MBIO3600: Molecular Microbiology Techniques MBIO 3600 Syllabus

Class Location : 201/204 Buller

Times : A01: MW 2:30- 5:30
A02: TR 2:30- 5:30

Start/end Date : Jan 24th – Apr 25th, 2022

Course Credits : 3.00

Course Instructor: Damien Rivers – Office hours by email appointment – Likely only via zoom due to Covid protocols.
Vanessa Kornelsen – Office hours by email appointment

Course Description:
A laboratory-based course, intended to teach the fundamental techniques required to work in a modern molecular microbiology laboratory. Students will develop a thorough understanding of the theory underpinning the techniques introduced in this course, laboratory skills involved in current techniques, and application of techniques to investigate scientific questions.

The scientific communication component will focus on scientific writing with basic principles and components of scientific writing being taught. These skills will then be used in the writing of a scientific manuscript based on experiments performed in lab and data collected. There will also be group-based discussion and assignments on how to more effectively communicate scientific information with the public, how to best display data and how to produce effective graphical abstracts.

Learning outcomes include development of technical skills, competency in following and troubleshooting protocols, presentation of results and scientific writing.

May not be held with: the former MBIO 4600, MBIO 4601, or MBIO 4030 when titled Advanced Microbial Genetics Lab.

Prerequisites: [MBIO 3410 or MBIO 3411]; and [(MBIO 2710 or CHEM 2710) and CHEM 2720] or [one of the former MBIO 2370, MBIO 2371, the former CHEM 2370, or CHEM 2371].

Course Organization:

This course is fairly unique in that it consist of both in-person (on campus), and remote meetings via zoom. Students in each slot will be broken into two groups, with each group alternating weekly between meeting in-person and meeting via zoom. This is done to help ensure social distancing can be maintained for the in-person component. The rotation will typically entail one full week in-person, followed by a remote week where one of the classes will have a synchronous zoom meeting (M/T), and the other class (W/Th) will have assigned readings or videos, with no synchronous meeting required. However, it IS expected students are available during ALL scheduled classes should the need to meet arise. (See student schedule for details)

Students registering for this course must ensure they satisfy the following:
1) They are able and authorized to attend the in-person components of this class
2) They are able and willing to follow ALL in-person Covid 19 (and other) safety rules (see lab rules on UMLearn)
3) Are available during ALL scheduled classes for either in-person or remote meetings
4) Acknowledge that we may be forced to update plans on little to no notice due to the evolving public health situation (This may include limiting or cancelling in-person meetings).

Students registering for this course must ensure they satisfy the following minimum technological requirements:
1) A computing device where one can create and edit documents (including but not limited to .pdf, word, excel)
2) An internet connection capable of streaming videos and downloading software
3) Access to a web-cam and microphone.

Grading Scheme:

Draft Manuscript	5 %
Peer Review of Draft MS	10 %
In class assignments	10 %
Final Manuscript	25 %
Hands on Technical Marks	30 %
Final Exam	20 %

Letter grades are assigned taking into consideration the grade distribution in the class and the University of Manitoba's descriptors A+ (Outstanding), A (Excellent), B+ (very good), B (Good), C+ (Satisfactory), C (Adequate), D (Marginal), F (Failure); see http://umanitoba.ca/student/records/grades/686.html

For this course, the grading scheme generally follows: A+ (>95%), A (85-94.9%), B+ (79.9-85%), B (70-79.9%), C+ (65-69.9%), C (55.0-64.9%), D (50-54.9%), F (<50%). Lower thresholds for some letter grades may be used if they are deemed more appropriate. Higher thresholds will not be used. Most of the Hands on Technical Marks will be graded prior to VW date.

Important dates:

Feb 22nd-25th	Reading Week
April 25th	VW deadline
April 25th	Last Day of Classes
April 16th-May 3rd	Final exam as scheduled by the registrar's office

Course policies:

Online policy: We recognize that these are unusual circumstances, and that there are some adjustments needed when working virtually. At the same time, we do want to remind

students that University policies, such as the Respectful Work and Learning Environment policy, still apply, as do basic expectations around how students will engage with each other, and with the University. This means that when participating in classes, online meetings, etc., students are expected to behave professionally, and follow the same basic norms as they would in person, such as being clothed, not being impaired, and participating respectfully. Essentially, if you wouldn't do it in an in-person class, don't do it in virtual setting. Section 2.5(c) of the Student Non-Academic Misconduct and Concerning Behaviour Procedure describes types of inappropriate or disruptive behaviour.

