**Microbio, Immun, Pathology-MIP (MIP)**

**Courses**

**MIP 101 Introduction to Human Disease (GT-SC2)**  Credits: 3 (3-0-0)
Course Description: Survey of human systems and diseases.
Prerequisite: None.
Term Offered: Spring.
Grade Mode: Traditional.
Special Course Fee: No.

**MIP 149 The Microbial World**  Credits: 3 (3-0-0)
Course Description: Importance of microbiology in daily life, with emphasis on positive and negative roles of microbes, infectious disease, and current microbiology issues.
Prerequisite: None.
Term Offered: Fall.
Grade Mode: Traditional.
Special Course Fee: No.

**MIP 150 Introduction to Research Methods**  Credits: 3 (0-6-0)
Course Description: Undergraduate research experience highlighting fundamental skills of laboratory research while working towards the goal of novel microbial discovery.
Prerequisite: None.
Terms Offered: Fall, Spring.
Grade Mode: Traditional.
Special Course Fee: No.

**MIP 192 Microbiology First-Year Seminar**  Credits: 2 (0-0-2)
Course Description: Introduction to microbiology major and faculty; academic and career planning; information sources in biomedical sciences.
Prerequisite: None.
Term Offered: Fall.
Grade Mode: Traditional.
Special Course Fee: No.

**MIP 250 Eukaryotic Microbiology**  Credits: 3 (3-0-0)
Course Description: Cell biology topics with emphasis on eukaryotic microbes. Topics include the central dogma of molecular biology, cell structure and function, and cell membranes as they relate to the importance of the host cell as well as parasites. Spotlight microbes will be studied that depict many eukaryotic processes important in cell biology, human health, and scientific models.
Prerequisite: CHEM 111, may be taken concurrently and LIFE 102.
Term Offered: Fall.
Grade Mode: Traditional.
Special Course Fee: No.

**MIP 260 The World of Parasites**  Credits: 3 (3-0-0)
Course Description: Introduction to parasitology; evolution, ecology, epidemiology, physiology, and morphology of representative parasites of every group.
Prerequisite: (CHEM 111) and (BZ 110 or LIFE 102).
Term Offered: Spring.
Grade Mode: Traditional.
Special Course Fee: No.

**MIP 275 Microcomputing Applications in Microbiology**  Credits: 2 (1-0-1)
Course Description: Network software on MS-DOS microcomputers will be used to acquire and analyze data and information that are commonly encountered in microbiology.
Prerequisite: None.
Registration Information: Must register for lecture and recitation.
Term Offered: Spring.
Grade Mode: Traditional.
Special Course Fee: No.

**MIP 298 Introductory Research**  Credits: Var[1-3] (0-0-0)
Course Description: Freshman/sophomore research experience in a working research environment.
Prerequisite: None.
Registration Information: Written consent of instructor required.
Terms Offered: Fall, Spring, Summer.
Grade Mode: Instructor Option.
Special Course Fee: No.

**MIP 300 General Microbiology**  Credits: 3 (3-0-0)
Course Description: Structure, function, development, physiology, and molecular biology of microorganisms emphasizing bacteria.
Prerequisite: (BZ 110 or BZ 120 or LIFE 102) and (CHEM 245, may be taken concurrently or CHEM 341, may be taken concurrently or CHEM 345, may be taken concurrently).
Registration Information: Sections may be offered: Online.
Terms Offered: Fall, Spring, Summer.
Grade Mode: Traditional.
Special Course Fee: No.

**MIP 302 General Microbiology Laboratory**  Credits: 2 (0-4-0)
Course Description: Laboratory skills and techniques for isolating, characterizing, and identifying bacteria.
Prerequisite: MIP 300, may be taken concurrently.
Terms Offered: Fall, Spring, Summer.
Grade Mode: Traditional.
Special Course Fee: No.

**MIP 303 General Microbiology--Honors Recitation**  Credit: 1 (0-0-1)
Course Description: Research and present topics related to the material presented in MIP 300.
Prerequisite: None.
Registration Information: Participation in the Honors Program required. Must have concurrent registration in MIP 300.
Terms Offered: Fall, Spring.
Grade Mode: Traditional.
Special Course Fee: No.

**MIP 315 Pathology of Human and Animal Disease**  Credits: 3 (3-0-0)
Course Description: Biological systems critical to mammalian physiology and how each is affected by metabolic, genetic, environmental, and infectious agents.
Prerequisite: BZ 110 or LIFE 102.
Terms Offered: Fall, Spring.
Grade Mode: Traditional.
Special Course Fee: No.

