GENETICS (GENETICS)

GENETICS 1 — COOPERATIVE EDUCATION/CO-OP IN GENETICS
1 credit.
Full-time off-campus work experience which combines classroom theory with practical knowledge of operations to provide students with a background upon which to base a professional career. Students receive credit only for the term in which they are actively enrolled and working. The same work experience may not count towards credit in GENETICS 399.
Requisites: So st, and consent of supervising instructor and academic advisor.
Repeatable for Credit: Yes, unlimited number of completions

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. This course 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. This course is intended for non-biological science majors, but a high school or college-level biology course is recommended as a prerequisite.
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

GENETICS 155 — FRESHMAN SEMINAR IN GENETICS
1 credit.
This seminar will introduce freshman 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 2017

GENETICS 289 — HONORS INDEPENDENT STUDY
1-2 credits.
Inter-Ag 288
Requisites: Enrolled in the CALS Honors Prgm Soph or Junior standing.
Course Designation: Honors - Honors Only Courses (H)
Repeatable for Credit: Yes, unlimited number of completions

GENETICS 299 — INDEPENDENT STUDY
1-3 credits.
Open to Freshmen
Requisites: Freshmen, Sophomore or Junior standing written consent of instructor.
Repeatable for Credit: Yes, unlimited number of completions

GENETICS 375 — SPECIAL TOPICS
1-4 credits.
Requisites: Consent of instructor
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 2017

GENETICS 399 — COORDINATIVE INTERNSHIP/COOPERATIVE EDUCATION
1-8 credits.
Requisites: So, Jr or Sr st and cons supervising inst, advisor, and internship program coordinator
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

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. Enroll Info: Current enrollment in a UW-Madison study abroad program
Requisites: None
Repeatable for Credit: Yes, unlimited number of completions
Last Taught: Fall 2017

GENETICS 466 — PRINCIPLES OF GENETICS
3 credits.
Genetics in eukaryotes and prokaryotes. Includes Mendelian genetics, mapping, molecular genetics, genetic engineering, cytogenetics, quantitative genetics, and population genetics. Illustrative material includes viruses, bacteria, plants, fungi, insects, and humans. Students may not enroll for GENETICS 466 and GENETICS 467/468. Not eligible to enroll if credit earned for GENETICS 467 or 468
Requisites: (BIOLOGY/BOTANY/ZOOLOGY/BOTANY 151 or BIOCORE 381 or BIOLOGY/BOTANY/BIOLOGY 130 or BIOLOGY/ZOOLOGY/BIOLOGY 101 and 102) and (CHEM 104 or CHEM 109 or CHEM 115).
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
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. Students may not enroll for GENETICS 466 and GENETICS 467/468. Not eligible to enroll if credit earned for GENETICS 466
Requisites: (BIOLOGY/BOTANY/ZOOLOGY/BIOLOGY/BOTANY 151 or BIOCORE 381 or BIOLOGY/BOTANY/BIOLOGY 130 or BIOLOGY/ZOOLOGY/BIOLOGY 101 and 102) and (CHEM 104 or CHEM 109 or CHEM 115).
Repeatable for Credit: No
Last Taught: Fall 2017

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. Students may not enroll in GENETICS 466 and GENETICS 467/468.
Requisites: GENETICS 467 (not eligible to enroll if credit earned for GENETICS 466)
Repeatable for Credit: No

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: Stdt must be enrolled in the cytotechnology internship prgm at the WI State Lab of Hygiene
Repeatable for Credit: No
Last Taught: Fall 2017

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: Stdt must be enrolled in the cytotechnology internship prgm at the WI State Lab of Hygiene
Repeatable for Credit: No

GENETICS 466 or equiv
Level - Advanced

GENETICS 545 — GENETICS LABORATORY
2 credits.

Students 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 equiv
Course Designation: Level - Advanced
L&S Credit - Counts as Liberal Arts and Science credit in L&S
Repeatable for Credit: No

GENETICS 546 — EVOSYSBIO: MODELING IN EVOLUTIONARY SYSTEMS
BIOLGY
3 credits.

All organisms are Systems that Evolve in their Biological contexts. EvoSysBio focuses on this bigger picture. How do intra-organismal and trans-organismal processes interact during evolution? Accurate answers require trans-disciplinary collaborations for building diverse model-ensembles, from biochemistry to ecology. Investigating biological systems of their choice, students are gently introduced to aspects of quantitative modeling, data science, and biological model curation, while learning the Evolvix modeling language for running simulations to support a collaborative grant proposal presented at the end. Students actively learn to (i) link models to observable data they curate, (ii) make predictions and quantify their uncertainty, (iii) define and limit the scope of models using critical thinking, causal analysis, and independent research skills, and (iv) communicate across disciplinary boundaries. This course is open to all aiming to grow their modeling skills at any level. All modeling problems can be simplified, or rendered unsolvable by poor boundary choices. Thus, students from different disciplines can customize their learning.
Requisites: None
Course Designation: Grad 50% - Counts toward 50% graduate coursework requirement
Repeatable for Credit: No

GENETICS/BIOLOGY 522 — EVOLUTION SEMINAR SERIES-
UNDERGRADUATE
1 credit.

The Evolution Seminar Series exposes students to diverse topics in contemporary evolutionary biology. Most weeks, one or more guest lecturers present their own primary research on a specialized topic in evolutionary biology. Diverse 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. Students learn to think 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, moderating discussions, and preparing a written report.
Requisites: Prior or concurrent enrollment in ZOOLOGY/ANTHRO/BOTANY 410
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

GENETICS 466 or equiv
Level - Advanced

GENETICS 546 — EVOSYSBIO: MODELING IN EVOLUTIONARY SYSTEMS
BIOLGY
3 credits.

All organisms are Systems that Evolve in their Biological contexts. EvoSysBio focuses on this bigger picture. How do intra-organismal and trans-organismal processes interact during evolution? Accurate answers require trans-disciplinary collaborations for building diverse model-ensembles, from biochemistry to ecology. Investigating biological systems of their choice, students are gently introduced to aspects of quantitative modeling, data science, and biological model curation, while learning the Evolvix modeling language for running simulations to support a collaborative grant proposal presented at the end. Students actively learn to (i) link models to observable data they curate, (ii) make predictions and quantify their uncertainty, (iii) define and limit the scope of models using critical thinking, causal analysis, and independent research skills, and (iv) communicate across disciplinary boundaries. This course is open to all aiming to grow their modeling skills at any level. All modeling problems can be simplified, or rendered unsolvable by poor boundary choices. Thus, students from different disciplines can customize their learning.
Requisites: None
Course Designation: Grad 50% - Counts toward 50% graduate coursework requirement
Repeatable for Credit: No
GENETICS 548 — COMPARATIVE AND FUNCTIONAL GENOMICS
3 credits.
Provides a broad survey of the field to enhance student appreciation for the profound advances that are now possible thanks to genomic data and thinking.
Requisites: GENETICS 466, 468, or BIOCORE 587
Repeatable for Credit: No

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 equiv courses
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

GENETICS/BOTANY/HORT 561 — INTRODUCTORY CYTOGENETICS
2-3 credits.
Mitosis, meiosis, variations in chromosome structure and number, cytological aspects of hybridity and apomixis; chromosomes as they affect breeding behavior.
Requisites: Genetics, Botany, Zoology 466 or cons inst
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 2015

GENETICS/MD GENET/ZOOLOGY 562 — HUMAN CYTOGENETICS
2 credits.
Fundamental principles of cytogenetics and special problems of human cytogenetics for biology and medical students.
Requisites: GENETICS 466, 468, BIOCORE 587, or BMOLCHEM/MD GENET 721
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

GENETICS 564 — GENOMICS AND PROTEOMICS
3 credits.
The basic principles of genomics, proteomics and bioinformatics will be taught through active-learning techniques that include: readings of primary literature, group presentations, peer review, bioinformatic lab exercises, science writing, and project-based learning experiences. 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. BIOCHEM 501 and MICROBIO 303 are recommended. Not open to graduate students
Requisites: GENETICS 466, 468, or BIOCORE 587.
Repeatable for Credit: No

GENETICS/MD GENET 565 — HUMAN GENETICS
3 credits.
Principles, problems, and methods of human genetics. Surveys aspects of medical genetics, biochemical genetics, molecular genetics, cytogenetics, quantitative genetics, and variation as applied to humans.
Requisites: Graduate standing, 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
Grad 50% - Counts toward 50% graduate coursework requirement
Repeatable for Credit: No
Last Taught: Fall 2017

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

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. This course is a companion seminar for independent research and together will fulfill the Genetics major capstone requirement. Students should have completed GENETICS 466, 468 or BIOCORE 587 in previous semesters. Concurrent enrollment in GENETICS 699, GENETICS 681, or GENETICS 399 is required.
Requisites: Consent of instructor
Repeatable for Credit: No
Last Taught: Fall 2017
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: Stdt must be enrolled in the cytotechnology internship prgm at the WI State Lab of Hygiene
Repeatable for Credit: No

