GENETICS (GEN)

Courses primarily for undergraduates:

GEN 110: Genetics Orientation
(1-0) Cr. 1. F.
This course is intended for first year students and others new to the genetics major. Discussion of university policies and resources, requirements of the major, career opportunities, and other topics related to the first year experience.

GEN 112: Genetics Orientation for Transfer Students
(0.5-0) Cr. 0.5. S.
Eight-week course for external transfer students and internal change of major students. Discussion of university policies and resources, requirements of the major, and career opportunities. Only one of GEN 110 or 112 may count toward graduation.

GEN 298: Cooperative Education
Cr. R. F.S.S.
Prereq: Permission of department cooperative education coordinator; sophomore classification
Required of all cooperative education students. Students must register for this course prior to commencing each work period.

GEN 313: Principles of Genetics
(Cross-listed with BIOL). (3-0) Cr. 3. F.S.SS.
Prereq: BIOL 211, BIOL 211L, BIOL 212, and BIOL 212L
Introduction to the principles of transmission and molecular genetics of plants, animals, and bacteria. Recombination, structure and replication of DNA, gene expression, cloning, quantitative genetics, and population genetics. Students may receive graduation credit for no more than one of the following: Gen 260, Gen 313 and 313L, Gen 320, Biol 313 and 313L, and Agron 320.

GEN 313L: Genetics Laboratory
(Cross-listed with BIOL). (0-3) Cr. 1. F.S.
Prereq: Credit or enrollment in BIOL 313
Laboratory to accompany 313. Students may receive graduation credit for no more than one of the following: Biol 313 and 313L, Gen 260, Gen 313, Gen 320, and Agron 320.

GEN 320: Genetics, Agriculture and Biotechnology
(Cross-listed with AGRON). (3-0) Cr. 3. F.S.
Prereq: BIOL 212
Transmission and molecular genetics with an emphasis on applications in agriculture, the structure and expression of the gene, how genes behave in populations and how recombinant DNA technology can be used to improve agriculture. Credit for graduation will not be allowed for more than one of the following: Gen 260, 313, 320 and Biol 313 and 313L.

GEN 322: Introduction to Bioinformatics and Computational Biology
(Cross-listed with BCBIO, BIOL). (3-0) Cr. 3. F.
Prereq: BIOL 212
Genome sequencing, assembly, structural and functional annotation, and comparative genomics. Investigating these topics will develop skills in programming and scripting (Perl and/or Python), the use of biological databases, sequence alignment, similarity search, identification of sequence patterns, construction of phylogenetic trees, and comparative genomics.

GEN 340: Human Genetics
(3-0) Cr. 3. F.S.SS.
Prereq: BIOL 313 or GEN 313
Fundamental concepts and current issues of human genetics. Human chromosome analysis, pedigree analysis, gene mapping, the human genome project, sex determination, genetics of the immune system, genetics of cancer, gene therapy, the genetic basis of human diversity, eugenics.

GEN 349: The Genome Perspective in Biology
(Cross-listed with BIOL). (2-2) Cr. 3. S.
Prereq: GEN 313 or GEN 320
Analysis of genome, RNA, and protein data using computer technology to answer biological questions on topics ranging from microbial diversity to human health. An introduction for students in the life sciences to the fields of genomics, bioinformatics and systems.

GEN 398: Cooperative Education
Cr. R. F.S.SS.
Prereq: Permission of department cooperative education coordinator; junior classification
Required of all cooperative education students. Students must register for this course prior to commencing each work period.

GEN 402: Microbial Genetics and Genomics
(Cross-listed with MICRO). (3-0) Cr. 3. Alt. F., offered even-numbered years.
Prereq: MICRO 302, Biol 313
The fundamental concepts of bacterial and bacteriophage genetics including mutagenesis, mechanisms of vertical and horizontal genetic information transfer and gene regulation are covered, along with genetic and genomic-based approaches to study these and other cellular processes of microorganisms. Review and discussion of research literature to examine experimental design, methodology, and interpretation of both historical and contemporary relevance to microbial genetics and genomics.
GEN 409: Molecular Genetics  
(3-0) Cr. 3. F.S.  
**Prereq:** BIOL 313  
The principles of molecular genetics. Gene structure and function;  
molecular mechanisms of DNA replication, recombination and repair,  
transcription and translation, regulation of gene expression.

