UNIVERSITY OF SASKATCHEWAN

COURSE SYLLABUS

COURSE TITLE: Genetics from genes to genomics

COURSE CODE: CRN 26105

TERM: T2 Winter 2015

COURSE CREDITS: 3

DELIVERY: Lecture

CLASS SECTION: 02?

START DATE: January 5 2014

CLASS LOCATION: Physics 107

LAB LOCATION: G77 THorvalson

CLASS TIME: MWF 10:30-11:20 am

LAB TIME: M to F: 1:30 - 4.20pm

WEBSITE: via Blackboard

T and Th: 8:30-11:20 am

Course Description:

This course combines contemporary genomics with classical Mendelian genetics. First, the course will focus on Mendelian genetics (including modified Mendelian inheritance), which will be related to the chromosomal theory of inheritance. This will be followed by the study of genetic linkage, genetic recombination, and their applications (i.e. genetic mapping). DNA mutation and repair will be studied followed by chromosomal mutation and chromosomal rearrangements. With an understanding of Mendelian genetics, genetic linkage, recombination, and gene mutation, the next focus will be on how the basics of bacterial genetics, recombinant DNA technology which can be used to isolate and modify genes to provide research tools, and practical applications. Understanding gene expression will lead to an exploration of gene regulation in plants and animals and will be followed by studying genome sequencing programs and the amazing advances in genetics brought about by structural, functional, and comparative genomics. Finally, the course will explain how genes behave in populations and evolution at the molecular level. It will present how molecules act as documents of evolutionary history, and how those documents can be interpreted.

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:

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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

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

Please note: There are different literal descriptors for undergraduate and graduate students.

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

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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

Class Schedule: Lectures 1-16 Professor Dillon; Lectures 17- 34 Dr Gagne

Date	Lecture Number	Topic
January 5 - Monday	Introduction	Class Overview, Rules and Regulations
January 7 - Wednesday	1	Chapter 1 – The Science of Genetics
January 9 - Friday	2	Chapter 3 – Mendelianism – The Basic Principles of Inheritance
January 12 - Monday	3	Chapter 3 – Mendelianism – Applications of Mendel's Principles
January 14 - Wednesday	4	Chapter 4 – Pedigrees and Extensions of Mendelianism
January 16 - Friday	5	Chapter 4 -Extensions of Mendelianism : From Genotype to Phenotype
January 19 - Monday	6	Chapter 5 – Chromosomal Basis of Mendelianism
January 21 - Wednesday	7	Chapter 5 – Chromosomes and Heredity
January 23 - Friday	8	Chapter 6 – Variation in Chromosome Structure and Number
January 26 - Monday	9	Chapter 7 – Linkage and Crossing Over
January 28 - Wednesday	10	Chapter 7 – part 2 - Chromosome Mapping
January 30 - Friday	11	Chapter 13 – Molecular Basis of Mutation
February 2 - Monday	12	Chapter 13 – part 2 - Mutagenic Agents and their Effects
February 4 - Wednesday	13	Chapter 13 - part 3 - More about mutation
February 6 - Friday		Midterm EXAM
February 9 - Monday	14	Chapter 8 and 9 – Genetics of Bacterial Viruses
February 11 - Wednesday	15	Chapter 8 and 9 – Genetics of Bacteria
February 13 – Friday	16	Chapter 17 -Transposons
February 16 – Monday	Reading Week	
February 18 - Wednesday	Reading Week	
February 20 - Friday	Reading Week	
February 23 - Monday	17	Chapter 11 – Gene Expression & the Central Dogma of Mol. Biol. 1
February 25 - Wednesday	18	Chapter 11 – Gene Expression & the Central Dogma of Mol. Biol. 1
February 27- Friday	19	Chapter 12 – Translation and the Genetic Code 1
March 2 - Monday	20	Chapter 12 – Translation and the Genetic Code 2
March 4 - Wednesday	21	Chapter 14 – Recombinant DNA technology 1
March 6 - Friday	22	Chapter 14 – Recombinant DNA technology 2
March 9 - Monday	23	No Chapter – Recombinant DNA technology 3
March 11 - Wednesday	24	Chapter 18 – Regulation of Gene Expression in Prokaryotes 1
March 13 - Friday	25	Chapter 18 – Regulation of Gene Expression in Prokaryotes 2
March 16 - Monday	26	Chapter 19 – Regulation of Gene Expression in Eukaryotes 1
March 18 - Wednesday	27	Chapter 19 – Regulation of Gene Expression in Eukaryotes 2
March 20 - Friday	28	Chapter 21 – Genetic Basis of Cancer 1
March 23 - Monday	29	Chapter 21 – Genetic Basis of Cancer 2
March 25 - Wednesday	30	Chapter 16 – Applications of Molecular Genetics 1
March 27 - Friday	31	The Ghost in Our Genes (Neil Ross 2007)
March 30 - Monday		Chapter 16 – Applications of Molecular Genetics 2
April 1 - Wednesday	32	Chapter 23 – Population Genetics 1
April 3 – Friday		Good Friday University Closed
April 6 - Monday	33	Chapter 23 – Population Genetics 2
April 8 - Wednesday	34	Review and General Discussion

