

Pre-Health Post-Baccalaureate Preparatory Programs
Core Studies and Specialized Studies

Student Handbook
Academic Year: 2022-2023



College of Liberal and Professional Studies
University of Pennsylvania

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The Pre-Health Post-Baccalaureate Preparatory Programs Student Handbook will be a useful resource for planning and implementing your program of study while you are a student in the College of Liberal and Professional Studies (LPS) at Penn. The handbook contains information concerning rules and regulations, procedures, options, advice and much more. Please read this document carefully and keep it for future reference.

COLLEGE OF LIBERAL AND PROFESSIONAL STUDIES (LPS)
PRE- HEALTH POST-BACCALAUREATE PREPARATORY PROGRAMS

(Pre-Health Programs):

Penn's Pre-Health Post-Baccalaureate Programs are designed for driven students, like you, who want to distinguish themselves as medical, dental, or veterinary school candidates. We are at the heart of an internationally renowned research university, offering you access to one of the finest health systems in the world. The rigorous academic challenges of our programs assure you—and admissions committees—that you are equipped to thrive at your future professional school. Our Pre-Health Programs Director and expert advising team draw upon [the full range of resources at Penn](#) to guide you through the health professional school application process and provide unrivaled support for your future career.

The [Pre-Health Core Studies](#) program supplies students who have little scientific background with key concepts and the rigorous training necessary to succeed in the health professional school of their choice. The [Pre-Health Specialized Studies](#) program is for students who possess a background in the sciences, but who are seeking to bolster their academic credentials and extend their studies. Many of our students don't fit neatly into either track, and our experienced advising team can help you develop a personalized profile of classes. Sample schedules for both programs are described below.

In general, basic pre-health curriculum usually expects the following courses are taken for a letter grade: two semesters each of biology, chemistry, organic chemistry, and physics, each with laboratories, and one semester of biochemistry. Many medical, dental, veterinary, and other health professional schools may require additional prerequisite courses such as English, calculus, statistics, physiology, microbiology, genetics, and behavioral sciences/humanities. It is the student's responsibility to know the required prerequisite courses for the desired professional schools to which they plan to apply.

Recommended courses to complete before taking the MCAT:

BIOL 1101 (BIOL 101): Introduction to Biology A
BIOL 1102 (BIOL 102): Introduction to Biology B
BIOL 2801 (BIOL 203): Essentials of Biochemistry or BIOL 2810 or **CHEM 2510** Principles Biological Chemistry
CHEM 1012 (CHEM 101): General Chemistry I or CHEM 1011/ CHEM 1021
CHEM 1022 (CHEM 102): General Chemistry II
CHEM 1101 (CHEM 053): General Chemistry Laboratory I
CHEM 1102 (CHEM 054): General Chemistry Laboratory II
CHEM 2410 (Chem 241): Principles of Organic Chemistry I
CHEM 2420 (CHEM 242): Principles of Organic Chemistry II
CHEM 2451 (CHEM 247): Experimental Organic Chemistry A

CHEM 2452 (CHEM248): Experimental Organic Chemistry B
PHYS 0101 (PHYS 101): General Physics I: Mechanics, Heat, & Sound
PHYS 0102 (PHYS 102): General Physics II: Electromagnetism, Optics, & Modern Physics

Some introductory course work in Psychology or Sociology, and Statistics may also be helpful. Speak with your Pre-Health academic advisor if you have not taken any behavioral sciences or statistics as part of your undergraduate preparation.

Recommended courses to complete **before** taking the **DAT**:

BIOL 1101 (BIOL 101): Introduction to Biology A
BIOL 1102 (BIOL 102): Introduction to Biology B
CHEM 1012 (CHEM 101): General Chemistry I or CHEM 1011/ CHEM 1021 sequence
CHEM 1022 (CHEM 102): General Chemistry II
CHEM 1101 (CHEM 053): General Chemistry Laboratory I
CHEM 1102 (CHEM 054): General Chemistry Laboratory II
CHEM 2410 (Chem 241): Principles of Organic Chemistry I
CHEM 2420 (CHEM 242): Principles of Organic Chemistry II
CHEM 2451 (CHEM 247): Experimental Organic Chemistry A
CHEM 2452 (CHEM248): Experimental Organic Chemistry B

Advanced course work in cell biology, biochemistry, physiology, or genetics may be helpful, recommended, or even required depending upon your professional school aspirations. Completion of Physics is not required for the DAT.

Academic Planning for Core Studies Track (Fall Start)

Math courses are frequently recommended for Core Studies' students to take prior to enrolling in our program please review our Core Studies website for [prerequisite skills in math](#). At a minimum, Core Studies students are required to have completed a college level pre-calculus course. Evidence of AP Calculus (both AB and BC) will also meet this math prerequisite.

All admitted Core Studies students are required to complete an online Pre-Health Math On-Ramp (ALEKS) course prior to enrolling in a chemistry or physics course. This requirement assures a baseline level of competency for all incoming core students. More information will be available to students upon admission to the Pre-Health program. The ALEKS Pre-Health Math On-Ramp course is available during the 11- week Summer Session so students are advised to plan ahead to assure they can fulfill this requirement before enrolling in classes.

Every new student is required to meet with a Pre-Health Advisor to create an academic plan prior to registering for classes (also known as 1st advising). Academic plans are individualized based on each student's academic background and goals. Recommendations from the Pre-Health admissions committee may also be incorporated into the academic plan. It is highly suggested that students meet with an academic advisor **at least twice per semester** while actively engaged in the Program.

Due to the number of laboratory sciences that Core Studies' students must complete prior to taking the MCAT or DAT, most students will need to distribute coursework over

a two-year timeline to both prepare for the MCAT/DAT and complete prerequisite course work. In light of the added rigor coursework with labs entails it is recommended that Core Studies students do not work while completing the Program. Although 12 course units (CUs) are the minimum required to complete the Core Studies Program most Core Studies students will complete 13 to 16 CUs in preparation for professional school.

Only the second-half of the LPS sequential science courses are offered during the Spring Semester (e.g. Intro to Biology B, General Chemistry II, General Physics II), therefore, Core Studies students are allowed to start in either the Fall Semester or Summer Term only.

A Fall Semester start or a Summer Term start is possible for completing the Core Studies Program within the two-year timeline. This is the typical pathway for most Core Studies students.

Study plans are individualized but the [sample study](#) plan outlined next page may be helpful:

Two-Year Fall-Start Core Studies Sample Plan

Term	Course	Course Units (c.u.)*
Year One		
Fall Semester	Physics I: Mechanics (lecture and lab): PHYS 0101-601	1.5
	Introductory Chemistry I Lecture: CHEM 1011-601/602 (lecture and recitation)	1
	General Chemistry I Lab: CHEM 1101-601/602 (lecture and lab)	0.5
Spring Semester	Physics II: Electromagnetism (lecture and lab): PHYS 0102-601	1.5
	General Chemistry II Lecture: CHEM 1021-601/602 (lecture and recitation)	1
	General Chemistry II Lab: CHEM 1102-601/602 (lecture and lab)	0.5
Summer Year 1	Complete the Biology sequence requirements: BIOL 1101-910/911 (lecture and lab) 1.5 cu in Summer Session 1 and BIOL 1102-920/921 (lecture and lab) 1.5 cu in Summer Session 2.	
Year Two		
Fall Semester	Organic Chemistry I lecture: CHEM 2410-601	1
	Experimental Organic Chemistry Lab (Part A): CHEM 2451-601 and CHEM 2451-602 (lecture and lab)	0.5
	Optional Advanced PH course	1 to 2
Spring Semester	Organic Chemistry II lecture: CHEM 2420-601	1
	Experimental Organic Chemistry Lab (Part B): CHEM 2452-601 and CHEM 2452-602 (lecture and lab)	0.5
	Optional Advanced PH course	1
	Essentials of Biochemistry: BIOL 203.601	1

This sample plan is just one of several options a pre-health student may select to prepare for the MCAT, DAT, or GRE and a June professional school application cycle.

Academic Planning for Core Studies Track (Summer Start)

Core students may also matriculate in the Summer term if planning to complete the Core Studies Program within a two-year or a one-year time line. However, a Summer Term start is a must if you intend to complete the Core Studies Program on a one-year timeline. Completing the Core Studies Program within a one-year timeline is reserved for academically exceptional students. Prior approval from the Program Director is required. Most international students must complete the Core Studies program with a summer start on a 1-year timeline due to visa requirements.

The decision whether to start with the BIOL 1101 and BIOL 1102 sequence or the CHEM 1012 and CHEM 1022 sequence in summer must be made **following a discussion with your admission interviewer and pre-health advisor**. To be eligible to begin the Core Studies program with the CHEM 1012/CHEM1022 sequence in the Summer Session, a student must have evidence of 2 semesters of college calculus or AP AB and BC.

If you have questions about your eligibility to complete the Core Studies program in 1-year please request a Pre-Advising appointment with the Program Director.

One-Year (four semesters) Summer-Start Core Studies Sample Plan

Term	Course	Course Units (c.u.)*
1st semester		
Summer Session I	General Chemistry I lecture and recitation: CHEM 1012-910 and CHEM 1012-911	1
	General Chemistry I Lab: CHEM 1101-911 (associated lecture and lab)	0.5
Summer Session II	General Chemistry II lecture and recitation: CHEM 1022-920 and CHEM 1022-921	1
	General Chemistry II Lab: CHEM 1102-920/921 (associated lecture and lab)	0.5
11-Week Summer Session Pre-Health (ALEKS) Math On-Ramp courses (no credit)		
2nd semester		

Fall semester	Intro Biology A lecture and lab: BIOL 1101-601 and BIOL 1101-602	1.5
	Physics I: Mechanics (lecture and lab): PHYS 0101-601	1.5
	Organic Chemistry I lecture: CHEM 2410-601	1
	Experimental Organic Chemistry 1 Lab: CHEM 2451-601 and CHEM 2451-602 (associated lecture and lab)	0.5
3rd semester		
Spring semester	Intro Biology B lecture and lab: BIOL 1102-601 and BIOL 1102-602	1.5
	Physics II: Electromagnetism (lecture and lab): PHYS 0102-601	1.5
	Organic Chemistry II lecture: CHEM 2420-601	1
	Experimental Organic Chemistry 2 Lab: CHEM 2452-601 and CHEM 2452-602 (associated lecture and lab)	0.5
4th semester		
Summer 11-Week Semester	Essentials of Biochemistry lecture: BIOL 2801-900	1

Some students may fall between the Core Studies and Specialized Studies track. Generally, if a student has completed 50% of the core curriculum (6 c.u.s) it would be most appropriate to follow the Specialized Studies track. This determination can be made in consultation with an Admission Interviewer or at the 1st advising session in consultation with a Pre-Health advisor and with approval of the Pre-Health Programs Director. Students may not switch their track from Core to Specialized after the first semester in the program.

