GENETICS (GENETICS)

GENETICS 133 – GENETICS IN THE NEWS
3 credits.

The science of genetics is at the heart of many issues facing our society, and as such, genetics is often in the news. Explores the underlying genetics and methodologies to gain a deeper understanding of the science behind the headlines so that we can make more informed decisions as citizens, and you can be part of a movement to help educate those around you.
Requisites: None
Course Designation: Breadth - Biological Sci. Counts toward the Natural Sci req
Level - Elementary
L&S Credit - Counts as Liberal Arts and Science credit in L&S
Repeatable for Credit: No
Last Taught: Spring 2024
Learning Outcomes: 1. Describe the methodologies used in genetics to gain a deeper understanding of the science behind the headlines Audience: Undergraduate

2. Apply foundational scientific knowledge to be informed, versed and up-to-date on current genetic topics Audience: Undergraduate

3. Critically evaluate genetics in the news for credibility, validity. and merit Audience: Undergraduate

4. Discuss how genetics is relevant to our everyday lives Audience: Undergraduate

5. Discuss ethical concerns related to genetics and the applications of biotechnology Audience: Undergraduate

6. Describe how genes influence inherited traits and how genetic variation leads to specific diseases Audience: Undergraduate

GENETICS 155 – FRESHMAN SEMINAR IN GENETICS
1 credit.

Introduction to the discipline of genetics, to the UW Laboratory of Genetics, to some of the research projects the faculty are pursuing, to resources available at UW-Madison, and to the career options open to an individual with a genetics undergraduate degree.
Requisites: None
Repeatable for Credit: No
Last Taught: Fall 2023
Learning Outcomes: 1. Discuss the broader role genetics plays in shaping societal issues and future career paths. Audience: Undergraduate

2. Demonstrate team-work, interpersonal and problem-solving skills to address societal, ethical and scientific issues related to genetics, and communicate their findings through written, oral and multi-media reports. Audience: Undergraduate

3. Discover academic, campus and community resources that assist in their transition to the university and increase their chance of success as an undergraduate. Audience: Undergraduate

4. Engage in meaningful genetics-related dialogue that addresses inclusivity, diversity and identity in science. Audience: Undergraduate

5. Understand how experiential and classroom learning can help them integrate, synthesize and apply knowledge that explores big questions and big ideas in genetics. Audience: Undergraduate

GENETICS 289 – HONORS INDEPENDENT STUDY
1-2 credits.

Research work for Honors students under direct guidance of a faculty member in an area encompassing Genetics. Students are responsible for arranging the work and credits with the supervising instructor.
Requisites: Consent of instructor
Course Designation: Honors - Honors Only Courses (H)
Repeatable for Credit: Yes, unlimited number of completions
Last Taught: Spring 2010

GENETICS 299 – INDEPENDENT STUDY
1-3 credits.

Research work for students under direct guidance of a faculty member in an area encompassing Genetics. Students are responsible for arranging the work and credits with the supervising instructor.
Requisites: Consent of instructor
Repeatable for Credit: Yes, unlimited number of completions
Last Taught: Spring 2024

GENETICS 375 – SPECIAL TOPICS
1-4 credits.

Specialized subject matter of current interest to undergraduate students.
Requisites: None
Course Designation: Breadth - Biological Sci. Counts toward the Natural Sci req
Level - Intermediate
L&S Credit - Counts as Liberal Arts and Science credit in L&S
Repeatable for Credit: Yes, unlimited number of completions
Last Taught: Spring 2024

GENETICS 399 – COORDINATIVE INTERNSHIP/COOPERATIVE EDUCATION
1-8 credits.

An internship under guidance of a faculty or instructional academic staff member in Genetics and internship site supervisor. Students are responsible for arranging the work and credits with the faculty or instructional academic staff member and the internship site supervisor.
Requisites: Consent of instructor
Course Designation: Level - Advanced
L&S Credit - Counts as Liberal Arts and Science credit in L&S
Workplace - Workplace Experience Course
Repeatable for Credit: Yes, unlimited number of completions
Last Taught: Spring 2024

GENETICS 400 – STUDY ABROAD IN GENETICS
1-6 credits.

Provides an area equivalency for courses taken on Madison Study Abroad Programs that do not equate to existing UW courses.
Requisites: None
Repeatable for Credit: Yes, unlimited number of completions

GENETICS 466 – PRINCIPLES OF GENETICS
3 credits.

Genetics in eukaryotes and prokaryotes. Includes transmission genetics, molecular genetics, evolutionary genetics, genetic engineering, and societal issues associated with genetics. Illustrative material includes bacteria, plants, insects, and vertebrates.
Requisites: (ZOOLOGY/BIOLOGY/BOTANY 151 or BIOCORE 381 or BOTANY/BIOLOGY 130 or ZOOLOGY/BIOLOGY 101 and 102) and (CHEM 104 or CHEM 109 or CHEM 115). Not eligible to enroll if credit earned for GENETICS 467 or 468
Course Designation: Breadth - Biological Sci. Counts toward the Natural Sci req
Level - Intermediate
L&S Credit - Counts as Liberal Arts and Science credit in L&S
Repeatable for Credit: No
Last Taught: Spring 2024
Learning Outcomes: 1. Recall basic genetics terminology Audience: Undergraduate

2. Understand central concepts in genetics Audience: Undergraduate

3. Use concepts to solve qualitative and quantitative problems Audience: Undergraduate

4. Interpret data from experiments Audience: Undergraduate

5. Apply knowledge of experimental genetics to research problems Audience: Undergraduate

GENETICS 467 – GENERAL GENETICS 1
3 credits.

Genetics of eukaryotes and prokaryotes. Includes Mendelian genetics, probability and hypothesis testing, genetic mapping, molecular genetics, gene expression and genetic engineering. Illustrative material includes viruses, bacteria, plants, fungi, insects, and humans.
Requisites: (ZOOLOGY/BIOLOGY 101 and 102, or ZOOLOGY/BIOLOGY/BOTANY 151, BIOCORE 381, or BOTANY/BIOLOGY 130) and (CHEM 104, 109, or 115). Not open to students with credit for GENETICS 466.
Repeatable for Credit: No
Last Taught: Fall 2023
Learning Outcomes: 1. Employ Mendel's laws of inheritance and probability theory to predict the outcome of genetic crosses. Audience: Undergraduate

2. Map genetic loci relative to the location of other loci on the same chromosome based on your understanding of meiosis and genetic recombination. Audience: Undergraduate

3. Apply knowledge of chromosomal mutations and variation to predict patterns of inheritance in diverse species. Audience: Undergraduate

4. Use the Central Dogma of Biology to predict molecules encoded by DNA sequences. Audience: Undergraduate

5. Apply the Genetic Code to predict the effects of mutations. Audience: Undergraduate

6. Design and interpret experiments to amplify, sequence, and clone DNA molecules. Audience: Undergraduate

GENETICS 468 – GENERAL GENETICS 2
3 credits.

Genetic analysis, population genetics, evolution and quantitative genetics. Includes mutant screens, pathway analysis, mosaic analysis, reverse genetics, genomics, Hardy-Weinberg linkage equilibrium, inbreeding, genetic drift, natural selection, population structure, inheritance of complex traits, domestication and human evolution.
Requisites: GENETICS 467
Repeatable for Credit: No
Last Taught: Spring 2024
Learning Outcomes: 1. Describe the molecular mechanisms that contribute to expression regulation in bacteria and eukaryotes. Audience: Undergraduate

2. Apply the tools of forward genetics, reverse genetics and mosaic analysis to investigate the regulatory networks that control growth, development and responses to the environment. Audience: Undergraduate

3. Explain the genetic and molecular basis of immunity. Audience: Undergraduate

4. Discuss the molecular mechanisms that contribute to somatic mutations and the progression to cancer. Audience: Undergraduate

5. Calculate genetic parameters in populations using the tools of population genetics. Audience: Undergraduate

6. Analyze the inheritance of complex traits using quantitative genetic analyses. Audience: Undergraduate

7. Apply the methods of evolutionary genetics to predict how genes and genomes evolve in the long-term. Audience: Undergraduate

GENETICS 470 – BASIC CYTOLOGY AND LABORATORY PROCEDURES
1 credit.

