The Warren Alpert Medical School of Brown University

Dean
Jack A. Elias

Admissions

Students interested in the study of medicine at the Warren Alpert Medical School of Brown University may apply through a variety of admission routes designed to create a highly qualified and diverse medical student body.

The majority of the 120 matriculants in the first-year class apply through the American College Application Service (AMCAS). Approximately (40%) of the first-year class enroll from Brown’s eight-year combined Bachelor’s-medical degree Program in Liberal Medical Education. These students are joined by students entering through special programs at institutions with which the medical school has formed linkages (postbaccalaureate and early identification). These admission routes are described below.

AMCAS Admission

Qualified students or graduates of accredited colleges or universities in the United States or Canada may apply to Alpert Medical School (AMS) through the AMCAS route. Individuals must first complete and submit the electronic AMCAS application, found on the website of the American Association of Medical Colleges (https://www.aamc.org), and indicate that they wish to apply to the Warren Alpert Medical School of Brown University. Applicants must also complete a web-based secondary application (forwarded by AMS Office of Admissions) and submit an application fee to be considered an eligible candidate for admission.

The AMCAS applicant pool for the most recent entering class (MD 2016) was competitive, with over 3300 applicants vying for 57 seats (of 120). The applicant pool was impressive in geographic scope and size, including residents of 49 states, the District of Columbia, the Commonwealth of Puerto Rico, and a number of foreign countries (predominantly Canada, China, and South Korea).

Additional information and related admission requirements may be found at http://www.brown.edu/academics/medical/admission. The Office of Admissions may be contacted by email (MedSchool_Admissions@brown.edu) or telephone (401) 863-2149. Letters and other correspondence should be mailed to the Office of Admissions, Box G-M, Brown University, Providence, RI 02912-9706.

Program in Liberal Medical Education (PLME)

The Program in Liberal Medical Education is an eight-year continuum of liberal arts and medical education leading to both the bachelor’s and M.D. degrees. The PLME is open to high school graduates who have applied to and are simultaneously admitted to Brown for their undergraduate studies. The PLME seeks highly qualified and strongly motivated high school students who are committed to a career in medicine at an early age and who also wish to pursue another area of academic interest to an advanced level of scholarship within the framework of a broad liberal education.

From a large (approximately 2,000) and highly qualified applicant pool, roughly 50 students matriculate annually. For additional information regarding the PLME, access the website at http://www.brown.edu/academics/medical/plme/ or contact the College Admission Office, Brown University, Prospect Street, Providence, RI 02912-9706; (401) 863-2378.

Postbaccalaureate Linkage Programs

The Postbaccalaureate (PB) Linkages are cooperative ventures between Alpert Medical School and the Premedical PB Programs at Bryn Mawr College, Columbia University, Johns Hopkins University, and Goucher College. Postbaccalaureate students enrolled in these programs may be offered admission to the medical school during the spring semester of their first year of study, thus allowing them to enter the medical school in the next class.

Selection occurs by a nomination process in which the premedical advisor selects candidates meeting established eligibility criteria (e.g., age, postbac grade point average). The number of PB students in each medical school class depends upon the number of places available as well as the caliber of the applicant pool. PB students nominated for admission must apply to AMCAS and complete an AMS secondary application. The MCAT is not required for admission. Timelines for this process are distributed to PB Program Directors on a yearly basis. Completed applications are reviewed by a subcommittee of the Admissions Committee, which selects nominees for interviews. The interviews follow the same protocol as that for AMCAS applicants and the same evaluation form is used.

The Early Identification Program (EIP)

The Early Identification Program (EIP) provides selected students at cooperating institutions with a place at Alpert Medical School upon continued academic progress and college graduation. This route provides opportunities for a medical career to two groups:

• Rhode Island residents enrolled at Providence College, Rhode Island College, and the University of Rhode Island; and
• Students enrolled at Tougaloo College, a historically black, liberal arts institution in Mississippi.

Eligible students are identified by their premedical advisor in the sophomore year of college, participate in selected PLME activities, and enroll in medical school after receiving the bachelor’s degree. Generally, up to two students may be admitted annually from each school. For more information and application procedures, please contact the premedical advisor at the participating institutions. For more information access the website at http://www.brown.edu/academics/medical/admission/other-routes-of-admission

Definition of Rhode Island Residency for Medical School Admission

An individual is considered a Rhode Island resident if he or she graduated from a Rhode Island high school and if the individual’s parent(s) have lived in Rhode Island for the previous two calendar years, as documented by federal tax returns. For dependent students, the custodial parent(s) must claim the student as a dependent on his or her federal tax returns for the prior two years. Individuals who are independent (i.e., not living with parents and filing individual federal tax returns for the previous two years) must have at least one parent residing in Rhode Island for the previous two years, as documented by federal tax returns.

Selection Factors

Students admitted to Alpert Medical School must attain competence in the sciences basic to medicine at a sufficient level to provide adequate preparation for medical school. Applicants are expected to demonstrate competence by successfully completing the following premedical course requirements at a college or university in the United States or Canada: one semester of organic chemistry; and two semesters of physics, inorganic chemistry, and social and behavioral sciences. The Medical College Admission Test (MCAT) is required for AMCAS route applicants.

All applicants are selected on the basis of academic achievement, faculty evaluations, evidence of maturity, motivation, leadership, integrity, and compassion. For the PLME, Brown seeks highly qualified and strongly motivated students who wish to pursue an area of academic interest to an advanced level of scholarship within the framework of a liberal premedical education.

In order to be eligible for consideration, candidates must present a minimum cumulative grade point average of 3.00 (on a 4.00 scale) in courses taken as a matriculated student at an undergraduate college. Applicants who have attended graduate school must achieve a cumulative grade point average of 3.00 (on a 4.00 scale) in courses taken in graduate school. Applicants must have completed requirements for the baccalaureate degree before matriculating into the medical school. All applicants must be capable of meeting the competency requirements expected of all graduates. Technological compensation can be made.
for some disabilities in certain competency requirements. Candidates accepted for admission who will need special accommodations cannot be admitted unless those supportive services are available, as determined by the Dean of Medicine and Biological Sciences. The processes for assessing whether applicants will be able to meet the competency requirements for the M.D. degree are described in Technical Standards for Medicine, listed below.

In keeping with the mission of Brown University, the office of admissions recognizes the importance of diversity to the success of the medical school. Dimensions of diversity include, but are not limited to: race, ethnicity, religious affiliation, gender identity, sexual orientation, veteran status, age, socioeconomic status and geographic background. Multicultural perspectives enrich educational understanding, improve outreach to the community, enhance trust and communication, and facilitate development of culturally appropriate clinical and research programs.

**Technical Standards for Medicine**

**Process for Assessing Whether Applicants Meet Technical Standards for Medicine:**

1. No inquiry will be made on the application forms concerning disability. Brown’s policies regarding technical abilities and skills necessary to meet the competency requirements are included with the letter of admission, and are asked at that time to contact the Associate Dean for Medical Education if they have any concerns about their ability to meet these standards.

2. Applicants who are identified as having a disability through volunteered information, supporting credentials, or interviews will have an assessment of their ability to meet competency requirements only after a determination is made of their admissibility to the medical program.

3. Those applicants with disabilities deemed admissible to the Medical School will be requested to have submitted on their behalf appropriate documentation in regard to the disability from a qualified health professional. The health professional will be asked to provide an opinion on the candidate’s ability to meet the competency requirements for the M.D. degree. The applicant may also be requested to respond to that question.

4. The responses will be submitted to a committee appointed by the Dean of Medicine and Biological Sciences. This committee may ask for a review of the supporting documentation by appropriate members of the faculty in regard to the applicant’s meeting the competency requirements. The committee will ascertain what accommodations, if any, the medical program would need to make in order that the applicant might be able to meet the competency requirements, and assess the feasibility of any needed accommodations.

5. The committee will review the information received to determine if the applicant will be able to meet the competency requirements, with reasonable accommodations on the part of the medical program, if necessary.

6. The committee will recommend to the Dean of Medicine and Biological Sciences acceptance of applicants who can meet the competency requirements or will recommend nonacceptance if they cannot.

**Process for Assessing Student’s Ability to Continue in the Medical School Should Disability Occur After Matriculation at Brown University:**

1. A student who develops a disability after matriculation at Brown University may be identified to the Medical Student Affairs Office through a variety of sources, e.g., reporting of accident or illness by peers, family, friends, or faculty and subsequent follow-up with health professionals managing the care.

2. If the degree to which the student has become disabled raises questions related to meeting the competency requirements after a review by the Associate Dean for Medical Education, a meeting of the ad hoc committee will be set up to discuss the situation. The student will be asked to meet with the committee members, unless the disability is so severe that the student needs to be represented by another individual. In some cases, it might be more appropriate to have a health professional, not directly involved in the care, serve as a consultant to the committee on the issues surrounding the disability.

3. The ad hoc committee will develop a recommendation as to the student's ability to successfully pursue a medical education based on his or her ability to meet the competency requirements of the medical program. These educational accommodations will be discussed with the appropriate course directors to be certain that there is agreement on how the student will be managed. If facilities accommodations are recommended, the committee will discuss these with the appropriate individuals to be certain that the needs for the disabled student can be provided. The committee’s recommendations will be discussed with the student or his or her representative in the event that the student cannot attend.

4. When the recommendation is that the disabled student can meet the medical program's competency requirements, the committee will develop a report on any educational program accommodations that, if made, will still meet the competency requirements.

5. Should the decision of the committee be to recommend to the dean that the student be dropped from enrollment in the medical program, the normal due process appeals mechanism will be in effect, and the Student Affairs Office will work with the individual as appropriate on potential alternative career options. For students in the Program in Liberal Medical Education continuum, being dropped from the program due to inability to meet competency requirements for medical education does not necessitate the withdrawal of the student from the undergraduate college if that phase of the student’s education has not been completed.

**Advanced Scholarship**

Medical students who wish to earn an advanced degree (M.A., Sc.M., M.P.H., Ph.D.), must meet the requirements of the Graduate School. Numerous academic departments at Brown offer graduate programs. All graduate studies are carried out under the supervision of a faculty member of a graduate program at Brown University. Students are subject to the specific requirements of that program in addition to the general guidelines given below. Students should discuss their interests and goals with a director of a graduate program in planning any study that might lead to an advanced graduate degree.

**Educational Programs**

**Program in Liberal Medical Education**

The Program in Liberal Medical Education (PLME) offers a unique opportunity to combine undergraduate education and professional studies in medicine into an eight-year program. The PLME is not an accelerated medical program. Rather, it encourages students to take advantage of the breadth of a liberal arts education, to take charge of their education, and to become active learners. At Brown, creative students need not sacrifice the benefits of a rich liberal arts education in order to gain admission to medical school.

The PLME provides great flexibility in curriculum planning. During the early years, students take courses related to their chosen concentration and to obtain a broad liberal education. In addition, students take courses designed to meet the competencies required for admission to Alpert Medical School. This begins with courses in the natural, social and behavioral sciences, and mathematics, which provide a foundation for later medical science and clinical courses.

Students may choose to work towards an A.B. or Sc.B. degree in the sciences, or to fulfill the requirements for an A.B. in the humanities, social sciences or behavioral sciences. Several interdisciplinary concentrations such as Public Policy and International Relations are also available. The expected duration of the program is eight years. The last four years of the program culminate in the M.D. degree.

Brown’s entire faculty is available to PLME students. This access to faculty throughout the University fosters collaborative teaching and research among scholars and students from widely divergent disciplines. Although the program is characterized by the unique breadth of educational opportunities available to students, it has great strength in
the conventional biomedical sciences accompanied by in depth research opportunities as well.

The Medical Curriculum

The Alpert Medical School curriculum has been designed and implemented with the intention of creating an integrated, contemporary, compassionate, and flexible program of learning for our students. Our approach to medical education is predicated on the vision that tomorrow's physician must be a lifelong learner who is scientifically and clinically enlightened, patient and service-centered, and who understands the economic underpinnings of the US health care system. Our goal is to train physicians who will provide informed and compassionate care while at the same time serving as leaders and change agents for the health care system. To achieve the latter goal, we aim to train physicians who will be leaders at all levels.

These educational goals are pursued through a curriculum with the following structure. During Years 1 and 2, students enroll in four sequential semesters of the Integrated Medical Sciences (IMS-I through -IV) and Doctoring-I through -IV. The elective Scholarly Concentrations Program is introduced to students during Year 1. Year 3 allows students to explore core disciplines and related specialties through the completion of required clerkships in medicine, surgery, pediatrics, obstetrics & gynecology, psychiatry, and family medicine. The transition from the third year to the fourth year takes place in May, after which time students have the opportunity to develop a program of elective rotations aimed at finalizing a career choice, and obtaining and preparing for a residency in their chosen field.

Alpert Medical School continues to employ a competency-based curriculum that was officially launched in 1996 for the graduating MD Class of 2000. The rationale behind the competency-based curriculum stems from the need to define the outcomes of the educational process: what are the desirable qualities of a medical school graduate, and what constitutes the essential knowledge base that will enable a graduate to make a successful transition to his or her chosen medical field?

All students are expected to gain competency in the Nine Abilities (see below) and knowledge base by graduation. Each course within the core curriculum of the Medical School identifies which abilities and parts of the knowledge base it addresses. Students may also meet the competency requirements through individualized study, group independent study projects (GISPs), or alternative courses that might be arranged as part of the requirements through individualized study, group independent study projects (GISPs), or alternative courses that might be arranged as part of collaborative learning opportunities.

Nine Abilities:
1. Effective communication
2. Basic clinical skills
3. Using basic science in the practice of medicine
4. Diagnosis, prevention, and treatment
5. Lifelong learning
6. Professionalism
7. Community health promotion and advocacy
8. Moral reasoning and clinical ethics
9. Clinical decision making

For additional information regarding Alpert Medical School please visit the website at: http://brown.edu/academics/medical/

Courses

Biology

Introduces the basic principles of human nutrition, and the application of these principles to the specific needs of humans, and the role of nutrition in chronic diseases. Provides an overview of the nutrients and their use by the human body. Also examines the role of nutrients in specific functions and disease states of the body. Not for biology concentration credit. Enrollment limited to 100. LILE
Fall BIOL0030 S01 14793 MW 8:30-9:50(01) (M. Flynn)

BIOL 0040. Nutrition for Fitness and Physical Activity.
Reviews the role of nutrition in physical activity and health. It is designed to provide the student with the information and skills needed to translate nutrition and physical activity recommendations into guidelines for both the athlete for maximal performance and the non-athlete to improve both health and body weight. Students will learn the use of the energy yielding nutrients in physical activity and how food choices can influence both athletic performance and long-term health through the effect on risk factors for chronic diseases. Prerequisite: BIOL 0030. Enrollment limited to 20. Instructor permission required.

BIOL 0060. Introduction to Human Physiology.
An introduction to human physiology aimed primarily at undergraduates who have minimal to no Biology background or who are not concentrating in biology. Acquire a basic understanding of the physiological mechanisms that allow for the running of each major organ systems. Topics include basic cardiovascular, respiratory, urinary, digestive, endocrine, and neuromuscular function, as well as aspects of reproduction and exercise physiology. Not for biology concentration credit. Lab.

BIOL 0080. Biotechnology Management.
An examination of the pharmaceutical, biotechnology, and medical product industries: what they are, how they function, whence they originate, and various perspectives on why some succeed and others fail. Pathways from lab-bench to marketplace are described as are the pervasive influences of the FDA, patent office, and courts. Extensive reading; emphasis on oral presentation. Primarily intended for students planning a career in biomedical industry. Not for biology concentration credit. Students MUST register for the lecture section and the conference. Enrollment limited to 20.
Spr BIOL0080 S01 23919 T 4:00-6:30(16) (B. Bready)

BIOL 0140A. Topics in Science Communications: Science Journalism Practicum.
Participants will understand how to read scientific research papers to interpret their findings and communicate these to a broader lay audience; analyze and understand best practices in science writing and the challenges of covering science for mass media; interviewing; fair and balanced coverage in reporting; give and receive peer feedback. Not for concentration credit in Biological Sciences programs. Enrollment limited to 10. Instructor permission required. S/NC WRIT
Spr BIOL0140A S01 23920 W 5:00-6:30 (S. Turner)

BIOL 0140B. Communicating Science: Biological Illustration.
This Sophomore Seminar is an immersion practicum that conjoins art and science. Employing a series of techniques, students will learn the protocols of scientific rendering in an intensive hands-on approach. Field trips will include the RISD Nature Lab, the Brown Greenhouse, and John Hay collection of biomedical and botanical folios. Media will include graphite/ carbon dust; pen and ink (stipple, line); coquelle board; scratch-board; colored pencil, watercolor and polymer clay. Course will be driven by project presentations focused on communicating science through illustration. Not for concentration credit in Biological Sciences programs. Instructor permission required; enrollment limited to 10. 1/2 credit. SOPH

BIOL 0140C. Communicating Science: Animating Science.
Taught by RISD/Brown professors with the Science Ctr and Creative Mind Initiative, this course explores the pedagogy of using visual media to convey scientific concepts. The goal is to assess the quality of existing material and design new material that fill an educational need and makes science engaging and accessible. Lectures, labs, discussions, critiques and speakers. Teams collaborate on a series of short exercises leading to the creation of videos/animations explaining scientific concepts. Projects evaluated on accuracy, clarity of explanation, educational value, viewer engagement and creativity. Not for concentration credit in Biological Sciences programs. Enrollment limited to 12; instructor permission.
Fall BIOL0140C S01 14794 W 1:00-6:00 (J. Stein)

BIOL 0140K. Conservation Medicine.
How have fruit bats contributed to the emergence of Nipah virus in Malaysia? Is an infectious cancer going to drive the Tasmanian Devil to extinction? Will a warmer world be a sicker world? We will consider these and additional topics at the intersection of global change biology and infectious disease emergence in this course. The course should be of interest to pre-med, general biology and environmental studies concentrators seeking interdisciplinary learning classroom experience. This will satisfy "Area 3" organismal biology concentration requirement for Biology/Health Human Biology. Expected background: BIOL 0200 or
The Warren Alpert Medical School of Brown University

equivalent placement. Enrollment limited to 15 sophomores. Instructor permission required. SOPH

BIOL 0150A. Techniques and Analyses using DNA-Based Biotechnology.

