

MOLECULAR BIOLOGY AND GENETICS (MBG)

MBG*1000 Genetics and Society Winter Only (LEC: 3, LAB: 1) [0.50]

This course covers the basic principles of genetics at work in human society. The roles of genes and inheritance in the biology of humans and the organisms with which we interact. Introduction to some of the social and ethical consequences of genetic knowledge and practice. This is a science course designed primarily for students in the Arts or Social and Applied Human Sciences.

Restriction(s): Students in the BAS, BSC and BSC.ENV program cannot take this course for credit.

Department(s): Department of Molecular and Cellular Biology

Location(s): Guelph

MBG*2040 Foundations in Molecular Biology and Genetics Fall and Winter (LEC: 4) [0.50]

This course will develop an understanding of the fundamental concepts in genetics, including patterns of inheritance, allelic variation, gene interaction, linkage, gene mapping and changes in chromosome structure and number. This will be followed by in-depth discussions on gene structure, replication, transcription, translation, recombination, mutation and DNA repair, and an introduction to gene regulation.

Prerequisite(s): 4.00 credits including BIOL*1090

Department(s): Department of Molecular and Cellular Biology

Location(s): Guelph

MBG*2400 Fundamentals of Plant and Animal Genetics Fall Only (LEC: 3, LAB: 2) [0.50]

Fundamental aspects of plant and animal genetics are covered in this course including the chromosomal basis of inheritance, natural and artificial selection, domestication, epigenetics and quantitative traits. Population dynamics and the effect of selection on allele frequencies will be introduced with examples from agricultural crop and animal species and companion animal species. Genomics will be introduced with an emphasis on the development and use of molecular genetic markers in marker assisted selection.

Prerequisite(s): (BIOL*1050 or BIOL*1070), BIOL*1090

Department(s): Department of Animal Biosciences

Location(s): Guelph

MBG*3040 Molecular Biology of the Gene Fall Only (LEC: 3) [0.50]

In this course, the structure, expression, control and modification of eukaryotic genes will be discussed with an emphasis on the underlying mechanisms and structure/function relationships. Many topics covered in introductory courses are included but discussed at a more advanced level. Students will have the opportunity to learn current genetic concepts and principles through lectures, as well as the application of this knowledge in the real world through primary literature reading and group research projects.

Prerequisite(s): MCB*2050

Restriction(s): MBG*4080

Department(s): Department of Molecular and Cellular Biology

Location(s): Guelph

MBG*3050 Human Genetics Winter Only (LEC: 3, LAB: 3) [0.50]

This course is designed to introduce the student to the study of biological inheritance in humans. The course includes discussion of the genetic basis of human individual differences, gene frequencies in human populations, human behavioral genetics, human cytogenetics, biochemical genetics and developmental genetics, medical genetics and other aspects of human heredity.

Prerequisite(s): MCB*2050

Department(s): Department of Molecular and Cellular Biology

Location(s): Guelph

MBG*3060 Quantitative Genetics Winter Only (LEC: 3) [0.50]

This course examines the nature of Mendelian inheritance when extended to quantitative traits that are jointly influenced by the environment and the simultaneous segregation of many genes. Prediction of response to natural and artificial selection in populations will also be studied.

Prerequisite(s): MBG*2400, 0.50 credits in statistics.

Department(s): Department of Animal Biosciences

Location(s): Guelph

MBG*3100 Plant Genetics Winter Only (LEC: 3, LAB: 2) [0.50]

This course examines reproduction in plants, genome organization, organelle and polyploid genetics, and analyses of mutations, genetic variation and linkage with classical and modern approaches.

Prerequisite(s): (MBG*2040 or MBG*2400), STAT*2040

Department(s): Department of Plant Agriculture

Location(s): Guelph

MBG*3350 Laboratory Methods in Molecular Biology Summer, Fall, and Winter (LEC: 1.5, LAB: 8) [0.75]

This course involves laboratory based instruction in the basic methodologies of Molecular Biology. Students will have the opportunity to develop technical skills and practical knowledge sufficient to perform basic procedures independently, and to diagnose and analyze experimental results obtained with these techniques.

