

## COURSE SYLLABUS

COURSE TITLE: **BIOL 316 - Molecular Genetics of Eukaryotes**

COURSE CODE:	CRN 85328	TERM:	T1 Fall 2016
COURSE CREDITS:	3.0	DELIVERY:	Lecture & Practicum (Lab)
CLASS SECTION:	01	START DATE:	07 Sept 2016
LECTURE LOCATION:	rm 125 Biology Bldg	LAB LOCATION:	Rm B213 Biology Bldg
LECTURE TIME:	10:30 to 11:20 am	LAB TIME:	Wed 1:30-4:20 pm
WEBSITE:	via Blackboard		

**Course Description**

Will study advanced topics in genetics in the context of the diversity in eukaryotic life. Prerequisite(s): BIOL 226.

**Learning Outcomes**

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

1. Understand the basic strategies of genetic analysis at the gene and genome level.
2. Understand the diversity in model organisms and their specific uses in genetics research.
3. Be able to read, understand, summarize and present a scientific article.
4. Be able to identify a scientific problem and devise experimental approaches to address it.
- 5.

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)

**Course Overview**

The course consists of 50 minutes of lecture per day for a total of 25 lectures. Scheduled lecture and laboratory times may be used for individual student seminars to be assigned, as needed. Laboratory experiments will be performed in pairs. Laboratories will be divided in an introduction, protocol explanation and experimental parts. At the end of each experiment, a discussion will take place in view of the data generated. The laboratory exercises will be composed of short answer questions about the experiment performed and will be taken individually at a scheduled lab time after the respective laboratory exercise and discussion are completed.

## Lecture Topics

Introduction: Lect 1. **Fundamentals of eukaryotic genes**

Topic 1: Lects 2,3 and 4. **Fundamentals of eukaryotic genes**  
(Watson et al. 2007. chapters 5 and 7)

Topic 2: Lects 5,6,7 and 8. Gene level analysis I: **Mutation isolation and gene mapping strategies**  
(Watson et al. 2007. chapters 12)

Topic 3: Lects 9, 10 and 11. **Gene level analysis II: Transgenesis, gene-specific knockouts and editing**  
(Watson et al. 2007. chapter 6)

Topic 4: Lects 12, 13 and 14. **Genome level analysis: "Omics" and high throughput strategies**  
(Watson et al. 2007. chapter 10,11,12,13 and 14)

Topic 5: Lects 15 and 16. **Epigenomics, mosaicism and regulation of gene dosage**  
(Watson et al. 2007. chapter 8)

Topic 6: Lects 17, 18, 19 and 20. **RNA interference and post-transcriptional gene silencing**  
(Watson et al. 2007. chapter 9)

Topic 7: Lects 21, 22, 23 and 24. **DNA fingerprinting and molecular forensics**  
(Watson et al. 2007. chapter 16)

## Laboratory Exercises

Students are expected to attend and participate in all laboratory exercises. A LAB MANUAL file will be posted on Paws. Students are requested to read the exercise of the week prior to the lab. Laboratory sections have two components; (1) Explanation of the exercise and any background required by the instructor (Dr. Carvalho) and (2) Experiment set up by the group. Experiments will be carried out in groups of 2 or three students. A teaching assistant (Mr. Waddell) will be present to help groups and troubleshoot any problems. Each experiment lasts two or more weeks to complete. At the end of each exercise, a discussion will take place about the results. A questionnaire for that purpose is present in the end of each laboratory experiment in the LAB MANUAL and will be the basis for the four written laboratory exercises to be held during lab time (~45 minutes) after the completion of each respective laboratory experiment. The four experiments outlined in the LAB MANUAL and the laboratory schedule are listed below.

(1) Mutagenesis and Complementation in Yeast

(2) Heat shock-induced expression in *Drosophila*

(3) Chemotaxis in *Caenorhabditis elegans*

#### (4) RNA interference in *Caenorhabditis elegans*

##### SEPTEMBER

	Lectures	Labs
Sept 07 - W	Introduction – Lec01	NO LAB
Sept 09 - F	Lec02	
Sept 12 - M	Lec03	
Sept 14 - W	Lec04	Seminar Topics distribution / Lab I part I week 1
Sept 16 - F	Lec05	
Sept 19 - M	Lec06	
Sept 21 - W	Lec05	Lab 1 part I week 2
Sept 18 – F	Lec06	
Sept 21 – M	Lec07	
Sept 23– W	Lec08	Lab 1 part I week 3
Sept 25 – F	Lec09	
Sept 28 – M	Lec10	
Sept 30 – W	Lec11	Lab 1 part I week 4