Students will study and practice a range of methods used in molecular biology while examining the ways in which those tools are used in research and in the development of medical treatments. This experience, combined with the reading and discussion of selected papers from the primary literature, fosters development of a skill set critically important for the modern day biology student. Expected background: high school Biology course. Enrollment limited to 10 first year students. Instructor permission required. Half-credit course. S/NC. FYS

Fall BIOL0150A S01 14795 M 1:00-3:30 (K. Smith)

BIOL 0150B. Statistical Computing for Biology.

Modern biological research is a data rich endeavor, necessitating strong quantitative and computational skills to interpret the results of experimental and observational studies. In this course we will explore the application of statistics and modeling in biological research and environmental science. Topics covered will include basic probability, experimental design, sampling, hypothesis testing and mathematical models for prediction. No prior statistics knowledge is assumed. Enrollment limited to 10 first year and sophomore students. Instructor permission, based on a portfolio review. This is a half-credit course. S/NC

BIOL 0150C. Methods for Extraction and Analyzing Secondary Metabolites of Medicinal Plants.

Plant secondary metabolites are currently the subject of much research interest when investigating new target compounds for potential medicine from natural products. New leads for drugs and phytotherapeutics from plants and plant parts have been increasing at a rapid rate especially by the pharmaceutical industry. Many plants have been selected and collected for their specific secondary compounds and healing powers by ethnobotanists in the field. The final step is the extraction and identification of these plant specimens. Enrollment limited to 10 first year students. Instructor permission required. Half-credit course. S/NC. FYS

Spr BIOL0150C S01 23921 T 3:00-5:00 (F. Jackson)

BIOL 0150D. Techniques in Regenerative Medicine: Cells, Scaffolds and Staining.

Regenerative Medicine, also known as Tissue Engineering, is the process of creating living, functional tissues to repair or replace native tissue or organ functions that have been lost due to disease or congenital defects. As such, it is a prominent scientific discipline that can either "stand alone" or complement material-based research efforts in the areas of device design, drug delivery, diagnostics and pharmaceuticals. Students will develop proficiencies in basic cell culture techniques, early stage tissue cell constructs. Enrollment limited to 10 first year students. Instructor permission required. Half-credit course. S/NC. FYS

Fall BIOL0150D S01 14797 Arranged (B. Zielinski-Habershaw)

BIOL 0160. Plants, Food, and People.

Examines the selection, breeding, cultivation and uses of food plants. Discusses the effects on agriculture of pathogens, climate change, and loss of biodiversity. Considers whether enough food can be produced for a world population of potentially 10 billion, while sustaining biodiversity and environmental quality. Course will include two papers and assistance from Writing Fellows; feedback from first paper will be available when writing second paper. Enrollment limited to 50. LILE

BIOL 0170. Biotechnology in Medicine.

Introduces undergraduates to the main technological advances currently dominating the practice of medicine. Provides an overview of the objectives, techniques, and problems related to the application of biomedical technology to the diagnosis and treatment of disease and the contemporary health care industry. Topics include: pharmaceutical development and formulation; organ replacement by prosthesis and transplantation; medical imaging; tissue engineering, therapeutic cloning, regenerative medicine; stem cells; societal, economic, and ethical issues. This course does carry Biology concentration credit.

Fall BIOL0170 S01 14798 MWF 12:00-12:50(12) (B. Zielinski-Habershaw)

BIOL 0180. The Biology of AIDS.

AIDS represents an example of the vulnerability of humans to new infectious agents. We will review some human infectious diseases including small pox, yellow fever and influenza, and then explore AIDS/HIV. First characterized in 1981, AIDS became the leading cause of death in U.S. males aged 25-44 within a decade. We will examine what factors make HIV such a potent pathogen. The course is intended for students beginning in biology. Expected: BIOL 0200, or equivalent placement. This course does carry Biology concentration credit.

Spr BIOL0180 S01 23924 MW 8:30-9:50(02) (P. Shank)

BIOL 0190E. Botanical Roots of Modern Medicine.

This course will explore a variety of medicinal plants found throughout the world, the diverse cultures that use them in their daily lives and the scientific underpinnings of their medicinal uses. In conjunction with readings, students will gain a hands-on approach in lab, observing, identifying and growing these plants. Enrollment limited to: 20. Students MUST register for the lecture section and the lab. FYS

Fall BIOL0190E S01 14799 MW 3:00-4:20(17) (F. Jackson)

Fall BIOL0190E L01 14997 W 3:00-5:50 (F. Jackson)

BIOL 0190F. Darwinian Medicine.

Explores evolutionary explanations of why we get sick, and how this can shape, or misshape, our interpretations of medicine. Draws on evolutionary genetics, population biology, molecular biology and physiology. This course will build on evolutionary biology and then focus on disease processes such as infection, aging, cancer, allergy, diabetes, and obesity. Enrollment limited to 20 first year students. FYS

Fall BIOL0190F S01 14800 TTh 1:00-2:20(10) (M. Tatar)

BIOL 0190P. Pride and Prejudice in the Development of Scientific Theories.

We will examine how the pace and shape of scientific progress is affected by the social/cultural context and the "personality" of the individual. We will look into how the interplay between society and the individual affects how scientific theories arise, are presented, are debated and are accepted. The course will initially focus on Charles Darwin and his theory of Natural Selection using the biography of Adrian Desmond and James Moore, "Darwin: The Life of a Tormented Evolutionist." Enrollment limited to 20 first year students. FYS DPLL

Fall BIOL0190P S01 14801 TTh 2:30-3:50(03) (S. Helfand)

BIOL 0190Q. Climate Change and Species Extinction.

In this course students will go beyond the headlines and delve into the science to explore the impact of climate change on species extinction. Students will explore the integration of science and technology through traditional textbooks, primary literature, open source databases, simulations, and discussions. Students will investigate the impact of climate change on species distribution, ecology, and behavior through interactive, inquiry-based, collaborative classroom investigations. Students will learn to integrate information from a variety of sources and disciplines and share their ideas through classroom discussion, written assignments, and oral presentations. Enrollment limited to 20 first year students. FYS WRIT

BIOL 0190R. Phage Hunters, Part I.

A research-based lab class for freshmen; both semesters are required for the modern day biology student. Expected background: high school biology. First characterized in 1917, phage are virulent agents that can shape, or misshape, our interpretations of medicine. Draws on evolutionary genetics, population biology, molecular biology and physiology. This course will build on evolutionary biology and then focus on disease processes such as infection, aging, cancer, allergy, diabetes, and obesity. Enrollment limited to 20 first year students. FYS

Fall BIOL0190R S01 14802 M 3:00-5:30(15) (Y. Zhou)

Fall BIOL0190R L01 14996 Arranged (S. Taylor)
Biol 0190s. Phage Hunters, Part II.
A research-based laboratory course for freshmen; both semesters are required. Students will isolate and characterize a bacteriophage virus found in the soil. Lab work includes isolation and purification of your own phage, DNA isolation and restriction mapping, and EM characterization of your phage. Several phages will be selected for genome sequencing over Winter Recess, and annotated in the spring. One hour of lecture/discussion, and 3 hours lab per week. Expected: AP Biology or equivalent, HS chemistry, and permission of the instructor. Students are expected to take fall and spring courses in the sequence. Enrollment limited to 20 first-year students. Instructor permission, FYS
Spr BIOL0190S S01 23925 M 3:00-5:30(13) (S. Taylor)
Spr BIOL0190S S01 23925 W 3:00-5:30(13) (S. Taylor)
Spr BIOL0190S L01 23926 Arranged (S. Taylor)

Biol 0190T. Bioinformatics: A Practical Introduction.
The amount of biological sequence data has grown at an exponential pace and spurred the development of computational tools that allow biologists to use this information. Students will become familiar with useful bioinformatics tools used by researchers. The course will introduce concepts of information transfer in biological molecules, storage in public databases, and how to use tools to access this information and organize it meaningfully. We will explore tools for studying whole genomes, including high-throughput sequencing data to assemble genomes and mapping subsets. Students will gain hands-on experience using these tools. Expected: AP credit or equivalent placement for BIOL 0200. FYS

This course presents an integrated account of development, structure and function in plants, especially seed plants. Enrollment limited to 20 first-year students. FYS WRIT
Fall BIOL0190U S01 14803 W 3:00-5:30(15) (P. Heywood)
Fall BIOL0190U S01 14803 M 3:00-5:30(15) (P. Heywood)

Biol 0200. The Foundation of Living Systems.
A broad overview of biological systems, emphasizing patterns and processes that form the basis of life. Explores essentials of biochemistry, molecular, and cellular biology and their relationship to the larger issues of ecology, evolution, and development. Examines current research trends in biology and their influence on culture. Appropriately for all students interested in biology. Serves as a gateway course to much of the intermediate and advanced curriculum. Placement tests are offered (contact Jody_Hall@brown.edu); AP scores of 4 or 5 are equivalent to BIOL 0200, and place a student out of this course. Students will be assigned to a lab section during the second week of class. LILE
Spr BIOL0200 S01 23926 MWF 11:00-11:50(04) (K. Miller)
Spr BIOL0200 S02 23927 MWF 12:00-12:50(05) (J. Hall)
Spr BIOL0200 L02 23930 Arranged (J. Hall)
Spr BIOL0200 L03 23931 Arranged (J. Hall)
Spr BIOL0200 L04 23932 Arranged (J. Hall)
Spr BIOL0200 L05 23933 Arranged (J. Hall)

Biol 0210. Diversity of Life.
This course will explore biological diversity – the number of taxa, and the functions, and processes that support life – from the perspectives of ecology and evolutionary biology. It will draw on examples and case studies from the geological record, functional morphology, the evolution of organ systems in vertebrates, genomics, behavior and sexual selection in birds and invertebrates. Overarching themes will emphasize that taxonomic diversity is an emergent property of complex life on Earth, and the importance of diversity of biological functions and processes in generating and maintaining taxonomic diversity. Class Restriction: Freshmen and sophomores; others by instructor permission.
Fall BIOL0210 S01 14804 MWF 11:00-11:50(02) (J. Kellner)

Lectures and recitation sections explore the mechanisms involved in the principles of macromolecular structure and function, the organization and regulation of pathways for intermediary metabolism, and the transfer of information from genes to proteins. It is expected that students have taken CHEM 0350 or are taking it concurrently.
Spr BIOL0280 S01 23934 TTh 1:00-2:20(10) (G. Jogli)
Spr BIOL0280 C01 23935 Arranged (L. Lapiere)
Spr BIOL0280 C02 23936 Arranged (L. Lapiere)
Spr BIOL0280 C03 23937 Arranged (L. Lapiere)
Spr BIOL0280 C04 23938 Arranged (L. Lapiere)
Spr BIOL0280 C05 23939 Arranged (L. Lapiere)
Spr BIOL0280 C06 23940 Arranged (L. Lapiere)
Spr BIOL0280 C07 23941 Arranged (L. Lapiere)
Spr BIOL0280 C08 23942 Arranged (L. Lapiere)
Spr BIOL0280 L01 23943 Arranged (L. Lapiere)
Spr BIOL0280 L02 23944 Arranged (L. Lapiere)

Biol 0285. Introductory Biochemistry Laboratory.
Working in small groups, students will examine enzymatic reactions in bacterial metabolic pathways. They will gather information from online databases, define a working model and test this model by purifying a target enzyme and characterizing its biochemical function. They will then propose a hypothesis for the enzymatic reaction mechanism and test this hypothesis by designing mutations in the enzyme active site and characterizing these mutant enzymes experimentally. Priority given to sophomore and junior students planning to enter research careers.
Expected: Students have previously taken or are concurrently enrolled in BIOL 0280; preference given to students concurrently enrolled. Instructor permission required. Course credit 0.5; final grade determined for BIOL 0280.
Spr BIOL0285 S01 23953 M 1:00-5:00 (S. Taylor)
Spr BIOL0285 S02 24941 Th 2:30-6:30 (S. Taylor)

A basic examination of endocrinology with emphasis on hormone biosynthesis, mechanism of action, physiological roles, and endocrine pathology. Topics include: mechanism of action of steroid, amine, and peptide hormones; neuroendocrinology; reproductive endocrinology; and endocrinology of metabolism and calcium homeostasis. It is expected that students have taken BIOL 0200 (or equivalent) and CHEM 0350.

Introduction to the developmental anatomy of vertebrate embryos, including humans, in an evolutionary context, through lecture, discussion and microscope slide study. Gametogenesis through germ layers and their organ system derivatives. Expected: BIOL 0200, or equivalent placement, or AP Biology score of 4 or 5. Limited to 18 freshmen and 18 sophomores. Students MUST register for the lecture section and the lab.

Biol 0350. The Fossil Record: Life through Time on Earth.
Course is designed for students with prior background in geology or evolutionary biology and who want to learn more about the fossil record, the origins of modern biodiversity and ecosystem structure, and interaction between organisms, and the geological and chemical cycles on the Earth. Lectures will cover major time periods during which animals and plants lived, as well as focusing on major transitions in the evolution of life on Earth. This course will fulfill requirements in both the biology/biology and evolutionary biology concentrations. Expected: BIOL 210, GEOG 0240 or equivalent. Instructor permission, enrollment limited to 20 sophomores/juniors; register for course/lab.
Spr BIOL0350 S01 25989 MWF 10:00-10:50(03) (A. Leslie)
Spr BIOL0350 L01 25980 Arranged (A. Leslie)

Biol 0380. The Ecology and Evolution of Infectious Disease.
We will survey the diverse biology of microbes responsible for human infectious disease, develop and apply ecological and evolutionary theory to infectious microbes, and provide practical experience interpreting and synthesizing the peer-reviewed scientific literature. The discovery of infectious microbes, the role of genetic novelty, population structure and transmission mode, and the influence of clinical therapies and host immune response will be considered. Evaluation will be based on preparation, participation, weekly student presentations, brief weekly written assignments, a midterm and a final. Expected: BIOL 0200 or equivalent. Enrollment limited to 25 first year students and sophomores.
LILE
Fall BIOL0380 S01 14805 MWF 10:00-10:50(14) (D. Weinreich)

An overview of vertebrate evolution that not only covers historical events, but also introduces various scientific concepts and modes of thought.
Topics include past and present biodiversity, convergent evolution, biogeography, competition, continental drift, climatic change over time, the notion of evolution as progress, and a whole-animal approach to understanding evolutionary events. Enrollment limited to 50. WRIT

BIOL 0400. Biological Design: Structural Architecture of Organisms. Many questions about the workings of living creatures can be answered by joining math, physics, and biology. We will identify basic physical science concepts that help biologists understand the structure and function of animals, plants, and microorganisms, and use these to study how the physical world constrains and facilitates the evolution of the extraordinary design and diversity of organisms. For first and second year students; others by permission. Recommended background: BIOL 0200, or equivalent. Enrollment limited to 40. Instructor permission required. WRIT
Fall BIOL0400 S01 14806 MWF 2:00-2:50(07) (J. Allen)

BIOL 0410. Invertebrate Zoology. A survey of invertebrate animals emphasizing evolutionary patterns and ecological relationships. Functional morphology, physiology, reproduction, development, and behavior of invertebrates will be examined. Laboratory exercises and two separate day-long field trips provide firsthand experience with the animals. Expected: BIOL 0200 or equivalent. Enrollment limited to 44. Students MUST register for the lecture section and a lab. Fall BIOL0410 S01 14807 MWF 11:00-11:50(02) (C. Dunn)
Fall BIOL0410 L01 14995 W 1:00-3:50 (C. Dunn)