Emails: Must be sent from your university email account. Emails sent to instructors from an email account other than the University of Manitoba account will automatically be deleted.

Photo policy: Image captures of slides/overhead material is strictly for personal use only (copyright). Please do not include the instructor and/or classmates in the image. Posting of images that include lecture material and/or the instructor/classmates on the internet is strictly prohibited.

Audio/Video recording policy: Prior consent must be obtained from the instructor to record the lecture. Students with disabilities are directed to Student Accessibility Services to facilitate the implementation of accommodations. Course instructors are willing to meet with students to discuss the accommodations recommended by Student Accessibility Services.

Academic Integrity: Students are encouraged to discuss course material, including assignments and the final project. However, each student must hand in his or her own copy of each assignment/project and conduct the work independently unless otherwise specified. Please remember that group projects are subject to the rules of academic dishonesty and every group member must ensure that a group project adheres to the principles of academic integrity. Copying from anywhere, including other students, books, or the internet constitutes a case of academic dishonesty and could have serious consequences. The goal in this class (as in all academic pursuits) is to learn. If you are unclear on what is acceptable or what constitutes plagiarism, please ask for clarification before turning in an assignment. Guidelines are stated in your calendar regarding University policy with respect to academic dishonesty and behavior (particularly plagiarism and cheating), as well as policies regarding absence from final exams.
http://umanitoba.ca/faculties/science/undergrad/resources/webdisciplinedocuments.html

Schedule "A" of the Responsibilities of Academic Staff with regards to Students (ROASS) policies of the University of Manitoba lists resources and policies for students. It is important that you familiarize yourself with these resources and policies. This document is available from the Department of Microbiology web page at:
http://umanitoba.ca/science/microbiology/

Medical notes: In the event that the student is unable to complete the work of any or all course components due to unforeseen circumstances (illness, family emergency, etc.), then the student must contact the instructor who, in consultation with the Department Head and Faculty of Science, will decide on alternative arrangements. Students who are unable to meet a course requirement due to medical circumstances are currently not required to

submit medical notes. However, please note that circumstances that result in missing multiple course components (e.g. assignments/exams/classes) may require medical documentation (e.g., Authorized Withdrawal, Tuition Fee Appeal, Leave of Absence, or accessibility-related accommodations). Students are advised to speak with an advisor in their faculty/college/school of registration in this case.

Voluntary Withdrawal (VW)/Authorized Withdrawal (AW)/Limited Access Policy (LAP):
VW: Students have the opportunity to voluntarily withdraw (VW) from this course; please refer to the University website for the deadline date. By then, you will have received feedback to allow you to assess your progress and determine if you are achieving the grade you are aiming for in this course. If you are unlikely to be successful in the course, or you are not achieving the grade that you are aiming for, you should consider a VW from the course. You may contact me to review your progress in more detail, or you may discuss the VW option with a Faculty academic advisor. Students enrolled in the course after the VW deadline will be assigned a final grade. http://umanitoba.ca/u1/know_yourself/573.html

AW: At times medical or compassionate circumstances arise in a student's life that prevent them from performing as they would in normal circumstances. If you are in this position, please contact a Faculty academic advisor to discuss your options. Be prepared to provide documentation, which supports your situation.
http://www.umanitoba.ca/student/resource/student_advocacy/authorized-withdrawal/index.html

Limited Access Policy: The Senate Executive Committee approved, on behalf of Senate that section 2.5(a) of the Repeated Course Policy to be suspended indefinitely. Sec 2.5 refers to Limited Access. Suspension of LAP means that you can retake the course you have decided to VW in the next semester.

Schedule (may be subject to modification):

Blue = in-person
Green = virtual
Red = due date

WEEK 1 (Jan 24th - 28th):

All students:

(A01:Mon/A02:Tues).
First day of class

- Syllabus
- Intro to the lab: Rules and safety – Including additional Covid-19 safety guideline
- Breaking slots into Group A and B
- Intro to the writing component

WEEK 2 (Jan 31st-Feb 4 th):

GROUP A:

(A01:Mon/A02:Tue).

Intro to in-person labs

- Intro to small vol. measurements : What do varying volumes look like in a pipetman
- Intro to small vol. measurements : 96 well serial dilution test

(A01:Wed /A02:Thurs).

Lab slot 1

- Study I: Step II: RNA extraction

GROUP B:

(A01:Mon/A02:Tue).

Scientific communication – Live Zoom Class

- Communicating Science to the Public

At End of Class: Group Assignment 1

(A01:Wed /A02:Thurs).