A comprehensive review of cellular biology, the study of optical methods with emphasis on the light microscope and the various techniques used in preparation and staining of specimens for cytologic and histologic study.
Requisites: Declared in Cytotechnology
Repeatable for Credit: No
Last Taught: Fall 2023
Learning Outcomes: 1. Relate cell and tissue structures to their functions in the context of human health and disease Audience: Undergraduate

2. Explain how the morphologic findings of injury or inflammation relate to its causes and consequences Audience: Undergraduate

3. Illustrate how cell cycle regulation and growth factor signaling contribute to inflammation, wound healing, injury, neoplasia, and cancer therapy Audience: Undergraduate

4. Apply principles of fixation and staining to best practices in the laboratory Audience: Undergraduate

5. Recommend appropriate ancillary studies based on specimen type, fixation, and other pre-analytic factors Audience: Undergraduate

GENETICS 471 – ADVANCED LABORATORY PROCEDURES
1 credit.

Preparation of non-gynecologic cytologic specimens using several different instrument methodologies. Application of universal precautions and safety in the handling of unknown biologic hazards. Introduction to histologic preparatory techniques and special staining methods.
Requisites: Declared in Cytotechnology
Repeatable for Credit: No
Last Taught: Spring 2024
Learning Outcomes: 1. Demonstrate competence in cytopreparatory techniques. Audience: Undergraduate

2. Recognize and correct pre-analytical, analytical, and post-analytical errors. Audience: Undergraduate

3. Recommend best practices for specimen collection, transport, and processing for the relevant ancillary studies performed on cytology specimens. Audience: Undergraduate

GENETICS 520 – NEUROGENETICS
3 credits.

The genetic basis of nervous system development, structure, function, and dysfunction. Will emphasize both current research findings on the genetic basis of specific neurological disorders, as well as genetic methodologies and experimental approaches used in neurobiological research.
Requisites: GENETICS 466, 467, BIOCORE 587, ZOOLOGY/ PSYCH 523, or PSYCH 454
Course Designation: Breadth - Biological Sci. Counts toward the Natural Sci req
Level - Intermediate
L&S Credit - Counts as Liberal Arts and Science credit in L&S
Repeatable for Credit: No
Last Taught: Spring 2024
Learning Outcomes: 1. Identify and summarize key concepts that underlie the genetic basis of nervous system development and function. Audience: Undergraduate

2. Explain specific examples of how genetic variation/mutation can alter cellular and molecular pathways to impact nervous system development and function, behavior, as well as cause neurological disorders and diseases. Audience: Undergraduate

3. Analyze and interpret primary data, discuss how this data supports current neurogenetic hypothesizes, and formulate research questions that build on this data and address remaining uncertainties. Audience: Undergraduate

4. Summarize experimental genetic and genomic techniques employed in neurogenetic research that utilize various model organisms, as well as humans. Audience: Undergraduate

GENETICS/BIOLOGY 522 – COMMUNICATING EVOLUTIONARY BIOLOGY
2-3 credits.

Exposure to diverse topics in contemporary evolutionary biology and development of critical thinking and communication skills. Most weeks guest lecturers present their own primary research on a specialized topic in evolutionary biology. Seminars include perspectives from genetics, ecology, geoscience, zoology, botany, microbiology, systematics, molecular biology, and integrative research. Some weeks feature special topics and discussions on pedagogical, legal, outreach, or other issues in evolutionary biology. Includes thinking critically about methodology, experimental design and interpretation, and how conclusions are reached in evolutionary biology by reading primary and secondary literature, attending seminars, discussing topics with speakers and other students, and preparing a written report. The 3-credit version of the course delves deeper into communication of evolutionary biology to researchers, undergraduates, K-12 students, and the general public.
Requisites: GENETICS 466, 468, ZOOLOGY/ANTHRO/BOTANY 410, or BIOCORE 381, or concurrent enrollment
Course Designation: Breadth - Biological Sci. Counts toward the Natural Sci req
Level - Advanced
L&S Credit - Counts as Liberal Arts and Science credit in L&S
Repeatable for Credit: No
Last Taught: Spring 2024
Learning Outcomes: 1. Demonstrate the ability to critically read and comprehend primary scientific literature from diverse areas of evolutionary biology. Audience: Undergraduate

2. Comprehend and critically evaluate oral research presentations in the field of evolutionary biology. Audience: Undergraduate

3. Participate effectively in discussions of scientific research in the field of evolutionary biology. Audience: Undergraduate

4. Write a clear and concise review of a selected topic in evolutionary biology and a critique of a research seminar in that area. Audience: Undergraduate

5. Synthesize and apply knowledge from other didactic courses and personal experiences in discussions of scientific research. Audience: Undergraduate

GENETICS 525 – EPIGENETICS
3 credits.

Introductory course in epigenetics - the layer of chemical information that sits on top of the genome - that switch genes 'on' or 'off'. Will introduce how the epigenome, in collaboration with the genome, controls versatile biological processes and cell fates. Will also cover the latest advances of how humans can control their own epigenetic destiny by lifestyle, diet, and other environmental factors.
Requisites: GENETICS 466 or 467
Course Designation: Grad 50% - Counts toward 50% graduate coursework requirement
Repeatable for Credit: No
Last Taught: Fall 2021
Learning Outcomes: 1. Recognize and summarize the difference between genetics and epigenetics. Audience: Both Grad Undergrad

2. Apply the basic knowledge of epigenetic mechanism and illustrate how their misregulations cause abnormal development and diseases. Audience: Both Grad Undergrad

3. Critically review and discuss epigenetic literature. Audience: Both Grad Undergrad

4. Design epigenetic experiments and interpret the results of those experiments. Audience: Both Grad Undergrad

5. Demonstrate the ability to clearly communicate epigenetic research in both oral and written formats Audience: Graduate

GENETICS 527 – DEVELOPMENTAL GENETICS FOR CONSERVATION AND REGENERATION
3 credits.

Human-induced factors such as changes in land use and global climate are causing rapid worldwide biodiversity loss. Can modern molecular genetics contribute to species preservation? In this course, we will first explore the challenges and potential of molecular genetic methods based on biobanking, gene editing and nuclear transfer for animal biodiversity preservation. Topics covered will include: i) maternal factors and early animal development, ii) interspecies somatic cell nuclear transfer (isSCNT) and oocyte-mediated reprogramming in animal cloning, iii) developmental, phylogenetic and ecological considerations for biobanking, iv) gene editing and synthetic biology as potential tools to recapture biodiversity. Use knowledge in animal population status, developmental genetics and phylogeny to address real-life problems involving the conservation of threatened animal populations.
Requisites: GENETICS 466, 467, or BIOCORE 381
Course Designation: Breadth - Biological Sci. Counts toward the Natural Sci req
Level - Advanced
L&S Credit - Counts as Liberal Arts and Science credit in L&S
Repeatable for Credit: No
Last Taught: Spring 2024
Learning Outcomes: 1. Develop a greater knowledge of global threats to animal populations Audience: Undergraduate

2. Learn principles of animal development at the egg-to-embryo transition, the use of oocytes for reprogramming, cloning and xenograft production, and the effects of phylogenetic relatedness on these processes Audience: Undergraduate

3. Learn developmental basis and consequences of inbreeding, breeding in captivity and domestication Audience: Undergraduate

4. Understand basic concepts in germ cell induction and manipulation Audience: Undergraduate

5. Learn about assessing and banking genetic diversity towards animal species preservation Audience: Undergraduate

GENETICS 528 – BANKING ANIMAL BIODIVERSITY: INTERNATIONAL FIELD STUDY IN COSTA RICA
1 credit.