Academic Planning Options for Specialized Studies Track

The Pre-Health Specialized Studies Program is designed to help you build a more competitive professional school application. The Specialized Studies Program will meet your needs if you already have a significant scientific background but seek to bolster your academic credentials and update your knowledge of more advanced topics in the sciences, such as biology or neuroscience.

All new Specialized Studies students are required to meet with a Pre-Health Advisor to create an academic plan of study before enrolling in courses. Study plans vary to accommodate each student's plans and academic background. Specialized Studies students may complete courses on a full-time or part-time basis:

Full-time students in the program will take four courses per term, usually in biology, anatomy and/or neuroscience, and complete their studies in 2 semesters. See sample schedule.

One-Year Full-time Specialized Studies Sample Schedule

Term	Course	Course Units (c.u.)
Year One		
Fall Semester	Essentials of Cell Biology: BIOL 2001-601	1
	Essentials of Physiology: BIOL 2301-601	1
	Essentials of Genetics: BIOL 2201-601	1
	Elements of Microbiology: BIOL 2701-601 (lecture and lab)	1
Spring Semester	Pathophysiology: BIOL 3313-601 (lecture)	1
	Neurological Basis of Autism: NRSC 4430-601	1
	Infectious Disease Biology: BIOL 3004-601 (fully online)	1
	Histology: BIOL 3006-601 (lecture and lab)	1
Total c.u.s		8

Part-time students who are working full-time or part-time in a health-related field generally take 2 courses per term, completing the program in 4 semesters, or 2 years.

Disclaimer: International students are required to complete their program requirement full time (enrolled in 4 course units/semester) over 3 semesters.

Academic Advising

The Director of the Pre-Health Post-Baccalaureate Preparatory Programs oversees the academic advising for all students enrolled in the program. Your pre-health advisors should be viewed as partners in your academic success. Every new student who enrolls in our program will have an individual 1st advising session with a member of the Pre-Health Advising team. This first planning session is mandatory and recommended prior to course registration. After that, follow-up advising appointments should be made *within the first 2 weeks of the start of the program and at least twice each semester.*

The Pre-Health Programs employ an “open advising” team model. That means each student is assigned to a team of advisors, not one single advisor. Your advising team is visible in Path@Penn. This model provides greater access to advising for students and it provides greater opportunity for the advisory to know the students. Advisors provide

direction on course selection, credible resource referrals on campus, support on academic progress, career options, professional school selection, and overall support while in the program. Advising appointments are available for in-person, telephone, or video meetings by contacting the Pre-Health Programs Coordinator at 215.746.2238 or by scheduling directly via the online **Penn Pre-Health Connect Site** via <https://pennprehealth.sas.upenn.edu/>

Penn Pre-Health Connect Site

The Penn Pre-Health Connect online service is made available to Pre-Health students based on their **active** enrollment with Penn LPS under the University's subscription agreement with PeopleGrove. New Pre-Health students are added to the Penn Pre-Health Connect Site during the week of new student orientation.

Penn Pre-Health Connect is an online platform designed to help students with scheduling of advising appointments, receiving program announcements, registering for events, program-specific resources, contributing to discussion boards, networking with your peers, and much more!

To explore the Penn Pre-Health Connect Site, you will access it via <https://pennprehealth.sas.upenn.edu/>

- An account was set-up for you by our program with either the email you have listed in the Penn Directory or if no email address is in the directory, your email address from your CollegeNet (admissions) application.
- We have not added Pennkeys to the system.
- A welcome email from Pre-Health Connect Site was sent to the associated email address with a temporary password. Check your SPAM/JUNK folder. If it's not there, select the 'forgot password' to reset it.

Please add the following to your safe sender contact list to the email associated with your Penn Pre-Health Connect Site account: pre-health@sas.upenn.edu This is how our program team will communicate important announcements, events, resources, opportunities to all active Pre-Health students.

It's very important to check your Notification settings and set them to daily digest so you don't miss anything.

Post-baccalaureate Pre-Health Certificates of Academic Achievement

The Post-Baccalaureate Pre-Health Programs at the University of Pennsylvania offer four options for a Post-Baccalaureate Certificate of Academic Achievement in Pre-Health Studies to provide incentive for academic excellence for highly motivated, dedicated students intent on a career in medicine or other health professions:

More information can be found here:

<https://www.lps.upenn.edu/non-degree-programs/pre-health/core/schedules>

<https://www.lps.upenn.edu/non-degree-programs/pre-health/specialized/schedules>

Certificates of Academic Achievement are issued to eligible students in September upon successful completion of the requirements.

Linkage

Penn's Pre-Health Programs participates in "linkage" agreements with the following allopathic medical schools: George Washington University School of Medicine, Rutgers Robert Wood Johnson School of Medicine, Rutgers New Jersey Medical School and the University of Pittsburgh School of Medicine; one osteopathic medical school: Philadelphia College of Osteopathic Medicine; and one dental school: the University of Pennsylvania School of Dental Medicine. This arrangement eliminates the application glide year between pre-health coursework completion and matriculation into medical or dental school. Linkage admissions are very selective; only a small number of placements are awarded each year.

Each medical and dental school determines the eligibility criteria and timeline of the nomination process. Candidates accepted in a linkage program are required to complete all pre-health coursework at Penn and take the MCAT/DAT by the spring semester of the same year they expect to begin medical and dental school. Performance criteria are determined by each medical and dental school, and all acceptances are contingent upon final review of a candidate's academic performance in the Penn Pre-Health Programs and MCAT/DAT results. For each linkage program, the MCAT/DAT deadline varies, as does their criteria for considering students in the Core Studies or Specialized Studies track and the recommended length of study at Penn (1-year or 2-years). The Pre-Health Program reserves the right to withdraw any linkage candidate for failing to follow the outlined process or failing to maintain communication with the program office once they are in the application process.

If you are interested in linkage, please speak with a Pre-Health Advisor. More information on Linkage can also be found here: <https://www.lps.upenn.edu/non-degree-programs/pre-health/features/linkages>

Pre-Health students can view the current eligibility criteria and timeline for Linkage on the Penn Pre-Health Connect Site under the resource tab.

Volunteering

Experience is essential in the field of healthcare you are pursuing. We recommend that our students complete volunteer, community service, shadowing and/or research experiences in healthcare. There are many opportunities for volunteer work at Penn and in Philadelphia; **it is up to you** to choose the setting and the type of experience you seek. We provide a *sample list* of contact people and volunteer programs on the Penn Pre-Health Connect Site, as well as current research postings.

Make time for volunteering: you will enjoy it, you will do something for others, and medical, dental, veterinary and nursing schools **expect** that you will have tested out your career interest in the "real world" of healthcare delivery prior to applying.

Pre-Health Programs Enhancements

During both the fall and spring semester, the Pre-Health Programs team will offer a variety of programming for current Pre-Health students to attend. In the fall semester we will feature distinguished speakers with current Penn health experts and beyond, a few career panels and alumni panels, along with various skill building workshops.

In the spring semester, we will focus on application-gearred workshops on how to apply to medical, dental, and veterinary school; tips on writing personal statements; and prospective nominee process for linkage.

All events will be posted on the Penn Pre-Health Connect Site Event page followed by an email announcement for registration.

Collecting Letters of Recommendation

An important component of your application to professional school is your letters of recommendation (LOR). You should begin assembling your portfolio of letters as soon as you begin the Pre-Health Programs. We recommend letters from faculty who can discuss your academic credentials, professionals who can provide insight into your potential as a future healthcare practitioner, and, when applicable, individuals who can discuss your volunteer, laboratory, or clinical experiences. We suggest that applicants applying to medical, dental, or veterinary school obtain three to five letters.

All of your letters are to be maintained confidentially until you are ready to apply to professional healthcare school. You can talk to a Pre-Health Advisor on the best way to collect your letters.

Pre-Health Committee Letter Eligibility

The Pre-Health Programs Evaluation Committee provides individualized committee letters for students who are applying for professional studies at medical and dental schools. As described by AMCAS, “the Committee Letter is a letter authored by a pre-health committee or pre-health advisor and intended to represent your institution's evaluation of you.” The committee letter becomes part of a recommendation packet assembled by Penn LPS which also includes your individual letters of recommendation.

Requests for a Pre-Health Committee Letter are due **March 1st of the application cycle**. Requests submitted after the March 1st deadline will not be considered.

Pre-Health students must meet the established minimum criteria for the committee letter and be in good academic standing with the program. The current eligibility criteria for a Pre-Health Committee Letter is posted on the Penn Pre-Health Connect Site under the resource tab which will also include information about the supporting materials that are required as well as the best way to collect and submit your internal materials. *Our program team will host a few information sessions the end of the fall semester and beginning of the spring semester each year to review the committee letter process.*

A few conditions of the Pre-Health Committee Letter:

- Once completed, Pre-Health Committee Letters are only good for **ONE application cycle** to medical or dental school.
- The Pre-Health Programs team will write a Pre-Health Committee Letter ***within one year of completion of the program***, provided that all other eligibility requirements have been met and the internal deadlines for a committee letter are observed.

Application cycle refers to the summer an applicant applies to a health professional school for the following fall semester matriculation.

Pre-Health students who do not meet eligibility requirements for a Penn LPS Pre-Health Committee Letter are advised to be in contact with the pre-health staff of their undergraduate institutions to request an institutionalized committee letter for alumni.

Pre-Health students applying to veterinary medical colleges may request a Director's Letter of Support for their application. You will be required to meet with the Program Director and must be in good academic standing with the program in order to receive one.

Application to Medical School

Each year the majority of our students are applying to medical school: allopathic (MD), osteopathic (DO), and/or dual degree programs (e.g.: MD/PhD or DO/PhD). Every applicant to medical school needs to complete the MCAT (Medical College Admission Test). The MCAT, offered January and March-September, is a computerized test that provides a mechanism for medical schools to assess all applicants on a single criterion. This is an important part of your credentials.

The MCAT requires extensive preparation, and students should begin preparing for this exam months in advance. Students are encouraged to discuss test preparation planning with their Pre-Health Advisors. While many students prepare successfully on their own, consult with your Pre-Health advisor about commercial test preparation resources available to students. In addition, we have free curated MCAT resources available to Pre-Health students through Canvas. You can request access to the online Canvas course through our Program Coordinator.

