



Department of Biology

## COURSE SYLLABUS

COURSE TITLE:	<b>BIOL 226 - 02 From Genes to Genomics</b>		
COURSE CODE:	CRN 22176	TERM:	T2 2016/17
COURSE CREDITS:	3.0	DELIVERY:	Lecture & Practicum (Lab)
CLASS SECTION:	01	START DATE:	Jan 04 2017
LECTURE LOCATION:	rm 106 Biol Bldg	LAB LOCATION:	Thorvalson G77
LECTURE TIME:	MWF 8:30 to 9:20 am	LAB TIME:	MTWRF 1:30 to 4.30pm
WEBSITE:	via Blackboard		
PREREQUISITES	Biology 120.3 or 110.6		

### Course Description

This course combines classical Mendelian genetics with contemporary genomic analysis. First, we focus on Mendelian genetics (including modified Mendelian inheritance) as we relate it to the chromosomal theory of inheritance. This is followed by the study of genetic linkage, genetic recombination, and genetic mapping. We then turn to understand the fundamental molecular processes (transcription and translation) that control the flow of genetic information and how our understanding of genetics and its uses have changed with the advent of molecular biology and recombinant DNA technology. We finish by investigating how the genome is (genetically and epigenetically) regulated at the level of gene expression to yield genetic variation at the level of the phenotype.

### 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](http://www.usask.ca/university_secretary/LearningCharter.pdf)

## Tentative Lecture Schedule

<b>Lect.</b>	<b>Lecturer</b>	<b>Day/Date</b>	<b>Topic</b>
L1	Carvalho	W, Jan 4	Course Introduction
L2	Carvalho	F, Jan 6	The Genetic Revolution
L3	Carvalho	M, Jan 9	The fundamental principles of heredity
L4	Carvalho	W, Jan 11	The fundamental principles of heredity
L5	Carvalho	F, Jan 13	The fundamental principles of heredity
L6	Carvalho	M, Jan 16	The fundamental principles of heredity
L7	Carvalho	W, Jan 18	The fundamental principles of heredity
L8	Carvalho	F, Jan 20	Chromosomal basis of Mendelism
L9	Carvalho	M, Jan 23	Extensions of Mendelian laws
L10	Carvalho	W, Jan 25	Extensions of Mendelian laws
L11	Carvalho	F, Jan 27	Extensions of Mendelian laws
L12	Carvalho	M, Jan 30	Linkage and Genetic Mapping
L13	Carvalho	W, Jan 1	Linkage and Genetic Mapping
L14	Carvalho	F, Feb 3	Linkage and Genetic Mapping
L15	Carvalho	M, Feb 6	Linkage and Genetic Mapping
L16	Carvalho	W, Feb 8	Linkage and Genetic Mapping
L17	Carvalho	F, Feb 10	Transcription and Translation
L18	Carvalho	M, Feb 13	Transcription and Translation
L19	Carvalho	W, Feb 15	Transcription and Translation
		F, Feb 17	MID TERM EXAM (Biology 106 9:30 -10:20)
<b>MID-TERM BREAK</b>			
L20	Carvalho	M, Feb 27	Central Dogma
L21	Carvalho	W, Mar 1	Transcription and Translation
L22	Carvalho	F, Mar 3	Transcription and Translation
L23	Carvalho	M, Mar 6	Recombinant DNA
L24	Carvalho	W, Mar 8	Recombinant DNA
L25	Carvalho	F, Mar 10	Recombinant DNA
L26	Carvalho	M, Mar 13	Recombinant DNA
L27	Carvalho	W, Mar 15	Gene Expression in Prokaryotes
L28	Carvalho	F, Mar 17	Gene Expression in Prokaryotes
L29	Carvalho	M, Mar 20	Gene Expression in Prokaryotes
L30	Carvalho	W, Mar 22	Gene Expression in Prokaryotes
L31	Carvalho	F, Mar 24	Gene Expression in Eukaryotes
L32	Carvalho	M, Mar 27	Gene Expression in Eukaryotes
L33	Carvalho	W, Mar 29	Gene Expression in Eukaryotes
L34	Carvalho	F, Mar 31	Epigenetic Control of Gene Expression
L35	Carvalho	M, Apr 3	Epigenetic Control of Gene Expression
L36	Carvalho	W, Apr 5	Epigenetic Control of Gene Expression

Final Exam TBA

## Course Overview

The course consists of 50 minutes of lecture time per day, three times a week. Laboratories will be held in the afternoons and will be divided in introduction, protocol explanation and experiment parts. At the end of each experiment, a discussion will take place considering the data generated in the class. The laboratory exam will be administered. More details will be made available in the first laboratory section

### Instructor:

#### Contact Information:

**Instructor:** Carlos Carvalho (instructor)

#### Contact info:

Office: room 142 BIOL Building

Ph# 966-4436

Email: [carlos.carvalho@usask.ca](mailto:carlos.carvalho@usask.ca)

**Lab Coordinator:** Vasu Penugonde (lab coordinator)

#### Contact info:

Office: room G77 THORV Building

Ph# 966-4431

Email: [penugonde.vasu@usask.ca](mailto:penugonde.vasu@usask.ca)

**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 only.

**Instructor Profiles & Other Information:** Dr. Carvalho is a regular faculty member in the Department of Biology. He holds an MSc in Molecular Biology and a PhD in Molecular Genetics.