Scientific communication – Independent Study

- Introduction to Scientific Writing
- Components of a Research paper

WEEK 3 (Feb 7th-Feb 11th):

GROUP A:

Mon: Study I Step II datasheet due

(A01:Mon/A02:Tue).

Scientific communication – Live Zoom Class

- Communicating Science to the Public

At End of Class: Group Assignment 1

(A01:Wed /A02:Thurs).

Scientific communication – Independent Study

- Introduction to Scientific Writing
- Components of a Research paper

GROUP B:

(A01:Mon/A02:Tue).

Intro to in-person labs

- Intro to small vol. measurements : What do varying volumes look like in a pipetman
- Intro to small vol. measurements : 96 well serial dilution test

(A01:Wed /A02:Thurs).

Lab slot 1

- Study I: Step II: RNA extraction

WEEK 4 (Feb 14th-Feb 18th):

GROUP A:

(A01:Mon/A02:Tue).

Lab slot 2

- Study I : Step III: cDNA synthesis
- Study I : Step VI: Sequencing of the *lacZ* region to determine the genotype
  Part A: Genomic DNA prep

(A01:Wed /A02:Thurs).

Lab slot 3

- Study I : Step IV: qRT-PCR
- Study I : Step VI: Sequencing of the *lacZ* region to determine the genotype
  Part B: Amplification of the *lacZ* region via PCR

GROUP B:

Mon: Study I Step II datasheet due

(A01:Mon/A02:Tue).

Scientific communication – Live Zoom Class

- Graphical Abstracts

At End of Class: Group Assignment 2

(A01:Wed /A02:Thurs).

Scientific communication – Independent Study

- Writing Introductions, Discussions, Methods
- Making Figures

WEEK 5 (Feb 28th- Mar 4th):

GROUP A:

Mon: Study I Step IV datasheet due

(A01:Mon/A02:Tue).

Scientific communication – Live Zoom Class

- Graphical Abstracts

At End of Class: Group Assignment 2

(A01:Wed /A02:Thurs).

Scientific communication – Independent Study

- Writing Introductions, Discussions, Methods
- Making Figures

GROUP B:

(A01:Mon/A02:Tue).

Lab slot 2

- Study I : Step III: cDNA synthesis
- Study I : Step VI: Sequencing of the *lacZ* region to determine the genotype
  Part A: Genomic DNA prep

(A01:Wed /A02:Thurs).

Lab slot 3

- Study I : Step IV: qRT-PCR
- Study I : Step VI: Sequencing of the *lacZ* region to determine the genotype
  Part B: Amplification of the *lacZ* region via PCR

WEEK 6 (Mar 7th- Mar 11th):

GROUP A:

(A01:Mon/A02:Tue).

Lab slot 4

- Study I : Step V: Determination of LacZ protein production
  Part A: SDS-PAGE gel
  Part B: Transfer to membrane
  Part C: Blocking of the membrane

(A01:Wed /A02:Thurs).

Lab slot 5

- Study I : Step V: Determination of LacZ protein production
  Part D: Detection of LacZ via Western Blot
- Study I : Step VI: Sequencing of the *lacZ* region to determine the genotype
  Part C: Gel isolation of PCR product
  Part D: Sequencing reaction set up.

GROUP B:

(A01:Mon/A02:Tue).

Scientific communication – Live Zoom Class

- Effective Data Display

At End of Class: Group Assignment 3

(A01:Wed /A02:Thurs).

Scientific communication – Independent Study

- Style and Revision
- Peer Review

WEEK 7 (Mar 14th- Mar 18th):

GROUP A:

Mon: Study I Step V datasheet due

(A01:Mon/A02:Tue).

Scientific communication – Live Zoom Class

- Effective Data Display

At End of Class: Group Assignment 3

(A01:Wed /A02:Thurs).

Scientific communication – Independent Study

- Style and Revision
- Peer Review

Fri: Study I Step VI datasheet due

GROUP B:

Mon: Study I Step IV datasheet due

(A01:Mon/A02:Tue).

Lab slot 4

- Study I : Step V: Determination of LacZ protein production
  - Part A: SDS-PAGE gel
  - Part B: Transfer to membrane
  - Part C: Blocking of the membrane

(A01:Wed /A02:Thurs).

Lab slot 5

- Study I : Step V: Determination of LacZ protein production
  - Part D: Detection of LacZ via Western Blot
- Study I : Step VI: Sequencing of the *lacZ* region to determine the genotype
  - Part C: Gel isolation of PCR product
  - Part D: Sequencing reaction set up.

