Offered by Gallatin College. Human anatomy, physiology, and pathology; including eukaryotic molecular genetics. Emphasis on the genetics of the major model organisms of biomedical research and how they are exploited to understand human biology and disease.

BIOH 320. Biomedical Genetics. 3 Credits. (3 Lec) S
PREREQUISITE: BIOH 260. Introduction to fundamental principles of eukaryotic molecular genetics. Emphasis on the genetics of the major model organisms of biomedical research and how they are exploited to understand human biology and disease.

BIOH 321. Human Developmental Biology. 4 Credits. (4 Lec) S
PREREQUISITE: BIOH 260. Introduction to cell signaling and morphogenetic processes that establish the basic vertebrate body plan. Regulation of gene expression in the context of embryonic development. Includes hands-on study of chicken and frog embryos.

BIOH 395. Human Pathophysiology. 3 Credits. (3 Lec) S
PREREQUISITE: Cell Biology and Neuroscience major and BCH 380 or BCH 441. Students will research two diseases of their own choosing and give a class presentation of their findings. The presentation normally includes diagnosis, pathophysiology, and treatment.

BIOH 405. Hematology. 3 Credits. (3 Lec) F
PREREQUISITE: BIOH 410 or BCH 380 are recommended. A study of the function, biochemistry, cell biology, and pathology of blood and its constituents.

BIOH 406. Hematology Laboratory. 1 Credit. (1 Lab) F
COREQUISITE: BIOH 405. Methods of examining white blood cells, red blood cells, and platelets. Also included is the examination of abnormal blood cells, hemostasis, and fluorescent antibody cell sorting analysis.

BIOH 409. Advanced HumanTorso Anatomy, 4 Credits. (2 Lec. 2 Lab) F
PREREQUISITES: Junior standing and 2 upper division biology courses and consent of instructor. Covers thorax and abdomen anatomy, emphasizing topography and three dimensional relations. Instruction will be based on student dissections of human cadavers, with lectures covering structure and function, as well as pathology typically encountered in the dissection laboratory. Co-convened with BIOH 509.

BIOH 411. Adv Human Anatomy. 4 Credits. (2 Lec, 2 Lab) S
PREREQUISITE: Senior standing, completion of at least two upper division courses in the biological sciences and consent of instructor. Covers back, extremities and joint anatomy, emphasizing topography and three dimensional relations. Instruction will be based on student dissections of human cadavers, with lectures covering structure and function, as well as pathology typically encountered in the dissection laboratory. Class can fulfill 4 upper division honor credits, if prerequisites are satisfied.

BIOH 420. Molecular Genetics. 3 Credits. (3 Lec) S
PREREQUISITE: BIOH 320. This course will focus on the use of current molecular genetic methods in biomedical research for editing and functionally analyzing eukaryotic genomes.

BIOH 422. Genes and Cancer. 3 Credits. (3 Lec) F
PREREQUISITE: BIOH 320. This course will focus on the molecular and cellular mechanisms of human cancer. The role of oncogenes and tumor suppressor genes in normal and cancerous cells will be examined, with an emphasis on how mutations in certain genes result in altered cell-cell signaling and cell proliferation. The role of genetic mutation in breast, colorectal and lymphoma cancers will be discussed, along with new technologies to detect and treat these cancers.

BIOH 425. Sensory Neurophysiology. 3 Credits. (3 Lec) F
PREREQUISITE: BIOH 422. This course will focus on the use of current molecular genetic methods in biomedical research for editing and functionally analyzing eukaryotic genomes.

BIOH 428. Intermediate Human Phys II. 3 Credits. (3 Lec) F
PREREQUISITE: BIOH 313. Inhibitor systems, tissue recognition and their role in defense. The role of the immune system in disease.

BIOH 429. Special Topics. 3 Credits. (2 Lec. 1 Rec) S
Spring 2016 Topic: Global Health. Survey the historical and emerging trends in health issues around the world. Develop a fluency in what health issues are occurring in the various regions around the globe. Establish a basic knowledge of the culture, environment, politics and geography of key global regions.