BIOL 0415. Microbes in the Environment. Examines the diversity of microbial life in the environment. Surveys key services that microbes perform on land and sea, including biodegradation of contaminants in the environment and ecosystem processes related to climate change. Examines biological interactions of symbioses, quorum sensing, and antibiotic production in a ecological context. Explores the genomic mechanisms explaining phylogeny and life history strategies in microbes. Demonstrate knowledge of the diversity of microbes in the environment and benefits in an ecological/evolutionary context. Lecture based, two field trips to expand appreciation for microbial ecology. BIOL 0200 or equivalent placement; CHEM 0330. Enrollment limited to 20 sophomores, juniors and seniors. WRIT
Fall BIOL0415 C01 23956 TTh 9:00-10:20(08) "To Be Arranged"
Spr BIOL0415 C01 23957 Arranged "To Be Arranged"

BIOL 0420. Principles of Ecology. The principles, concepts, and controversies involved in the study of the distribution and abundance of plant and animal populations and their integration into natural communities. Emphasizes interactions among organisms and the hierarchical nature of ecological processes affecting individuals, populations, and communities. Expected: BIOL 0200 (or equivalent) and MATH 0090. Lectures and weekly discussion.
Spr BIOL0420 S01 23966 TTh 9:00-10:20(08) "To Be Arranged"

BIOL 0430. The Evolution of Plant Diversity. Examines the evolutionary history of plants from a phylogenetic perspective. Introduces the science of phylogenetics - how to infer phylogenies and how to use them to understand organism evolution. Highlights major trends in plant evolution over the past 400 million years. Lectures survey major plant lineages, with special focus on flowering plants. Weekly labs, field trips, and assignments stress basic plant anatomy and morphology, identification, and learning the local flora. Expected: BIOL 0200 (or equivalent) and WRIT
Fall BIOL0430 S01 14808 TTh 9:00-10:20(08) (E. Edwards)
Fall BIOL0430 L01 14994 Arranged (E. Edwards)

BIOL 0440. Inquiry in Plant Biology: Analysis of Plant Growth, Reproduction and Adaptive Responses. This course focuses on what plants do and how they do it. Introduces the biology of plants, their growth and development, structural features, and their cellular and organismal responses to key stimuli. Examines physiological, reproductive and developmental strategies throughout the plant life cycle and in relation to environmental challenges. Discusses the significance of various plant model systems for genetic research and understanding of mechanisms controlling plant growth and development. Prerequisites: BIOL 0200 (or equivalent placement). Students MUST register for the lecture section and a lab. Enrollment limited to 24 students.
Spr BIOL0440 S01 23961 TTh 10:30-11:50(09) (S. Ramachandran)

BIOL 0455. Coastal Ecology and Conservation. Will enable to students to master fundamental ecological concepts and understand how this knowledge can be used to inform coastal conservation and management. Case studies from New England and elsewhere, field trips to rocky shores, salt marshes and coastal ecosystems enable students to develop scientific skills and experience the challenges of coastal conservation science. The course is aimed at freshmen and sophomores. Expected background: BIOL 0200 or equivalent placement. Enrollment limited to 15 students, and written permission required. Email (Mark_Bertness@brown.edu) to receive course application (due May 1). Admitted students register for the course in September.
Fall BIOL0455 S01 16467 TTh 2:30-3:50(03) (M. Bertness)

BIOL 0460. Insect Biology. Focuses on characteristics that make insects unique and why more insect species have been described than all other organisms combined; the opportunity to investigate diversity and adaptation; their abundance, small size, and short lifespans; their importance as agents of biocontrol pollination, agricultural pests, and disease vectors. Expected: BIOL 0200 or equivalent. Enrollment limited to 20. Students MUST register for lecture AND lab. Primarily for freshmen and sophomores.
Spr BIOL0460 S01 25061 MW 8:30-9:50(02) (D. Morse)
Spr BIOL0460 L01 25062 Arranged (D. Morse)

BIOL 0470. Genetics. Genetic phenomena at the molecular, cellular, organismal, and population levels. Topics include transmission of genes and chromosomes, mutation, structure and regulation of the expression of the genetic material, elements of genetic engineering, and evolutionary genetics. One laboratory session and one discussion session per week. (Students should not plan to take BIOL 0470 after 1540.) Expected: BIOL 0200 (or equivalent placement). Students will be assigned to Lab sections in the first week of class.
Fall BIOL0470 S01 14809 TTh 10:30-11:50(13) (M. Johnson)
Fall BIOL0470 L01 14984 Arranged (J. Hall)
Fall BIOL0470 L02 14985 Arranged (J. Hall)
Fall BIOL0470 L03 14986 Arranged (J. Hall)
Fall BIOL0470 L04 14987 Arranged (J. Hall)
Fall BIOL0470 L05 14988 Arranged (J. Hall)
Fall BIOL0470 L06 14989 Arranged (J. Hall)
Fall BIOL0470 L07 14990 Arranged (J. Hall)
Fall BIOL0470 L08 14991 Arranged (J. Hall)
Fall BIOL0470 L09 14992 Arranged (J. Hall)
Fall BIOL0470 L10 14993 Arranged (J. Hall)

BIOL 0480. Evolutionary Biology. A broad introduction to the patterns and processes of evolution at diverse levels of biological organization. Topics covered include natural selection, adaptation, speciation, systematics, macroevolution, mass extinction events, and human evolution. Weekly discussion sections involve debates on original research papers. Occasional problem sets involve computer exercises with population genetics and phylogeny reconstruction. Expected: BIOL 0200 (or equivalent placement).
Fall BIOL0480 S01 14810 MWF 9:00-9:50(01) (D. Rand)
Fall BIOL0480 C01 14983 Arranged (D. Rand)

BIOL 0495. Statistical Analysis of Biological Data. A first course in probability distributions and the use of statistical methods for biological data. Topics covered will include describing data, statistical inference (hypothesis tests and confidence intervals), analyzing associations, and methods for categorical data (contingency tables and odds ratios). Methods will be applied to data drawn from areas of biological inquiry. For statistics or related science credit in Biology programs. Expected background: BIOL 0200 or equivalent, math equivalent to MATH 0100. This course is for related science credit only in Biological Sciences concentration programs. Enrollment limited: 40 undergraduates—20 juniors and 10 sophomores, and 10 for seniors requiring permission of instructor.
Spr BIOL0495 S01 23960 TTh 10:30-11:50(09) (S. Ramachandran)
Spr BIOL0495 C01 23961 Arranged (S. Ramachandran)
BIOL 0500. Cell and Molecular Biology.
This course examines the structure and function of the basic unit of an organism, the cell. An experimental approach is used to examine cellular functions, ranging from gene transcription, cell division and protein secretion, to cell motility, and signal transduction. Relevance to health and disease will be considered. Expected: BIOL 0200 (or equivalent placement).

BIOL 0510. Introductory Microbiology.
Introduces role of microbes in our understanding of biology at the cellular and molecular level. Focuses on microbial significance for infectious disease, public health, genetics, biotechnology, and biochemical cycles. Laboratory involves basic microbiological techniques and selection and manipulation of microbes. Expected: BIOL 0200 (or equivalent placement). Students MUST register for the lecture section, conference, and the lab. Enrollment limited to 108.

BIOL 0530. Principles of Immunology.
Introduction to experimental and theoretical foundations of immunology. Focuses on concepts, landmark experiments and recent advances. Topics include innate and adaptive immunity; structure/function of antibody molecules and T cell receptors; regulation of immune responses through cellular interactions. Applications of concepts to medically significant issues (vaccines, transplantation, inflammation, autoimmunity, cancer, HIV/AIDS) are discussed. Interpretative analysis of experimental data is emphasized. Expected background: BIOL 0200 or equivalent placement credit.

BIOL 0800. Principles of Physiology.
Introduction to the function and integration of organ systems with an emphasis on human physiology. Includes basic concepts in cell and organ system physiology as well as fundamentals of modern trends in physiological science. Emphasizes the application of physical and chemical principles to organ function at both the cellular and systemic levels. Expected: BIOL 0200 or equivalent.

BIOL 0860. Diet and Chronic Disease.
This course addresses the relationship of food to the development and treatment of chronic diseases. Chronic diseases discussed are obesity, dyslipidemia/heart disease, diabetes mellitus, cancers and osteoporosis. Dietary recommendations for these diseases are critically assessed. Laboratory includes basic nutritional techniques and selection and manipulation of experimental diets. Expected: BIOL 0200 or equivalent placement.

BIOL 0920A. Controversies in Medicine.
Why and how do controversies in medicine emerge at specific moments in time? Why do scientists come to different conclusions based on the same data? Does it matter how we interpret controversies? This sophomore-level seminar critically analyzes contemporary controversies in medicine and public health. Using a case study approach, we will examine the social and political assumptions that inform important controversies. Questions related to the relationship between science, media, activism, and health inequality will be woven into the case studies. Enrollment limited to 20 sophomores. (For theme, not biology, credit in Health and Human Health and Biology only.) SOPH

BIOL 0940A. Viral Epidemics.
This sophomore seminar will examine epidemics (outbreaks) of viral infections from a historical perspective. We will also cover current literature and up to the minute news accounts of infectious disease related outbreaks occurring around the globe. The major focus will be on virus related diseases but any microbial outbreak in the news will be explored. The seminar will cover basic aspects of microbial pathogenesis so students can gain an appreciation of microbial host interactions. Essential writing skills will also be developed. Enrollment limited to 20 sophomore students. WRIT SOPH

BIOL 0940B. Sophomore Seminars in Biology: Life in a Shell.
This Sophomore seminar is an examination of broad themes in whole animal physiology with an emphasis on environmental adaptations. The foundation of the course will be the instructor’s recent book “Life in a Shell: A Physiologist’s View of Turtle.” A consideration of this iconic animal’s novel biological traits will lead into comparisons with our own biology and that of other animals. Topics: respiration, circulation, metabolic rate, buoyancy control, overwintering, migration, reproduction, and bone structure and function. Relevant original research papers will be used. Mandatory S/NC; enrollment of 20 students; override required. Expected: BIOL 0200 or equivalent placement credit. SOPH

BIOL 0940C. Sophomore Seminar: Insect Biology.
Focuses on characteristics that make insects unique and why more insect species have been described than all other organisms combined; the opportunity to investigate diversity and adaptation; their abundance, small size, and short lifespans; their importance as agents of biocontrol pollination, agricultural pests, and disease vectors. Expected: BIOL 0200 or equivalent. Enrollment limited to 12 sophomores only. Students MUST register for lecture AND lab. SOPH

BIOL 0940D. Rhode Island Flora: Understanding and Documenting Local Plant Diversity.
This Sophomore Seminar focuses on species level identification of plants in Rhode Island and will cover the dominant plant species in each of the state’s main habitats including coastal wetlands and uplands, freshwater wetlands, peatlands, upland forests, and disturbed areas. Students will learn to identify plants using online interactive keys as well as more technical dichotomous keys and will also cover basic ecological processes in each habitat including the interaction of soils, geology, and hydrology. Materials related to plant morphology, plant taxonomy, plant evolution, understanding phylogenetic trees, and botanical illustration. Pre-requisites: BIOL 0200. Instructor permission required. SOPH

BIOL 0960. Independent Study in Science Writing.
Incorporates a nontechnical science journalism component into the BioMed curriculum. A series of four to six specific assignments are recommended, based on topics derived from another biology course taken previously by the student, whose instructor has agreed to serve as a BIOL 0960 sponsor. Assignments may include, for example, investigative or analytical reviews, or feature articles on ethical or social impacts of new discoveries. The student and instructor schedule meetings to discuss topics and due dates, review rough drafts, and evaluate completed work. Not for concentration credit in the biological sciences programs. Permission must be obtained from the instructor prior to registering. Section numbers vary by instructor. Half credit.

BIOL 1040. Ultrasstructure/Bioimaging.
This course examines microscopy and image analysis in the life sciences. Theoretical and practical aspects of microscopy will be discussed. Students will obtain hands-on experience with electron microscopy, light microscopy, fluorescence microscopy, and confocal microscopy. Students will learn to display images in 3D. Students must be able to commit to hold special sessions during classes. Students can gain an appreciation of the nature and structure of life, and how this is revealed by microscopy. Expected: BIOL 0200.

Brown University
BIOL 1050. Biology of the Eukaryotic Cell. Examines organelle and macromolecular complexes of eukaryotic cells with respect to structural and functional roles in major cellular activities. Emphasizes experimental basis for knowledge in modern cell biology using original literature, and discusses validity of current concepts. For advanced undergraduates and beginning graduate students. Complementary to BIOL 1270 and 1540. Prerequisites: BIOL 0280, 0470, 0500, or instructor permission. Graduate students register for BIOL 2050.

BIOL 1070. Biotechnology and Global Health. This course examines contemporary biotechnologies used to combat the predominant, worldwide problems in human health. Global health will be addressed from the scientific and engineering perspectives while integrating public health policy, health systems and economics, medical and research ethics, and technology regulation and management. This course is intended for graduate and advanced undergraduate students in biology, engineering, or related fields who have an interest in global health initiatives. Expected background: BIOL 0200 and BIOL 0800, or equivalents. Preference will be granted to graduate students in the Biotechnology and Biomedical Engineering programs. Only for related course credit in Biology, and for theme course credit in Health and Human Biology programs. Enrollment limited to 20. Instructor permission required.

BIOL 1090. Polymer Science for Biomaterials. Basic principles of polymer science and its application in medicine. Topics include basic polymerization chemistry, kinetics of polymerization and depolymerization with emphasis on bioerodible polymers, characterization of polymers by physical methods, bulk and surface properties, behavior of polymers in solutions, crystallization, gelation, and liquid crystals. Hands-on experience with polymer characterization. Expected: CHEM 0350. Enrollment limited to 25.

BIOL 1100. Cell Physiology and Biophysics. Current topics in cell physiology, with an emphasis on membrane-mediated interactions between cells and their environment. Topics may include: ion channel structure, function and regulation; intracellular regulatory molecules; mechanisms of sensory transduction; membrane receptors and second messenger systems; vesicle secretion; and cytoskeletal regulation of cell function. Lectures, discussion, and student presentations of the current literature. Expected: BIOL 0800 or NEUR 0010. Instructor permission required. Registration override will not be given out until after the first one or two classes. Enrollment limited to 30, and admission is based on seniority -- graduate students, seniors, then juniors. (Not for first and second-year undergraduates.)

BIOL 1110. Topics in Signal Transduction. Signal transduction is one of the most rapidly developing fields in biomedical sciences. Defects in signaling pathways can be responsible for diseases such as cancer, diabetes, cardiovascular disorders and psychoses. This course offers students an overview of the molecular pathways that allow cells to receive and process signals from their external environment, with an emphasis on the emerging state-of-the-art techniques used in their study. Expected background: BIOL 0200, 0280, 0470, or 0500. Enrollment limited to 20 juniors and seniors. Instructor permission required.

BIOL 1120. Biomaterials. A biomaterial is defined as a material suitable for use in medical implants that come in direct contact with patients' tissues. These include polymers, metals, and ceramics, and materials obtained from biological sources or through recombinant biotechnology. Goal: to provide comprehensive coverage of biomaterial science and technology. Emphasizes the transition from replacement to repair strategies. For advanced undergraduates and graduate students. Prerequisite: BIOL 0800 or instructor permission.

BIOL 1140. Tissue Engineering. Tissue engineering is an interdisciplinary field that incorporates progress in cellular and molecular biology, materials science, and engineering, to advance the goal of replacing or regenerating compromised tissue function. Using an integrative approach, we will examine tissue design and development, manipulation of the tissue microenvironment, and current strategies for functional reconstruction of injured tissues. Expected: CHEM 0330, plus BIOL 0500 or 0800. Enrollment limited to 20. Instructor permission required.

BIOL 1150. Stem Cell Engineering. Stem cell engineering focuses on using adult, embryonic, and induced stem cells to repair damaged or diseased tissues. This course will examine the role of stem cells in development, tissue homeostasis, and wound healing, as well as how they are being applied in regenerative medicine. A lecture and discussion format for major topic areas. Students will receive hands-on training in how to isolate, culture, and differentiate adult stem cells in a laboratory setting. Expected: CHEM 0330 and BIOL 0500 or an equivalent course in cell biology or physiology. Cell culture experience highly recommended. Enrollment limited to 20. Instructor permission required.

