**MB 110. ORIENTATION TO MICROBIOLOGY. (1 Credit)**
Introduction of incoming microbiology students to college life with an emphasis on faculties, facilities, services, and curricula in microbiology. Exposure to career opportunities in microbiology. Graded P/N.

**MB 201. LABORATORY SKILLS. (1-16 Credits)**
These credits are designed for students who are doing experiential learning in a research laboratory on campus, performing basic laboratory tasks that are not elevated to the level of an independent research project. Graded P/N.

*This course is repeatable for 16 credits.*

**MB 230. *INTRODUCTORY MICROBIOLOGY. (4 Credits)**
Microbiology as it affects our everyday lives. The impact of microorganisms on health, food/water sanitation, environment, industry, and genetic engineering. Lec/lab. (Bacc Core Course)

Attributes: CPBS – Core, Pers, Biological Science

Equivalent to: MB 230H

**MB 230H. *INTRODUCTORY MICROBIOLOGY. (4 Credits)**
Microbiology as it affects our everyday lives. The impact of microorganisms on health, food/water sanitation, environment, industry, and genetic engineering. Lec/lab. (Bacc Core Course)

Attributes: CPBS – Core, Pers, Biological Science; HNRS – Honors Course Designator

Equivalent to: MB 230

**MB 255. *ALLIED HEALTH MICROBIOLOGY. (4 Credits)**
General properties of cellular microbes and viruses, microbial biochemistry and genetics, pathogenesis and disease, immunity, and microbial infections. Lecture and lab emphasis is on medical microbiology, infectious diseases, and public health. Not intended for biological sciences majors. Lec/lab. CROSSLISTED as BHS 255.

Attributes: CPBS – Core, Pers, Biological Science

**MB 290. SUCCESS IN MICROBIOLOGY. (1 Credit)**
Science skills, science literacy, ethics, and professional development to build a successful career in Microbiology. Learn the process of research, access and analyze primary literature, evaluate user-generated science content, practice professional skills, and identify and plan for experience-building opportunities such as jobs, research and internships. Sophomore standing or higher.

**MB 299. SPECIAL TOPICS. (1-16 Credits)**
May be repeated for credit when topic varies.

Equivalent to: MB 299H

*This course is repeatable for 16 credits.*

**MB 299H. SPECIAL TOPICS. (1-16 Credits)**
May be repeated for credit when topic varies.

Attributes: HNRS – Honors Course Designator

Equivalent to: MB 299

*This course is repeatable for 16 credits.*

**MB 302. GENERAL MICROBIOLOGY. (3 Credits)**
Emphasis on cytology, physiology, virology, growth and control of growth with coverage of the role of microorganisms in nature, in disease, and as useful tools.

Prerequisites: (CH 332 with C- or better or CH 335 with C- or better) and (((BI 212 with C- or better or BI 212H with C- or better) and (BI 213 [C-] or BI 213H [C-]) or (BI 204 [C-] and BI 205 [C-] and BI 206 [C-])))

**MB 302H. GENERAL MICROBIOLOGY LABORATORY. (2 Credits)**
Development of laboratory techniques; exercises designed to reinforce concepts covered in MB 302. MB 302 is a prereq that may be taken prior to or concurrently with MB 303. Lec/lab.

Prerequisites: MB 302 (may be taken concurrently) with D- or better

Recommended: Two terms organic chemistry

**MB 310. BACTERIAL MOLECULAR GENETICS. (3 Credits)**
Introductory concepts of bacterial molecular genetics. Topics include DNA replication, mutation, DNA repair, DNA recombination, transposons, bacteriophages, genetic manipulation, and gene regulation.

Prerequisites: MB 302 with D- or better and (BI 314 [D-] or BI 314H [D-]) or BB 314 [D-]) and (BB 450 [D-] or BB 490 [D-]) and (BB 451 (may be taken concurrently) [D-] or BB 491 (may be taken concurrently) [D-])

**MB 310H. BACTERIAL MOLECULAR GENETICS LAB: A WRITING INTENSIVE COURSE. (3 Credits)**
Scientific writing, laboratory notebook composition, experimental design, and laboratory experiments in bacterial molecular biology. (Writing Intensive Course)

Attributes: CWIC – Core, Skills, WIC

Prerequisites: (MB 303 with D- or better or MB 303H with D- or better) and MB 310 (may be taken concurrently) [D-]

**MB 311. *MOLECULAR MICROBIOLOGY LAB: A WRITING INTENSIVE COURSE. (3 Credits)**
Scientific writing, laboratory notebook composition, experimental design, and laboratory experiments in bacterial molecular biology. (Writing Intensive Course)

Attributes: CWIC – Core, Skills, WIC

Prerequisites: (MB 303 with D- or better or MB 303H with D- or better) and MB 310 (may be taken concurrently) [D-]

**MB 312. BACTERIAL PHYSIOLOGY AND METABOLISM. (3 Credits)**
Molecular structure and function, macromolecular assembly, energy production and use, and cellular growth.

