

# Biology (BIOL)

---

To register for courses and see a real-time listing of classes and sections offered, view the add/drop system (<https://userve.uvu.edu/StudentRegistrationSsb/ssb/term/termSelection/?mode=search>).

## **BIOL 1010. General Biology BB. (3 Credits)**

Introduces major themes and concepts of biology including cell and molecular biology, genetics, diversity, evolution, and ecology. Provides students with necessary information and skills to critically evaluate what they hear, read, and see in the living world; communicate clearly; and apply methods to interpret data for making informed decisions concerning the role of biology in a world of which they are a part. May be delivered online.

## **BIOL 1011. Introduction to Bioinformatics BB. (3 Credits)**

Covers fundamental topics of bioinformatics including bioinformatics databases, sequence and structure alignment, and protein structure prediction. Uses current examples to introduce an overview of methodologies and applications sufficient to introduce students to the field of bioinformatics.

## **BIOL 1015. General Biology Laboratory. (1 Credit)**

Pre- or Corequisite(s): BIOL 1010

Covers introductory topics in general biology. Complements the student's experience in the General Biology 1010 course with emphasis on the application of the scientific method. Includes actual student experiences with living organisms, use of the microscope, and an introduction to techniques used in the study of life.

Course lab fee of \$13 for supplies applies.

## **BIOL 101H. General Biology BB. (3 Credits)**

Introduces major themes and concepts of biology including cell and molecular biology, genetics, diversity, evolution, and ecology. Provides students with necessary information and skills to critically evaluate what they hear, read, and see in the living world; communicate clearly; and apply methods to interpret data for making informed decisions concerning the role of biology in a world of which they are a part. Requires a term paper, project, or presentation.

## **BIOL 1070. Heredity BB. (3 Credits)**

Prerequisite(s): BIOL 1010 is strongly recommended

Introduces genetics for non-majors. Addresses patterns of inheritance from generation to generation (with an emphasis on human heredity), DNA structure and function as well as other aspects of molecular genetics and reproductive technologies.

## **BIOL 1200. Prehistoric Life BB. (3 Credits)**

Cross-listed with: GEO 1020

Prerequisite(s): BIOL 1010 or GEO 1010 recommended

Studies prehistoric life. Uses the concepts of biology and physical science. Studies major groups of ancient animals and plants as found in the rock record. Includes aspects and fundamental concepts of biology, ecology, and geology.

## **BIOL 1500. Biological Anthropology BB. (3 Credits)**

Cross-listed with: ANTH 1020

Prerequisite(s): (ENGL 1010 or ENGH 1005) and (ANTH 101G or BIOL 1010)

For students with special interests in Anthropology or the Life Sciences. Studies fossils and living primates, primate biology and behavior. Surveys humanoid fossils. Investigates human evolution and variations of basic biology as it pertains to human development. Stresses the importance of the distribution and diversity of humankind.

## **BIOL 1610. College Biology I BB. (4 Credits)**

Pre- or Corequisite(s): ACT (or equivalent) composite score of 21+, or ENGH 1005 or ENGL1010 (or higher); BIOL 1615

Gives a broad exposure to many aspects of the life sciences. Covers topics of biochemistry, energetics, cell structure and function, genetics, and evolution. BIOL 1615 is recommended, but not required for pre-nursing or pre-dental hygiene majors.

## **BIOL 1615. College Biology I Laboratory. (1 Credit)**

Corequisite(s): BIOL 1610

Laboratory course to accompany BIOL 1610. Topics covered include scientific method, biomolecules, cell structure and function, cellular reproduction, Mendelian and molecular genetics, DNA technology, and evolution.

Course Lab fee of \$24 applies.

## **BIOL 1620. College Biology II. (3 Credits)**

Prerequisite(s): BIOL 1610 and BIOL 1615 with a C- or higher in each.

Corequisite(s): BIOL 1625

Provides the second semester material in the two semester introductory course designed for biology majors. Covers the evolution of life, the relationships between major taxa, anatomy and physiology of these major taxa, and interactions between living organisms and their environments. Discusses major current issues in the biological field.