BIOL 1190. Synaptic Transmission and Plasticity. Synapses are the means by which the nervous system communicates. In this seminar-style course, we will explore the molecular and physiological underpinnings of synaptic transmission. We will then examine ways in which synapses can modulate their strength during development, learning, and other adaptive processes. Expected: BIOL 0800 or written permission of the instructor.

BIOL 1200. Protein Biophysics and Structure. Structural Biology is the science to determine 3-dimensional structures of biomacromolecules (i.e., proteins, RNA, and DNA). These structures enable biologists to understand and explore their function. Since proteins, RNA, and DNA are the primary molecules of life, structural biology enables us to understand and influence these molecular machineries which form the basis of all biological processes. Throughout the class, the students will see examples of biologically important proteins and protein complexes that will allow them to correlate structure and biological function. Prerequisite: BIOL 0280.

BIOL 1210. Synthetic Biological Systems. A multidisciplinary course that combines science and engineering providing a solid foundation in a cutting edge field of biological engineering. Synthetic biology is a mixture of biology, chemistry, engineering, genetic engineering and biophysics. It builds on recent work in systems biology which involves the modeling of biological systems, but goes further in that it involves the construction and standardization of
BIOL 1220. Synthetic Biological Systems in Theory and Practice.
A multidisciplinary laboratory, lecture, and discussion based course that combines several areas of science and engineering providing a foundation in the cutting edge field of synthetic biological engineering. The field of synthetic biology is centered around trying to make biology easier to engineer. It builds on recent work in systems biology which involves the modeling of biological systems, but goes further in that it involves the construction and standardization of biological parts that fit together making complex systems. This course will combine classes, guest lectures and discussion lab visits to give students the best possible tools for understanding and applying research in synthetic biology. Expected: at least two courses in any of the key disciplines (biology, chemistry, physics, math, engineering, computer science) beyond the introductory level, and permission of the instructor.

BIOL 1222A. Current Topics in Functional Genomics.
A technological revolution in genomics has exponentially increased our ability to gather biological data. A host of new methods and types of analysis has arisen to accommodate this dramatic shift in data collection. The broad scope of inquiry has ushered in an era of “system-wide” approaches and brute-force strategies where rare signals can be detected and studied. In this seminar we will cover papers that embody this new approach. Students typically have taken an advanced undergraduate-level course in biology.

BIOL 1250. Host-microbiome Interactions in Health and Disease.
Will focus on our current understanding of how various microbiomes communicate and interact with the host and the factors that influence these interactions. We will discuss how the new technologies such as metagenomics and metabolomics have enhanced our understanding of host-microbiome interactions in health and disease. Students will have the opportunity to participate in discussions on how to apply recent discoveries to disease processes, health restoration and maintenance. The course will help students develop skills in critical thinking and in reading and evaluating original scientific literature. Expected: students with a background in basic microbiology (BIOL 0530 or its equivalent). 20 enrollment.

BIOL 1260. Physiological Pharmacology.
Covers the physiology of human disease (e.g., Heart failure and arrhythmia; cancer signaling pathways with a focus on breast cancer; neurological disorders such as schizophrenia and Parkinson’s disease) and discusses the pharmacology of the drugs used to treat disease. A group of the most commonly prescribed drugs is discussed in terms of their fundamental modes of action and clinical importance. Expected: BIOL 0800.

BIOL 1270. Advanced Biochemistry.
An advanced course in biochemistry, biochemical methods, and reading of the primary literature, featuring systematic coverage of the biochemistry of the central dogma, including DNA (replication, repair, recombination), RNA (regulation and mechanism of transcription, processing, turnover), and proteins structure, synthesis, modification, degradation, mechanisms of action, function). Expected: BIOL 0280, CHEM 0350, 0360. Graduate students register for BIOL 2270.

Provides a conceptual understanding of molecular events underlying development of human cancer. Focused on genetic changes leading to malignant transformation of cells. Covers cell cycle control, DNA damage, mutation, cancer predisposition syndromes, oncogenic viruses, tumor immunology, metastasis, cancer chemotherapy and drug resistance. Lecture plus discussion of primary literature. Prerequisites: BIOL 0280, 0470 or 0500.

BIOL 1300. Biomolecular Interactions: Health, Disease and Drug Design.
Interactions between the molecules of life-proteins, RNA, DNA, membrane components-underlie all functions necessary for life. This course focuses on how nature controls these interactions, how these interactions can go awry in disease, and how we can learn the rules of these interactions to design drugs to treat disease. Students will review the physical basis of molecular interactions, learn classic and state-of-the-art high-resolution and high-throughput tools used to measure interaction, and survey the experimental and computational strategies to harness these interactions using a case study in rational drug design. Prerequisite: Introductory Biochemistry (BIOL 0280). Enrollment limited to 20; instructor permission.

BIOL 1310. Developmental Biology.
Covers the molecular and cellular events of development from fertilized egg to adult. Genetic basis of body form, cell fate specification and differentiation, processes controlling morphogenesis, growth, stem cells and regeneration will be examined. Differential gene regulation, intercellular signaling and their evolutionary conservation will be central to discussion of mechanisms governing developmental processes. Additional topics: developmental plasticity, impact of epigenetic and environmental factors, and basis of disease gleaned from developmental biology research. Live embryos will complement and reinforce concepts covered in class. Enrollment limited to 36. Expected: BIOL 0200 (or equivalent), and one course in genetics, cell biology or embryology.

This course is an advanced, seminar-based course. Primary literature is emphasized to complement the format of extensive student seminar presentations. It is essential that students have a strong background in biology in order to gain the most from this course. The emphasis of the course is student seminar presentation and extensive discussion on the material. This is often the first opportunity for students to present/discuss science in a seminar format. Expected background: a course in Cell Biology (e.g. BIOL 0500 or 1050), and two additional Biology courses above the introductory (BIOL 0200) level. Enrollment limited to 20.

BIOL 1410. Evolutionary Genetics.
This course will focus on selected topics in molecular population genetics, molecular evolution, and comparative genomics. Classic and current primary literature at the interface of evolution and genetics will be discussed in a seminar format. The laboratory involves wet-lab exercises (allozymes, PCR- RFLP, sequencing), plus computer labs using DNA analysis packages. Students will prepare a final grant proposal on specific research interests. Expected: BIOL 0470 or 0480. Students MUST register for the lecture section and the lab. Enrollment limited to 20.

BIOL 1420. Experimental Design in Ecology.
An overview and discussion of the basic principles used to design lab and field experiments in ecology and environmental science. Topics include: replication and statistical power, appropriate use of factorial designs, nonparametric methods, post hoc tests, natural versus manipulative experiments, experimental artifacts and impact study design. Discussions based on primary literature and a new text. Expected: BIOL 0420.

BIOL 1425. Phylogenetic Biology.
This course is the study of the evolutionary relationships between organisms, and the use of evolutionary relationships to understand other aspects of organismal biology. This course will provide a detailed picture of the statistical, mathematical, and computational tools for building phylogenies and using them to study evolution. Enrollment is by instructor permission. Students will present scientific papers in class and complete a final project consisting of their own phylogenetic analysis. Expected Background: Evolutionary Biology and quantitative methods (such as statistics, computation, or math). Open to juniors, seniors, and graduate students. Enrollment limited to 16.
Population genetics is the study of how biological processes such as mutation, natural selection, population size, and subdivision drive evolution over the timescale of generations. The past 20 years have seen a flowering in our understanding of this process from both theoretical and experimental perspectives. This course will present a rigorous introduction to modern population genetics, with particular emphasis on the complementary interplay between theory and experiment. Students will gain extensive experience with the primary literature of the field. Prerequisites: MATH 0100 and one of BIOL 0470 or 0480, or permission.

BIOL 1440. Marine Biology.
An examination of current topics in the ecology of marine organisms and communities. Current literature and ideas are analyzed in a seminar format (Shr/week). A class research project provides hands-on experience with designing and interpreting experimental field work. Prerequisites: BIOL 0410 and 0420. Instructor's permission required.

This course will explore foundational concepts in community ecology, and will draw on examples and case studies from marine and terrestrial ecosystems, including species-rich tropical rain forests and coral reefs, the marine intertidal and benthic environments, and species-poor forests and grasslands of the temperate zone. Overarching themes will emphasize theoretical frameworks to understand the evolutionary origins and maintenance of this biological diversity. This will be accomplished using traditional lectures, weekly student-led discussions, readings of the primary literature, and class activities. Expected background: BIOL 200 or equivalent placement; and BIOL 0420; OR instructor permission.

BIOL 1465. Human Population Genomics.
An introduction to human genomics and the evolutionary forces that shape observed genetic variation across humans today. Topics will include the relationship among humans and other primates, human population genetics and genomics, and examples of the concomitant evolution of both cultural traits and domesticated organisms. Assignments include a class presentation and reviewing papers on a selected topic. Expected background: BIOL 0470 or 0480, and BIOL 0495, PHP 2500, or equivalent. Enrollment limited to 25. Instructor permission required. WRIT Fall BIOL1465 S01 15766 MW 9:00-10:20(08) (M. Bertness)

BIOL 1470. Conservation Biology.
Conservation Biology is the scientific study of the phenomena that affect the maintenance, loss, and restoration of biological diversity. Topics covered include: 1) the impacts of global warming, species invasions, and habitat destruction on biodiversity, 2) strategies developed to combat these threats, and 3) a consideration of key economic and ethical tradeoffs. Special attention will be paid to current debate and controversy within this rapidly emerging field of study. Readings will include the primary literature. A term-paper will be required. Prerequisite: BIOL 0420 or instructor permission. Enrollment limited to 30.

BIOL 1475. Biogeography.
Will provide an overview of the field of biogeography—the study of geography of living organisms. Class meetings will be split between lectures and discussions. Each discussion will expose students to foundational papers, which set the context for the field's development, and more recent papers, which show where the field is headed. Each student will conduct a short (but time consuming) original research project on some topic in biogeography. Prerequisites: BIOL 0420 and 0480. Expected: one taxonomy-based course (e.g., BIOL 0410, 0430, or 0460). Enrollment limited to 15 juniors, seniors, and graduate students. Instructor permission required.

BIOL 1480. Terrestrial Biogeochemistry and the Functioning of Ecosystems.
Three fundamental interdisciplinary questions will be addressed: How do ecosystems work? What limits the growth of life on Earth? How are humans altering the framework in which all life exists? Earth is basically a closed chemical system, and the reactions that support life are fueled by sunlight. But added to this chemistry and physics is the tremendous influence of life. Life created an oxygen atmosphere; the evolution of biological nitrogen fixation exponentially increased how many organisms could exist, and the soils that support human food production developed only by biologically-mediated processes. Throughout Earth's 4.5 billion-year history changes in Earth's basic biogeochemical processes have been fairly slow. Under our inattentive stewardship, we have almost instantaneously altered all of the major element cycles. We will focus heavily on what these changes mean for life on Earth. Instructor permission required.

Explore the linkages between climate change and health. Students will come to appreciate the topic through the foundations of the primary disciplines relevant to the field including global health, environmental change, disease ecology, and others. Climate-health linkages will be learned through weekly case studies addressed collectively through student-centered lectures, discussion of the primary literature, groups activities and guest lectures from campus faculty on topics ranging from climate migration to infectious disease range shifts. Expected background: BIOL 0475, or BIOL 1470, or PHP 1070, or PHP 1920, or equivalent experience with instructor's permission. Enrollment limited to 12 juniors and seniors.

BIOL 1500. Plant Physiological Ecology.
An in-depth look at plant ecological strategy, focusing on the anatomical and physiological adaptations of plants to particular environments. Additional topics include plant-animal interactions, historical biogeography, and community assembly processes. A comparative, phylogenetic approach is emphasized. Lectures present a broad overview of topics, and discussions focus on current outstanding problems. Lab exercises provide hands-on experience in designing experiments, measuring plant performance, and scientific writing. Required laboratory hours to be arranged by the instructor. Expected: BIOL 0430 or BIOL 0440. Enrollment limited to 15.

BIOL 1520. Innate Immunity.
Innate immunity is the initial response to microbes that prevents infection of the host. It acts within minutes to hours, allowing the development of the adaptive response in vertebrates. It is the sole mechanism of defense in invertebrates such as insects. The components and mechanisms dictating this response are explored. Prerequisite: BIOL 0530. Enrollment limited to 30. Graduate students must obtain instructor permission.

BIOL 1540. Molecular Genetics.
Covers advanced genetic and molecular methods and their use in analysis of complex biological phenomena such as development, signaling, behavior, and disease. Discusses how these techniques are applied in various organisms, with emphasis on the major Eukaryotic genetic model systems (Drosophila, nematodes, mouse, yeast, Arabidopsis) and on human genetics. Uses primary literature to analyze the design of forward- and reverse-genetic approaches to discover novel gene function. For advanced undergraduates and beginning graduate students. Prerequisite for undergraduates: BIOL 0470 or instructor permission. Expected background: any of BIOL 0280, 0500, 1050, or 1310. Graduate students should register for BIOL 2540. Spring BIOL1540 S01 23990 TTh 1:00-1:50(11) (L. Brossay)

BIOL 1550. Biology of Emerging Microbial Diseases.
Emerging diseases influence the health of human populations in less developed countries and are expected to have similar effects worldwide. Rising incidence of "new" diseases underscores the need for knowledge of infection mechanisms and their outcomes. Focuses on biochemical, genetic, cellular and immunological events of emerging pathogens and host responses. Expected: BIOL 0470 or BIOL 0530. Spring BIOL1550 S01 23990 MWF 1:00-1:50(06) (A. Campbell)

BIOL 1555. Methods in Biomedical Informatics.
Will provide a methodological survey of approaches used in biomedical informatics. Particular emphasis given to formalisms and algorithms used within the context of biomedical research and health care, including those used in biomolecular sequence analysis, electronic health records, clinical decision support, and public health surveillance. Practical programming
skills will also be taught within these contexts. The final project of the course is to demonstrate an understanding of biomedical informatics approaches through development of a solution within biomedical research or healthcare context. Prerequisite: introductory statistics course. Enrollment: 20 students. For biological science concentrators, graduate students, others with permission.

BIOL 1560. Virology.
Emphasizes the understanding of molecular mechanisms of viral pathogenesis. Begins with a general introduction to the field of virology and then focuses on the molecular biology of specific viruses that are associated with human disease. Lectures based on current literature. Prerequisite: BIOL 0280, 0470, or 0530, or instructor permission. Spr BIOL1560 S01 23991 MW 9:00-9:50(02) (A. Jamieson)

BIOL 1600. Development of Vaccines to Infectious Diseases.
Provides background steps involved in vaccine development, from conceptualization to production to deployment. Considers infectious diseases and associated vaccines in context of community health. Appropriate for students wanting to gain an understanding of vaccine science. Provides a foundation for advanced courses in immunology and infectious disease, biomedical research, or medical/graduate studies. Activities include a weekly section meeting for discussion of relevant primary literature, and a final project of the student’s choice in the form of an in-class presentation, a research paper or an approved alternative format. Expected: BIOL 0200 or equivalent placement; BIOL 0530, and at least one additional biology course. Spr BIOL1600 S01 23993 MW 3:00-4:20(14) (R. Bungiro)

How and why do animals run, jump, swim and fly? Physiology, anatomy, ecology, and evolutionary history all influence, and are influenced by, the way animals move around. We will integrate analyses from many levels of biological organization - from molecular motors, through bone-muscle systems, to biogeography - with methods and approaches from mechanics, fluid dynamics, and robotics. Expected: BIOL 0800 and PHYS 0030. Instructor permission required. WRIT Spr BIOL1800 S01 24543 TTh 10:30-11:50(09) 'To Be Arranged'

BIOL 1820. Environmental Health and Disease.
Fundamental concepts relating to the adverse effects of chemical agents on human health. Topics include dose-response relationships, absorption, distribution, metabolism, excretion, mechanisms of toxicity, and the effects of selected environmental toxins on organ systems. Many of these concepts will be reinforced through the use of a case-study approach where a pertinent environmental issue is incorporated into the ongoing lectures. Expected: BIOL 0500 and BIOL 0800, plus either ENVS 0490 or BIOL 0420. Advanced students have priority. Spr BIOL1820 S01 24927 MW 8:30-9:50(02) (T. Johnston)

BIOL 1850. Environmental and Genetic Toxicology.
Human disease is produced by complex interactions between inherited genetic predisposition and environmental exposures. These interactions will be explored at the molecular, cellular, and systemic levels. Prototype diseases will include hereditary disorders of hemoglobin, hypercholesterolemia, birth defects, and cancer. Expected: Cell Biology. BIOL 1870. Techniques in Pathobiology.
A methodology course featuring laboratory and lecture instruction in established and leading-edge technologies. Examples: flow cytometry (multi-parameter analysis, cell sorting, DNA analysis, apoptosis analysis); molecular biology (PCR, in situ hybridization, southern blotting, cytogenetics, gene cloning, bioinformatics); digital imaging (image acquisition, processing and analysis); light microscopy (confocal, immuno-histochemistry); transmission electron microscopy (immuno/lectin/ enzyme cytochemistry); scanning electron microscopy (including x-ray microanalysis). Spr BIOL1870 S01 23995 TTh 1:00-3:50 (C. Jackson)

BIOL 1880. Comparative Biology of the Vertebrates.
The biology, structure, and evolutionary history of the vertebrates considered phylogenetically, emphasizing evolution of the major body systems. Stresses an evolutionary approach to the correlation of structure and function with environment and mode of life. Labs include dissection of several different vertebrates and comparative osteological material. Emphasis of course is on critical thinking rather than memorization of material. Recommended: BIOL 0320 or 0800. First year students must obtain instructor permission to register. Enrollment limited to 32. Students MUST register for the lecture section and the lab. Spr BIOL1880 S01 23996 MW 11:00-11:50(04) 'To Be Arranged' Spr BIOL1880 L01 23997 W 1:00-4:50 'To Be Arranged'

BIOL 1890. Human Histology.
This course will provide an in-depth treatment of the “stuff we are made of” and the wonderful logic of its organization. This course focuses first on the biology of the four basic tissues (epithelium, connective tissue, muscle and nerve) and second, how they contribute to the functional anatomy of all organs and systems. For Pfizer students only.