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: Stdt must be enrolled in the cytotechnology internship prgm at the WI State Lab of Hygiene
Repeatable for Credit: No

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: Stdt must be enrolled in the cytotechnology internship prgm at the WI State Lab of Hygiene
Repeatable for Credit: No
Last Taught: Fall 2017

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: Stdt must be enrolled in the cytotechnology internship prgm at the WI State Lab of Hygiene
Repeatable for Credit: No
Last Taught: Fall 2017

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: Stdt must be enrolled in the cytotechnology internship prgm at the WI State Lab of Hygiene
Repeatable for Credit: No
Last Taught: Fall 2017

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: Stdt must be enrolled in the cytotechnology internship prgm at the WI State Lab of Hygiene
Repeatable for Credit: No

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: Stdt must be enrolled in the cytotechnology internship prgm at the WI State Lab of Hygiene
Repeatable for Credit: No

GENETICS 575 — MISCELLANEOUS SYSTEMS
3 credits.
Anatomy, histology, physiology and pathology of skin, thyroid, lymph nodes and other sites and the corresponding cellular 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: Stdt must be enrolled in the cytotechnology internship prgm at the WI State Lab of Hygiene
Repeatable for Credit: No

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: Stdt must be enrolled in the cytotechnology internship prgm at the WI State Lab of Hygiene
Repeatable for Credit: No

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 specimens.
Requisites: Stdt must be enrolled in the cytotechnology internship prgm at the WI State Lab of Hygiene
Repeatable for Credit: No
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: Stdt must be enrolled in the cytotechnology internship prgm at the WI State Lab of Hygiene
Repeatable for Credit: No
Last Taught: Summer 2017

GENETICS/MICROBIO 607 — ADVANCED MICROBIAL GENETICS
3 credits.

Molecular genetic methods and related aspects of prokaryotic and lower eukaryotic biology, as well as critical analysis of the scientific literature. Approximately two-thirds of the course will focus on prokaryotes and one-third on lower eukaryotic microbes.

Requisites: GENETICS 466 or equiv, BIOCHEM 501 or equiv, Grad st or cons inst
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

GENETICS/AN SCI 610 — QUANTITATIVE GENETICS
3 credits.

An advanced approach with emphasis on statistical foundations. Classical theory with extensions to maternal and paternal effects. Selection theory is considered in depth.

Requisites: GENETICS 466 and Statistics 572 or cons inst
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 2017

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: Bact 370 or equiv BIOCHEM 501 or equiv, or cons inst
Course Designation: Breadth - Biological Sci. Counts toward the Natural Sci req
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 2017

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

This course focuses on the basic molecular mechanisms that regulate DNA, RNA, and protein metabolism in eukaryotic organisms. This course is intended for advanced undergraduates and first year graduate students with a firm knowledge of basic biochemistry.

Requisites: BIOCHEM 501 or 508 or graduate 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

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: BOTANY/GENETICS/ZOOLOGY 466, GENETICS 467 or 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

GENETICS/CHEM 626 — GENOMIC SCIENCE
2 credits.

This course is designed to bring cutting-edge topics in the genomic sciences into the reach of traditionally “pure” chemistry, biology, engineering, computer science statistics students. It is also designed for enabling biologically-oriented students to deal with the advances in analytical science so that they may incorporate new genomic science concepts into their own scientific repertoires. Intended for graduate students and for undergraduates with extensive research experience.

Requisites: Graduate standing
Course Designation: Breadth - Physical 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

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. Using a combination of lectures and primary research literature reading/student-led seminars, we will 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. Prior completion of ZOOLOGY 470 is recommended.

Requisites: GENETICS 466, 468, or BIOCORE 587
Repeatable for Credit: No
Last Taught: Spring 2017
GENETICS 631 — PLANT GENETICS
2 credits.

Covers the basic concepts of genetics and genomics as applied to plants, 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 organelar chromosomes; haploidy and polyploidy; expression regulation and epigenetics), and a description of current methodologies used in the analysis of these processes.

Our objective is to instigate in students a broader knowledge and understanding of the principles and methodologies used in plant genetics such that they can adopt them most effectively in their own research projects, and can describe and discuss them more thoroughly with the general public.

**Requisites:** Graduate standing or 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:** Fall 2017

GENETICS 633 — POPULATION GENETICS
3 credits.