## Laboratory schedule

Date	Week	Lab	Lab Exercise	Assignment
Jan 16 <sup>th</sup> to Jan 20 <sup>th</sup>	1	1	<b>Setup <i>Drosophila</i> Breeding Experiment: Category 1</b>	Concept Problem. Problem solving
Jan 23 <sup>rd</sup> to Jan 27 <sup>th</sup>	2	2	<b><i>Drosophila</i> Breeding Experiment: category 2</b>	Concept Problem. Problem solving
Jan 30 <sup>th</sup> to Feb 3 <sup>rd</sup>	3	3	<b><i>Drosophila</i> Breeding Experiment: Category 3</b> Setup F1 X F 1 cross	Concept Problem. Problem solving
Feb 6 <sup>th</sup> to Feb 10 <sup>th</sup>	4	4	<b><i>Drosophila</i> Breeding Experiment</b> Thin Layer Chromatography of <i>Drosophila</i> Eye Pigments. Score F2 Progeny Phenotypes	Concept Problem Problem solving
Feb 3 <sup>th</sup> to Feb 17 <sup>th</sup>	5	5	Thin Layer Chromatography of <i>Drosophila</i> Eye Pigments. Score F2 Progeny Phenotypes	Concept Problem. Problem solving
Feb 20 <sup>th</sup> to Feb 24 <sup>h</sup>	6	6	Mid-Term Break	
Feb 27 <sup>h</sup> to March 3 <sup>rd</sup>			Chi-square test Score F2 Progeny Phenotypes	Concept Problem Problem solving
March 6 <sup>th</sup> to March 10 <sup>th</sup>	7	7	<b><i>Drosophila</i> Breeding Experiment</b> Discussion of class results.	
March 13 <sup>th</sup> to March 17 <sup>th</sup>	8	8	<b><i>Drosophila</i> - PCR genotyping</b>	Concept Problem. Problem solving
March 20 <sup>th</sup> to March 24 <sup>th</sup>			Review Lab	
April 3 <sup>rd</sup>			<b>Final Lab Exam</b>	

## Resources

### Suggested text:

*Introduction to Genetic Analysis* – 11<sup>th</sup> edition. Griffiths et. al. 2015.

### Support text:

*Principles of Genetics* – 6<sup>th</sup> Edition. Snustad and Simmons. 2012.

Most lectures will be based on chapters of the **Griffiths** text listed above. In some cases, only sections of chapters will be complemented with information from the **Snustad** text. Chapter links to the lectures will be announced in class. Copies of the textbook can be found in the Natural Sciences Library. The textbook should help students to prepare in advance for lecture and as a resource in studying for exams, it should not be used as a substitute for the lecture notes and attendance.

## Electronic Resources

Lecture notes, laboratory material, etc, will be posted on Blackboard (Paws). It is suggested that students acquire a license to use *Sapling*<sup>®</sup> (saplinglearning.com) with their textbook. Questions will be assigned through Sapling to emphasize concepts every week.

## Grading Scheme

### Evaluation of Student Performance

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

Midterm and Final exam questions will be based on the material (posted notes) | presented and discussed in lecture. Use the suggested textbooks and online material as reference for context when studying.

**Midterm Exam Value: 30%** of final course grade **Date:** February 17<sup>th</sup> from 8:30 to 9:20 at room 106 (Biology). **Format:** 40 multiple choice questions. Calculators allowed. No phones, laptops, tablets or other material allowed.

**Final Exam Value: 40%** of final grade **Date:** Consult the Final Exam Schedule **Length:** 3 hours **Format:** 100 multiple choice questions. The final 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.

**Lab Component: 30% Final** of final course grade. **Lab Exam:** accounts for **25%** and **weekly lab assignments** for **5%**. For due dates, see Lab schedule above. The final lab exam consists of 50 multiple choice questions. For more information, please attend the first laboratory section of the course.

### Required Components and Exam Scheduling

Student MUST complete all laboratory exercises and take the lab exam to pass the course. There is no minimum lab mark requirement. In case the laboratory requirement is not met, the final course mark will be a fail irrespective of performance in midterm and final exams. Students are expected to attend all scheduled laboratory practices. No make up labs will be offered. **The lab exam, midterm and final examinations must be written on the date scheduled.** Failure to take any exam(s) will result in a mark of 0 (zero) for the correspondent exam(s). 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 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 are scheduled by the undergraduate office and 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>

### 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](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/StudentNonAcademicMisconduct2012.pdf](http://www.usask.ca/university_secretary/honesty/StudentNonAcademicMisconduct2012.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](http://www.usask.ca/university_secretary/pdf/dishonesty_info_sheet.pdf)

### **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](mailto:dss@usask.ca).