BIOL 1920B. Health Inequality in Historical Perspective.
Seminar takes a historical perspective to explore causes of health inequality in the US. Draws on studies from the 19th century-present. Examines socio-political and economic context of health/disease, focusing on how race, class, and gender shape the experience of health, disease causality, and public health responses. Includes health consequences of immigration, incarceration, race-based medicine, the Chicago heatwave, and Katrina. BIOL 0200 and work in Africana Studies and/or science-technology courses SUGGESTED. Not for biology concentration credit. Suitable as related science or theme course for HHB. Enrollment restricted to 20, third- AND FOURTH-year students. Spr BIOL1920B S01 24045 Arranged (L. Braun)

BIOL 1920C. Social Contexts of Disease.
What shapes our understandings of disease, and what makes a disease real? How might we explain the demise of formerly prevalent diseases and the arrival of others? How do politics, technologies, and institutions affect conceptions of disease and structure their treatment? Will examine the impact of social context on patients' experiences of disease, including clinical, scientific, and public health approaches. Will consider disease in relation to social relationships, power of the state to regulate disease, and cultural care of the body. Enrollment limited to 20 students; instructor permission required; serves as Capstone in Health and Human Biology. Not for concentration credit. WRIT

BIOL 1920D. Race, Difference and Biomedical Research: Historical Considerations.
This advanced seminar places the current debate over race, health, and genetics in historical context. An overarching goal is to understand how the social world informs the scientific questions we ask, design of research studies, and interpretation of findings. How have the theories and practices of biomedical science and technology produced knowledge of “race” and racial difference historically? How does race relate to gender and class? What are the implications of this debate for understanding health inequality? Previous coursework in Africana Studies, biomedical science, history of science, and/or science and technology studies preferred. Enrollment limited to 20; instructor permission. WRIT

BIOL 1941A. Plants in a Changing Planet.
Plants are the foundation of Earth's ecosystems and essential to human survival and civilization. This seminar will examine the physiological, ecological, and evolutionary responses of plants to rapid environmental change, and the consequences for agriculture and the structure and function of natural systems. Expected background: at least one of the following courses - BIOL 0420, 0430, 0440, 0480, or ENVS 0490. BIOL 1950. Directed Research/Independent Study.
Directed research/independent study in biological sciences: basic science, social studies of biomedical science, and clinically-oriented projects, mentored by individual faculty members in the Division of Biology and Medicine. Sites include campus and hospital based facilities. Projects can serve as the basis for Honors theses, or to fulfill research requirements in a Bio-Med concentration program. Students planning to use 1950/1960 to fulfill a concentration requirement must receive approval from the concentration advisor. No more than two (2) semesters of BIOL 1950/1960 may be used toward a concentration program in the biological sciences. Faculty from outside the Division may supervise projects for bio-med
program concentrators, but should do so using their Department's own Independent Study course number.

**BIOL 1960. Directed Research/Independent Study.**
Directed research/independent study in biological sciences: basic science, social studies of biomedical science, and clinically-oriented projects, mentored by individual faculty members in the Division of Biology and Medicine. Sites include campus and hospital based facilities. Projects can serve as the basis for Honors theses, or to fulfill research requirements in a Bio-Med concentration program. Students planning to use 1950/1960 to fulfill a concentration requirement must receive approval from the concentration advisor. No more than two (2) semesters of BIOL 1950/1960 may be used toward a concentration program in the biological sciences. Faculty from outside the Division may supervise projects for bio-med program concentrators, but should do so using their Department's own Independent Study course number.

**BIOL 1970A. Stem Cell Biology.**
Senior seminar course will provide an interactive forum by which up to twenty seniors (and qualified juniors with permission) will explore the biology of stem cells from their humble beginnings in the embryo to their potential use in regenerative medicine. The potency and regulation of embryonic and adult stem cell populations derived from diverse organisms will be contrasted with laboratory-derived human stem-like cells for biomedical applications. Critical reading of classical and modern literature in the field of stem cell biology will form the basis of student-led presentations, papers and ethical forums. Expected: biochemistry, genetics and/or cell biology. Instructor permission; 20 students.

**BIOL 2000B. Topics in MCDB: How Protein Structure Informs Biological Function.**
This course covers various aspects of structural and functional biology from primary to quaternary structure and deals with the 3D structure of proteins and nucleic acids and 3D structure determination. Course will be a mixture of lecture and class discussion/presentations. Students typically have taken an advanced undergraduate-level course in biology or biochemistry. Advanced undergraduates with permission. Enrollment limited to 20 students.

**BIOL 2000C. Protein Biophysics and Structure: Molecular Basis of Disease.**
Proteins are the engines of life. Determining how they function from a biophysical and structural perspective enables us to understand how they work and, equally important, how we can direct and alter their activities. These types of efforts are the basis of all medicinal and drug research. Students will obtain a broad and firm foundation of both biophysical methods and in depth studies of medically important proteins and protein complexes that will allow them to correlate structure and biological function. Graduate course; open to junior and senior undergraduates with appropriate prior coursework. Instructor permission required; enrollment limit: 12 students.

**BIOL 2000D. Current Topics in Molecular, Cellular, Developmental Biology Biochemistry.**
Protein synthesis is a fundamental cellular process mediated by ribosomes. This course will focus on progress in understanding: ribosome structure and function, ribosome biogenesis and export, quality control, ribosome degradation, and interface of ribosomes with other cellular pathways. Students will present research publications on a given topic and lead a discussion examining the experimental approach and findings of each publication. Enrollment limited to 20. Intended for graduates and advanced undergraduates with instructor permission.

**BIOL 2000E. Topics in MCDB: The Genomics Revolution and its Impact on Genetics, Medicine and Society.**
A technological revolution in genomics has exponentially increased our ability to gather biological data. A host of new methods and approaches of analysis has arisen to accommodate this dramatic shift in data collection. The broad scope of inquiry has ushered in an era of “system-wide” approaches and brute-force strategies where rare signals can be detected and studied. In this seminar we will cover papers that embody this new approach. Enrollment limited to 20 graduate students. Advanced undergraduate with appropriate course preparation and permission from instructor.

**BIOL 2010. Quantitative Approaches to Biology.**
Graduate level introduction to quantitative and computational methods in modern biology. Topics include Programming, Modeling, Algorithms, Bioinformatics, Applied Statistics, Structural Biology, Molecular Dynamics, Enzyme Kinetics, and Population and Quantitative Human Genetics. Preference is given to graduate students in Molecular Biology, Cell Biology and Biochemistry and Molecular Pharmacology, Physiology, and Biotechnology. Limited to 20 students. Instructor permission required.

**BIOL 2020. Biotechnology Science and Industry.**
This course provides a comprehensive overview of the primary functional roles and steps involved in developing and commercializing a novel technology/scientific breakthrough within the biotechnology industry. This course is particularly suitable for students interested in pursuing a career within a biotechnology company, or for those interested in developing an in-depth knowledge of how the science of biotechnology becomes real world products. Pre Requisites: Foundations of Living Systems (BIOL0020), Principles of Physiology (BIOL0080), and Principles of Economics (ECNO110)/equivalent or instructor's permission is required.

**BIOL 2030. Foundations for Advanced Study in the Life Sciences.**
A double-credit graduate course on multidisciplinary experimental approaches to biological questions. Focusing on primary literature, lectures and discussions covers the mechanisms and regulation of basic cellular processes involving nucleic acids (synthesis, structure, maintenance and transmission) and proteins (synthesis, maturation, function) and their integration into more complex circuits (signaling, organelle biogenesis and inheritance, cell cycle control). Required for PhD students in the MCB Graduate Program; all others must obtain instructor permission. Enrollment is limited to graduate students.

**BIOL 2040. Ultrastructure/Bioimaging.**
This course examines microscopy and image analysis in the life sciences. Theoretical and practical aspects of microscopy will be discussed. Students will obtain hands-on experience with electron microscopy, light microscopy, fluorescence microscopy, and confocal microscopy. Students will learn to display images in 3D. For graduate students and advanced undergraduates. Instructor permission required.

**BIOL 2050. Biology of the Eukaryotic Cell.**
(Undergraduate students should register for BIOL 1050.)

**BIOL 2089. The Importance of Intellectual Property in Biotechnology.**
This course delves into the various roles of intellectual property in biotechnology. In addition to providing a solid foundation in the fundamentals of intellectual property, the course will use case studies in biotechnology to explore in depth the interplay between specific scientific breakthroughs and intellectual property. An understanding of the science of biotechnology is critical for advanced understanding of the value and possibilities of biotechnology intellectual property.

**BIOL 2110. Drug and Gene Delivery.**
Topics in drug delivery systems including history of the field, advantages of controlled release technology, stabilization and release of proteins, fabrication methods, regulatory considerations, economic aspects, patents and intellectual property rights, and more. Prepects students for research in industry and academia, and offers information for consultants in the field. Expected: BIOL 1090, 1120, CHEM 0350, 0360.

**BIOL 2117. Human Physiology.**
For Brown-Pfizer Master of arts Program students. Provides an introduction to basic human physiological concepts along with more
advanced coverage of selected systems. We'll start with topics of diffusion, cell physiology and the basis of cell membrane potential and then cover the nervous, endocrine, musculoskeletal, cardiovascular, respiratory, renal and gastrointestinal systems. We'll focus on normal human physiology and at times incorporate discussions of exercise physiology, pathophysiology, and specific physiologic scenarios to build toward the goal of understanding complex integration of function between cells, tissues and organ systems. Readings will consist of textbook chapters along with primary literature covering selected topics.

**BIOL 2130. Techniques in Molecular and Cell Science.**
This course provides hands-on laboratory training in state-of-the-art techniques in molecular and cellular sciences, and reinforces this training with didactic lectures that stress key principles, the quantitative approach and the most exciting applications of these technologies in the context of current research. Areas covered include cell culture, tissue engineering, DNA cloning, gene therapy, quantitative assays, microscopy and image analysis.

Enrollment is limited to 12; written permission required. Permission will be granted after the first class. Students MUST register for the lecture section and a lab.

**BIOL 2135. Pharmacokinetics and Drug Design.**
Consists of the absorption, distribution, metabolism, and elimination of drugs. These factors, including dosage, determine the concentration of drugs at its sites of action, and intensity of effects. Will examine models describing the relationship between plasma drug concentrations and therapeutic drug effect. Will acquire biologic sampling techniques, analytic methods for measurement of drugs and metabolites, and procedures facilitating data used in designing drugs and dosage regimens. Prerequisite: BIOL 0800 or equivalent. Enrollment limited to 20. Preference given to graduate students in Biotechnology and BME, especially Masters students. Graduate students (PhD and ScM) from other programs enroll if permission of instructor is granted.

**BIOL 2140. Principles in Experimental Surgery.**
An introduction to the principles and practice of surgery, sterile technique, anesthesia, and laboratory animal care. Intended to provide highly supervised, hands-on experience in techniques for humane handling and surgical management of experimental animal subjects. Emphasizes surgical technique, anesthesia technique, and laboratory animal medicine. Prerequisite: BIOL 0800. Limited to five (5) Graduate students only. Instructor permission required. Students MUST register for the lecture section and the lab.

**BIOL 2145. Molecular Targets of Drug Discovery.**
This course emphasizes the role of cell physiology in the identification of drug targets and the development of novel drugs. Specific protein drug targets such as G-protein coupled receptors will be examined in detail from identifying a target to development of drugs for that target and the physiological consequences. Prerequisite: BIOL 0800. Enrollment limited to 20. Preference given to graduate students in Biotechnology and BME, especially Masters students. Graduate students from other programs may enroll if permission of the instructor is granted.

**BIOL 2150. Pharmacology and Physiology.**
Fundamental concepts in pharmacology and physiology from the cellular/molecular level to organ systems. Required of first-year graduate students in Molecular Pharmacology and Physiology. Fall BIOL2170 S01 14969 MWF 10:00-11:30 (D. Horrigan)

**BIOL 2150. MPPB Professional Development Seminar.**
Professional development seminar required of all first year graduate students in the Molecular Pharmacology and Physiology Graduate Program, and open to graduate students in other programs. Topics include grants and funding, effective oral presentation skills, alternative careers in science, and others. All students will be required to present a research seminar during the scheduled class time.

Instructor permission required for graduate students outside the Molecular Pharmacology and Physiology Graduate Program. Not intended for undergraduate students.

Fall BIOL2190 S01 14970 M 12:00-1:30 (D. Horrigan)

**BIOL 2200A. Molecular Biology and Chemistry.**
A critical evaluation of contemporary research in biochemical, molecular biology, and structural biology. Intensive reading and discussion of the current literature, critical analysis, and student presentations in seminars. Advanced undergraduates with permission. Enrollment limited to 20.

**BIOL 2200B. Post–Transcriptional Regulations of Gene Expression.**
Enrollment limited to 20.
BIOL 2200D. Current Topics in Biochemistry: Biochemical Genomics. A critical evaluation of current research in biochemical and molecular biology focusing on the mechanism and regulation of transcription. Intensive reading, critical analysis, and discussion of the relevant literature in the context of student presentations in seminars. Advanced undergraduates with permission of the instructor. Enrollment limited to 20 students. Instructor permission required.

BIOL 2210A. Molecular Mechanisms in Site–Specific Recombination and DNA Transposition. Enrollment limited to 20.

BIOL 2210C. Current Topics in Molecular Biology: Cellular Quality Control Mechanisms. Protein synthesis is a fundamental cellular process that is dependent upon the rapid and accurate synthesis of ten to twenty thousand ribosomes per generation to carry out the equally rapid and accurate synthesis of protein. Progress in understanding Ribosome structure and function, Ribosome evolution, Ribosome biogenesis and coordination of cell growth with cell division will be explored using the current literature with weekly student seminars and a final research proposal.

BIOL 2222B. Current Topics in Functional Genomics. A technological revolution in genomics has exponentially increased our ability to gather biological data. A host of new methods and types of analysis has arisen to accommodate this dramatic shift in data collection. The broad scope of inquiry has ushered in an era of "system-wide" approaches and brute-force strategies where rare signals can be detected and studied. In this seminar we will cover papers that embody this new approach. Students typically have taken an advanced undergraduate-level course in biology.

BIOL 2230. Biomedical Engineering and Biotechnology Seminar. Required of all first- and second-year graduate students in the Biomedical Engineering and Biotechnology Seminar graduate program, and open to others. Concepts of drug delivery and tissue engineering, implantation biology, and cellular therapy, as well as the research projects directed by program faculty. Students present research seminars and participate in presentations by outside speakers. Includes Journal Club activities. Open to graduate students only.

BIOL 2240. Biomedical Engineering and Biotechnology Seminar. See Biomedical Engineering and Biotechnology Seminar (BIOL 2230) for course description.

BIOL 2245. Blood Substitutes: Principles and Therapeutics Development. Blood serves many critical functions including respiratory gas transport, hemostasis and host defense. Plasma and cellular components of blood, their functional mechanisms, pathophysiologic consequences when deficient and current treatments will be reviewed. Finally, development of blood component substitutive therapeutics (blood substitutes) based on protein and cellular engineering technologies (biotherapeutics) will be discussed. Open to Graduates and Juniors and Seniors who meet the pre-requisites BIOL 0800 and BIOL 0280 or with instructor's permission.

BIOL 2250. Advanced Biochemistry. (Undergraduate students should register for BIOL 1270.)

BIOL 2270. Advanced Biochemistry.