BIOH 430. Neurophysiology. 3 Credits. (3 Lec) F
PREREQUISITE: BIOH 260. Physiology of integrative mechanisms in nervous systems. Topics range from the mechanisms of synaptic transmission and action potential generation to the neural basis of learning and memory.

BIOH 509. Human Pathophysiology. 3 Credits. (3 Lec) S
PREREQUISITE: BIOH 405 or BCH 380. Introduction to the study of pathophysiology and how it is exploited to understand human biology and disease.

BIOH 305. Human Skeletal Biology. 3 Credits. (3 Lec) Su
PREREQUISITE: BIOH 185 or BIOH 201 and Junior standing or consent from instructor. Covering the organization and function of the human nervous system. The course will emphasize theories of normal functioning and its responses to environmental change, as in learning and structural modification. Homeostasis will be emphasized.
BIOH 435. Cognitive Neuroscience. 3 Credits. (3 Lec) F
PREREQUISITE: BIOH 313. This course will survey our present knowledge of the neural basis of normal and abnormal cognitive function in humans and non-human primates. Topics will range from perception and action to attention, consciousness and mental illness.

BIOH 440. Neuroscience of Mental Illness. 3 Credits. (3 Lec) S
PREREQUISITE: BIOH 313. Survey of the major categories of human mental illness and their underlying neural mechanisms and treatments.

BIOH 444. Modeling Brain Disorders. 3 Credits. (3 Lec) F
PREREQUISITE: BIOH 313. In this course, students will delve into the primary research literature in the field of behavioral neuroscience. We will study a variety of model systems and paradigms used to study neurological and psychiatric disorders. In addition, students will learn to effectively communicate about science orally and in writing.

BIOH 445. Intro Pharmacology. 3 Credits. (3 Lec)
PREREQUISITE: BIOH 185 or BIOH 201 and BIOH 260. An introduction to the pharmacodynamics of drug action. Major classes of pharmaceutical drugs will be studied to understand their mechanism of action at the cellular and organ levels. Clinical trials for new drugs will also be considered.

BIOH 454. Microanatomy (Histology). 3 Credits. (2 Lec, 1 Lab) F, On Demand.
PREREQUISITE: BIOH 260, or consent of instructor. Covers an introspective microscopic study of mammalian cells, tissues and organs. Emphasizing normal structure and function relating to disease processes in specific organ systems. Class discussion will relate the normal microanatomy to human pathology.

BIOH 455. Molecular Medicine. 3 Credits. (3 Lec) F
PREREQUISITE: BIOH 313 and BIOH 320 and BCH 380. Lecture and seminar courses based on recent, original papers. Moves from human disease to molecular explanations. Intended for upper level students with a strong background in biology.

BIOH 464. Clinical Hematology and Body Fluids. 2 Credits. (1 Lec, 1 Lab) Su
PREREQUISITE: Acceptance in professional training program. Topics include a review of normal hematopoiesis; red blood cell, white blood cell, and platelet disorders; body fluid overview; and an introduction to hematology instrumentation.

BIOH 465R. Gene Expression Lab: From Genes to Proteins to Cells. 3 Credits. (3 Lab) On Demand
PREREQUISITE: BCH 380 or BCH 441. This course will give students the opportunity to design a unique research project, then learn and use the appropriate methods to pursue their research question. The course will expose students to the research process used in most basic science labs.

BIOH 466. Clin Microbiology I. 3 Credits. (2 Lec, 1 Lab) Su
PREREQUISITE: Acceptance in professional training program. Topics include a review of medical microbiology, virology, mycology, parasitology, and clinical laboratory testing procedures.

BIOH 467. Clinical Chemistry I. 3 Credits. (2 Lec, 1 Lab) S
PREREQUISITE: Acceptance in professional training program. Topics include an introduction to theories and principles with emphasis on all body systems, and the role of instrumentation in the clinical chemistry laboratory.

