



MICR*2430 Methods in Microbial Culture and Physiology

Fall 2023

Section(s): C01

Department of Molecular and Cellular Biology

Credit Weight: 0.50

Version 1.00 - September 07, 2023

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 do assigned textbook readings and watch accompanying "lecture" videos 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. Lab exercises and a team-based case study will further develop comprehension.

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. To that end, the following strategies will be used:

1. **Class recordings:** classes will be recorded, edited and posted for streaming by the next day. Streaming from Microsoft Stream can be used for closed-captioning. These are

not meant to substitute for class, and reliance on these videos *in lieu* of class attendance and participation will adversely affect your learning.

2. **Labs:** Students will be working in pairs, or, with the case study, teams of 5-6. **Students who are feeling ill** are asked to contact Amanda and remain home. Alternate arrangements will be made.
3. **Keeping on track:** given the flipped nature of this course, and the importance of individual preparation for class, weekly tasks (readings & "lecture" videos, along with video lengths) are identified in **Section 5.1** of the course outline. The **Courselink** calendar, announcements, and discussion forums will be used extensively; Dr. K. will check the latter daily. **Weekly reading guides** are provided to help you stay **ahead of the content**, so that you aren't scrambling to read multiple textbook sections and watch multiple lecture videos prior to the seminar on that topic (where you will apply and clarify your knowledge).
4. **Topic quizzes:** 5 non-cumulative quizzes, every ~2 weeks. Online, open for 24h with >3x the required time limit. Best 4 of 5. The seminar following each quiz will be used to go over ALL problem areas identified by the quiz, and correct misconceptions.
5. **Assessments, due dates, and grading schemes all have built-in flexibility:** in particular, everyone has **two free passes for a 48h extension on a dropbox submission**. Note these are to be used for medical, psychological or compassionate reasons, but require no documentation or explanations, just advance notice to Dr. K. These free passes cannot be used for team deadlines.

1.3 Timetable

1. Seminar: Tues. 10:00 - 11:20 am in MAC129
2. Labs: Tues, Wed, Thurs, 2:30 - 5:20 in SSC4110

- Labs begin Tues. Sept 12th

1.4 Final Exam

In person: Sat. Dec. 9, 11:30-1:30PM

- location tba

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: Amanda van der Vinne M.Sc.
Email: avander@uoguelph.ca
Office: SSC 3519
Office Hours: The best way to have your questions answered is the discussion board on Courselink. If you require a meeting, please email Amanda to arrange a meeting.

2.2 Teaching assistants

Each section will have 1 MCB GTA. These TAs will introduce themselves and provide contact information during the first lab period.

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)

Bound hard-copy manual is required and can be purchased from the University Bookstore. Lab report sheets may be downloaded from Courselink.

Courselink (Website)

<https://courselink.uoguelph.ca>

The course website will be used extensively and will include all relevant course materials, including lecture videos, some online lab and case study materials, online syllabus topic quizzes, discussion boards, links for additional readings, group drop boxes, and course

calendar.

PEAR Tool (Website)

<https://www.uoguelph.ca/peartool/user/signon.cfm?destination=index%2Ecfm>

UofG online platform for **Peer Evaluation Assessment and Review**. 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.

Zoom (Website)

<https://zoom.us>

This will be used for polling throughout each class. Access is through CourseLink.

PeerWise (Website)

<https://peerwise.cs.auckland.ac.nz/docs/>

This is a free online tool for authoring, answering, commenting on and rating student-authored multiple-choice questions. A site for MICR*2430 F21 will be set up and the class list imported. You will need to create an account (assuming you have not used the tool before) and then select the course. The tool is simple to use but instructions for creating, and for answering, questions, are provided in text as well as video on the PeerWise site. Dr. K. will provide some introductory/review questions to the MICR*2430 repository, to help you get started and seminar 1 will include a brief discussion of Bloom's taxonomy and what makes good, higher level MCQs. Any good quality, higher Bloom's level questions will be considered for inclusion in the final exam, with no upper limit! So you will derive double benefits from authoring and answering/providing feedback on, other questions: you will be learning as you do both, and you raise the likelihood that you will know some questions AND THEIR ANSWERS on the midterm and final exam! Students may earn participation marks for their questions.

3.2 Recommended Resources

Team Outlook Calendars (Website)

Once case study teams have been created, members are encouraged to establish a shared team calendar to ensure all established and internally-agreed upon deadlines and meeting dates are readily accessible.

