

GENETICS (GGG)

College of Agricultural & Environmental Sciences

GGG 201A – Advanced Genetic Analysis (5 units)

Course Description: Fundamentals of genetic analysis and chromosome structure using model organisms including mutation, transmission, complementation, suppression, and enhancement as well as epigenetic phenomena at the whole organism and molecular levels.

Prerequisite(s): (BIS 101 or BIS 101V); STA 100; or the equivalent, graduate standing.

Learning Activities: Lecture/Discussion 5 hour(s).

Grade Mode: Letter.

GGG 201B – Genomics (5 units)

Course Description: Prokaryotic and eukaryotic genomes. Experimental strategies and analytical challenges of modern genomics research and the theory and mechanics of data analysis. Structural, functional, and comparative genomics. Related issues in bioinformatics.

Prerequisite(s): GGG 201A; GGG 201C; or equivalents that provide a basic understanding of genetics and molecular biology.

Learning Activities: Lecture 3 hour(s), Discussion 2 hour(s).

Enrollment Restriction(s): Class limited to 40 students; priority to Genetics Graduate Group students.

Grade Mode: Letter.

GGG 201C – Molecular Genetic Mechanisms in Disease (4 units)

Course Description: Exploration of how basic mechanisms of molecular biology contribute to health and disease. Diseases related to animals, plants, and microbes will highlight fundamental concepts in the assembly, function and regulation of DNA, RNA, and protein.

Prerequisite(s): BIS 101 or BIS 101V; or the equivalent.

Learning Activities: Lecture/Discussion 4 hour(s).

Enrollment Restriction(s): Pass One restricted to graduate students in genetics, microbiology or biochemistry and molecular biology graduate groups.

Grade Mode: Letter.

GGG 201D – Quantitative & Population Genetics (5 units)

Course Description: Basic concepts of quantitative and population genetics including gene and genotypic frequencies, multiple factor hypothesis, phenotypic and genotypic values, heritability, selection, genetic variation, the detection of quantitative trait loci and evolution in populations. Experimental and analytical methods.

Prerequisite(s): GGG 201A; or consent of instructor.

Learning Activities: Lecture 5 hour(s).

Grade Mode: Letter.

GGG 205 – Molecular Genetics Laboratory (5 units)

Course Description: Students will conduct experiments in molecular genetics laboratories. Individual research problems will emphasize experimental design, experience with methodologies, and data interpretation.

Prerequisite(s): BIS 101 (can be concurrent) or BIS 101V (can be concurrent); or the equivalent course; enrolled in Genetics Graduate Group.

Learning Activities: Laboratory 15 hour(s).

Repeat Credit: May be repeated 3 time(s).

Grade Mode: Satisfactory/Unsatisfactory only.

GGG 211 – Concepts in Human Genetics & Genomics (3 units)

Course Description: Human genomic organization; genetic structure of populations; positional cloning, application of linkage, association, and haplotypes; quantitative trait loci analyses; integrative genetic studies of gene expression; DNA repair mechanisms in genetic disease; mutation analyses; epigenetics; mitochondrial disease; gene manipulation and therapy.

Prerequisite(s): GGG 201A; or equivalent course; GGG 201B and GGG 201C or equivalent are recommended.

Learning Activities: Lecture/Discussion 3 hour(s).

Enrollment Restriction(s): Pass One restricted to graduate students enrolled in the Human Genetics Focus Group; Pass Two restricted to graduate students enrolled in Genetics Graduate Group; after that, open enrollment for graduate students up to 12 students, then undergraduates.

Grade Mode: Letter.

GGG 220 – Genomics & Biotechnology of Plant Improvement (3 units)

Course Description: Integration of modern biotechnology and classical plant breeding including the impact of structural, comparative and functional genomics on gene discovery, characterization and exploitation. Covers molecular markers, plant transformation, hybrid production, disease resistance, and novel output traits.

Prerequisite(s): BIS 101 or BIS 101V; or equivalent.

Learning Activities: Lecture 3 hour(s).

Cross Listing: PLS 220.

Grade Mode: Letter.

GGG 225 – Gene & Cellular Therapies (3 units)

Course Description: Gene therapy from basic concepts to clinical applications. Topics include the human genome and genetic variation, genetic diseases, methods to manipulate gene expression, viral and non-viral delivery vectors, history and progress of gene therapy, case studies, and ethical issues.

Learning Activities: Lecture/Discussion 3 hour(s).

Cross Listing: PHA 225.

Grade Mode: Letter.

GGG 250 – Functional Genomics: From Bench to Bedside (3 units)

Course Description: Functional genomics (how genetic variation and epigenomics affect gene expression), with an emphasis on clinical relevance and applications. Topics include genetic variation and human disease, cancer therapeutics, and biomarker discovery.

Prerequisite(s): GGG 201C; MCB 214; or equivalent.

Learning Activities: Lecture/Discussion 3 hour(s).

Credit Limitation(s): No credit to students who have previously completed PHA 250.

Cross Listing: BCM 250.

Grade Mode: Letter.

GGG 280 – Genetics, Racism, & Inequality (2 units)

Course Description: Issues of diversity, equity, and inclusion in the context of the science of genetics. Association between theories of race, genetic science, and racism. Impact of and responses to bias and lack of diversity in science.