GEN 410: Analytical Genetics  
(3-0) Cr. 3. F.S.  
**Prereq:** BIOL 313 or GEN 313  
The principles and practice of genetic analysis. Mendelian genetic  
analysis, mutational, transgenic, and genomic analysis of gene function,  
linkage and gene mapping, chromosomal aberrations, aneuploidy and  
polyplody, extrachromosomal inheritance, analysis of genetic pathways.

GEN 444: Bioinformatic Analysis  
(Cross-listed with BCB, BCBIO, BIOL, COM S, CPR E). (4-0) Cr. 4. F.  
**Prereq:** MATH 165 or STAT 401 or equivalent.  
Broad overview of bioinformatics with a significant problem-solving  
component, including hands-on practice using computational tools to  
solve a variety of biological problems. Topics include: bioinformatic  
data processing, Perl programming, genome assembly, database search,  
sequence alignment, gene prediction, next-generation sequencing,  
comparative and functional genomics, and systems biology.

GEN 462: Evolutionary Genetics  
(Cross-listed with BIOL). (3-0) Cr. 3. F.  
**Prereq:** BIOL 315  
The genetic basis of evolutionary processes in higher organisms. The role  
of genetic variation in adaptation, natural selection, adaptive processes,  
and the influence of random processes on evolutionary change.

GEN 490: Independent Study  
Cr. 1-5. Repeatable, maximum of 9 credits.  
**Prereq:** GEN 313, junior or senior classification, permission of instructor  
Independent study in any area of genetics. Students may use no more  
than 9 credits of university-wide 490 credits (including Gen 490) toward  
the total of 120 credits required for graduation.

GEN 491: Undergraduate Seminar, Professional Practice in Genetics Disciplines  
(1-0) Cr. 1. F.S.  
**Prereq:** BIOL/GEN 313; credit or enrollment in GEN 409 or GEN 410; Junior Classification  
Intended to develop career objectives and obtain positions appropriate  
to the goals of students, in particular juniors, in preparation for position  
searches in the senior year. Discussion of various career paths in  
genetics disciplines; identification of experiences to enhance entry  
to specific careers; exposure to professional practices not covered  
elsewhere including literature database management, scientific figure  
preparation for publication, the peer-review journal system, the federal  
competitive grants system, laboratory budgets and management,  
authorship and collaborations, etc.; preparation of effective curricula  
vitae and application letters; and verbal scientific discourse appropriate  
to interview interactions and other professional settings.

GEN 492: Laboratory Teaching Experience  
Cr. 1-2. Repeatable, maximum of 9 credits. F.S.  
**Prereq:** GEN 313, junior or senior classification, permission of instructor  
For students registering to be undergraduate laboratory assistants.  
Offered on a satisfactory-fail basis only. No more than 2 credits of GEN  
490U or GEN 492 may be applied toward the Genetics advanced course  
requirement.

GEN 495: Special Topics in Genetics  
(1-0) Cr. 1-3. Repeatable, maximum of 3 credits. F.S.  
**Prereq:** GEN 313; permission of instructor  
Content varies from year to year. Genetics students may use no more  
than 9 credits of university-wide 490-499 credits toward the total of 120  
credits required for graduation.

GEN 496: Attendance and Critique of Genetics Seminars  
Cr. 1. Repeatable, maximum of 3 credits. F.S.  
**Prereq:** GEN 313, junior or senior classification, permission of instructor  
Attendance and critique of departmental seminars in BBMB, GDCB, or  
EEOB. Offered on a satisfactory-fail basis only. Genetics students may  
use no more than 9 credits of university-wide 490 - 499 credits toward the total of 120  
credits required for graduation.

GEN 498: Cooperative Education  
Cr. R. F.S.S.  
**Prereq:** Permission of department cooperative education coordinator; senior classification  
Required of all cooperative education students. Students must register  
for this course prior to commencing each work period.
GEN 499: Genetics Research
Cr. 1-5. Repeatable, maximum of 9 credits. F.S.S.
*Prereq: GEN 313, junior or senior classification, permission of instructor*
Independent research in any area of genetics. Genetics students may use no more than 9 credits of university-wide 490-499 credits toward the total of 120 credits required for graduation.

GEN 499H: Genetics Research for Honors
Cr. 1-5. Repeatable, maximum of 9 credits. F.S.S.
*Prereq: GEN 313, junior or senior classification, permission of instructor*
Independent research in any area of genetics; for Honors students only. Genetics students may use no more than 9 credits of university-wide 490-499 credits toward the total of 120 credits required for graduation.