Department of Microbiology, Immunology, and Pathology

Office in Pathology Building, Room 110
(970) 491-6144
cvmbs.colostate.edu/academics/mip/ (http://csu-cvmbs.colostate.edu/academics/mip/pages/default.aspx)

Professor Gregg Dean, Department Head
Associate Professor Mark Zabel, Associate Head for Graduate Education
Professor Erica Suchman, Associate Head for Undergraduate Education
Associate Professor Kristy Pabilonia, Associate Head for DVM and Clinical Service
Professor Jeff Wilusz, Program Coordinator, Plan B Master’s Degree Program

Undergraduate Majors
- Major in Microbiology

Minors
- Minor in Microbiology

Graduate

Graduate Programs in Microbiology, Immunology and Pathology

The department offers graduate programs (http://csu-cvmbs.colostate.edu/academics/mip/graduate/Pages/default.aspx) leading to Master of Science, Doctor of Philosophy, and combined Doctor of Veterinary Medicine/Doctor of Philosophy degrees. Students interested in graduate work should refer to the Graduate and Professional Bulletin and the Department of Microbiology, Immunology and Pathology (http://csu-cvmbs.colostate.edu/academics/mip/Pages/default.aspx).

The research programs (http://csu-cvmbs.colostate.edu/academics/mip/Pages/default.aspx) in the department provide excellent opportunities for graduate training in fundamentals of modern investigative microbiology, immunology, and pathobiology. An emphasis is placed on a multi-disciplinary approach to research problems. Areas of research strength in the department include bacteriology, immunology, mycobacterial diseases, prion biology, vector borne infectious diseases, and virology. Please visit the Department of Microbiology (http://csu-cvmbs.colostate.edu/academics/mip/graduate/Pages/Microbiology-MS-and-PhD-Program.aspx) for more information.

Master Programs
- Master of Science in Microbiology, Plan A*
- Master of Science in Microbiology, Plan B

Ph.D.
- Ph.D. in Microbiology*
- Ph.D. in Pathology*

* Please see department for program of study.

Courses

Microbiology, Immunology, and Pathology (MIP)

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.
Additional Information: Biological & Physical Sciences 3A, Natural & Physical Sciences w/o lab (GT-SC2).

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 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.
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  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: None.
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 384  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/Biosynthesis  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 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 not allowed for both MIP 462 and VS 533. Must register for lecture and laboratory.
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 500  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: 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 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: No.