Date	Lab Exercises	Assignment
January 12-16	Introduction to Drosophila Genetics, set up cross 1	
January 19-23	Lab 1:Drosophila Breeding Experiment- Cross 1, set up cross 2	Concept problem 1
January 26-30	Lab 2; Drosophila Breeding Experiment- Cross 2, set up cross 3	Concept problem 2
February 2-6	Lab 3: Drosophila Breeding Experiment- Cross 3	Concept problem 3
February 9-13	Lab 4: Drosophila- TLC experiment 1	Concept problem 4
February 17-20	Mid-term Break – No Labs	
February 23-27	Lab 5: Drosophila- TLC experiment 2	Concept problem 5
March 2-6	Lab6: Probability and Chi-Square Test	Concept problem 6
March 9-13	Lab 7: Review of labs: 1, 2, 4, 5 and 6	Concept problem 7
March 16-20	Lab 8: In-Lab assignment # 1	
March 23-27	Lab 9: Review of cross 3 results	Concept problem 8
March 30-April 3	Lab 10: In-Lab assignment # 2	

Midterm and Final Examination Scheduling

Midterm and final examinations must be written on the date scheduled.

Final examinations may be scheduled at any time during the examination period (INSERT FIRST AND LAST DAY OF CURRENT EXAM PERIOD); students should therefore avoid making prior travel, employment, or other commitments for this period. If a student is unable to write an exam through no fault of his or her own for medical or other valid reasons, documentation must be provided and an opportunity to write the missed exam may be given. Students are encouraged to review all examination policies and procedures:

http://www.usask.ca/calendar/exams&grades/examregs/

Instructor Information

Contact Information

Professor Jo-Anne R Dillon

- Office: Vaccine and Infectious Disease Organization. By appointment as access to building is restricted.
- Available before and after EVERY class
- Email: j.dillon@usask.ca

Dr Steve Gagne

- Office: Room 3D30.11 Health Science Building
- Tel: 306 966 8810
- Email: steve.j.gagne@gmail.com

Lab Coordinator: Vasu Penugonde

- Office: Room G77 THORV Building
- Tel 306 966 4431
- Email: penugonde.vasu@usask.ca

Suggested Resources

Readings/Textbooks:

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.

Textbooks are available from the University of Saskatchewan Bookstore:
www.usask.ca/consumer_services/bookstore/textbooks

Downloads. Lecture notes will be available on Blackboard and will usually be posted the day before the lecture

Grading Scheme

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: Friday, February 6 Physics 107; 10:30 am-11:20 am.

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.

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 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. In order to access DSS programs and supports, students must follow DSS policy and procedures. For more information, check http://www.students.usask.ca/disability/, or contact DSS at 966-7273 or dss@usask.ca.

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