UNIVERSITY OF SASKATCHEWAN
Department of Biology

BIOLOGY 226.3.1 - From Genes to Genomics (CRN 26105)
September – December 2014

COURSE TITLE:	**Genes to Genomes**		
COURSE CODE:	**CRN 26105**	**TERM:**	**1 (FALL)**
COURSE CREDITS:	**3**	**DELIVERY:**	**Lecture**
CLASS SECTION:	**01**	**START DATE:**	**3rd September 2014**
CLASS LOCATION:	**BIOL 106**	**LAB LOCATION:**	**Thorvaldson G77**
CLASS TIME:	**MWF 8:30-9:20**	**LAB TIME:**	**L1 M 1:30-4:20 pm** **L2 T 8:30-11:20 pm** **L3 T 1:30-4:20 am** **L4 W 1:30-4:20 pm** **L5 Th 8:30-11:20 pm** **L6 Th 1:30-4:20 pm** **L7 F 1:30-4:20 pm**
WEBSITE:			

Instructor:	**Dr Peta Bonham-Smith**, Arts 229 (306-966-4274) peta.bonhams@usask.ca
Textbook:	*Principles of Genetics*. Snustad & Simmons. 6th Edition. Wiley
Lab Coordinator:	Mr Vasu Penugonde, Thorvalson G77 (966-4431)
Lab manual:	Biology Department (U of S), available from bookstore ($25).

****You are required to refresh your understanding of Mitosis and Meiosis prior to the start of the course****

Course Description

This course combines contemporary genomics with classical Mendelian genetics. First, we focus on Mendelian genetics (including modified Mendelian inheritance), and we relate it 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 chromosomal rearrangements. With an understanding of Mendelian genetics, genetic linkage, recombination, and gene mutation, we next 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 is followed by study of genome sequencing programs, and the amazing advances in genetics brought about by structural, functional, and comparative genomics. We finish by studying how genes behave in populations and evolution at the molecular level: how molecules act as

documents of evolutionary history, and how we read those documents.

Prerequisites

BIOL 120.
Note: BIOL 121 is strongly recommended. Students with credit for BIOL 211 will not receive credit for BIOL 226.

Learning Outcomes

By the completion of this course, students will be expected to:

1. Understand the basic of genetic analysis at the gene, genome and population levels.
2. Understand the basic organization of prokaryotic and eukaryotic genomes.
3. Understand gene expression and regulation mechanisms
4. Be able to solve genetic problems.

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

Lecture Schedule:

Date	Lecture Number	Topic
September 3 - Wednesday	Introduction	Chapter 1 – The Science of Genetics
September 5 - Friday	1	Chapter 3 – Mendelism – Mendel's experiments
September 8 - Monday	2	Chapter 3 – Mendelism – Applications of Mendel's Principles
September 10 - Wednesday	3	Chapter 4 – Extensions of Mendelism 1
September 12 - Friday	4	Chapter 4 – Extensions of Mendelism 2
September 15 - Monday	5	Chapter 4 - Extensions of Mendelism 3
September 17 - Wednesday	6	Chapter 5 – Chromosomal Basis of Mendelism
September 19 - Friday	7	Chapter 6 – Chromosome Number and Structure
September 22 - Monday	8	Chapter 7 – Linkage and Crossing Over
September 24 - Wednesday	9	Chapter 7 – Chromosome Mapping 1
September 26 - Friday	10	Chapter 7 – Chromosome Mapping 2
September 29 - Monday	11	Chapter 13 – Molecular Basis of Mutation
October 1 - Wednesday	12	Chapter 13 – Topics in Mutation
October 3 - Friday	13	Chapter 13 – Mutations?
October 6 - Monday	14	Chapter 8 and 9 – Genetics of Viruses & Bacteria
October 8 - Wednesday	15	Chapter 17 – Transposons 1
October 10 - Friday	16	Chapter 17 – Transposons 2
October 13 - Monday	THANKSGIVING	
October 15 - Wednesday	17	Chapter 11 – Gene Expression and the Central Dogma of Mol. Biol.
October 17 - Friday	MIDTERM EXAM Biology 106	
October 20 - Monday	18	Chapter 12 – Translation and the Genetic Code
October 22 - Wednesday	19	Chapter 14 – Recombinant DNA technology 1
October 24 - Friday	20	Chapter 14 – Recombinant DNA technology 2
October 27 - Monday	21	Chapter 14 – Recombinant DNA technology 3
October 29 - Wednesday	NO LECTURE	
October 31 - Friday	22	Chapter 18 – Gene Regulation in Prokaryotes 1
November 3 - Monday	23	Chapter 18 – Gene Regulation in Prokaryotes 2
November 5 - Wednesday	24	Chapter 19 – Gene Regulation in Eukaryotes 1
November 7 - Friday	25	Chapter 19 – Gene Regulation in Eukaryotes 2
November 10 - Monday	FALL BREAK	
November 12 - Wednesday	FALL BREAK	
November 14 - Friday	FALL BREAK	
*****November 15 - Saturday*****		LAST DAY TO WITHDRAW WITHOUT ACADEMIC PENALTY
November 17 - Monday	26	Chapter 19 – Epigenetics 1
November 19 - Wednesday	27	Chapter 19 – Epigenetics 2
November 21 - Friday	28	Chapter 21 – Genetic Basis of Cancer
November 24 - Monday	29	Chapter 16 – Applications of Molecular Genetics 1
November 26 - Wednesday	30	Chapter 16 – Applications of Molecular Genetics 2
November 28 - Friday	31	Chapter 16 – Applications of Molecular Genetics 3
December 1 - Monday	32	Chapter 23 – Population Genetics 1
December 3 - Wednesday	33	Chapter 23 – Population Genetics 2
December 5 - Friday	34	REVIEW
	FINAL EXAM TBA	

Laboratory Schedule:

Date	Week	Laboratory Exercise	Assignment
Sept 8th	1	Lab 1: Introduction to *Drosophila* Genetics. Setup cross 1	
Sept 15th	2	Lab 2: Cross 1 - Observe and record P_1, P_2 phenotypes. Setup cross 2	Concept Problem Problem solving
Sept 22nd	3	Lab 3: Cross 2 - Observe and record P_1, P_2 phenotypes. Setup cross 3	Concept Problem Problem solving
Sept 29th	4	Lab 4: Cross 3 - Observe and record P_1, P_2 phenotypes.	Concept Problem Problem solving
Oct 6th	5	Lab 5: Thin Layer Chromatography of Eye Pigments	Concept Problem Problem solving

Oct 13th		*****THANKSGIVING – NO LAB*****	
Oct 14th	6	Lab 6: Thin Layer Chromatography of Eye Pigments	Concept Problem Problem solving
Oct 20th	7	Lab 7: Hypothesis Testing	Concept Problem Problem solving
Oct 27th	8	Lab 8: Review of labs 1 to 7	Concept Problem
Nov 3rd	9	Lab 9: In-Lab assignment # 1	
Nov 10th-14th		**MID-TERM BREAK: REMEMBRANCE DAY. NO LABS**	
Nov 17th	10	Lab 10: Review of Cross 3 results	Concept Problem
Nov 24th	11	Lab 11: In-Lab assignment # 2	

Suggested Resources

Textbooks
Principles of Genetics – 6th Edition; Snustad and Simmons 2012.

Most lectures will be based on chapters of the textbook listed above. In some cases, only sections of chapters will be covered. Chapter link to the lectures will be announced in class. Copies of the textbook can be found in the Natural Sciences Library.

Electronic Resources
Lecture notes will not be posted on Blackboard, however, the audio of each lecture will be available through Blckboard.

Grading Scheme

Evaluation of Student Performance

There are three components in the marking scheme of the course: Midterm exam, Final exam and in-lab exercises. There are no minimal marks required in these individual components in order to successfully pass the course.