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 instructor 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

Seminars are structured in 2-week blocks and are NOT designed as lectures. Each will involve a combination of group work on problems, in-class Mentimeter polling, and class discussions to help students apply their knowledge, provide formative feedback on comprehension and clarify common misconceptions. While polling will not be graded, active engagement in discussions prior to, and following, polls, is guaranteed to help you actively identify and clarify misconceptions, apply your knowledge and deepen your comprehension.

1. **Week prior to Topic quiz: "Discussions & problems seminar"** uses problem-based learning to help solidify comprehension in preparation for the quiz. **Before this class**, you must have done the relevant readings and watched the associated videos in order to get the most benefit and increase your likelihood of success on the quiz. Format is a combination of group and class discussions & polling and explanations of sticking points.
2. **Following week: "Topic quiz debrief"** using the same format but focused on areas of confusion identified from the quiz. The quizzes are not released, so this is the best opportunity to ensure any areas of confusion are clarified, and to further deepen your comprehension for the cumulative case study and final exam. **After** a debrief seminar, students are welcome to book appointments with Dr. K. to review their quiz(zes) in person, or *via* a Teams meeting, as well as to discuss their current learning strategies and how those might be refined.

Given that students must do the assigned readings and watch the "lecture" videos prior to each "Problems & Discussions" seminar, failure to plan ahead will have a considerable impact on the value of these seminars. This is particularly true for topics 4, 5 & 6, which involve more complex biochemical concepts, and also incorporate material from the previous topics; these also cover multiple textbook sections and lecture videos.

To help you learn this material, the case study begins prior to the start of topic 4, and has a major focus on those last 3 topics. So planning ahead and keeping on top of things will also make the case study MUCH easier!

5.1 Lecture

Tue, Sep 12, 10:00 AM - 11:20 AM

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

Tue, Sep 19, 10:00 AM - 11:20 AM

Topics: **Topic 1: Growth in the environment & lab.** Discussions & problems seminar

References: To be done BEFORE this seminar:

1. Sec. 4.1 & 9.3, (review of relevant previous concepts 1.2-1.3, 7.1-7.4). **Use reading guides, taking notes ONLY for terms/names ID'd in red font**
2. Lecture videos 1-3: **LV1-From ecosystems to media** (~25 min), **LV2-Nutrients** (~33 min), **LV3-Autotrophy & diazotrophy** (~18 min)

Tue, Sep 26, 10:00 AM - 11:20 AM

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

Tue, Oct 3, 10:00 AM - 11:20 AM

Topics: **Topic 2: Growth kinetics & enumeration.** Discussions & problems seminar

References: To be done BEFORE this seminar:

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

(~19 min)

Tue, Oct 10

Topics: **Fall Study Break Day** - No seminars but **Topic 2 quiz is Thurs (9am)-Fri (9am).**

Next week's seminar is a quiz 2 debrief AND **topic 3 discussions & problems seminar** (much of content should be review). Topic 3 readings and videos (identified in week 7) must be done BEFORE next seminar

Tue, Oct 17, 10:00 AM - 11:20 AM

Topics: **Topic quiz 2 debrief**

AND

Topic 3: The cell membrane and transport. Discussions & problems

References: To be done BEFORE this seminar

1. Sec. 3.3
2. Lecture videos 6-8: **LV6-Bacterial cell wall & passive transport** (~17 min), **LV7-Introduction to active transport** (~15 min), & **LV8- Active transport-ABC & PTS** (~17 min)

Tue, Oct 24, 10:00 AM - 11:20 AM

Topics: **Topic 3 quiz debrief**

References: See Topic 4 readings and lecture videos in week 9: these MUST be completed PRIOR to next week's seminar

Tue, Nov 1, 10:00 AM - 11:20 AM

Topics: **Topic 4: The influence of environment on growth.** Discussions & problems seminar

References: To be done BEFORE this seminar

1. Sec. 9.4, 9.5, 9.6 & 9.7
2. Lecture videos 9a, 9b, 10 & 11: **LV9-Environment influences a) O₂ (~23 min) & b) temperature (~27 min), LV10-Adaptation to pH (~17 min), LV11-Adaptation to osmotic stress (~11 min)**

