UNIVERSITY OF VICTORIA

Biology 362 – TECHNIQUES IN MOLECULAR BIOLOGY

COURSE OUTLINE - Spring 2023

Lecture: Wed, 1:30-2:20PM, MAC D109; Lab: Thu, 2:30-5:20PM, CUN116 or CLE A103

Course Instructor: **Dr. Ryan Gawryluk**
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Lab Coordinator: **Maggie Lawton**
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Office hours by inquiry; please email to make an appointment.

Land Acknowledgement: We acknowledge and respect the lək̓ʷəŋən peoples on whose traditional territory the University of Victoria stands, and the Songhees, Esquimalt and W̱SÁNEĆ peoples whose historical relationships with the land continue to this day. We are thankful to be able to learn together on this land, and strive to make the world a better place.

Diversity and Inclusion: We welcome everyone to learn in this course and we respect every human being, including all people from all ethnic backgrounds, religious beliefs, sexual orientations, genders, socio-economic backgrounds and abilities.

Course Description (in calendar): Techniques in Molecular Biology. An introduction to basic techniques in molecular biology. Course includes nucleic acid (DNA) isolation, polymerase chain reaction (PCR), gel electrophoresis, molecular cloning, computer-based analysis of nucleotide sequence data, including BLAST searches, multiple sequence alignment, and phylogenetic analyses. This is a single term-long project where new student-collected data are incorporated into a final report written as a scientific manuscript.

Course Description (changes): Practical Skills in Genomics (future name)**.** An introduction to basic techniques in molecular biology and genomics. Course includes nucleic acid (DNA) isolation, polymerase chain reaction (PCR), gel electrophoresis and other DNA quality control, next generation DNA sequencing, computer-based analysis of large-scale nucleotide sequence data, including DNA sequence assembly and mapping, BLAST searches, multiple sequence alignment, and phylogenetic analyses. This is a single term-long project where new student-collected data are incorporated into a final report written as a scientific manuscript.

DATE		LECT/*LAB*	TITLE (tentative)
Jan	11-W	Lec.1.	Course introduction
	12-Th	**Lab 1**	**Introduction / Experimental Design / Safety**
			Assignment 1 due: Project proposal
	18-W	Lec. 2.	Nucleic acid extraction methods
	19-Th	**Lab 2**	**DNA extraction Pt 1**
	25-W	Lec. 3.	TBD
	26-Th	***Lab 3***	**DNA extraction 2 and quality control (Nanodrop)**
Feb	1-W	Lec. 4.	Polymerase Chain Reaction (PCR) techniques
	2-Th	**Lab 4**	**DNA quality control (Qubit) and PCR**
	8-W	Lec 5.	Next generation sequencing: Background and applications
	9-Th	**Lab 5**	**Gel electrophoresis, Tutorial: How to write an introduction**
	15-W	Lec.6	Illumina DNA sequencing I (library production)
	16-Th	**Lab 6**	***Illumina library production***
			Assignment 2 due: Annotated bibliography of five sources
	22-W and **23-Th**		*Reading Break: no lecture, no lab*
Mar	1-W	Lec 7	Next generation DNA sequencing II (quality control methods)
	2-Th	**Lab 7**	**Library quality control: Experion. Tutorial: Scientific figures**
			Assignment 3 due: 2-3 page Introduction
	8-W	Lec. 8	Next generation DNA sequencing III (sequencing proper)
	9-Th	**Lab *8***	**MiSeq DNA sequencing. Tutorial: Material and Methods writing**
			Assignment 4 due: Figure for Nanodrop, Qubit
	15-W	Lec. 8	DNA sequence data formats and raw data manipulations
	16-Th	**Lab 9**	**Sequence analysis: Data quality control and cleanup**
	22-W	Lec. 10	Next gen. sequence data analysis
	23-Th	***Lab 10***	***Clustering of Operational Taxonomic Units* (OTU)**
			Assignment 5 due: Experimental Materials + Methods (M+M)
	29-W	Lec. 11	Sequence similarity search tools
	30-Th	**Lab 11**	***Quantification and identification of OTUs***
Apr	5-W	Lec. 12	Phylogenetic reconstruction methods
	6-Th	**Lab 12**	***Phylogenetic reconstructions***
	13-Th		*Assignment 6 due: M+M for bioinformatics, results*
	27-Th		***Final paper due****

Requirements:		
	Assignments (5)	50% (best 5 out of 6 counted, 10% each)
	Final paper*	25%
	Practical Skills/Participation	5%
	Quizzes (10)	20%

*Final paper is a course requirement. Failure to submit will result in an F in the course.

Grading system: Percentages converted to letter grades

A+ 90-100	A 85-89	A- 80-84	B+ 77-79	B 73-76
B- 70-72	C+ 65-69	C 60-64	D 50-59	F 0-49

Please note – You need to provide an acceptable rationale (*e.g.*, health problems) to be granted an extension for assignment due dates. We assign an incomplete (not a zero) for any elements missed with an excuse, and your final mark will be calculated on the basis of the other completed components of the course, and you will not incur any penalty. However, failure to complete too many important parts of the course (missed labs, quizzes, or assignments) will result in being banned from submitting the final paper, a course requirement; see lab manual introduction for details.

Students must abide by academic regulations as set out in the University of Victoria calendar. They must observe standards of scholarly integrity with regards to plagiarism and cheating. Please refer to UVic Academic Calendar and this website:

https://www.uvic.ca/current-students/home/academics/academic-integrity/index.php

Students must abide to current COVID19 regulations, please check https://www.uvic.ca/return-to-campus.

UVic is committed to promoting, providing and protecting a supportive and safe learning and working environment for all of its members. Your health and mental well-being are important for succeeding in this course, so please take advantage of UVic resources.

Support Connect. 24/7 help by phone or online

https://www.uvic.ca/student-wellness/contacts/emergency-contacts/index.php#ipn-supportconnect-24-7-help

Student Wellness Centre to support students' mental, physical and spiritual health

https://www.uvic.ca/student-wellness/

Centre for Accessible Learning. The CAL staff are available by appointment to assess specific needs, provide referrals and arrange appropriate accommodations: https://www.uvic.ca/services /cal/. The sooner you let us know your needs, the quicker we can assist you in achieving your learning goals in this course.

Office of Indigenous Academic and Community Engagement (IACE) has the privilege of assembling a group of Elders from local communities to guide students, staff, faculty and administration in Indigenous ways of knowing and being.

https://www.uvic.ca/services/indigenous/students/index.php

Office of Student life. Student conduct, Student mental health, Sexualized violence awareness

https://www.uvic.ca/services/studentlife/index.php

Important Dates

The UVic calendar contains a more complete list of important dates; please consult it for more detail https://www.uvic.ca/calendar/dates/

Wednesday, January 11	First BIOL362 lecture
Thursday, January 12	First BIOL362 lab
Wednesday, January 25	Last day for adding classes
Tuesday, January 31	Last day for paying second term fees without penalty
Sunday, February 12	Last day for 50% reduction in tuition fees for standard courses.
Mon-Fri, February 20-24	Reading break, no classes
Tuesday, February 28	Last day for withdrawing from courses without penalty of failure
Wednesday, April 5	Last BIOL362 lecture
Thursday, April 6	Last BIOL362 lab and last day of classes