MICR*2430 Methods in Microbial Culture and Physiology

W22

Winter 2022
Section(s): C01

Department of Molecular and Cellular Biology
Credit Weight: 0.50
Version 1.00 - January 07, 2022

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1 Course Details

1.1 Calendar Description

This course uses a hands-on approach to investigate microbial growth and factors that impact growth and the interactions of microbes with biotic and abiotic environments. This course will explore the ecological diversity of microorganisms of selected environments. Students will develop a wide range of microbiology-related laboratory skills.

Pre-Requisites:	MICR*2420
Restrictions:	This is a Priority Access Course. Enrolment may be restricted to particular programs, specializations or semester levels during certain periods. Please see the departmental website for more information.

1.2 Course Description

This course will be taught using a **flipped** format. Students will watch lecture videos and do textbook readings prior to the Tuesday seminar. During class, students will work in groups, using problem-based learning to clarify and deepen their understanding of the concepts. During this group work, social distancing regulations will be suspended, however all other safety protocols will be enforced. Lab exercises and a team-based case study will further develop comprehension.

Recognizing that we've all struggled, academically and personally, during the pandemic, and that those struggles are on-going, my goal is to help you learn and foster your curiosity about this field, while maintaining a focus on kindness, empathy and flexibility throughout the semester. We're all in this together, and it is my hope we will be able to work as a team, so that we are ALL successful and finish the semester strong, rather than feeling like we're

limping to the finish line! To that end, the following strategies will be used:

1. Class recordings: whether in-person or remote, will be recorded, edited and posted for streaming by the next day. Videos will be available on Microsoft Stream to facilitate accurate closed-captioning.
2. Labs: ***per*** UofG policy, the first two weeks of the semester will be remote and labs will be hosted on Zoom. Hopefully, we will be able to return to the planned F2F labs beginning the week of January 24. In f2f labs, students will be working in pairs. **Students who are feeling ill** are asked to contact the lab coordinator and remain home. Alternate arrangements will be made.
3. Keeping track: given the flipped nature of this course, as well as the required flexibility this particular semester requires, weekly tasks as well as their estimated "time to completion" will be itemized in advance (when possible), using the **Checklist** function of Courselink, **Courselink Announcements**, e-mails when necessary, as well as **Courselink Discussion Forums** for different course components. Dr. K. will check the latter daily.
4. Topic quizzes: non-cumulative, online, open for 24h with >3x the required time limit. Best 4 of 5.
5. **Assessments, due dates, and grading schemes will have built-in flexibility.**

1.3 Timetable

1. Seminar: Tues. 11:30 - 12:50 pm
    - Jan. 11 & 18 ***via*** Zoom
    - Jan. 24 (tentative) in MAC149
2. Labs: Wed, Thurs & Fri. 2:30 - 5:20
    - Weeks 1 (Jan. 12-14) & 2 (Jan. 19-21) ***via*** Zoom
    - Weeks 3-12 (tentative) in SSC4102

1.4 Final Exam

Thurs. Apr. 14, 2:30-4:30. Location TBA

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2 Instructional Support

2.1 Instructional Support Team

Instructor: Wendy Keenleyside Ph.D.
Email: wkeenley@uoguelph.ca
Telephone: +1-519-824-4120 x53813
Office: SSC 3506

- She/her

Lab Co-ordinator: Catrien Bouwman
Email: cbouwman@uoguelph.ca
Telephone: +1-519-824-4120 x52533
Office: SSC 3504
Office Hours: Office Hours and format will be posted on CourseLink the first week of class.

2.2 Teaching assistants

Two graduate students from MCB will be assigned as GTAs to each of the 3 lab sections. These TAs will introduce themselves and provide contact details during the week 1 lab period.

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3 Learning Resources

3.1 Required Resources

Microbiology: Canadian Edition (Textbook)
https://openlibrary.ecampusontario.ca/catalogue/item/?id=0a20e9e2-f721-4c67-b555-097c56f336b2

- **By Keenleyside *et al*. Adapted from Microbiology by Openstax, specifically for MICR2420 and MICR2430.**
- **This is an Open Education Resource (OER): the e-book is free.**

Laboratory Manual (Lab Manual)
Given the uncertainty of how much of the semester will be online, you do not need to purchase the lab manual. All required materials for the lab will be in the associated folders on Courselink.

Courselink (Website)

https://courselink.uoguelph.ca
The course website will be used extensively. Some of the most important features are listed below, along with an explanation of **why** they are so valuable. Please familiarize yourself with the organization and content of the website.