Additional information about the MCAT can be found on the Association of American Medical Colleges (AAMC) website: <https://www.aamc.org/students/applying/mcat/>

In addition to reviewing medical school admission websites, the following professional resources are very valuable when it comes time to navigate medical school admission requirements and how to develop your school list when it comes time to apply to medical school:

- **AAMC MSAR- Medical School Admission Requirements guide:**
<https://www.aamc.org/students/applying/requirements/msar/>

- **AACOM's Student Guide to Osteopathic Medical Colleges:**
<https://choosedo.org/explorer/>

The majority of medical schools participate in a primary application service:

- Allopathic schools use **AMCAS: American Medical College Application Services** <https://www.aamc.org/students/applying/amcas/>
- Osteopathic schools use **AACOMAS: American Association of Colleges of Osteopathic Medicine Application Services:** <https://choosedo.org/how-to-apply/>
- Texas Medical (MD and DO) Schools use **TMSAS: Texas Medical & Dental Schools Application Services:** <https://www.tmsas.com/>

Application to Dental School

With our proximity to the University of Pennsylvania School of Dental Medicine, a number of our students that enter our program are interested in applying to dental school. Information about dental school programs and requirements can be found on the American Dental Education Association website <http://www.adea.org/>.

The ADEA also publishes an official guide for applying to dental school and what the admission requirements are each year:

- **ADEA Official Guide to Dental Schools:** <https://www.adea.org/officialguide/>
- **As well as a new online Dental School Explorer guide:**
<https://dentalschoolexplorer.adea.org/>

As part of the dental school application process, applicants must take the **Dental Admission Test: DAT**. The DAT requires extensive preparation, and should only be taken after all the basic science courses are completed, specifically general biology, inorganic/general and organic chemistry. The test is arduous and students should begin preparing for this exam months in advance. While many students prepare successfully on their own, commercial test preparation discounts may be available to students through the program. Detailed information about the test can be found on the American Dental Association DAT website: <https://www.ada.org/education/testing/exams/dental-admission-test-dat>

The primary application used by most dental schools is known as the **AADSAS: Associated American Dental Schools Application Service:**
<https://aadsas.liaisoncas.com/applicant-ux/#/login>

Texas Dental Schools use the TMSAS (Texas Medical & Dental Schools Application Services): <https://www.tmsas.com/dental/index.html>

Application to Veterinary School

With our proximity to the University of Pennsylvania, School of Veterinary Medicine, we additionally have a number of students preparing to become veterinarians. Information

about programs and the application process is found at Association of American Veterinary Medical Colleges home page: <http://aavmc.org/>.

A valuable resource is the **Veterinary Medical School Admissions Requirements (VMSAR)** <https://www.aavmc.org/publications/vmsar.aspx> which outlines each veterinary school admission requirements. Recently, a majority of veterinary medical schools have decided not to require the GRE revised General Test as part of their admissions process. Pre-vet students need to check the individual VMD's program requirements before deciding not to take the GREs.

Pre-Health students are encouraged to check with the program director for available discounts for GRE test prep. Here is additional information regarding the **GRE revised General Test**: <http://www.ets.org/gre/>

The primary application service for pre-vet applicants to apply to the majority of veterinary medical colleges is called **VMCAS: Veterinary Medical College Application Services** <https://www.aavmc.org/students-applicants-and-advisors/veterinary-medical-college-application-service>

ACADEMIC SERVICES, REGISTRATION, AND ADMINISTRATIVE PROCEDURES

College of Liberal and Professional Studies Academic Services

LPS Student Services & Records staff is available to help Pre-Health Core Studies and Specialized Studies students. Students may receive assistance for registration of courses; billing and adjustments; issues relating to student records and academic standing; and identifying campus resources.

In addition, students should see an LPS Student Records Coordinator to transfer from one LPS program to another, or to transfer internally to another school at the University.

Course Selection

Students should consider carefully the amount of time they have for study and preparation of assignments before registering for courses in order to avoid registering for more course work than they are able to complete and handle. All Pre-Health Core and Specialized Studies students must meet with a member of the Pre-Health Advising team at the beginning of their academic career to plan their course schedule.

During the academic year, Penn LPS Pre-Health courses are offered in the evening (and some on Saturday). A complete listing of LPS courses with times and descriptions are on our website on the online *Course Guide*, available in February for the following Fall and Summer terms and in October for the Spring term. LPS course listings are also available on the web at <https://www.lps.upenn.edu/courses/lps>

During the summer session, Pre-Health courses are rostered throughout the day and into the evenings. The *Course Timetable* appears in late February (for Fall and Summer

terms) and October (for the Spring term) and is updated on the web in the *Course and Room Roster*, <https://sfs.upenn.edu/registration-catalog-calendar/rosters-timetables>

Additionally, all undergraduate courses are open to admitted Pre-Health Core and Specialized Studies students. Students may take day or evening courses at their discretion, with the understanding that there is a **significant difference in tuition** outside of LPS courses. Students are discouraged from enrolling in courses at other schools outside of Penn. **Please keep in mind that course(s) taken elsewhere will not be included toward the minimum c.u.s necessary for a committee letter and/or certificate.**

Many courses list prerequisites in their course descriptions. Students should consult the program or instructor if they have a question about fulfilling prerequisites. Prior academic work may also fulfill a prerequisite. The *University of Pennsylvania Registrar*, which is available on the web at <https://catalog.upenn.edu/> provides course descriptions for the courses listed in the *Course Timetable*.

Advance Registration and Add/Drop Periods

Students may register for courses through Path@Penn the University's web-based online registration system; LPS staff can provide assistance or answer questions. Complete registration instructions are included in the *Course Timetable*. In order to access the registration system, students must have an active PennKey—a user name plus password. Students can access Path@Penn via <https://sfs.upenn.edu/path-at-penn>

Path@Penn is a student's main hub for information about their academic records, financial aid, and student profile. More information about using Path@Penn can be found on the LPS website under the Current Students tab via <https://www.lps.upenn.edu/students/current-students>

The course registration process involves two registration periods. The first is **Advance Registration Request Period**, when students enter their requests for courses they wish to take. At the end of Advance Registration, a scheduling program processes all registration requests at the same time to determine who gets enrolled in the requested courses. Students should check their course requests following the advance registration request period to verify enrollment for that term. Students may advance register during a two-week period starting in late March for the following Fall term and during a two-week period in early November for the following Spring term.

There is no Advance Registration Request Period for Summer terms, but students may register for summer courses at the same time that they advance register for the Fall term.

The second Registration period is **Add/Drop Period** which opens approximately three weeks after the Advance Registration Request Period has closed and students have been notified of their schedules. During this period, students who participated in

Advance Registration Request Period who wish to make changes to their schedules may Add/Drop as they wish through their Path@Penn accounts. Students will know immediately what changes have been processed by viewing their Path@Penn schedules online.

Permits and Authorizations

The courses that require special permission from the instructor are indicated in the *Course Timetable*. The majority of Pre-Health courses are designed to allow priority registration for Pre-Health students and do not require permits for pre-health students. The permits are authorized by the instructor or department and entered by the department offering the course. A permit is not a registration. Students must “claim” the permit by actually enrolling in the course through **Path@Penn**. A permit reserves a seat in the course; an authorization allows you to enroll if a seat is available. After both Advance Registration and Add/Drop periods have ended, the Registrar's Office removes unclaimed permits from students' records.

Course Change Deadlines (Dropping, Adding, Withdrawing)

LPS deadlines differ from those of other colleges and schools at Penn; adherence to LPS deadlines is strictly observed. Students should consult the LPS website for term-specific registration deadlines. The LPS Academic Calendars also indicate any corresponding financial obligations: <https://www.lps.upenn.edu/about/academic-calendar>

Adding a Course

Students may add a new course via **Path@Penn** through the second week of the term, *except for foreign language courses and writing courses, which may only be added through the first week*. Students should consult the [LPS Academic Calendar](#) for term-specific deadlines.

When making registration changes via **Path@Penn**, students should always verify their schedule to make sure the changes have taken effect before logging out.

Dropping a Course

Students may drop a course with no financial obligation until the published deadline in the current *LPS Course Guide* (approximately two weeks into the term). Students should consult the online LPS Academic Calendar for term-specific deadlines. Students can officially drop a course through Path@Penn until the initial drop deadline.

Absence from class does not constitute a drop nor does notifying the instructor.

Students who fail to drop a course officially within published deadlines may receive a grade of “F”.

When making registration changes via **Path@Penn**, students should always verify their schedule to make sure the changes have taken effect before logging out.

Late Drop Period

Students may also drop a course between the second and fourth weeks of the term, but in so doing they will **incur a 50 percent financial obligation** for the tuition and fees for the dropped course. During this period, students must go to the LPS Current Student page to access the online Late Drop Form: <https://www.lps.upenn.edu/students/current-students> The completed online form must be submitted by the end of the business day (5:00PM EST) by the last day of the Late Drop period. Students should consult the online LPS Academic Calendar for term-specific deadlines.

Absence from class does not constitute a drop, nor does notifying the instructor. Students who fail to drop a course officially within published deadlines may receive a grade of “F”.

Withdrawing from a Course

Students wanting to discontinue a course after the late drop period has ended would need to withdraw from the course (until the published withdraw period deadline). Students should consult the current *LPS Course Guide* on the LPS website for term-specific deadlines.

Students who withdraw from a course after the late drop period will **have full 100% financial obligation and a “W” notation** on their official Penn transcript.

To withdraw, students must go to the LPS Current Student page to access the online Withdrawal Form: <https://www.lps.upenn.edu/students/current-students>

The completed online form must be submitted by the end of the business day (5:00PM EST) by the last day of the Withdraw period. Students should consult the online LPS Academic Calendar for term specific deadlines.

Students are encouraged to discuss their withdrawal and overall academic progress with a Pre-Health Advisor and Program Director within the Pre-Health Programs by scheduling an advising appointment

Auditing a Course

Pre-Health courses are not open to auditors. In special situations a student may obtain permission to audit a Pre-Health course from the Program Director. Auditing requires registering for the courses as an auditor and the tuition is the same as taking the course for a grade. Observers are not permitted to be added to any Pre-Health course.

Changing Grade or Credit Status of a Course

Pre-Health students are required to take a course for a grade only. Changing grade status to pass/fail is not allowed on any pre-health course.

Deferred Enrollment

Students who are admitted to LPS may defer their matriculation for up to one year **ONLY**. Students who wish to do so should notify LPS of their intentions as early as possible. It is not necessary for deferred students to reapply. However, students must

inform LPS if they enroll at any other institution prior to their matriculation at LPS, and they must submit final official transcripts of any coursework completed prior to their enrollment at LPS.

