Western Science

Department of Biology

BIO3595B – Advanced Genetics

1. Course Information

Course Information
This course will expand on basic genetic principles by examining advanced concepts and techniques used in genetic research to expand our knowledge of biological systems. Specific methods in genetic manipulation, next-generation sequencing, epigenetic analysis and bioinformatics will be examined. Primary literature readings will be used to inform discussion of the implication and applications of these topics.

List of Prerequisites
BIO-2581A/B – minimum of 70%

Unless you have either the requisites for this course or written special permission from your Dean to enroll in it, you may be removed from this course and it will be deleted from your record. This decision may not be appealed. You will receive no adjustment to your fees in the event that you are dropped from a course for failing to have the necessary prerequisites or permission.

2. Instructor Information

Instructors	Email	Office	Office Hours
Dr. Ryan Austin	raustin9@uwo.ca	BGS3045	Wed 2:00-3:00
Carly Charron	ccharro5@uwo.ca	n/a	n/a

Students must use their Western (@uwo.ca) email addresses when contacting the instructor.

3. Course Syllabus, Schedule, Delivery Mode

This course will use examples from diverse biological systems to expand basic genetic principles such as mutation, recombination, gene and genome evolution, complex inheritance and functional genomics. Current research will be used to inform discussion of the implication and applications of these topics.

Students will study and explore the scientific methods and technologies used to conduct advanced genetic and genomic analyses. Specifically students will emerge with an understanding of :

- How scientists manipulate and track the genetic material of model organisms

- How next-generation sequencing is used to gather genomic data
- The different methods used to survey and study epigenetic data
- The role that bioinformatics plays in genomic analysis

Day	Time	Location
Wednesdays	10:30am – 12:30pm	NCB-117
Fridays	1:30pm – 2:30pm	NCB-117

For most weeks, the format will follow a 2 hour lecture on Wednesdays with a 1 hour discussion of one or two papers from research literature on the topic in the tutorial on Friday. A general overview of topics to be discussed each week is below.

Week	Dates	Topic	
1	Jan 11 / 13	Introduction & Genetics review	Quiz 1
2	Jan 18 / 20	Mutagenesis	Quiz 2
3	Jan 25 / 27	Transgenesis	Quiz 3
4	Feb 1 / 3	Genetic mapping	Quiz 4
5	Feb 8 / 10	Transcriptomics	Quiz 5
6	Feb 15 / 17	Next-generation sequencing	midterm
7	Mar 1 / 3	Genomics	Quiz 6
8	Mar 8 / 10	Epigenetics I	Quiz 7
9	Mar 15 / 17	Epigenetics II	Quiz 8
10	Mar 22 / 24	Bioinformatics	Quiz 9
11	Mar 29 / 31	Phylogenetics	Quiz 10
12	Apr 5	Genome evolution	

Key Sessional Dates:
Classes begin: January 9, 2023
Reading Week: February 18 – 26, 2023
Classes end: April 10, 2023
Exam period: April 13 – 30, 2023

In the event of a COVID-19 resurgence during the course that necessitates the course delivery moving away from face-to-face interaction, affected course content will be delivered entirely online, either synchronously (i.e., at the times indicated in the timetable) or asynchronously (e.g., posted on OWL for students to view at their convenience). The grading scheme will **not** change. Any remaining assessments will also be conducted online as determined by the course instructor.

4. Course Materials

Students are responsible for checking the course OWL site (http://owl.uwo.ca) on a regular basis for news and updates. This is the primary method by which information will be disseminated to all students in the class. All course material, including weekly readings will be posted to OWL: http://owl.uwo.ca.

If students need assistance with the course OWL site, they can seek support on the OWL Help page. Alternatively, they can contact the Western Technology Services Helpdesk. They can be contacted by phone at 519-661-3800 or ext. 83800.

Technical Requirements
It may be beneficial, but not mandatory, to have access to a laptop for certain bioinformatic focused lectures. In the event of online learning due to a COVID resurgence, a stable internet connection, and computer with working microphone and/or webcam may be needed.

5. Methods of Evaluation

Key Dates:

Midterm test: Feb 17th (in-class)
Assignment 1 due: March 3rd
Assignment 2 due: March 31st
Quizzes 1 – 10: due Friday's on material from Wednesday's lecture
Final exam: TBD (during exam period)

The midterm will be taken in-class and cover material up to and including lecture content on Wednesday February 15th. The final exam will cover material from the duration of the course with an emphasis on material covered since the midterm. Both midterm test and final exam will be multiple-choice and short answer format.