1. **"Checklist" (in banner):**

   - a weekly breakdown of required or recommended tasks, organized chronologically according to required or recommended order of completion, and including any relevant links (e.g. to reading guides, lecture videos)
   - given the flipped nature of this source, with the inherent increased individual responsibility for time management, this tool will help significantly, ensuring that you are proactive in managing your time so that you don't fall behind or forget a due date :-)

2. **"Learning tools" folder (in Content):**

   - **weekly reading/study guides** - includes names and terms in the associated textbook section or lab introduction that are **assumed knowledge** for watching the associated lecture video, and others that will be discussed/described in the lecture video and class, but are akin to signposts so that you focus your reading on the relevant concepts and don't fall down a rabbit hole of minutiae. The guides also include relevant content-specific learning outcomes that should be turned into questions **after** watching the associated lecture videos, in order to test your comprehension and accuracy of your notes. These are posted as Word files, specifically so that you can enter the definition and description of the **assumed knowledge** names and terms
   - **homework -** one "big picture" homework assignment ***per*** topic, for pulling the various concepts together and testing your comprehension of the finer details as well as the bigger picture. There are no answers posted, no associated due dates and these are not taken up in class. They are a tool to be used prior to topic quizzes and the final exam. Students are encouraged to work together on these.
   - **Content-specific learning outcomes** - master list for the entire course. Collectively these answer the questions "what do I need to know for the quiz/exam?". "how will I be tested on this?" and "how much detail do I need to

know?". I use these as a checklist when I create the assessments, to ensure that ALL quizzes and the final correlate in depth and emphasis, with these LOs. In essence, these are a **table of contents** for your assessments.

3. **"Topic videos & accompanying slides" (Content):**

   - links for a total of 17 lecture videos that collectively cover the entirety of the course content. These MUST be watched AFTER doing the readings as described in that week's reading guide, and BOTH must be done prior to the Tuesday topic review seminar. The topic review seminar is used purely for working on problems related to that week's topic - the seminar problems are higher level ones that incorporate common misconceptions and alternate with the topic quiz "debrief" seminars.

4. **Lab folders (Content):**

   - these contain ALL required materials for online labs, as well as in-person lab, and include the report sheets for the individual lab reports

5. "**Tools" (banner):**

   - **Quizzes** - links to ALL online quizzes, including the **6 practice quizzes** for testing your basic comprehension for each of the 6 topics.
   - **Discussion -** Various content & course structure-related forums. These are **checked daily** and should be used for all questions not of a personal nature (the latter should be addressed *via* email to the instructor, lab coordinator or TA). Despite the fact this is not anonymous, in contrast to Discord, you are encouraged to post your questions here as the instructor can ensure that any student-posted answers are correct, it is highly unlikely that you are the only student with this question, and it gives us an idea of areas of general confusion or difficulty that need to be addressed in class or lab.

Zoom (Website)

https://zoom.us/meetings

This is accessed through "Content" and will be used for hosting virtual seminars and labs and **for seminar polling throughout the semester**. When we are back on campus, it will

also be used for hosting group office hours, as required.

- Students do not need to purchase a Zoom Pro account but do need to register for a free account using their University of Guelph email address and full name as appears on their student card.

PEAR Tool (Website)
https://www.uoguelph.ca/peartool/user/signon.cfm?destination=index%2Ecfm
UofG online platform for **P**eer **E**valuation **A**ssessment and **R**eview.

- This will be used for the peer evaluation component of the Case Study Ch. 2 concept questions, and for the final anonymous evaluation of the distribution of effort among team members.

3.2 Recommended Resources

PEERWise (Website)
https://peerwise.cs.auckland.ac.nz/at/?uoguelph_ca
A free website for authoring, answering and reviewing MCQs related to the course content.

- Students earn their bonus marks for authoring and answering questions using this site
- Any higher Bloom's-level MCQs will be incorporated into the final exam, providing additional incentive to author, answer and think more critically about the course content
- The class list will be uploaded and the site will become accessible once the add period for W22 is over

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4 Learning Outcomes

Course Goals

This course is designed as an active learning course, where students learn the concepts of microbial growth, metabolism, cultivation and ecology, through independent reading, group discussions and online lab exercises which include, in the second half of the semester, a case study and case study teams. Note that the case study will simultaneously cover a majority of the course learning outcomes as well as the broader MCB program Learning Outcomes (including Problem solving & Critical thinking, Communication, Professional & Ethical behaviour) and the University of Guelph learning outcomes (including Critical & Creative Thinking, Literacy, Communicating & Professional & Ethical Behaviour).

- **Content-related** learning outcomes will be posted separately on Courselink, and regularly updated. The content-related LOs all fall under 1 or more of the Course Learning Outcomes identified in section 4.1. The latter can be viewed as overarching descriptions of the course's scope, while the former are offering-specific, to be used by the intructor AND students when setting/writing and grading the various assessments.

4.1 Course Learning Outcomes

By the end of this course, you should be able to:

1. Demonstrate an understanding that chemical transformations of biological molecules are catalyzed by enzymes organized in metabolic pathways, and that these pathways are regulated
2. Understand and appreciate the metabolic diversity among eukaryotes, prokaryotes and archaea
3. Be able to describe how thermodynamically unfavourable processes occur
4. Understand that the properties of cells are a function of the chemical structures of their constituent macromolecules and be able to describe some of the macromolecular interactions essential to cell function
5. Appreciate the roles of cells as the fundamental unit of life and the role of the prokaryotes in the evolution of eukaryotic cells, their organelles, and the major metabolic pathways
6. Demonstrate an understanding of communication within and between cells and their environment
7. Demonstrate an understanding of the molecular structure, function and regulation of genes and genomes and be able to explain, with examples, how environmental factors may affect the frequency of genotypes and phenotypes in a population
8. Successfully design and explain experiments for the isolation, identification and enumeration of microbes or assess such proposals
9. Perform experiments using appropriate safety precautions, and microbiological techniques for the isolation, identification and enumeration of representative groups of bacteria and fungi
10. Use appropriate and accurate mathematical calculations and statistical analyses and assess the reliability of data using biological and technical replicates
11. Successfully interpret and communicate scientific data in laboratory reports, group assignments and tests