Please note: Core Studies students can only defer to fall or summer terms.

Inactive Status

Students who do not enroll in courses for four consecutive terms, including summer, are considered inactive status. They will be officially dropped from the student rolls of the University of Pennsylvania as of the fourth term not enrolled. After being dropped, students wishing to resume their studies at Penn are required to reapply for admission and pay a new application fee.

Pre-Health students at LPS are advised that they must also make adequate academic progress in their programs as outlined below under “**Maintaining Academic Standing**” and “Failure to Maintain Academic Standing.”

LPS ACADEMIC POLICIES

Course Unit

Academic credit is defined by the University of Pennsylvania as a course unit (c.u.). Usually, a one-CU course at Penn is converted to 4 semester credit hours elsewhere. Credit earned through LPS is full University of Pennsylvania academic credit. In general, the average course offered at Penn is listed as being worth 1 c.u.; courses that include a lecture and a lab are often worth 1.5 c.u.s.

Grading System

The following grades are used to report the standing of a student upon completion of each course.

A+	= 4.0 Distinguished
A	= 4.0 Excellent
A-	= 3.7
B+	= 3.3
B	= 3.0 Good
B-	= 2.7
C+	= 2.3
C	= 2.0 Average
C-	= 1.7
D+	= 1.3
D	= 1.0 Below Average
F	= 0.0 Failure
GR	= No Grade reported for student
NR	= No Grades reported for course
I	= Incomplete (see below)
II	= Extended Incomplete (see below)
P	= Pass (A+ to D)
S	= Satisfactory progress
U	= Unsatisfactory
W	= Withdrew
AUD	= Audit
X	= Academic Violation

Incomplete Grades

An incomplete grade indicates that a student has not completed all the work in a course and has done so with the instructor's permission. If the work for a course is incomplete as a result of the student's unexplained failure to hand in assignments or to take the final examination at the regularly scheduled time, the instructor should issue a grade of "F" for the course.

An instructor who chooses to grant an extension to a student who has not completed a course by the end of the term may grant either an Incomplete (I) or an Extended

Incomplete (II). An Incomplete must be made up within the **first four weeks of the start of the next term**, and an Extended Incomplete must be made up **by the end of the next term** (including summer term). In either case, if the Incomplete is not made up by the deadline, it will become an “F”. An Incomplete is made up only when the official grade is received by the LPS Office. Once an Incomplete grade is converted to an “F”, the instructor may change the grade after the student has completed all required work. Students with two or more Incomplete grades are subject to registration hold and are required to meet with the Director of the Pre-Health Programs to explain the circumstances of the incompletes and develop an academic plan to resolve them.

Failures

The grade of “F” remains on the record and is not erased even if students have repeated the course with a passing grade. Students who fail a major or major-related course may be required to repeat the course at the discretion of the major advisor. A grade of “F” is always calculated in the cumulative grade point average.

Academic Grievances

The instructor who gives an evaluation, exam, or course grade has sole authority for changing such evaluation, exam, or course grade provided the instructor remains on the faculty (or the emeritus faculty) of the University of Pennsylvania. In cases in which faculty appointments have terminated, or faculty have resigned or are deceased, sole authority for changing an evaluation rests with the Undergraduate Chair of the relevant department. LPS students who wish to have an evaluation, exam, or course grade reviewed must first discuss the matter with the instructor who gave the evaluation unless the instructor is no longer a member of the University of Pennsylvania faculty or emeritus faculty. Should this meeting not yield a resolution that is satisfactory to both the student and the instructor, or not be possible, the student may ask the Undergraduate Chair of the relevant department or the Pre-Health Program Director for assistance in the matter.

A student who has a concern about any other matter related to a course should first discuss the matter with the instructor of the course. Should this meeting not yield a resolution that is satisfactory to both the student and the instructor, or not be possible, the student may ask the relevant undergraduate chair or the Pre-Health Program Director for assistance in the matter.

Should the matter not be resolved with the aid of the undergraduate chair or the Pre-Health Program Director, then the student may seek the assistance of the Director of Academic Affairs of LPS. The role of the Director of Academic Affairs is limited to insuring that the department or program has arranged for a proper review of the matter.

Repeating a Course

Students may not repeat any course for credit toward a degree in which a passing grade (D or better) has been received (with the exception of writing courses and certain Fine Arts courses). A student may, however, repeat a course in order to demonstrate his or her ability to achieve a better grade. This second grade will be reflected on the

student's transcript, but no credit will be awarded for the repeated course, and it will not be averaged into the student's cumulative grade point average. Students should consult with a Pre-Health Advisor before registering for a course they have already taken at Penn.

Maintaining Academic Standing

Post-Baccalaureate Pre-Health Core and Specialized Studies students must maintain good academic standing. To be competitive, it is strongly recommended that Pre-health students strive to achieve and maintain a cumulative grade point average of 3.50 (B+) or higher. The minimum requirements for maintaining good academic standing include all of the following conditions:

- maintain a cumulative GPA of 2.00 or higher
- earn a term GPA of 2.00 or higher; and
- accumulate no more than two Incompletes, F's or Withdrawals in one term; and
- accumulate no more than five Incompletes, F's, or Withdrawals during the course of their academic career; and
- make adequate progress toward completing program requirements

Failure to Maintain Academic Standing

1. **Academic Probation:** Students who fail to meet one or more of the conditions listed above will be placed on academic probation. LPS will notify students when they are placed on academic probation. Students on Academic Probation will be required to meet with the Pre-Health Director and may be placed on registration hold. It is expected that all students on probation will be enrolled in the term following probation.
2. **Deferred Drop Probation:** Students may be placed on Deferred Drop Probation if they fail to meet the requirements for recovery from Academic Probation, or their academic term GPA is below 1.70. Students on deferred drop probation must achieve a minimum GPA of 2.00 for that semester. If they do not, they may be dropped from the rolls. Students on Deferred Drop Probation will be required to meet with a LPS Student Services staff member and will be placed on registration hold until they meet with a LPS advisor. It is expected that all students on probation will be enrolled in the term following probation.
3. **Mandatory Leave of Absence:** Students who accumulate two or more incomplete grades in a given semester may be placed on a mandatory leave of absence until such work is finished. Students placed on mandatory leave must complete all outstanding course work before they are allowed to re-enroll and continue with new work. Students on mandatory leave of absence may not receive credit at Penn for courses taken at another institution during the leave.
4. **Conditions to be restored to good academic standing:** Students who are on academic probation must remedy the condition(s) that placed them on academic probation within the next three courses they take, with no grades of W, F, I, GR, or NR and no more than one pass/fail course.
5. **Conditions for readmission:** Students who have been dropped for poor academic performance and who wish to be considered for readmission must contact the Director of the Pre-Health Programs for requirements and procedures

for readmission. Students will not be considered for readmission for one full calendar year following dismissal. Credit will not be given for courses taken at another institution during that year. If a student is readmitted, the student must maintain good academic standing through to program completion. If the student fails to meet these conditions, the student will be dropped from the University without further warning, and with no opportunity for readmission.

Petition Procedure

Students who wish the College of Liberal and Professional Studies to waive any academic requirement or regulation must submit a petition to the College of Liberal and Professional Studies Petition Review Committee, as appropriate, and, if relevant, to the instructor involved. Students should begin the petition process by meeting with the Program Director to determine the most appropriate course of action. Petition forms may be obtained from the Pre-Health Programs Director at LPS or via this link <https://sdfs.upenn.edu/registrar/forms>.

Final Examinations

Final examinations for LPS courses must be given on the first regular class meeting night (at the regular meeting time) during the period of final examinations. No change in scheduling is permitted without unanimous consent of all students in the class and the Program Director. A final exam may not be administered on a reading day or during the last week of classes.

In addition, the Provost's statement on "Rules Governing Final Examinations," found at http://www.upenn.edu/provost/images/uploads/Rules_Governing_Final_Examinations.pdf, applies to all LPS courses and makes clear that no classes covering new material may be held during the reading days although review sessions may be scheduled. No students shall be excused from a final examination in a course where such an examination is required. In exceptional instances, such as serious illness or injury, students may be allowed to postpone the examination with the approval of the instructor.

Transcripts

An official Penn transcript can be ordered through the "Order my official transcript" link on [Path@Penn](#) for a fee. Most students and alumni from the Class of 1988 onward can view unofficial transcripts for free at any time through [Path@Penn](#).

Leave of Absence

Students take time away from their studies for a wide variety of reasons including to: manage a medical concern, fulfill a family obligation, pursue career-related opportunities, complete military service, or work on a political campaign

While interrupting your studies to take time away may seem intimidating, a leave is a means to the successful completion of your academic program, not a barrier.

If you are considering a leave, take time to think carefully about your goals for your time away and for when you return. Speaking with the Pre-Health Program Director is an important first step. Depending on your circumstances you should get advice from other sources as well. Students taking time away in order to manage a medical condition should discuss the leave with their healthcare provider. Your Program Director will help you connect with other campus resources as you prepare to take a leave of absence, such as Student Financial Services, Housing, and International Student and Scholar Services.

Students typically take a leave for a full academic year. Individual circumstances may require more or less time; the length of the leave is determined by the school. Students on leave should remain in contact with their Program Director and update them about changes in plans. The return from leave process supports students in a successful re-entry to academic life at Penn. When preparing to return, students must consult their Pre-Health Program Director to develop a plan that includes connection with appropriate resources.

(1) Requesting a Leave of Absence

- You must meet with the Program Director to discuss a leave request.
- You must submit a written request for leave of absence, detailing the reasons for the desired leave.
- The leave request will be evaluated and, if the request is approved, the program will stipulate conditions that must be met by you before returning from leave.
- You will be notified with the result of the leave request. The program may deny any request for leave. In granting leaves, the decision of the program is final.
- While you are on leave, you may not be enrolled in Penn classes and will not receive credit for classes taken elsewhere during the leave unless special approval by the program is given. Students on leave may not live in University-owned housing during the term of their leave. In addition, students may not participate in and/or hold a leadership position in a registered University organization.
- Discontinuance of study without permission from the University does not constitute a leave of absence. If you have requested a leave of absence for a given semester, you may still be dropped from the University rolls if your previous term's grades qualify you for this action.

(2) Checklist: Leave of Absence, Drop or Withdrawal

Once a leave of absence or withdrawal has been approved, or you have been dropped from the program, that action will be posted to your transcript. Your PennCard will be deactivated as soon as the leave, drop, or withdrawal has been processed.

