# GENE - GENETICS (GENE)

**GENE 101/BICH 101 Perspectives in Biochemistry and Genetics**

Credit 1. 1 Lecture Hour.
Introduction to biochemistry and genetics and their relationship to the biological, biophysical and chemical sciences.

**Prerequisite:** Biochemistry and genetics major or approval of instructor.

**Cross Listing:** BICH 101/GENE 101.

**GENE 285 Directed Studies**

Credits 1 to 4. 1 to 4 Other Hours.
Introduction to laboratory research.

**Prerequisite:** Freshman or sophomore classification in genetics or approval of instructor.

**GENE 289 Special Topics in...**

Credits 1 to 4. 1 to 4 Lecture Hours.
Selected topics in an identified area of genetics. May be repeated for credit.

**Prerequisites:** Freshman or sophomore classification in genetics; approval of instructor.

**GENE 291 Research**

Credits 0 to 4. 0 to 4 Other Hours.
Research conducted under the direction of faculty member in genetics. May be repeated 2 times for credit.

**Prerequisites:** Freshman or sophomore classification and approval of instructor.

**GENE 301 Comprehensive Genetics**

Credits 3. 3 Lecture Hours.
Survey of the fundamental principles of genetics: Physical basis of Mendelian inheritance, expression and interaction of genes, linkage, sex linkage, biochemical nature of genetic material and mutation. No credit will be given for more than one of GENE 301, GENE 302, GENE 315 or GENE 320/BIMS 320. Not open to biochemistry or genetics majors.

**Prerequisite:** BIOL 112; concurrent enrollment in GENE 312.

**GENE 302 Principles of Genetics**

Credits 3. 3 Lecture Hours.
Mechanisms of inheritance, stressing the conservation of fundamental genetic processes throughout evolution, from bacteria to humans; mutations and phenotypes. Mendelian genetics, population genetics and evolution, and complex inheritance. Course designed for biochemistry, genetics and all majors in biology. No credit will be given for more than one of GENE 301, GENE 302, GENE 315 and GENE 320/BIMS 320. Not open to biochemistry or genetics majors.

**Prerequisite:** BIOL 112; concurrent enrollment in GENE 312.

**GENE 310 Principles of Heredity**

Credits 3. 3 Lecture Hours.
Basic principles of classical genetics, molecular genetics, mutation theory and genetic engineering; emphasis on humans and society. Not open to biochemistry and genetics majors.

**Prerequisite:** Junior classification.

**GENE 312 Comprehensive Genetics Laboratory**

Credit 1. 0 Lecture Hours. 3 Lab Hours.
Exercises in Mendelian genetics, meiosis, probability theory in pedigrees, population and quantitative genetics, as well as other genetics theory; molecular techniques to examine DNA and analyze outcomes.

**Prerequisite:** GENE 301 or GENE 302 or registration therein.

**GENE 315 Genetics of Plants**

Credits 3. 3 Lecture Hours.
Fundamental genetic principles as applied to plants: transmission, replication, expression and interaction of genes; linkage, recombination and mapping; chromosomal and gene mutation; behavior of genes in populations; selection, mating systems, cytoplasmic inheritance; molecular analysis and manipulation of genes and gene products; genetically modified plants. Not open to biochemistry or genetics majors. No credit will be given for more than one of GENE 301, GENE 302, GENE 315 or GENE 320/BIMS 320.

**Prerequisite:** BIOL 101 or BIOL 111.

**GENE 320/BIMS 320 Biomedical Genetics**

Credits 3. 3 Lecture Hours.
Fundamental genetic principles as applied to biomedical science; Mendelian inheritance, linkage and genetic mapping, mutagenesis and pedigree analysis; molecular basis of gene function and inherited disease; gene therapy and genetic counseling. No credit will be given for more than one of GENE 301, GENE 302, GENE 315 or GENE 320/BIMS 320.

**Prerequisite:** BIMS major with a minimum overall 2.5 Texas A&M GPA.

**Cross Listing:** BIMS 320/GENE 320.

**GENE 404 Plant Breeding**

Credits 3. 2 Lecture Hours. 2 Lab Hours.
Application of genetics and other sciences to the breeding and improvement of horticultural crops; methods and special techniques employed.

**Prerequisite:** GENE 301.

**Cross Listing:** HORT 404/GENE 404. Credit cannot be given for HORT 404/GENE 404 and SCSC 304.

**GENE 405/BIMS 405 Mammalian Genetics**

Credits 3. 3 Lecture Hours.
Comparative mammalian genetic systems with emphasis on laboratory animals; organization and expression of mammalian genes; development and use of genetically defined animals in biomedical and genetic research.

**Prerequisite:** GENE 302.

**Cross Listing:** BIMS 405/GENE 405.

**GENE 406/BIOL 406 Bacterial Genetics**

Credits 3. 3 Lecture Hours.
A problem oriented course surveying the manipulation and mechanisms of genetic systems in bacteria; recombination, gene structure and regulation of bacterial genes, plasmids and phages.