## **BIOL 1625. College Biology II Laboratory. (1 Credit)**

Corequisite(s): BIOL 1620

Laboratory course to accompany BIOL 1620. Topics covered include animal biology and diversity and plant biology and diversity.

Course Lab fee of \$30 for lab, transportation applies.

**BIOL 202R. Science Excursion. (1 Credit)**

Cross-listed with: GEO 202R

For students interested in the natural world. Explores a wide variety of topics in science, including geology, botany, astronomy, zoology, ecology, and archeology. Consists of a minimum of a four-day field trip. Participants should gain an increased understanding of several fields of scientific study. May be repeated as many times as desired for interest, however a maximum of 3 credits may count toward graduation.

**BIOL 204R. Natural History Excursion BB. (3 Credits)**

Cross-listed with: BIOL 1200, GEO 204R

For students interested in the natural world. Promotes an in-depth look at a wide variety of topics in science, including geology, botany, astronomy, zoology, ecology, and archeology. Consists of 15 hours of lecture plus an appropriate field trip. Participants should gain an interdisciplinary understanding of science and nature. May be repeated for up to six credits toward graduation.

**BIOL 2070. Desert Natural History. (3 Credits)**

Cross-listed with: GEO 2070

Integrates the teaching of geological and biological systems of the southwestern deserts. Discusses the ecology and geology of unique desert ecosystems; the rocks and strata providing the foundation of the landscape; the evolutionary and geological processes that mold the landscape and the species within it over time; and, the relationships between the physical and biological aspects of the ecosystem, including humans. Provides an intense, hands-on field course where faculty and students participate together in daily activities in a natural setting. Is held for part of the time on the UVU main campus and part of the time at the Capitol Reef Field Station. Requires students to live and learn at the field station for approximately 1/3 of the course.

**BIOL 2500. Environmental Biology BB. (3 Credits)**

Prerequisite(s): BIOL 1010 or BIOL 1610 is recommended

Acquaints students with the principles of environmental systems, including biogeochemical cycles, energy transformations, biotic and abiotic interactions, natural resources and their management. Discusses the interactions of ecological principles and humanity's technology relative to the world today and factors that influence the quality of life.

**BIOL 290R. Special Topics In Biology. (1-4 Credits)**

Prerequisite(s): BIOL 1010 or higher or Instructor Approval

Explores and examines special topics relating to the field of Biology. Emphasizes areas of rapid growth in Biology or current importance to society. May be repeated for a total of six credits toward graduation.

**BIOL 295R. Independent Studies in Life Sciences. (1-4 Credits)**

Prerequisite(s): At least 3 credit hours of college-level biology, approval of a faculty mentor, and approval of the department chair

Provides individual studies in biology under the direction of a faculty mentor. Includes literature reviews, original research, and participation in ongoing departmental projects. Introduces students to the methodology of life science research. Requires written and oral communication of scientific information. May be repeated for a maximum of 4 credits toward graduation.

**BIOL 3070. Advanced Desert Natural History. (3 Credits)**

Cross-listed with: GEO 3070

Prerequisite(s): University Advanced Standing

Integrates the geological and biological systems of the southwestern deserts. Includes discussion of the ecology and geology of unique desert ecosystems; the rocks and strata providing the foundation of the landscape; the evolutionary and geological processes that mold the landscape and the species within it over time; and, the relationships between the physical and biological aspects of the ecosystem, including humans. Provides an intense, hands-on field course where faculty and students participate together in daily activities and experimental design in a natural setting. Is held part of the time on the UVU main campus and part of the time at the Capitol Reef Field Station. Requires students to live and learn at the field station for approximately 1/3 of the course.

**BIOL 3100. Introduction to Data Analysis for Biologists. (3 Credits)**

Prerequisite(s): University Advanced Standing

Introduces computational methods for analyzing and visualizing common biological data types, focusing on developing computational skills and best practices for working with biological data. Provides instruction in command-line computing and appropriate software environments to enable robust and reproducible analyses of varied data sets.

