental laws of mechanics, kinematics and dynamics, work and energy, rotational dynamics, oscillations, gravitation, fluids, temperature and heat, gas laws, the first and second laws of thermodynamics. Science Requirement: Partial Fulfillment.

**PHYS W1402y Introduction To Electricity, Magnetism, and Optics 3 pts.** Prerequisite: *PHYS W1401*. Corequisite: *MATH V1102 or V1106*, or the equivalent. Electric fields, direct currents, magnetic fields, alternating currents, electromagnetic waves, polarization, geometrical optics, interference, and diffraction. Science Requirement: Partial Fulfillment.

#### **3. PHYS W1601 – 1602 Physics**

**7 pts.**

**PHYS W1601x Physics, I: Mechanics and Relativity 3.5 pts.** Corequisite: *MATH V1102* or the equivalent. Fundamental laws of mechanics, kinematics and dynamics, work and energy, rotational dynamics, oscillations, gravitation, fluids, introduction to special relativity and relativistic kinematics. The course is preparatory for advanced work in physics and related fields. Science Requirement: Partial Fulfillment.

**PHYS W1602y Physics, II: Thermodynamics, Electricity, and Magnetism 3.5 pts.** Prerequisite: *PHYS W1601*. Corequisite: *MATH V1201* or the equivalent. Temperature and heat, gas laws, the first and second laws of thermodynamics, kinetic theory of gases, electric fields, direct currents, magnetic fields, alternating currents, electromagnetic waves. The course is preparatory for advanced work in physics and related fields. Science Requirement: Partial Fulfillment.

#### **4. PHYS W2801-2802 Accelerated Physics I and II**

**9 pts.**

**PHYS W2801x-W2802y Accelerated Physics, I and II 4.5 pts.** Prerequisites: Advanced Placement in physics and mathematics, or the equivalent, and the instructor's permission. (A special placement meeting is held during Orientation.) This accelerated two-semester sequence covers the subject matter of *PHYS W1601, W1602* and *W2601*, and is intended for those students who have an exceptionally strong background in both physics and mathematics. The course is preparatory for advanced work in physics and related fields. There is no accompanying laboratory; however, students are encouraged to take the intermediate laboratory, *PHYS W3081*, in the following year.

### LAB OPTIONS

**PHYS W1291-1292 General Physics Lab**

**2 pts.**

**PHYS W1493 Experimental Physics Lab**

**3 pts.**

|   |               |
|---|---------------|
| <b>PHYS W1494 Experimental Physics Lab</b>                    | <b>3 pts.</b> |
| <b>PHYS W2699 Experiments in Classical and Modern Physics</b> | <b>3 pts.</b> |
| <b>PHYS W3081 Intermediate Lab</b>                            | <b>2 pts.</b> |

**PHYS W1291x-W1292y General Physics Laboratory 1 pt.** Corequisite: *PHYS W1201-W1202*. This course is the laboratory for the corequisite lecture course. It is best to be taken concurrently with the lecture.

**PHYS W1493x Introduction To Experimental Physics 3 pts.** Prerequisite: *PHYS W1401* and *W1402*. Laboratory work associated with the two prerequisite lecture courses. Experiments in mechanics, thermodynamics, electricity, magnetism, optics, and wave motion. Note: Students cannot receive credit for both *PHYS W1493* and *W1494*.

**PHYS W1494y Introduction To Experimental Physics 3 pts.** Prerequisite: *PHYS W1401*, *W1402*, and *W1403*. Laboratory work associated with the three prerequisite lecture courses. Experiments in mechanics, thermodynamics, electricity, magnetism, optics, wave motion, atomic physics, and nuclear physics. (Students cannot receive credit for both *PHYS W1493* and *W1494*.)

**PHYS W2699y Experiments In Classical and Modern Physics 3 pts.** Prerequisites: *PHYS W1601* (or *W1401*), *W1602* (or *W1402*), and *W2601*. Laboratory work associated with the three prerequisite lecture courses. Experiments in mechanics, thermodynamics, electricity, magnetism, optics, wave motion, atomic physics, and nuclear physics.