You should notify all relevant offices of the leave or drop. These offices may include the following, if applicable:

- [Student Registration and Financial Services](#)
- [Housing and Conference Services](#)
- [International Student and Scholar Services](#) (ISSS)
- [Student Health Service](#)
- [Office of Student Conduct](#)

(3) While Out

During the term of your leave or drop, you may call your program office if you have any questions. Please be aware of the conditions for return outlined in your leave or drop letter, since you will be required to fulfill them before you may re-enroll.

(4) Applying to Return

You must apply to return from leave or drop by the relevant deadline (for the fall semester, July 15; for the spring semester, November 15; for the summer, April 15). Any return request submitted to the Program Director later than the deadline may be denied. Please fill out a request to return from leave and show that you have fulfilled all of the conditions for return as outlined in your original letter from your program.

TUITION, FEES, AND FINANCIAL AID

Tuition

Tuition is the cost of instruction. Evening courses, day courses, and graduate courses cost different amounts. The current tuition rates for LPS courses can be found in the *LPS Course Guide* and on the web at <https://www.lps.upenn.edu/non-degree-programs/pre-health/tuition>. LPS students who take day (or summer) courses must normally pay day (or summer) rates for tuition and general fee.

For day (undergraduate) rates, please reference <https://www.lps.upenn.edu/non-degree-programs/pre-health/tuition>

For summer rates, please reference: <https://summer.sas.upenn.edu/tuition>

Tuition rates for undergraduate day courses and graduate courses may be obtained from the Student Financial Services Office, Room 100, Franklin Building, 3451 Walnut Street, 215.898.1988, or the LPS Student Records Office, 215.746.6902.

In cases where a Pre-Health student has a time conflict between 2 LPS classes, and there is an equivalent day class available, students may request a tuition reduction

approval from the Program Director. The Course-Conflict Tuition Adjustment form can be found on the Pre-Health website under Tuition.

Program Fee

The program fee is assessed each term and enables LPS to maintain and provide for non-academic services.

General Fee

A General Fee is assessed to all undergraduate, graduate, and professional students, and directly funds Penn's non-instructional student support services. The General Fee for full-time students provides them with full access to a wide variety of services and resources, including counseling and wellness, multicultural resource centers, student activities, recreation and fitness, learning support, and much more.

Special Course Fees

Non-credit courses are offered at special fees announced in the *LPS Course Guide* each term. These are listed (as are laboratory and other course fees payable in addition to tuition) with the course description in the *LPS Course Guide*.

Technology Fee

The technology fee covers all the public computing labs, networking access and a host of other computing services and local support.

Clinical Fee

This mandatory fee is assessed to all full time students and supports Penn Wellness services, including Campus Health, Counseling and Psychological Services, the Student Health Service, and the Office of Alcohol and Other Drug Programs

Online Course fee

The online course fee (\$150) is required for students enrolled in an online or hybrid course and covers additional services associated with those courses.

Payment Process

Effective September 1, 2006, Student Financial Services discontinued paper billing and implemented Penn.Pay, a web-based electronic billing system for Student Accounts. With the electronic billing system, student account billing statements are accessible from any computer with Internet access. Students are notified by an e-mail that is sent to their University-assigned e-mail accounts when the new monthly statement is ready for viewing. Payment options are online via the Penn.Pay service (ACH), or mailing a check to a lockbox processing center; a printable PDF file will be available on Penn.Pay to accompany check payments.

The Office of Student Financial Services post e-bills within four to six weeks after the registration has been processed. All tuition and fees are payable by the date indicated on the bill. Students are required to pay in full the amount listed. Students with billing/payment questions or problems should contact Student Financial Services

(215.898.1988). Students who have not received a bill within six weeks after registration should contact the LPS Student Records Office (215.746.6902).

Late Payment

Students will continue to be held liable for payment until such time as their indebtedness is removed. Exceptions may be granted by petition to the College of Liberal and Professional Studies Student Services Committee and only under extraordinary circumstances. The University reserves the right to withhold registration material, transcripts, and all other information regarding the record of any student who is in arrears in the payment of tuition, fees, or any other charges, including student loans. For continued delinquency in the payment of debts to the University, the student may be permanently dropped from the rolls. The enforcement of this penalty shall not relieve the student of the obligation to pay any outstanding fees and charges.

Payment of Tuition, Fees, and Other Charges

All amounts billed are due on the due date indicated on the bill. The bill states the charges for tuition, fees, room, board, and other expenses from a variety of offices across Penn in a central billing statement. It may show both actual and temporary credits from a variety of sources.

Payment may be made by mail. Send the payment coupon (lower portion of the bill) and a check, made payable to the:

The Trustees of the University of Pennsylvania
P.O. Box 785551
Philadelphia, PA 19178-5551

Payment also may be made in person by bringing the payment, along with the payment coupon (lower portion of your bill) to the University Cashier:

Franklin Building Lobby
3451 Walnut Street
Philadelphia, PA 19104

Balances remaining unpaid beyond the due date are subject to a late payment penalty of 1.5% per month on the unpaid balance which will appear on the next statement.

The current bill is always available online at Penn.Pay: <https://srfs.upenn.edu/billing-payment/pennpay>

No student shall be awarded a degree or certificate who has not paid in full all financial obligations to the University.

When a check for payment of a bill is not honored on presentation to the payer bank, the bill is considered unpaid. As a result, late payment penalties will be assessed together with a \$30.00 returned check charge.

Tuition Refund Policy

Under the following circumstances, all or part of tuition will be refunded.

1. Dropped Courses

If a student drops a course within the first two weeks of the start of the semester, the associated full tuition, general fee, and technology fee will be refunded by credit to the student's University account. Although students are permitted to drop without academic penalty between the ends of the second and fifth weeks of the term, only 50% of the tuition, general fee, and technology fee will be refunded. If a student withdraws from a course after the fifth week of classes, a grade of 'W' is recorded on the transcript, and the student is responsible for the entire tuition and fees for the course. A student who has not yet paid at the point of withdrawal will nevertheless remain indebted to the University until the tuition is paid. Please refer to the LPS Academic Calendar for term-specific deadlines: <https://www.lps.upenn.edu/about/academic-calendar>

2. Illness

A student who withdraws because of an acute illness may petition the LPS Petition Review Committee to request a partial refund of tuition. A petition, together with a doctor's letter, must be submitted. The physician's letter must state that the student has been disabled by illness or injury arising after the beginning of classes and is unable to continue class work. Students experiencing illness that will disrupt their academic program are encouraged to meet with the Program Director to plan for their academic progress.

3. Cancelled Courses

The University reserves the right to cancel or change any course. If a College of Liberal and Professional Studies course is cancelled or rescheduled at a time during which the student is unable to attend, all tuition and fee charges will be refunded.

STUDENT IDENTIFICATION AND UNIVERSITY-WIDE ELECTRONIC RESOURCES

PennCard

When present on campus for face-2-face courses, all LPS students are **required** to obtain a PennCard, the official University of Pennsylvania identification for students, faculty, and staff. The PennCard provides access to University facilities, services, cash convenience, and more. To obtain a PennCard, bring a valid form of photo ID (driver's license, passport, etc.) to the PennCard Center, Second Floor of Penn Bookstore, 3601 Walnut Street or via application through Penn Campus Express. Only enrolled students may receive a PennCard, which should be carried at all times. The PennCard site can be found here: <http://cms.business-services.upenn.edu/penncard/>

PennKey

All LPS students are **required** to obtain a PennKey. A PennKey is required to authenticate, or verify, an individual's identity and to access many of Penn's networked computer systems and services. Authorized users need a PennKey and password to access such resources as Path@Penn, Canvas, certain library resources, and public campus computers. A PennKey is also required to obtain a Penn email address. Newly admitted students will receive a PennKey setup code via email within 5-7 business days of the receipt of their enrollment form. If you have not received a PennKey setup code within that time frame, you should contact pennkey@isc.upenn.edu. If you wish to get it sooner, please allow two business days after submitting your enrollment form before visiting the Registrar's office. You will need to show a photo ID. The following site provides more information about the PennKey:

<http://www.upenn.edu/computing/pennkey/>.

Path@Penn

Path@Penn provides secure access via the Internet to online course registration, class schedules, academic records, future academic planning, billing, financial aid application status and awards, address corrections and updates, and student health information. A PennKey is required to access Path@Penn at <https://sfs.upenn.edu/path-at-penn>

Penn Email

SAS students have several options for email. As a SAS student, you will create an email address based on your PennKey. For example, if your PennKey is "bfranklin", your email address will be "bfranklin@sas.upenn.edu". This is the address that is entered for you in the Penn directory and is the address that your professors, advisors and others at Penn will use to communicate with you. Information about how to forward your SAS email to an existing account can be found here:

<https://www.sas.upenn.edu/computing/help/students/email/forwarding>

UNIVERSITY-WIDE SELECTED STUDENT SERVICES

The Weingarten Center

The Weingarten Center, located at 220 South 40th Street, Suite 260 is Penn's home for Academic Support and Disability Services.

For more information about the Weingarten Center visit their website at <https://wlrc.vpul.upenn.edu/>

Academic Support:

The Weingarten Center provides academic support by the way of learning consultations, tutoring and interactive programs to support Penn students as they develop learning strategies and content knowledge to further their academic and professional goals. To get started, please visit the web at <https://wlrc.vpul.upenn.edu/academic-support/>

Student Disabilities Services

The Weingarten Center includes Student Disabilities Services (SDS), which provides comprehensive professional services and programs for students with disabilities to ensure equal academic opportunities and participation in University-sponsored programs. Reasonable accommodation to a qualified student's known disability may be provided to assure equal access. Penn invites students with disabilities to self-identify at any time during their course of study as enrolled students. Although the self-identification process is confidential and completely voluntary, it is required for those requesting accommodation. Disability Services may be contacted via the web at <https://wlrc.vpul.upenn.edu/disability-services/>

Counseling and Psychological Service

The Counseling and Psychological Service (CAPS) offers a wide range of services including: individual and group counseling and therapy, crisis intervention, structured workshops, psychological testing, medication reviews, and consultation. The staff of CAPS consists of psychologists, psychiatrists, and social workers. In addition, psychology doctoral interns, psychiatric residents, psychology practicum students, and social work field placement students supplement the professional staff. Services are without charge to Penn students. What a student discusses with CAPS will be treated as private and confidential and will be revealed only with the student's permission, or in a psychiatric emergency, such as when the need exists to prevent injury to oneself or others. For more information: <https://caps.wellness.upenn.edu/>

Office of the University Ombudsman

The Office of the Ombudsman assists individuals in finding solutions to problems that they may not be resolvable through other channels. The office is concerned with safeguarding individual rights and promoting better channels of communication

throughout the University. It is independent of all administrative offices. The Ombudsman is not an advocate for any one individual or group. He or she is an advocate for fairness, adherence to University regulations, due process, and personal responsibility. The Office supplements, but does not replace, any existing grievance mechanisms or modes of redress. It can and does recommend changes in existing rules and practices when necessary. The Office of the Ombudsman may be reached at 215.898.8261 or <https://ombuds.upenn.edu/>

Student Health Services

The University has a number of health-related requirements for full time students. These include completion and submission of health and immunization records, coverage for outpatient medical care through Penn Student Health Service (SHS), and maintenance of health insurance coverage for in-patient and catastrophic care. Students are advised to call SHS at 215.746.3535 or consult their website at <https://shs.wellness.upenn.edu/> for the most accurate and up-to-date information on student health requirements.