Prerequisites: MB 310 with D- or better and BB 451 [D-]

Recommended: BB 450

**MB 314. AQUATIC MICROBIOLOGY. (3 Credits)**
A survey of the diversity, ecology, and physiology of microbes in aquatic systems, with emphasis on their roles in food webs, chemical cycling, and human health. Provides the background knowledge and quantitative/analytical skills necessary to interpret and critique current and historical research in the fields of general aquatic microbiology.

Prerequisites: (CH 231 with D- or better or CH 231H with D- or better or CH 121 with D- or better) and (CH 232 [D-] or CH 232H [D-] or CH 122 [D-]) and (CH 233 [D-] or CH 233H [D-] or CH 123 [D-])

**MB 330. *DISEASE AND SOCIETY. (3 Credits)**
Infectious disease has many effects on the development of society, and likewise, human interactions affect the development of disease. The course examines these interactions with a focus on the role of race, class, and economic status in the development of epidemics. (Bacc Core Course)

Attributes: CPDP – Core, Perspective, Difference/Power/Discrimination

**MB 340. HUMAN VIROLOGY. (4 Credits)**
Properties of viruses, their biology, pathogenesis and concern to society. Emphasis on viruses causing human disease. CROSSLISTED as BHS 340.

Prerequisites: (BI 204 with C- or better and BI 205 [C-] or BI 206 [C-] or BI 211 [C-] and BI 212 [C-]) or (BI 211 [C-] and BI 212 [C-] and BI 213 [C-])

Equivalent to: BHS 340

**MB 385. *EMERGING INFECTIOUS DISEASES AND EPIDEMICS. (3 Credits)**
Emerging and reemerging infectious disease is a contemporary global issue of great concern. To understand and evaluate the issue, the course covers germ theory, disease history and ecology, microbial pathogenesis and the immune response, historic plagues, and the biological, environmental, population and social changes that contribute to disease emergence. (Writing Intensive Course)

Attributes: CWIC – Core, Skills, WIC

Prerequisites: (BI 211 with D- or better or BI 211H with D- or better) and (BI 212 [D-] or BI 212H [D-]) and BI 213 [D-] or (BI 213H [D-])
MB 399. SPECIAL TOPICS. (1-16 Credits)
Equivalent to: MB 399H
This course is repeatable for 16 credits.

MB 399H. SPECIAL TOPICS. (1-16 Credits)
Attributes: HNRS – Honors Course Designator
Equivalent to: MB 399
This course is repeatable for 16 credits.

MB 401. RESEARCH. (1-16 Credits)
This course is repeatable for 16 credits.

MB 403. THESIS. (1-16 Credits)
This course is repeatable for 16 credits.

MB 405. READING AND CONFERENCE. (1-16 Credits)
Conference: Instruction in microbiology.
This course is repeatable for 16 credits.

MB 406. SPECIAL PROJECTS. (1-16 Credits)
Reading and Conference/Instructor in Microbiology.
This course is repeatable for 16 credits.

MB 407. SEMINAR. (1-16 Credits)
Graded P/N.
This course is repeatable for 16 credits.

MB 410. OCCUPATIONAL INTERNSHIP. (1-10 Credits)
Supervised work experience at selected cooperating institutions, agencies, laboratories, clinics or companies. Maximum of 10 credits allowed but no more than 3 credits may be used to satisfy microbiology major requirement of 36 credits. Graded P/N.

MB 416. IMMUNOLOGY. (3 Credits)
Basic theory and applications of immunochemistry, immunogenetics, and cellular immunology. Examination of immunologically related diseases.

Prerequisites: BB 450 with D- or better or BB 490 with D- or better

MB 417. IMMUNOLOGY LABORATORY. (2 Credits)
Laboratory on the applications of current immunological techniques.