Study abroad course that provides an on-site educational experience where we use developmental genetics concepts to guide projects of biobanking and oocyte-mediated cloning, as a potential last-defense resort for the preservation of living species under risk of extinction. It will provide hands-on experience in current research and activities in biodiversity areas, including visits to biodiversity-rich ecosystems, on site seminars and demonstrations, biodiversity preservation activities, as well as exposure to local culture and social needs.
Requisites: GENETICS 466, 467, BIOCORE 381, or ZOOLOGY 470
Repeatable for Credit: No
Learning Outcomes: 1. Exposure to biodiversity–rich areas and their challenges due to fragmentation, climate change and invasive species. Audience: Undergraduate

2. Assessment of scientific methods applicable to biodiversity preservation including ecosystem preservation, restoration, and species reintroduction. Audience: Undergraduate

3. Team-based assessment of regional animal phylogenetic biodiversity as related to bio-banking approaches. Audience: Undergraduate

4. Achieve a better understanding of local cultural and socioeconomic needs on their own and in the context of balancing ecosystem preservation activities. Audience: Undergraduate

GENETICS 545 – GENETICS LABORATORY
2 credits.

Gain practical experience in classical and molecular genetic laboratory techniques using plants, animals, and fungi. Topics include complementation and linkage analysis, gene mapping, library screening, yeast and bacterial transformation, restriction analysis, PCR, sequencing, and Southern blot analysis.
Requisites: GENETICS 466 or 467
Course Designation: Level - Advanced
L&S Credit - Counts as Liberal Arts and Science credit in L&S
Repeatable for Credit: No
Last Taught: Spring 2024
Learning Outcomes: 1. Understand central concepts in genetics. Audience: Undergraduate

2. Use concepts to solve problems. Audience: Undergraduate

3. Interpret data from experiments. Audience: Undergraduate

4. Apply genetics knowledge to problems. Audience: Undergraduate

5. Communicate effectively both written and orally. Audience: Undergraduate

GENETICS 548 – THE GENOMIC REVOLUTION
3 credits.

Profound advances are now possible thanks to genomic data and analysis. Introduces the structure, function, and evolution of genomes. It also outlines the realized and prospective benefits of genomic technology for human health, agriculture, and conservation.
Requisites: GENETICS 466, 468, or BIOCORE 587
Course Designation: Breadth - Biological Sci. Counts toward the Natural Sci req
Level - Advanced
L&S Credit - Counts as Liberal Arts and Science credit in L&S
Repeatable for Credit: No
Last Taught: Spring 2024
Learning Outcomes: 1. Use scientific literature to learn about new developments in genomic research. Audience: Undergraduate

2. Examine methods for generating and analyzing genomic data. Audience: Undergraduate

3. Investigate basic and applied questions being addressed by genomic research. Audience: Undergraduate

4. Describe the organization, function, and evolution of genomes. Audience: Undergraduate

5. Appraise the impact of genomic science on health, agriculture, and conservation. Audience: Undergraduate

GENETICS/HORT 550 – MOLECULAR APPROACHES FOR POTENTIAL CROP IMPROVEMENT
3 credits.

Introduction of basic concepts of plant molecular biology and molecular techniques in current use. Topics include: organization and regulation of plant genes, gene cloning and analysis, transformation systems for plants, and molecular techniques for crop improvement.
Requisites: BIOCHEM 501 and (GENETICS 466 or 467); or graduate/professional standing
Course Designation: Breadth - Biological Sci. Counts toward the Natural Sci req
Level - Advanced
L&S Credit - Counts as Liberal Arts and Science credit in L&S
Grad 50% - Counts toward 50% graduate coursework requirement
Repeatable for Credit: No
Last Taught: Spring 2023
Learning Outcomes: 1. Learn how to critically read scientific journal articles. Audience: Both Grad Undergrad

2. Gain experience evaluating and discussing scientific results as reported in journal articles. Audience: Both Grad Undergrad

3. Gain experience preparing and presenting a formal talk on a scientific topic. Audience: Both Grad Undergrad

4. Develop an understanding of how discoveries in basic science lead to practical developments that drive crop improvement. Audience: Both Grad Undergrad

5. Develop a deep understanding of the following molecular methods: Genome Sequencing, RNAseq, Gene Expression Chips, plant transformation, Gene Silencing, and CRISPR-based gene editing. Audience: Both Grad Undergrad

6. Develop a working knowledge of the following bioinformatics tools: BLAST searching, Genome Browsers, EFP Browser, Genevestigator, SnapGene, and gRNA design tools. Audience: Both Grad Undergrad

7. Develop skills in writing a scientific research proposal. Audience: Graduate

GENETICS 564 – GENOMICS AND PROTEOMICS
3 credits.

The basic principles of genomics, proteomics and bioinformatics will be taught through a semester-long project of the students choosing. Creative problem solving in science skills will be learned through a variety of active-learning techniques that include: reading of primary literature, group presentations, peer review, bioinformatic lab exercises, science communication skills (writing visualization), and creating a website. Emphasis will be placed upon how to effectively communicate science (written, oral and written). Topics include: genomic sequencing, phylogeny, domain analysis, transcriptomics, CRISPR screens, chemical genomics, quantitative proteomics and protein networks. Capstone course.
Requisites: GENETICS 466, 468, or BIOCORE 587. Not open to graduate students
Course Designation: Gen Ed - Communication Part B
Breadth - Biological Sci. Counts toward the Natural Sci req
Level - Advanced
L&S Credit - Counts as Liberal Arts and Science credit in L&S
Repeatable for Credit: No
Last Taught: Spring 2024
Learning Outcomes: 1. Gain confidence in modern genomic and proteomic experimental methods used to ask fundamental biological questions and how to become creative problem solvers. Audience: Undergraduate

2. Learn how to mine bioinformatic databases to obtain information about a gene/protein associated with a human disease assembled on a website built by the student. Audience: Undergraduate

3. Learn how to apply what you learned, by writing and visualizing three specific aims of a grant with goals to address the gap in knowledge about the disease and gene of your choosing. Audience: Undergraduate

4. Effectively communicate scientific research by applying unique visual, verbal, and oral techniques facilitated by the instructor called “Slide Evolution”. Audience: Undergraduate

5. To learn how working in diverse teams (social and intellectual) makes you a more innovative problem solver. Audience: Undergraduate

GENETICS/MD GENET 565 – HUMAN GENETICS
3 credits.

Principles, problems, and methods of modern human genetics. Focuses on how researchers discover the genetics of diseases and how those discoveries are used to improve clinical practice. Surveys aspects of (i) the molecular function of the human genome, (ii) the basic principles of human genetics including statistical genetics, quantitative genetics, and genomic variation in human populations, (iii) the genetics of rare disorders and common diseases, and genomic analysis approaches, including genome-wide association studies and sequencing, and (iv) how genetics are used in medicine and discussions covering ethical considerations of human genomic data.
Requisites: GENETICS 466, 468, BIOCORE 587, or graduate/professional standing
Course Designation: Breadth - Biological Sci. Counts toward the Natural Sci req
Level - Intermediate
L&S Credit - Counts as Liberal Arts and Science credit in L&S
Grad 50% - Counts toward 50% graduate coursework requirement
Repeatable for Credit: No
Last Taught: Fall 2023
Learning Outcomes: 1. Predict and describe how different classes of genetic variants, as defined by (a) mutation mechanism, (b) variant size, (c) population frequency, and (d) location in the genome, could affect molecular and cellular functions and risk for disease Audience: Both Grad Undergrad

2. Design experimental approaches to investigate the mechanisms of human genetic disorders Audience: Both Grad Undergrad

3. Explain and give examples of genetic inheritance patterns and the contribution of inherited factors to disease risk Audience: Both Grad Undergrad

4. Describe the design, strengths, and weaknesses of the various approaches for identifying genes or loci associated with a human disease or trait (e.g. linkage mapping, genetic association, sequencing), and interpret results from these studies Audience: Both Grad Undergrad

5. Explain how genetic information is used in the practice of medicine for diagnosis or to guide treatment and the limitations of current clinical diagnostic or treatment tools Audience: Both Grad Undergrad

6. Apply human genetics concepts to critically analyze published scientific studies and to describe experimental approaches that can be performed to address shortcomings and/or extend the findings of published work Audience: Graduate

GENETICS 566 – ADVANCED GENETICS
3 credits.

