GENETICS, DEVELOPMENT AND CELL BIOLOGY (GDCB)

Courses primarily for graduate students, open to qualified undergraduates:

GDCB 505: Entrepreneurship in Science and Technology
(3-0) Cr. 3. Alt. F., offered even-numbered years.
High level success at modern science requires entrepreneurship both in and outside the laboratory. Scientists are in a unique position to not only think, but to thrive, "outside of the box" and take unorthodox approaches to research that lead to positive paradigm shifts in our lives. Exploration of many facets of science, technology, industry and commerce, with frequent guest lectures from entrepreneurs.

GDCB 510: Transmission Genetics
(3-0) Cr. 3. F.
Prereq: GEN 410 or graduate standing
In-depth investigations of modern research practices of transmission genetics. Designed for students interested in genetic research. Topics include: Mendelian genetic analysis, analysis of genetic pathways, mutational analysis of gene function, chromosomal mechanics, genetic mapping, epigenetic inheritance, human genetic analysis.

GDCB 511: Molecular Genetics
(Cross-listed with MCDB). (3-0) Cr. 3. S.
Prereq: BIOL 313 and BBMB 405
The principles of molecular genetics: gene structure and function at the molecular level, including regulation of gene expression, genetic rearrangement, and the organization of genetic information in prokaryotes and eukaryotes.

GDCB 513: Plant Metabolism
(Cross-listed with PLBIO). (2-0) Cr. 2. Alt. F., offered even-numbered years.
Prereq: BIOL 330, PHYS 111, CHEM 331; one semester of biochemistry recommended
Photosynthesis, respiration, and other aspects of plant metabolism.

GDCB 528: Advances in Molecular Cell Biology
(Cross-listed with MCDB). (3-0) Cr. 3. Alt. F., offered even-numbered years.
Prereq: Courses in general cell biology and biochemistry
Cell biological processes including cell signaling, cell division, intracellular trafficking, biogenesis of organelles, cell adhesion and motility.

GDCB 533: Advances in Developmental Biology
(Cross-listed with MCDB). (3-0) Cr. 3. Alt. F., offered odd-numbered years.
Prereq: BIOL 314 or Biol 423
Fundamental principles in multicellular development. Emphasis on cellular and molecular regulation of developmental processes, and experimental approaches as illustrated in the current literature.

GDCB 536: Statistical Genetics
(Cross-listed with STAT). (3-0) Cr. 3. Alt. F., offered even-numbered years.
Prereq: STAT 401, STAT 447; GEN 320 or BIOL 313
Statistical models and methods for genetics covering models of population processes: selection, mutation, migration, population structure, and linkage disequilibrium, and inference techniques: genetic mapping, linkage analysis, and quantitative trait analysis. Applications include genetic map construction, gene mapping, genome-wide association studies (GWAS), inference about population structure, phylogenetic tree construction, and forensic and paternity identification.

GDCB 542: Introduction to Molecular Biology Techniques
(Cross-listed with B M S, EEOB, FS HN, HORT, NREM, NUTRS, V MPM, VDPAM). Cr. 1. Repeatable. F.S.SS.
Sessions in basic molecular biology techniques and related procedures. Offered on a satisfactory-fail basis only.

GDCB 542A: Introduction to Molecular Biology Techniques: DNA Techniques
(Cross-listed with B M S, BBMB, EEOB, FS HN, HORT, NREM, NUTRS, V MPM, VDPAM). Cr. 1. Repeatable. F.S.
Includes genetic engineering procedures, sequencing, PCR, and genotyping. Offered on a satisfactory-fail basis only.

GDCB 542B: Introduction to Molecular Biology Techniques: Protein
(Cross-listed with B M S, BBMB, EEOB, FS HN, HORT, NREM, NUTRS, VDPAM). Cr. 1. Repeatable. S.SS.
Prereq: Graduate classification
Techniques. Includes: fermentation, protein isolation, protein purification, SDS-PAGE, Western blotting, NMR, confocal microscopy and laser microdissection, Immunophenotyping, and monoclonal antibody production. Sessions in basic molecular biology techniques and related procedures. Offered on a satisfactory-fail basis only.

GDCB 542C: Introduction to Molecular Biology Techniques: Cell Techniques
(Cross-listed with B M S, BBMB, EEOB, FS HN, HORT, NREM, NUTRS, V MPM, VDPAM). Cr. 1. Repeatable. F.S.
Includes: immunophenotyping, ELISA, flow cytometry, microscopic techniques, image analysis, confocal, multiphoton and laser capture microdissection. Offered on a satisfactory-fail basis only.

GDCB 542D: Introduction to Molecular Biology Techniques: Plant Transformation
(Cross-listed with B M S, BBMB, EEOB, FS HN, HORT, NREM, NUTRS, V MPM, VDPAM). Cr. 1. Repeatable. S.
Includes: Agrobacterium and particle gun-mediated transformation of tobacco, Arabidopsis, and maize, and analysis of tranformants. Offered on a satisfactory-fail basis only.

GDCB 542E: Introduction to Molecular Biology Techniques: Proteomics
(Cross-listed with B M S, BBMB, EEOB, FS HN, HORT, NREM, NUTRS, V MPM, VDPAM). Cr. 1. Repeatable. F.
Includes: two-dimensional electrophoresis, laser scanning, mass spectrometry, and database searching. Offered on a satisfactory-fail basis only.

