

Microbiology (MICB)

MICB 5650 Microbiome Seminar Series 1 Credit

Microbiomics touches upon a broad range of disciplines, including microbiology, immunology, biochemistry, and bioinformatics. This new discipline can further elucidate our understanding of the complex interactions among hosts, the immune system, and health at every stage of life. This seminar series will bring leading experts in the field of microbiome and introduce students to the broad range of current research such as human immune systems, wellness and aging, environmental health, neurological functions, and population health. The course will consist of lectures by instructors and guest speakers. The course will touch upon the role of next-generation microbial sequencing, including indications for, and how to interpret the results of the taxonomic and metagenomic analyses as an introduction to the advanced course on microbiomics and health.

Level: Graduate, Undergraduate

Grading: Main Campus (UGrad, Grad)

Course registration restrictions:

Enrollment is limited to Graduate level students.

MICB 6120 Immunology 3 Credits

The course will focus on the cells, organs and molecules of the immune system and how they contribute to discrimination of self from non-self. The paradigm used in the course will be the host response to infectious agents. Hypersensitivity, autoimmunity, graft rejection and tumor immunity will be considered as variations in the basic protective function of the immune system.

Level: Graduate, Undergraduate

Grading: Main Campus (UGrad, Grad)

Course registration restrictions:

Enrollment limited to students in the MS-BHTA-SM, MS-BSPA-SM, MS-MICB-SM or PHD-MICB-SM programs.

Enrollment is limited to Graduate level students.

MICB 6140 Bacteriology Mycology 3 Credits

The course will focus on principle human pathogenic bacteria and fungi. The host-pathogen relationship and antimicrobial therapy will be grounded in an understanding of the structure and physiology of medically-important prokaryotes and lower eukaryotes.

Level: Graduate, Undergraduate

Grading: Main Campus (UGrad, Grad)

Course registration restrictions:

Enrollment limited to students in the MS-BHTA-SM, MS-BSPA-SM, MS-MICB-SM or PHD-MICB-SM programs.

Enrollment is limited to Graduate level students.

MICB 6190 Biology/Biochem of Viruses 3 Credits

Biology and Biochemistry of Viruses: This course will cover the general principles of virology. Topics will include: the effects of viruses on human health and disease; laboratory approaches to studying viruses; virus structure and mechanisms of replication; host responses to virus infection and viral counter-responses; virus engineering - including vaccine development and gene therapy; the role of virus ecology in emerging viral diseases. The focus will be primarily on viruses that affect human health.

Level: Graduate, Undergraduate

Grading: Main Campus (UGrad, Grad)

Course registration restrictions:

Enrollment limited to students in the MS-BHTA, MS-BSPA, MS-MICB or PHD-MICB programs.

Enrollment is limited to Graduate level students.

MICB 6221 Adv Techniques in Microbiol I 1-3 Credits

Practical course on performing experiments which require use of ultracentrifuge, scintillation counting equipment, thin-layer and column chromatography, mass culture of organisms, acrylamide gel electrophoresis, PCR, DNA sequencing, and other techniques. Limited to Department of Microbiology and Immunology graduate students.

Level: Graduate

Grading: Main Campus (UGrad, Grad)

Equivalent to MICB 6220

Course registration restrictions:

Enrollment is limited to Graduate level students.

MICB 6222 Adv Techniques in Microbiol I 1-3 Credits

Practical course on performing experiments which require use of ultracentrifuge, scintillation counting equipment, thin-layer and column chromatography, mass culture of organisms, acrylamide gel electrophoresis, PCR, DNA sequencing, and other techniques. Limited to Department of Microbiology and Immunology graduate students..

Level: Graduate

Grading: Main Campus (UGrad, Grad)

Course registration restrictions:

Enrollment limited to students in the MS-MICB program.

MICB 6290 Mech of Microbial Pathogenesis 3 Credits

A course designed to explore the varied ways pathogenic bacteria overcome natural host defense, to describe host responses to infection, and to discuss the network of interactions between pathogen and man at the molecular and cellular level.

Level: Graduate, Undergraduate

Grading: Main Campus (UGrad, Grad)

Course registration restrictions:

Enrollment limited to students in the MS-BHTA, MS-BSPA, MS-MICB or PHD-MICB programs.

Enrollment is limited to Graduate level students.

MICB 6600 Concepts of Immunotherapy 3 Credits

This is a new course focusing on therapeutic approaches that target various features of the immune system to infections, cancer or immune based diseases such as autoimmunity. Topics will include fundamental concepts of immunology as these apply to therapies, and types of immunotherapy such as biologics, cell-based therapies, and therapeutic vaccines. The course will also provide overviews of different immunotherapeutic approaches, specific examples of therapeutic targets featuring both licensed and experimental small molecules, the challenges of immune-based therapies, and overviews of the development, features, and challenges of therapeutic vaccines. The course will also feature lectures by invited experts in various fields related to immune therapy and vaccine development. Students are encouraged, but not required, to take MICB-612 (Immunology) or an equivalent, prior to this course.

Level: Graduate, Undergraduate

Grading: Main Campus (UGrad, Grad)

Course registration restrictions:

Enrollment limited to students in the MS-BHTA, MS-BSPA, MS-MICB or PHD-MICB programs.

Enrollment is limited to Graduate level students.

MICB 6709 Immunogenetics:Evo/HumanHealt 2 Credits

The course focuses on the evolutionary forces and evolved systems that shape human health. We have inherited sophisticated immune systems developed over multi-million years to meet changing threats to health. Their present form is contingent on many evolutionary acquisitions in the progression from ancient innate recognition systems to the flexible learning associated with adaptive immunity. The basic processes that govern change - mutation, selection, and chance - are explored in detail, and the role and limitations of each in human health are discussed. The evolution of immune systems is studied using comparative approaches, from prokaryotes to modern humans via lampreys, jawed vertebrates, primates, apes, and our close relatives, the Neandertals and Denisovans. Potential selection drivers are investigated, and evidence of selective pressures is identified. The shortcomings of our immune systems are discussed, and the biotechnological approaches now being used to overcome known limitations are explored.