**BIOL 3150. Bioinformatics Data Skills. (3 Credits)**

Prerequisite(s): BIOL 1011 and University Advanced Standing

Introduces basic data skills for bioinformatics students with a focus on genetic sequence data, command-line usage, and pipeline development. Develops competence in interacting with a remote high-performance computing environment and installing, parsing, and linking novel bioinformatics tools. Applies the principles of project organization and reproducibility to create an analysis pipeline.

**BIOL 3200. Guided Research Experience. (1-3 Credits)**

Prerequisite(s): BIOL 1610 or BIOL 1010

Provides an authentic research experience that is structured in a way that the class will move through the stages of research at the same time throughout the semester. Covers selected essential components and skills of conducting research including laboratory techniques, experimental design, hypothesis testing, and communication of findings. Focused for biology majors with little to no research experience. Course fee of \$15 for materials applies.

**BIOL 3300. Developmental Biology. (3 Credits)**

Prerequisite(s): BIOL 1610 with a minimum grade of C- and University Advanced Standing

Examines the principles of Developmental Biology with emphasis on the specialization of cells and their organization into body plans. Is recommended for Biology Majors interested in developmental processes.

May be delivered online.

**BIOL 3400. Cell Biology. (3 Credits)**

Prerequisite(s): BIOL 1610 and CHEM 1220 with a C- or higher in each and University Advanced Standing

Teaches students the fundamentals of cell biology. Emphasizes the molecular basis of cell structure and functions as well as cell signaling.

**BIOL 3405. Cell Biology Laboratory. (1 Credit)**

Prerequisite(s): BIOL 1610 and CHEM 1220 or higher with minimum grade of C- in each and University Advanced Standing

Corequisite(s): BIOL 3400

Uses laboratory exercises to demonstrate topics covered in BIOL 3400. Includes experimental methods for studying cell processes, enzymes, tissue specific proteins, organelles, and experimental design.

Course Lab fee of \$100 applies.

**BIOL 3500. Genetics. (3 Credits)**

Prerequisite(s): BIOL 1610 with minimum grade of C- and University Advanced Standing

For Biology majors. Studies the genetic basis of life and the mechanisms by which information to make life is stored in the DNA. Presents classical, molecular, and population genetics in the background of current techniques and understanding of genetic processes. Provides an understanding of the basic principles of genetics and preparation for more advanced courses in other aspects of biology.

Canvas CourseMat \$103/Macmillan applies

**BIOL 3515. Advanced Genetics Laboratory. (1 Credit)**

Prerequisite(s): University Advanced Standing

Pre- or Corequisite(s): BIOL 3500

Provides experience with genetic analysis of one or more model organisms. Examines recent advances in genetic analysis, how those advances impact medicine and society, and how genetics is increasingly influenced by Genomic and Bioinformatic methods. Includes examination of new technologies and their practical and ethical implications. Provides hands-on experience using bioinformatic tools in identification of gene structure and annotation of genomes.

**BIOL 3550. Molecular Biology. (3 Credits)**

Prerequisite(s): BIOL 1610, CHEM 1110 or CHEM 1215, and University Advanced Standing

Examines the structure, organization, replication, and expression of genomes. Explores the methods used for study of genome structure and function, including nucleotide and protein extractions, separations, and characterizations. Compares sequence data of genomes, transcriptomes, and proteomes. Examines primary literature in the field.

**BIOL 3555. Experiments in Molecular Biology. (1 Credit)**

Prerequisite(s): University Advanced Standing

Pre- or Corequisite(s): BIOL 3550

Performs experiments in molecular biology including cDNA synthesis, gene cloning, DNA sequencing, polymerase chain reaction (PCR), computer analysis of nucleic acid and protein sequences, protein expression-screening and protein separation and characterization.

Course Lab fee of \$150 applies.