**MIP 334 Food Microbiology**  Credits: 3 (3-0-0)
Course Description: Microorganisms in production of foods, in preservation and spoilage, and in food-borne diseases. Control of microorganisms in foods.
Prerequisite: LIFE 205 or MIP 300.
Term Offered: Fall.
Grade Mode: Traditional.
Special Course Fee: No.
MIP 335 Food Microbiology Laboratory Credits: 2 (0-4-0)
Course Description: Laboratory skills and techniques related to the presence of microorganisms in food, production, and preservation.
Prerequisite: (LIFE 206 or MIP 302) and (MIP 334, may be taken concurrently).
Term Offered: Fall (odd years).
Grade Mode: Traditional.
Special Course Fee: No.

MIP 342 Immunology Credits: 4 (3-0-1)
Course Description: Principles of immunology: components of the immune system, interactions of humoral and cellular elements, and clinical applications of basic concepts.
Prerequisite: (CHEM 245, may be taken concurrently or CHEM 341, may be taken concurrently or CHEM 345, may be taken concurrently) and (LIFE 201B or LIFE 210 or MIP 300).
Registration Information: Must register for lecture and recitation.
Terms Offered: Fall, Spring.
Grade Mode: Traditional.
Special Course Fee: No.

MIP 343 Immunology Laboratory Credits: 2 (0-4-0)
Course Description: Techniques used in research and clinical immunology, including diagnostic problem solving and data analysis.
Prerequisite: MIP 302 and MIP 342, may be taken concurrently.
Term Offered: Spring.
Grade Mode: Traditional.
Special Course Fee: No.

MIP 350 Microbial Diversity Credits: 3 (3-0-0)
Course Description: Physiological, taxonomic, and phylogenetic aspects of microbial diversity. Yeasts and filamentous fungi as microbial entities.
Prerequisite: MIP 300.
Term Offered: Spring (odd years).
Grade Mode: Traditional.
Special Course Fee: No.

MIP 351 Medical Bacteriology Credits: 3 (3-0-0)
Course Description: Bacteria which cause human and veterinary diseases; host-parasite relationships, disease mechanisms, prevention, and therapy.
Prerequisite: MIP 342.
Term Offered: Spring.
Grade Mode: Traditional.
Special Course Fee: No.

MIP 352 Medical Bacteriology Laboratory Credits: 3 (0-6-0)
Course Description: Laboratory skills and techniques necessary for identifying medically important bacteria.
Prerequisite: MIP 302 and MIP 351, may be taken concurrently.
Term Offered: Spring.
Grade Mode: Traditional.
Special Course Fee: No.

MIP 354 Supervised College Teaching Credits: Var[1-5] (0-0-0)
Course Description: Prerequisite: None.
Registration Information: Written consent of department required.
Maximum of 10 credits allowed in course. A maximum of 10 combined credits for all 384 and 484 courses are counted towards graduation requirements.
Terms Offered: Fall, Spring, Summer.
Grade Mode: Instructor Option.
Special Course Fee: No.

MIP 400A Capstone in Microbiology: Medical Microbiology Credits: 2 (2-0-0)
Course Description: Prerequisite: (MIP 342) and (MIP 351, may be taken concurrently or MIP 420, may be taken concurrently).
Registration Information: Written consent of department required.
Terms Offered: Fall, Spring.
Grade Mode: Traditional.
Special Course Fee: No.

MIP 400B Capstone in Microbiology: Biotechnology Credits: 2 (0-0-2)
Course Description: Prerequisite: (BC 351 or BC 401) and (MIP 300).
Terms Offered: Fall, Spring.
Grade Mode: Traditional.
Special Course Fee: No.

MIP 400C Capstone in Microbiology: Immunology Credits: 2 (2-0-0)
Course Description: Prerequisite: (MIP 342) and (MIP 351, may be taken concurrently or MIP 420, may be taken concurrently).
Terms Offered: Fall, Spring.
Grade Mode: Traditional.
Special Course Fee: No.

MIP 400D Capstone in Microbiology: Microbial Diversity/Ecology Credits: 2 (2-0-0)
Course Description: Prerequisite: (MIP 342) and (MIP 351, may be taken concurrently or MIP 420, may be taken concurrently).
Terms Offered: Fall, Spring.
Grade Mode: Traditional.
Special Course Fee: No.

MIP 400E Capstone in Microbiology: Microbial Genetics Credits: 2 (2-0-0)
Course Description: Prerequisite: (MIP 342) and (MIP 351, may be taken concurrently or MIP 420, may be taken concurrently).
Terms Offered: Fall, Spring.
Grade Mode: Traditional.
Special Course Fee: No.

MIP 400F Capstone in Microbiology: Virology Credits: 2 (2-0-0)
Course Description: Prerequisite: (MIP 342) and (MIP 351, may be taken concurrently or MIP 420, may be taken concurrently).
Terms Offered: Fall, Spring.
Grade Mode: Traditional.
Special Course Fee: No.