12. Through open and regular communication between team members, learn to become an effective research team, understand the essential difference between a group and a team, and further develop team skills
13. Demonstrate a good work ethic by setting goals, meeting deadlines and working cooperatively and responsibly with team members

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5 Teaching and Learning Activities

5.1 Lecture

Tue, Jan 11, 11:30 AM - 12:50 PM

Topics:	**Introduction to course & review of basic concepts**
References:	See Topic 1 readings and lecture videos in week 2: these MUST be completed PRIOR to next week's seminar (Jan. 18)

Tue, Jan 18, 11:30 AM - 12:50 PM

Topics:	**Topic 1 Growth in the environment & lab discussions & problems**
References:	To be done BEFORE this seminar (Jan. 18): **Topic 1 textbook readings & lecture videos** 1. Sec. 4.1 & 9.3, (review of relevant previous concepts 1.2-1.3, 7.1-7.4) 2. Lecture videos 1-3: **LV1-From ecosystems to media** (~25 min), **LV2- Nutrients** (~33 min) **& LV3 - Autotrophy/diazotrophy** (~18min)

Tue, Jan 25, 11:30 AM - 12:50 PM

Topics:	**Topic quiz #1 debrief**

References: See Topic 2 readings and lecture videos in week 4: these MUST be completed PRIOR to next week's seminar (Feb. 1)

Tue, Feb 1, 11:30 AM - 12:50 PM

Topics: **Topic 2 Growth Kinetics & Enumeration discussions & problems**

References: To be done BEFORE this seminar (Feb. 1):

Topic 2 textbook readings & lecture videos

1. Sec. 9.2
2. Lecture videos 4-5: **LV4**-**Bacterial cultures & growth curves** (13.5') **LV5**-**Bacterial enumeration** (19')

Tue, Feb 8, 11:30 AM - 12:50 PM

Topics: **Topic quiz #2 debrief**

References: See Topic 3 readings and lecture videos in week 6: these MUST be completed PRIOR to next week's seminar (Feb. 15)

Tue, Feb 15, 11:30 AM - Tue, Feb 22, 12:50 PM

Topics: **Topic 3 The cell membrane & transport discussions & problems**

References: To be done BEFORE this seminar (Feb. 15):

Topic 3 textbook readings & lecture videos

1. Sec. 3.3
2. Lecture videos 6-8: **LV6-Bacterial cell wall & passive transport** (24'), **LV7-Introduction to active transport** (19'), **LV 8-Active transport – ABC & PTS** (23')

Tue, Feb 22

Topics: Winter Break - no classes

Tue, Mar 1, 11:30 AM - 12:50 PM

Topics: **Topic quiz #3 debrief**

References: See Topic 4 readings and lecture videos in week 8: these MUST be completed PRIOR to next week's seminar (Mar. 8)

Tue, Mar 8, 11:30 AM - 12:50 PM

Topics: **Topic 4 The Influence of environment on growth discussion & problems**

References: **Topic 4 readings & lecture videos:**

1. Sec. 9.4-9.7 (review 3.3, 7.3, 7.4) & case study Ch. 1, 2 & 3
2. Lecture videos 9-11: **LV9-Environmental influences: O_2 & temp** (35'), **LV10-Adaptation to pH** (~31 min) & **LV11-Adaptation to osmotic stress** (14 min)

Tue, Mar 15, 11:30 AM - 12:50 PM

Topics:	**Topic quiz #4 debrief**
References:	See Topic 5 readings and lecture videos in week 10: these MUST be completed PRIOR to next week's seminar (Mar. 22)

Tue, Mar 22, 11:30 AM - 12:50 PM

Topics:	**Topic 5 The Biochemistry of catabolism discussion & problems**
References:	**Topic 5 readings & lecture videos:** 1. Ch. 8 introduction, Sec. 8.1-8.5, 10.3, Case study Ch. 2-3 2. Lecture videos 12-15: **LV 12: Central pathways** (36'), **LV13: Intro. To fermentation & redox potentials** (19'), **LV 14: Redox & the Electron transport chain** (30'), **LV 15: Primary & secondary fermentation** (13')

Tue, Mar 29, 11:30 AM - 12:50 PM

Topics:	**Topic quiz #5 debrief**
References:	See Topic 6 readings and lecture videos in week 12: these are integral to Ch. 2 & 3, as well as the final exam, and MUST be completed PRIOR to next week's seminar (Apr. 5)

Tue, Apr 5, 11:30 AM - 12:50 PM

Topics:	**Topic 6 Microbial diversity & ecology discussions & problems**
References:	**Topic 6 readings & lecture videos:**