Principles of classical and modern genetic analysis taught through readings in the scientific literature and group projects. Capstone course.
Requisites: Declared in Genetics undergraduate program and GENETICS 466, 468, or BIOCORE 587
Course Designation: Breadth - Biological Sci. Counts toward the Natural Sci req
Level - Intermediate
L&S Credit - Counts as Liberal Arts and Science credit in L&S
Repeatable for Credit: No
Last Taught: Spring 2024
Learning Outcomes: 1. Critically evaluate primary literature in the field of genetics and genomics. Audience: Undergraduate

2. Explore and utilize information resources available to aid in the advancement of future professional careers. Audience: Undergraduate

3. Formulate research questions about the genetic control of biological processes and design experiments to answer these questions using appropriate genetic and genomic tools. Audience: Undergraduate

4. Demonstrate teamwork, interpersonal and problem-solving skills to address societal, ethical, professional, and scientific issues related to genetics and genomics. Audience: Undergraduate

5. Communicate scientific findings effectively to multiple audiences. Audience: Undergraduate

GENETICS 567 – COMPANION RESEARCH SEMINAR
1 credit.

Student-led discussions on scientific, societal, and professional topics relevant to Senior research and selected original research presentations.
Requisites: Consent of instructor
Repeatable for Credit: No
Last Taught: Fall 2023
Learning Outcomes: 1. Interpret primary literature data in genetics and related fields Audience: Undergraduate

2. Communicate accompanying senior laboratory research Audience: Undergraduate

3. Develop skills in science communication at multiple levels of detail Audience: Undergraduate

4. Critically discuss interrelated aspects of science and society Audience: Undergraduate

5. Explore careers related to genetics and genomics Audience: Undergraduate

GENETICS 568 – THE CENTRAL NERVOUS SYSTEM
1 credit.

Anatomy, physiology, histology and pathology of the central nervous system and the corresponding cellular manifestations which provide diagnostic information. Cell changes related to specimen preparation. Correlation of the didactic information with the microscopic cellular patterns to provide a diagnosis.
Requisites: Declared in Cytotechnology
Repeatable for Credit: No
Last Taught: Spring 2024
Learning Outcomes: 1. Integrate each patient's history, clinical, and radiologic findings with microscopic findings to make an accurate diagnosis using standard diagnostic criteria. Audience: Undergraduate

2. Recommend and interpret ancillary tests appropriately in the context of the molecular basis of diseases involving the central nervous system. Audience: Undergraduate

3. Integrate cytomorphologic and clinical knowledge of the central nervous system into existing knowledge of other organ systems. Audience: Undergraduate

4. Value the impact of cytologic diagnosis of central nervous system specimens from a patient and public health perspective. Audience: Undergraduate

GENETICS 569 – THE BREAST
1 credit.

Anatomy, histology, physiology and pathology of the breast and the corresponding cellular manifestations which provide diagnostic information. Cell changes related to specimen processing. Correlation of the didactic information with the microscopic cell patterns to provide a diagnosis.
Requisites: Declared in Cytotechnology
Repeatable for Credit: No
Last Taught: Spring 2024
Learning Outcomes: 1. Integrate each patient's history, clinical, and radiologic findings with microscopic findings to make an accurate diagnosis using standard diagnostic criteria. Audience: Undergraduate

2. Recommend and interpret ancillary tests appropriately in the context of the molecular basis of diseases involving the breast. Audience: Undergraduate

3. Integrate cytomorphologic and clinical knowledge of the breast into existing knowledge of other organ systems. Audience: Undergraduate

4. Value the impact of cytologic diagnosis of breast specimens from a patient and public health perspective. Audience: Undergraduate

GENETICS 570 – THE FEMALE REPRODUCTIVE SYSTEM
8 credits.

Anatomy, histology, physiology, and pathology of the female reproductive tract and the corresponding cellular manifestations which provide diagnostic information. Cellular changes due to therapy and specimen collection. Correlation of the didactic information with the microscopic cellular patterns to provide a diagnosis.
Requisites: Declared in Cytotechnology
Repeatable for Credit: No
Last Taught: Fall 2023
Learning Outcomes: 1. Demonstrate a basic knowledge of the anatomy, histology and endocrinology of the female reproductive tract as well as the anus and rectum in both men and women. Audience: Undergraduate

2. Recognize cellular degenerative, reactive and reparative changes and identify all clinically relevant organisms associated with the female reproductive tract as well as the anus and rectum in both men and women. Audience: Undergraduate

3. Apply criteria and use the Bethesda reporting system to make the appropriate interpretation of cellular changes seen microscopically. Audience: Undergraduate

4. Correlate each patient's history and clinical findings with the microscopic findings on their uterine cervical/vaginal specimens and know the proper follow-up recommendation for their diagnosis. Audience: Undergraduate

5. Recommend appropriate ancillary studies and integrate the results with the cytologic diagnosis. Audience: Undergraduate

GENETICS 571 – CLINICAL PRACTICE I
1 credit.

Clinical practicum to develop diagnostic expertise involving the microscopic examination of routine gynecologic specimens (Pap smears). Observe the signout of abnormal cytologic specimens by cytopathologist staff.
Requisites: Declared in Cytotechnology
Repeatable for Credit: No
Last Taught: Fall 2023
Learning Outcomes: 1. Demonstrate professional and ethical responsibility as part of a patient-centered healthcare team. Audience: Undergraduate

2. Demonstrate a basic knowledge of the CLIA 88 regulation on GYN cytology. Audience: Undergraduate

3. Demonstrate a basic troubleshooting skill encountered during clinical practice. Audience: Undergraduate

4. Apply criteria and use the Bethesda reporting system to make the appropriate interpretation of cellular changes seen microscopically. Audience: Undergraduate

5. Correlate each patient's history and clinical findings with the microscopic findings on their uterine cervical/vaginal specimens and know the proper follow-up recommendation for their diagnosis. Audience: Undergraduate

6. Value the impact of cytologic diagnosis of cervical/vaginal and anorectal specimens from a patient and public health perspective. Audience: Undergraduate

GENETICS 572 – THE RESPIRATORY SYSTEM
3 credits.

Anatomy, histology, physiology and pathology of the respiratory tract and the corresponding cellular manifestations which provide diagnostic information. Cell changes related to specimen processing. Correlation of the didactic information with the microscopic cellular patterns to provide a diagnosis.
Requisites: Declared in Cytotechnology
Repeatable for Credit: No
Last Taught: Fall 2023
Learning Outcomes: 1. Integrate each patient's history, clinical, and radiologic findings with microscopic findings to make an accurate diagnosis using standard diagnostic criteria. Audience: Undergraduate

2. Recommend and interpret ancillary tests appropriately in the context of the molecular basis of diseases involving the respiratory system. Audience: Undergraduate

3. Integrate cytomorphologic and clinical knowledge of the respiratory system into existing knowledge of other organ systems. Audience: Undergraduate

4. Value the impact of cytologic diagnosis of respiratory tract specimens from a patient and public health perspective. Audience: Undergraduate

GENETICS 573 – THE GENITOURINARY SYSTEM
2 credits.

Anatomy, physiology, histology and pathology of the urinary tract and male reproductive systems and the corresponding cellular manifestations which provide diagnostic information. Cell changes related to specimen processing. Correlation of didactic information with microscopic cell patterns to provide a diagnosis.
Requisites: Declared in Cytotechnology
Repeatable for Credit: No
Last Taught: Fall 2023
Learning Outcomes: 1. Integrate each patient's history, clinical, and radiologic findings with microscopic findings to make an accurate diagnosis using standard diagnostic criteria. Audience: Undergraduate

2. Recommend and interpret ancillary tests appropriately in the context of the molecular basis of diseases involving the genitourinary system. Audience: Undergraduate

3. Integrate cytomorphologic and clinical knowledge of the genitourinary system into existing knowledge of other organ systems. Audience: Undergraduate

4. Value the impact of cytologic diagnosis of genitourinary system specimens from a patient and public health perspective. Audience: Undergraduate

GENETICS 574 – THE GASTROINTESTINAL SYSTEM
3 credits.