MIP 400G Capstone in Microbiology: Service Learning Credits: 2 (2-0-0)
Course Description: Prerequisite: (MIP 342) and (MIP 351, may be taken concurrently or MIP 420, may be taken concurrently).
Registration Information: Written consent of department required.
Terms Offered: Fall, Spring.
Grade Mode: Traditional.
Special Course Fee: No.
MIP 401 Laboratory Research Methods in Microbiology Credits: 4 (0-6-1)
Course Description: Hands-on experience in laboratory research methods for students working individually on a project which stems from a larger research project of a faculty member's laboratory. All students will work in the same facility equipped with appropriate equipment and supplies to conduct the student research project.
Prerequisite: MIP 150 and MIP 300 and MIP 302.
Restriction: Must be a: Undergraduate.
Registration Information: Sophomore standing. Must register for laboratory and recitation.
Term Offered: Fall, Spring.
Grade Mode: Traditional.
Special Course Fee: No.

MIP 420 Medical and Molecular Virology Credits: 4 (4-0-0)
Course Description: Principles of animal virology: structure, classification, assay, diagnosis, control, replication, genetics, host-parasite relationships.
Prerequisite: (MIP 342 and BC 351, may be taken concurrently or BC 401, may be taken concurrently).
Term Offered: Fall.
Grade Mode: Traditional.
Special Course Fee: No.

MIP 425 Virology and Cell Culture Laboratory Credits: 2 (0-4-0)
Course Description: Isolation and characterization of viruses. Viral diagnostic and cell culture techniques.
Prerequisite: MIP 302 and MIP 420, may be taken concurrently.
Term Offered: Fall.
Grade Mode: Traditional.
Special Course Fee: No.

MIP 432 Microbial Ecology Credits: 3 (2-0-1)
Course Description: Principles of microorganism interactions with their living and non-living environments; implications for the environment, plants and animals.
Prerequisite: MIP 300.
Registration Information: Must register for lecture and recitation.
Term Offered: Spring (even years).
Grade Mode: Traditional.
Special Course Fee: No.

MIP 433 Microbial Ecology Laboratory Credit: 1 (0-3-0)
Course Description: Experimental microbial ecology; the design, conduct and interpretation of experiments that illustrate basic principles of microbial ecology.
Prerequisite: MIP 432, may be taken concurrently.
Term Offered: Spring (even years).
Grade Mode: Traditional.
Special Course Fee: No.

MIP 436 Industrial Microbiology Credits: 4 (2-4-0)
Course Description: Use of microorganisms for producing commercially valuable products.
Prerequisite: LIFE 206 or MIP 302.
Registration Information: Must register for lecture and laboratory.
Term Offered: Fall (even years).
Grade Mode: Traditional.
Special Course Fee: No.

MIP 443 Microbial Physiology Credits: 4 (3-0-1)
Course Description: Structure, function of bacterial constituents; comparison with other organisms. Bacterial growth, energy production, biosynthesis.
Prerequisite: (MIP 300) and (BC 351 or BC 401).
Registration Information: Must register for lecture and laboratory.
Term Offered: Spring.
Grade Mode: Traditional.
Special Course Fee: No.

MIP 450 Microbial Genetics Credits: 3 (3-0-0)
Course Description: Principles of genetics at molecular level; mutation, recombination, complementation, suppression, control of gene expression, and recombinant DNA.
Prerequisite: (MIP 300) and (BC 351, may be taken concurrently or BC 401, may be taken concurrently).
Term Offered: Fall.
Grade Mode: Traditional.
Special Course Fee: No.

MIP 462 Parasitology and Vector Biology Credits: 5 (3-4-0)
Also Offered As: BSPM 462 and BZ 462.
Course Description: Protozoa, helminthes, and insects and related arthropods of medical importance; systematics, epidemiology, host damage and control.
Prerequisite: (BZ 110 or LIFE 103) and (MIP 302 or LIFE 206 or BZ 212).
Registration Information: Credit allowed for only one of the following: MIP 462, BSPM 462, BZ 462. Must register for lecture and laboratory.
Term Offered: Fall.
Grade Mode: Traditional.
Special Course Fee: No.

MIP 492 Senior Professional Development Seminar Credits: 2 (1-0-1)
Course Description:
Prerequisite: MIP 342.
Registration Information: Microbiology majors only. Must register for lecture and recitation.
Term Offered: Fall.
Grade Mode: Traditional.
Special Course Fee: No.

MIP 495 Independent Study Credits: Var[1-18] (0-0-0)
Course Description:
Prerequisite: MIP 300.
Registration Information: Written consent of department required.
Terms Offered: Fall, Spring, Summer.
Grade Mode: Instructor Option.
Special Course Fee: No.

