GENETICS, DEVELOPMENT AND CELL BIOLOGY (GDCB)

Courses primarily for graduate students, open to qualified undergraduates:

GDCB 5100: Transmission Genetics
Credits: 3. Contact Hours: Lecture 3.
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. (Typically Offered: Fall)

GDCB 5110: Advanced Molecular Genetics
(Cross-listed with MCDB 5110).
Credits: 3. Contact Hours: Lecture 3.
Mechanisms of molecular genetic processes in eukaryotes and prokaryotes, including DNA replication and repair, transcription, translation and regulation of gene expression. Critical evaluation and discussion of current primary literature, methodologies and experimental data. (Typically Offered: Spring)

GDCB 5130: Plant Metabolism
(Cross-listed with PLBIO 5130).
Credits: 2. Contact Hours: Lecture 2.
Photosynthesis, respiration, and other aspects of plant metabolism. Offered even-numbered years. (Typically Offered: Fall)

GDCB 5280: Advances in Molecular Cell Biology
(Cross-listed with MCDB 5280).
Credits: 3. Contact Hours: Lecture 3.
Cell biological processes including cell signaling, cell division, intracellular trafficking, biogenesis of organelles, cell adhesion and motility. Offered even-numbered years. (Typically Offered: Fall)

GDCB 5330: Advances in Developmental Biology
(Cross-listed with MCDB 5330).
Credits: 3. Contact Hours: Lecture 3.
Fundamental principles in multicellular development. Emphasis on cellular and molecular regulation of developmental processes, and experimental approaches as illustrated in the current literature. Offered odd-numbered years. (Typically Offered: Fall)

GDCB 5360: Statistical Genetics
(Cross-listed with STAT 5360).
Credits: 3. Contact Hours: Lecture 3.
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 5420A: Introduction to Molecular Biology Techniques: DNA Techniques
(Cross-listed with BMS 5420A/ EEOB 5420A/ FSHN 5420A/ BBMB 5420A/ HORT 5420A/ NREM 5420A/ NUTRS 5420A/ VDPAM 5420A/ VMPM 5420A).
Credits: 1. Contact Hours: Lecture 0.5, Laboratory 1.
Repeatable.
Includes genetic engineering procedures, sequencing, PCR, and genotyping. Offered on a satisfactory-fail basis only. (Typically Offered: Fall, Spring)

GDCB 5420B: Introduction to Molecular Biology Techniques: Protein
(Cross-listed with BMS 5420B/ EEOB 5420B/ FSHN 5420B/ BBMB 5420B/ HORT 5420B/ NREM 5420B/ NUTRS 5420B/ VDPAM 5420B).
Credits: 1. Contact Hours: Lecture 0.5, Laboratory 1.
Repeatable.
Includes: immunophenotyping, ELISA, flow cytometry, microscopic techniques, image analysis, confocal, multiphoton and laser capture microdissection. Offered on a satisfactory-fail basis only. (Typically Offered: Spring, Summer)

GDCB 5420C: Introduction to Molecular Biology Techniques: Cell Techniques
(Cross-listed with BMS 5420C/ EEOB 5420C/ FSHN 5420C/ BBMB 5420C/ HORT 5420C/ NREM 5420C/ NUTRS 5420C/ VMPM 5420C/ VDPAM 5420C).
Credits: 1. Contact Hours: Laboratory 2.
Repeatable.
Includes: immunophenotyping, ELISA, flow cytometry, microscopic techniques, image analysis, confocal, multiphoton and laser capture microdissection.ular biology techniques and related procedures. Offered on a satisfactory-fail basis only. (Typically Offered: Fall, Spring)

GDCB 5420D: Introduction to Molecular Biology Techniques: Plant Transformation
(Cross-listed with BMS 5420D/ EEOB 5420D/ FSHN 5420D/ BBMB 5420D/ HORT 5420D/ NREM 5420D/ NUTRS 5420D/ VMPM 5420D/ VDPAM 5420D).
Credits: 1. Contact Hours: Lecture 0.5, Laboratory 1.
Repeatable.
Includes: Agrobacterium and particle gun-mediated transformation of tobacco, Arabidopsis, and maize, and analysis of tranformants. Offered on a satisfactory-fail basis only. (Typically Offered: Spring)

GDCB 5420E: Introduction to Molecular Biology Techniques: Proteomics
(Cross-listed with BMS 5420E/ EEOB 5420E/ FSHN 5420E/ BBMB 5420E/ HORT 5420E/ NREM 5420E/ NUTRS 5420E/ VMPM 5420E/ VDPAM 5420E).
Credits: 1. Contact Hours: Lecture 0.5, Laboratory 1.
Repeatable.
Includes: two-dimensional electrophoresis, laser scanning, mass spectrometry, and database searching. Offered on a satisfactory-fail basis only. (Typically Offered: Fall)

GDCB 5420F: Introduction to Molecular Biology Techniques: Metabolomics
(Cross-listed with BMS 5420F/ EEOB 5420F/ FSHN 5420F/ BBMB 5420F/ HORT 5420F/ NREM 5420F/ NUTRS 5420F/ VMPM 5420F/ VDPAM 5420F).
Credits: 1. Contact Hours: Lecture 0.5, Laboratory 1.
Repeatable.
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. (Typically Offered: Fall)

GDCB 5420G: Introduction to Molecular Biology Techniques: Genomic
(Cross-listed with BMS 5420G/ EEOB 5420G/ FSHN 5420G/ BBMB 5420G/ HORT 5420G/ NREM 5420G/ NUTRS 5420G/ VMPM 5420G/ VDPAM 5420G).
Credits: 1. Contact Hours: Lecture 0.5, Laboratory 1.
Repeatable.
Sessions in basic molecular biology techniques and related procedures. Offered on a satisfactory-fail basis only. (Typically Offered: Spring)