GDCB 542F: Introduction to Molecular Biology Techniques: Metabolomics
(Cross-listed with B M S, BBMB, EEOB, FS HN, HORT, NREM, NUTRS, V MPM, VDPAM). Cr. 1. Repeatable. F.
Includes: metabolomics and the techniques involved in metabolite profiling. For non-chemistry majoring students who are seeking analytical aspects into their biological research projects. Offered on a satisfactory-fail basis only.

GDCB 542G: Introduction to Molecular Biology Techniques: Genomic
(Cross-listed with B M S, BBMB, EEOB, FS HN, HORT, NREM, NUTRS, V MPM, VDPAM). Cr. 1. Repeatable. S.
Offered on a satisfactory-fail basis only.

GDCB 544: Fundamentals of Bioinformatics
(Cross-listed with BCB, COM S, CPR E). (4-0) Cr. 4. F.
Prereq: MATH 165 or STAT 401 or equivalent
Survey of key bioinformatics methods, including hands-on use of computational tools to solve various biological problems. Topics include: database searching, sequence alignment, gene prediction, RNA and protein structure prediction, construction of phylogenetic trees, comparative and functional genomics, and systems biology.

GDCB 545: Plant Molecular, Cell and Developmental Biology
(Cross-listed with MCDB, PLBIO). (3-0) Cr. 3. Alt. F., offered odd-numbered years.
Prereq: Biol 313, BIOL 314, BIOL 330 or BBMB 405
Plant nuclear and organelle genomes; regulation of gene expression; hormone signaling; organization, function, and development of plant cells and subcellular structures; regulation of plant growth and development.

GDCB 556: Cellular, Molecular and Developmental Neuroscience
(Cross-listed with B M S, NEURO). (3-0) Cr. 3. F.
Prereq: BIOL 335 or BIOL 436; physics recommended
Fundamental principles of neuroscience including cellular and molecular neuroscience, nervous system development, sensory, motor and regulatory systems.

GDCB 557: Advanced Neuroscience Techniques
(Cross-listed with NEURO). (3-0) Cr. 3. Alt. S., offered odd-numbered years.
Prereq: Neuro 556 or equivalent course
Research methods and techniques; lectures, laboratory exercises and/or demonstrations representing individual faculty specialties.

GDCB 568: Bioinformatics II (Advanced Genome Informatics)
(Cross-listed with BCB, COM S, STAT). (3-0) Cr. 3. S.
Prereq: BCB 567 or (BIOL 315 and STAT 430), credit or enrollment in GEN 409
Advanced sequence models. Basic methods in molecular phylogeny. Hidden Markov models. Genome annotation. DNA and protein motifs. Introduction to gene expression analysis.

GDCB 570: Bioinformatics IV (Computational Functional Genomics and Systems Biology)
(Cross-listed with BCB, COM S, CPR E, STAT). (3-0) Cr. 3. S.
Prereq: BCB 567 or COM S 311, COM S 228, GEN 409, STAT 430
Algorithmic and statistical approaches in computational functional genomics and systems biology. Elements of experiment design. Analysis of high throughput gene expression, proteomics, and other datasets obtained using system-wide measurements. Topological analysis, module discovery, and comparative analysis of gene and protein networks. Modeling, analysis, simulation and inference of transcriptional regulatory modules and networks, protein-protein interaction networks, metabolic networks, cells and systems: Dynamic systems, Boolean, and probabilistic models. Multi-scale, multi-granularity models. Ontology-driven, network based, and probabilistic approaches to information integration.

GDCB 590: Special Topics
Cr. arr. Repeatable.
Prereq: Permission of instructor

Courses for graduate students:

GDCB 661: Current Topics in Neuroscience
(Cross-listed with BBMB, NEURO). (2-0) Cr. 2-3. Repeatable. Alt. S., offered even-numbered years.
Prereq: NEURO 556 (or comparable course) or permission of instructor
Topics may include molecular and cellular neuroscience, neurodevelopment, neuroplasticity, neurodegenerative diseases, cognitive neuroscience, sensory biology, neural integration, membrane biophysics, neuroethology, techniques in neurobiology and behavior.

GDCB 690: Seminar in GDCB
Cr. 1. Repeatable.
Research seminars by faculty, invited speakers, and graduate students. Offered on a satisfactory-fail basis only.

GDCB 691: Faculty Seminar
Cr. 1. Repeatable.
Faculty research series.

GDCB 696: Research Seminar
(Cross-listed with AGRON, BBMB, FOR, HORT, PLBIO). Cr. 1. Repeatable. F.S.
Research seminars by faculty and graduate students. Offered on a satisfactory-fail basis only.

GDCB 698: Seminar in Molecular, Cellular, and Developmental Biology
(Cross-listed with BBMB, MCDB, MICRO, V MPM). (2-0) Cr. 1-2. Repeatable. F.S.
Student and faculty presentations.

GDCB 699: Research
Cr. arr. Repeatable.
Research for thesis or dissertation. Offered on a satisfactory-fail basis only.

GDCB 699I: Research
(Cross-listed with A ECL, ANTHR, EEOB, IA LL). Cr. 1-4. Repeatable.