Prerequisites: (MB 303 with D- or better or MB 303H with D- or better) and MB 416 (may be taken concurrently) [D-]

MB 420. MICROBIAL GENOMES, BIOGEOCHEMISTRY, AND DIVERSITY. (3 Credits)
A survey of microbial diversity from the earliest lifeforms to the modern role of bacteria and archaea in global biogeochemical cycles. Topics covered include molecular evolution, microbial genomics, biochemical diversity, and metabolic pathways that adapt cells to extreme environments. Particular emphasis is placed on marine systems, from photosynthesis in surface waters to life in the ocean crust.

Prerequisites: BB 451 with D- or better

MB 422. AQUATIC MICROBIOLOGY LABORATORY. (2 Credits)
Laboratory analyzing field samples from freshwater and marine systems to examine patterns of microbial communities.

Prerequisites: MB 303 with D- or better and MB 314 [D-]

MB 430. BACTERIAL PATHOGENESIS. (3 Credits)
Bacteria pathogenic for humans, emphasizing the structural, physiological and genetic mechanisms of pathogenesis. Role of the immune system in pathogenesis and protection.

Prerequisites: MB 302 with D- or better and MB 310 [D-] and (BB 451 [D-] or BB 491 [D-])

MB 434. VIROLOGY. (3 Credits)
Properties of viruses, their biology and pathogenesis. Emphasis on viruses causing human disease.

Prerequisites: ((BB 450 with D- or better or BB 450H with D- or better) and (BB 451 [D-] or BB 451H [D-])) or (BB 490 [D-] and BB 491 [D-] and BB 492 [D-])

MB 435. PATHOGENIC MICROBES LABORATORY. (2 Credits)
Laboratory experiments to illustrate concepts presented in MB 430 and/or MB 434, focusing on pathogenic microorganisms.

Prerequisites: (MB 303 with D- or better or MB 303H with D- or better) and MB 302 [D-] and (MB 430 (may be taken concurrently) [D-] or MB 434 (may be taken concurrently) [D-])

MB 436. THE HUMAN MICROBIOME. (3 Credits)
Examines the biodiversity, function, and medical importance of the communities of microorganisms that inhabit the human body. A diverse array of topics will be discussed, including how the human microbiome is studied, case studies of specific aspects of the human microbiome, and emerging theories of how the microbiome influences human health.

Prerequisites: BI 314 with D- or better or BB 314 with D- or better or BI 314H with D- or better or MB 302 with D- or better

MB 440. FOOD MICROBIOLOGY. (3 Credits)
Role of microorganisms in food spoilage, infection, and intoxication; also basic principles in contamination control and germicidal treatment during processing, preparing, and distributing food for consumption.

Prerequisites: MB 302 with D- or better

MB 441. FOOD MICROBIOLOGY LABORATORY. (2 Credits)
Laboratory techniques to accompany MB 440/MB 540.

Prerequisites: (MB 303 with D- or better or MB 303H with D- or better) and MB 440 (may be taken concurrently) [D-]
Recommended: MB 302

MB 448. MICROBIAL ECOLOGY. (3 Credits)
A comparison of soil sediments and freshwater as microbial habitats. Discussion of the role of microorganisms in nutrient cycles, effects of microbial activity on plant and animal life.

Prerequisites: MB 302 with D- or better

MB 456. MICROBIAL GENETICS AND BIOTECHNOLOGY. (3 Credits)
General biology of natural, genetically engineered, and composite plasmids. Major topics include extrachromosomal DNA replication, plasmid transmission, insertion elements, transposons, gene expression, and recombinant DNA vectors. Biotechnological applications and molecular genetic tools are emphasized.

Prerequisites: MB 302 with D- or better and (BB 450 [D-] or BB 490 [D-]) and (BB 451 [D-] or BB 491 [D-]) and (MB 310 [D-] or BB 492 [D-])

MB 479. FERMENTATION MICROBIOLOGY. (3 Credits)
An introduction to industrial microbiology with a focus on the physiology of fermentation and use of microorganisms for the production of food ingredients, fermented foods, and beverages. FST students need to take BB 350 and MB students need to take BB 450 for their respective majors. CROSSLISTED as FST 479/FST 579.