**PHYS W3081x or y Intermediate Laboratory Work 2 pts.** Primarily for junior and senior physics majors. Other majors require the instructor's permission. May be repeated for credit by performing different experiments. The laboratory has available thirteen individual experiments, of which two are required per 2 points. Each experiment is chosen by the student in consultation with the instructor. Each section meets one afternoon per week, with registration in each section limited by the laboratory capacity. Experiments (classical and modern) cover topics in electricity, magnetism, optics, atomic physics, and nuclear physics.

## **MATHEMATICS**

Although mathematics is not required by all medical schools, a number of schools require competency in this area, often equivalent to one semester of calculus and/or one of statistics. Your choice of courses should be based on your background and your intended program of study – there are some majors which will require a year or more of calculus. Please consult the CC or SEAS Bulletin for more specific information.

AP credit can, in most cases, be applied toward this one year recommended math requirement.

### **Calculus Options:**

**MATH V1101x or y Calculus I 3 pts.** Prerequisites: see Courses for First-Year Students. Functions, limits, derivatives, introduction to integrals.

**MATH V1102x or y Calculus II 3 pts.** Prerequisites: *MATH V1101* or the equivalent. Methods of integration, applications of the integral, Taylor's theorem, infinite series.

**MATH V1201x or y Calculus III 3 pts.** Prerequisites: *MATH V1101* with a grade of B or better or *Math V1102*, or the equivalent. Vectors in dimensions 2 and 3, complex numbers and the complex exponential function with applications to differential equations, Cramer's rule, vector-valued functions of one variable, scalar-valued functions of several variables, partial derivatives, gradients, surfaces, optimization, the method of Lagrange multipliers.

## Statistics Options:

The Department of Statistics offers three elementary survey courses, STAT W1001 (Introduction to Statistical Reasoning), W1111 (Introduction to Statistics - without Calculus), and W1211 (Introduction to Statistics - with Calculus). While any one of the three would be acceptable to medical schools, the best course for preparation for a future in medicine is probably STAT W1111. Some engineering students have a statistics course required for the major. These courses should also meet the prerequisite requirement.

**STAT W1001x and y Introduction to Statistical Reasoning 3 pts.** Prerequisites: Some high school algebra. A friendly introduction to statistical concepts and reasoning with emphasis on developing statistical intuition rather than on mathematical rigor. Topics include design of experiments, descriptive statistics, correlation and regression, probability, chance variability, sampling, chance models, and tests of significance. Science Requirement: Partial Fulfillment.

**STAT W1111x and y Introduction to Statistics (without calculus) 3 pts.** Prerequisites: Intermediate high school algebra. Designed for students in fields that emphasize quantitative methods. Graphical and numerical summaries, probability, theory of sampling distributions, linear regression, confidence intervals and hypothesis testing. Quantitative reasoning and data analysis. Practical experience with statistical software. Illustrations are taken from a variety of fields. Data-collection/analysis project with emphasis on study designs is part of the coursework requirement.

**STAT W1211x and y Introduction to Statistics (with calculus) 3 pts.** Prerequisites: one semester of calculus. Designed for students who desire a strong grounding in statistical concepts with a greater degree of mathematical rigor than in STAT W1111. Random variables, probability distributions, pdf, cdf, mean, variance, correlation, conditional distribution, conditional mean and conditional variance, law of iterated expectations, normal, chi-square, F and t distributions, law of large numbers, central limit theorem, parameter estimation, unbiasedness, consistency, efficiency, hypothesis testing, p-value, confidence intervals. maximum likelihood estimation. Satisfies the pre-requisites for ECON W3412.