1. Sec. 8.6, 8.7, 10.1, 9.1, 10.6, Case study Ch. 1-3
2. Lecture videos 16-17: **LV 16-Heterotrophs vs lithotrophs** (24') & **LV 17-Phototrophs & the ETC** (27')

5.2 Course Content: Labs

Week/dates	**Lab Topic**	**Readings**
1 Jan. 12-14	Exp. 1 - Soil microbiology (online)	Laboratory 1
2 Jan. 19-21	Due to Dropbox: Report 1 Exp. 2 - Bacterial Physiological Diversity (online)	Laboratory 2
3 Jan. 26-28	Due to Dropbox: Report 2 Exp. 3 - Comparative counting (in person??)	Laboratory 3
4 Feb. 2-4	Exp. 3 results Exp. 4 - Growth curve (online)	Laboratory 4
5 Feb. 9-11	Due to dropbox: Reports 3 & 4 Exp. 5 – Biochemical tests (in person??) Introduction to case study & case study teams	Laboratory 5 & Case Study - Introduction to the Winogradsky Columns

Week/dates	**Lab Topic**	**Readings**
	- Assign Case study Ch. 1 questions	
6 Feb. 16-18	Due to dropbox: Team charter Exp. 5 results Exp. 6 – Antimicrobials (in person??) Ch 1 lab (virtual results)	Laboratory 6 Case Study Ch. 1 & Ch. 1 readings
7 Mar. 2- 4	Due to dropbox: Reports 5 & Ch. 1 questions Exp. 6 results Ch. 1 team quiz Assign Ch. 2 questions	Case Study Ch. 1 & Ch. 1 readings
8 Mar. 9-11	Due to dropbox: Report 6 & Team effectiveness feedback summary Ch. 2 lab (virtual results)	Case Study Ch. 2 & Ch. 2 readings
9 Mar. 16-18	Due to **PEARTool**: Ch. 2 draft answers Ch. 2 team quiz #1 Assign Ch. 3 questions	Case Study Ch. 2 & Ch. 2 readings

Week/dates	Lab Topic	Readings
10 Mar. 23-25	Due to **PEARTool**: Ch. 2 reviews Ch. 2 team quiz #2	Case Study Ch. 2 & Ch. 2 readings
11 Mar. 30-Apr. 1	Due to dropbox: Ch. 2 & Ch. 3 final answers Ch. 3 team quiz	Case Study Ch. 3 & Ch. 3 readings

- Case study readings are given in the case study, published in the course manual. Other readings are provided via link or pdf on Courselink

5.3 Method of Presentation

Students will learn the techniques and concepts through virtual (hopefully only the first 2 weeks!) and face-to-face seminars + lab sessions and will use a combination of independent reading, lecture videos, laboratory activities, group/team discussions and team work in an interactive case study and collaborative tests/test questions. **Simple concepts and definitions will be itemized in weekly reading guides and covered through independent reading, laboratory exercise introductions, but will not be covered during class.**

5.4 Teamwork

This is a major component of the course due to the documented advantages of peer discussion and instruction to facilitate deeper learning, as well as being a critical skill in the workplace. Case Study groups of students will be formed. They will work together in the online lab sections and outside of class/lab time on the case study. Teams will be constructed following best practices, using student answers to a survey. Team member accountability will be ensured through an initial "Team Charter" and finally, through anonymous peer evaluations using the UofG PEARTool. The average scores from those anonymous assessments will be used to assign individual case study grades from the team grade.

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6 Assessments

Comprehension of the first 5 of 6 topics will be tested through **non-cumulative** online topic quizzes. This means that it is entirely the student's responsibility to keep up with the assigned readings and content, as the final exam **IS** cumulative and includes lab-related material. Students are expected to keep reviewing previously covered material. In order to help facilitate this, ungraded practice quizzes on basic knowledge for each of the 6 topics will be available. In addition, the topics are organized so that there is a logical progression and subsequent topics build on the concepts from previous ones. The case study integrates all of the course topics.

Total quiz grade weight transferred to final exam if final exam grade is higher. There will be no alternative quizzes for students who are unable to write during the scheduled time (quiz grade is best 4 of 5). Students who struggle with the quizzes are encourage to set up a meeting with Dr. Keenleyside to identify ways in which to improve. Absent the identification of the underlying causes of your performance struggles, relying on improved performance on the cumulative final exam without a change in learning strategies is extremely risky.

6.1 Marking Schemes & Distributions

Syllabus topic quizzes are best 4/5. Students who do better on the final exam will have the grade weight for the quizzes transferred to the final. Students unable to complete 4 of the 5 quizzes may, at the instructor's discretion, be given an alternative assignment OR have the quiz grade weight transferred to the final exam.

Name	Scheme A (%)	Scheme B (%)
Syllabus topic quizzes	20	0
Lab reports	20	20
Case study	15	15
Participation	5	5
Final exam	40	60
Total	100	100

6.2 Assessment Details

Syllabus topic quizzes (20%)
Date: , Online
Learning Outcome: 1, 2, 3, 4, 5, 6, 7, 8, 8, 10, 11

Short non-cumulative quizzes every 2 weeks, consisting of multiple T/F statements that assess the ability to apply and interpret the concepts for that topic; these will include any directly related material **from labs completed to-date.**

The quizzes will consist of multiple T/F, matching and calculation questions, and are calculated to require no more than 20 min. for completion, **assuming the student has fully prepared for the test**. All students will have 50 minutes, i.e. >2x the required time, to complete each quiz, and a 24h window in which to write it, beginning at 9:00AM (EST). All quizzes open on a Monday and are followed by a **debrief** of the problem areas in the next day's seminar**.**

1. **Jan. 24-25** - Growth in the Environment and Lab
2. **Feb. 7-8** - Growth Kinetics and Enumeration
3. **Feb. 28-Mar. 1** - The Cell Membrane and Transport
4. **Mar. 14-15** - Influence of the Environment on Microbial Growth
5. **Mar. 28-29** - The Biochemistry of Catabolism

- Because these are non-cumulative, of an applied nature, and online and will use **Respondus Lockdown but NOT Respondus monitor.** The questions are largely non-googleable, meaning that in addition to protecting academic integrity, and that students who have not kept up with the material and topic-related tasks will not perform well. This means that students MUST have completed ALL work related to that topic prior to the previous week's topic review session, AND followed up to clarify concepts identified through those sessions as problem areas.
- Individual quizzes **will not be released** but all problematic questions will be discussed during the Tuesday seminar that immediately follows a quiz, through the use of polling questions and group discussions.
  Individual appointments to further discuss conceptual difficulties can be made with Dr. Keenleyside
- Textbook content that is **tested but not covered in class** is the more basic material (e.g. definitions) identified in weekly posted reading guides and usually also covered in the introductions to the lab exercises.
- There is no Syllabus Topic quiz for the 6th topic, **Microbial Diversity & Ecology**. This topic is itself cumulative with respect to the previously-covered course topics, and is a major focus of the Case Study team quizzes.

Best 4 of 5 grades; each quiz is worth 5%. **No make-up quizzes.** If a student misses more than 1 quiz, the grade weight may be transferred to the final exam, **OR** the student may be required to do a separate assignment (the nature of which will be determined by Dr. Keenleyside), on that topic.

For any student whose final exam grade exceeds the total quiz grade, marking scheme B will be used.

Laboratory reports (20%)

Date: Laboratory exercises 1-6
Learning Outcome: 2, 7, 8, 9, 10, 11, 13
Reports are submitted to Dropbox on Courselink by 2:30 p.m.Eastern Time, on your scheduled lab day, the week immediately following conclusion (collection of results) of that lab exercise. Unless students are using 1 of their 2 tokens for a 48h extension, and barring extreme circumstances, late reports will lose 20% per day and reports will be assessed a grade of zero after 48h.

Case study (15%)

Date: Weeks 5 through 11, In lab, online and outside of lab time
Learning Outcome: 1, 2, 3, 4, 5, 6, 7, 8, 8, 10, 11, 12, 13
Various small dropbox or PEARTool due dates associated with preliminary work for each of 3 chapters as well as 2 components related to team accountability (team charter; team effectiveness feedback summary).

Concept questions for each of 3 chapters are divided among team members, researched, discussed and, ultimately, a final word file for each chapter is submitted to the team dropbox. Grading is all-or-none for completion, formatting, specific comments re. improvements resulting from peer review, and evidence of good faith effort only (NOT accuracy).

Comprehension of each chapter, including the virtual labs for Ch. 1 & 2 is assessed through team quizzes in lab, using IF-AT cards ("scratch & win" cards), or online using break-out rooms and an online team quiz. The instructor and TAs may help guide team discussions when deadlocked or running off-track.

1. Chapter 1 team quiz - **Mar. 2-4**
2. Chapter 2 team quizzes - **Mar. 16-18 (**1st attempt) & **Mar. 23-25** (2nd attempt)
3. Chapter 3 - **Mar. 30-Apr. 1**

Individual case study grades assigned based on the cumulative (team grade) x average score (as %) from the team's distribution of effort assessments

Participation (5%)

Date: Tue, Jan 11 - Tue, Apr 5
Learning Outcome: 12, 13
Through in-class Zoom polling. The scheduled lecture slot will be used for active learning of concepts, using a combination of group work on problems, polling and class discussions. In classes that precede a syllabus topic quiz, this will provide formative feedback on comprehension; in classes that immediately follow a syllabus topic quiz, this will help clarify and correct any misconceptions. Students who are feeling unwell are asked to contact Dr. K. and to NOT attend F2F class(es) - participation marks will not be affected.