BIOL 2290A. Mechanisms of Virus Entry, Replication, and Pathogenesis. This course will focus on the interactions between viruses and host cells that contribute to invasion, manipulation of viral and cellular gene expression, and manipulation of the host's response to infection. We will address interactions between viruses infecting humans, as well as those of plants, fungi, and bacteria. Students will be evaluated on their ability to critically analyze data in published manuscripts, including presentations of primary papers, classroom discussion, and completion of a research proposal. Expected: at least two of the following: BIOL 1050, 1270, 1520, 1540, 1560. Advanced undergraduates with permission of the instructor.

BIOL 2290B. Mechanisms of Protein Synthesis and Impact on Human Disease. This course will examine mechanisms central to the regulation of protein synthesis in both prokaryotes and eukaryotes. Targeting protein synthesis through ribosomes is a proven drug target commonly used to treat many infectious diseases. The regulation of protein synthesis in eukaryotes is critical for myriad human conditions including aging and cancer, including the recently discovered role of microRNAs. This course will explore the common and unique mechanisms of regulation of protein synthesis between prokaryotes and eukaryotes and the importance of understanding these mechanisms for human health. For graduate students and advanced undergraduates with permission.

BIOL 2290C. Neuronal Signaling meets the RNA World. The concept of one gene, one protein is nowhere more violated than in protein encoding genes expressed in the nervous system. We will cover a variety of post-transcriptional processing events which serve to generate protein diversity in the nervous system including alternative splicing, trans-splicing, and RNA editing. We will also address non-coding RNAs and their roles, in particular, in regulating nervous system function. Since it is clear that nervous system complexity is not a function of gene number across large phylogenetic distances, the course will be aimed at instilling a greater understanding of how the regulation of shared "toolbox" genes results in organismal complexity. Advanced undergraduates with permission of the instructor.

BIOL 2290D. Small RNA Regulation of Germ Cells and Development. Enrollment limited to 20.

BIOL 2290E. Signal Transduction. This seminar course will provide a broad introduction to basic mechanisms of cell signaling from the extracellular environment to the nucleus of a cell, and to the mechanisms that regulate signal transmission. Topics of discussion will include: processing and modification of signaling molecules; signal recognition/ligand binding; co-receptors and receptor trafficking; intracellular relays; transduction to the nucleus; regulation of signal intensity and duration; feedback controls. Signal transduction pathways from several model systems will be examined and their relevance to development and disease will be considered. Senior undergraduates with permission of the instructors. Enrollment limited to 20.

BIOL 2310. Developmental Biology. Covers the molecular and cellular evolution of development from fertilized egg to adult. Genetic basis of body form, cell fate specification and differentiation, processes controlling morphogenesis, growth, stem cells and regeneration are examined. Differential gene regulation, intercellular signaling and evolutionary conversation are central to discussion of mechanisms governing developmental processes. Additional topics: developmental plasticity, impact of epigenetic and environmental factors, and basis of disease gleaned from developmental biology research. Live embryos complement and reinforce concepts covered in class. Expected: BIOL0200 (or equivalent), and one course in genetics, embryology, cell biology or molecular biology. Enrollment limited to 36. (Undergraduate students register for BIOL 1310.)
BIOL 2320E. Genetic Control of Cell Fate Decisions.
A cell's fate is acquired in a process whereby largely uncommitted progenitor cells are instructed down a commitment path that ultimately results in a specific cell type with distinct molecular and physiological properties. This process is critical for the establishment of all cell types and tissues and is poised to be a critical topic in cell-based therapeutic strategies. We will investigate the intrinsic and extrinsic mechanisms that manifest at the genetic level to impart cell fate decisions on progenitors. Advanced undergraduates with permission of the instructor.

BIOL 2340. Neurogenetics and Disease.
Genetic mutations provide a powerful approach to dissect complex biologic problems. We will focus on fascinating discoveries from "forward genetic" studies – moving from nervous system phenotype to genetic mutation discovery. There will be an emphasis of neurologic disease phenotypes and the use of novel genomic methods to elucidate the central molecular and cellular causes for these conditions. The course will emphasize the use of "reverse genetics" – engineered mutations in model systems – to dissect nervous system function and disease mechanisms. Disorders to be covered include autism, intellectual disability, schizophrenia, epilepsy. Enrollment limited to 20. Instructor permission required.

BIOL 2350. The Biology of Aging.
Studying the mechanisms underlying the process of aging promises to be one of the next frontiers in biomedical science. Understanding the biology of aging is important for the long-term possibility of increasing life span, and for the immediate benefits it will have on age-related diseases. As demographics of industrialized countries have changed, age-related diseases such as cancer/cardiovascular/stroke, osteoporosis/arthritis/Alzheimer's have assumed epidemic proportions. Understanding the aging process is a pre-requisite for designing interventions for treatment. Focus is on examining the biology of aging through the examination of a molecular/cellular/genetic and demographic nature. Suggested prerequistes: BIOL 0200, 0280, 0470, 0800. Enrollment limited to 20. Advanced undergraduates with permission of instructor.

BIOL 2430. Topics in Ecology and Evolutionary Biology.
Current literature in ecology, behavior, and evolutionary biology is discussed in seminar format. Topics and instructors change each semester. Representative topics have included: structuring of communities, biomechanics, coevolution, quantitative genetics, life history strategies, and units of selection. Expected: courses in advanced ecology and genetics.

BIOL 2440. Topics in Ecology and Evolutionary Biology.
See Topics In Ecology And Evolutionary Biology (BIOL 2430) for course description.

BIOL 2450. Exchange Scholar Program.
Fall BIOL2450 S01 14705 Arranged "To Be Arranged"
Fall BIOL2450 S02 14706 Arranged "To Be Arranged"

BIOL 2540. Molecular Genetics.
(Undergraduate students should register for BIOL 1540.)
Spr BIOL2540 S01 23989 TTh 2:30-3:50(11) (E. Larschan)

BIOL 2640A. Viral Immunology.
Viral Immunology is an advanced topics course in Microbiology and Immunology which will be focused on viral immunology. Weekly meetings will cover different issues concerning defense against viral infections and pathology related to viral infection, with focus on viral-host interactions. Topics will be selected to present either important basic concepts in the context of immune responses and/or major challenges in controlling viral infections. Recent advances in understanding virus-host interactions, host responses to viruses, cytokine regulation of immune responses or cytokine-mediated pathology during viral infections will be emphasized.

BIOL 2640B. Microbial Pathogenesis.
Examines microbial pathogens and the underlying mechanisms by which infectious organisms cause diseases. Bacterial, fungal, protozoal and viral pathogens will be studied using tools of modern biology. Also examined are the host's immune responses to infection and disease. Areas covered include mechanisms of pathogen internationalization and survival, immune responses, signal transduction and pathobiology. Expected: BIOL 0510, 0530, or 1550.

BIOL 2640C. The Immune System.
Introduction to the experimental and theoretical foundations of immunology and the function of the mammalian immune system. Focuses on concepts, landmark experiments and recent advances. Topics include innate and adaptive immunity; structure/function of antibody molecules and T cell receptors; and regulation of immune responses through cellular interactions. Application of concepts to medically significant issues (vaccines, transplantation, hypersensitivity, autoimmunity, cancer, immunodeficiency) is discussed. Interpretative analysis of experimental data is emphasized. Activities include written assignments that analyze a hypothetical immune system and a final paper addressing an immunological topic of the student's choosing. For Pfizer students only.

BIOL 2850. Introduction to Research in Pathobiology.
Introduces incoming pathobiology graduate students with research opportunities in the laboratories of program faculty. Consists of seminars with individual faculty members in the graduate program in pathobiology. Required background reading of recent papers lead to a discussion of current research in the faculty member's laboratory. Additional discussions include safety and ethical issues in research. Open only to first-year graduate students in the program in pathobiology.

BIOL 2860. Molecular Mechanisms of Disease.
This course is designed for graduate students and focuses on the underlying causes of human disease. Students should have a solid background in the life sciences with an understanding of the fundamental principles of molecular biology, genetics, biochemistry and cell biology. A discussion of cystic fibrosis, using this disease to explore basic principles of molecular biology, genetics, physiology and pathology. Then the course centers on the genetic and environmental basis of disease and carcinogenesis. Will lecture individual student presentations and experimental planning exercises. Emphasis will be placed on the development of presentation skills and research design. Undergraduates require instructor permission.

BIOL 2970. Preliminary Examination Preparation.
For graduate students who have met the tuition requirement and are paying the registration fee to continue active enrollment while preparing for a preliminary examination.

BIOL 2980. Graduate Independent Study.
Independent study projects at the graduate level. Section numbers vary by instructor. Please check Banner for the correct section number and CRN to use when registering for this course.

BIOL 2985. Graduate Seminar.
Section numbers vary by instructor. Please see the registration staff for the correct section number to use when registering for this course.

BIOL 2990. Thesis Preparation.
For graduate students who have met the tuition requirement and are paying the registration fee to continue active enrollment while preparing a thesis.

BIOL 2995. Thesis.
Section numbers vary by instructor. Please see the registration staff for the correct section number to use when registering for this course.

BIOL 3001. Clerkship in Medicine.
Twelve weeks.
BIOL 301. Systemic Pathology.
First-semester systemic pathology course building on the general principles of disease introduced in general pathology IMS-1. Objectives include learning the classification of systemic disease according to basic pathological mechanisms, describing and explaining the functional and structural changes produced by the most common diseases, and enhancing the ability to diagnose and treat patients. Runs in parallel with pathophysiology BIOL 3500; covers four organ system segments: cardiovascular, renal, and pulmonary and supporting structures.

BIOL 305. Individualized Clerkship in Medicine.
Fall BIOL3015 S12 10003 Arranged 'To Be Arranged'
Fall BIOL3015 S16 10004 Arranged 'To Be Arranged'

BIOL 3020. Nephrology.
No description available.
Fall BIOL3020 S12 10005 Arranged 'To Be Arranged'
Fall BIOL3020 S24 10007 Arranged 'To Be Arranged'
Spr BIOL3020 S34 20002 Arranged 'To Be Arranged'

BIOL 3025. Longitudinal in Renal Disease.
No description available.
Fall BIOL3035 S14 10010 Arranged 'To Be Arranged'

BIOL 3030. Clinical Nephrology.
No description available.
Fall BIOL3030 S31 10008 Arranged 'To Be Arranged'
Fall BIOL3030 S24 10009 Arranged 'To Be Arranged'

BIOL 3035. Clinical Nephrology.
No description available.
Fall BIOL3035 S14 10010 Arranged 'To Be Arranged'

BIOL 3040. Clinical Dermatology.
No description available.
Fall BIOL3040 S12 10011 Arranged 'To Be Arranged'
Fall BIOL3040 S14 10012 Arranged 'To Be Arranged'
Fall BIOL3040 S21 10013 Arranged 'To Be Arranged'
Fall BIOL3040 S22 10014 Arranged 'To Be Arranged'
Fall BIOL3040 S24 10015 Arranged 'To Be Arranged'
Spr BIOL3040 S32 20003 Arranged 'To Be Arranged'
Spr BIOL3040 S34 20004 Arranged 'To Be Arranged'

BIOL 3050. Gastroenterology.
No description available.
Fall BIOL3050 S12 10016 Arranged 'To Be Arranged'
Fall BIOL3050 S14 10017 Arranged 'To Be Arranged'
Fall BIOL3050 S22 10018 Arranged 'To Be Arranged'
Fall BIOL3050 S23 10019 Arranged 'To Be Arranged'
Fall BIOL3050 S24 10020 Arranged 'To Be Arranged'
Spr BIOL3050 S32 20005 Arranged 'To Be Arranged'
Spr BIOL3050 S34 20006 Arranged 'To Be Arranged'

BIOL 3060. Gastroenterology.
No description available.
Fall BIOL3060 S12 10021 Arranged 'To Be Arranged'
Fall BIOL3060 S14 10022 Arranged 'To Be Arranged'
Fall BIOL3060 S22 10023 Arranged 'To Be Arranged'
Fall BIOL3060 S24 10024 Arranged 'To Be Arranged'
Spr BIOL3060 S32 20007 Arranged 'To Be Arranged'

BIOL 3070. Infectious Disease.
No description available.
Fall BIOL3070 S14 10025 Arranged 'To Be Arranged'
Fall BIOL3070 S22 10026 Arranged 'To Be Arranged'
Fall BIOL3070 S24 10027 Arranged 'To Be Arranged'
Spr BIOL3070 S34 20008 Arranged 'To Be Arranged'

BIOL 3075. Infectious Disease.
Fall BIOL3075 S14 10028 Arranged 'To Be Arranged'

BIOL 3100, Cardiology.
No description available.
Fall BIOL3100 S14 10034 Arranged 'To Be Arranged'
Fall BIOL3100 S24 10035 Arranged 'To Be Arranged'
Spr BIOL3100 S34 20011 Arranged 'To Be Arranged'

BIOL 3080. HIV/AIDS.
No description available.
Fall BIOL3080 S12 10030 Arranged 'To Be Arranged'
Fall BIOL3080 S14 10031 Arranged 'To Be Arranged'
Fall BIOL3080 S22 10032 Arranged 'To Be Arranged'
Fall BIOL3080 S24 10033 Arranged 'To Be Arranged'
Spr BIOL3080 S32 20009 Arranged 'To Be Arranged'
Spr BIOL3080 S44 20010 Arranged 'To Be Arranged'

BIOL 3090. Allergy and Clinical Immunology Seminar.
The pathophysiology, diagnosis, and treatment of allergic and immunological diseases. Particularly addresses the following diseases: asthma, rhinitis, sinusitis, urticaria, anaphylaxis, primary immunodeficiencies, food allergy, allergic reactions to medications, atopic eczema and insect-sting allergy. Molecular, cellular, and genetic components of allergy and other immunologic inflammation guide consideration of the diagnosis, clinical management, and prevention of allergic and other immunological diseases.

BIOL 3110. Clinical Adult Cardiology.
No description available.
Fall BIOL3110 S13 10036 Arranged 'To Be Arranged'
Fall BIOL3110 S14 10037 Arranged 'To Be Arranged'
Fall BIOL3110 S24 10038 Arranged 'To Be Arranged'
Spr BIOL3110 S33 20012 Arranged 'To Be Arranged'
Spr BIOL3110 S34 20013 Arranged 'To Be Arranged'

BIOL 3120. Coronary Care Unit.
No description available.
Fall BIOL3120 S12 10039 Arranged 'To Be Arranged'
Fall BIOL3120 S14 10040 Arranged 'To Be Arranged'
Fall BIOL3120 S22 10041 Arranged 'To Be Arranged'
Fall BIOL3120 S24 10042 Arranged 'To Be Arranged'
Spr BIOL3120 S32 20014 Arranged 'To Be Arranged'
Spr BIOL3120 S34 20015 Arranged 'To Be Arranged'

BIOL 3140. Cardiology.
No description available.
Fall BIOL3140 S14 10043 Arranged 'To Be Arranged'
Fall BIOL3140 S22 10044 Arranged 'To Be Arranged'
Fall BIOL3140 S24 10045 Arranged 'To Be Arranged'

BIOL 3165. Med/Peds Infectious Diseases.
No description available.
Fall BIOL3165 S14 10046 Arranged 'To Be Arranged'
Fall BIOL3165 S24 10047 Arranged 'To Be Arranged'
Spr BIOL3165 S32 20016 Arranged 'To Be Arranged'

BIOL 3170. Urgent Care.
No description available.
Fall BIOL3170 S12 10048 Arranged 'To Be Arranged'
Fall BIOL3170 S21 10049 Arranged 'To Be Arranged'
Fall BIOL3170 S22 10050 Arranged 'To Be Arranged'
Fall BIOL3170 S24 10051 Arranged 'To Be Arranged'
Spr BIOL3170 S32 20017 Arranged 'To Be Arranged'

BIOL 3180. Hospice and Palliative Medicine.
No description available.
Fall BIOL3180 S12 10052 Arranged 'To Be Arranged'
Fall BIOL3180 S14 10053 Arranged 'To Be Arranged'
Fall BIOL3180 S22 10054 Arranged 'To Be Arranged'
Fall BIOL3180 S24 10055 Arranged 'To Be Arranged'
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BIOL 3200. Tropical Medicine in East Africa.  
No description available.

Fall BIOL3200 S14 10056 Arranged "To Be Arranged"
Fall BIOL3200 S15 10057 Arranged "To Be Arranged"
Fall BIOL3200 S18 10058 Arranged "To Be Arranged"
Fall BIOL3200 S24 10059 Arranged "To Be Arranged"
Fall BIOL3200 S25 10060 Arranged "To Be Arranged"
Fall BIOL3200 S28 10061 Arranged "To Be Arranged"

BIOL 3205. International Critical Care at Tuebingen.

BIOL 3210. Hospice and Palliative Medicine.  
No description available.