MIP 496 Group Study Credits: Var[1-3] (0-0-0)
Course Description: Faculty-supervised investigation of areas of special interest in microbiology, virology, microbial physiology, or microbial genetics.
Prerequisite: None.
Registration Information: Written consent of instructor required.
Terms Offered: Fall, Spring.
Grade Mode: Traditional.
Special Course Fee: No.
MIP 498 Research Credits: Var[1-3] (0-0-0)  
Course Description:  
Prerequisite: MIP 302.  
Registration Information: Written consent of instructor required.  
Terms Offered: Fall, Spring, Summer.  
Grade Mode: Instructor Option.  
Special Course Fee: No.  
MIP 520 Fundamentals of Prion Biology Credit: 1 (1-0-0)  
Course Description: Current state of prion research, future research directions, and the relationship of prion disease with other disease systems. Critical reading and synthesis of the literature, with an emphasis on writing skills.  
Prerequisite: (BC 351 or MIP 342) and (MIP 300).  
Registration Information: Junior standing. Credit not allowed for both MIP 520 and MIP 581A3.  
Term Offered: Fall.  
Grade Mode: Traditional.  
Special Course Fee: No.  
MIP 530 Advanced Molecular Virology Credits: 4 (3-0-1)  
Course Description: Virus-host interactions at the molecular and cellular level.  
Prerequisite: (BC 351 or BC 401) and (BC 463 or MIP 450).  
Registration Information: Must register for lecture and recitation.  
Term Offered: Spring (even years).  
Grade Mode: Traditional.  
Special Course Fee: No.  
MIP 533 Epidemiology of Infectious Diseases/Zoonoses Credits: 3 (2-0-1)  
Also Offered As: VS 533.  
Course Description: Epidemiologic features of infectious and parasitic diseases that have a major impact on community medicine.  
Prerequisite: MIP 300.  
Registration Information: Credit not allowed for both MIP 533 and VS 533. Must register for lecture and recitation.  
Term Offered: Spring.  
Grade Mode: Traditional.  
Special Course Fee: No.  
MIP 540 Biosafety in Research Laboratories Credits: 2 (2-0-0)  
Course Description: Practical applications of biosafety principles, including lab practices and regulatory aspects of research involving infectious microorganisms and rDNA.  
Prerequisite: MIP 300.  
Terms Offered: Fall, Spring.  
Grade Mode: Traditional.  
Special Course Fee: No.  
MIP 543 RNA Biology Credits: 3 (3-0-0)  
Course Description: Gene expression and regulation that occurs at the level of RNA (e.g., splicing, stability, export, translation, RNAi, etc.).  
Prerequisite: BC 351, may be taken concurrently or BC 401, may be taken concurrently.  
Term Offered: Fall (odd years).  
Grade Mode: Traditional.  
Special Course Fee: No.  
MIP 545 Microbial Metagenomics/Genomics Data Analysis Credits: 2 (2-0-0)  
Course Description: Microbiomes, microbes and their genetic material present in a host/environment, are linked to risk of disease in humans, animals, and plants. Metagenomics, including 16S rRNA community survey methods and shotgun metagenomics, use high throughput sequencing technology to provide insight into the composition and potential function of microbiomes. Hands-on experience with using bioinformatics and statistical tools necessary to process and analyze the resulting large datasets.  
Prerequisite: None.  
Registration Information: Senior standing. This is a partial semester course. Credit not allowed for both MIP 545 and MIP 581A2.  
Term Offered: Fall.  
Grade Mode: Traditional.  
Special Course Fee: No.  
MIP 550 Microbial and Molecular Genetics Laboratory Credits: 4 (2-6-0)  
Course Description: Use of both in vivo genetics and in vitro molecular techniques to study gene structure, function, and regulation in bacteria.  
Prerequisite: MIP 302 and MIP 450.  
Registration Information: Written consent of department required. Must register for lecture and laboratory.  
Term Offered: Spring.  
Grade Mode: Traditional.  
Special Course Fee: Yes.  
MIP 555 Principles and Mechanisms of Disease Credits: 3 (3-0-0)  
Course Description: Principles of disease processes; emphasis on reactivity of the diseased cell, tissue, organ, or organism.  
Prerequisite: BMS 300.  
Term Offered: Fall.  
Grade Mode: Traditional.  
Special Course Fee: No.  
MIP 563 Biology of Disease Vectors Credits: 3 (3-0-0)  
Course Description: Vector physiology and genomics, new strategies in vector control, and vector/host interactions.  
Prerequisite: MIP 462 or BSPM 462 or BZ 462.  
Term Offered: Spring (odd years).  
Grade Mode: Traditional.  
Special Course Fee: No.  
MIP 565 Next Generation Sequencing Platform/Libraries Credit: 1 (0-2-0)  
Also Offered As: BZ 565.  
Course Description: Theoretical and experimental aspects of next generation sequencing experiments with a focus on the Illumina platform. Students will create and sequence metagenomic and 16S rDNA libraries from soil samples and unknown bacterial cultures.  
Prerequisite: CM 505.  
Registration Information: This is a partial semester course. Credit allowed for only one of the following: BZ 565, CM 581A2, or MIP 565.  
Term Offered: Fall.  
Grade Mode: Traditional.  
Special Course Fee: No.  
MIP 570 Functional Genomics Credits: 3 (2-2-0)  
Course Description: State-of-the-art genomic tools with applications to studies of pathogenesis and pathophysiology of infectious diseases.  
Prerequisite: MIP 300 and MIP 302 and MIP 443 and MIP 450.  
Registration Information: Must register for lecture and laboratory.  