**SIEO W4150x and y Introduction to Probability and Statistics 3 pts.** Prerequisites: MATH V1101 and V1102 or the equivalent. A quick calculus-based tour of the fundamentals of probability theory and statistical inference. Probabilistic models, random variables, useful distributions, expectations, laws of large numbers, central limit theorem. Statistical inference: point and confidence interval estimation, hypothesis tests, linear regression. Students seeking a more thorough introduction to probability and statistics should consider STAT W3105 and W3107.

**IEOR E3658x Probability 3 pts.** Lect: 3. Prerequisites: *Calculus*. For undergraduates only. This course is required for the OR:FE concentration. This class must be taken during (or before) the third semester. Students who take IEOR E3658 may not take SIEO W3600 or W4150 due to significant overlap. Fundamentals of probability theory. Distributions of one or more random variables. Moments, generating functions, law of large numbers and central limit theorem.

**IEOR E4307x Applied Statistical Models in Operations Research 3 pts.** Lect: 3. Prerequisites: *SIEO W3600* This course is required for undergraduate students majoring in OR:FE and OR. Analytical techniques and forecasting methodologies with application to industrial problems. Evaluation and comparison of techniques as they pertain to industrial applications. Term project.

**STAT W3105x Introduction to Probability 3 pts.** Prerequisites: MATH V1101 and V1102 or the equivalent A calculus-based introduction to probability theory. A quick review of multivariate calculus is provided. Topics covered include random variables, conditional probability, expectation, independence, Bayes' rule, important distributions, joint distributions, moment generating functions, central limit theorem, laws of large numbers and Markov's inequality.

**STAT W3107y Introduction to Statistical Inference 3 pts.** Prerequisites: STAT W3105 or W4105, or the equivalent. Calculus-based introduction to the theory of statistics. Useful distributions, law of large numbers and central limit theorem, point estimation, hypothesis testing, confidence intervals maximum likelihood, likelihood ratio tests, nonparametric procedures, theory of least squares and analysis of variance.

## PSYCHOLOGY

The MCAT now contains a new section entitled, Psychological, Social, and Biological Foundations of Behavior. This section will emphasize concepts physicians will need to know in order to serve the increasingly diverse patient population and to understand the impact of behavior on health. This MCAT section emphasizes that appropriate attention must be placed on learning about the social determinants of health and the human side of medicine. The majority of content in this section is drawn from introductory psychology concepts. A small portion is drawn from the field of sociology. While most medical schools have not named psychology as a specific prerequisite requirement, because of the content of the new MCAT, we recommend that students consider taking PSYC 1001 The Science of Psychology. This is the course at Columbia that we have determined best covers the new content on the MCAT. While we certainly encourage student to explore courses within the Sociology Department, there is no one course that we currently recommend. Many students may find that they can learn key concepts through self-study. For more information on the new MCAT please see [About the MCAT Exam](#)

**PSYC W1001x or y The Science of Psychology 3 pts.** Enrollment may be limited. Attendance at the first two class periods is mandatory. Broad survey of psychological science including: sensation and perception; learning, memory, intelligence, language, and cognition; emotions and motivation; development, personality, health and illness, and social behavior. Discusses relations between the brain, behavior, and experience. Emphasizes science as a process of discovering both new ideas and new empirical results. Science Requirement: Partial Fulfillment.

## BIOCHEMISTRY

One semester of biochemistry is currently required by a number of medical schools. We suspect that an increasing number of medical schools will add biochemistry to their required list in the future. While some medical schools may consider our BIOL 2005-2006 sequence in fulfillment of this requirement because it covers a lot of the foundational concepts, we cannot guarantee that all schools will accept this in fulfillment.

**BIOC W3300 Biochemistry** Prerequisites: one year each of Introduction to Biology and General Chemistry. Corequisites: Organic Chemistry. Biochemistry is the study of the chemical processes within organisms that give rise to the immense complexity of life. This complexity emerges from a highly regulated and coordinated flow of chemical energy from one biomolecule to another. This course serves to familiarize students with the spectrum of biomolecules (carbohydrates, lipids, amino acids, nucleic acids, etc.) as well as the fundamental chemical processes (glycolysis, citric acid cycle, fatty acid metabolism, etc.) that allow life to happen. In particular, this course will employ active learning techniques and critical thinking problem-solving to engage students in answering the question: how is the complexity of life possible?