----------END OF DATA COLLECTION FOR PAPER----------

WEEK 8 (Mar 21th- Mar 25th):

GROUP A:

(A01:Mon/A02:Tue).

Lab slot 6

- Mini Ex.1 : Identification of an unknown plasmid
  - Part A: Plasmid isolation
- Mini Ex.2 : PCR-Based Site-Directed mutagenesis
  - Part A: Mega-Primer PCR

(A01:Wed /A02:Thurs).

Lab slot 7

- Mini Ex.1 : Identification of an unknown plasmid
  - Part B: Restriction Digest and Analysis
  - Part C: Gel Electrophoresis and Analysis
- Mini Ex.2 : PCR-Based Site-Directed mutagenesis
  - Part B: Gel Isolation of Your "Mutant" PCR Product

Fri: Draft Manuscript Due

GROUP B:

Mon: Study I Step V datasheet due

(A01:Mon/A02:Tue).

Scientific communication – Live Zoom Class

- Written feedback and review skills

At End of Class: Group Assignment 4

(A01:Wed /A02:Thurs).
Scientific communication – Independent Study
- Titles and Abstracts

Fri: Study I Step VI datasheet due

WEEK 9 (Mar 28th- Apr 1st):

GROUP A:

(A01:Mon/A02:Tue).
Scientific communication – Live Zoom Class
- Written feedback and review skills

At End of Class: Group Assignment 4

(A01:Wed /A02:Thurs).
Scientific communication – Independent Study
- Titles and Abstracts

Fri: Review Due

GROUP B:

(A01:Mon/A02:Tue).
Lab slot 6
- Mini Ex.1 : Identification of an unknown plasmid
  Part A: Plasmid isolation
- Mini Ex.2 : PCR-Based Site-Directed mutagenesis
  Part A: Mega-Primer PCR

(A01:Wed /A02:Thurs).
Lab slot 7
- Mini Ex.1 : Identification of an unknown plasmid
  Part B: Restriction Digest and Analysis
  Part C: Gel Electrophoresis and Analysis
- Mini Ex.2 : PCR-Based Site-Directed mutagenesis
  Part B: Gel Isolation of Your "Mutant" PCR Product

Fri: Draft Manuscript Due

WEEK 10 (Apr 4th- Apr 8th):

GROUP A:

Mon: Mini Ex.1 datasheet due

(A01:Mon/A02:Tue).
Lab slot 8
- Mini Ex.2 : PCR-Based Site-Directed mutagenesis
  Part C: Digestion of Your PCR Product
  Part D: Mutant rhaK PCR Product Ligation

(A01:Wed /A02:Thurs).
Lab slot 9

- Mini Ex.2 : PCR-Based Site-Directed mutagenesis
  Part E: Transformation of Your Construct into *E. coli* DH5α

GROUP B:

(A01:Mon/A02:Tue).
Scientific communication – Live Zoom Class

- Scientific Communication to General Public Revisited

At End of Class: Group Assignment 5

(A01:Wed /A02:Thurs).
Scientific communication

- Communicating Science to the Public

Fri: Review Due

WEEK 11 (Apr 11th- Apr 15th):

GROUP A:

Mon: Mini Ex.2 datasheet due

Nothing assigned; extra writing time

Fri: Final Manuscript due

GROUP B:

Mon: Mini Ex.1 datasheet due

(A01:Mon/A02:Tue).
Lab slot 8

- Mini Ex.2 : PCR-Based Site-Directed mutagenesis
  Part C: Digestion of Your PCR Product
  Part D: Mutant rhaK PCR Product Ligation

(A01:Wed /A02:Thurs).
Lab slot 9

- Mini Ex.2 : PCR-Based Site-Directed mutagenesis
  Part E: Transformation of Your Construct into E. coli DH5α

WEEK 12 (Apr 18th- Apr 22nd):

GROUP A:

(A01:Mon/A02:Tue).

Scientific communication – Live Zoom Class

- Scientific Communication to General Public Revisited

At End of Zoom class: Group Assignment 5

(A01:Wed /A02:Thurs).

Scientific communication

- Communicating Science to the Public

GROUP B:

Mon: Mini Ex.2 datasheet due

Nothing assigned; extra writing time

Fri: Final Manuscript due

The University of Manitoba campuses are located on original lands of Anishinaabeg, Cree, Oji-Cree, Dakota, and Dene peoples, and on the homeland of the M´etis Nation.

We respect the Treaties that were made on these territories, we acknowledge the harms and mistakes of the past, and we dedicate ourselves to move forward in partnership with Indigenous communities in a spirit of reconciliation and collaboration.