**BIOL 3600. Biological Chemistry. (3 Credits)**

Cross-listed with: CHEM 3600

Prerequisite(s): University Advanced Standing

Pre- or Corequisite(s): CHEM 2320

Introduces principles of the chemical processes that define living organisms. Covers structure and function of proteins, carbohydrates, lipids and nucleic acids. Explores metabolic pathways, biosynthesis, enzymatics, thermodynamics, membrane dynamics and related processes within a living cell. Emphasizes molecular mechanisms of reactions and their outcome.

**BIOL 3605. Biological Chemistry Lab. (1 Credit)**

Cross-listed with: CHEM 3605

Prerequisite(s): University Advanced Standing

Corequisite(s): BIOL 3600

Introduces laboratory techniques in biochemistry. Studies methods and theory behind purification of proteins and nucleic acids including chromatography and electrophoresis. Uses methods in assessing enzyme activity and kinetics and protein structure analysis. Includes analysis and manipulation of DNA and RNA.

Course Lab fee of \$145 applies.

**BIOL 3620. Biological Chemistry II. (3 Credits)**

Cross-listed with: CHEM 3620

Prerequisite(s): (CHEM 3600 or BIOL 3600) and University Advanced Standing

Is a continuation of CHEM 3600. Teaches in-depth the biochemistry of molecular and cell biology processes. Explores the topics of molecular information flow and signaling. Examines current understanding in biochemical methods and ideas beyond those discussed in Biochem I.

**BIOL 369R. Introduction to Undergraduate Research. (1 Credit)**

Prerequisite(s): BIOL 1610; (MATH 1050 or STAT 2040 highly recommended) and University Advanced Standing

Introduces fundamentals of research in biology, including how to identify a research problem, form testable hypotheses, select appropriate experimental methods, collect data, determine appropriate sample size, establish appropriate controls, conduct experiments, document experiment details and data, tabulate, analyze and interpret data and how to write a research report. Emphasizes research ethics, institutional research guidelines, personal protection, and proper disposal of hazardous chemicals and biologicals. Introduces research opportunities available within and beyond the university community. May be repeated for a maximum of 2 credits toward graduation.

**BIOL 3700. General Ecology. (3 Credits)**

Prerequisite(s): BIOL 1620 with a C- or higher, and University Advanced Standing

Introduces the relationships between organisms and their environment, including processes at the individual, population, community, ecosystem, and biosphere levels. Includes specific topics such as adaptation to abiotic factors in terrestrial and aquatic habitats, global climate patterns and biomes, evolution of life histories, reproductive strategies and social behaviors, population distributions and dynamics, species interactions, community structure and succession, energy flow and nutrient cycles in ecosystems, global biodiversity, and the impact of humans on ecological processes.

**BIOL 3705. General Ecology Laboratory. (1 Credit)**

Prerequisite(s): University Advanced Standing

Corequisite(s): BIOL 3700

Provides lab experience in which students may acquire skills in the collection, analysis, and presentation of ecological data. Includes field sampling of plant and animal populations, laboratory experiments and observations, and computer simulations. Emphasizes techniques in data storage and statistical analysis, graphical representation of data, and scientific writing.

Course Lab fee of \$18 for lab, transportation applies.

**BIOL 3800. Conservation Biology. (3 Credits)**

Prerequisite(s): (BIOL 1010 or BIOL 1620 with a minimum of C-) and University Advanced Standing; BIOL 3700 strongly recommended

Presents the scientific principles of conservation biology and associated cultural and ethical issues. Explores the interplay of biodiversity, ecosystems, and human activity. Investigates the challenges facing management of our natural resources in order to maintain healthy and productive populations and ecosystems. May include a service-learning project with a community partner.

Course fee of \$13 for materials, transportation applies

**BIOL 3850. Marine Biology. (3 Credits)**

Prerequisite(s): BIOL 1620 with a C- or higher, and University Advanced Standing

Introduces students to the study of life in the ocean. Presents basic principles of the geological, chemical, and physical environment of marine systems. Examines the principal groups of marine organisms including microbes, seaweeds, invertebrates, fishes, marine birds, reptiles, and mammals. Surveys the basics of marine ecology and introduces students to the different types of oceanic habitats from the intertidal and surface waters down to the deep sea. May include an optional non-graded field trip (additional cost would apply, for more information contact the instructor).