**BIOC C3501x Biochemistry, I: Structure and Metabolism 4 pts.** Prerequisites: ENVB W2001 or BIOL C2005 and one year of organic chemistry. Lecture and recitation. Students wishing to cover the full range of modern biochemistry should take both BIOC C3501 and C3512. Protein structure, protein folding, enzyme kinetics, allostery, membrane transport, biological membranes, and protein targeting. Chemistry and metabolism of amino acids, carbohydrates, lipids, purines, and pyrimidines. Recitation Section Required.

## IMPORTANT NOTE:

As Columbia courses are not specifically designed nor taught to prepare students for any standardized test, including the MCAT, there may be some concepts or topics on the MCAT which were not covered in your courses. However, given the strong foundation and background that you will develop through coursework here, you will be able to pick up this additional content through self-study or through a test preparation course.

## SPECIAL NOTES RELATED TO CURRICULUM

### **AP Credit:**

Policies regarding the acceptance of AP credit in fulfillment of premedical requirements varies from medical school to medical school, and sometimes from course to course. Most medical schools will require applicants to take at least one additional college level course in the subject area should they receive AP credit for the course requirement.

Additionally, the AP policies at Columbia vary from department to department as they are the purview of the faculty in each field of study. Some departments do not grant credit until an advanced course has been completed successfully. Additionally, even though you may receive AP credit for an introductory level course, this does not necessarily mean a department will exempt you from a requirement for the major. In any case, AP credits are not awarded until the conclusion of the first year at Columbia.

The most common question surrounding AP credit and premedical requirements relates to Chemistry. Students who begin in either CHEM W3045-W3046 Intensive Organic Chemistry for First Year Students or CHEM W1604 Second Semester General Chemistry (Intensive) will receive 6 and 3 credits of AP respectively (should they have 4 or 5 on AP test, and earn a C or better in the sequence). These students are however still encouraged to go forward and take additional chemistry at the advanced level (biochemistry and/or other upper level chemistry) so that they may strengthen their skills and background and meet requirements for schools that are less open to accepting AP credit (including some of the state schools in California). [Click here](#) for a chart of policies regarding AP credit at the accredited medical schools.

### **Labs:**

It is generally desirable to complete the labs before senior year; however, this is not critical. Biology and biochemistry majors often will not take the major lab until senior year, and this presents no problem. Others may put off either the biology or the organic chemistry lab until senior year if necessary. However the biology lab may be useful for MCAT preparation and, therefore, it would help to do it before sitting for the MCAT.

### **Barnard Courses:**

It is permissible to take premed requirements at Barnard. It should be noted, however, that the Biology and Chemistry Departments in the College may not accept the courses towards the major. You should discuss this decision with your Advising Dean before making a decision. Also regarding the new MCAT, Barnard's biology class may not contain enough biochemistry to adequately prepare you for the new test. If you choose to take Barnard's biology sequence, you may have to supplement it with a Biochemistry course.

You should have good reasons for taking courses at Barnard and if you elect a sequence there you should try to take the entire sequence for consistency.

**Note:** some Barnard sequences begin in the spring and end in the fall. Thus, before choosing a Barnard sequence, please discuss the pros and cons with your Advising Dean or prehealth adviser.

### **Summer Courses**

#### Columbia College:

Summer courses at other institutions are not transferable to Columbia (**CC ONLY**) except in a few clearly outlined circumstances. Summer work at Columbia is, of course, acceptable. It is however, not desirable to take premedical sciences over the summer, except in unusual circumstances. Occasionally, a student's schedule will require taking summer courses, but the reason should not be to lighten your load during the academic year. Medical schools want to be assured of an applicant's capacity to handle heavy science loads and therefore may question your decision to take summer courses, if you have not demonstrated the ability to take on high volumes during the regular academic year. Additionally, the summer is a great time to pursue other types of experiences like research or clinical exposure.