GDCB 5440: Fundamentals of Bioinformatics
(Cross-listed with BCB 5440/ COMS 5440/ CPRE 5440).
Credits: 4. Contact Hours: Lecture 3, Laboratory 2.
A practical, hands-on overview of how to apply bioinformatics to biological research. Recommended for biologists desiring to gain computational molecular biology skills. Topics include: sequence analysis, genomics, proteomics, phylogenetic analyses, ontology enrichment, systems biology, data visualization and emergent technologies. Offered odd-numbered years. (Typically Offered: Fall)

GDCB 5450: Plant Molecular, Cell and Developmental Biology
(Cross-listed with MCDB 5450/ PLBIO 5450).
Credits: 3. Contact Hours: Lecture 3.
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. Offered odd-numbered years. (Typically Offered: Fall)

GDCB 5560: Cellular, Molecular and Developmental Neuroscience
(Cross-listed with BMS 5560/ NEURO 5560).
Credits: 3. Contact Hours: Lecture 3.
Fundamental principles of neuroscience including cellular and molecular neuroscience, nervous system development, and regulatory systems. Offered odd-numbered years. (Typically Offered: Fall)

GDCB 5570: Rotations in Neuroscience
(Cross-listed with NEURO 5570).
Credits: 2. Contact Hours: Lecture 2.
Rotation experiences in various neuroscience research methods and techniques related to our current faculty specialties. (Typically Offered: Fall, Spring)

GDCB 5680: Statistical Bioinformatics
(Cross-listed with COMS 5680/ BCB 5680/ STAT 5680).
Credits: 3. Contact Hours: Lecture 3.
Statistical models for sequence data, including applications in genome annotation, motif discovery, variant discovery, molecular phylogeny, gene expression analysis, and metagenomics. Statistical topics include model building, inference, hypothesis testing, and simple experimental design, including for big data/complex models. (Typically Offered: Spring)

GDCB 5690: Structural Bioinformatics
(Cross-listed with BCB 5690/ COMS 5690/ CPRE 5690/ BBMB 5690).
Credits: 3. Contact Hours: Lecture 3.
Molecular structures including genes and gene products: protein, DNA and RNA structure. Structure determination methods, structural refinement, structure representation, comparison of structures, visualization, and modeling. Molecular and cellular structure from imaging. Analysis and prediction of protein secondary, tertiary, and higher order structure, disorder, protein-protein and protein-nucleic acid interactions, protein localization and function, bridging between molecular and cellular structures. Molecular evolution. (Typically Offered: Fall)

GDCB 5700: Systems Biology
(Cross-listed with COMS 5700/ CPRE 5700/ BCB 5700/ STAT 5700).
Credits: 3. Contact Hours: Lecture 3.
Algorithmic and statistical approaches in computational functional genomics and systems biology. Analysis of high throughput biological data obtained using system-wide measurements. Topological analysis, module discovery, and comparative analysis of gene and protein networks. Modeling, analysis, and inference of transcriptional regulatory networks, protein-protein interaction networks, and metabolic networks. Dynamic systems and whole-cell models. Ontology-driven, network based, and probabilistic approaches to information integration. (Typically Offered: Spring)

GDCB 5850: Fundamentals of Predictive Plant Phenomics
(Cross-listed with BCB 5850/ ME 5850).
Credits: 4. Contact Hours: Lecture 3, Laboratory 3.
Principles of engineering, data analysis, and plant sciences and their interplay applied to predictive plant phenomics. Transport phenomena, sensor design, image analysis, graph models, network data analysis, fundamentals of genomics and phenomics. Multidisciplinary laboratory exercises. (Typically Offered: Fall)

GDCB 5900: Special Topics
Credits: 1-30. Repeatable.
Prereq: Instructor Permission for Course

Courses for graduate students:

GDCB 6610: Advanced Topics in Neuroscience
(Cross-listed with BBMB 6610/ KIN 6610/ NEURO 6610).
Credits: 3. Contact Hours: Lecture 3.
Repeatable.
Prereq: NEURO 5560 (or comparable course) or permission of instructor
Students will present three journal articles and two overview lectures on topics in neuroscience that are related but outside of their own research interest. Offered even-numbered years. (Typically Offered: Spring)

GDCB 6900: Seminar in GDCB
Credits: 1. Contact Hours: Lecture 1.
Repeatable.
Research seminars by faculty, invited speakers, and graduate students. Offered on a satisfactory-fail basis only.

GDCB 6960: Research Seminar
(Cross-listed with AGRON 6960/ BBMB 6960/ FOR 6960/ PLBIO 6960/ HORT 6960).
Credits: 1. Contact Hours: Lecture 1.
Repeatable.
Research seminars by faculty and graduate students. Offered on a satisfactory-fail basis only. (Typically Offered: Fall, Spring)

GDCB 6980: Seminar in Molecular, Cellular, and Developmental Biology
(Cross-listed with BBMB 6980/ MCDB 6980/ MICRO 6980/ VMPM 6980).
Credits: 1-2. Contact Hours: Lecture 2.
Repeatable.
Student and faculty presentations. (Typically Offered: Spring)

GDCB 6990: Research
Credits: 1-30. Repeatable.
Prereq: Instructor Permission for Course
Research for thesis or dissertation. Offered on a satisfactory-fail basis only.