- **Polling:** students will be polled multiple times per class, earning one mark per response. The final grade is determined by the percentage of questions answered versus 95% of the total questions polled: grade = #student polls/(#total polls x 0.95)

Final exam (40%)

Date: Thu, Apr 14, 2:30 PM - 4:30 PM, TBA
Learning Outcome: 1, 2, 3, 4, 5, 6, 7, 8, 8, 9, 10, 11
In person, [a]2-stage. Location tba

- Cumulative including lecture content, textbook readings, lab and case study material
- Part A - higher-Blooms level MCQs, including some student-authored questions from PEERWise & part B = short answer
- The short answer question will be provided at least a week prior to the exam and will be a non-googleable (i.e. hypothetical) scenario that combines many of the topics and concepts, and tests overall comprehension. Students may collaborate on this, however they must **learn** the answer as they will be required to answer the question in the individual stage of the exam, without any aids.
- Textbook content that is tested but not covered in class is the more basic material (e.g. definitions) identified in the posted reading guides and usually also covered in the introductions to lab exercises 1-6 and the case study questions.

[a]**2-stage exam**: the length of the first (individual) stage will be shortened to allow for a second group stage. During the second stage, case study teams will work together to reach consensus on a subset of the MCQs from the individual stage. Grade is calculated to give the highest possible, using either of the following:

1. Only the individual portion of the exam

2. Both stages of the exam combined (85% + 15%)
3. Individual plus the class average from the second stage (when a student is unable to participate in the second stage[b]; 85% + 15%)

[b] Students registered with SAS should identify themselves to Dr. K. in order to discuss the possibility of beginning the individual exam **early**, in order to then join their team members for the second stage

6.3 Bonus marks

Students may earn **up to 2% bonus marks** through some combination of the following:

1. Authoring 4 or more questions on PEERWise (each is worth 0.5 marks)
2. Answering 8 or more questions on PEERWise (each is with 0.25 marks)

- An added advantage of participation on PEERWise is that I will incorporate any **high-level** multiple choice (not T/F) questions in the final exam.

Students may earn an **additional 0.25% bonus marks** for obtaining a perfect score on the course outline online quiz.

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7 Course Statements

7.1 Grading

1. **Syllabus topic quizzes** - best 4 of 5. There are no alternative quizzes. Students who MISS more than one will either have the grade weight transferred to the final exam, or may be asked to do an assignment (worth 5%) on the topic. The nature of this assignment will be determined by Dr. Keenleyside. For any student who performs better on the final exam, the total quiz grade will be dropped and the grade weight transferred to the final exam.
2. **Bonus activities** - students may supplement lost classroom polling through authoring, and/or answering, questions on PEERWise (2%) and/or through doing the Course outline "Easter egg hunt" quiz in the first week (0.25%).
3. **Assignments/reports** – lab reports are due by 2:30 pm Eastern Time on the lab day following conclusion of the respective lab exercise; the details for case study

submissions and their grading are described in in a "**Case study by week"** file on CourseLink. Each student has **two tokens for 2 - 48h due date extensions**, no questions asked. **These are to be used for health-related problems that prevent you from submitting by the due date.** All drop boxes close at the submission deadline - students who miss the deadline must e-mail Dr. Keenleyside and cc Catrien and your GTA, in order to be given an extension. Late submissions of lab reports will result in mark deductions of **20% per day, with a grade of zero after 48h.** For the case study, all grades are team grades; failure to meet a case study submission deadline results in a grade of zero for the missing concept question answer or Ch. 2 peer review. Teams are expected to discuss and agree to early completion of individual tasks, and to discuss openly, honestly and compassionately, any potential problems with an individual's assigned task. Failing team solution to individual challenges, the distribution of effort scores are used to reflect individual team member's case study contributions, with the individual's average score being used to assess individual case study grades. The individual's case study grade may therefore end up higher or lower than the net grade earned by the team.

7.2 Emails

1. Pease only use your UofG e-mail account.
2. All questions related to Course/Lab Content should first be posted to the Discussion board on Courselink. Dr. K. and Catrien will regularly check and respond to those posts, allowing the rest of the class to see the answers.
3. E-mails regarding personal concerns will be prioritized - we're here to help and support you!
4. If you feel you need help with your learning/study skills, please e-mail Dr. K!
5. Questions about any of the online quiz questions will not be answered until after the quiz closes for everyone.
6. Please be patient - replies to e-mails may take 24-48h. Those sent outside of regular weekday hours (8:30 am-4:30 pm Eastern Time) will be answered during the regular work hours.