Anatomy, histology, physiology and pathology of the gastrointestinal system and the corresponding cellular manifestations which provide diagnostic information. Cell changes related to specimen processing. Correlation of the didactic information with the microscopic cellular patterns to provide a diagnosis.
Requisites: Declared in Cytotechnology
Repeatable for Credit: No
Last Taught: Spring 2024
Learning Outcomes: 1. Integrate each patient's history, clinical, radiologic, and endoscopic findings with microscopic findings to make an accurate diagnosis using standard diagnostic criteria. Audience: Undergraduate

2. Recommend and interpret ancillary tests appropriately in the context of the molecular basis of diseases involving the gastrointestinal tract. Audience: Undergraduate

3. Integrate cytomorphologic and clinical knowledge of the gastrointestinal tract into existing knowledge of other organ systems. Audience: Undergraduate

4. Value the impact of cytologic diagnosis of gastrointestinal specimens from a patient and public health perspective. Audience: Undergraduate

GENETICS 575 – MISCELLANEOUS SYSTEMS
3 credits.

Anatomy, histology, physiology and pathology of skin, thyroid, lymph nodes and other sites and the corresponding celluular manifestations which provide diagnostic information. Emphasis on specimen collection by fine needle aspiration. Correlation of the didactic information with the microscopic cellular patterns to provide a diagnosis.
Requisites: Declared in Cytotechnology
Repeatable for Credit: No
Last Taught: Spring 2024
Learning Outcomes: 1. Integrate each patient's history, clinical, and radiologic findings with microscopic findings to make an accurate diagnosis using standard diagnostic criteria. Audience: Undergraduate

2. Recommend and interpret ancillary tests appropriately in the context of the molecular basis of diseases involving skin, thyroid, lymph nodes, and other sites. Audience: Undergraduate

3. Integrate cytomorphologic and clinical knowledge of skin, thyroid, lymph nodes, and other sites into existing knowledge of other organ systems. Audience: Undergraduate

4. Value the impact of cytologic diagnosis of specimens from skin, thyroid, lymph nodes, and other sites from a patient and public health perspective. Audience: Undergraduate

GENETICS 576 – EFFUSIONS
2 credits.

Anatomy, physiology, histology and pathology of the body cavities. Cytologic manifestations which provide diagnostic information. Cell changes related to specimen processing. Correlation of the didactic information with the microscopic cellular patterns to provide a diagnosis.
Requisites: Declared in Cytotechnology
Repeatable for Credit: No
Last Taught: Spring 2024
Learning Outcomes: 1. Integrate each patient's history, clinical, and radiologic findings with microscopic findings to make an accurate diagnosis using standard diagnostic criteria. Audience: Undergraduate

2. Recommend and interpret ancillary tests appropriately in the context of the molecular basis of diseases involving effusions. Audience: Undergraduate

3. Integrate cytomorphologic and clinical knowledge of effusions into existing knowledge of other organ systems. Audience: Undergraduate

4. Value the impact of cytologic diagnosis of effusion specimens from a patient andpublic health perspective. Audience: Undergraduate

GENETICS 577 – APPLIED CYTOLOGY I
1 credit.

Written and practical application of the comprehensive body of knowledge to all aspects of preparation, evaluation, correlation and diagnosis of cytologic speciments.
Requisites: Declared in Cytotechnology
Repeatable for Credit: No
Last Taught: Spring 2024
Learning Outcomes: 1. Integrate each patient's history, clinical, and radiologic findings with microscopic findings to make an accurate diagnosis using standard diagnostic criteria. Audience: Undergraduate

2. Recommend and interpret ancillary tests appropriately in the context of the molecular basis of diseases involving all organ systems. Audience: Undergraduate

3. Integrate cytomorphologic and clinical knowledge of all organ systems. Audience: Undergraduate

4. Value the impact of cytologic diagnosis from a patient and public health perspective. Audience: Undergraduate

GENETICS 578 – APPLIED CYTOLOGY II
1 credit.

Written and practical application of the advanced comprehensive body of knowledge to all aspects of preparation, evaluation, correlation and diagnosis of cytologic specimens. Practice in nationally offered cytologic examinations.
Requisites: Declared in Cytotechnology
Repeatable for Credit: No
Last Taught: Summer 2023
Learning Outcomes: 1. Integrate each patient's history, clinical, and radiologic findings with microscopic findings to make an accurate diagnosis using standard diagnostic criteria. Audience: Undergraduate

2. Recommend and interpret ancillary tests appropriately in the context of the molecular basis of diseases involving all organ systems. Audience: Undergraduate

3. Integrate cytomorphologic and clinical knowledge of all organ systems. Audience: Undergraduate

4. Value the impact of cytologic diagnosis from a patient and public health perspective. Audience: Undergraduate

GENETICS 588 – IMMUNOGENETICS
3 credits.

Immunogenetics focuses on the unique genetic phenomena that occur in lymphocytes during development and response to stimuli. It pays particular attention to the processes of adaptive antigen receptor development and maturation, major histocompatibility complex molecule polygeny and polymorphism in the context of current real-life challenges (e.g. COVID-19, influenza, and HIV), immunological evolution, epigenetics associated with autoimmunity, sex differences in immune responses, and some genetic processes involved in cancer of white blood cells. Ultimately, the genetic mechanisms that drive the immunological and clinical differences observed between individuals when confronted with the same challenge will be examined, and explored through the primary and secondary research literature in order to strengthen scientific literacy.
Requisites: GENETICS 466, 467 or BIOCORE 383
Repeatable for Credit: No
Last Taught: Fall 2023
Learning Outcomes: 1. Describe the genetic mechanisms underlying interindividual immune response differences to the same immunological challenge Audience: Undergraduate

2. Critically evaluate major research advances in the primary literature and place them within the historical context of other major immunogenetic discoveries Audience: Undergraduate

3. Predict the downstream effects of manipulating variables that are involved in molecular pathways or currently being used in immunogenetic based research and clinical practices Audience: Undergraduate

4. Effectively communicate difficult immunogenetics topics regarding interindividual immune response differences Audience: Undergraduate

GENETICS 605 – CLINICAL CASES IN MEDICAL GENETICS
3 credits.

The use of genetics in medicine has experienced significant growth over the past 50 years, identifying risk genes, and devising diagnostic tests and therapies based on this knowledge for specific clinical disorders such as cystic fibrosis, achondroplasia, and Retts syndrome. MDs and biomedical scientists from UW Hospital and Clinics, the School of Medicine and Public Health, and other UW units will present lectures in this field followed by question-answers sessions. Other class sessions will be devoted to student presentations and open discussion of research literature.
Requisites: GENETICS 466, 467 or BIOCORE 383
Course Designation: Grad 50% - Counts toward 50% graduate coursework requirement
Repeatable for Credit: No
Last Taught: Spring 2024
Learning Outcomes: 1. Design experiments to discover the genes and defects within genes that cause diseases in humans Audience: Undergraduate

2. Understand how model organisms are used to investigate the molecular mechanisms for genetic disorders Audience: Undergraduate

3. Design and interpret diagnostic DNA-based tests for the detection of allelic variants that cause disease Audience: Undergraduate

4. Know the diverse physiological-developmental mechanisms that underlie a broad spectrum of diseases Audience: Undergraduate

5. Devise strategies to develop therapies to treat or cure disease and understand the limits therapeutic interventions Audience: Undergraduate

6. Develop a report on (1) the design of a diagnostic test for a genetic disorder, (2) the molecular biological pathways affected by the genetic disorder, and (3) application of the understanding of the disorder to develop a therapy or management regime Audience: Graduate

GENETICS/BIOCHEM/MICROBIO 612 – PROKARYOTIC MOLECULAR BIOLOGY
3 credits.

