



MICR*2430 Methods in Microbial Culture and Physiology

Winter 2023

Section(s): C01

Department of Molecular and Cellular Biology

Credit Weight: 0.50

Version 1.00 - January 10, 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 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: these begin week 1 (Jan. 11-13). Students will be working in pairs, or, with the case study, teams of 5-6, however **students who are feeling ill** are asked to contact Catrien 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, available for 24h with time limits of 20-25 minutes. Best 4 of 5.
5. **Assessments, due dates, and grading schemes will have built-in flexibility.** Each student will have 2 free passes for 48H extension on an individual dropbox submission. Note the student must e-mail Dr. K., the TA and Catrien in advance of the deadline; no documentation or explanations are required. These passes cannot be used for team deadlines.

1.3 Timetable

1. Seminar: Fri. 1:00 - 2:20 pm in MAC149
2. Labs: Wed, Thurs & Fri. 2:30 - 5:20 in SSC4102

1.4 Final Exam

In person, April 24, 2023. 11:30-1:30 am. 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: Catrien Bouwman
Email: cbouwman@uoguelph.ca
Telephone: +1-519-824-4120 x52533
Office: SSC 3504
Office Hours: Meetings can be scheduled upon request.

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.

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 lab 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>

Because of the design of this course, and specifically the importance of not falling behind, 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 - usually** 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 labs 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.

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.

Mentimeter (Website)

<https://www.menti.com>

For classroom polling. Access to the app is free - students simply need to register. Each class will provide the code for that day's polling - students enter the code on the app.

3.2 Recommended Resources

Zoom (Website)

<https://zoom.us/meetings>

This is accessed through "Content" and will 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.

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 W23 is over

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

5.1 Lecture

Fri, Jan 13, 1:00 PM - 2:20 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)

Fri, Jan 20, 1:00 PM - 2:20 PM

Topics: **Topic 1: Growth in the environment & lab.** Group and class discussions

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)
2. Lecture videos 1-3: **LV1-From ecosystems to media** (~25 min), **LV2- Nutrients** (~33 min) & **LV3 - Autotrophy/diazotrophy** (~18min)

Fri, Jan 27, 1:00 PM - 2:20 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

Fri, Feb 3, 1:00 PM - 2:20 PM

Topics: **Topic 2: Growth Kinetics & Enumeration.** Group & class discussions

References: To be done BEFORE this seminar:

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

Fri, Feb 10, 1:00 PM - 1:20 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

Fri, Feb 17, 1:00 PM - 2:20 PM

Topics: **Topic 3: The cell membrane & transport.** Group & class discussions

References: To be done BEFORE this seminar:

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')**

Mon, Feb 20 - Fri, Feb 24

Topics: Winter Break - no classes

Fri, Mar 3, 1:00 PM - 2:20 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

Fri, Mar 10, 1:00 PM - 2:20 PM

Topics: **Topic 4: The Influence of environment on growth.** Group & class discussion

References: To be done BEFORE this seminar:

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: O₂ & temp (35')**, **LV10-Adaptation to pH (~31 min)** & **LV11-Adaptation to osmotic stress (14 min)**

Fri, Mar 17, 1:00 PM - 2:20 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

Fri, Mar 24, 1:00 PM - 2:20 PM

Topics: **Topic 5: The Biochemistry of catabolism.** Group & class discussion

References: To be done BEFORE this seminar:

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')

Fri, Mar 31, 1:00 PM - 1:20 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 the last seminar

Fri, Apr 7, 1:00 PM - 2:20 PM

Topics: Good Friday - class rescheduled to Monday Apr. 10

Mon, Apr 10, 1:00 PM - 2:20 PM

Topics: **Topic 6: Microbial diversity & ecology.** