BIOH 323. 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 Human torso Anatomy, 4 Credits. (2 Lec, 2 Lab) F
PREREQUISITES: Junior standing and BIOH 185 or BIOH 201 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. Advanced 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 mechanism 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) S
PREREQUISITE: BIOH 313. Neurophysiology of sensory cells and systems. Topics range from the mechanisms underlying sensory reception to the processing of sensory information at higher stages. The major focus will be on human sensory systems. Pathologies that effect sensory perception will be considered.

BIOH 428R. Molecular basis of neurological diseases, 3 Credits. (1 Lec, 2 Rec) F
PREREQUISITES: BIOH 313 CO REQUISITES: BIOH 425 This course will give an in-depth view of the molecular aspects to neuroscience. Student projects will then use that knowledge to research the current state of molecular understanding of a chosen neurological disease.

BIOH 429. Student Assistant Training for Integrated Physiology (BIOH 185). 2 Credits. (1 Lab, 1 Lab)
PREREQUISITES: BIOH 185 with a grade of C+ or higher, and consent of instructor. This course provides deeper contact with BIOH 185 curriculum for those considering an academic profession. Course experience in BIOH 185 teaching laboratory under detailed academic supervision in recognition that teaching enhances learning. Includes the preparation, organization, presentation of materials, and student evaluation.

BIOH 430. Neuroethology, 3 Credits. (3 Lec) S
PREREQUISITE: BIOH 313 Introduction to the study of neuroethology based on a review of historically significant and modern primary research materials. In this class we will explore a number of ‘model systems’ that have been used extensively to develop our current understanding of the neural bases of animal and human behavior. This includes sound localization in owls, echolocation in bats, electrolocation in various fish and number of varied sensory systems used for species-specific communication in both vertebrates and invertebrates.
BIOH 431. Student Assistant Training for Advanced Human Torso Anatomy (BIOH 409). 3 Credits. (1 Lec, 2 Lab)
PREREQUISITES: BIOH 409 with a grade of C+ or higher, and consent of instructor. This course provides deeper contact with BIOH 409 curriculum for those considering an academic profession. Course experience in BIOH 409 teaching laboratory under detailed academic supervision in recognition that teaching enhances learning. Includes the preparation (including dissection), organization, presentation of materials, and student evaluation.

BIOH 432. Student Assistant Training for Advanced Human Anatomy (BIOH 411). 3 Credits. (1 Lec, 2 Lab)
PREREQUISITES: BIOH 411 with a grade of C+ or higher, and consent of instructor. This course provides deeper contact with BIOH 411 curriculum for those considering an academic profession. Course experience in BIOH 411 teaching laboratory under detailed academic supervision in recognition that teaching enhances learning. Includes the preparation (including dissection), organization, presentation of materials, and student evaluation.

BIOH 433. Student Assistant Training for Neuroanatomy (BIOH 309). 3 Credits. (1 Lec, 2 Lab)
PREREQUISITES: BIOH 309 with a grade of C+ or higher, and consent of instructor. This course provides deeper contact with BIOH 309 curriculum for those considering an academic profession. Course experience in BIOH 309 teaching laboratory under detailed academic supervision in recognition that teaching enhances learning. Includes the preparation (including dissection), organization, presentation of materials, and student evaluation.

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. Introduction to Pharmacology. 3 Credits. (3 Lec)
PREREQUISITE: BIOH 185 or BIOH 201 or ANSC 265 and BIOB 160 or BIOB 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.

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 461. Tutoring Human Anatomy and Physiology I. 3 Credits. (1 Lec, 2 Lab)
PREREQUISITES: BIOH 201 with a grade of C+ or higher, and consent of instructor. This course provides deeper contact with BIOH 201 curriculum for those considering an academic profession. Course experience in BIOH 201 teaching laboratory under detailed academic supervision in recognition that teaching enhances learning. Includes the preparation, organization, presentation of materials, and student evaluation.

BIOH 463. Tutoring Human Anatomy and Physiology II. 2 Credits. (1 Lec, 1 Lab)
PREREQUISITES: BIOH 211 with a grade of C+ or higher, and consent of instructor. This course provides deeper contact with BIOH 211 curriculum for those considering an academic profession. Course experience in BIOH 211 teaching laboratory under detailed academic supervision in recognition that teaching enhances learning. Includes the preparation, organization, presentation of materials, and student evaluation.

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) Su
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) Su
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 471. 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, clinical immunology, medical mycology, and phlebotomy techniques. 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.

BCH 441
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 483. Peer Leaders for Anatomical Science Laboratories. 3 Credits. (1 Lec, 2 Lab)
PREREQUISITES: Completion of one of the following SA I courses: BIOH 429, 431, 432, 433, 461 or 463 and instructor permission. BIOH 483 is the second semester of Student Assistant training with the added responsibility of being a lead SA assigned to a lab according to their prerequisite course work. This course provides deeper contact with curriculum and a higher level of course responsibility working directly with the assigned TA and coordinating other SA’s assigned to the lab section. Includes the preparation, organization, presentation of materials, and student evaluation.

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 mycobacterium. 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.

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 BIOI 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 year on either neurocytology, neuroendocrinology/neuroimmunology, or developmental neurobiology.

BIOH 511. Advanced Human Anatomy. 4 Credits. (2 Lec. 2 Lab) S
PREREQUISITES: 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)
PREREQUISITES: BIOH 420. This course will focus on the use of current molecular genetic methods in biomedical research for editing and functionally analyzing eukaryotic genomes.

BIOH 524. Fungal Evolution. 3 Credits. (3 Lec)
PREREQUISITES: General Microbiology or General Genetics or Evolution or Microbial Genetics. Fungal Evolution focuses on the origins, diversity, lifestyles, and unique features of the kingdom Fungi. It covers both macro- and micro-evolutionary aspects, including the fungal tree of life, fungal reproduction and biology, and fungal interactions with the environment and other organisms. The course will include research of primary literature, including article presentation and synthesis and will be co-convened with BIOM424.

BIOH 528. Molecular Basis of Neurological Diseases. 3 Credits. (1 Lec, 1 Ind, 1 Rct) 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 535. Principles of Neuroscience. 3 Credits. (1 Lec, 2 Rct) F
This course will provide a broad introduction to the critical components of the field of neuroscience. The semester will be divided into 2-3 week modules. Each professor will cover a major subdivision of neuroscience including information on the questions, methods, and seminal discoveries that form the foundation of the field (lecture #1). Subsequent lectures (#2-4) will entail a student-led, seminar-style group discussion based around assigned primary literature materials.

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 umbrella of cell signaling.

BIOH 545. Current Neurosciences. 3 Credits. (3 Rec) S
PREREQUISITE: BIOH 535 This course is designed to familiarize students with the most current findings and methods in the field of neuroscience. Course focuses on critical analysis of primary literature in core areas of neuroscience.

BIOH 565. Gene Expression Lab: From Genes to Proteins to Cells. 3 Credits. (3 Lab) On Demand
PREREQUISITES: 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) F
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.

BIOI 409. Special Topics. 3 Credits.

BIOC 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: Graduate standing 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
PREREQUISITES: 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 either 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.