Again, please consult an adviser before taking required premedical courses during summer session. If it is decided that summer is the best route, you need not take the course at Columbia in order for it to fulfill prerequisites for medical school – just as long as you don't need this course for your major or to fulfill other requirements.

#### School of Engineering and Applied Science:

The curriculum at **SEAS** can be very full and demanding, thereby requiring you to take one of the required premedical courses during a summer. Because SEAS students typically take four science courses a semester, a course taken over the summer won't raise the same concerns as it might for students enrolled at the College. However, taking courses over the summer might lead you to miss out on other important opportunities, including summer research and clinical experiences.

#### **Study Abroad:**

Premedical courses should not be taken during study abroad programs. Unfortunately, many medical schools will not accept coursework taken outside of the United States in fulfillment of requirements and therefore we do not recommend taking these required courses while abroad. However, we do absolutely encourage study and work abroad opportunities, for they offer many other benefits including cultural immersion. If you are interested in studying abroad, you should consult a premedical advisor so that you may carefully plan for this endeavor.

#### **Postbaccalaureate Studies:**

Not all Columbia students will know from the very start that medicine is where they want to end up. Some discover this part way through their undergraduate years or even after graduating. As a result, some students will finish their premedical coursework after graduating or enroll in a postbaccalaureate program that is specifically designed to allow one to complete the preparatory courses before application. These students may still take advantage of all of the advising services and the committee evaluation offered through Preprofessional Advising.

## THE MCAT

The Medical College Admission Test (MCAT) is a standardized, multiple-choice examination, required for application to medical school in the United States and Canada. This exam attempts to assess the knowledge and skills necessary for success in medical school. The MCAT changed in April 2015.

The new test consists of four sections:

- Biological and Biochemical Foundations of Living Systems
- Chemical and Physical Foundations of Biological Systems
- Psychological Social and Biological Foundations of Behavior
- Critical Analysis and Reasoning Skills

Medical college admissions committees consider an applicant's MCAT scores as part of their evaluation of applicants' academic readiness for medical school.

As stated above, in order to be prepared to take the MCAT, we recommend that students complete the following:

- 1 year of General Chemistry and General Chemistry Lab
- 1 year of Cell and Molecular Biology and Biology Lab
- 1 year of Organic Chemistry and Organic Chemistry Lab
- 1 year of General Physics and Physics Lab
- 1 semester of Psychology

Note: While the new MCAT will assess foundational concepts in biochemistry, in evaluating the available information provided by the AAMC regarding the test content, with the assistance of departmental faculty, it is our collective impression that that our introductory sequence in biology (BIOL C2005-C2006) will provide a good foundation upon which to prepare for the MCAT.

The timing of your MCAT depends on your application timeline. If you plan to apply to go straight on to medical school after graduation, it is recommended to take the MCAT no later than June following your junior year. Remember that the average age of an entering medical school student is 24, and about 70% of Columbia students take a gap year (or more) before applying to medical school.

The MCAT is offered on multiple test dates throughout the year, including test dates in January, March, April, May, June, July, August, and September. For a full calendar of test dates and sites, please refer to the MCAT section of the AAMC website: [www.aamc.org](http://www.aamc.org).

The MCAT is a test you can and should prepare for. Whether you do it by means of a commercial preparatory course, or on your own with one of the myriad preparation books, is a matter of personal taste. Whichever you decide, if you prepare as a full-time enrolled student, you should probably make some attempt to lighten your course or activities load during the semester/summer when you prepare.

Timing is essential for the medical school application, and it will be important that you take this test in a timely manner. It is helpful to consult a premedical adviser regarding your individual timing.

## PERSONAL COMPETENCIES (As defined by AAMC)

These areas of competency were first defined by the Innovation Lab, a group brought together by the AAMC to identify new ways to assess the personal competencies of applicants in the medical school application process. One of the first steps for this group was to define these competencies.