**BIOL 4000. Freshwater Ecology. (4 Credits)**

Prerequisite(s): BIOL 1620 and (BIOL 2500 or BIOL 3700) with a C- or higher in each, and University Advanced Standing

Explores physical, chemical, and biological characteristics of freshwater systems, including lakes, rivers, and streams. Emphasizes freshwater habitats as ecosystems. Studies human impacts on freshwater, with particular reference to Utah and the West. Emphasizes field experience in collecting and measuring the physiochemical characteristics and different groups of organisms found in freshwater habitats. Includes weekly laboratory.

Course Lab fee of \$17 for lab, transportation applies.

**BIOL 4260. Ethical Issues in Biology WE. (2 Credits)**

Prerequisite(s): BIOL 1010 or BIOL 1610 with a C- or higher, and University Advanced Standing

Offers an in-depth analysis of current ethical issues in biology. Requires extensive reading and an analytical term paper. Presents subjects in lecture and in lab sessions. Concentrates on readings and on analyses of issues and their effects on people. Explores and discusses individual participant paradigms.

**BIOL 4300. Bioinformatics and Genome Analysis. (4 Credits)**

Prerequisite(s): BIOL 3500 with a minimum grade C- and University Advanced Standing

Studies analysis of genomic sequences, comparison of genomes of different species to gather information about protein function. Includes hands on learning in bioinformatics and genomics. Uses a combination of computer work and discussions that will allow the student to perform basic gene and protein analysis using web tools.

**BIOL 4400. Genomics. (3 Credits)**

Prerequisite(s): BIOL 3500 with minimum grade of C- and University Advanced Standing

Introduces genomics as a science and its relationship to bioinformatics. Provides fundamental knowledge and skills to carry out analysis of genes and genomes. Covers computational approaches for interpreting genomic data, including genome sequencing and annotation, gene expression and the transcriptome, functional genomics, metagenomics, and genetic variation and SNPs.

**BIOL 4450. Immunology. (3 Credits)**

Cross-listed with: MICR 4450

Prerequisite(s): (MICR 2060 or MICR 3450 or ZOOL 2420) and University Advanced Standing

Explores the macromolecules, cells and organs involved in innate and adaptive immunity. Examines the development of lymphocyte repertoire, positive and negative selection of lymphocytes and the production of effector lymphocytes. Studies properties of antigens, vaccines, antigen presenting cells and the mechanisms of antigen presentation. Reviews major immunological methods for medical diagnostics and other applications. Examines causes and consequences of autoimmune and lymphoproliferative diseases and immunodeficiencies. Probes how immune response could be manipulated for cancer therapy and transplantation medicine.

**BIOL 4455. Immunology Laboratory. (1 Credit)**

Prerequisite(s): University Advanced Standing

Corequisite(s): BIOL 4450

Addresses federal, local and institutional regulations on using vertebrate animals for biomedical research. Teaches and regularly practices aseptic techniques required in handling biohazardous materials including vertebrate tissues. Studies how to collect tissues and blood from vertebrate animals and process the samples for harvesting various types of cells and macromolecules. Presents common immunological techniques such as western blot analysis and ELISA. Covers how to immunize animals using appropriate adjuvant and harvest plasma from immunized animals to isolate immunoglobulin. Examines tissue typing methodologies including PCR techniques.

Course Lab fee of \$150 applies.

**BIOL 4500. Principles of Evolution WE. (3 Credits)**

Prerequisite(s): BIOL 1620 and (BIOL 3500 or MICR 3650) with a C- or higher in each, senior status, and University Advanced Standing

Pre- or Corequisite(s): BIOL 3700 or MICR 3150 or BOT 3700

Focuses on the concepts of evolution as a fundamental principle of biology. Emphasizes the mechanisms and explanations of the tremendous diversity of life. Studies classical, molecular and current explanations of evolution in the background of current techniques and understanding of the genetic processes. Examines the principles of evolution and the various aspects of natural selection and speciation.

