

# MOLECULAR & CELLULAR BIOLOGY (MCB)

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## MCB 501. RESEARCH AND SCHOLARSHIP. (1-16 Credits)

PREREQ: Departmental approval required.

*This course is repeatable for 99 credits.*

## MCB 503. THESIS. (1-16 Credits)

PREREQ: Departmental approval required.

*This course is repeatable for 999 credits.*

## MCB 505. READING AND CONFERENCE. (1-16 Credits)

PREREQ: Departmental approval required.

*This course is repeatable for 99 credits.*

## MCB 507. SEMINAR. (1-16 Credits)

PREREQ: Departmental approval required.

*This course is repeatable for 99 credits.*

## MCB 508. WORKSHOP. (1-16 Credits)

*This course is repeatable for 99 credits.*

## MCB 509. PRACTICUM. (1-16 Credits)

PREREQ: Departmental approval required.

*This course is repeatable for 99 credits.*

## MCB 510. INTERNSHIP. (1-16 Credits)

PREREQ: Departmental approval required.

*This course is repeatable for 99 credits.*

## MCB 525. TECHNIQUES IN MOLECULAR AND CELLULAR BIOLOGY. (3 Credits)

An intensive laboratory course introducing modern methods for the manipulation of cellular macromolecules. Recombinant DNA technology, protein chemistry, and in situ hybridization methods presented in a format that emphasizes experimental continuity. The course requires two weeks of intensive full-time involvement.

## MCB 530. INTRODUCTION TO POPULATION GENETICS. (3 Credits)

Genetic polymorphisms, inbreeding, genetic drift, population subdivision and gene flow, mutation and selection. Emphasis on applied rather than theoretical questions. Offered alternate years.

**Equivalent to:** GEN 530

**Recommended:** BI 311 and ST 351 and ST 352

## MCB 535. GENES AND CHEMICALS IN AGRICULTURE: VALUE AND RISK. (3 Credits)

A multidisciplinary course that examines the scientific, social, political, economic, environmental, and ethical controversies surrounding agricultural and natural resource biotechnologies. Lec/rec. CROSSLISTED as FES 435/FES 535, FES 435H, TOX 435/TOX 535, TOX 435H.

**Equivalent to:** BI 535, FES 535, FS 535, TOX 535

**Recommended:** One quarter each of biology and chemistry

## MCB 541. PLANT TISSUE CULTURE. (4 Credits)

Principles, methods, and applications of plant tissue culture. Laboratory is important part of course. Topics include callus culture, regeneration, somaclonal variation, micropropagation, anther culture, somatic hybridization, and transformation. CROSSLISTED as PBG 441/PBG 541.

**Equivalent to:** HORT 541, PBG 541

**Recommended:** (BI 311 and BOT 331) or PBG 430

## MCB 554. GENOME ORGANIZATION, STRUCTURE, AND MAINTENANCE. (4 Credits)

How diverse organisms store their individual sets of genetic information (genomes). Evolution of genomes and gene families. Structures of DNA and chromatin. Biochemical and regulatory pathways that protect cellular genomes against environmental and endogenous damage and ensure transmission of faithful copies to progeny. Remodeling of genomes by recombination and transposition.

**Equivalent to:** GEN 554, MB 554, TOX 554

**Recommended:** BI 311 (or genetics equivalent) and (BB 450 and BB 451 and BB 452) or (BB 490 and BB 491 and BB 492)

## MCB 555. GENOME EXPRESSION AND REGULATION. (4 Credits)

Prokaryotic and eukaryotic systems will be used to describe recent advances in understanding transcriptional and posttranscriptional control mechanisms. Topics include: microbial, yeast and mouse model systems; transcriptional control mechanisms; RNA processing, silencing and microRNAs; protein synthesis and posttranslational modification; microarray- and mass spectrometry-based expression genomics.

**Equivalent to:** GEN 555

**Recommended:** BB 451

## MCB 557. SCIENTIFIC SKILLS AND ETHICS. (3 Credits)

Offers instruction, guest lectures and case-study based discussions of ethical issues relevant to scientists on topics such as mentoring, best practices of conducting research, research misconduct and compliance, intellectual property, peer review, ethical use of animal and human subjects and managing conflicts of interest. Training in the preparation and presentation of scientific seminars and grant writing.