The University provides outpatient medical care to students through its Student Health Service. The SHS offers an array of clinical services, including initial and follow-up treatment of acute medical illness and injury, management of chronic health problems, health screening, and preventive care.

All full-time students *must* carry coverage for care at the Student Health Service, either through payment of the Clinical Fee or through enrollment in the Penn Student Insurance Plan (PSIP). Full-time students who have private or employer-sponsored insurance do not have to purchase the student plan, but they must still pay the clinical fee for coverage at the Student Health Service.

Coverage for the Student Health Service (either through the clinical fee or through enrollment in PSIP) is *optional* for part-time students.

The Student Health Clinic is located at 3535 Market Street, Suite 100. Students must bring their PennCard and insurance information whenever they go for medical care. For hours and other information refer to the Student Health Services website <https://shs.wellness.upenn.edu/contact/> or call 215.746.3535.

Student Health Insurance

The University requires all full-time students to maintain medical insurance with coverage for in-patient care and catastrophic illness and injury. Students may satisfy insurance requirements through private or employer-sponsored plans or through enrollment in PSIP. All full-time students must either enroll in PSIP or submit a waiver indicating alternative coverage. *Full-time students who fail to provide information about coverage will be enrolled and billed for PSIP.*

Part-time students may enroll voluntarily in PSIP, but they are *not* subject to the insurance requirement, and will *not* be enrolled by default in PSIP. Coverage for the

Student Health Service (either through the Clinical Fee or through enrollment in PSIP) is *optional* for part-time students: <https://shs.wellness.upenn.edu/psipinsurance/> /

Immunization

Students enrolled in the College of Liberal and Professional Studies are part of the University community and benefit from the University's efforts to provide a safe and healthy environment. The following LPS students must comply with University immunization requirements upon first enrolling in credit courses:

- students who enroll full time;
- students who are eligible for, and purchase, the Penn Student Insurance Plan;
- students who use the Student Health Service, whether part or full time;
- students enrolled in a LPS degree program (AA, BA, BFA, MLA, MES, MSAG, MAPP and MUSA), whether part-time or full-time.

To comply, LPS students should complete a Pre-Matriculation Health Record obtained from the Student Health Service. Please note: Students born on or before January 1, 1957 are exempt from the above requirements. The Student Health Service can provide missing immunizations at a fee that covers costs.

LPS students who are not in the above categories are strongly encouraged to update their immunizations and file them with the Student Health Service using the Health Record. In the event of an outbreak of a communicable disease in any Penn class, all students in that class would be required to comply immediately with the University immunization requirements. Contact the Immunization Coordinator at 215.746.3535, menu option #4 or email immune@pobox.upenn.edu

A comprehensive list of campus resources can be found here: <https://home.vpul.upenn.edu/support-resources/>

UNIVERSITY-WIDE SELECTED POLICIES:

**For Information concerning all Published Policies Relevant to Students see
The Pennbook: Resources, Policies & Procedures Handbook
Published by the Office of the Provost**

<https://provost.upenn.edu/> Code of Academic Integrity

In as much as the standing of an educational institution and the value of a degree from that institution are dependent upon the integrity of study and research carried on at that institution, the Code of Academic Integrity is drawn to make clear the policy of the University concerning academic honesty. Each student attending the University must abide by this code, the text of which is available on the web at <https://catalog.upenn.edu/pennbook/code-of-academic-integrity/>

Confidentiality of Student Records

Pursuant to the Family Educational Rights and Privacy Act of 1974 (“FERPA”), as amended, in general, personally identifiable information can be disclosed to people outside the University only with the written consent of the student or alumnus/a involved. A statement setting forth specific University policy concerning the following **(1)** disclosure of information to people outside the University, **(2)** disclosure of information to people within the University, **(3)** permitting students to inspect and review records, and **(4)** providing students with the opportunity to seek the correction of their records is available. The complete confidentiality statement is available on the web at <https://catalog.upenn.edu/pennbook/#text>

Non-Discrimination Policy Statement

The University of Pennsylvania values diversity and seeks talented students, faculty, and staff from diverse backgrounds. The University of Pennsylvania does not discriminate on the basis of race, sex, sexual orientation, religion, color, national or ethnic origin, age, disability, or status as a Vietnam Era Veteran or disabled veteran in the administration of educational policies, programs, or activities; admissions policies; scholarship and loan awards; athletic, or other University-administered programs or employment.

Questions or complaints regarding this policy should be directed to: Executive Director, Office of Affirmative Action and Equal Opportunity Programs, Sansom Place East, 3600 Chestnut Street, Suite 228, Philadelphia, PA 19104-6106 or 215.898.6993 (Voice) or 215.898.7803 (TDD). See also <https://catalog.upenn.edu/pennbook/#text>

LPS PRE-HEALTH PROGRAMS COURSES

Human Anatomy ANAT

Pre-Health students are allowed 1.0 CU of ANAT to apply toward CORE or SPECIALIZED program requirements. Students must obtain prior approval from the program director for any exceptions to this policy. Outside of the program requirements, students may take as many ANAT courses as they wish to pay for, but they will not substitute for program requirements. ANAT series is offered Fall, Spring, and Summer.

ANAT 5130 (0.5 CU)

(ONLINE) *Human Anatomy: Cardiovascular and Respiratory Systems*

This 0.5 CU human anatomy course will cover anatomy, embryology, histology, and imaging of the cardiovascular and respiratory systems. The objectives are to: 1) define and discuss the structures that participate in the process of respiration; 2) compare and contrast structures situated in the chest (thorax and mediastinum); 3) describe anatomic differences of the right versus the left lung, structures in each lung, and how each lung functions; 4) summarize the anatomic differences in the atria and ventricles of the heart and how these chambers contract, resulting in the opening and closing of the atrioventricular and semilunar valves; 5) compare and contrast the histology of the heart, bronchi, bronchioles, and lung alveoli; 6) analyze and identify anatomic structures in plain films and/or other imaging modalities; and 7) discuss the embryology of the heart and lungs, including fetal and postnatal circulation and common congenital heart malformations.

ANAT 5140 (0.5 CU)

(ONLINE) *Human Anatomy: Digestive System*

This 0.5 CU human anatomy course will cover anatomy, embryology, histology, and imaging of the digestive system. The objectives are to: 1) define the embryological basis for the formation of the gastrointestinal tract; 2) define and discuss the anatomic structures that make up the digestive system, including the mouth, larynx, esophagus, stomach, small intestine, large intestine, liver, and biliary tract; 3) compare and contrast the arterial blood supply and the functional and histologic differences in various parts of the gastrointestinal tract; and 4) analyze and identify anatomic structures in plain films and/or other imaging modalities.

ANAT 5150 (1 CU)

(ONLINE) *Human Anatomy: Musculoskeletal System*

This 1.0 CU human anatomy course will cover anatomy, embryology, histology, and imaging of the musculoskeletal system, including the limbs, vertebral column, and back. The objectives are to: 1) discuss the anatomic structures that make up the major parts of the musculoskeletal system, which are the vertebral column and back, upper limbs, and lower limbs; 2) identify the blood supply, innervation, and musculature of the upper limbs, including the shoulder, elbow, wrist, and hand; 3) identify the blood supply, innervation, and musculature of the lower limbs, including the hip, knee, ankle, and foot; 4) define the components of the nervous system that affect the musculoskeletal system, limbs, vertebral column, and back and discuss nerve lesions; 5) discuss how herniated disks, fractures of the upper and lower limbs, and impingement of nerve roots can result in musculoskeletal abnormalities, and 6) analyze and identify anatomic structures in plain films and/or other imaging modalities.

ANAT 5160 (0.5 CU)

(ONLINE) *Human Anatomy: Endocrine and Reproductive Systems*

This 0.5 CU human anatomy course will cover anatomy, embryology, histology, and imaging of the endocrine and reproductive systems. The objectives are to: 1) define mechanisms of hormonal signaling; 2) describe the anatomic relationships and gross structure of major endocrine and reproductive organs, including the hypothalamus, pituitary glands, thyroid gland, parathyroid glands, pancreas, adrenal glands, gonads, breasts, and male and female reproductive systems; 3) characterize the microscopic anatomy of major endocrine and reproductive organs; 5) assess the regulation of major hormonal axes and intuit pathophysiologic effects of hormonal dysregulation; 6) explain the effects of significant hormones on their respective target tissues; 7) trace the embryologic origins of the endocrine and reproductive organs, including the pharyngeal apparatus.

ANAT 5170 (0.5 CU)

(ONLINE) *Anatomy of the Head and Neck: Cranial Nerves and Their Distribution*

This 0.5 CU human anatomy course will cover anatomy, embryology, histology, and imaging of the head and neck with emphasis on the cranial nerves and their distribution. The objectives are to: 1) identify major bone and cartilage components of the neck and skull and how they develop; 2) describe sources of innervation to face, CN V and VII; 3) name cranial nerve innervations of extraocular muscles of the eyes; 4) name major elements that make up naso-, oro-, and laryngeal pharynx; 5) name the cranial nerves involved in swallowing; 6) identify the signs and symptoms of lesions of each of the cranial nerves; and 7) identify structures on CT and plain film imaging of head and neck.