*1. Integrity and Ethics: Behaves in an honest and ethical manner; adheres to ethical principles and follows rules and procedures; resists peer pressure to engage in unethical behavior and encourages others to behave in honest and ethical ways.*

*2. Reliability and Dependability: Consistently fulfills obligations in a timely and satisfactory manner; takes responsibility for personal actions and performance.*

*3. Service Orientation: Demonstrates a desire to help others and a sensitivity to others' needs and feelings; demonstrates a desire to alleviate others' distress.*

*4. Social, Interpersonal, and Teamwork Skills: Demonstrates an awareness of others' needs, goals, feelings, and the ways that social and behavioral cues affect peoples' interactions and behaviors; adjusts behaviors appropriately in response to these cues; treats others with respect and demonstrates a respect for diverse populations.*

*5. Desire to Learn: Sets goals for continuous self-improvement and for learning new concepts and skills; assesses own strengths and weaknesses; solicits and responds appropriately to feedback.*

*6. Resilience and Adaptability: Demonstrates tolerance of stressful or changing environments or situations and adapts effectively to them; is persistent, even under difficult situations; recovers from setbacks.*

*7. Cultural Competence: Ability to relate to individuals from different cultural backgrounds. A willingness to seek exposure and interaction with diverse communities*

*8. Oral Communication: Clear communication and ability to present yourself.*

Part of your premedical preparation should be an ongoing self-assessment of your level of competency in these areas. If you perceive areas of potential weakness, you should talk with your premedical adviser to come up with strategies for self-improvement. The process should also help you ascertain with certainty whether or not medicine is the best profession for you.

## EXTRACURRICULAR OPPORTUNITIES FOR PREMEDS

It is first of all important to understand that medical schools are quite genuinely interested in what you have done in college besides take courses and prepare for the MCAT. You really are more than a composite of GPA and MCAT scores. However, it is equally important to understand that impressive extracurricular involvement will not save you if your numbers are too low. You will have to figure out

for yourself what the appropriate balance is. The medical profession needs people who have learned the best ways to balance their professional responsibilities and their personal lives. Some doctors will tell you it is the hardest thing they had to learn. College is not a bad time to start.

By and large, your choice of extracurricular activities should be guided quite simply by your interests. There is nothing intrinsically better about a cultural organization, a literary society, or the football team. Depth of involvement and leadership in one or two things rather than membership in many will probably be more meaningful, but really, this is an area where you should simply do what appeals to you. It may well be true that activities which involve taking care of people in need (children, the elderly, and the homeless) are appealing to medical schools, but so are activities that demand judgment, efficiency, organization, team work, leadership, and dedication. Do what suits you. When considering your activities, think about the personal competencies that have been defined by the AAMC. This might help to guide you in terms of ways to stretch yourself into areas that you have not yet developed or shown competency. For example, if all of your activities are solitary, a medical school may not have appropriate evidence to evaluate your social, interpersonal, or teamwork skills. Community work, or other activities where you are giving your time freely to aid others, may help a medical school to assess your service orientation. Since medicine is a service-related profession, demonstrating that you have a history of serving others is certainly helpful. Community work also provides you with the opportunity to step outside of your comfort zone, interacting with people different from yourself.

Also consider sticking with whatever you begin. Depth of involvement in an activity often leads to leadership opportunities, and this type of depth and commitment is something that is valued by professional schools.

Paid employment must also be seen as an extracurricular activity. It is recognized that some students must work in order to help contribute to their college expenses. Although it would no doubt be pleasant and interesting for you to be able to work in some medically related field – a doctor's office, a hospital, a lab – this is not always possible. However, a great many non-medical jobs will require intelligence, responsibility, integrity, judgment, good humor, and the ability to deal well with the public. All of these things and many more are of interest to schools. The point is to do whatever you *are* doing well and look for opportunities where you will grow and develop as an individual.