Molecular basis of bacterial physiology and genetics with emphasis on molecular mechanisms; topics include nucleic acid-protein interactions, transcription, translation, replication, recombination, regulation of gene expression.
Requisites: (BIOCHEM 501 or 507) and (MICROBIO 470, GENETICS 466 or 468) or graduate/professional standing
Course Designation: Breadth - Biological Sci. Counts toward the Natural Sci req
Level - Advanced
L&S Credit - Counts as Liberal Arts and Science credit in L&S
Grad 50% - Counts toward 50% graduate coursework requirement
Repeatable for Credit: No
Last Taught: Fall 2023

GENETICS/AGRONOMY/AN SCI/HORT 615 – GENETIC MAPPING
3 credits.

Computing-intensive course to prepare students for genetic mapping research; linkage analysis and QTL mapping in designed crosses; linkage disequilibrium and association analysis (GWAS). Recommended preparation is undergraduate courses in genetics and statistics and prior experience writing R scripts (such as module 1 of STAT 327).
Requisites: Graduate/professional standing
Course Designation: Grad 50% - Counts toward 50% graduate coursework requirement
Repeatable for Credit: No
Last Taught: Spring 2023

GENETICS/BIOCHEM/MD GENET 620 – EUKARYOTIC MOLECULAR BIOLOGY
3 credits.

Focuses on the basic molecular mechanisms that regulate DNA, RNA, and protein metabolism in eukaryotic organisms.
Requisites: BIOCHEM 501, 508 or graduate/professional standing
Course Designation: Level - Intermediate
L&S Credit - Counts as Liberal Arts and Science credit in L&S
Grad 50% - Counts toward 50% graduate coursework requirement
Repeatable for Credit: No
Last Taught: Spring 2024

GENETICS/ENTOM/ZOOLOGY 624 – MOLECULAR ECOLOGY
3 credits.

Basic principles of molecular ecology. Lecture topics include population genetics, molecular phylogenetics, rates and patterns of evolution, genome evolution, and molecular ecology.
Requisites: GENETICS 466, 467, BIOCORE 383, or graduate student standing
Course Designation: Breadth - Biological Sci. Counts toward the Natural Sci req
Level - Intermediate
L&S Credit - Counts as Liberal Arts and Science credit in L&S
Grad 50% - Counts toward 50% graduate coursework requirement
Repeatable for Credit: No
Last Taught: Spring 2023
Learning Outcomes: 1. Identify and describe common molecular genetic techniques. Audience: Both Grad Undergrad

2. Demonstrate knowledge about the significance of genetic diversity in species biology. Audience: Both Grad Undergrad

3. Differentiate how ecological and evolutionary processes shape genetic variation. Audience: Both Grad Undergrad

4. Analyze genetic data and communicate the results. Audience: Both Grad Undergrad

5. Evaluate whether genetic data are appropriate for answering scientific questions. Audience: Both Grad Undergrad

6. Summarize and critique the primary literature in the field of Molecular Ecology. Audience: Graduate

GENETICS/CHEM 626 – GENOMIC SCIENCE
2 credits.

Brings cutting-edge topics in the genomic sciences into the reach of those in chemistry, biology, engineering, computer science statistics fields. Enables biologically-oriented students to deal with advances in analytical science so that they may incorporate new genomic science concepts into their own scientific repertoires.
Requisites: Graduate/professional standing
Course Designation: Grad 50% - Counts toward 50% graduate coursework requirement
Repeatable for Credit: No
Last Taught: Spring 2024

GENETICS 627 – ANIMAL DEVELOPMENTAL GENETICS
3 credits.

Advanced genetics course focusing on genetic mechanisms of animal embryonic development, with particular emphasis on central molecular circuitries that control development and genetic analytical tools used to reveal them. Address topics including maternal and epigenetic inheritance, the egg-to-embryo transition, pattern formation, organogenesis, coordination of cellular and molecular mechanisms, and animal models of human congenital disorders.
Requisites: GENETICS 466, 468, or BIOCORE 587
Repeatable for Credit: No
Last Taught: Spring 2024
Learning Outcomes: 1. Integrate concepts in genetics in the identification and function of genes involved in development and cell differentiation. Audience: Undergraduate

2. Understand developmental cascades and morphogenetic processes involved in patterning and diversification of the animal tissue plan. Audience: Undergraduate

3. Apply developmental genetic principles towards the understanding of syndromes in animals, including humans. Audience: Undergraduate

4. Learn principles underlying the divergence of body types during evolution. Audience: Undergraduate

GENETICS/BIOCHEM 631 – PLANT GENETICS AND DEVELOPMENT
3 credits.

Covers the basic concepts of genetics and genomics as applied to plants and their development, including discussions on breeding systems (modes of reproduction, sex determination, self incompatibility and crossing barriers), linkage analysis, genome structure and function (structure, function and evolution of nuclear and organellar chromosomes; haploidy and polyploidy; expression regulation and epigenetics), along with a description of current methodologies used in the analysis of these processes within the context of plant development. The objective is to instigate a broader knowledge and understanding of the principles and methodologies used in plant genetics and their applications in investigations of the molecular mechanisms that modulate plant development.
Requisites: GENETICS 466, 468, BIOCORE 587, or graduate/professional standing
Course Designation: Breadth - Biological Sci. Counts toward the Natural Sci req
Level - Advanced
L&S Credit - Counts as Liberal Arts and Science credit in L&S
Grad 50% - Counts toward 50% graduate coursework requirement
Repeatable for Credit: No
Last Taught: Fall 2023
Learning Outcomes: 1. Identify the genetic and molecular mechanisms that modulate breeding systems in plants including sex determination, self-incompatibility, crossing barriers and apomixis. Audience: Undergraduate

2. Explain the concepts of recombination, linkage and expression regulation, and apply them to map genes and identify examples of segregation distortion and gene drive. Audience: Undergraduate

3. Describe the techniques used in forward genetics, reverse genetics, mosaic analysis and reverse breeding, and implement them in studies of plant growth, development, reproduction and environmental responses. Audience: Undergraduate

4. Recognize examples of organellar genetics in plants, and discuss their importance in plant-breeding and crop-improvement programs. Audience: Undergraduate

5. Discuss the structure of plant chromosomes and their behaviors in aneuploids. Audience: Undergraduate

6. Examine the genetic basis of quantitative traits, and identify contributing loci using genome-wide association studies. Audience: Undergraduate

7. Compare and contrast published experimental data that address specific biological questions in plants, use the corresponding information to develop novel hypotheses, and design experiments that test these hypotheses. Audience: Undergraduate

GENETICS 633 – POPULATION GENETICS
3 credits.

Population genetics, aimed at preparing students to initiate research in this field. Explore how genetic variation is influenced by mutation and recombination, population size changes and migration, and natural selection for or against new mutations.
Requisites: GENETICS 466, 468, BIOCORE 381, or graduate/professional standing
Course Designation: Grad 50% - Counts toward 50% graduate coursework requirement
Repeatable for Credit: No
Last Taught: Spring 2024
Learning Outcomes: 1. Understand methods of measuring and summarizing DNA variation. Audience: Both Grad Undergrad

2. Examine fundamental population genetic models and their predictions. Audience: Both Grad Undergrad

3. Develop intuition for the impact of evolutionary processes on genetic variation. Audience: Both Grad Undergrad

4. Identify and understand modern methods of population genetic data analysis. Audience: Both Grad Undergrad

5. Evaluate ongoing controversies and unsolved problems in population genetics. Audience: Both Grad Undergrad

6. Assess the relevance and utility of course content to own research. Audience: Graduate

GENETICS/MD GENET/POP HLTH 636 – PUBLIC HEALTH GENOMICS
1 credit.