BIOL 3215. Internal Medicine Night Float.

BIOL 3220. Endocrinology.  
No description available.

Fall BIOL3220 S14 10062 Arranged "To Be Arranged"
Fall BIOL3220 S22 10063 Arranged "To Be Arranged"
Fall BIOL3220 S24 10064 Arranged "To Be Arranged"

BIOL 3230. Hematology Oncology.  
No description available.

Fall BIOL3230 S12 10065 Arranged "To Be Arranged"
Fall BIOL3230 S14 10066 Arranged "To Be Arranged"
Fall BIOL3230 S24 10067 Arranged "To Be Arranged"
Spr BIOL3230 S32 20019 Arranged "To Be Arranged"
Spr BIOL3230 S34 20020 Arranged "To Be Arranged"

BIOL 3240. Clinical Hematology/Oncology.  
No description available.

Fall BIOL3240 S14 10068 Arranged "To Be Arranged"
Fall BIOL3240 S24 10069 Arranged "To Be Arranged"

BIOL 3260. Hematology Oncology.  
No description available.

Fall BIOL3260 S24 10070 Arranged "To Be Arranged"

BIOL 3270. Hematology.  
No description available.

Fall BIOL3270 S14 10071 Arranged "To Be Arranged"
Fall BIOL3270 S24 10072 Arranged "To Be Arranged"

BIOL 3280. Allergy.  
No description available.

Fall BIOL3280 S12 10073 Arranged "To Be Arranged"
Fall BIOL3280 S22 10074 Arranged "To Be Arranged"
Fall BIOL3280 S24 10075 Arranged "To Be Arranged"
Spr BIOL3280 S34 20021 Arranged "To Be Arranged"

BIOL 3290. Pulmonary Diseases.  
No description available.

Fall BIOL3290 S12 10076 Arranged "To Be Arranged"
Fall BIOL3290 S14 10077 Arranged "To Be Arranged"
Fall BIOL3290 S24 10078 Arranged "To Be Arranged"
Spr BIOL3290 S34 20022 Arranged "To Be Arranged"

BIOL 3300. Pulmonary Diseases.  
No description available.

Fall BIOL3300 S14 10079 Arranged "To Be Arranged"
Fall BIOL3300 S24 10080 Arranged "To Be Arranged"
Spr BIOL3300 S34 20023 Arranged "To Be Arranged"

BIOL 3310. Pulmonary Diseases.  
No description available.

Fall BIOL3310 S14 10081 Arranged "To Be Arranged"
Fall BIOL3310 S24 10082 Arranged "To Be Arranged"
Spr BIOL3310 S34 20024 Arranged "To Be Arranged"

No description available.

Fall BIOL3320 S10 10083 Arranged "To Be Arranged"

Fall BIOL3330 S14 10084 Arranged "To Be Arranged"
Fall BIOL3330 S24 10085 Arranged "To Be Arranged"
Spr BIOL3330 S34 20025 Arranged "To Be Arranged"

BIOL 3331. Subinternship in Medicine - MH.  
No description available.

Fall BIOL3331 S14 10086 Arranged "To Be Arranged"
Fall BIOL3331 S24 10087 Arranged "To Be Arranged"

BIOL 3332. Subinternship in Medicine - MHRI.  
No description available.

Fall BIOL3332 S14 10088 Arranged "To Be Arranged"
Fall BIOL3332 S24 10089 Arranged "To Be Arranged"

BIOL 3333. Subinternship in Medicine - RIM.  
No description available.

Fall BIOL3333 S14 10090 Arranged "To Be Arranged"
Fall BIOL3333 S24 10091 Arranged "To Be Arranged"

BIOL 3334. Subinternship in Medicine - VAMC.  
No description available.

Fall BIOL3334 S14 10092 Arranged "To Be Arranged"
Fall BIOL3334 S24 10093 Arranged "To Be Arranged"

BIOL 3340. Subinternship in Medical Intensive Care (MICU).  
No description available.

Fall BIOL3340 S14 10094 Arranged "To Be Arranged"
Fall BIOL3340 S24 10095 Arranged "To Be Arranged"
Spr BIOL3340 S34 20026 Arranged "To Be Arranged"

BIOL 3350. Subinternship in Critical Care Medicine.  
No description available.

Fall BIOL3350 S14 10096 Arranged "To Be Arranged"
Fall BIOL3350 S24 10097 Arranged "To Be Arranged"
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No description available.

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Fall BIOL3370 S14 10099 Arranged "To Be Arranged"
Fall BIOL3370 S24 10100 Arranged "To Be Arranged"
Spr BIOL3370 S34 20028 Arranged "To Be Arranged"

BIOL 3390. Psychiatry in Medical Practice.  
No description available.

Fall BIOL3390 S12 10101 Arranged "To Be Arranged"
Fall BIOL3390 S14 10102 Arranged "To Be Arranged"
Fall BIOL3390 S15 10103 Arranged "To Be Arranged"
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Fall BIOL3390 S24 10106 Arranged "To Be Arranged"

BIOL 3400. Medical Consultation - OB/Gyn.  
No description available.

Fall BIOL3400 S14 10107 Arranged "To Be Arranged"
Fall BIOL3400 S24 10108 Arranged "To Be Arranged"
Spr BIOL3400 S34 20029 Arranged "To Be Arranged"

BIOL 3405. Medical Consult in OB/Gyn and Periop Med.  
No description available.

Fall BIOL3405 S12 10109 Arranged "To Be Arranged"
Fall BIOL3405 S14 10110 Arranged "To Be Arranged"
Fall BIOL3405 S22 10111 Arranged "To Be Arranged"
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BIOL 3410. Internal Medicine in the Dominican Republic.  
No description available.

Fall BIOL3410 S24 10114 Arranged "To Be Arranged"

BIOL 3415. Clinical Medicine in Nicaragua.  
No description available.

Fall BIOL3415 S14 10115 Arranged "To Be Arranged"

BIOL 3460. College Health Longitudinal.  
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<th>Delivery</th>
<th>Section</th>
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<td>BIOL 3470</td>
<td>Issues Concerning Deaf Patients in Healthcare.</td>
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<td></td>
<td>Students will gain understanding of the basics of communication with and among the Deaf, including ASL, lip-reading, current technologies, and the use of interpreters.</td>
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<td>Nuclear, Biological, Chemical Weapons of Mass Destruction Domestic Preparedness Training Seminar.</td>
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<td>Clinical Reasoning and Human Errors in Medicine.</td>
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BIOL 3585. Advanced Clinical Mentorship in Radiation Oncology.
BIOL 3586. Advanced Clinical Mentorship Independent Study.
BIOL 3587. Advanced Clinical Mentorship in Primary Care/Behavioral Medicine.
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BIOL 3640. Doctoring 1.
Fall BIOL3640 S01 10171 Arranged (S. Warrier)

BIOL 3641. Integrated Medical Sciences I.
Fall BIOL3641 S01 10172 Arranged (L. Dumenco)

BIOL 3642. IMS 1 - Scientific Foundations of Medicine.
Fall BIOL3642 S01 10173 Arranged (P. Gruppuso)

BIOL 3643. IMS-1 Histology.
Fall BIOL3643 S01 10174 Arranged 'To Be Arranged'

BIOL 3644. IMS-1 Human Anatomy I.
Fall BIOL3644 S01 10175 Arranged (D. Ritter)

BIOL 3645. IMS-1 General Pathology.
Fall BIOL3645 S01 10176 Arranged (L. Dumenco)

BIOL 3650. Doctoring 2.
Spr BIOL3650 S01 20034 Arranged (S. Warrier)

BIOL 3651. Integrated Medical Sciences II - Comprehensive.
Spr BIOL3651 S01 20035 Arranged 'To Be Arranged'

BIOL 3652. IMS-2 Brain Sciences.
Spr BIOL3652 S01 20036 Arranged 'To Be Arranged'

BIOL 3653. IMS-2 Microbiology/Infectious Diseases.
Spr BIOL3653 S01 20037 Arranged 'To Be Arranged'

BIOL 3654. IMS-2 Endocrine Sciences.
Fall BIOL3654 S01 10177 Arranged 'To Be Arranged'

BIOL 3655. Human Anatomy II.
Spr BIOL3655 S01 20039 Arranged 'To Be Arranged'

BIOL 3656. Health Systems and Policy I.
Fall BIOL3656 S01 10178 Arranged 'To Be Arranged'

BIOL 3657. Health Systems and Policy II.

BIOL 3660. Doctoring 3.
Fall BIOL3660 S01 10179 Arranged (S. Rougas)

BIOL 3661. Integrated Medical Sciences III - Comprehensive.
Fall BIOL3661 S01 10180 Arranged 'To Be Arranged'

BIOL 3662. IMS-3 Cardiovascular.
Fall BIOL3662 S01 10181 Arranged (D. Burtt)

BIOL 3663. IMS-3 Pulmonary.
Fall BIOL3663 S01 10182 Arranged (M. Jankowich)

BIOL 3664. IMS-3 Renal.
Fall BIOL3664 S01 10183 Arranged (S. Hu)

BIOL 3665. IMS-II Supporting Structures.
Fall BIOL3665 S01 10184 Arranged 'To Be Arranged'

BIOL 3666. Integrated Medical Sciences III - Systemic Pathology.
Fall BIOL3666 S01 10185 Arranged (C. Oyer)

BIOL 3667. Integrated Medical Sciences III - System-Based Pharmacology.
Fall BIOL3667 S01 10186 Arranged (R. Patrick)

BIOL 3670. Doctoring 4.
Spr BIOL3670 S01 20040 Arranged (S. Rougas)

BIOL 3671. Integrated Medical Sciences IV - Comprehensive.
Spr BIOL3671 S01 20041 Arranged 'To Be Arranged'

BIOL 3672. IMS-4 Hematology.
Spr BIOL3672 S01 20042 Arranged 'To Be Arranged'

BIOL 3673. IMS-4 Gastroenterology.
Spr BIOL3673 S01 20043 Arranged 'To Be Arranged'

BIOL 3674. IMS-3 Human Reproduction.
Fall BIOL3674 S01 10187 Arranged (C. Oyer)

BIOL 3675. Integrated Medical Sciences IV - Systemic Pathology.
Spr BIOL3675 S01 20044 Arranged 'To Be Arranged'

BIOL 3676. Integrated Medical Sciences IV - System-Based Pharmacology.
Spr BIOL3676 S01 20045 Arranged 'To Be Arranged'

BIOL 3691. System-Based Pharmacology.

BIOL 3750. Neurology.
No description available.
Fall BIOL3750 S12 10188 Arranged 'To Be Arranged'

No description available.
Fall BIOL3770 S12 10194 Arranged 'To Be Arranged'

Fall BIOL3780 S14 10196 Arranged 'To Be Arranged'

BIOL 3790. Aging and Dementia.
No description available.
Fall BIOL3790 S12 10197 Arranged 'To Be Arranged'

BIOL 3800. Neurosurgery.
No description available.
Fall BIOL3800 S12 10201 Arranged 'To Be Arranged'

BIOL 3815. Subinternship in Neurosurgery.
Fall BIOL3815 S14 10206 Arranged 'To Be Arranged'

BIOL 3890. Culture, Patient, Advocacy and the Community.
This course focuses on the knowledge, skills, and attitudes required for effective patient advocacy with an emphasis on the role of culture in developing advocacy partnerships with patients, families, peers and community service providers. Specifically, it examines the relationships between race, ethnicity, social factors, economic factors and health status indicators. The course will provide opportunities to build self-awareness, to develop greater insight into the social and community contexts of health.
care and patient advocacy, and to refine physician-patient communication skills.

**BIOL 3900. Core Clerkship in Surgery.**
Six weeks.
- Fall BIOL3900 S10 10209 Arranged 'To Be Arranged'
- Fall BIOL3900 S02 10210 Arranged 'To Be Arranged'
- Spr BIOL3900 S03 20052 Arranged 'To Be Arranged'

**BIOL 3905. Individual Clerkship in Surgery.**
- Fall BIOL3905 S14 10211 Arranged 'To Be Arranged'

**BIOL 3910. Introduction to Surgical Oncology.**
No description available.
- Fall BIOL3910 S12 10212 Arranged 'To Be Arranged'
- Fall BIOL3910 S14 10213 Arranged 'To Be Arranged'
- Fall BIOL3910 S24 10214 Arranged 'To Be Arranged'
- Spr BIOL3910 S34 20053 Arranged 'To Be Arranged'

**BIOL 3920. Surgery of the Alimentary Tract.**
No description available.
- Fall BIOL3920 S14 10215 Arranged 'To Be Arranged'
- Fall BIOL3920 S22 10216 Arranged 'To Be Arranged'
- Fall BIOL3920 S24 10217 Arranged 'To Be Arranged'

**BIOL 3930. Physical Medicine and Rehabilitation.**
No description available.
- Fall BIOL3930 S12 10218 Arranged 'To Be Arranged'
- Fall BIOL3930 S14 10219 Arranged 'To Be Arranged'
- Fall BIOL3930 S22 10220 Arranged 'To Be Arranged'
- Fall BIOL3930 S23 10221 Arranged 'To Be Arranged'
- Fall BIOL3930 S24 10222 Arranged 'To Be Arranged'
- Spr BIOL3930 S32 20054 Arranged 'To Be Arranged'

**BIOL 3940. Subinternship in Surgical Intensive Care (SICU).**
No description available.
- Fall BIOL3940 S14 10223 Arranged 'To Be Arranged'
- Fall BIOL3940 S24 10224 Arranged 'To Be Arranged'
- Spr BIOL3940 S32 20055 Arranged 'To Be Arranged'

**BIOL 3950. Outpatient Management of Musculoskeletal Problems.**
No description available.
- Fall BIOL3950 S12 10225 Arranged 'To Be Arranged'
- Fall BIOL3950 S14 10226 Arranged 'To Be Arranged'
- Fall BIOL3950 S22 10227 Arranged 'To Be Arranged'
- Fall BIOL3950 S24 10228 Arranged 'To Be Arranged'
- Spr BIOL3950 S32 20056 Arranged 'To Be Arranged'
- Spr BIOL3950 S34 20057 Arranged 'To Be Arranged'

**BIOL 3960. Orthopedic Surgery.**
No description available.
- Fall BIOL3960 S14 10229 Arranged 'To Be Arranged'
- Fall BIOL3960 S24 10230 Arranged 'To Be Arranged'

**BIOL 3970. Orthopedic Surgery in the Community.**
No description available.
- Fall BIOL3970 S14 10231 Arranged 'To Be Arranged'
- Fall BIOL3970 S24 10232 Arranged 'To Be Arranged'

**BIOL 3975. Primary Care Orthopedics.**
- Fall BIOL3975 S12 10233 Arranged 'To Be Arranged'

**BIOL 3980. Hand and Upper Extremity Surgery.**
No description available.
- Fall BIOL3980 S14 10234 Arranged 'To Be Arranged'
- Fall BIOL3980 S24 10235 Arranged 'To Be Arranged'

**BIOL 3990. Pediatric Orthopedic Surgery.**
No description available.
- Fall BIOL3990 S14 10236 Arranged 'To Be Arranged'
- Fall BIOL3990 S22 10237 Arranged 'To Be Arranged'

**BIOL 4000. Outpatient Orthopedics.**
No description available.
- Fall BIOL4000 S22 10238 Arranged 'To Be Arranged'

**BIOL 4010. Anesthesiology.**
No description available.
- Fall BIOL4010 S10 10239 Arranged 'To Be Arranged'
- Fall BIOL4010 S12 10240 Arranged 'To Be Arranged'
- Fall BIOL4010 S14 10241 Arranged 'To Be Arranged'
- Fall BIOL4010 S21 10242 Arranged 'To Be Arranged'
- Fall BIOL4010 S22 10243 Arranged 'To Be Arranged'
- Fall BIOL4010 S24 10244 Arranged 'To Be Arranged'
- Spr BIOL4010 S32 20058 Arranged 'To Be Arranged'
- Spr BIOL4010 S34 20059 Arranged 'To Be Arranged'

**BIOL 4011. Anesthesiology - MH.**
- Fall BIOL4011 S12 10245 Arranged 'To Be Arranged'
- Fall BIOL4011 S14 10246 Arranged 'To Be Arranged'
- Fall BIOL4011 S22 10247 Arranged 'To Be Arranged'
- Fall BIOL4011 S24 10248 Arranged 'To Be Arranged'

**BIOL 4012. Anesthesiology - RIH.**
- Fall BIOL4012 S10 10249 Arranged 'To Be Arranged'
- Fall BIOL4012 S12 10250 Arranged 'To Be Arranged'
- Fall BIOL4012 S22 10251 Arranged 'To Be Arranged'
- Fall BIOL4012 S24 10252 Arranged 'To Be Arranged'