Prerequisite(s): GGG 291 B or better (can be concurrent); or consent of Instructor.

Learning Activities: Discussion 2 hour(s).

Enrollment Restriction(s): Restricted to graduate students and upper-division undergraduates with a focus on genetics or molecular biology.

Repeat Credit: May be repeated for credit since every year the focus is on different aspects of DEI in genetics; can be taken again with no possible overlap with previous sessions.

Grade Mode: Letter.

GGG 290 – Seminar in Evolutionary, Developmental & Population Genetics (1 unit)

Course Description: Topics of current interest in evolutionary, population, and developmental genetics.

Learning Activities: Seminar 1 hour(s); Discussion 0.5 hour(s).

Enrollment Restriction(s): Pass One restricted to graduate students; undergraduate students may enroll with consent of instructor.

Repeat Credit: May be repeated when topic differs.

Grade Mode: Satisfactory/Unsatisfactory only.

GGG 290A – Graduate Student Conference in Genetics (1 unit)

Course Description: Student-given seminars on topics in genetics, with critiques by instructor and peers.

Learning Activities: Conference 1 hour(s).

Enrollment Restriction(s): Restricted to Genetics Graduate Group students.

Repeat Credit: May be repeated.

Grade Mode: Satisfactory/Unsatisfactory only.

GGG 291 – Seminar in History of Genetics (2 units)

Course Description: The development of modern genetic theories beginning with Mendel.

Prerequisite(s): BIS 101 or BIS 101V.

Learning Activities: Seminar 2 hour(s).

Grade Mode: Letter.

GGG 292 – Seminar in Genomics & Epigenomics (1 unit)

Course Description: Topics of current interest in genomics and epigenomics.

Learning Activities: Seminar 1 hour(s); Discussion 0.5 hour(s).

Enrollment Restriction(s): Pass One restricted to graduate students; or consent of instructor.

Repeat Credit: May be repeated credit when topic differs.

Grade Mode: Satisfactory/Unsatisfactory only.

GGG 293 – Seminar in Animal Genetics (1-3 units)

Course Description: Emphasis on recent advances in the field of animal genetics, ranging from quantitative genetics to molecular biology as it relates to animals.

Prerequisite(s): GGG 201A; or consent of instructor.

Learning Activities: Seminar 1-3 hour(s).

Grade Mode: Letter.

GGG 294 – Seminar in Human Genetics (1 unit)

Course Description: In-depth study of current topics in human genetics including genetic diversity, migration, phenotypic evolution and genetic associations with disease. Focus on population genetic theory. Topic changes yearly.

Prerequisite(s): GGG 201A; consent of instructor.

Learning Activities: Seminar 1 hour(s); Discussion 0.5 hour(s).

Enrollment Restriction(s): Pass One restricted to graduate students; or consent of instructor.

Repeat Credit: May be repeated when topic differs.

Grade Mode: S/U only.

GGG 295 – Seminar in Molecular Genetics (1-3 units)

Course Description: Topics of current interest related to the structure, modification and expression of genes.

Prerequisite(s): GGG 201A; or consent of instructor.

Learning Activities: Seminar 1 hour(s); Discussion 0.5 hour(s).

Enrollment Restriction(s): Pass One restricted to graduate students; or consent of instructor.

Repeat Credit: May be repeated when topic differs.

Grade Mode: S/U only.

GGG 296 – Scientific Professionalism & Integrity (2 units)

Course Description: Review of basic skills required of contemporary scientists. Topics include scientific conduct, manuscript preparation, grant writing, seminar presentations, and time management. Emphasis on responsibilities of scientists to factually and thoughtfully communicate results.

Prerequisite(s): Graduate standing or consent of instructor.

Learning Activities: Lecture 1 hour(s), Seminar 1 hour(s).

Grade Mode: Pass/No Pass only.

GGG 297 – Seminar in Plant Genetics (1-3 units)

Course Description: Current topics in plant genetics examined in student-conducted seminars and discussion format. Integration of molecular, organismal and population genetics to address questions in plant biology will be emphasized.

Prerequisite(s): GGG 201A; or consent of instructor.

Learning Activities: Seminar 1 hour(s); Discussion 0.5 hour(s).

Enrollment Restriction(s): Pass One restricted to graduate students; or consent of instructor.

Repeat Credit: May be repeated when topic differs.

Grade Mode: S/U only.

GGG 298 – Group Study (1-5 units)

Course Description: Group study of selected topics in genetics.

Prerequisite(s): Consent of instructor.

Learning Activities: Variable.

Grade Mode: Satisfactory/Unsatisfactory only.

GGG 299 – Research (1-12 units)

Course Description: Research.

Learning Activities: Variable.

Grade Mode: Satisfactory/Unsatisfactory only.

GGG 300 – Methods in Teaching Genetics (1-3 units)

Course Description: Practical experience in the methods and problems of teaching genetics. Includes analysis of texts and supporting material, discussion of teaching techniques, preparing for and conducting discussion or laboratory sections, formulating examinations under supervision of instructor.

Prerequisite(s): Consent of instructor; graduate standing.

Learning Activities: Lecture/Discussion, Variable.

Repeat Credit: May be repeated 3 time(s) or 9 units when teaching in different genetics related course.

Grade Mode: Satisfactory/Unsatisfactory only.