**There are two areas of extracurricular activity that may be seen as specifically appropriate for premeds: research experience and clinical experience.**

There is a long-standing myth that students “must do research” to get accepted into medical school. It is certainly true that much of the information upon which medical treatments are based was ascertained in the laboratory. It is also true that participating in a research experience (whether bench or clinical) will help you to be a more literate reader of the current research. But an outside lab experience is not absolutely required for entrance into medical school. Medical school admissions deans will often say that they like to see that applicants have “exposed themselves to some methodology for producing new knowledge.” They define this very broadly and thus it is not just limited to wet lab experience. A senior thesis in anthropology or a summer doing clinical research would fulfill this expectation as well as lab research. The exception here is the student who wishes to pursue a career in medical research and may even be applying for a combined MD/PhD degree. If

these are your interests, you will not only want, but need, to get extensive experience in basic science research beyond that provided by your course work. Opportunities are legion, both in our own departments and at our medical school (including those through the Summer Undergraduate Research Fellowships), but also at many of the medical schools and research establishments throughout the city and around the nation.

Clinical exposure is a different matter. This is something you do—expose yourself to doctors, nurses, and patients at the site of healthcare delivery. There is obviously nothing at all in your premedical course work which prepares you for the actual business of taking care of sick people. Many kind, compassionate, concerned, good-hearted individuals find that their own particular personality is not at all suited for medical care-taking. It is better to find that out before going to medical school rather than after. Clinical exposure will also help you to demonstrate your commitment and knowledge of the field of medicine, including both the rewards and challenges.

There are a number of ways in which a Columbia student can acquire clinical experience. Probably the most convenient because of proximity is volunteering at Mt. Sinai St. Luke's Hospital. It's close by, it's a teaching hospital, and it's accustomed to training prospective physicians at every stage of their education. The program is not open to first-year students until second semester. It is also possible to volunteer in a number of other hospitals and other healthcare delivery settings throughout the city and often near your own home in the summers. Please refer to our volunteer list at: <https://www.cc-seas.columbia.edu/preprofessional/health>

### **PREMEDICAL RELATED STUDENT ORGANIZATIONS**

This list is just a sampling – there are too many related organizations to list. Please attend the Activities Fair and check out the Student Development and Activities website to peruse other opportunities.

#### **AMSA**

The American Medical Student Association is a premedical society at Columbia University. This student club is a great community of students who share an interest in attending medical school. They plan programs and different lectures that are of interest to its members.

#### **CAPS**

Columbia University Association of Predental Students

This organization is dedicated to bringing together our predental students. It conducts panel discussions and field trips related to dentistry and dental school application.

#### **CU-EMS**

Columbia University Emergency Medical Service is a Division of Health Services at Columbia and the Department of Public Safety. It is a student operated, New York State certified, Basic Life Support (BLS) volunteer ambulance corps. CU EMS provides pre-hospital emergency medical care, free of charge, to Columbia University's Morningside Heights Campus and the surrounding area 24 hours a day, 7 days a week, 365 days a year. The corps has approximately 65 active members and responds to over 700 emergency calls per year.

#### **CUSJ**

Columbia University Science Journal. Student led publication focused on undergraduate research.

### **CHARLES DREW PREMEDICAL SOCIETY**

The Charles Drew Premedical Society was established in order to increase the number of minority students applying and entering into health professional schools. Charles Drew serves as a support group and a resource for all underrepresented premedical students in the Columbia community.

### **HEALTH LEADS**

Health Leads is a non-profit organization that aims to improve health by providing support and resources to the urban underserved. They operate student-run community help desks at both Harlem Hospital and Columbia Presbyterian.

### **PEER HEALTH EXCHANGE**

Peer Health Exchange recruits and trains students to teach health education in underresourced high schools in NYC. Volunteers teach twelve different workshops ranging from sexual health to substance abuse and nutrition. This is a great way to gain leadership experience and to impact the lives of young people.