Term Offered: Fall.  
Grade Mode: Traditional.  
Special Course Fee: No.
MIP 576 Bioinformatics Credits: 3 (3-0-0)
Also Offered As: BSPM 576.
Course Description: Technical computing across platforms using bioinformatics tools in molecular analysis.
Prerequisite: BC 463 or BZ 310 or BZ 350 or CM 501 or CS 155 or ERHS 332 or MIP 275 or MIP 300 or MIP 450 or STAT 307.
Registration Information: Credit not allowed for both MIP 576 and BSPM 576.
Terms Offered: Fall, Spring.
Grade Mode: Traditional.
Special Course Fee: No.
MIP 577 Computer Analysis in Population Genetics Credits: 2 (0-4-0)
Also Offered As: BZ 577.
Course Description: Computational and statistical techniques and practical exercises in discrete and quantitative genetics.
Prerequisite: MIP 578, may be taken concurrently or BZ 578.
Registration Information: Credit not allowed for both MIP 577 and BZ 577.
Term Offered: Fall.
Grade Mode: Traditional.
Special Course Fee: No.
MIP 578 Genetics of Natural Populations Credits: 4 (3-0-1)
Also Offered As: BZ 578.
Course Description: Theoretical and empirical aspects of the genetics of natural populations; current molecular techniques and statistical analysis.
Prerequisite: (BZ 350 or LIFE 201A or LIFE 201B or SOCR 330) and (STAT 201 or STAT 301 or STAT 307 or ERHS 307).
Registration Information: Must register for lecture and recitation. Credit not allowed for both MIP 578 and BZ 578.
Term Offered: Fall.
Grade Mode: Traditional.
Special Course Fee: No.
MIP 611 Advanced Microbiological Research Methods Credits: 4 (2-0-2)
Course Description: In-depth presentation of the ever-growing arsenal of techniques needed to be an effective experimental microbiologist/molecular biologist.
Prerequisite: None.
Restriction: Must be a: Graduate, Professional.
Registration Information: Must register for lecture and recitation. Sections may be offered: Online. Enrollment in the face-to-face offering of the course requires admission to the M.S. in Microbiology, Immunology, and Pathology, Plan B.
Term Offered: Fall.
Grade Mode: Traditional.
Special Course Fee: No.
MIP 612 Applied Immunology Credits: 3 (3-0-0)
Course Description: Application of classic and modern principles in immunology currently being used in the medical, biotechnology and basic research fields.
Prerequisite: None.
Restriction: Must be a: Graduate, Professional.
Registration Information: Sections may be offered: Online. Enrollment in the face-to-face offering of the course requires admission to the M.S. in Microbiology, Immunology, and Pathology, Plan B.
Term Offered: Spring.
Grade Mode: Traditional.
Special Course Fee: No.
MIP 613 Applied Microbiology and Virology Credits: 4 (4-0-0)
Course Description: Application of bacteria, fungi and viruses in translational research, from drug and vaccine development to the generation of clean energy.
Prerequisite: None.
Restriction: Must be a: Graduate, Professional.
Registration Information: Sections may be offered: Online. Enrollment in the face-to-face offering of the course requires admission to the M.S. in Microbiology, Immunology, and Pathology, Plan B.
Term Offered: Fall.
Grade Mode: Traditional.
Special Course Fee: No.
MIP 614 Medical Microbiology Credits: 3 (3-0-0)
Course Description: In-depth examination of the pathogenic mechanisms of medically important bacteria, fungi, parasites and viruses.
Prerequisite: None.
Restriction: Must be a: Graduate, Professional.
Registration Information: Sections may be offered: Online. Enrollment in the face-to-face offering of the course requires admission to the M.S. in Microbiology, Immunology, and Pathology, Plan B.
Term Offered: Spring.
Grade Mode: Traditional.
Special Course Fee: No.
MIP 615 Ophthalmic Pathology Credit: 1 (1-0-0)
Course Description: Background in normal ocular histology as well as pathologic changes in the eye, taught through a combination of lectures and class discussions.
Prerequisite: None.
Restriction: Must be a: Graduate, Professional.
Term Offered: Fall.
Grade Mode: Traditional.
Special Course Fee: No.
MIP 616 Modern Molecular Biology for Microbiologists Credits: 4 (3-0-1)
Course Description: Develop a working knowledge in the theory and applications of modern molecular biology to applied and translational research uses in microbiology.
Prerequisite: None.
Restriction: Must be a: Graduate, Professional.
Registration Information: Admission to the M.S. in Microbiology, Immunology, and Pathology, Plan B program. Must register for lecture and recitation.
Term Offered: Fall.
Grade Mode: Traditional.
Special Course Fee: No.
MIP 617 Principles of Biodefense/Emerging Pathogens Credits: 3 (3-0-0)
Course Description: In-depth analysis of the physiology, biology and epidemiology of biodefense agents and emerging pathogens.
Prerequisite: None.
Restriction: Must be a: Graduate, Professional.
Registration Information: Admission to the M.S. in Microbiology, Immunology, and Pathology, Plan B program.
Term Offered: Spring.
Grade Mode: Traditional.
Special Course Fee: No.
MIP 618 MIP Masters Seminar Series  Credit: 1 (0-0-1)
Course Description: Foster the development of MIP master’s students by improving communication skills and discussion of cutting edge research.
Prerequisite: None.
Restriction: Must be a: Graduate, Professional.
Registration Information: Enrollment in an MIP graduate program. May be taken twice for credit.
Terms Offered: Fall, Spring.
Grade Mode: Traditional.
Special Course Fee: No.