**Prerequisites:** GENE 302; BIOL 351.

**Cross Listing:** BIOL 406/GENE 406.

**GENE 411/MEPS 411 Biotechnology for Crop Improvement**

Credits 3. 3 Lecture Hours.
Use of biotechnology to improve agricultural, horticultural and forest crops; techniques and methods used and case studies where biotechnology has been used to alter traits such as pathogen resistance, protein or oil consumption, ripening, fertility and wood properties.

**Prerequisite:** BIOL 111 or equivalent.

**Cross Listing:** MEPS 411/GENE 411.

**GENE 412 Population and Ecological Genetics**

Credits 3. 3 Lecture Hours.
Concepts of population genetics including dynamics of natural populations with emphasis on ecological interactions.

**Prerequisite:** GENE 302.
GENE 419/BICH 419 Computational Techniques for Evolutionary Analysis  
Credits 3. 3 Lecture Hours.  
Computational techniques for studying evolution; algorithms for construction and analysis of evolutionary relationships.  
Prerequisite: Junior or senior classification or approval of instructor.  
Cross Listing: BICH 419/GENE 419.

GENE 420 Bioethics  
Credits 3. 3 Lecture Hours.  
The application of ethical theory to the use of modern genetics and biochemistry stressing the social implications of genetic engineering, agricultural manipulation and biotechnology.  
Prerequisites: GENE 302; BICH 410 or BICH 440.

GENE 421/BIMS 421 Advanced Human Genetics  
Credits 3. 3 Lecture Hours.  
A rigorous, analytical approach to genetic analysis of humans including diagnosis and management of genetic disease in humans; transmission of genes in human populations; human cytogenetics; the structure of human genes; human gene mapping; molecular analysis of genetic disease; genetics screening and counseling.  
Prerequisites: GENE 302; BICH 410 or BICH 440.  
Cross Listing: BIMS 421/GENE 421.

GENE 431/BICH 431 Molecular Genetics  
Credits 3. 3 Lecture Hours.  
Molecular basis for inheritance including gene structure and function, chromosomal organization, replication and repair of DNA, transcription and translation, the genetic code, regulation of gene expression, genetic differentiation and genetic manipulations.  
Prerequisites: BICH 410 or BICH 440; GENE 301 or GENE 302 or GENE 320/BIMS 320.  
Cross Listing: BICH 431/GENE 431.

GENE 432/BICH 432 Laboratory in Molecular Genetics  
Credits 2. 6 Lab Hours.  
Laboratory for molecular genetics providing technical experience with tools of molecular biology.  
Prerequisite: GENE 301, GENE 302 or GENE 320/BIMS 320; BICH 410 or BICH 440.  
Cross Listing: BICH 432/GENE 432.

GENE 450 Recombinant DNA and Biotechnology  
Credits 3. 3 Lecture Hours.  
Basic genetic engineering techniques; cloning with plasmid, lambda, cosmid and M13 vectors; gene libraries; DNA sequencing and mutagenesis; PCR; eucaryotic expression with yeast, baculovirus and mammalian vectors; transgenic animals and plants; gene therapy; monoclonal antibodies; bioremediation.  
Prerequisites: BICH 431/GENE 431 or GENE 431/BICH 431 or concurrent registration; BICH 411 or 441 or concurrent registration.

GENE 452/BIMS 452 Modifying Mammalian Genomes for Biomedical Research  
Credits 3. 3 Lecture Hours.  
Review advances in the production of transgenic animals, the manipulation of embryonic stem cells for transgenics and therapeutics, the modification of specific genes in mammalian species by homologous recombination and RNA interference; special emphasis on genetic manipulation of cells and animals for biomedical research, stem-cell and gene therapy.  
Prerequisite: GENE 302.  
Cross Listing: BIMS 452/GENE 452.

GENE 481 Genetics I Seminar  
Credit 1. 1 Lecture Hour.  
Seminar topics on recent developments in genetics.  
Prerequisites: GENE 302; GENE 431/BICH 431 or concurrent registration; senior classification or approval of instructor.

GENE 482 Genetics II Seminar  
Credit 1. 1 Lecture Hour.  
Student preparation and presentation of pertinent genetics topics.  
Prerequisites: GENE 481; senior classification or approval of instructor.

GENE 485 Directed Studies  
Credits 1 to 4. 1 to 4 Other Hours.  
Directed study in genetics not included in established courses.  
Prerequisites: Junior or senior classification; approval of instructor and department head.

GENE 489 Special Topics in...  
Credits 1 to 4. 1 to 4 Lecture Hours.  
Selected topics in an identified area of genetics. May be repeated for credit.  
Prerequisite: Approval of instructor.

GENE 491 Research  
Credits 0 to 4. 0 to 4 Other Hours.  
Laboratory research supervised by a faculty member.  
Prerequisites: Major in genetics; junior or senior classification in genetics or approval of instructor.