BIOH 468. Clinical Immunohematology I. 3 Credits. (2 Lec, 1 Lab) S
PREREQUISITE: Acceptance in professional training program. Basic techniques in blood banking. Topics to be included are: ABO/Rh typing, antibody identification, transfusion therapy and reactions, donor collection and component preparation.

BIOH 469. Essentials of Clinical Lab Practice. 1 Credit. (1 Lab) Su
PREREQUISITE: Acceptance in professional training program. Provides an orientation to the program, safety information, phlebotomy training, and an overview of management practices. Also includes instruction in hemostasis, molecular diagnostics and urinalysis.

BIOH 470. Summer Clinical Laboratory. 12-13 Credits. Su
PREREQUISITE: To take this course, students must be accepted into a professional training program. This is a clinical laboratory science course, which will be conducted at affiliate training programs during the summer of a student's senior year. It includes student lecture and laboratory instruction in clinical immunohematology, clinical chemistry, phlebotomy, clinical hemostasis, clinical microscopy and urinalysis, clinical body fluids, transfusion techniques, and clinical microbiology.

BIOH 471. Professional Training I. 12-13 Credits. (12-13 Lec; 13 cr max) F
PREREQUISITE: To take this course, students must be accepted into a professional training program. BIOH 470. Students will review basic and advanced information in immunohematology, clinical chemistry, clinical hematology, clinical microbiology, clinical immunology, medical mycology, and phlebotomy techniques. Students will perform patient laboratory testing under the guidance of trained professionals.

BIOH 472. Professional Training II. 12-13 Credits. (12-13 Lec; 13 cr max) S
PREREQUISITE: To take this course, students must be accepted into a professional training program. BIOH 471. Students will learn financial and quality management information of the clinical laboratory and study advanced immunohematology, clinical chemistry, clinical microbiology, and clinical hematology. During this course, students will perform actual patient laboratory testing under the guidance of trained professionals.

BIOH 473. Laboratory Practice II. 1 Credit. (1 Lab) F
PREREQUISITE: Students must be accepted to the MMLS training program. Essential skills for performing phlebotomy, laboratory specimen collection, handling and preparing samples for laboratory analysis and interpersonal communication skills will be emphasized.

BIOH 474. Clinical Hematology II. 2 Credits. (2 Lab) F
PREREQUISITE: Students must be accepted to the MMLS training program. Blood cell identification, manual and automated procedures for the assessment of hematologic disease will be emphasized. Students will begin to learn to assess, interpret and correlate hematologic data with disease.

BIOH 475. Clinical Hemostasis. 1 Credit. (1 Lab) F
PREREQUISITE: Students must be accepted to the MMLS training program. Laboratory skills using manual and automated procedures will be emphasized. Students will assess, interpret and correlate data as it relates to normal and abnormal hemostasis and anticoagulant therapy.

BIOH 476. Clinical Microbiology II. 3 Credits. (3 Lab) F
PREREQUISITE: Students must be accepted to the MMLS training program. The ability to differentiate pathogens from commensals and perform identification procedures and antimicrobial susceptibility testing are emphasized along with an introduction to specialized and automated testing.

BIOH 477. Clinical Chemistry and Urinalysis II. 3 Credits. (3 Lab) F
PREREQUISITE: Students must be accepted to the MMLS training program. Manual and automated procedures for determining chemical analytes in blood and body fluids and the associated disease conditions will be emphasized along with an introduction to specialized testing.

BIOH 478. Clinic Immunohematology II. 2 Credits. (2 Lab) F
PREREQUISITE: Students must be accepted to the MMLS training program. Maintenance of blood components and performing routine and basic problem solving procedures in the blood bank will be emphasized. Correlation of immunohematology theory and disease with testing and transfusion practices and patient care will be covered.

BIOH 479. Clinical Immunology/Serology. 1 Credit. (1 Lab) F
PREREQUISITE: Students must be accepted to the MMLS training program. Assessment, interpretation and clinical significance of immunology principles and techniques and their correlation to laboratory data and patient disease will be emphasized.