MIP 619 MIP Masters Topics Credits: 2 (1-0-1)
Course Description: Foster the development of MIP master’s students by improving communication skills and discussion of cutting edge research.
Prerequisite: None.
Restriction: Must be a: Graduate, Professional.
Registration Information: Admission to the M.S. in Microbiology, Immunology, and Pathology, Plan B program. May be taken twice for credit.
Terms Offered: Fall, Spring.
Grade Mode: Traditional.
Special Course Fee: No.

MIP 624 Advanced Topics in Microbial Ecology Credits: 2 (1-0-1)
Course Description: Recent conceptual developments in microbial ecology, emphasizing theoretical aspects of microbial ecology, particularly in an evolutionary context.
Prerequisite: MIP 300 and MIP 432.
Restriction: Must be a: Graduate, Professional.
Registration Information: Must register for lecture and recitation.
Term Offered: Fall (odd years).
Grade Mode: Traditional.
Special Course Fee: No.

MIP 628 Immunity to Infection Credits: 3 (3-0-0)
Course Description: How microorganisms have evolved to counteract the immune system and how the immune system has evolved to resist microbes.
Prerequisite: None.
Restriction: Must be a: Graduate, Professional.
Term Offered: Spring (odd years).
Grade Mode: Traditional.
Special Course Fee: No.

MIP 630 Advances in Microbial Physiology Credits: 3 (3-0-0)
Course Description: Contemporary developments in bacterial structure, function, metabolism, and genetics.
Prerequisite: MIP 443.
Restriction: Must be a: Graduate, Professional.
Term Offered: Fall (even years).
Grade Mode: Traditional.
Special Course Fee: No.

MIP 636 Mechanisms of Viral Infection and Disease Credits: 4 (3-0-1)
Course Description: Cytopathic mechanisms, pathogenetic events in viral diseases; host response and antiviral immunity; cancer induction by DNA and RNA viruses.
Prerequisite: MIP 420 or MIP 530.
Restriction: Must be a: Graduate, Professional.
Registration Information: Must register for lecture and recitation.
Term Offered: Spring (odd years).
Grade Mode: Traditional.
Special Course Fee: No.

MIP 643 Grant Writing for Microbiology/Pathology Credit: 1 (1-0-0)
Course Description: To effectively communicate ideas, goals and approaches in a scientific grant proposal.
Prerequisite: None.
Restriction: Must be a: Graduate, Professional.
Registration Information: Enrollment in an MIP graduate program.
Term Offered: Spring.
Grade Mode: Traditional.
Special Course Fee: No.

MIP 651 Immunobiology Credits: 3 (3-0-0)
Course Description: Structure, function, regulation of immunoglobulins and the immune system. Cellular immunity including transplantation and cancer.
Prerequisite: MIP 342.
Restriction: Must be a: Graduate, Professional.
Term Offered: Fall.
Grade Mode: Traditional.
Special Course Fee: No.

MIP 654 Research Policies and Regulations Credit: 1 (1-0-0)
Course Description: Reviews CSU and federal policies, rules, and regulations on integrity, use of humans and animals, authorship, data, genetics, etc., using case studies.
Prerequisite: None.
Restriction: Must be a: Graduate, Professional.
Terms Offered: Fall, Spring.
Grade Mode: Traditional.
Special Course Fee: No.

MIP 666 Writing Scientific Manuscripts Credits: 3 (0-0-3)
Course Description: Writing biological science manuscripts for publication.
Prerequisite: None.
Restriction: Must be a: Graduate, Professional.
Registration Information: Written consent of instructor.
Term Offered: Fall (even years).
Grade Mode: Traditional.
Special Course Fee: No.

MIP 670 Molecular Immunology and Immunogenetics Credits: 3 (3-0-0)
Course Description: Molecular basis and genetics of immune response. Biochemistry of immunologically mediated diseases.
Prerequisite: MIP 651.
Restriction: Must be a: Graduate, Professional.
Term Offered: Fall (odd years).
Grade Mode: Traditional.
Special Course Fee: No.