This is a graduate-level (and upper-level undergraduate) course in population genetics, aimed at preparing students to initiate research in this field. We will explore how genetic variation is influenced by mutation and recombination, population size changes and migration, and natural selection for or against new mutations. Undergraduates who have completed GENETICS 468, GENETICS 466, or BIOCORE 587 may contact the instructors to discuss the appropriateness of this course for their curriculum.

**Requisites:** Graduate or professional standing
**Course Designation:** Grad 50% - Counts toward 50% graduate coursework requirement
**Repeatable for Credit:** No
**Last Taught:** Fall 2017

GENETICS/BOTANY/ZOOLOGY 645 — MODELING IN POPULATION GENETICS AND EVOLUTION
3 credits.

Introduction to mathematical techniques and approaches for predicting evolutionary change within populations. Concentrates on classic population genetic models and results, including selection on one and several loci; mutation; non-random mating; drift. Evaluation based on periodic problem sets and independent projects.

**Requisites:** Intro evolution, intro genetics, calculus, or cons inst
**Course Designation:** Level - Advanced
**L&S Credit:** Counts as Liberal Arts and Science credit in L&S
**Repeatable for Credit:** No
**Last Taught:** Fall 2017

GENETICS/BOTANY/M M & I/MICROBIO/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. Enrollment open to graduate students, but undergraduates welcome to contact instructor for permission. All students should have some prior coursework in genetics (such as GENETICS 466 or 467) and microbiology (such as MICROBIO 303). It is also recommended that students take PL PATH 300 332 prior to this course.

**Requisites:** Graduate or professional standing
**Course Designation:** 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

GENETICS 660 — EVOLUTIONARY GENOMICS
2 credits.

We will present and discuss modern topics in evolutionary genomics, including genomic approaches, their application to evolutionary biology, and insights gleaned from such studies. Topics include evolution of genome architecture, gene content, and sequences. The course also covers molecular evolution as applied to the genome scale.

**Requisites:** GENETICS 466 or Biocore 301/302 sequence or equivalent, and consent of instructor
**Repeatable for Credit:** No
**Last Taught:** Spring 2017

GENETICS 662 — CANCER GENETICS
2 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 personalized medicine. Thus, there has been a rapid increase in this knowledge over the last decade. It is expected that students will become aware of the current major issues in cancer research and will be able to critically evaluate the cancer genetics literature.

**Requisites:** GENETICS 466, 467 or BIOCORE 383
**Repeatable for Credit:** No
**Last Taught:** Fall 2017

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:** Stdt must be enrolled in the cytotechnology internship prgm at the WI State Lab of Hygiene
**Repeatable for Credit:** No
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: Stdt must be enrolled in the cytotechnology internship prgm at the WI State Lab of Hygiene
Repeatable for Credit: No
Last Taught: Summer 2017

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: Stdt must be enrolled in the cytotechnology internship prgm at the WI State Lab of Hygiene
Repeatable for Credit: No

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 clinical cytology.

Requisites: Stdt must be enrolled in the cytotechnology internship prgm at the WI Statte Lab of Hygiene
Repeatable for Credit: No

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

Contents vary; consideration of subjects not included in the curriculum.

Requisites: Graduate standing or GENETICS 466, GENETICS 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 2018

GENETICS 681 — SENIOR HONORS THESIS
2-4 credits.

Requisites: Honors candidacy
Course Designation: Honors - Honors Only Courses (H)
Repeatable for Credit: Yes, unlimited number of completions

GENETICS 682 — SENIOR HONORS THESIS
2-4 credits.

Continuation of 681.

Requisites: Honors program candidacy GENETICS 681
Course Designation: Honors - Honors Only Courses (H)
Repeatable for Credit: No

GENETICS 699 — SPECIAL PROBLEMS
1-3 credits.

Advanced work not covered in regular courses.

Requisites: Cons inst and Sr st
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

GENETICS 701 — ADVANCED GENETICS
3 credits.

Advanced Genetics is the first semester course of a 2-semester core series (GENETICS 701 and GENETICS 702) for first-year graduate students in the Genetics doctoral degree program. This series provides professional level training in genetic mechanisms and analysis as applied to genetic transmission, gene expression, forward and reverse genetics, population and quantitative genetics, molecular genetics, genomics, developmental genetics and epigenetics. Lectures are coupled with assigned readings of peer-reviewed literature that serve as the basis for graded in-class presentations and discussion, homework questions and essays.

Requisites: Declared in Genetics doctoral program
Course Designation: Grad 50% - Counts toward 50% graduate coursework requirement
Repeatable for Credit: No
Last Taught: Fall 2017

GENETICS 702 — ADVANCED GENETICS II
3 credits.