Prerequisites: (BI 212 with C- or better or BI 212H with C-/or better) and CH 331 [C-] and CH 332 [C+] and (BB 350 [D-] or BB 450 [D-] and MB 302 [D-])
Equivalent to: FST 479
MB 480. GENERAL PARASITOLOGY. (3 Credits)
Introduction to parasitology. The course emphasizes medical parasitology, but will cover a broad overview of parasitology, covering important groups and host/parasite relationships among all taxa from invertebrates to vertebrates, including mammals.
Recommended: BI 314 or BB 450 or Z 361 or MB 302

MB 490. MICROBIOLOGY CAPSTONE EXPERIENCE. (2 Credits)
Capstone experience for microbiology students to practice professional skills necessary to sustain a career in science. Students will work in teams to analyze research data and communicate this analysis, in addition to explore career opportunities and learn how to successfully compete for jobs. Graded P/N.
Prerequisites: MB 302 with D- or better

MB 491. FISH DISEASES IN CONSERVATION BIOLOGY AND AQUACULTURE. (3 Credits)
Introduction to diseases of fish including pathogens important to aquaculture and ornamental industries as well as to wild fish populations and conservation programs. CROSSLISTED as FW 491/FW 591.
Equivalent to: FW 491
Recommended: 9 credits of upper-division fisheries or biology.

MB 496. FISH DISEASES IN CONSERVATION BIOLOGY AND AQUACULTURE LAB. (2 Credits)
This laboratory complements lectures in FW/MB 491/591, with students learning basic necropsy techniques; identification of bacterial, viral and metazoan pathogens; and molecular identification methods. CROSSLISTED as FW 496/FW 596.
Equivalent to: FW 496
Recommended: MB 303 or other upper-division laboratory course.

MB 499. SPECIAL TOPICS. (1-16 Credits)
This course is repeatable for 16 credits.
Recommended: One term of biology

MB 501. RESEARCH. (1-16 Credits)
PREREQ: Departmental approval required.
This course is repeatable for 16 credits.

MB 503. THESIS. (1-16 Credits)
This course is repeatable for 999 credits.

MB 505. READING AND CONFERENCE. (1-16 Credits)
This course is repeatable for 16 credits.

MB 507. SEMINAR. (1 Credit)
Graded P/N.
This course is repeatable for 99 credits.

MB 510. INTERNSHIP. (1-16 Credits)
This course is repeatable for 16 credits.

MB 511. SCIENTIFIC SKILLS. (1 Credit)
Foundational skills for success in graduate school. Students will also become familiar with ongoing research programs in three active programs in the Microbiology Program.

MB 512. HIGHLIGHTS OF MICROBIOLOGY. (1 Credit)
Designed for students to gain familiarity with the history of microbiology through reading, reviewing and writing about great papers in the field. Students also meet the Microbiology Program faculty and students, and learn about some of the research in the Microbiology Program through attending colloquium.

MB 513. MICROBIAL SYSTEMS. (3 Credits)
Presentation of a modern view of microbiology through the lens of microbes’ influences on our planet’s habitats and inhabitants. Discusses current research and the use of advanced techniques to illustrate how microbiology is contributing to many cross-disciplinary problems that can involve engineering, public health, sociology, ecology, geology, etc.

MB 516. IMMUNOLOGY. (3 Credits)
Basic theory and applications of immunochemistry, immunogenetics, and cellular immunology. Examination of immunologically related diseases.
Recommended: BB 450 or BB 490

MB 517. IMMUNOLOGY LABORATORY. (2 Credits)
Laboratory on the applications of current immunological techniques.
Recommended: (MB 303 or MB 303H) and completion or concurrent enrollment in MB 516

MB 520. MICROBIAL GENOMES, BIOGEOCHEMISTRY, AND DIVERSITY. (3 Credits)
A survey of microbial diversity from the earliest lifeforms to the modern role of bacteria and archaea in global biogeochemical cycles. Topics covered include molecular evolution, microbial genomics, biochemical diversity, and metabolic pathways that adapt cells to extreme environments. Particular emphasis is placed on marine systems, from photosynthesis in surface waters to life in the ocean crust.
Recommended: BB 451 or BB 551

MB 530. BACTERIAL PATHOGENESIS. (3 Credits)
Bacteria pathogenic for humans, emphasizing the structural, physiological and genetic mechanisms of pathogenesis. Role of the immune system in pathogenesis and protection.
Recommended: MB 302 and MB 310 and (BB 451 or BB 491)

MB 534. VIROLOGY. (3 Credits)
Properties of viruses, their biology and pathogenesis. Emphasis on viruses causing human disease.
Recommended: ((BB 450 or BB 450H) and (BB 451 or BB 451H)) or (BB 490 and BB 491 and BB 492)