MIP 675 Advanced Bioanalytic Pathology Credits: 2 (2-0-0)
Course Description: Laboratory medicine for post-graduate veterinarians and professional veterinary medical students.
Prerequisite: VM 724.
Restriction: Must be a: Graduate, Professional.
Registration Information: Written consent of instructor or DVM degree required.
Term Offered: Spring (even years).
Grade Mode: Traditional.
Special Course Fee: No.
MIP 698 Research Credits: Var[1-18] (0-0-0)
Course Description:
Prerequisite: None.
Restriction: Must be a: Graduate, Professional.
Registration Information: Enrollment in an MIP graduate program.
Terms Offered: Fall, Spring, Summer.
Grade Mode: Instructor Option.
Special Course Fee: No.

MIP 699 Thesis Credits: Var[1-18] (0-0-0)
Course Description:
Prerequisite: None.
Restriction: Must be a: Graduate, Professional.
Registration Information: Enrollment in an MIP graduate program.
Terms Offered: Fall, Spring, Summer.
Grade Mode: Instructor Option.
Special Course Fee: No.

MIP 700 Topics in Microbiology Credit: 1 (1-0-0)
Course Description: Current literature in bacteriology, virology, genetics, and immunology.
Prerequisite: MIP 300.
Restriction: Must be a: Graduate, Professional.
Registration Information: Must register for lecture and laboratory.
Term Offered: Spring (odd years).
Grade Modes: S/U within Student Option, Trad within Student Option.
Special Course Fee: No.

MIP 720 Methods of Carbohydrate Analysis Credits: 2 (1-3-0)
Also Offered As: ERHS 730.
Course Description: Structural analysis of complex carbohydrates using gas chromatography, mass spectrometry, and nuclear magnetic resonance.
Prerequisite: CHEM 346.
Restriction: Must be a: Graduate, Professional.
Registration Information: Must register for lecture and laboratory.
Term Offered: Spring (odd years).
Grade Modes: S/U within Student Option, Trad within Student Option.
Special Course Fee: No.

MIP 730 Principles of Flow Cytometry & Cell Sorting Credits: 2 (1-2-0)
Also Offered As: ERHS 730.
Course Description: Explores the background of flow cytometry, fluorescent molecules, experimental design, Flow Cytometry data Analysis, applications, and principles of cell sorting.
Prerequisite: None.
Restriction: Must be a: Graduate, Professional.
Registration Information: Must register for lecture and laboratory. This is a partial semester course. Credit not allowed for both ERHS 730 and MIP 730.
Term Offered: Spring.
Grade Mode: Traditional.
Special Course Fee: No.

MIP 740 Microbial and Molecular Genetics Credits: 3 (2-0-1)
Course Description: Molecular biology and genetics of prokaryotic and eukaryotic cells and their viruses; strategies for genetic manipulation.
Prerequisite: MIP 450.
Restriction: Must be a: Graduate, Professional.
Registration Information: Must register for lecture and recitation.
Term Offered: Spring (odd years).
Grade Mode: Traditional.
Special Course Fee: No.

MIP 760 Mechanisms of Bacterial Pathogenesis Credits: 3 (2-0-1)
Course Description: Mechanisms of bacterium-host interaction at molecular and cellular levels in pathogenesis of bacterial disease.
Prerequisite: BC 351 and MIP 342.
Restriction: Must be a: Graduate, Professional.
Registration Information: Must register for lecture and recitation.
Term Offered: Fall (odd years).
Grade Mode: Traditional.
Special Course Fee: No.

MIP 765 Comparative Neuropathology Credits: 2 (1-2-0)
Course Description: Spontaneous diseases of nervous system of domesticated, laboratory, and wild animals.
Prerequisite: None.
Restriction: Must be a: Graduate, Professional.
Registration Information: Must register for lecture and laboratory.
Term Offered: Spring (odd years).
Grade Mode: Traditional.
Special Course Fee: No.

MIP 766 Cytology--Clinical Pathology Credit: 1 (0-0-1)
Course Description: Discussion of cytology cases that are diagnostically challenging, medically interesting, or classic case examples. Discussions and microscopic reviews of the cases will be led by a clinical pathologist.
Prerequisite: MIP 786A and MIP 786B and MIP 786C.
Restriction: Must be a: Graduate, Professional.
Registration Information: Written consent of instructor.
Term Offered: Spring.
Grade Mode: S/U Sat/Unsat Only.
Special Course Fee: No.

MIP 767 Advanced General Pathology Credits: 3 (3-0-0)
Course Description: In-depth, detailed study of general pathology and molecular mechanisms of disease. Help prepare students in the Anatomic and/or Clinical Pathology Residency prepare for the ACVP Board examination. Enhance the pathology knowledge and skills of Professional Veterinary Medicine students and graduate students in related disciplines.
Prerequisite: None.
Restriction: Must be a: Graduate, Professional.
Term Offered: Fall.
Grade Mode: Traditional.
Special Course Fee: No.