Tue, Nov 7, 10:00 AM - 11:20 AM

Topics: **Topic quiz 4 debrief**

References: See Topic 5 readings and lecture videos in week 11: these MUST be completed PRIOR to next week's seminar

Tue, Nov 14, 10:00 AM - 11:20 AM

Topics: **Topic 5: The biochemistry of catabolism.** Discussions & problems seminar

References: To be done BEFORE this seminar:

1. Sec. Ch. 8 intro, Sec. 8.1-8.5 & 10.3
2. Lecture videos 12-15: **LV12- Central pathways (~37 min), LV13-Introduction to fermentation & redox potentials (~19 min), LV14-Redox & the electron transport chain (~24 min), LV15-Primary & secondary fermentation (~15 min)**

Tue, Nov 21, 10:00 AM - 11:20 AM

Topics: **Topic 5 quiz debrief**

References: See Topic 6 readings and lecture videos in week 12: these MUST be completed PRIOR to next week's seminar

Tue, Nov 28, 10:00 AM - 11:20 AM

Topics: **Topic 6: Microbial diversity & ecology.** Discussions & problems seminar

References: To be done BEFORE this seminar

1. Sec. 8.6-8.7, 10.1, 9.1 & 10.6
2. Lecture videos 16 & 17: **LV16-Heterotrophs vs lithotrophs** (~29 min), **LV7-Phototrophs & photosystems** (~41 min)

Thu, Nov 30, 10:00 AM - 11:20 AM

Topics: (Make-up class for fall break day; Tuesday schedule.)

Ch. 3 team quiz & review

References: Sec. 8.1, 8.3, 8.6-8.7, 10.1, 10.6 & Case study

5.2 Course Content: Labs

| Week | Lab Topic | Readings |
|---------------|--|-----------------|
| Sept 12-14 | Exp. 1 - Soil microbiology | Laboratory 1 |
| Sept 19-21 | Exp. 1 - Soil microbiology results Exp. 2 - Bacterial Physiological Diversity | Laboratory 2 |
| Sept 26-28 | Due to Dropbox: Report 1 Exp. 2 - Results Exp. 3 - Comparative counting | Laboratory 3 |
| Oct 3-5 | Due to Dropbox: Report 2 | Laboratory 4 |

| Week | Lab Topic | Readings |
|---------------|--|---|
| | <p>Exp. 3 results</p> <p>Exp. 4 - Growth curve</p> <p>REPORT 3 DUE to DROPBOX OCT 13</p> | |
| Oct 17-19 | <p>Due to Dropbox: Report 4</p> <p>Exp. 5 – Biochemical tests</p> <p>Introduction to case study & case study teams</p> <p>- Assign Case study Ch. 1 questions</p> | Laboratory 5 & Case Study - Introduction to the Winogradsky Columns |
| Oct 24-26 | <p>Due to Dropbox: Team charter</p> <p>Exp. 5 results</p> <p>Exp. 6 – Antimicrobials</p> <p>Ch 1 lab (virtual results)</p> | Laboratory 6 Case Study Ch. 1 & Ch. 1 readings |
| Oct. 31-Nov 2 | <p>Due to Dropbox: Report 5 & Ch. 1 questions</p> <p>Exp. 6 results</p> <p>Ch. 1 team quiz</p> <p>Assign Ch. 2 questions</p> | Case Study Ch. 1 & Ch. 1 readings Ch. 2 lab exercise |

| Week | Lab Topic | Readings |
|----------------------------|--|-----------------------------------|
| | Ch. 2 lab (virtual) | |
| Nov 7-9 | Due to Dropbox: Report 6 & Team effectiveness feedback summary Lab session cancelled; Ch. 2 lab (virtual) | Case Study Ch. 2 & Ch. 2 readings |
| Nov 13-15 | Due to PEARTool : Ch. 2 draft answers Ch. 2 team quiz #1 (including on Ch.2 results & interpretations) Assign Ch. 3 questions | Case Study Ch. 2 & Ch. 2 readings |
| Nov 21-23 | Due to PEARTool : Ch. 2 reviews Ch. 2 team quiz #2 | Case Study Ch. 1 & Ch. 1 readings |
| No labs Nov 28 - 30 | Due to dropbox: Ch. 2 & ch. 3 final answers Ch. 3 quiz in Dec. 1 make-up lecture | Case Study Ch. 3 & Ch. 3 readings |

- Case study readings are provided on in the relevant case study folders on Courselink.