**BIOL 4550. Molecular Evolution and Bioinformatics WE. (3 Credits)**

Prerequisite(s): BIOL 3500 with minimum grade of C-, and minimum of 6 additional credits upper division biology (BIOL, BOT, MICR, ZOOL, BTEC) courses, and University Advanced Standing

Focuses on the concepts of evolution as a fundamental principle of biology with emphasis on change at the molecular level. Teaches how natural selection shapes the evolution of genes, gene systems, macromolecules, and organisms. Explores the roles of mutation, natural selection, population size and subdivision, and genetic recombination. Introduces different approaches for testing hypotheses about how molecules evolve by using phylogenetic analysis.

**BIOL 4600. Bioinformatics Capstone. (3 Credits)**

Prerequisite(s): Senior status in the Bioinformatics program and University Advanced Standing

Applies concepts from the previous Bioinformatics sequence of courses to the real world. Allows students to work with faculty members and industry experts to design and complete a project that incorporates various concepts that have been presented in previous Bioinformatics courses. Requires development and/or application of bioinformatic tools and presentation of results.

**BIOL 4700. Proteomics. (3 Credits)**

Cross-listed with: CHEM 4700

Prerequisite(s): (CHEM/BIOL 3600 or BIOL 3400 or BIOL 4300) and University Advanced Standing

Explores the fundamentals of discovery-based biochemistry, especially of proteins, relating proteomics to other fields of discovery-based chemistry, biology, and biochemistry, and to the field of systems biology. Establishes the relevance of proteomics to human concerns, including the health sciences and chemical fields.

**BIOL 481R. Biology Internship. (1-5 Credits)**

Prerequisite(s): BIOL 1620 with a C- or higher and Instructor Approval

Allows biology majors to earn credit while obtaining practical and research experience as an intern in a government, nonprofit, private agency, or with an approved employer. Must be supervised by agency representative and faculty advisor. Department chairperson approval required and written contracts must be completed and signed. May be repeated with a maximum of 5 credits counting toward graduation. May be graded credit/no credit.

**BIOL 489R. Student Research. (1-4 Credits)**

Prerequisite(s): BIOL 1620, CHEM 1210, instructor permission, and University Advanced Standing

Provides guided research studies in biology under the direction of a Biology Department faculty mentor. Includes any combination of literature reviews, original research, and/or participation in ongoing departmental projects. Involves students in the methodology of original biology research. Requires preparation and presentation of oral and/or written reports. May culminate in results that will form the basis of the senior thesis in the major, if thesis option is chosen. May be repeated for 9 credits toward graduation.

**BIOL 4900. Museum-Based Taxonomy and Biodiversity Research. (3 Credits)**

Prerequisite(s): BIOL 1620 and (BOT 2050 or BOT 2100 or BOT 2400) with a C- or higher, and University Advanced Standing

Focuses on botany and utilizes the UVU natural history museum herbarium and other online natural history resources. Employs museum-based pedagogical tools and will evaluate, define and practice taxonomic applications in biodiversity research, including how floras, faunas and mycotas have been used by scientists. Uses floristics to assess outputs (dissemination) and impacts as well as assess technology on field data collection, uses, potential, and how might collections be used in the future.

**BIOL 490R. Special Topics in Biology. (1-4 Credits)**

Prerequisite(s): BIOL 1620 and University Advanced Standing

Explores and examines special topics relating to the field of biology. Emphasizes areas of rapid growth in biology or current importance to society. May be repeated for a total of 9 credits toward graduation.

**BIOL 492R. Professional Development. (1 Credit)**

Prerequisite(s): University Advanced Standing

Pre- or Corequisite(s): BIOL 4500 or BIOL 4550

Focuses on professional skills required for students to move forward in their chosen career. Emphasizes writing an effective cover letter, resume and personal statement and communicating effectively in an interview setting. Addresses social media branding for professional settings. Requires students to complete the biology major field test and other department assessments. May be repeated for a maximum of 2 credits toward graduation.