## MCB 563. CANCER AND CHEMOPREVENTION. (2 Credits)

A summary of mechanisms of cancer progression, how cancer is detected, and introduction to chemoprevention using targeted therapy and alternative medicine.

**Recommended:** BB 451 and BI 314 and BI 460

## MCB 575. COMPARATIVE GENOMICS. (4 Credits)

Principles of comparative genomics. Methods for genome assembly and annotation. Genomic approaches for the study of structural change, whole genome duplication, gene family evolution, gene networks, gene regulation and epigenetics. Lab topics include the analysis of next generation sequencing data and conducting comparative genome analyses. Lec/lab. CROSSLISTED as BOT 575.

**Equivalent to:** BOT 575

**Recommended:** Basic working knowledge of cell and molecular biology and genetics. BI 314 and (BI 311 or CSS 430)

## MCB 576. INTRODUCTION TO COMPUTING IN THE LIFE SCIENCES. (3 Credits)

Introduction to management of large datasets (e.g., nucleic acids, protein), computer programming languages, application of basic mathematical functions, and assembly of computational pipelines pertinent to life sciences. CROSSLISTED as BOT 476/BOT 576.

**Equivalent to:** BOT 576

**Recommended:** Cell and molecular biology or genetics and familiarity with text editing software and unix/linux operating system

## MCB 599. SPECIAL TOPICS. (1-16 Credits)

*This course is repeatable for 16 credits.*

## MCB 601. RESEARCH. (1-16 Credits)

*This course is repeatable for 16 credits.*

## MCB 603. THESIS. (1-16 Credits)

*This course is repeatable for 999 credits.*

**MCB 605. READING AND CONFERENCE. (1-16 Credits)**

*This course is repeatable for 16 credits.*

**MCB 609. PRACTICUM. (1-16 Credits)**

*This course is repeatable for 16 credits.*

**MCB 610. INTERNSHIP. (1-9 Credits)**

Laboratory rotation.

*This course is repeatable for 16 credits.*

**MCB 620. DNA FINGERPRINTING. (1 Credit)**

Principles and methods for producing and analyzing DNA fingerprints.

Offered alternate years. CROSSLISTED as PBG 620.

**Equivalent to:** CSS 620, GEN 620, PBG 620

**Recommended:** BI 311 or CSS 430 or CSS 530 or PBG 430 or PBG 530 or HORT 430 or HORT 530

**MCB 621. GENETIC MAPPING. (1 Credit)**

Principles and methods for constructing genetic maps comprised of molecular and other genetic markers. Offered alternate years.

CROSSLISTED as PBG 621.

**Equivalent to:** CSS 621, GEN 621, PBG 621

**Recommended:** BI 311 or CSS 430 or CSS 530 or PBG 430 or PBG 530 or HORT 430 or HORT 530

**MCB 622. MAPPING QUANTITATIVE TRAIT LOCI. (1 Credit)**

Principles and methods for mapping genes underlying phenotypically complex traits. Offered alternate years. CROSSLISTED as PBG 622.

**Equivalent to:** CSS 622, GEN 622, PBG 622

**Recommended:** CSS 590 or ST 513

**MCB 637. MOLECULAR HOST-MICROBE INTERACTIONS. (3 Credits)**

Lecture and discussion-based presentation of the molecular bases for interactions between organisms. Addresses bacterial, algal, and fungal symbionts of eukaryotes and considers pathogenesis, commensalism, and mutualism. A focus on the evolution of host-microbe interactions is included.

**MCB 662. HORMONE ACTION. (3 Credits)**

Mechanisms of action of peptide and steroid hormones and related compounds at the cellular level. CROSSLISTED as ANS 662.

**Prerequisites:** BB 451 with C or better or BB 551 with C or better or BB 492 with C or better or BB 592 with C or better

**Equivalent to:** PHAR 662

**MCB 671. MOLECULAR TOOLS. (3 Credits)**

Intended for personnel with some scientific background who are seeking basic- and advanced-level molecular biology knowledge and who wish to become involved with molecular biology-related and biotechnological research. CROSSLISTED as VMB 671.

**Equivalent to:** VMB 671

**MCB 699. SPECIAL TOPICS. (0-16 Credits)**

*This course is repeatable for 16 credits.*