5.3 Method of Presentation

Students will learn the techniques and concepts through 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.

6 Assessments

There are **5 non-cumulative** online topic quizzes. While this should lower the stress and anxiety often associated with a bigger stakes midterm, the "cost" of this more flexible (and hopefully kinder) approach is the **much greater responsibility on students to keep up with the assigned readings and content**. The final exam **IS** cumulative, includes lab-related material and the grade can replace that of the topic quizzes when student performance is better than the quizzes. **So in addition to being responsible for keeping on top of the assigned readings and videos, students will also be expected to keep reviewing previously covered material**. To help facilitate this, ungraded practice quizzes for each of the 6 topics are available, however these questions are from our old "textbook reading quizzes" - so they are not higher level, but directly related to the reading guides for each topic. The topics are, however, organized so that there is a logical progression with subsequent topics building on concepts from previous topics, and the case study, which begins after the fall break day, integrates **all** of the course topics. This case study, while done in teams, with tasks parcelled out to team members, relies on peer discussion and instruction, so that everyone learns!

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 |

| Name | Scheme A (%) | Scheme B (%) |
|---------------|--------------|--------------|
| 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, consisting of multiple T/F statements that assess the ability to apply and interpret; these will include any directly related material **from labs completed to-date**.

The quizzes will be of a length calculated to require no more than 20 min. for completion, assuming the student has studied. All students will have 50min to complete each quiz, i.e. >2x the required time to complete the quiz, and a 24h window in which to write it, beginning at 9:00AM (EST). All quizzes except #2 open on a Monday and are followed by a **debrief** of the problem areas in that week's seminar. There are no labs the week of the fall break day so quiz #2 opens @9AM Thus. Oct. 13 and will remain open for 24h.

1. **Sept. 25-26** - Growth in the Environment and Lab
2. **Oct. 12-13** (Thurs.-Fri. following fall break) - Growth Kinetics and Enumeration
3. **Oct. 23-24** - The Cell Membrane and Transport
4. **Nov. 6-7** - Influence of the Environment on Microbial Growth
5. **Nov. 20-21** - The Biochemistry of Catabolism

- These are non-cumulative, online, multiple T/F questions from a test bank. The questions are of an applied nature, to test comprehension, rather than memorization. **Respondus Lockdown will be used, but NOT Respondus monitor.**
- The questions are largely non-googleable, meaning that in addition to protecting academic integrity, students who have not kept up with the material and topic-related tasks will not perform well. To perform well: 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. "Homework" problems are available online, generally 1 for each topic: these are specifically designed to help you study and test yourself, before doing a quiz. They are not graded, and answers are not provided or taken up: you are encouraged to

work with others, and seek help from the instructor, when stumped on a particular aspect of the homework.

- **The quizzes will not be released; students who are still concerned following the Tuesday debrief (which focuses on problems areas identified by the quiz), are encouraged to meet with Dr. K., in order to review their quizzes in person or online.**
- Textbook content that is **tested but not covered in class** is the more basic material (e.g. definitions) identified in weekly reading guides and usually also covered in the introductions to lab exercises 1-7.
- 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 will be assessed through 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 cumulative final exam grade exceeds the total quiz grade, marking scheme B will be used. Students who appear at risk after the first 2-3 quizzes will receive an e-mail inviting you to meet with Dr. K. and identify strategies for improvement.

Laboratory reports (20%)

Date: Laboratory exercises 1-6

Learning Outcome: 2, 7, 8, 9, 10, 11, 13

Reports are submitted to Dropbox on Courouselink 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: Tue, Oct 17 - Thu, Nov 30, 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 quiz - **Oct. 31-Nov. 2**
2. Chapter 2 (2 quizzes) - **Nov. 14-16 & Nov. 21-23**
3. Chapter 3 quiz - **Nov. 30**

Individual case study grades assigned based on the cumulative (team grade) x average score (as %) from the team's distribution of effort assessments. While student grades typically don't change, or change very minimally, **they MAY range between 0.5-1.5x the team grade in the case of a persistent problem with a team member.**

Participation (5%)

Date: Tue, Sep 19 - Thu, Nov 30

Learning Outcome: 12, 13

Reflections: a brief written reflection on what you learned/struggled with/were surprised at etc. To be submitted in hard copy as you leave class. Each is worth 0.5 marks based on evidence of good faith effort; **10 of 12 required for full marks.**

- **Bonus marks:** submission of 11-12 reflections gives an **additional 1-2 marks** on this grade category, which will be allowed to exceed 100%

Final exam (40%)

Date: Sat, Dec 9, 11:30 AM - 1:30 PM

Learning Outcome: 1, 2, 3, 4, 5, 6, 7, 8, 8, 9, 10, 11

In person, ^a2-stage.

