COURSE SYLLABUS

COURSE TITLE:	BIOL 226: From Genes to Genomes		
COURSE CODE:	CRN 22176	TERM:	Winter T2 2017-18
COURSE CREDITS:	3.0	DELIVERY:	Lecture & Practicum (Lab)
CLASS SECTION:	01	START DATE:	January 3rd 2018
CLASS LOCATION:	Biology 106	LAB LOCATION:	Thorvaldson G77
CLASS TIME:	10:30 to 11:20 (M,W,F)	LAB TIME:	See lab schedule
WEBSITE:	via Blackboard		

Calendar Description

Content ranges from Mendelian genetics to computational procedures based on the complete genome. Examples from eukaryotic species, including humans, are emphasized. Topics include classical transmission genetics, cytogenetics, DNA structure and replication, gene function, mutation and repair, regulation, recombinant DNA technology, and structural, functional and comparative genomics.

Learning Outcomes

By the completion of this course, students will have a sound basic understanding of the principles of Mendelian and molecular genetics.

The student will:

1. Understand Mendel's first and second law of genetics and how they relate to cytogenetics.
2. Be able to predict the outcome of crosses and to carry out pedigree analysis.
3. Understand the principles of recombination and be able to map chromosomes
4. Recognize how expression of genetic information is related to phenotype
5. Be conversant with genomics and the application of genomic technologies.
6. Understand how genes behave in populations and how this mechanism contributes to evolutionary processes.

Note: The University of Saskatchewan Learning Charter is intended to define aspirations about the learning experience that the University aims to provide, and the roles to be played in realizing these aspirations by students, instructors and the institution. A copy of the Learning Charter can be found at: http://www.usask.ca/university_secretary/LearningCharter.pdf

More information on the Academic Courses Policy on course delivery, examinations and assessment of student learning can be found at: http://www.usask.ca/university_secretary/council/academiccourses.php

Course Overview

First, the course focus on Mendelian genetics (including modified Mendelian inheritance) and how it relates to the chromosomal theory of inheritance. This is followed by the study of genetic linkage, genetic recombination and their applications (i.e. genetic mapping). DNA mutation and repair are then studied, followed by chromosomal mutation and rearrangements. Then, based on the previous topics, the course focus on how recombinant DNA technology can be used to isolate and modify genes to provide research tools and practical applications. Understanding gene expression leads to an exploration of gene regulation in plants and animals, and it is followed by the study of DNA sequencing technologies, comparative genomics and recent advances in genetics. Towards the end of the course, it explores the relation of genes and their different forms (i.e. alleles) at the population level and how this mechanism shapes the evolutionary history of living organisms.

The field of genetics represents a fundamental aspect of modern society. Genetics research has strengthened our understanding of human biology, crop and livestock production, medical and diseases treatment and environmental applications. This course is intended to provide an introduction to this fascinating field of science by studying basic genetics topics, principles and research methods in the context of the diversity in prokaryotic and eukaryotic life. The course consists of both lecture and laboratory components. Laboratories will be divided in an introduction, protocol explanation and experiment part. At the end of each experiment, a discussion will take place considering the data generated in the class. The laboratory exercises will be composed of simple questions about the experiment performed and will be taken individually at a scheduled lab time.

Suggested order of topics

The topics cover in class will include:

Part 1. Introduction and transmission Genetics

The fundamental principles of heredity
Mendelian genetics
Molecular basis of Mendelian inheritance
Extensions of Mendelian genetics (gene interactions)
Linkage and recombination mapping

Part 2. Molecular genetics: from DNA to phenotype

DNA structure and analysis
DNA replication and recombination
DNA organization in chromosomes
Gene expression and regulation
Recombinant DNA technology

Part 3. Mutation, variation and evolution

Mutations and epigenetics
Inheritance of complex traits: quantitative genetics
Population genetics
Evolution

Disclaimer: This course outline is tentative and may be subjected to change

Note: Last day to withdraw from Winter Term 2 classes is Thursday March 15, 2018.

Laboratory class information:

During the lab sessions, students will perform the following activities:

1. Drosophila melanogaster controlled crosses
2. Chromatography and PCR assays
3. Concept problems.

Proposed Laboratory Schedule

Date	Week	Lab	Lab Exercise	Assignment
Jan 22 to Jan 27	1	1	**Setup *Drosophila* Breeding Experiment: Category 1**	Concept Problem. Problem solving
Jan 29 to Feb 2	2	2	***Drosophila* Breeding Experiment: category 2**	Concept Problem. Problem solving
Feb 5 to Feb 9	3	3	***Drosophila* Breeding Experiment: Category 3** Setup F1 X F 1 cross	Concept Problem. Problem solving
Feb 12 to Feb 16	4	4	***Drosophila* Breeding Experiment** Thin Layer Chromatography of Drosophila Eye Pigments. Score F2 Progeny Phenotypes	Concept Problem Problem solving
Feb 20 to 23	5		***Mid Term Break***	
Feb 26 to Mar 2	6	5	**Thin Layer Chromatography of Drosophila Eye Pigments**. Score F2 Progeny Phenotypes	Concept Problem. Problem solving
Mar 5 to Mar 9	7	6	**Chi-square test** Score F2 Progeny Phenotypes	Concept Problem Problem solving
March 12 to March 16	8	7	***Drosophila* Breeding Experiment** Discussion of class results.	
March 19th to Mar 23	9	8	***Drosophila*** - PCR genotyping	
March 28	10	9	Review Lab	
April 2nd	11		**Final Lab Exam**	

Instructors

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Office Hours: Please note that all instructors have other commitments that may take them away from their office. Specific appointments can be set by email.