7.3 Student Responsibilities

1. **Respectfulness:** let's all do our part to create an environment of mutual respect. In class, this means paying attention, not talking while the instructor or another student is talking, not sending or receiving text messages or phone calls once class has started.
2. **Lab attendance**. **Attendance during online lab sessions in mandatory and will be taken at the end of each online lab period.** Students not present at that time will be required to write a short summary of the material missed for that lab period. Details of this make up assignment will be given on a case by case basis. Failure to complete this by the given due date will result in a 20% deduction on the respective lab report. This 20% will be in addition to any further deductions should the report be handed in after the given due date. Learning the practical skills associated with this field of study is critical for your education and for your safety, however, **if you are feeling unwell**, you are asked to e-mail the lab coordinator (cbouwman@uoguelph.ca) and stay home: a virtual alternative will be provided. STUDENTS WILL ONLY BE PERMITTED TO ATTEND THEIR LAB SECTION, as shown on web advisor.
3. **Laboratory preparedness:** You must have read the relevant laboratory exercise in advance of the lab and watched any associated online lab demonstration videos, prior to attending the virtual or in-person lab. **For in-person labs**: preparing flow charts in advance of lab, mapping out what you will be doing, will help organize your tasks and ensure you finish in less than the scheduled 3h. You must bring with you closed-toed shoes, a lab coat, your lab manual, an elastic band for long hair, and a notebook. If you wear contact lenses, you must also bring safety glasses.
4. **Working in pairs or teams:** Lab partners are expected to work collaboratively, to communicate effectively with each other and the GTAs/lab coordinator, and to hand in independent lab reports. Mid-semester, case study teams of ~6 will be announced. These teams will discuss and collaborate on the development of a team charter. After completion of Chapter 1, teams will discuss and provide preliminary feedback (“Team Effectiveness Feedback”) on their functioning and determine areas for improvement. Upon completion, team members will assign anonymous scores for the distribution of effort among team mates. As described previously, the average scores will be used to assess individual grades based on the team mark. An individual's grade may go UP or DOWN, relative to the group grade, within limits. As with work-place teams (which are the norm, even if you are a CEO), the development of an effective team requires effort, communication

and is a learned and critical skill: it results in a synergy that leads to performance, creativity and productivity that are superior to what a single member working alone can accomplish.

5. **Seminar preparedness:** Seminars are highly interactive. In order to be prepared and get the most benefit, you must have done the assigned readings, filled in the definitions or descriptions of the assumed knowledge names/terms in that week's reading guide, and watched the lecture video(s), **in that order**. Weekly seminars alternate between entirely problem-based learning classes designed to identify gaps in your comprehension prior to the following week's quiz, and topic quiz debriefs, designed to clarify concepts that were poorly understood based on the quiz results. So students are expected to be considerably more independent than in regular lecture courses; your success is highly dependent on your ability to keep up with material, to be prepared for the topic review classes, and to go back to your notes/readings/videos and fill in the missing or erroneous information prior to the quizzes. To help you keep on top of things, use the checklist of weekly tasks. **Textbook readings:** as described earlier in this outline, terms and definitions that are assumed knowledge are identified by their red font in the reading guides: these will not be directly covered in lecture videos or class, they are often also described in the introductions to the various laboratory exercises, and **will be tested**.
6. **Classroom polling:** students must answer 95% of the semester's polls for full marks. Unless a student is absent for an extended period due to medical, psychological or compassionate reasons, **marks for >5% missed polls are to be made up through the identified bonus activities.**

8 Department of Molecular and Cellular Biology Statements

8.1 Academic Advisors

If you are concerned about any aspect of your academic program:

- Make an appointment with a program counsellor in your degree program. B.Sc. Academic Advising or Program Counsellors

8.2 Academic Support

If you are struggling to succeed academically:

- Learning Commons: There are numerous academic resources offered by the Learning Commons including, Supported Learning Groups for a variety of courses, workshops related to time management, taking multiple choice exams, and general study skills. You can also set up individualized appointments with a learning specialist. http://www.learningcommons.uoguelph.ca/
- Science Commons: Located in the library, the Science Commons provides support for physics, mathematic/statistics, and chemistry. Details on their hours of operations can be found at: http://www.lib.uoguelph.ca/get-assistance/studying/chemistry-physics-help and http://www.lib.uoguelph.ca/get-assistance/studying/math-stats-help

8.3 Wellness

If you are struggling with personal or health issues:

- Counselling services offers individualized appointments to help students work through personal struggles that may be impacting their academic performance. https://www.uoguelph.ca/counselling/
- Student Health Services is located on campus and is available to provide medical attention. https://www.uoguelph.ca/studenthealthservices/clinic
- For support related to stress and anxiety, besides Health Services and Counselling Services, Kathy Somers runs training workshops and one-on-one sessions related to stress management and high performance situations. http://www.selfregulationskills.ca/

8.4 Personal information

Personal information is collected under the authority of the University of Guelph Act (1964), and in accordance with Ontario's Freedom of Information and Protection of Privacy Act (FIPPA) http://www.e-laws.gov.on.ca/index.html. This information is used by University officials in order to carry out their authorized academic and administrative responsibilities and also to establish a relationship for alumni and development purposes.

For more information regarding the Collection, Use and Disclosure of Personal Information policies please see the Undergraduate Calendar. (https://www.uoguelph.ca/registrar/calendars/undergraduate/current/intro/index.shtml)

8.5 Course Offering Information Disclaimer

Please note that course delivery format (face-to-face vs online) is subject to change up to the first-class day depending on requirements placed on the University and its employees by

public health bodies, and local, provincial and federal governments. Any changes to course format prior to the first class will be posted on WebAdvisor/Student Planning as they become available.

9 University Statements

9.1 Email Communication

As per university regulations, all students are required to check their e-mail account regularly: e-mail is the official route of communication between the University and its students.

9.2 When You Cannot Meet a Course Requirement

When you find yourself unable to meet an in-course requirement because of illness or compassionate reasons please advise the course instructor (or designated person, such as a teaching assistant) in writing, with your name, id#, and e-mail contact. The grounds for Academic Consideration are detailed in the Undergraduate and Graduate Calendars.

