VETERINARY AND BIOMEDICAL SCIENCES (VBSC)

VBSC 503: Critical Elements of Genetics and Molecular and Cellular Biology

4 Credits

Foundational topics and critical analysis in evolution, genetics, molecular and cellular biology and cell differentiation. BIOL (/BMMB/MCIBS/ VB SC) 503 Critical Elements of Genetics and Molecular and Cellular Biology (4) Central elements in genetics, genomics and molecular and cell biology will be covered. The course will focus on foundational principles and concepts that will allow students to understand the behavior of proteins and organelles within cells, and to appreciate how intracellular events influence interactions of cells with one another in multicellular systems and during development. Another major focus will be genome architecture, both in the context of evolution and gene expression. Students will also learn how genetic approaches can be used to understand cell and molecular biology, and will develop critical thinking skills through the analysis of the primary scientific literature. The course will include lecture and discussion sessions.

Cross-listed with: BIOL 503, MCIBS 503

VBSC 511: Molecular Immunology

2 Credits

The study of molecular and biochemical events that influence immune responses and define current questions in immunology. BMMB 511 / MCIBS 511 / VBSC 511 Molecular Immunology (2) The goals of the course are to integrate the current questions of immunology with other disciplines, in particular cell biology and biochemistry, and to provide training in critical thinking and evaluation of data and experiments. The course will be approximately 2/3 lecture by the instructor and 1/3 student presentations of papers related to the material. In addition, written critical reviews of recently published papers and a short research proposal will be assigned. By focusing on the mechanisms involved in immunity and disease, this course complements several existing courses on immunology, virology, and biochemistry. The prerequisites of MICRB 410 and BMB 400 assure that the students enrolling in the course have a general understanding of immunology and biochemistry. This course is projected as an elective for the Molecular Medicine and Immunobiology focus areas in the MCIBS graduate program and for the Pathobiology and BMMB graduate programs. The course will be offered in the fall semester with an enrollment limit of 20 students

Prerequisite: B M B400 , MICRB410
Cross-listed with: BMMB 511, MCIBS 511

VBSC 514: Prostaglandins and Leukotrienes

3 Credits

Biochemical, physiological, and nutritional aspects of arachidonic acid and related essential fatty acid metabolism. Structure-activity relationships of prostaglandins, prostacyclins, thromboxanes, and leukotrienes.

Prerequisite: BIOCH402 or BIOCH437

Cross-listed with: NUTR 514

VBSC 520: Pathobiology

3 Credits

This course provides students with opportunities to read, present, and discuss current papers from the scientific literature. The papers will reflect new and innovative methods of studying the molecular mechanisms by which viral and bacterial pathogens infect hosts, evade immune defenses, and cause disease. Additional topics include immunological basis for disease, and new strategies for development of vaccines and therapeutics. Students will learn and evaluate new experimental approaches and techniques, and think critically about data interpretation. The course also provides opportunities for students to develop and refine both scientific writing and oral presentation skills in preparation for graduate-level qualifying and comprehensive exams.

Prerequisite: V SC 420 ; BIOCH401 or BIOCH437

VBSC 534: Current Topics in Cancer Research

3 Credits

A discussion of current cancer research literature with the focus on primary research literature. VB SC 534 Current Topics in Cancer Research (3) Students enrolled in Current Topics in Cancer Research will acquire knowledge of focused areas in cancer research including basic biology of cancer cells, genes and signaling pathways that control cancer cell growth and metastasis, molecular methods for analysis of human and animal cancers, specific animal models of cancer and molecular approaches to cancer therapy. Emphasis will be placed on critical reading of primary literature, identification of strengths and weaknesses of methods, approach and conclusions of specific studies and implications of the research for future studies and understanding of cancer and therapy. This course will provide a solid foundation and companion for other specialized courses in a diverse group of graduate degree programs as well as the critical thinking and analysis required for completion of a doctoral program.

Prerequisite: BIOL 413 or BIOL 416 or B M B400 or B M B433 or B M B460

VBSC 535: Oncology: Bench to Bedside

3 Credits

This course is required for graduate students in the MCIBS program who are in the Cancer Biology Emphasis Area. It is designed to give students who are studying cancer at a molecular, reductive level experience with the clinical aspects of the disease. The course will be held at Mt. Nittany Medical Center once a week for 3 hrs, in both patient-oriented, hands-on and didactic settings to understand how cancer is diagnosed, imaged, and treated, how patient care and side effects of therapy are managed, and the importance of clinical trials in developing new treatments for cancer. For each subject area students will spend 2 hours engaged in a clinical experience related to cancer under the supervision of course directors or additional clinicians at Mt. Nittany, followed by a 1 hour lecture/didactic session on a related topic. In addition to broad learning objectives, this course will make students aware of critical issues in cancer biology and treatment that may serve as a springboard for future research.

Prerequisite: MCIBS 503, MCIBS 590, BIOL 416; VBSC 534
Cross-listed with: MCIBS 535

VBSC 555: Principles of Metabolomics

3 Credits

Metabolomics is broadly defined as the comprehensive measurement of low-molecular weight molecules present within an organism, cell, or tissue. As a newer -omics technology, it has found applications in a number of disciplines, including biomedical studies, drug discovery, environmental and ecological monitoring, plant biology, toxicology, and food science. This course teaches the general principles of metabolomics studies and analysis. The objectives of this course include: Demonstrate an understanding of the nature of metabolomics investigations and methods that enter into reproducible, rigorous studies; describe the instrumental and chemical considerations involved in gathering robust data; apply uni- and multi-variate statistical analyses to the data; demonstrate an understanding of interpretation strategies and how to relate statistical analyses to the original sample system; and apply knowledge of metabolomics in discussing emerging instrumental and analytical strategies. This course is designed for those interested in incorporating metabolomics analyses into their research programs, as well as those interested in this emerging -omics technology and its applications to human, plant, animal, and environmental systems. While there is no formal perquisite or requirement for statistics prior to taking this course, it should be understood that a lot of data analysis techniques surrounding metabolomics involves univariate and multivariate statistics. Thus, an understanding of basic statistics is recommended to maximize the benefits of this course. The course will include in-person interaction with both the Metabolomics Core Facility and the NMR Core Facility to gain some hands-on experience on sample submission and operation of the instruments in question.

Recommended Preparations: An understanding of basic statistics and chemical principles is recommended to maximize the benefits of this course

VBSC 590: Colloquium

1-3 Credits/Maximum of 3

Continuing seminars which consist of a series of individual lectures by faculty, students, or outside speakers.

VBSC 596: Individual Studies

1-9 Credits/Maximum of 9

Creative projects, including nonthesis research, which are supervised on an individual basis and which fall outside the scope of formal courses.

VBSC 597: Special Topics

1-9 Credits/Maximum of 9

Formal courses given on a topical or special interest subject whihc may be offered infrequently; several different topics may be taught in one year or semester.

VBSC 597A: **SPECIAL TOPICS**

1-3 Credits

VBSC 597B: **SPECIAL TOPICS**

1-2 Credits

VBSC 597F: **SPECIAL TOPICS**

1 Credits

VBSC 597G: **SPECIAL TOPICS**

1 Credits

VBSC 600: Thesis Research

1-15 Credits/Maximum of 999

No description.

VBSC 601: Ph.D. Dissertation Full-Time

0 Credits/Maximum of 999

No description.

VBSC 602: Supervised Experience in College Teaching

1-3 Credits/Maximum of 6

Experience in preparing and conducting lectures/laboratories and assembling materials for laboratories.