**BIOL 4013. Anesthesiology - WIH.**
- Fall BIOL4013 S12 10253 Arranged 'To Be Arranged'
- Fall BIOL4013 S14 10254 Arranged 'To Be Arranged'
- Fall BIOL4013 S22 10255 Arranged 'To Be Arranged'
- Fall BIOL4013 S24 10256 Arranged 'To Be Arranged'

**BIOL 4020. Pediatric Anesthesiology.**
No description available.
- Fall BIOL4020 S12 10257 Arranged 'To Be Arranged'
- Fall BIOL4020 S14 10258 Arranged 'To Be Arranged'
- Fall BIOL4020 S22 10259 Arranged 'To Be Arranged'
- Fall BIOL4020 S24 10260 Arranged 'To Be Arranged'
- Fall BIOL4020 S24 10261 Arranged 'To Be Arranged'
- Spr BIOL4020 S32 20060 Arranged 'To Be Arranged'

**BIOL 4030. Ophthalmology.**
No description available.
- Fall BIOL4030 S11 10262 Arranged 'To Be Arranged'
- Fall BIOL4030 S12 10263 Arranged 'To Be Arranged'
- Fall BIOL4030 S14 10264 Arranged 'To Be Arranged'
- Fall BIOL4030 S22 10265 Arranged 'To Be Arranged'
- Fall BIOL4030 S24 10266 Arranged 'To Be Arranged'
- Spr BIOL4030 S32 20061 Arranged 'To Be Arranged'
- Spr BIOL4030 S34 20062 Arranged 'To Be Arranged'

**BIOL 4040. Ophthalmology in a Missionary Hospital.**
No description available.
- Fall BIOL4040 S12 10267 Arranged 'To Be Arranged'
- Fall BIOL4040 S22 10268 Arranged 'To Be Arranged'
- Fall BIOL4040 S24 10269 Arranged 'To Be Arranged'
- Spr BIOL4040 S32 20063 Arranged 'To Be Arranged'
- Spr BIOL4040 S34 20064 Arranged 'To Be Arranged'

**BIOL 4100. Pediatric Surgery.**
No description available.
- Fall BIOL4100 S12 10270 Arranged 'To Be Arranged'
- Fall BIOL4100 S14 10271 Arranged 'To Be Arranged'
- Fall BIOL4100 S22 10272 Arranged 'To Be Arranged'
- Fall BIOL4100 S24 10273 Arranged 'To Be Arranged'
- Spr BIOL4100 S34 20065 Arranged 'To Be Arranged'

**BIOL 4110. Adult Cardiac Surgery.**
No description available.
- Fall BIOL4110 S12 10274 Arranged 'To Be Arranged'
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Fall: BIOL4220 S22 10279 Arranged
Fall: BIOL4220 S24 10280 Arranged
Spr: BIOL4220 S32 20066 Arranged

Fall: BIOL4230 S22 10307 Arranged

BIOL 4240. Cardiothoracic Surgery.
BIOL 4250. Ambulatory Plastic Surgery.
BIOL 4270. Subinternship in Cardiac Surgery.
BIOL 4280. Introduction to Thoracic Surgery.
BIOL 4300. Orofacial Surgery.
BIOL 4360. Pediatric Hematology Oncology.
BIOL 4400. Pediatric Neurology.
BIOL 4450. Pediatric Oncology.
BIOL 4480. Otorhinolaryngology.
BIOL 4550. Adolescent Medicine.

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Fall BIOL4550 S24 10341 Arranged "To Be Arranged"
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BIOL 4560. Pediatric Cardiology.
No description available.
Fall BIOL4560 S14 10342 Arranged "To Be Arranged"
Fall BIOL4560 S24 10343 Arranged "To Be Arranged"
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BIOL 4570. Pediatric Infectious Diseases.
No description available.
Fall BIOL4570 S12 10344 Arranged "To Be Arranged"
Fall BIOL4570 S14 10345 Arranged "To Be Arranged"
Fall BIOL4570 S24 10346 Arranged "To Be Arranged"
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BIOL 4580. Pediatric Endocrinology.
No description available.
Fall BIOL4580 S14 10347 Arranged "To Be Arranged"
Fall BIOL4580 S24 10348 Arranged "To Be Arranged"
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No description available.

BIOL 4600. Pediatric Neurorehabilitation.
No description available.
Fall BIOL4600 S12 10349 Arranged "To Be Arranged"
Fall BIOL4600 S22 10350 Arranged "To Be Arranged"
Fall BIOL4600 S24 10351 Arranged "To Be Arranged"
Spr BIOL4600 S32 20080 Arranged "To Be Arranged"

BIOL 4620. Subinternship in Perinatal Medicine (NICU).
No description available.
Fall BIOL4620 S14 10352 Arranged "To Be Arranged"
Fall BIOL4620 S24 10353 Arranged "To Be Arranged"

No description available.
Fall BIOL4630 S14 10354 Arranged "To Be Arranged"
Fall BIOL4630 S24 10355 Arranged "To Be Arranged"
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BIOL 4640. Subinternship in Pediatric Critical Care.
No description available.
Fall BIOL4640 S14 10356 Arranged "To Be Arranged"
Fall BIOL4640 S24 10357 Arranged "To Be Arranged"
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Fall BIOL4650 S12 10359 Arranged "To Be Arranged"
Fall BIOL4650 S14 10360 Arranged "To Be Arranged"
Fall BIOL4650 S21 10361 Arranged "To Be Arranged"
Fall BIOL4650 S22 10362 Arranged "To Be Arranged"
Fall BIOL4650 S24 10363 Arranged "To Be Arranged"

BIOL 4670. Pediatrics in a Developing Country: Cambodia.
No description available.

BIOL 4680. Subinternship in Pediatric Hematology-Oncology.
No description available.
Fall BIOL4680 S14 10364 Arranged "To Be Arranged"
Fall BIOL4680 S24 10365 Arranged "To Be Arranged"

BIOL 4900. Core Clerkship in Obstetrics and Gynecology.
Six weeks.
Fall BIOL4900 S01 10366 Arranged "To Be Arranged"
Fall BIOL4900 S02 10367 Arranged "To Be Arranged"
Spr BIOL4900 S03 20083 Arranged "To Be Arranged"

BIOL 4905. Individualized Clerkship in Ob/Gyn.

BIOL 4910. Subinternship in Maternal Fetal Medicine.
No description available.
Fall BIOL4910 S14 10368 Arranged "To Be Arranged"
Fall BIOL4910 S24 10369 Arranged "To Be Arranged"
Spr BIOL4910 S34 20084 Arranged "To Be Arranged"

BIOL 4920. Subinternship in Urogynecology + Reconstructive Pelvic Surgery.
No description available.
Fall BIOL4920 S14 10370 Arranged "To Be Arranged"
Fall BIOL4920 S24 10371 Arranged "To Be Arranged"

BIOL 4940. Reproductive Endocrinology and Infertility.
No description available.
Fall BIOL4940 S12 10372 Arranged "To Be Arranged"
Fall BIOL4940 S14 10373 Arranged "To Be Arranged"
Fall BIOL4940 S22 10374 Arranged "To Be Arranged"
Fall BIOL4940 S24 10375 Arranged "To Be Arranged"
Spr BIOL4940 S34 20085 Arranged "To Be Arranged"

BIOL 4950. Subinternship in Gynecologic Oncology and Pelvic Surgery.
No description available.
Fall BIOL4950 S12 10376 Arranged "To Be Arranged"
Fall BIOL4950 S14 10377 Arranged "To Be Arranged"
Fall BIOL4950 S22 10378 Arranged "To Be Arranged"
Fall BIOL4950 S24 10379 Arranged "To Be Arranged"
Spr BIOL4950 S34 20086 Arranged "To Be Arranged"

BIOL 4955. Subinternship in Women's Ambulatory Ob-Gyn.
Fall BIOL4955 S14 10380 Arranged "To Be Arranged"
Fall BIOL4955 S24 10381 Arranged "To Be Arranged"

BIOL 4960. Women's Reproductive Health Topics.
No description available.
Fall BIOL4960 S14 10382 Arranged "To Be Arranged"
Fall BIOL4960 S24 10383 Arranged "To Be Arranged"

BIOL 4970. Breast Disease.
No description available.
Fall BIOL4970 S14 10384 Arranged "To Be Arranged"
Fall BIOL4970 S22 10385 Arranged "To Be Arranged"
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BIOL 4975. Gynecologic and Breast Pathology.
No description available.
Fall BIOL4975 S12 10387 Arranged "To Be Arranged"
Fall BIOL4975 S14 10388 Arranged "To Be Arranged"
Fall BIOL4975 S22 10389 Arranged "To Be Arranged"
Fall BIOL4975 S24 10390 Arranged "To Be Arranged"
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BIOL 4980. Patients with Women's Cancers.
No description available.
Fall BIOL4980 S14 10391 Arranged "To Be Arranged"
Fall BIOL4980 S22 10392 Arranged "To Be Arranged"
Fall BIOL4980 S24 10393 Arranged "To Be Arranged"
Spr BIOL4980 S34 20088 Arranged "To Be Arranged"

BIOL 4990. Clinical Cancer Genetics.
No description available.
Fall BIOL4990 S24 10394 Arranged "To Be Arranged"
Spr BIOL4990 S33 20089 Arranged "To Be Arranged"

BIOL 5100. Core Clerkship in Psychiatry.
Six weeks.
Fall BIOL5100 S01 10395 Arranged "To Be Arranged"
Fall BIOL5100 S02 10396 Arranged "To Be Arranged"
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BIOL 6500. Cancer Action and Reflection (CARE).
No description available.

BIOL 6501. Medical Chinese Elective.
Students will attain a working knowledge of Chinese relevant to medical practice in order to better communicate with and serve Chinese-speaking patients. Open to students who are proficient in the Mandarin dialect of Chinese.

BIOL 6502. Intermediate Medical Spanish.
The course is designed for students to gain beginning-level competence in Medical Spanish that will enable them to communicate more effectively with Spanish-speaking patients and their families. Specifically, the students will develop critical Spanish lexicon and language skills for conducting the medical interview. Perquisite: Background in Spanish.
Grading: S/NC

BIOL 6503. Poverty, Health and Law.
No description available.

BIOL 6504. Health Care in America.
No description available.

BIOL 6505. Introduction to Multidisciplinary Fetal Medicine.
An 8-session elective seminar for 2nd year medical school students. Emphasis is placed on the multidisciplinary approach to medical problems. The course concentrates on those conditions for which fetal and/or neonatal intervention may be indicated, from gene therapy to fetal surgical intervention.

No description available.

BIOL 6507. Elective in Mindfulness Training.
No description available.

BIOL 6508. Gender and Sexuality in Healthcare: Caring for All Patients.
The goal of the course is to provide medical students with the knowledge needed to effectively and competently work with a growingly diverse patient (and colleague) population. Contemporary medical school curricula are lacking in the instruction and discussion of patients of all genders and sexualities. This elective will address this need. The course will consist of eight 2-hour sessions, with guest speakers lecturing for the first hour and small group discussion happening for the second hour. Students are required to keep a journal of their experiences as their final assignment for the class. The class will be graded S/NC.
The topics range from LGBTQ Teenagers to Institutionalized Homophobia to Hormone Therapy, led by experts in each field.

BIOL 6509. Introduction to Surgery.
No description available.

BIOL 6510. Topics in Medicine - An International Perspective at University of Rostock, Germany.
No description available.

BIOL 6511. Comparative Medical Ethics at University of Tuebingen, Germany.
No description available.

BIOL 6512. Modern Genetics: Ethics, Policy, and the Doctor-Patient Relationship.
No description available.

BIOL 6513. (Play)writing and Medicine.
No description available.

This elective seminar for 1st and 2nd year medical school and PLME students will introduce them to the world of complementary and alternative forms of healing (CAM) and place it into a framework of an Integrative medicine.
<table>
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<tr>
<th>Course Code</th>
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<th>Semester 3</th>
<th>Semester 4</th>
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No description available.

**BIOL 7100. Independent Study 1.**
No description available.

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Arranged 'To Be Arranged'

**Fall BIOL7100 S12 10534**
Arranged 'To Be Arranged'

**Fall BIOL7100 S13 10535**
Arranged 'To Be Arranged'

**Fall BIOL7100 S14 10536**
Arranged 'To Be Arranged'

**Fall BIOL7100 S15 10537**
Arranged 'To Be Arranged'

**Fall BIOL7100 S16 10538**
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**Fall BIOL7100 S17 10539**
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**Fall BIOL7100 S18 10540**
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**Fall BIOL7100 S25 10546**
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**Fall BIOL7100 S26 10547**
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**Fall BIOL7100 S27 10548**
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**Fall BIOL7100 S29 10550**
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**Fall BIOL7100 S37 10557**
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**Fall BIOL7110 S22 10560**
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**Fall BIOL7110 S33 20136**
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**Fall BIOL7110 S34 20137**
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**BIOL 7130. Independent Study.**
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**BIOL 7140. Approved Subinternship Independent Study.**
No description available.

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Arranged 'To Be Arranged'

**Fall BIOL7140 S16 10569**
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### Medical Education

**MED 2030. Research Methods in Population Medicine.**

The thesis requirement for the Master of Science degree in Population Medicine is an integral component of the Primary Care-Population Medicine program at Brown University. This course well have students develop and demonstrate the necessary research skills to formulate a population medicine research question and then design, conduct and write a manuscript presenting a research study that will satisfy the thesis requirement. The course itself. An introductory primary on biostatistics A research methodology seminar series A journal club in which the biostatistics and research methodology will be integrated in the analysis and critique of studies related to population medicine.

**MED 2040. Health Systems and Policy II.**

This course will offer an overview of the critical issues in U.S. healthcare and public health policy. It will also provide future leaders in population medicine with a foundation for analyzing healthcare reform and public health efforts and for identifying the role of physicians in driving and shaping future policy reforms to improve the healthcare system and population health.

**MED 2045. Quantitative Reasoning.**

In this course, students will be introduced to fundamental concepts in clinical epidemiology and basic statistics, as they relate to population and clinical research. This course is intended to teach students both the basic knowledge required to develop and interpret clinical studies as well as the skills in order to conduct basic statistical analyses.

**MED 2046. Leadership in Health Care.**

This courses emphasizes practical application of teamwork and leadership skills across multiple settings. Leadership in Health Care is a master’s level course for second year medical students enrolled in the Primary Care-Population Medicine (PC-PM) program. Through interactive classroom sessions, field work in health care advocacy, and a team-based “leadership action project”, students will develop foundational leadership skills. The first formal leadership course at Alpert Medical School, Leadership in Health Care will contribute to the PC-PM program’s ultimate goal of preparing physician leaders who will improve the quality of health care and wellness of the population.

**MED 2060. Population and Clinical Medicine II.**

This is the second semester of Population and Clinical Medicine, a two-semester course focused on the integration of population medicine and clinical practice. In this course, students will focus on topics integral to clinical medicine, but expand beyond the patient into the population and beyond. Given the importance of population health interventions for impacting the health of vulnerable and underserved patients, the course will focus on issues affecting these populations.

**MED 2980. Independent Study in Population Medicine.**

For students enrolled in the Primary Care-Population Medicine program at Alpert Medical School, this course is structured to allow students to conduct research focused on population health with a mentor at Brown University.

### Program in Liberal Medical Education

**PLME 0200. Primetime Bioethics.**

Is it ethical to design a perfect baby? Who should get these organs? Is it ever okay to be dishonest with patients for their own good? These questions and more will be tackled in this discussion-based course that uses episodes of popular medical television shows to highlight topics in medical ethics. Students will watch 1-2 episodes of TV shows and read related articles and chapters on biomedical ethics and ethics theory. The goal is to give students the background with which to approach the ethical topics. This course may be most beneficial to students pursuing a career in medicine.
This program has been developed for Brown PLME students and first year Italian medical students to familiarize the future physicians with the much-debated theme of healthcare delivery and policies. Students will focus on medicine beyond science through the critical study of how socioeconomic and cultural factors impact this field. Students will compare the Italian and American systems, focusing on historical structures and current issues in healthcare regulation. Enrollment limited to 10.

PLME 1000. PLME Senior Seminar in Scientific Medicine.
This course is an interdisciplinary and integrative science course that will supplement the preparation of both PLME and pre-medical students for the study of medicine in the 21st century. The course will use a case-based approach to relevant and contemporary subjects in medicine and healthcare, such as: biological systems and their interactions; diagnosis and therapy optimization; and the humanistic aspects of patient care. The course is intended for seniors interested in attending medical school but will preferentially enroll PLME students. Prerequisite: PLME competency in Biology, Chemistry (inorganic and organic), Physics, and introductory calculus. Enrollment limited to 40. S/NC

Fall  PLME1000  S01  15965  Arranged  "To Be Arranged"