Provides an introduction to public health genomics through a review of fundamental principles of genetics, the use of genetic information in clinical and research settings, and its implications for disease management and prevention, and health promotion. Explores policies that guide public health and discusses current ethical, legal, and social implications of these policies.
Requisites: (Junior standing and ZOOLOGY/BIOLOGY/BOTANY 151) or graduate/professional standing
Course Designation: Grad 50% - Counts toward 50% graduate coursework requirement
Repeatable for Credit: No
Last Taught: Spring 2022

GENETICS/BOTANY/M M & I/PL PATH 655 – BIOLOGY AND GENETICS OF FUNGI
3 credits.

Fungal genetics, genomics, and physiology using plant pathogenic fungi and the genetic models Aspergillus nidulans and Neurospora crassa as model systems to explore the current knowledge of fungal genetics and plant/fungal interactions.
Requisites: Graduate/professional standing
Course Designation: Grad 50% - Counts toward 50% graduate coursework requirement
Repeatable for Credit: No
Last Taught: Fall 2022

GENETICS/MD GENET 662 – CANCER GENETICS
3 credits.

Cancer remains one of the most difficult health issues facing our society. There is hope in the horizon due to an increasing understanding of both genetic and epigenetic alterations in cancer. In particular, DNA sequencing of human cancers is becoming more common in major health care centers, and there is expectation that this technology will allow for personalized medicine. Thus, there has been a rapid increase in this knowledge over the last decade. Become aware of the current major issues in cancer research and critically evaluate the cancer genetics literature.
Requisites: GENETICS 466, 467 or BIOCORE 383
Repeatable for Credit: No
Last Taught: Spring 2024
Learning Outcomes: 1. Organize, complete, and deliver a scientific presentation. Audience: Undergraduate

2. Become familiar with the major research advances in cancer genetics. Audience: Undergraduate

3. Understand how to critically evaluate the cancer genetics literature. Audience: Undergraduate

4. Learn how major technological advances in molecular genetics are being applied to cancer research and clinical care of patients. Audience: Undergraduate

GENETICS 670 – SEMINAR IN CLINICAL CYTOGENETICS
1 credit.

Overview of the basic features of chromosome structure and behavior including karyotyping clinical correlates of numerical and structural chromosome aberrations, sex chromosome abnormalities, breakage syndromes and the chromosomal changes associated with the development of cancer.
Requisites: Declared in Cytotechnology
Repeatable for Credit: No
Last Taught: Spring 2024
Learning Outcomes: 1. Recommend cytogenetic and molecular studies on cytology specimens when appropriate. Audience: Undergraduate

2. Demonstrate appropriate specimen triage and preparation for cytogenetic specimens. Audience: Undergraduate

3. Recognize the role of chromosomal and other genetic abnormalities in human disease. Audience: Undergraduate

4. Interpret cytogenetic nomenclature appropriately. Audience: Undergraduate

GENETICS 671 – ADVANCED CLINICAL PRACTICE
8 credits.

Clinical practicum to develop diagnostic expertise of cytologic specimens. Examine challenging cases with emphasis on diagnostic pitfalls. Observe patient clinics related to cytologic specimen collection. Participate at clinical experiences in fine needle aspiration, histology, and a private cytology laboratory.
Requisites: Declared in Cytotechnology
Repeatable for Credit: No
Last Taught: Summer 2023
Learning Outcomes: 1. Demonstrate professional and ethical responsibility as part of a patient-centered healthcare team. Audience: Undergraduate

2. Demonstrate basic troubleshooting of common problems encountered during clinical practice. Audience: Undergraduate

3. Integrate each patient's history, clinical, and radiologic findings with microscopic findings to make an accurate diagnosis using standard diagnostic criteria. Audience: Undergraduate

4. Recommend and interpret ancillary tests appropriately in the context of the molecular basis of disease. Audience: Undergraduate

5. Integrate cytomorphologic and clinical knowledge of all organ systems.\ \n Audience: Undergraduate

6. Value the impact of cytologic diagnosis of cytology specimens from a patient and public health perspective. Audience: Undergraduate

GENETICS 672 – SEMINAR IN LABORATORY OPERATIONS AND QUALITY CONTROL
1 credit.

Review the fundamentals of basic administrative functions and regulatory requirements including planning, organizing, supervising and controlling business management, record keeping, data processing and laboratory safety. Quality assurance procedures necessary for obtaining, processing, diagnosing and reporting cytologic specimens.
Requisites: Declared in Cytotechnology
Repeatable for Credit: No
Last Taught: Spring 2024
Learning Outcomes: 1. Recognize regulations and accreditations requirements for the cytology laboratory. Audience: Undergraduate

2. Relate laboratory administrative and workflow functions to the quality of patient care. Audience: Undergraduate

3. Demonstrate appropriate laboratory safety procedures. Audience: Undergraduate

4. Compare supervisory and business management practices in different laboratory settings. Audience: Undergraduate

5. Identify best practices in quality assurance and quality control. Audience: Undergraduate

GENETICS 673 – SEMINAR IN CLINICAL CYTOLOGY
1 credit.

Preparation of a case study or clinical topic of choice by each student to present to a peer professional group of cytology staff and medical faculty. Preparation of a referenced scientific term paper or participation in an approved research or class project pertaining to cliniccal cytology.
Requisites: Declared in Cytotechnology
Repeatable for Credit: No
Last Taught: Spring 2024
Learning Outcomes: 1. Demonstrate significant expertise in a focused area of cytology with clinical and/or public health implications. Audience: Undergraduate

2. Communicate cytology-relevant knowledge in this focused area with others. Audience: Undergraduate

3. Identify authoritative sources of cytology information. Audience: Undergraduate

4. Integrate information from a variety of authoritative sources to support a thesis. Audience: Undergraduate

5. Produce scientific publication-quality written work. Audience: Undergraduate

GENETICS/MD GENET 677 — ADVANCED TOPICS IN GENETICS
1-3 credits.

Contents vary; consideration of subjects not included in the curriculum.
Requisites: Graduate/professional standing, GENETICS 466, 468, or BIOCORE 383
Course Designation: Breadth - Biological Sci. Counts toward the Natural Sci req
Level - Advanced
L&S Credit - Counts as Liberal Arts and Science credit in L&S
Grad 50% - Counts toward 50% graduate coursework requirement
Repeatable for Credit: Yes, unlimited number of completions
Last Taught: Spring 2024

GENETICS 681 — SENIOR HONORS THESIS
2-4 credits.

Individual study for majors completing theses for Honors degrees as arranged with a faculty member.
Requisites: Consent of instructor
Course Designation: Honors - Honors Only Courses (H)
Repeatable for Credit: Yes, unlimited number of completions
Last Taught: Spring 2023

GENETICS 682 — SENIOR HONORS THESIS
2-4 credits.

Individual study for majors completing theses for Honors degrees as arranged with a faculty member.
Requisites: Consent of instructor
Course Designation: Honors - Honors Only Courses (H)
Repeatable for Credit: No
Last Taught: Fall 2023

GENETICS 695 — ADVANCING TO BIOLOGICAL SCIENCES PHD STUDY
1 credit.

Explore the biological science PhD student experience, from the initial stages of consideration through applications and interviews, to graduate student life and career opportunities. Reflect on personal goals and the nature of graduate study to confirm that a research-focused PhD is right for you. Consider whether to apply this year or later on, in light of admissions expectations and personal readiness. Identify research areas, PhD programs, and prospective advisors of interest. Improve application materials, strengthen interview skills, and consider individual priorities for selecting a program.
Requisites: Senior standing
Repeatable for Credit: No
Learning Outcomes: 1. Appraise the individual appropriateness and optimal timing of PhD study in light of personal goals and preparedness\\n Audience: Undergraduate

2. Identify research areas, graduate prospects, and prospective mentors of interest Audience: Undergraduate

3. Recognize the admissions processes and priorities typically followed by graduate programs Audience: Undergraduate

4. Develop, evaluate, and refine PhD application materials Audience: Undergraduate

5. Communicate research interests, motivation, personal strengths, and career goals with faculty and peers Audience: Undergraduate

GENETICS 699 — SPECIAL PROBLEMS
1-3 credits.