Midterm Exam Value: 25% of final course grade
Date: October 17th from 8:30 to 9:20 at room 106 (Biology).
Format: Multiple choice problems and questions. Calculators allowed. No phones, laptops, tablets or other material allowed.

Final Exam Value: 45% of final grade
Date: Consult the Final Exam Schedule
Length: 3 hours
Format: Multiple choice problems and questions.
Description: The exam is comprehensive in that it will cover all lecture, material. Material delivered since the midterm exam will be emphasized. Calculators allowed. No phones, laptops, tablets or other material allowed.

Individual in-lab writing assignments: **Value**: together 30% of final grade.
Due Date: See Course Schedule
Format: Multiple choice and short answer questions about the experiments and background of the laboratory experiments.

Attendance Expectations and Laboratory Exercise Requirement

Completion of all laboratory exercises is a required component of this course. Students are expected to attend all scheduled lab. No make-up labs will be offered.

Midterm and Final Examination Scheduling

Midterm and final examinations must be written on the date scheduled. Final course examinations may be scheduled at any time during the examination period; students should therefore avoid making prior travel, employment, or other commitments for this period. If a student is unable to write a midterm or the lab exam through no fault of his or her own for medical or other valid reasons, documentation must be provided within 3 days of the missed exam and an opportunity to write the missed exam may be given.
Students who miss the final exam must contact the College and apply for a deferred final exam. Deferred exams may utilize a different format than the regular exam, at the sole discretion of the instructor. Students are encouraged to review all University examination policies and procedures: http://www.usask.ca/calendar/exams&grades/examregs/

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 can be found at: http://students.usask.ca/current/academics/grades/grading-system.php

University of Saskatchewan Grading System (for undergraduate courses)

Exceptional (90-100) A superior performance with consistent evidence of

- a comprehensive, incisive grasp of the subject matter;
- an ability to make insightful critical evaluation of the material given;
- an exceptional capacity for original, creative and/or logical thinking;
- an excellent ability to organize, to analyze, to synthesize, to integrate ideas, and to express thoughts fluently.

Excellent (80-90) An excellent performance with strong evidence of

- a comprehensive grasp of the subject matter;
- an ability to make sound critical evaluation of the material given;
- a very good capacity for original, creative and/or logical thinking;
- an excellent ability to organize, to analyze, to synthesize, to integrate ideas, and to express thoughts fluently.

Good (70-79) A good performance with evidence of

- a substantial knowledge of the subject matter;
- a good understanding of the relevant issues and a good familiarity with the relevant literature and techniques;
- some capacity for original, creative and/or logical thinking;
- a good ability to organize, to analyze and to examine the subject material in a critical and constructive manner.

Satisfactory (60-69) A generally satisfactory and intellectually adequate performance with evidence of

- an acceptable basic grasp of the subject material;
- a fair understanding of the relevant issues;
- a general familiarity with the relevant literature and techniques;
- an ability to develop solutions to moderately difficult problems related to the subject material;
- a moderate ability to examine the material in a critical and analytical manner.

Minimal Pass (50-59) A barely acceptable performance with evidence of

- a familiarity with the subject material;
- some evidence that analytical skills have been developed;
- some understanding of relevant issues;
- some familiarity with the relevant literature and techniques;
- attempts to solve moderately difficult problems related to the subject material and to examine the material in a critical and analytical manner which are only partially successful.

Failure <50 An unacceptable performance

Examinations through Disability Services for Students (DSS)

Students who have disabilities (learning, medical, physical, or mental health) are strongly encouraged to register with Disability Services for Students (DSS) if they have not already done so. Students who suspect they may have disabilities should contact DSS for advice and referrals. It is the responsibility of the student to contact DSS in advance of exams. In order to access DSS programs and supports, students must follow DSS policy and procedures. For more information, check http://students.usask.ca/current/disability/ or contact DSS at 966-7273 or dss@usask.ca.

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