Undergraduate Calendar - Academic Consideration and Appeals
https://www.uoguelph.ca/registrar/calendars/undergraduate/current/c08/c08-ac.shtml

Graduate Calendar - Grounds for Academic Consideration
https://www.uoguelph.ca/registrar/calendars/graduate/current/genreg/index.shtml

Associate Diploma Calendar - Academic Consideration, Appeals and Petitions
https://www.uoguelph.ca/registrar/calendars/diploma/current/index.shtml

9.3 Drop Date

Students will have until the last day of classes to drop courses without academic penalty. The deadline to drop two-semester courses will be the last day of classes in the second semester. This applies to all students (undergraduate, graduate and diploma) except for Doctor of Veterinary Medicine and Associate Diploma in Veterinary Technology (conventional and alternative delivery) students. The regulations and procedures for course registration are available in their respective Academic Calendars.

Undergraduate Calendar - Dropping Courses
https://www.uoguelph.ca/registrar/calendars/undergraduate/current/c08/c08-drop.shtml

Graduate Calendar - Registration Changes
https://www.uoguelph.ca/registrar/calendars/graduate/current/genreg/genreg-reg-regchg.shtml

Associate Diploma Calendar - Dropping Courses
https://www.uoguelph.ca/registrar/calendars/diploma/current/c08/c08-drop.shtml

9.4 Copies of Out-of-class Assignments

Keep paper and/or other reliable back-up copies of all out-of-class assignments: you may be asked to resubmit work at any time.

9.5 Accessibility

The University promotes the full participation of students who experience disabilities in their academic programs. To that end, the provision of academic accommodation is a shared responsibility between the University and the student.

When accommodations are needed, the student is required to first register with Student Accessibility Services (SAS). Documentation to substantiate the existence of a disability is required; however, interim accommodations may be possible while that process is underway.

Accommodations are available for both permanent and temporary disabilities. It should be noted that common illnesses such as a cold or the flu do not constitute a disability.

Use of the SAS Exam Centre requires students to make a booking at least 14 days in advance, and no later than November 1 (fall), March 1 (winter) or July 1 (summer). Similarly, new or changed accommodations for online quizzes, tests and exams must be approved at least a week ahead of time.

For Guelph students, information can be found on the SAS website
https://www.uoguelph.ca/sas

For Ridgetown students, information can be found on the Ridgetown SAS website
https://www.ridgetownc.com/services/accessibilityservices.cfm

9.6 Academic Integrity

The University of Guelph is committed to upholding the highest standards of academic integrity, and it is the responsibility of all members of the University community-faculty, staff, and students-to be aware of what constitutes academic misconduct and to do as much as possible to prevent academic offences from occurring. University of Guelph students have the responsibility of abiding by the University's policy on academic misconduct regardless of their location of study; faculty, staff, and students have the responsibility of supporting an environment that encourages academic integrity. Students need to remain aware that instructors have access to and the right to use electronic and other means of detection.

Please note: Whether or not a student intended to commit academic misconduct is not relevant for a finding of guilt. Hurried or careless submission of assignments does not excuse students from responsibility for verifying the academic integrity of their work before submitting it. Students who are in any doubt as to whether an action on their part could be construed as an academic offence should consult with a faculty member or faculty advisor.

Undergraduate Calendar - Academic Misconduct
https://www.uoguelph.ca/registrar/calendars/undergraduate/current/c08/c08-amisconduct.shtml

Graduate Calendar - Academic Misconduct

https://www.uoguelph.ca/registrar/calendars/graduate/current/genreg/index.shtml

9.7 Recording of Materials

Presentations that are made in relation to course work - including lectures - cannot be recorded or copied without the permission of the presenter, whether the instructor, a student, or guest lecturer. Material recorded with permission is restricted to use for that course unless further permission is granted.

9.8 Resources

The Academic Calendars are the source of information about the University of Guelph's procedures, policies, and regulations that apply to undergraduate, graduate, and diploma programs.

Academic Calendars
https://www.uoguelph.ca/academics/calendars

9.9 Disclaimer

Please note that the ongoing COVID-19 pandemic may necessitate a revision of the format of course offerings, changes in classroom protocols, and academic schedules. Any such changes will be announced via CourseLink and/or class email.

This includes on-campus scheduling during the semester, mid-terms and final examination schedules. All University-wide decisions will be posted on the COVID-19 website (https://news.uoguelph.ca/2019-novel-coronavirus-information/) and circulated by email.

9.10 Illness

Medical notes will not normally be required for singular instances of academic consideration, although students may be required to provide supporting documentation for multiple missed assessments or when involving a large part of a course (e.g.. final exam or major assignment).

9.11 Covid-19 Safety Protocols

For information on current safety protocols, follow these links:

- https://news.uoguelph.ca/return-to-campuses/how-u-of-g-is-preparing-for-your-safe-return/
- https://news.uoguelph.ca/return-to-campuses/spaces/#ClassroomSpaces

Please note, these guidelines may be updated as required in response to evolving University, Public Health or government directives.