ANAT 5180 (0.5 CU)

(ONLINE) *Brain and Spinal Cord: Longitudinal Neural Pathways*

This course, covering the anatomy, development, and cytology of the central nervous system, including a detailed examination of the functional and clinical neuroanatomy of the spinal cord, prepares students to: - Compare and contrast the differences in how the neural tube and neural crest develop, and list their postnatal derivatives. - Compare the malformations that result in open versus closed neural tube defects, including the ability to distinguish the different forms of spina bifida. - List the major excitatory and inhibitory neurotransmitters used by neurons in the central and peripheral nervous system. - Compare the functions of Schwann cells and Oligodendrocytes in forming myelin and the differences in autoimmune diseases (MS and Guillain Barre) associated with each. - Recall the basic anatomy of the spinal cord including the vertebral level where the cord end and meninges end, what makes up the conus medullaris and cauda equina, and which cord segments innervate the upper and lower limbs. - Contrast the two divisions of the ANS in terms of locations of pre and post ganglionic neuron cell bodies, neurotransmitters utilized and receptors that they bind to. - Describe the names and locations of the two neurons that generate voluntary versus reflex contractions of skeletal muscle, and be able to draw and label a cord section with these neurons. - Recall the differences between the myotatic and inverse myotatic reflexes. - Describe how these two sensory systems utilize three neurons to process sensory information. - Draw out the three neurons that are components of the DC/ML System and label the modalities of their dorsal roots, their course and sites of termination. - Draw out the three neurons that are components of the Anterolateral System and label the modalities of their dorsal roots, their course and sites of termination. - Summarize the major signs and symptoms of the 7 common spinal cord diseases and clinical conditions including Polio, Tabes dorsalis, ALS, Subacute Combined Degeneration, Syringomyelia, Anterior cord syndrome, Brown Sequard Syndrome.

ANAT 5190 (1 CU)

(ONLINE) *Brain and Spinal Cord: Motor and Sensory Functional Systems*

This course, covering the anatomy of the central nervous system, including a detailed examination of the functional and clinical neuroanatomy of the brainstem, cerebellum, diencephalon, visual system, auditory system and cerebral cortex, prepares students to:

- Describe the cerebellar connectional anatomy that permits the right side of the cerebellum to promote fine-tuning of skeletal muscles on the right side of the body. - Recall how cerebellar lesions cause tremor with movement and how hemisphere lesions of the cerebellum differ from vermis lesions. - Identify which lesions result in dysmetria, disidiadochokinesis, and gait ataxia. - Describe the major components of the Direct and Indirect Basal Ganglia Pathways, the neurotransmitters that they use and their roles in initiating movement or suppressing unwanted movement. - Contrast the signs and symptoms of those with a direct (Parkinson's) and indirect (Huntington's) basal ganglia disease and how each cause different forms of resting tremors. - Name the 4 major tracts that traverse the brainstem and the signs and symptoms if each is lesioned. - Discuss how motor and sensory nuclei of brainstem cranial nerves are organized into functional longitudinal columns in the brainstem and note how this organization correlates with the entry and exit points of cranial nerves. - Distinguish the gaze malfunctions that result from lesions to the Frontal Eye Field, PPRF, and MLF. - Trace the path of a visual stimulus from the nasal and temporal parts of the retina to the cuneus and temporal gyrus of visual cortex. - Draw out the different visual field deficits and the causes evident in lesions to the optic nerve, optic chiasm, optic tract, optic radiations and visual cortex. - Describe the three components of the ear and how the organ of Corti transduces mechanical energy into generator potentials. - Distinguish between the lesion sites and causes of a sensorineural versus a conductive hearing loss and how one uses the Weber and Rinne tests to determine the nature of the hearing loss. - Differentiate the major nuclei of the thalamus and their functions. - Describe the different embryonic origins of the pituitary and the nuclei in the hypothalamus that control or contribute to the functional activity of each pituitary component. - Name the lobes that make up the cortex and distinguish the vascular territories of the anterior, middle and posterior cerebral arteries. - Describe how the dominant hemisphere differs functionally from the non-dominant hemisphere. - List four different lesion sites in the dominant hemisphere that result in an aphasia and list the signs and symptoms of that aphasia. -

BIOL 1101 (1.5 CUs)***Introduction to Biology A***

General principles of biology focusing on the basic chemistry of life, cell biology, molecular biology, and genetics in all types of living organisms. Particular emphasis will be given to links between the fundamental processes covered and current challenges of humankind in the areas of energy, food, and health. BIOL 1101 is the companion course to BIOL 1102 and should be taken before BIOL 1101. There is a linked co-requisite laboratory course for BIOL 1101. (3 hrs. lec., 3 hrs. lab, 1.5 c.u.)

BIOL 1102 (1.5 CUs)***Introduction to Biology B***

General principles of biology focusing on evolution, physiology, development, and ecology in all types of living organisms. General principles of biology focusing on evolution, physiology, development, and ecology in all types of living organisms. BIOL 1102 is the companion course to BIOL 1101 and should be taken after BIOL 1101. There is a linked co-requisite laboratory course for BIOL 1102. (3 hrs. lec., 3 hrs. lab, 1.5 c.u.)

BIOL 2001 (1 CU)***Essentials of Cell Biology***

An intermediate level exploration of cell structure and function including membrane structure, intracellular organelles, membrane trafficking, surface receptors and signal transduction, the cytoskeleton, cell motility and communication, and the cell cycle.

Prerequisite(s): (BIOL 1101 AND BIOL 1102) OR BIOL 1121.

BIOL 2201 (1 CU)***Essentials of Genetics***

This course will survey the discipline of molecular genetics. Mendelian and molecular genetics will be discussed as well as the use of genetic analysis to address questions in all areas of biology. The processes of DNA replication, transcription, and translation will be discussed at the molecular level. Other topics include the regulation of gene expression and genomics. **Prerequisite(s):** (BIOL 1101 AND BIOL 1102) OR BIOL 1121.

BIOL 2301 (1 CU)***Essentials of Physiology***

A comparative and quantitative approach to the physiological function of vertebrates. Topics include: muscles, nervous system, cardiovascular system, respiration.

Prerequisites: (BIOL 1101 AND BIOL 1102) OR BIOL 1121.

BIOL 2701 (1 CU)***Elements of Microbiology***

Microbiology plays a central role in diverse areas of human life such as infectious disease, ecology, and biotechnology. This course will cover aspects of modern microbiology with an emphasis on prokaryotic organisms. The topics will include basic aspects of microbial diversity, genetics, and pathogenesis as well as examples of applied microbiology. There is a linked course laboratory requirement for this combined lecture and laboratory 1.0 CU course. **Prerequisite(s):** (BIOL 1101 OR BIOL 1121) AND (BIOL 2201 OR BIOL 2210).

BIOL 2801 (1 CU)***Essentials of Biochemistry***

Intermediate level course covering principles of modern biochemistry. Topics include protein structure, protein purification and characterization, proteomics, enzyme kinetics and mechanisms, membrane structure and function, metabolism, and cellular energy transduction. Emphasis will be on biochemical problem solving, experimental design, and application of quantitative methods in a biological and clinical context.

Prerequisite(s): ((BIOL 1101 AND BIOL 1102) OR BIOL 1121) AND CHEM 2410.

BIOL 3004 (1 CU)**(ONLINE) *Infectious Diseases Biology***

This course is delivered in a synchronous online format and focuses on selected topics concerning infectious agents, the diseases they cause in humans, and the social and scientific challenges they pose. The first section addresses the principles of epidemiology and microbial pathogenesis, as well as pathophysiology of infectious diseases. In the second section, tools and techniques of diagnosis, tracking, and control of infectious diseases will be discussed. To develop a broad understanding of the many different aspects of infectious processes, selected viral, fungal, protozoan, and helminthic pathogens and related infectious diseases will be presented. **Prerequisite(s):** (BIOL 2201 OR BIOL 2210) AND BIOL 2701 AND BIOL 4004.

BIOL 3006 (1 CU)***Histology***

This course is designed to introduce the undergraduate student to the structure of tissues at the cellular level and to the way in which those tissues are assembled into organs. This knowledge of structure will be the basis for discussion of tissue and organ function. This course is a combined lecture and dry lab for 1.0 CU. **Prerequisite(s):** ((BIOL 1101 AND BIOL 1102) OR BIOL 1121) AND (BIOL 2001 OR BIOL 2010).

BIOL 3313 (1 CU)

Pathophysiology

This course is a study of homeostatic changes that occur with disease, and the implications of those changes in the progression and treatment of disease at molecular and cellular levels. Generalized mechanisms of disease as well as diseases of individual organ systems will be examined, with a view to understanding homeostatic compensations that occur as a result of altered function. **Prerequisite(s):** BIOL 2001 AND BIOL 2301.

BIOL 4004 (1 CU)

Immunobiology

Early development of microbiology, pathology, & immunobiology; molecular & cellular bases of immune phenomena including: immunity to pathogens, immune diseases, autoimmunity, & hypersensitivity. **Prerequisite(s):** (BIOL 2001 OR BIOL 2010) AND (BIOL 2201 OR BIOL 2210).

BIOL 4007 (1 CU)

Cancer Cell Biology

Course will focus on the molecular mechanisms by which fundamental cellular processes are disrupted in the development of cancer. **Prerequisite(s):** (BIOL 2001 OR BIOL 2010) AND (BIOL 2201 OR BIOL 2210).

BIOL 4010 (1 CU)

Advanced Cell Biology

This course is designed for beginning graduate students and advanced undergraduates with a particular enthusiasm for cell biology. Biology 480 does not attempt to cover all aspects of cell biology, and is therefore not appropriate for students seeking a lecture course which provides a comprehensive survey of the field. Rather, the primary objective of this course is to teach those students considering a career in the biomedical sciences how to read, discuss, and question original research papers effectively. Intensive classroom discussions focus on the experimental methods used, results obtained, interpretation of these results in the context of cell structure and function, and implications for further studies. **Prerequisite(s):** BIOL 2001 or BIOL 2010.

BIOL 3054 (1 CU)

Developmental Biology

A view of how an animal embryo is specified to develop and differentiate into a wide spectrum of cell types, and how the spatial patterns and axes of embryos are determined. The course will focus on genetic and molecular approaches, but will also cover the comparative anatomy of developing embryos to the extent necessary to understand the conserved aspects of embryonic patterning. Special emphasis will be placed on organisms with particular advantages for the study of embryonic development: e.g., mouse, frog, zebrafish, and *Drosophila*. The first half of the course will cover cell fate restrictions, cloning animals using nuclear transfer, stem cell biology, formation of the embryonic axes in vertebrates and *Drosophila*, and patterning of the neural tube and mesodermal tissues. The second half of the course will focus on emerging ideas and findings in the field, with emphasis on analysis of original literature. **Prerequisite(s):** (BIOL 2001 or BIOL 2010) OR (BIOL 2201 BIOL 2210).