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: Technical 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 576, 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: Enrollment in the face-to-face offering of the course requires admission to the M.S. in Microbiology, Immunology, and Pathology, Plan B. Sections may be offered: Online.
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: Enrollment in the face-to-face offering of the course requires admission to the M.S. in Microbiology, Immunology, and Pathology, Plan B. Sections may be offered: Online.
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.
<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
<th>Course Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>MIP 616</td>
<td>Modern Molecular Biology for Microbiologists</td>
<td>4</td>
<td>Develop a working knowledge in the theory and applications of modern molecular biology to applied and translational research uses in microbiology.</td>
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<td>Special Course Fee:</td>
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<td>Grade Mode:</td>
<td>Traditional</td>
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<td>Term Offered:</td>
<td>Fall</td>
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<tr>
<td>MIP 617</td>
<td>Principles of Biodefense/Emerging Pathogens</td>
<td>3</td>
<td>In-depth analysis of the physiology, biology and epidemiology of biodefense agents and emerging pathogens.</td>
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<td>Special Course Fee:</td>
<td>No</td>
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<tr>
<td>MIP 618</td>
<td>MIP Masters Seminar Series</td>
<td>1</td>
<td>Foster the development of MIP master’s students by improving communication skills and discussion of cutting edge research.</td>
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<td>Special Course Fee:</td>
<td>No</td>
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<tr>
<td>MIP 619</td>
<td>MIP Masters Topics</td>
<td>2</td>
<td>Foster the development of MIP master’s students by improving communication skills and discussion of cutting edge research.</td>
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<td>Special Course Fee:</td>
<td>No</td>
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<tr>
<td>MIP 624</td>
<td>Advanced Topics in Microbial Ecology</td>
<td>2</td>
<td>Recent conceptual developments in microbial ecology, emphasizing theoretical aspects of microbial ecology, particularly in an evolutionary context.</td>
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<td>Special Course Fee:</td>
<td>No</td>
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<tr>
<td>MIP 628</td>
<td>Immunity to Infection</td>
<td>3</td>
<td>How microorganisms have evolved to counteract the immune system and how the immune system has evolved to resist microbes.</td>
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<td>Prerequisite:</td>
<td>MIP 300 and MIP 432</td>
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<td>Restriction:</td>
<td>Must be a: Graduate, Professional</td>
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<td>Term Offered:</td>
<td>Fall (odd years)</td>
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<td>Grade Mode:</td>
<td>Traditional</td>
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<tr>
<td>MIP 630</td>
<td>Advances in Microbial Physiology</td>
<td>3</td>
<td>Contemporary developments in bacterial structure, function, metabolism, and genetics.</td>
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<td>Special Course Fee:</td>
<td>No</td>
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<tr>
<td>MIP 636</td>
<td>Mechanisms of Viral Infection and Disease</td>
<td>4</td>
<td>Cytopathic mechanisms, pathogenetic events in viral diseases; host response and antiviral immunity; cancer induction by DNA and RNA viruses.</td>
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<td>Prerequisite:</td>
<td>MIP 443</td>
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<td>Restriction:</td>
<td>Must be a: Graduate, Professional</td>
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<td>Term Offered:</td>
<td>Fall (odd years)</td>
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<td>Grade Mode:</td>
<td>Traditional</td>
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<td>MIP 643</td>
<td>Grant Writing for Microbiology/Pathology</td>
<td>1</td>
<td>To effectively communicate ideas, goals and approaches in a scientific grant proposal.</td>
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<td>Prerequisite:</td>
<td>MIP 420 or MIP 530</td>
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<td>Restriction:</td>
<td>Must be a: Graduate, Professional</td>
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<td>Term Offered:</td>
<td>Spring (odd years)</td>
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<td>Grade Mode:</td>
<td>Traditional</td>
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<tr>
<td>MIP 651</td>
<td>Immunobiology</td>
<td>3</td>
<td>Structure, function, regulation of immunoglobulins and the immune system. Cellular immunity including transplantation and cancer.</td>
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<td>Prerequisite:</td>
<td>MIP 342</td>
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<td>Restriction:</td>
<td>Must be a: Graduate, Professional</td>
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<td>Term Offered:</td>
<td>Fall</td>
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<td>Grade Mode:</td>
<td>Traditional</td>
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<tr>
<td>MIP 654</td>
<td>Research Policies and Regulations</td>
<td>1</td>
<td>Reviews CSU and federal policies, rules, and regulations on integrity, use of humans and animals, authorship, data, genetics, etc., using case studies.</td>
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<td>Prerequisite:</td>
<td>None</td>
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<td>Restriction:</td>
<td>Must be a: Graduate, Professional</td>
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<td>Term Offered:</td>
<td>Fall, Spring</td>
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<td>Grade Mode:</td>
<td>Traditional</td>
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**Department of Microbiology, Immunology, and Pathology**
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 (odd 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: 3  (3-0-0)
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 D.V.M. 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.
Terms Offered: Fall, Spring.
Grade Mode: Traditional.
Special Course Fee: No.

MIP 720  Methods of Carbohydrate Analysis  Credits: 2  (1-3-0)
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 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: Fall (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  Cytopathology--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 778 Pathobiology of Laboratory Animals  Credits: 3 (3-0-0)
Course Description: Unique natural biology and diseases of laboratory animal species emphasizing clinical, diagnostic, morphologic 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: Post-DVM graduate students only.
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: Post-DVM graduate students only.
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: Post-DVM graduate students only.
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: Post-DVM graduate students only.
Terms Offered: Fall, Spring, Summer.
Grade Mode: S/U Sat/Unsat Only.
Special Course Fee: No.

MIP 792A Seminar: Research/Faculty  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 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.