Biology 2CO3: Genetics
Fall 2012

INSTRUCTORS:
Dr. Kimberley Dej, Ph.D.   LSB 425 dej@mcmaster.ca
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Instructional Assistant:
Dr. Mihaela Georgescu LSB 119A mgeorg@mcmaster.ca
> **Office hours**: Monday through Friday 10:00-11:00 am and 2:00-3:00 pm, or whenever the door is open.

LECTURES:
JHE/376   Monday, Thursday 3:30-4:20 pm
              Tuesday 4:30-5:20 pm

COURSE DESCRIPTION:
An understanding of the principles of Mendelian inheritance is a prerequisite to the conceptual understanding of all fields of Biology. The material covered in this course builds upon topics covered in first year Biology, which was an introduction to heredity and the molecular biology of information transfer from DNA to RNA to protein. We take a more detailed examination of how traits are transmitted and how a genotype is expressed as a phenotype. We also explore aspects of chromosomal mapping, linkage, crosses, and mutations and begin to look at genome mapping projects and the application of information from the genome. We also take a look at genes and alleles at the population level and discuss factors that change allele frequency. We also take a close look at polygenic traits, those traits that are determined by multiple genes which include plant growth, human height, and disease. Underlying our examination of inheritance and the expression of phenotype is an understanding of the molecular mechanisms that regulate gene expression.

COURSE OBJECTIVES:
By the end of this course students should be able to,

> •define and solve genetics problems that include data interpretation and problems of statistics and probability.
> •interpret, analyze and design scientific experiments
> •demonstrate verbal communication skills through regular discussions
> •students will develop a scientific attitude towards research and data gathering by practicing the scientific methods: formulation of a hypothesis, experimental testing of predictions.

PREREQUISITES:
Biology 1A03, Biology 1MO3 and Chemistry 1AA3 and registration in an Honours program in the Faculty of Science, or a program in Arts & Science, Health Sciences or Kinesiology.

FORMAT:
This course consists of three one-hour lectures and one hour tutorial each week. In the tutorial, lecture material, new material, and assignments will be addressed. Therefore, the tutorials represent an integral part of the course work and are mandatory.

This course uses Avenue to Learn to post the course outline, assignments, and other notices. Go to http://avenue.mcmaster.ca/ to log-on to the course's home page.

Requirements:
Textbook: We will make reference to the following textbook in lecture and tutorial: Genetics - A Conceptual Approach, 3rd or 4th edition.
Author: Benjamin Pierce   Publisher: W. H. Freeman.

Note: In lieu of this, you could use a comparable Genetics textbook for reference and practice problems.

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COURSE EVALUATION:

Midterm	35%
Tutorial quizzes	12%
Tutorial paper	6%
Participation	2%
Exam	45%

SCHEDULE OF LECTURE MATERIAL:
Week 1 – Dr. Dej
Sept. 10th - 14th
> ***What is a gene?   Mendelian genetics***
> Case study: Sickle cell disease and the β-globin gene

Week 2 – Dr. Gupta
Sept. 17th - 21st
> ***Chromosome dynamics: Chromosomal basis of inheritance***
> Case study: Non-disjunction

Week 3 – Dr. Gupta
Sept. 24th - 28th
> ***What is a chromosome? Chromosome structure and gene expression***
> Case study: The X-chromosome

Week 4 – Dr. Gupta
Oct. 1st - 5th
> ***Mechanisms of regulating gene expression: mRNA processing***
> Case study: Sex determination in *Drosophila melanogaster*

Week 5 – Dr. Gupta
Oct. 8th - 12th
> ***Mechanisms of regulating gene expression: RNA interference***
> Case study: *C.elegans*

Week 6 – Dr. Gupta
Oct. 15th - 19th
> ***Gene mapping in eukaryotes***
> Case study: *Drosophila melanogaster*

Week 7 – Dr. Gupta
Oct. 22nd - 26th
Molecular maps and sequenced genomes
Case study: Mapping human traits and disease

MIDTERM – Oct. 25th 7:00 – 9:00 pm

Week 8 – Dr. Dej
Oct. 29th to Nov. 2nd
Individual to populations: Population Genetics
Case study: β-globin alleles and malaria

Week 9 – Dr. Dej
Nov. 5th - 9th
Extensions of Mendelian principles: Genetic interactions
Case study: cat coloration

Weeks 10 – Dr. Dej
Nov. 12th - 16th
From multiple genes to quantitative traits
Case study: Mimulus

Week 11 – Dr. Dej
Nov. 19th - 23rd
Dominant traits
Case study: Huntington's disease

Week 12 – Dr. Dej
Nov. 26th - 30th
Changes in Chromosome structure and number
Case study: San Luis Valley Syndrome

The final exam is scheduled within the exam period by the Registrar's Office.

REQUESTS FOR RELIEF FOR MISSED ACADEMIC TERM WORK
If you are absent from the university for a minor medical reason, lasting fewer than 5 days, you may report your absence, once per term, without documentation, using the McMaster Student Absence Form. Absences for a longer duration or for other reasons must be reported to your Faculty/Program office, with documentation, and relief from term work may not necessarily be granted.
Please note that the MSAF may not be used for term work worth 30% or more, nor can it be used for the final examination. The MSAF may not be used for tutorial assignments.

Immediately after using the online tool, students MUST contact Mihaela Georgescu (mgeorg@mcmaster.ca) regarding the nature of the relief. Failure to do so may negate the opportunity for relief.

CHANGES TO THE COURSE OUTLINE:
At certain points in the course it may make good sense to modify the schedule outlined. The instructor reserves the right to modify elements of the course and will notify students accordingly, both in class and on Avenue to Learn). Posted changes take precedence over this course outline.
The University may change the dates and deadlines for any or all courses in extreme circumstances. If either type of modification becomes necessary, reasonable notice and communication with the students will be given with explanation and the opportunity to comment on changes. It is the responsibility of the student to check their McMaster email and course websites weekly during the term and to note any changes.

ACADEMIC DISHONESTY:
You are expected to exhibit honesty and use ethical behavior in all aspects of the learning process. Academic credentials you earn are rooted in principles of honesty and academic integrity. Academic dishonesty is to knowingly act or fail to act in a way that results or could result in unearned academic credit or advantage. This behavior can result in serious consequences, e.g. the grade of zero on an assignment, loss of credit with a notation on the transcript (notation reads: "Grade of F assigned for academic dishonesty"), and/or suspension or expulsion from the university.
It is your responsibility to understand what constitutes academic dishonesty. For information on the various types of academic dishonesty please refer to the Academic Integrity Policy, located at http://www.mcmaster.ca/academicintegrity
The following illustrates only three forms of academic dishonesty:

> 1. Plagiarism, e.g. the submission of work that is not one's own or for which other credit has been obtained.

> 2. Improper collaboration in group work,. While we encourage you to work with your peers in solving problems on your assignments, copying of answers is not acceptable. Your final work must be your own.

> 3. Copying or using unauthorized aids in tests and examinations.

Grades obtained in 2C03 will be converted according to the following scheme, which is the one in general use at McMaster University.

90 – 100%	A+	12
85 – 89%	A	11
80 – 84%	A-	10
77 – 79%	B+	9
73 – 76%	B	8
70 – 72%	B-	7
67 – 69%	C+	6
63 – 66%	C	5
60 – 62%	C-	4
57 – 59%	D+	3
53 – 56%	D	2
50 – 52%	D-	1
0 – 49%	F	0

When the final marks are obtained, ALL borderline cases will be reviewed and, where warranted, adjustments will be made in the final mark.