**BIOL 4940. Student Seminar WE. (2 Credits)**

Prerequisite(s): BIOL 1610 with a C- or higher, junior or senior standing, and University Advanced Standing

Requires students to research scientific literature, give oral presentations, write a research paper, and lead discussions on assigned biology topics in specific areas of current research in biology.

**BIOL 497R. Biology Colloquium. (0.5-1 Credits)**

Prerequisite(s): University Advanced Standing

Requires students to attend lectures presented by department faculty and/or invited speakers. Features lectures that are usually a summary of the speaker's recent research results, presented at a level appropriate for junior and senior biological science majors. May be repeated for a maximum of 2 credits toward graduation.

**BIOL 499R. Senior Thesis. (1-2 Credits)**

Prerequisite(s): ENGL 2010, junior standing, instructor permission, and University Advanced Standing

Teaches students to write a thesis based on library research or work performed during laboratory/field research under BIOL 489R. Provides experience in critically analyzing published literature and, if laboratory/field research was performed, comparing research results with the scientific literature.

Requires a technically accurate report on one's findings. Includes the opportunity to present the research results to students, faculty and the community at a Department of Biology seminar. May be repeated once for a total of 2 credits toward graduation.

**BIOL 5000. Regulatory Affairs for Life Sciences. (4 Credits)**

Prerequisite(s): Acceptance into the Certificate of Proficiency in Regulatory Affairs for Life Sciences or Instructor Approval

Introduces regulatory affairs as practiced by medical device and biopharma companies in the US. Focuses on United States Federal Drug Administration and International Conference on Harmonisation of Technical Requirements for Registration of Pharmaceuticals for Human Use guidances and best practices.

**BIOL 5010. Quality Management Systems for the Life Sciences. (2 Credits)**

Prerequisite(s): BIOL 5000

Introduces FDA and International Conference on Harmonisation (ICH) requirements for the QSR (Quality System Regulation). Focuses on ISO 13485 and related guidances. Specifically covers the regulations and standards which are the basis of the regulated life science industry.

**BIOL 5020. Design Control and Risk Management for the Life Sciences. (3 Credits)**

Prerequisite(s): BIOL 5000

Introduces design control and risk management requirements for medical device and BioPharma companies.

**BIOL 525R. Advanced Topics for Biology Teachers. (1-5 Credits)**

Prerequisite(s): Departmental Approval

For licensed teachers or teachers seeking to re-certify their biology endorsement from the Utah State Office of Education. Teaches principles of biology and pedagogy of teaching biology for teachers in public or private schools. Emphasizes correlation with the Utah Core Curriculum, the National Science Education Standards, and the Benchmarks of Project 2061. Topics will vary.

**BIOL 579R. Special Topics. (2 Credits)**

Focuses on issues that are current and often changing in regulatory affairs, such as international regulations. Engages students in discussion and lectures with industry experts on cutting-edge issues that impact how medical devices and pharmaceuticals are regulated for compliance and safety.

May be repeated for a maximum of 8 credits toward graduation.

May be delivered online.

**BIOL 580R. Capstone Project. (1 Credit)**

Prerequisite(s): BIOL 5020

Applies knowledge learned in the Regulatory Affairs sequence of courses to the real world. Allows students to work with faculty members and industry experts to design and complete a project that incorporates various concepts that have been presented in previous Regulatory Affairs courses. May be repeated for a maximum of 3 credits toward graduation.

**BIOL 581R. Biology Internship. (1-5 Credits)**

Prerequisite(s): Instructor Approval and Internship Orientation

Allows students to earn credit while obtaining practical and research experience as an intern in a government, nonprofit, private agency, or with an approved employer. Must be supervised by agency representative and faculty advisor. Department chairperson approval required and written contracts must be completed and signed. May be repeated with a maximum of 5 credits counting toward graduation. May be graded credit/no credit.