BIOH 482. Laboratory Practice III. 2 Credits. (2 Lab) S
PREREQUISITE: Students must be accepted to the MMLS training program. A two week rotation in a small hospital laboratory provides an opportunity to experience a different work environment and practice laboratory skills.

BIOH 484. Clinical Hematology III. 2 Credits. (2 Lab) S
PREREQUISITE: Students must be accepted to the MMLS training program. Competence in performing testing and the ability to assess, interpret, and correlate hematologic data with other patient information to recommended additional testing, diagnosis, and probable treatment option for the patient will be emphasized.

BIOH 486. Clinical Microbiology III and Molecular Diagnostics. 2 Credits. (2 Lab) S
PREREQUISITE: Students must be accepted to the MMLS training program. Competently identify and provide susceptibility data for microorganisms isolated from human specimens including clinically significant yeasts, molds, parasites, viruses and mycobacteria. Perform molecular diagnostic techniques available.

BIOH 487. Clinical Chemistry III. 2 Credits. (2 Lab) S
PREREQUISITE: Students must be accepted to the MMLS training program. Achieve entry level knowledge of disease processes, and exhibit professional competencies in clinical chemistry laboratory procedures and the operation of laboratory instrumentation.
### BIOH 488. Clinical Immunohematology. 3 Credits. (3 Lab) S
**PREREQUISITE:** Students must be accepted to the MMLS training program. Attain competency and the ability to correlate testing data to theory and initiate advanced techniques where appropriate. Students will demonstrate entry level competency by managing the daily aspects of blood bank operation.

### BIOH 489. Laboratory Management. 1 Credit. (1 Lab) S
**PREREQUISITE:** Students must be accepted to the MMLS training program. General management policies, principles, and procedures necessary for efficient operation of a clinical laboratory will be emphasized along with federal and state regulations which govern the clinical laboratory.

### BIOH 490R. Undergraduate Research. 1-6 Credits. (1-6 Ind; 12 cr max) F,S,Su
**PREREQUISITE:** Consent of instructor. Directed undergraduate research/creative activity which may culminate in a research paper, journal article, or undergraduate thesis. Course will address responsible conduct of research. May be repeated.

### BIOH 491. Special Topics. 1-4 Credits. (1-4 Lec; 12 cr max) On Demand
**PREREQUISITE:** BIOB 260. Courses not required in any curriculum for which there is a particular one-time need, or given on a trial basis to determine acceptability and demand.

### BIOH 492. Independent Study. 1-3 Credits. (1-3 Ind; 6 cr max) On Demand
**PREREQUISITE:** Junior standing, consent of instructor and approval of department head. Directed research and study on an individual basis.

### BIOH 509. Advanced Human Torso Anatomy, 4 Credits. (2 Lec, 2 Lab) F
**PREREQUISITE:** Degree-seeking graduate student, undergraduate A & P coursework covers thoracic, abdominal and pelvic anatomy, emphasizing anatomical landmarks and relationships. Instruction will be based on student dissections of human cadavers, and lectures covering structure, function, and common pathology. Co-Convened with BIOL 409.

### BIOH 510. Topics in Neurobiology. 3 Credits. (2 Lec. 1 Lab) S
**PREREQUISITE:** Graduate standing and at least one upper division or graduate course in neurobiology. Recent advances in topics in neurobiology with emphasis in different years on either neurocytology, neuroendocrinology/neuroimmunology, or developmental neurobiology.

### BIOH 511. Advanced Human Anatomy, 4 Credits. (2 Lec. 2 Lab) S
**PREREQUISITE:** Degree-seeking graduate student, undergraduate anatomy and physiology work covers the musculoskeletal system of the back and upper and lower extremity and arthrology, emphasizing anatomical landmarks and relationships. Integrating of vascular and nervous supply along with the understanding of kinesiology will also be a major focus. Instruction will be based on student dissections of human cadavers, and lectures covering structure, function, and common pathology. Cross-Listed with BIOH 411.