Resource Material

Textbook: A customized edition of ***Introduction to Genetic Analysis***. *Griffiths et al*. 11th Edition. Freeman, has been designed for use in Biol 226. It is available through the bookstore and includes Sapling Access.

Downloads

These will be available as appropriate through the course Blackboard site. The only document that you are required to download and read is the course syllabus. **Please note that instructor's PowerPoint slides or lecture notes may be provided to you as a courtesy**. You are not required to download or print these slides/notes. While the instructor will endeavor to have the lecture PowerPoint slides/notes posted sometime in advance of the lecture, ***this is not a guarantee.***

Grading Scheme

Midterm exam	25%
Final exam	40%
Laboratory	30%
Sapling Assignments	5%
Total	100%

Evaluation Components

Midterm Exam:

Value: **25%** of final course grade
Date: Date to be announced, during class period
Length: 50 minutes
Format: Multiple choice problems and questions
Description: Based on all lecture material prior to the exam date unless otherwise indicated. No phones, laptops, tablets or other material allowed.

Final Exam:

Value: **40%** of final course grade
Date: Consult Final Exam Schedule
Length: 180 minutes (3 hours)
Format: Multiple choice problems and questions
Description: The exam is a comprehensive evaluation (i.e. cover all lectures and material). Material delivered since the midterm exam will be emphasized. No phones, laptops, tablets or other material allowed.

Laboratory

Value: **30%** of final grade (25% lab exam and 5% assignment/concept problems)
Date: see Laboratory Schedule
Format: Multiple choice and short answer questions about the experiments and background of the laboratory experiments
Description: The desired format and expectation for the lab reports will be presented in the lab period.

Sapling Assignments

Value: **5%** of final grade
Date: multiple assignments
Format: Completion of online assignments designed to increase comprehension.

Description: More information on Sapling assignments will be provided in the lecture period.

University of Saskatchewan Grading System

Students in BIOL 226 are reminded that the University has established a grading system to be used in all of its courses. Information on literal descriptors for grading at the University of Saskatchewan (reproduced below) can be found at: http://students.usask.ca/current/academics/grades/grading-system.php

Scheduling of Exams

Students must bring their current University of Saskatchewan student card to all exams and be prepared to present it for verification purposes. Entry into certain campus buildings where exams may be held, also requires a valid student card.

It is forbidden for students to utilize in any way during an exam, any electronic device (e.g., cell phone, dictionary, palm pilot, translator, etc.). This includes calculators because these are not required for any exam.

Midterm and final examinations, and the lab exam, must be written on the date scheduled. Final examinations may be scheduled at any time during the examination period in December 2013; students should therefore avoid making prior travel, employment, or other commitments for this period.

In the event that a student is absent from the **midterm exam** through no fault of his/her own due to a medical emergency, death in the family, or other valid reasons, documentation must be provided explaining the absence, to assist in the determination of whether permission will be granted for the student to write a deferred mid-term exam. Students absent for the Mid-Term Lecture Exam **must advise their Instructor in person or by telephone (not by email) and initiate arrangements for writing a Deferred Mid-Term Exam, within 3 working days of the missed exam**, in order to avoid being assigned a grade of zero for the exam.

If a student is absent from the **final exam** through no fault of his or her own for medical or any other valid reason, **he/she must apply to the Dean's Office of the College in which he/she is registered for an opportunity to write a Deferred Final Exam**, **within 3 working days of the missed exam**. Documentation must also be provided to explain the absence from the final exam. Deferred exams may utilize a different format than the regular exam, at the sole discretion of the instructors.

Students are encouraged to review all examination policies and procedures:
http://www.usask.ca/calendar/exams&grades/examregs/

Student Feedback

Lab report feedback will usually be available within one week. Midterm and final exam grades will be communicated via the course Blackboard site and exams will be available for student review by appointment.

Attendance Expectations for Laboratory Classes

There are ***no mandatory*** components to this course, however, students are expected to attend all scheduled classes. Conceptual understanding of Genetics, like all science courses, requires students to actively engage and interact with colleagues. Students are expected ***to attend all scheduled laboratories***. No make-up labs will be offered.

Integrity Defined (from the Office of the University Secretary)

The University of Saskatchewan is committed to the highest standards of academic integrity and honesty. Students are expected to be familiar with these standards regarding academic honesty and to uphold the policies of the University in this respect. Students are particularly urged to familiarize themselves with the provisions of the Student Conduct & Appeals section of the University Secretary Website and avoid any behavior that could potentially result in suspicions of cheating, plagiarism, misrepresentation of facts and/or participation in an offence. Academic dishonesty is a serious offence and can result in suspension or expulsion from the University.

All students should read and be familiar with the Regulations on Academic Student Misconduct (http://www.usask.ca/university_secretary/honesty/StudentAcademicMisconduct.pdf) as well as the Standard of Student Conduct in Non-Academic Matters and Procedures for Resolution of Complaints and Appeals (http://www.usask.ca/university_secretary/honesty/StudentNon-AcademicMisconduct2012.pdf)

For more information on what academic integrity means for students see the Student Conduct & Appeals section of the University Secretary Website at: http://www.usask.ca/university_secretary/pdf/dishonesty_info_sheet.pdf

Examinations with Access and Equity Services (AES)

Students who have disabilities (learning, medical, physical, or mental health) are strongly encouraged to register with Access and Equity Services (AES) if they have not already done so. Students who suspect they may have disabilities should contact AES for advice and referrals. In order to access AES programs and supports, students must follow AES policy and procedures. For more information, check www.students.usask.ca/aes, or contact AES at 306-966-7273 or aes@usask.ca.

Students registered with AES may request alternative arrangements for mid-term and final examinations. Students must arrange such accommodations through AES by the stated deadlines. Instructors shall provide the examinations for students who are being accommodated by the deadlines established by AES.
