Course Outline

BIOL361 Molecular Genetics and Genomics, Summer 2016

Instructor: Dr. Jürgen Ehlting

Office: CUN159a. eMail: je@uvic.ca

Lectures: Cornet Rm. 143, 10:30 AM– 12:20 PM, Monday Wednesday, and Thursday

Office hours: Mondays, 2:00 – 4:00 PM or by appointment, please inquire by eMail

Course Description:

Naturally occurring and induced genetic mutations leading to phenotypic variation within- and among-species in a diversity of eukaryotic taxa, including yeasts, plants and vertebrates. Regulation of transcription and translation (including small regulatory RNAs), protein-protein interactions, molecular mechanism of tumor formation, genome structure and mobile genetic elements, and functional genomics.

Evaluation

One hundred (100) marks in total: Two midterm exams, each worth 30 marks and a final exam (cumulative, with main focus on material after the second midterm) worth 40 marks.

Grading scheme: A+ (90%-100%), A (85-89.75%), A- (80-84.75%), B+ (77-79.75, B (73-76.75%), B- (70-72.75%), C+ (65-69.75%), C (60-64.75%), D (50-59.75%), F (<50%)

Notes

There will be deferred midterm exams scheduled outside lecture time within a week after the midterm for those providing proper documentation (e.g. doctors note). If you also miss the deferred midterm but provide documentation for that date as well, your final mark will be calculated on the basis of the other completed components of the course, and you will not incur any penalty. I will assign a zero (not an incomplete) for an unexcused missed midterm or assignment.

Only pen and pencil will be permitted during any exam; no texts, no electronic devices. Students must abide by academic regulations as set out in the university calendar. You must observe standards of scholarly integrity with regards to plagiarism and cheating. Please refer to UVic Academic Calendar webpage below:

http://web.uvic.ca/calendar2008/FACS/UnIn/UARe/PoAcI.html

Resources

Lecture notes and complete references of key papers will be uploaded to Moodle. *Molecular Biology of the Cell* (the textbook for BIOL360) will be very useful but is not required.

Lecture schedule

A Phenotype to Genotype

Monday, May 9:	Course introduction
	Qualitative and quantitative genetic loci: Sticklebacks with a no-pelvis phenotypes
Wednesday, May 11:	Mapping Pitx1: the transcription factor responsible for pelvis phenotypic variation.
Thursday, May 12:	Molecular basis of convergent evolution of hind-limb reduction in animals.
Monday, May 16:	More markers, more possibilities: principles of SNP arrays and application in family studies: Clubfoot disease.
Wednesday, May 18:	Whole genome association genetics and human diseases: Anemia, BCL11 and fetal hemoglobin (HbF).

B Genome Structure and Plasticity

Thursday, May 19:	Whole genome sequencing approaches and eukaryotic genome structure
Monday, May 23:	*Victoria Day – University closed*
Wednesday, May 25:	***MIDTERM 1 (30/100)***
Thursday, May 26:	Transposable elements and their mode of jumping
	Assignment handout
Monday, May 30:	Transposable elements shape genomes and facilitate evolution
Wednesday, June 1:	Gene and genome duplications.

C) Molecular Basis of Tumor Formation in Mammals and Plants

Thursday, June 2:	Mammalian tumors and their cause: alterations of cancer critical genes
Monday, June 6:	Genomics of mammalian tumor formation.
Wednesday, June 8:	***MIDTERM 2 (30/100)***
Thursday, June 9:	Introduction to plant tumors and their cause; the tumor inducing plasmid of *Agrobacterium tumefaciens*.
Monday, June 13:	Molecular mechanism of plant tumor formation.
	Inter-kingdom lateral gene transfer and its use to create genetically modified plants

D) The world of RNA: functions beyond being a messenger.

Wednesday, June 15:	The diverse functions of RNA's
	Assignment due

Thursday, June 16:	The discovery of small regulatory RNA's in *Caenorhabditis elegans*.
Monday, June 20:	Post-transcriptional regulation of gene expression via small interfering RNAs: Mechanisms of small RNA regulatory action.
Wednesday, June22:	Gene regulatory mechanisms involving long non-coding RNA's: HOTAIR.
Thursday, June 23:	**Final Exam**

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