### BIOH 520. Molecular Genetics. 3 Credits. (3 Lec) S
**PREREQUISITE:** BIOH 320. This course will focus on the use of current molecular genetic methods in biomedical research for editing and functionally analyzing eukaryotic genomes.

### BIOH 528. Molecular Basis of Neurological Diseases. 3 Credits. (1 Lec, 1 Ind, 1 Ret) F
**PREREQUISITE:** BIOH 313 and BIOH 525 or consent of instructor. This course will give an in-depth view of the molecular aspects to neuroscience. Student projects will then use that knowledge to do their own research into the current molecular understanding of a chosen neurological disease and writing up an NIH research proposal.

### BIOH 542. Survey of Current Cell Signaling. 2 Credits. (2 Sem.; max 12) S
This course will be in a journal club style where peer reviewed articles will be presented and discussed in a critical fashion. The goals are to learn how to synthesize information, develop critical thinking, keep up with the literature, learn about new topics and foster interdisciplinary interactions. Topics will be student driven with the restriction that they fall under the broad umbrella of cell signaling.

### BIOH 565. Gene Expression Lab: From Genes to Proteins to Cells. 3 Credits. (3 Lab) S
**PREREQUISITE:** BIOH 425 and BCH 380. This course is intended to develop a specific research question and to learn the appropriate techniques necessary to address the chosen research question. The primary focus will be experience with a wide breadth of laboratory techniques including tissue culture, heterologous expression, microscopy, RNA extraction, RT-PCR, gene expression analysis, protein extraction, protein expression analysis, and data quantification.

### BIOH 586. A Big Ideas Approach for AP Biology Teachers. 3 Credits. (2 Lec, 1 Rec) Su
**PREREQUISITE:** A minimum of 2 years teaching experience teaching high school biology with emphasis on AP biology. This course is designed to introduce teachers of Advanced Placement (AP) Biology to a Big Ideas approach: evolution, energy, information and system. A Big Idea approach focuses on key concepts and related content that define the AP Biology course and exam. Big ideas encompass the core scientific principles, theories and processes governing living organisms and biological systems. Students in the course will finish by developing a lesson plan using this pedagogy that could be used for a high school AP Biology course.

### BIOH 590. Master's Thesis. 1-10 Credits. (1-10 Ind; max unlimited) F,S,Su
**PREREQUISITE:** Master's standing.

### BIOH 592. Independent Study. 1-3 Credits. (1-3 Ind; 6 cr max) On Demand
**PREREQUISITE:** Graduate standing, consent of instructor, approval of department head and Dean of Graduate Studies. Directed research and study on an individual basis.

### BIOH 594. Seminar. 1 Credit. (1 Sem; 4 cr max) On Demand
**PREREQUISITE:** Graduation or seniors by petition and course prerequisites as determined for each offering. Topics offered at the graduate level which are not covered in regular courses. Students participate in preparing and presenting discussion material.

### BIOH 595. Anatomy & Physiology for Tchrs. 3 Credits. (1 Lec. 1 Lab. 1 Rec) Su
**PREREQUISITE:** Teacher of science with a minimum of two years teaching experience. Must have solid background in life science. This course is designed for high-school and post-secondary instructors who are currently teaching an anatomy and physiology course or are interested in developing one. The goal of the course is to help instructors develop an A&P curriculum that integrates Next Generation Science Standards. Participants from all A&P instructional backgrounds are welcome and should expect to work in a collaborative environment.

### BIOH 690. Doctoral Thesis. 1-10 Credits. (1-10 Ind; max unlimited) F,S,Su
**PREREQUISITE:** Doctoral standing.
Font Notice

This document should contain certain fonts with restrictive licenses. For this draft, substitutions were made using less legally restrictive fonts. Specifically:

Times was used instead of Adobe Garamond Pro.

The editor may contact Leepfrog for a draft with the correct fonts in place.