Both assignments will cover the application of an advanced genetic/genomic method of the students choosing (eg. ATAC-seq, Hi-C, INTACT, etc). The method chosen for each assignment can be the same or different and does not have to be necessarily covered in class. Further details on each assignment will be discussed in class and provided on OWL.

Assignment 1 (10%): a one-page summary methodology on a genomic technology. The summary should provide a paragraph or two on what the technology does and why it's significant along with a brief point form synopsis detailing application of it's methodology.

Assignment 2 (20%): Five slides (submitted as PDF) that detail the application of a genetic method in a primary literature paper of the students' choice. The presentation should detail the papers goals, an overview of the genomic method applied and a summary of the primary result of the study. It should be completed in groups of 2 or 3.

Quizzes (10 x 1%): There will be ten weekly quizzes on material that was covered in that week's lecture. Each week's quiz will be taken online in OWL. They will open for access each Wednesday after lecture and will close at midnight on the following Friday.

The overall course grade will be calculated as listed below:

Quizzes (10)	10%
Midterm Test	20%
Assignments (2)	30%
Final Exam	40%

6. Student Absences

If you are unable to meet a course requirement due to illness or other serious circumstances, please follow the procedures below.

For work totalling 10% or more of the final course grade, you must provide valid medical or supporting documentation to the Academic Counselling Office of your Faculty of Registration as soon as possible. For further information, please consult the University's medical illness policy at

https://www.uwo.ca/univsec/pdf/academic_policies/appeals/accommodation_medical.pdf.

The Student Medical Certificate is available at

https://www.uwo.ca/univsec/pdf/academic_policies/appeals/medicalform.pdf.

For assignments, an extension will be typically granted in the case of illness. For a missed midterm, a remake will be scheduled.

Absences from Final Examinations

If you miss the Final Exam, please contact the Academic Counselling office of your Faculty of Registration as soon as you are able to do so. They will assess your eligibility to write the Special Examination (the name given by the University to a makeup Final Exam).

You may also be eligible to write the Special Exam if you are in a "Multiple Exam Situation" (e.g., more than 2 exams in 23-hour period, more than 3 exams in a 47-hour period).

6. Accommodation and Accessibility

Religious Accommodation
When a course requirement conflicts with a religious holiday that requires an absence from the University or prohibits certain activities, students should request accommodation for their absence in writing at least two weeks prior to the holiday to the course instructor and/or the Academic Counselling office of their Faculty of Registration. Please consult University's list of recognized religious holidays (updated annually) at

https://multiculturalcalendar.com/ecal/index.php?s=c-univwo.

Accommodation Policies
Students with disabilities are encouraged to contact Accessible Education, which provides recommendations for accommodation based on medical documentation or psychological and cognitive testing. The policy on Academic Accommodation for Students with Disabilities can be found at:

https://www.uwo.ca/univsec/pdf/academic_policies/appeals/Academic Accommodation_disabilities.pdf.

7. Academic Policies

The website for Registrarial Services is http://www.registrar.uwo.ca.

In accordance with policy,

https://www.uwo.ca/univsec/pdf/policies_procedures/section1/mapp113.pdf,

the centrally administered e-mail account provided to students will be considered the individual's official university e-mail address. It is the responsibility of the account holder to ensure that e-mail received from the University at their official university address is attended to in a timely manner.

No electronic devices whatsoever are permitted during the taking of tests and exams.

Scholastic offences are taken seriously and students are directed to read the appropriate policy, specifically, the definition of what constitutes a Scholastic Offence, at the following Web site:

http://www.uwo.ca/univsec/pdf/academic_policies/appeals/scholastic_discipline_undergrad.pdf.

Computer-marked multiple-choice tests and exams may be subject to submission for similarity review by software that will check for unusual coincidences in answer patterns that may indicate cheating.

8. Support Services

Please visit the Science & Basic Medical Sciences Academic Counselling webpage for information on adding/dropping courses, academic considerations for absences, appeals, exam conflicts, and many other academic related matters: https://www.uwo.ca/sci/counselling/.

Students who are in emotional/mental distress should refer to Mental Health@Western (https://uwo.ca/health/) for a complete list of options about how to obtain help.

Additional student-run support services are offered by the USC, https://westernusc.ca/services/.