Advanced Genetics II is the second semester course of a 2-semester core series for first-year graduate students in the Genetics doctoral degree program. This series provides professional level training in genetic mechanisms and analysis as applied to genetic transmission, gene expression, forward and reverse genetics, population and quantitative genetics, molecular genetics, genomics, developmental genetics and epigenetics. Lectures are coupled with assigned readings of peer-reviewed literature that serve as the basis for graded in-class presentations and discussion, homework questions and essays.

Requisites: GENETICS 701
Course Designation: Grad 50% - Counts toward 50% graduate coursework requirement
Repeatable for Credit: No
GENETICS/BIOCHEM 703 — TOPICS IN EUKARYOTIC REGULATION
2 credits.

Design and interpretation of experiments addressing molecular mechanisms of eukaryotic regulation. For first year graduate students with firm knowledge of basic biochemistry, molecular biology and genetics.

Requisites: Must have taken Biochem/Genetics/Microbiology 612 and consent of instructor
Course Designation: Grad 50% - Counts toward 50% graduate coursework requirement
Repeatable for Credit: No
Last Taught: Spring 2013

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; lecture.

Requisites: BIOCHEM 501 or 601 BOTANY 500 or Biocore 301 323
Course Designation: Grad 50% - Counts toward 50% graduate coursework requirement
Repeatable for Credit: No
Last Taught: Fall 2014

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 or professional standing
Course Designation: Grad 50% - Counts toward 50% graduate coursework requirement
Repeatable for Credit: No
Last Taught: Fall 2017

GENETICS/BOTANY/BOTANY 820 — FOUNDATIONS OF EVOLUTION
2 credits.

Through reading and analysis of the primary literature, this course will explore some of the most important themes and debates that have permeated evolutionary biology over the last 50 years. Students will read key papers related to each controversial topic, will debate the pros and cons of competing viewpoints, and will reflect on the relevance of the issues to contemporary evolutionary biology. Students will also write a paper that analyzes one topic in more detail. This course is intended for graduate students who plan to specialize in evolutionary biology, broadly construed.

Requisites: Graduate or professional standing
Course Designation: Grad 50% - Counts toward 50% graduate coursework requirement
Repeatable for Credit: No
Last Taught: Fall 2017
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 or professional standing
Course Designation: Grad 50% - Counts toward 50% graduate course requirement
Repeatable for Credit: No
Last Taught: Fall 2016

GENETICS/MD GENET/POP HLTH 888 — PUBLIC HEALTH GENOMICS
1 credit.

Public health genomics uses knowledge gained from genetic and molecular research along with a consideration of ethical, legal, and social implications (ELSI) to prevent disease and improve the health of the population. Students enrolled in this course will be provided an introduction to public health genomics through a review of fundamental principles of genetics, followed by lectures and discussions on the use of genetic information in clinical and research settings and its implications for disease management and prevention. Students will also gain an awareness of policies that guide public health and will be able to discuss current ethical, legal, and social implications of these policies. These learning objectives will be met through readings and videos, lectures, and discussions of recent journal articles and current topics in public health genomics.

Requisites: Graduate or professional standing
Course Designation: Grad 50% - Counts toward 50% graduate course requirement
Repeatable for Credit: No

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 course requirement
Repeatable for Credit: Yes, unlimited number of completions

GENETICS/AN SCI/DY SCI 951 — SEMINAR IN ANIMAL BREEDING
1 credit.

Requisites: Graduate or professional standing
Course Designation: Grad 50% - Counts toward 50% graduate course requirement
Repeatable for Credit: No

GENETICS/AGRonomy/HORT 957 — SEMINAR-PLANT BREEDING
1 credit.

Requisites: Graduate or professional standing
Course Designation: Grad 50% - Counts toward 50% graduate course requirement
Repeatable for Credit: Yes, unlimited number of completions

GENETICS 990 — RESEARCH
1-12 credits.

Requisites: Consent of instructor
Course Designation: Grad 50% - Counts toward 50% graduate course requirement
Repeatable for Credit: Yes, unlimited number of completions

GENETICS 993 — SEMINAR IN GENETICS
1 credit.

Sections deal with various aspects of genetics: Drosophila, maize, immunogenetics, developmental genetics, or other special topics. Students may enroll in two or more sections if they wish.

Requisites: Graduate or professional standing
Course Designation: Grad 50% - Counts toward 50% graduate course requirement
Repeatable for Credit: Yes, unlimited number of completions