Biology 316.3
Molecular Genetics of Eukaryotes

Department of Biology, University of Saskatchewan
Sept 2013

LEC:	M, W, F	10:30am - 11:20am @ BIO 125
LAB:	W	1:30pm - 4:20pm @ BIO 213

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Text Book: Most lectures will be based on chapters of the Watson textbook listed below. If you have plans to take further courses in genetics/molecular biology during your undergraduate program or are considering applying to graduate school in these fields, purchasing this textbook will be beneficial to you after this course. Otherwise, two copies are on reserve in the Natural Sciences Library (Geology Library) for this course.

Recombination DNA: Genes and Genomes – A Short Course 3rd Edition. Watson, Caudy, Myers and Witkowski. 2007.

Website: Lecture notes, laboratory files, etc, will be posted on Blackboard (Paws).

Academic Dishonesty: Please be aware of the University of Saskatchewan's policy on academic dishonesty (http://www.arts.usask.ca/students/academics/appeals-integrity.php). Please read this information, as it is your responsibility to know what is not acceptable academic behavior.

Evaluation:

		dates:
Lab Reports (4)	10%	TBA
Mid Term Exam	30%	October 16th
Seminar	20%	TBA
Final Exam	40%	TBA

Objectives and Learning Outcomes :

This course is intended to students who, having being introduced to basic genetics and molecular biology concepts, want to explore the current trends in genetics research and understand how the new technologies involved are transforming the world we live in. The course is taught on a researcher's perspective and the experimental viewpoint is emphasized. Students are expected by the end of the course to understand how to apply the scientific method to answer basic biological questions using the existing genetic tools. Gene-specific and genomic approaches will be discussed. In the process, students will learn to appreciate the importance of model organisms as platforms to study conserved and at times universal mechanism in Biology. The course will have a lecture, laboratory and student seminar modules. The seminars will be an opportunity for students to showcase different model organisms used in genetic analysis and explore in depth their impact in research.

Evaluation will be based on two exams, four lab reports and the individual seminar. There are no mandatory components or attendance required for passing the course.

Mid Term Exam:
Will account for **30%** of the student final mark and will cover all lectures and all laboratories to that point. The mid term exam will be on March 03 from 1:30 to 3:00pm at BIO 213 (lab room). It will be composed short essay questions.

Final Exam:
The final exam will be comprehensive in nature and consist of essay-style and multiple choice questions to be answered in 3 hours. The time and date of the final exam will be set by the registrar's office of the University of Saskatchewan. The exam will account for **40%** of the student final mark and will encompass the content of the course taught after the midterm exam, including all seminars presented.

Seminars:
The seminar is a very important component of this course and will account for **20%** of the final marks. The purpose of the seminar is to give the student the opportunity to broaden his or her knowledge of a particular eukaryotic model organism that he or she is interested. Ultimately, the goal of this part of the course is to demonstrate how genetic research takes advantage of the existing biological diversity to establish research models that are suitable in addressing specific research questions. There will be no make up seminars. In case the student cannot present the seminar for a justifiable reason, the 20% of the seminar marks will be added to the final exam.

Lab Reports:
Lab reports are intended to demonstrate that you have performed and understood the experiment and can translate the data into simple, direct and precise scientific language. Lab reports are not meant to reproduce the content of lectures but to sharpen the student's ability to recognize and sort out relevant data that addresses a particular experimental question towards a reasonable conclusion. An explanation of the format of lab reports will be given in the first lab session. Late reports will receive a grade of 0%. Do not turn in a lab report if you have not attended the

lab. There will be no make up labs. Finally, make sure you have understood the labs as they will be included in the exams. Lab reports will amount to **10%** of the marks.

OUTLINE OF LECTURE TOPICS

Topic 1: Fundamentals of eukaryotic genes
(Watson et al. 2007. chapters 5 and 7)

Topic 2: Gene level analysis I: Mutant isolation and gene mapping strategies
(Watson et al. 2007. chapters 12)

Topic 3: Gene level analysis II: Transgenesis and gene-specific knockouts
(Watson et al. 2007. chapter 6)

Topic 4: Genome level analysis: "Omics" and high throughput strategies
(Watson et al. 2007. chapter 10,11,12,13 and 14)

Topic 5: Epigenomics, mosaicism and regulation of gene dosage
(Watson et al. 2007. chapter 8)

Topic 6: RNA interference and post-transcriptional gene silencing
(Watson et al. 2007. chapter 9)

Topic 7: DNA fingerprinting and molecular forensics
(Watson et al. 2007. chapter 16)

OUTLINE OF LABORATORIES

(1) Mutagenesis and Complementation in Yeast

(2) Heat shock-induced expression in Drosophila

(3) Chemotaxis in Caenorhabditis elegans

(4) RNA interference in Caenorhabditis elegans