##### OCTOBER

Oct 02 – F	Lec12	
Oct 05 – M	Lec13	
Oct 07 – W	Lec14	Lab 1 part II week 5
Oct 09 – F	Lec15	
Oct 10 – M	Thanksgiving	
Oct 14 – W	MIDTERM	
Oct 16 – F	Lec16	Lab1 part II week 6 - Discussion
Oct 19 – M	Lec17	
Oct 21 – W	Lec18	LAB EXERCISE 1 - Lab 2 pl
Oct 23 – F	Lec19	
Oct 26 – M	Lec20	
Oct 28 – W	Lec21	Lab 2 pII - Discussion
Oct 30 – F	Lec22	

##### NOVEMBER

Nov 02 – M	Lec23	
Nov 04 – W	Lec24	LAB EXERCISE 2 - Lab 3 pl
Nov 06 – F	Lec25	
Nov 07 – M	Fall Break	
Nov 09 – W	Fall Break	
Nov 11 – F	Fall Break Remembrance Day	
Nov 14 – M	Seminars	
Nov 16 – W	Seminars	Lab 3 pII - Discussion / Lab 4 pl
Nov 18 – F	Seminars	
Nov 21 – M	Seminars	
Nov 23 – W	Seminars	LAB EXERCISE 3 - Lab 4 pII
Nov 25 – F	Seminars	
Nov 28 – M	Seminars	
Nov 30 – W	Seminars	Lab 4 pIII - LAB EXERCISE 4

##### DECEMBER

Dec 02 – F	Seminars	
Dec 05 – M	Seminars	
Dec 07 – W	REVIEW	

FINAL EXAM : TBA

## Instructors:

### Contact Information:

**Instructor:** Carlos Carvalho

#### Contact info:

Office: room 242 BIOL Building

Ph# 966-4436

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

**Lab Coordinator:** Vasu Penugonde

#### Contact info:

Office: room G77 THORV Building

Ph# 966-4431

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

Teaching Assistant: Brandon Waddell

#### Contact info:

Lab: room 245 BIOL Building

Ph# 966-8857

Email: [bmw482@usask.ca](mailto:bmw482@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 a PhD in genetics and teaches and conducts research in this field of study (<http://artsandscience.usask.ca/profile/CCarvalho#/profile>).

## Suggested Resources

### Suggested textbooks for Reference:

**Recombination DNA: Genes and Genomes** – A Short Course 3<sup>rd</sup> Edition. Watson, Caudy, Myers and Witkowski. 2007.

Some of the lecture material will use the Watson textbook listed above, but will not be limited or entirely based on the text. When relevant, the instructor will identify the scientific literature used in the notes for further consultation. If you have plans to take further courses in genetics/molecular biology during your undergraduate program or are considering applying to graduate school in these fields, purchasing this textbook will be beneficial to you after this course. Otherwise, two copies for consultation are on reserve in the Natural Sciences Library (Geology Library) for this course.

## Electronic Resources

Lecture notes, laboratory material, and lecture videos (*Lecture Capture*), will be posted on Blackboard (Paws).

## Grading Scheme

### Evaluation of Student Performance

**Midterm Exam Value:** 25% of final course grade **Date:** Wednesday, October 14<sup>th</sup> from 10:30 to 11:20 at room 125. **Format:** Essay questions.

**Final Exam Value:** 40% of final grade **Date:** Consult the Final Exam Schedule **Length:** 3 hours **Format:** Multiple choice and essay questions. **Description:** The exam is comprehensive in that it will cover all lecture, laboratory and seminar material. Material delivered since the midterm exam will be emphasized. Calculators allowed. No phones, laptops, tablets or other material allowed.

**Individual Laboratory Exercises: Value:** 15% of final grade **Due Date:** See Course Schedule **Format:** Four exercises made of short answer questions about the experiments and background of each laboratory experiment. These exercises will be taken without consultation during normal lab time. You should not hand in exercises for labs that you have not attended. There will be no make up exercises.

**Individual Seminars: Value:** 20% of final grade **Due Date:** See Course Schedule **Format:** 20 minutes power point presentation introducing a model organism chosen by the student and exemplifying its use in research by presenting the main discoveries of a published scientific paper assigned by the instructor. The pdf of the presentation has to be submitted to the instructor 24 hours in advance to the presentation and will be posted in paws for all students to download. Student presentations and power point presentations will be part of the material tested on the final exam. ***Student presentations will not available on Lecture Capture.***

### Attendance Expectations

There are no mandatory components to this course. Students are expected to attend all lecture and scheduled lab periods. No make up labs will be offered. Students who miss a lab exercise are assigned a mark of zero for the respective exercise.

### 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 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 exam dates are assigned by the Undergraduate Office and exam format may change 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 316 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. In order to access DSS programs and supports, students must follow DSS policy and procedures. You must contact DSS in advance to request special exam accommodations. For more information, check <http://students.usask.ca/current/disability/> or contact DSS at 966-7273 or [dss@usask.ca](mailto:dss@usask.ca).