- 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
- Short answer portion of individual exam is a big-picture, non-googleable question that will be provided at least a week prior to the exam. 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.
- 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.

^a2-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 MCQs from the individual stage. Overall exam 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%)

** 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 participate with their team on the second stage

6.3 Bonus marks

Up to 2% bonus marks through the following:

1. Authoring 4 or more questions on PEERWise (each is worth 0.5 marks, to a maximum of 2)
 2. Answering 8 or more questions on PEERWise (each is with 0.25 marks, to a maximum of 2)
- 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.

An additional 0.5% bonus marks for obtaining a perfect score on the course outline online quiz (**this closes before seminar 1**).

An additional 0.5-1% for submitting 11-12 reflections.

7 Course Statements

7.1 Grading

1. **Syllabus topic quizzes** - best 4 of 5. 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 earn up to 2% through authoring, and/or answering, questions on PEERwise (2%) 0.5% for doing the Course outline "Easter egg hunt" quiz in the first week (0.5%), and up to 1% for submitting 12 post-seminar reflections.
3. **Assignments/reports** – Lab reports are due by 12:00 pm (Noon) Eastern Time on your lab day - 1 week following conclusion of the respective lab exercise (dates in Dropbox on Courselink). The exception to this is the report for **Lab #3**, which is a virtual lab: that report is due by noon Oct. 13 for all lab sections. Each student has **two free passes for a 48h lab report extension**, no questions asked. **These are to be used for health-related problems that prevent you from submitting by the due date.** Dropbox end date is 48h after due date: it is a STUDENT RESPONSIBILITY to e-mail Dr. K. (cc the lab coordinator & TA) within that 48h window to request the use of a free pass. Failing this, mark deductions are **20% per day, with a grade of zero after 48h.** For the case study, all grades are team grades so there are no extensions - students should negotiate amongst themselves to cover for each other. 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.
4. **Case study:** teams are expected to discuss and agree to early completion of individual tasks, and to discuss openly, honestly and compassionately, any individual challenges that might be impacting team performance. Failing resolution of such 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 be higher or lower than the net team grade. Only under extreme circumstances, and repeated failure to resolve problems with an individual team member, Dr. Keenleyside may remove the problem student from the team, and the student will either forgo those team marks, or complete the entire case study on their own. Note that the case study is deliberately designed to involve a "divide and conquer" approach to the various tasks - it is far too much for a single individual.

7.2 Emails

1. Please only use your UofG e-mail account, identify the course about which you are e-mailing, and your chosen name at the end.
2. All questions related to Course/Lab Content should first be posted to the Discussion board on Courselink. Dr. K. and Amanda 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 sent outside of regular weekday hours (9 am-5 pm Eastern Time) may take 24-48h (more if they are over the holiday long weekend).
7. Just as we promise to respond to your e-mails (within the above guidelines), we expect you to answer any e-mail we send to you. These are rare, but always important, and usually time-critical.

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. For e-mails, this means composing the message as you would to a current or potential employer: start with a salutation ("dear Dr. K./Amanda/etc" ...not "hey") and end with your chosen name.
2. **Lab attendance. Attendance at lab sessions is mandatory and will be taken at each lab period.** Students not present at that time will be required to write a short assignment relating to 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 (avander@uoguelph.ca) and stay home: a make-up assignment will be given, or an alternative 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 lab. 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. **Case study team quizzes.** A total of 4, held during scheduled lab periods. **If you require academic accommodation** (i.e. absence due to medical, psychological or compassionate grounds), but are able to participate remotely, you must **A)** notify your team members in advance, and **B)** e-mail Dr. K. & Amanda in advance, cc'ing your team members, agreeing to maintain academic integrity (i.e. consulting ONLY the lab manual, Drury *et al.* article, your concept question answers and, for Ch. 1 & 2, lab results) and specifying that one of the team members will be responsible for establishing the video link.
7. **Post-class reflections:** Contact Dr. K. only if you require academic accommodation for missing more than 2 classes.

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 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).