MIP 768 Advanced Clinical Pathology Credits: 2 (2-0-0)
Course Description: In-depth clinical pathology (cytology, hematology, and biochemistry) for post-professional students in CVMBs residency and/or graduate degree programs.
Prerequisite: None.
Restriction: Must be a: Graduate, Professional.
Registration Information: Credit not allowed for both MIP 768 and MIP 768A2.
Term Offered: Spring.
Grade Mode: Traditional.
Special Course Fee: No.

MIP 778 Pathobiology of Laboratory Animals Credits: 3 (3-0-0)
Course Description: Unique natural biology and diseases of laboratory animal species emphasizing clinical, diagnostic, morpologic and clinical pathologic features.
Prerequisite: None.
Restriction: Must be a: Graduate, Professional.
Term Offered: Spring (even years).
Grade Mode: Traditional.
Special Course Fee: No.
MIP 784 Supervised College Teaching  Credits: Var[1-18] (0-0-0)
Course Description:
Prerequisite: None.
Restriction: Must be a: Graduate, Professional.
Registration Information: Written consent of department required.
Terms Offered: Fall, Spring, Summer.
Grade Mode: Instructor Option.
Special Course Fee: No.

MIP 786A Practicum: Comparative Gross and Histologic Pathology  Credits: Var[1-18] (0-0-0)
Course Description:
Prerequisite: None.
Restriction: Must be a: Graduate, Professional.
Registration Information: Written consent of department required.
Terms Offered: Fall, Spring, Summer.
Grade Mode: Instructor Option.
Special Course Fee: No.

MIP 786B Practicum: Surgical Pathology  Credits: Var[1-18] (0-0-0)
Course Description:
Prerequisite: None.
Restriction: Must be a: Graduate, Professional.
Registration Information: Written consent of department required.
Terms Offered: Fall, Spring, Summer.
Grade Mode: Instructor Option.
Special Course Fee: No.

MIP 786C Practicum: Clinical Pathology  Credits: Var[1-18] (0-0-0)
Course Description:
Prerequisite: None.
Restriction: Must be a: Graduate, Professional.
Registration Information: Written consent of department required.
Terms Offered: Fall, Spring, Summer.
Grade Mode: Instructor Option.
Special Course Fee: No.

MIP 786D Practicum: Comparative Medicine  Credits: Var[1-18] (0-0-0)
Course Description:
Prerequisite: None.
Restriction: Must be a: Graduate, Professional.
Registration Information: Written consent of department required.
Terms Offered: Fall, Spring, Summer.
Grade Mode: Instructor Option.
Special Course Fee: No.

MIP 792C Seminar: Microscopic and Bioanalytic Pathology  Credits: Var[1-3] (0-0-0)
Course Description:
Prerequisite: None.
Restriction: Must be a: Graduate, Professional.
Registration Information: M.S. and Ph.D. candidates only. Maximum of 3 credits allowed per subtopic.
Terms Offered: Fall, Spring, Summer.
Grade Mode: Instructor Option.
Special Course Fee: No.

MIP 792D Seminar: Anatomic Pathology  Credits: Var[1-3] (0-0-0)
Course Description:
Prerequisite: None.
Restriction: Must be a: Graduate, Professional.
Registration Information: M.S. and Ph.D. candidates only. Maximum of 3 credits allowed per subtopic.
Terms Offered: Fall, Spring, Summer.
Grade Mode: Instructor Option.
Special Course Fee: No.

MIP 795 Independent Study  Credits: Var[1-18] (0-0-0)
Course Description:
Prerequisite: None.
Restriction: Must be a: Graduate, Professional.
Registration Information: Written consent of department required.
Terms Offered: Fall, Spring, Summer.
Grade Mode: Instructor Option.
Special Course Fee: No.

MIP 796 Group Study  Credits: Var[1-18] (0-0-0)
Course Description:
Prerequisite: None.
Restriction: Must be a: Graduate, Professional.
Registration Information: Written consent of department required.
Terms Offered: Fall, Spring, Summer.
Grade Mode: Instructor Option.
Special Course Fee: No.

MIP 798 Research Credits: Var[1-18] (0-0-0)
Course Description:
Prerequisite: None.
Restriction: Must be a: Graduate, Professional.
Registration Information: Ph.D. candidates only. Maximum of 3 credits allowed per subtopic.
Terms Offered: Fall, Spring, Summer.
Grade Mode: Instructor Option.
Special Course Fee: No.
MIP 799 Dissertation Credits: Var[1-18] (0-0-0)
Course Description:
Prerequisite: None.
Restriction: Must be a: Graduate, Professional.
Registration Information: Ph.D. candidates only. Maximum of 3 credits allowed per subtopic.
Terms Offered: Fall, Spring, Summer.
Grade Mode: Instructor Option.
Special Course Fee: No.