BIOL 4018 (1 CU)

Cell Communication and Disease

Effective coordination between cells through cell communication and signaling enables multicellular organisms to develop and survive. Conversely, aberrations in these pathways are at the heart of a wide variety of human diseases. In this seminar course, we will discuss the molecular and cellular mechanisms of cell communication using a series of human diseases as a framework. The course will introduce postbac and advanced undergraduate students to the fundamental principles of cell signaling and will explore current questions of interest to the field. The synergistic nature of research directed at understanding basic cell biology, development and physiology with research aimed at elucidation and control of specific human ailments will be emphasized. The course will be comprised of a combination of introductory lectures and extensive discussion of primary literature. Students are expected to have a basic knowledge of cell biology, biochemistry and cell structure. **Prerequisites:** BIOL 2201 and 2801.

CHEM 1011***Introduction to General Chemistry I (FALL)***

This course is equivalent to Chemistry 1012 but is intended for students with less preparation in high school chemistry and mathematics, and moves more methodically through the introductory chapters. The course covers most of the same topics as Chem1012 and is designed to provide students with the skills needed to succeed in Chem1022. In Chem1011 there is a strong emphasis on problem-solving that is fundamental to all physical science. The course will take an 'atoms first' approach to introductory chemistry. Topics will include: an overview of quantum theory - focusing on its role in understanding atomic structure, the periodic table, and chemical bonding. Introduction to fundamental chemical ideas and their application to chemical reactions, stoichiometry, ideal gases, and intermolecular interactions, using the principles of chemical structure as a foundation, will be discussed. Topics from mathematics and physics that are necessary to chemical problem-solving will be included as needed. Prerequisite: Students with credit for CHEM 1012 may not enroll in CHEM 1011. Credit will not be awarded for both CHEM 1011 and 1012. MATH 1300 is recommended for Pre-Health (LPS) but not required. Pre-Health students are expected to have completed a college pre-calculus course as a prerequisite and the ALEKS Pre-Health Math On Ramp course is also a prerequisite. This course had a required linked co-requisite recitation and a co-requisite laboratory course CHEM 1101. CHEM 1011 lecture and CHEM 1101 Laboratory = 1.5 CU

CHEM 1021 (1 CU)***Introduction to General Chemistry II (SPRING)***

Continuation of CHEM 1011. The second term stresses the thermodynamic approach to chemical reactions, electrochemical processes, and reaction rates and mechanisms. It includes special topics in chemistry. There is a linked course requirement recitation and General Chemistry Laboratory II CHEM 1102 is a linked course co-requisite. CHEM 1021 and CHEM 1102 General Chemistry LaboratoryII = 1.5 CU.

CHEM 1012 (1 CU)

General Chemistry I (SUMMER) For students with AP Calculus 1&2 or 2 semester of college calculus. Pre-Health students pre-approved for the accelerated CORE STUDIES program will take this chemistry series.

Basic concepts and principles of chemistry and their applications in chemistry and closely-related fields. The first term emphasizes the understanding of chemical reactions through atomic and molecular structure. This is a university level course, treating the material in sufficient depth so that students can solve chemical problems and can understand the principles involved in their solution. It includes an introduction to condensed matter. This course is suitable for majors or non-majors and is recommended to satisfy either major or pre-professional requirements for general chemistry. This course is presented for students with high school chemistry and AP calculus or 2 semester of college calculus. Students with a lesser background than this should take CHEM 1011. Prerequisite: Students with credit for CHEM 1011 may not enroll in CHEM 1012. Credit is not awarded for both CHEM 1011 and 1012. There is a linked course requirement recitation and General Chemistry Laboratory I CHEM 1101 is a linked course co-requisite. CHEM 1012 and CHEM 1101 General Chemistry Laboratory = 1.5 CU.

CHEM 1022 (1 CU)**General Chemistry II (SUMMER)**

Continuation of CHEM 1012. Second Term: thermodynamic approach to chemical reactions, electrochemical processes, reaction rates & mechanisms. Includes special topics in chemistry. There is a linked course requirement recitation and General Chemistry Laboratory II CHEM 1102 is a linked course co-requisite. CHEM 1022 and CHEM 1102 General Chemistry Laboratory II = 1.5 CU.

CHEM 1101 (0.5 CU)**General Chemistry Laboratory I**

A general laboratory course covering aspects of qualitative and quantitative analysis, determination of chemical & physical properties, and chemical synthesis. Co-requisite(s) CHEM 1011 or 1012.

CHEM 1102 (0.5 CU)**General Chemistry Laboratory II**

Continuation of CHEM 1102. Co-requisite(s) CHEM 1021 or CHEM 1022.

CHEM 2410 (1 CU)**Principles of Organic Chemistry I**

Fundamental course in organic chemistry based upon the modern concepts of structure and mechanism of reactions. Prerequisite(s) CHEM 1021 or CHEM 1022 or equivalent. Pre-Health students may take CHEM 2410 as a prerequisite or co-requisite for CHEM 2451 Experimental Organic Chemistry A. All non-pre-health students are required to take CHEM 2410 and CHEM 2451 as co-requisites.

CHEM 2420 (1 CU)***Principles of Organic Chemistry II***

Continuation of CHEM 2410. Pre-requisites: CHEM 2410. Pre-Health students may take CHEM 2420 as a prerequisite or a co-requisite for CHEM 2452 Experimental Organic Chemistry B. All non-pre-health students are required to take CHEM 2420 and CHEM 2452 as co-requisites.

CHEM 2451 (0.5 CU)***Experimental Organic Chemistry A***

A basic laboratory course in which both the theoretical and practical aspects of a variety of organic reactions and multistep syntheses are emphasized. Modern chromatographic, instrumental, and spectroscopic techniques are applied to experimental organic chemistry. This course has required laboratory lecture and laboratory sections. CHEM 2410 is a required co-requisite for CHEM 2451. LPS Pre-Health students may take CHEM 2410 (or equivalent) as a pre-requisite or a co-requisite to CHEM 2451.

CHEM 2452 (0.5 CU)***Experimental Organic Chemistry A***

A basic laboratory course in which both the theoretical and practical aspects of a variety of organic reactions and multistep syntheses are emphasized. Modern chromatographic, instrumental, and spectroscopic techniques are applied to experimental organic chemistry. Modern chromatographic, instrumental, and spectroscopic techniques are applied to experimental organic chemistry. This course has required linked laboratory lecture and laboratory sections. CHEM 2420 is a required co-requisite for CHEM 2451. LPS Pre-Health students may take CHEM 2420 (or equivalent) as a pre-requisite or co-requisite to CHEM 2451.

Neuroscience NRSC (formerly BIBB)

NRSC 1110 (1 CU)

Intro to Brain and Behavior

Course begins with the cellular basis of neuronal activities and progresses to the physiological bases of motor control, sensory systems, motivated behaviors, and higher mental processes. **This course has a linked co-requisite laboratory section.**

NRSC 2217 (1 CU)

Visual Neuroscience

An introduction to the scientific study of vision, with an emphasis on the biological substrate and its relation to behavior. Topics will typically include physiological optics, transduction of light, visual thresholds, color vision, anatomy and physiology of the visual pathways, and the cognitive neuroscience of vision. **Prerequisites:** NRSC 1110.

NRSC 2269 (1 CU)

Autonomic Physiology

This course will introduce the student to the functioning of the autonomic nervous system (ANS), which is critically involved in the maintenance of body homeostasis through regulation of behavior and physiology. The course will begin with a review of the basic anatomy and physiology of the ANS including the sympathetic, parasympathetic and enteric divisions. The mechanisms by which the ANS regulates peripheral tissues will be discussed, including reflex and regulatory functions, as will the effect of drugs which modulate ANS activity. The role of the ANS in regulating behavior will be addressed in the context of thirst, salt appetite and food intake. **Prerequisites:** NRSC 1110 or permission of the Instructor.

NRSC 4420 (1 CU)

Smell and Taste

All organisms respond to chemicals in their environment. This chemosensation guides diverse behaviors such as a feeding, avoiding predators, sex, and social interactions. This course will provide a broad survey of our current understanding of taste and smell, focusing on insect and rodent model systems as well as studies in humans. The course will begin with a review of chemical signal transduction mechanisms, and build to an exploration of the cortical integration of chemical signals and chemical guided behaviors. Class time will emphasize primary literature, discussion, and student presentations. The goal is to reach an integrated understanding of the physiology and psychology of chemical sensory systems. In the process, students will learn to read and critically evaluate data from primary research articles. **Prerequisites:** NRSC 1110.

NRSC 4425 (1 CU)

Neurotechnology: From Concept to Clinic

The nervous system, and in particular the brain, remains the least understood part of the human body and is also the site of devastating, irreversible injury and disease. This course reviews wearable and implantable medical devices and surgical techniques that have been developed to treat conditions of the nervous system. The course will begin with a review of human neuroanatomy and neurophysiology and proceed to establish benchmarks and context for evaluating device efficacy. Contrasts with pharmaceuticals and the emergence of “electroceuticals” will be discussed. An overview of the bench-to-bedside process will be provided and then we will cycle through a series of major neuro-related medical devices (cochlear implants, deep brain stimulators, epiretinal arrays, responsive neurostimulators, spinal cord stimulators, functional electrical stimulation), and surgical approaches (nerve grafts, tendon transfers). The course will conclude with a focus on brain-computer interfaces and autologous engineered neural constructs and explore the ethical and medical implications of implanting such devices in able-bodied people, bottlenecks in enhancement and critical evaluation of the idea of superintelligence. This course may be of interest to students interested in pursuing careers in medicine, artificial intelligence, and business. **Prerequisites:** NRSC 1110 or Permission of Instructor.

NRSC 4430 (1 CU)

Neurological Basis of Autism

This course examines neurobiological mechanisms of autism spectrum disorder (ASD). The cognitive neuroscience literature on autism will be roughly categorized around major theoretical models and their relation to autism, focusing on cognitive neuroscience and functional brain imaging, along with some structural imaging and EEG. **Prerequisites:** NRSC 1110 or equivalent.

PHYS 0101 (1.5 CUs)

General Physics I: Mechanics, Heat, and Sound

An introduction to the classical laws of motion, including kinematics, forces in nature, Newton's laws of motion, conservation of energy and momentum, fluid statics and dynamics, oscillations, and waves. An introduction to the classical laws of motion, including kinematics, forces in nature, Newton's laws of motion, conservation of energy and momentum, fluid statics and dynamics, oscillations, and waves. Suggested for students in a pre-health program. This course has a linked course requirement laboratory section.

PHYS 0102 (1.5 CUs)

General Physics II: Electromagnetism, Optics, and Modern Physics

A continuation of PHYS 0101 emphasizing an introduction to classical electricity and magnetism, light and optics, special relativity, the quantum theory of matter, and nuclear physics. Suggested for students in a pre-health program. This course has a linked course requirement laboratory section.