Individual advanced work in an area of Genetics under the direct guidance of a faculty member.
Requisites: Consent of instructor
Course Designation: Level - Advanced
L&S Credit - Counts as Liberal Arts and Science credit in L&S
Repeatable for Credit: Yes, unlimited number of completions
Last Taught: Spring 2024

GENETICS 701 — ADVANCED GENETICS
3 credits.

First semester of professional level training in genetic mechanisms and analysis as applied to genetic transmission, gene expression, forward and reverse genetics, molecular genetics, genonmics, developmental genetics, and epigenetics.
Requisites: Declared in Genetics doctoral program
Course Designation: Grad 50% - Counts toward 50% graduate coursework requirement
Repeatable for Credit: No
Last Taught: Fall 2023

GENETICS 702 – ADVANCED GENETICS II
3 credits.

Second of semester of professional level training in genetic mechanisms and analysis as applied to genetic transmission, gene expression, forward and revese genetics, molecular genetics, genonmics, developmental genetics, and epigenetics.
Requisites: GENETICS 701
Course Designation: Grad 50% - Counts toward 50% graduate coursework requirement
Repeatable for Credit: No
Last Taught: Spring 2024

GENETICS/MD GENET 707 – GENETICS OF DEVELOPMENT
3 credits.

A research-level analysis of the current status of the investigation of processes controlling differential gene activity and cellular behavior. The major emphasis is genetic. In successive years, the focus moves from the gene to the cell to the organism.
Requisites: Declared in Genetics graduate program
Course Designation: Grad 50% - Counts toward 50% graduate coursework requirement
Repeatable for Credit: Yes, unlimited number of completions
Last Taught: Spring 2023

GENETICS/MD GENET 708 – METHODS AND LOGIC IN GENETIC ANALYSIS
3 credits.

Contemporary issues in genetic, developmental, cell, and molecular biology are addressed in a discussion format. Invited speakers give research lectures and reading material is taken from the primary literature. The discussion focuses on evaluating genetic approaches to biological problems.
Requisites: Declared in Genetics graduate program
Course Designation: Grad 50% - Counts toward 50% graduate coursework requirement
Repeatable for Credit: No
Last Taught: Spring 2024

GENETICS/CRB 710 – DEVELOPMENTAL GENETICS
3 credits.

Covers a broad range of topics in animal development, with an emphasis on molecular mechanisms. Focuses on common themes, with the goal of understanding and analyzing current research in developmental biology and genetics.
Requisites: Graduate/professional standing
Course Designation: Grad 50% - Counts toward 50% graduate coursework requirement
Repeatable for Credit: No
Last Taught: Fall 2023

GENETICS/BOTANY/ENTOM/ZOOLOGY 820 – FOUNDATIONS OF EVOLUTION
2 credits.

Explore some of the most important themes and debates that have permeated evolutionary biology over the last 50 years. Read key papers related to each controversial topic, debate the pros and cons of competing viewpoints, and reflect on the relevance of the issue to contemporary evolutionary biology.
Requisites: Graduate/professional standing
Course Designation: Grad 50% - Counts toward 50% graduate coursework requirement
Repeatable for Credit: No
Last Taught: Fall 2022

GENETICS/BIOCHEM/BOTANY 840 – REGULATORY MECHANISMS IN PLANT DEVELOPMENT
3 credits.

Molecular mechanisms whereby endogenous and environmental regulatory factors control development; emphasis on stimulus perception and primary events in the signal chain leading to modulated gene expression and cellular development.
Requisites: Graduate/professional standing
Course Designation: Grad 50% - Counts toward 50% graduate coursework requirement
Repeatable for Credit: No
Last Taught: Fall 2020

GENETICS/AN SCI/POP HLTH 849 – GENETIC EPIDEMIOLOGY
3 credits.

This course will provide an introduction to genetic epidemiology. Topics will include a general overview of genetics and Mendelian and complex inheritance, as well as various elements of study design, including participant ascertainment; phenotype definition; biologic sample selection; genotyping, sequencing, and quality control; measurement of covariates, and choice of analytic methods. We will briefly discuss some of the original study designs and then focus on current study designs for the remainder of the class. Additional emerging topics will be briefly touched upon. Students will complete short homework assignments to enforce concepts learned during lectures, discuss journal articles, and prepare a very short grant application for the mid-term project. In the final weeks of class, students will work together to analyze data from a real genetic study, prepare tables, interpret the findings, and present their project to their peers.
Requisites: Graduate/professional standing
Course Designation: Grad 50% - Counts toward 50% graduate coursework requirement
Repeatable for Credit: No
Last Taught: Spring 2024

GENETICS 875 – SPECIAL TOPICS
1-4 credits.

Special topics of current interest to graduate students.
Requisites: Graduate/professional standing
Course Designation: Grad 50% - Counts toward 50% graduate coursework requirement
Repeatable for Credit: Yes, unlimited number of completions
Last Taught: Spring 2024

GENETICS 885 – ADVANCED GENOMIC AND PROTEOMIC ANALYSIS
3 credits.

With the availability of genome sequences and high-throughput techniques, organismal physiology can now be examined on a global scale by monitoring the behavior of all genes or proteins in a single experiment. This course will present modern techniques in genomics and proteomics, with particular focus on analyzing the data generated by these techniques. Course material will cover genomic sequencing, comparative sequence analysis, phylogeny construction and phylogenomics, transcription factor motif discovery, DNA microarray analysis, techniques in mass spectrometry, proteomic screening methods, and protein-interaction network analysis. In addition to lecture time, the course includes computer lab where students get hands-on experience analyzing genomic and proteomic datasets. Students should have coursework in general statistics and intermediate or advanced genetics.
Requisites: Graduate/professional standing
Course Designation: Grad 50% - Counts toward 50% graduate coursework requirement
Repeatable for Credit: No
Last Taught: Fall 2022

GENETICS/B M E/B M I/BIOCHEM/CBE/COMP SCI 915 – COMPUTATION AND INFORMATICS IN BIOLOGY AND MEDICINE
1 credit.

Participants and outside speakers will discuss current research in computation and informatics in biology and medicine. This seminar is required of all CIBM program trainees.
Requisites: Consent of instructor
Course Designation: Grad 50% - Counts toward 50% graduate coursework requirement
Repeatable for Credit: Yes, unlimited number of completions
Last Taught: Spring 2024

GENETICS/AN SCI/DY SCI 951 – SEMINAR IN ANIMAL BREEDING
0-1 credits.

Requisites: Graduate/professional standing
Course Designation: Grad 50% - Counts toward 50% graduate coursework requirement
Repeatable for Credit: No
Last Taught: Spring 2020

GENETICS/AGRONOMY/HORT 957 – SEMINAR-PLANT BREEDING
1 credit.

Graduate seminar in Plant Breeding Plant Genetics (PBPG) that requires students to give oral scientific presentations on topics chosen by the instructors and/or the student¿s thesis research. This seminar is coordinated by PBPG faculty on a rotating basis.
Requisites: Graduate/professional standing
Course Designation: Grad 50% - Counts toward 50% graduate coursework requirement
Repeatable for Credit: Yes, unlimited number of completions
Last Taught: Spring 2024

GENETICS 990 – RESEARCH
1-12 credits.

Independent laboratory research in preparation of a graduate thesis under supervision of a faculty member.
Requisites: Consent of instructor
Course Designation: Grad 50% - Counts toward 50% graduate coursework requirement
Repeatable for Credit: Yes, unlimited number of completions
Last Taught: Spring 2024

GENETICS 993 – SEMINAR IN GENETICS
0-1 credits.

Various aspects of genetics: Drosophila, maize, immunogenetics, developmental genetics, or other special topics.
Requisites: Graduate/professional standing
Course Designation: Grad 50% - Counts toward 50% graduate coursework requirement
Repeatable for Credit: Yes, unlimited number of completions
Last Taught: Summer 2023