## **THE APPLICATION PROCESS**

Students who wish to enter medical school in the fall following graduation from college will complete the application process in the summer between junior and senior years. Detailed instructions about the timetable and procedures are available for each new class in the fall semester and there will be general required and optional meetings for all prospective applicants to review the entire process. The important points to bear in mind before that time are the following:

### **Premedical Advisers**

During your first two years, you and your Advising Dean will work out a course plan, which includes the premed courses. In the fall or spring of your sophomore year, you will declare your major or concentration; at that time, you will be assigned an additional adviser in your department. It is highly advisable that you also meet with a Preprofessional Advising Dean in the Center for Student Advising. You can do this at any time and as early as your first semester.

### **Premedical Advisory Committee Letter of Evaluation**

The Premedical Advisory Committee (PAC) Evaluation is a comprehensive letter of evaluation and supporting document that is written for current students and alumni applying to graduate schools of the health professions. It is designed to provide the admissions committee with a complete understanding of each candidate's background and experiences both academic and extracurricular.

This letter is written on a student's request and only after the student completes all committee application requirements by the stated deadline. The committee application includes submission of letters of recommendation, resume, autobiography, activities grid, supplemental information form, as well as an interview with the PAC.

During the fall semester, Preprofessional Advising staff will hold an informational meeting for all students planning to apply to medical, dental, or veterinary school in the coming summer. At this time the application for the Committee Evaluation will be distributed and students will register their intent to apply to health professional school in the coming summer.

It is highly advisable to start accumulating letters of recommendation from faculty, employers, etc. at the end of each semester, unless you expect to have a continued association with your prospective referee, in which case you will request the letter directly prior to application. Forms are available on the Preprofessional website:

<http://www.studentaffairs.columbia.edu/preprofessional/health/forms/>

These letters should be sent by the writer to the Center for Student Advising/Preprofessional Advising (403 Lerner). They can be sent via the postal service (give them an addressed envelope) or as a .pdf via email to ([preprofessional@columbia.edu](mailto:preprofessional@columbia.edu)). The letters of reference will be kept on file for your application year. The recommendation waivers must accompany each letter received in our office, and you must make a consistent decision for all of your letters regarding the waiver. This is essential because eventually all of your letters will become a part of the Premedical Advisory Committee Letter of Evaluation. If you have questions about this, please consult a preprofessional adviser.

### **Application Timing**

Many students choose to apply to medical school after they have graduated from college. This may be because they started premed courses later in their college careers, want more time to finish prerequisites, wish to improve their records before applying, need more time to explore the field of medicine and gather professional experience, desire to achieve other goals before starting medical school, or simply because they would like a break before beginning the rigorous process of medical training. Today, the average entering age of matriculants is 24. Medical schools highly value the maturity that comes with experience in the world and therefore taking a gap year or two to grow in other ways outside the classroom may indeed enhance your candidacy.

Whatever the reason, it is always better to wait to apply to medical school until you are absolutely sure you are ready. It is too much work and too expensive to embark upon casually. Medical schools have absolutely no bias against older applicants, and in fact some schools have begun to prefer candidates with more life experience. Generally, students will present a much more impressive profile if they apply after getting some postgraduate experience. Columbia will, of course, continue to assist you in the application process whenever you choose to apply. In fact, approximately 65-70% of the applicants to medical school from Columbia have already graduated from college when they apply and take at least one year between college and medical school.

### **Columbia Outcomes**

Medicine is a profession which waxes and wanes in popularity. Over the past decade we have experienced an increase nationally in the number of applicants to medical school, and these numbers remain extremely high. Whatever the case may be, Columbia regularly sees a very high percentage of its applicants accepted to medical school. Broadly educated students, who have been involved in life as well as books, do extremely well in the competition. The key seems to be to see yourself first as a Columbia student, and second, as a premed.

# SUBSCRIBE TO THE

## ***CCSEAS-PRE-HEALTH LISTSERV***

The listserv provides students and alumni with information about upcoming on and off-campus events, scholarships, volunteer and research opportunities, summer programs, and other relevant information for those interested in health professions.

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