Prerequisite(s): BIOC*2580, MCB*2050

Restriction(s): Registration in BSC.BIOC (major or minor), BIOC:C, BTOX, BTOX:C, BPCH, BPCH:C, MICR(major or minor), MICR:C, MBG (major or minor), PBTC, PLSC (major or minor), TOX, TOX:C

Department(s): Department of Molecular and Cellular Biology

Location(s): Guelph

MBG*3660 Genomics Winter Only (LEC: 3) [0.50]

This course examines the genomes of eukaryotes and prokaryotes including how genomes are mapped and sequenced, the function of the genome and ethical issues arising from genomic information. How genomic data is used for understanding and treating human disease and for the study of evolution will also be discussed.

Prerequisite(s): MCB*2050

Department(s): Department of Molecular and Cellular Biology

Location(s): Guelph

MBG*4020 Genetics of Companion Animals Fall Only (LEC: 3) [0.50]

This course explores theoretical and applied aspects of breeding programs for performance, pleasure and hobby animal populations to enhance genetic selection and population viability. Case studies are used to explore the theory and practice of designing practical and sustainable breeding programs that integrate molecular genetics, animal breeding and statistical genomics for a variety of single and multiple birth species.

Prerequisite(s): MBG*3060

Equate(s): ANSC*4020

Department(s): Department of Animal Biosciences

Location(s): Guelph

MBG*4030 Animal Breeding Methods and Applications Winter Only (LEC: 3, LAB: 2) [0.50]

Theoretical and scientific aspects of practical animal breeding programs which lead to genetic improvement of efficiency and profitability of animal production will be presented along with applications to livestock and poultry species. This course integrates quantitative genetics with concepts of statistics, economics, biology and biotechnology and expands into development of practical breeding plans.

Prerequisite(s): MBG*3060

Department(s): Department of Animal Biosciences

Location(s): Guelph

MBG*4040 Genetics and Molecular Biology of Development Fall Only (LEC: 3, LAB: 2) [0.50]

This course provides an examination of the genetic mechanisms that underlie organismal development. The molecular biology of cell determination and differentiation and the genetic control of morphogenesis and pattern formation will be emphasized.

Prerequisite(s): MBG*3040

Department(s): Department of Molecular and Cellular Biology

Location(s): Guelph

MBG*4110 Epigenetics Fall Only (LEC: 3) [0.50]

Epigeneticists study how chromatin regulates the establishment and maintenance of hereditary tissue-specific gene expression programs. As such, this course will focus on the structure of chromatin and its links to DNA replication and gene expression. A variety of epigenetics phenomena (gene silencing, position effects, transposable genetic elements, whole chromosome inactivation and gene imprinting) will be covered in detail. Other themes will include how the maintenance of the epigenetic landscapes are mediated through non-coding RNAs and how metabolism, stress and the environment can affect the epigenetic control of gene expression. Modern advances in epigenetics will be explored through the analysis and critique of primary literature.

Prerequisite(s): MBG*3040

Department(s): Department of Molecular and Cellular Biology

Location(s): Guelph

MBG*4160 Plant Breeding Fall Only (LEC: 3, LAB: 2) [0.50]

This course examines the application of genetic principles to plant improvement. Topics include breeding objectives, mating systems, selection, testing and germplasm maintenance of horticultural and crop plants.

Prerequisite(s): (MBG*2040 or MBG*2400), STAT*2040

Department(s): Department of Plant Agriculture

Location(s): Guelph

MBG*4240 Applied Molecular Genetics in Medicine and Biotechnology Winter Only (LEC: 3) [0.50]

This course will examine advanced techniques and methods used in molecular biology, medicine and biotechnology such as genome, transcriptome and proteome analysis, contemporary genetic screens, genetic engineering, transgenic organisms and gene therapy. The course will highlight the most recent developments and applications of such techniques.

Prerequisite(s): MBG*3040

Department(s): Department of Molecular and Cellular Biology

Location(s): Guelph

MBG*4300 Plant Molecular Genetics Fall Only (LEC: 3) [0.50]

This course studies the molecular genetics of plants. The topics include: plant genome diversity and synteny; *Arabidopsis thaliana* genome, hormonal, environmental and developmental regulation of gene expression; chloroplast and mitochondrial genomes; and gene expression and silencing in transgenics. The course will be delivered using a lecture and paper discussion format. Students will learn and use a variety of computer techniques to search and analyze plant genome databases.

Offering(s): Offered in odd-numbered years.

Prerequisite(s): MBG*2040 or MBG*2400

Department(s): Department of Plant Agriculture

Location(s): Guelph