MB 540. FOOD MICROBIOLOGY. (3 Credits)
Role of microorganisms in food spoilage, infection, and intoxication; also basic principles in contamination control and germicidal treatment during processing, preparing, and distributing food for consumption.
Recommended: MB 302

MB 541. FOOD MICROBIOLOGY LABORATORY. (2 Credits)
Laboratory techniques to accompany MB 440/MB 540.
Prerequisites: MB 540 (may be taken concurrently) with C or better
Recommended: MB 302 and MB 303

MB 548. MICROBIAL ECOLOGY. (3 Credits)
A comparison of soil sediments and freshwater as microbial habitats. Discussion of the role of microorganisms in nutrient cycles, effects of microbial activity on plant and animal life.
Recommended: MB 302

MB 555. BIOLOGY OF THE PROKARYOTES. (3 Credits)
An integrative graduate course examining bacterial and archaeanal life at different levels of biological organization, emphasizing current research and analysis of primary literature. The various life styles of prokaryotes are the common theme of the course. Topics include biofilms, cooperation and communication, development, stress responses, metabolic interactions involved in global nutrient cycling. Offered every even year in winter term.
Recommended: BB 450 and MB 310 and MB 312
**MB 556. MICROBIAL GENETICS AND BIOTECHNOLOGY. (3 Credits)**
General biology of natural, genetically engineered, and composite plasmids. Major topics include extrachromosomal DNA replication, plasmid transmission, insertion elements, transposons, gene expression, and recombinant DNA vectors. Biotechnological applications and molecular genetic tools are emphasized.
**Recommended:** MB 302 and (BB 450 or BB 490) and (BB 451 or BB 491) and (MB 310 or BB 492)

**MB 579. FERMENTATION MICROBIOLOGY. (3 Credits)**
An introduction to industrial microbiology with a focus on the physiology of fermentation and use of microorganisms for the production of food ingredients, fermented foods, and beverages. CROSSLISTED as FST 479/FST 579.
**Equivalent to:** FST 579
**Recommended:** (BI 212 or BI 212H) and CH 331 and CH 332 and (BB 350 or BB 450) and MB 302

**MB 580. GENERAL PARASITOLOGY. (3 Credits)**
Introduction to parasitology. The course emphasizes medical parasitology, but will cover a broad overview of parasitology, covering important groups and host/parasite relationships among all taxa from invertebrates to vertebrates, including mammals.
**Recommended:** BI 314 or BB 450 or Z 361 or MB 302

**MB 591. FISH DISEASES IN CONSERVATION BIOLOGY AND AQUACULTURE. (3 Credits)**
Introduction to diseases of fish including pathogens important to aquaculture and ornamental industries as well as to wild fish populations and conservation programs. CROSSLISTED as FW 491/FW 591.
**Equivalent to:** FW 591
**Recommended:** 9 credits of upper-division fisheries or biology.

**MB 596. FISH DISEASES IN CONSERVATION BIOLOGY AND AQUACULTURE LAB. (2 Credits)**
This laboratory complements lectures in FW/MB 491/591, with students learning basic necropsy techniques; identification of bacterial, viral and metazoan pathogens; and molecular identification methods. CROSSLISTED as MB 496/MB 596.
**Equivalent to:** FW 596
**Recommended:** MB 303 or other upper-division laboratory course.

**MB 599. SELECTED TOPICS. (0-6 Credits)**
This course is repeatable for 24 credits.

**MB 601. RESEARCH. (1-16 Credits)**
This course is repeatable for 16 credits.

**MB 603. THESIS. (1-16 Credits)**
This course is repeatable for 999 credits.

**MB 605. READING AND CONFERENCE. (1-16 Credits)**
This course is repeatable for 16 credits.

**MB 607. SEMINAR. (1 Credit)**
Graded P/N.
**This course is repeatable for 99 credits.**

**MB 610. INTERNSHIP. (1-9 Credits)**
This course is repeatable for 16 credits.

**MB 668. MICROBIAL BIOINFORMATICS AND GENOME EVOLUTION. (4 Credits)**
Theoretical and practical issues in microbial genome sequencing and annotation, with an emphasis on evolutionary theory and comparative analysis of microbial genome sequences. Metabolic prediction from genomes, with a population genetics perspective on comparative microbial genomics. Exploration of applications of genomics and allied tools to microbial populations, including metagenomics, metaproteomics, and metatranscriptomics.

**MB 699. SPECIAL TOPICS. (0-16 Credits)**
Lec/lab.
**This course is repeatable for 16 credits.**