Level: Graduate

Grading: Main Campus (UGrad, Grad)

Course registration restrictions:

Enrollment is limited to Graduate level students.

MICB 6852 Sem: Microbiol/Immunology Fall 1 Credit

This seminar will contain a variety of research-based lectures in the field of Microbiology & Immunology. External lectures will be supplemented by presentations of current Ph.D. students in Microbiology & Immunology.

Level: Graduate, Undergraduate

Grading: Pass/Fail Default

Course registration restrictions:

Enrollment limited to students in the MS-BHTA-SM, MS-BSPA-SM, MS-MICB-SM or PHD-MICB-SM programs.

Enrollment is limited to Graduate level students.

MICB 6853 Sem:Microbiol/Immunology Sprng 1 Credit

This seminar will contain a variety of research-based lectures in the field of Microbiology & Immunology. External lectures will be supplemented by presentations of current Ph.D. students in Microbiology & Immunology.

Level: Graduate

Grading: Pass/Fail Default

Course registration restrictions:

Enrollment limited to students in the MS-BHTA, MS-BSPA, MS-MICB or PHD-MICB programs.

Enrollment is limited to Graduate level students.

MICB 7008 Immunogenetics in Health Dis 2 Credits

The course will consist of a lecture series composed of the following themes: Distinction of self and non-self – why is it important. Origins of innate and of adaptive immunity. Generation of diversity for T-cell and B-cell receptors and for major histocompatibility (HLA) systems. The genetic and the molecular basis of disease associations with HLA. Understanding why HLA is the most critical locus for so many complex diseases. Genetics of natural killer cell receptors. Phases in cancer: elimination, equilibrium and escape. Cancer genome project: driver and passenger mutations. Immunotherapy in cancer. The microbiome in immunity and cancer. The students will be guided to understanding the origins and functions of the systems that protect the body from invasion. The course will explore the unique genetic systems that generate the wide diversity of antigen receptors which learn how to recognize molecular features distinguishing our proteins and metabolites from those of invading parasites, microbes and viruses. The genetics of the human leukocyte antigen (HLA) system is explored, as well as that of the T-cell and B-cell receptors. Genome wide association studies (GWAS) indicate the strongest associations with diverse diseases ranging from the infectious (e.g. leprosy, viral control of HIV and HBV) to the complex and autoimmune (e.g. narcolepsy, rheumatoid arthritis, diabetes, multiple sclerosis, schizophrenia, psoriasis, irritable bowel disease) occur in the HLA region. The molecular and evolutionary reasons that make the HLA an epicenter of disease are explained and individual disease associations studied in addition to the role of HLA polymorphisms in transplant histocompatibility. Connections between cancer and immunity are explored. The elimination of aberrant cells can be compromised by the occurrence of lesions sheltered from the immune system in cancer. Equilibrium occurs in which altered-self remains un-eliminated while chronic inflammation generates a tumor microenvironment that promotes growth and ultimately migration of cancerous cells. The students explore the technologies (next generation and single cell sequencing) that have enabled the simultaneous profiling of genetic and metabolic markers in multiple cancers. The roles of the microbiome in responses to therapy are examined. Immunotherapy (Science breakthrough of 2013) is explored. The targeting of checkpoint inhibitors is shown to promote the renewal of immune function against the tumor cells and their elimination from the body.

Level: Graduate

Grading: Main Campus (UGrad, Grad)

Course registration restrictions:

Enrollment limited to students in the following programs:

- MS-BHTA
- MS-BHTA-SM
- MS-BSPA
- MS-BSPA-SM
- MS-MICB
- MS-MICB-SM
- PHD-MICB
- PHD-MICB-SM

Enrollment is limited to Graduate level students.

MICB 7949 Tutorial Microbiology 0-3 Credits

Level: Graduate

Grading: Main Campus (UGrad, Grad)

MICB 9000 Tutorial 0-3 Credits

Level: Graduate

Grading: Main Campus (UGrad, Grad)

Course registration restrictions:

Enrollment is limited to Graduate level students.

MICB 9985 MICB Lab Rotation Summer

Level: Graduate

Grading: Pass/Fail Default

Course registration restrictions:

Enrollment is limited to Graduate level students.

MICB 9986 MICB Lab Rotation Fall

Level: Graduate

Grading: Pass/Fail Default

Course registration restrictions:

Enrollment is limited to Graduate level students.

MICB 9987 MICB Lab Rotation Spring

Level: Graduate

Grading: Pass/Fail Default

Course registration restrictions:

Enrollment is limited to Graduate level students.

MICB 9991 Continuous Registration

Level: Graduate, Undergraduate

Grading: No Grade

Course registration restrictions:

Enrollment is limited to Graduate level students.

MICB 9992 Continuous Registration

Level: Graduate, Undergraduate

Grading: No Grade

Course registration restrictions:

Enrollment is limited to Graduate level students.

MICB 9993 Continuous Registration

Level: Graduate, Undergraduate

Grading: Main Campus (UGrad, Grad)

Course registration restrictions:

Enrollment is limited to Graduate level students.

MICB 9994 Continuous Registration

Level: Graduate, Undergraduate

Grading: No Grade

Course registration restrictions:

Enrollment is limited to Graduate level students.

MICB 9999 Thesis Research

Level: Graduate, Undergraduate

Grading: No Grade

Course registration restrictions:

Enrollment is limited to Graduate level students.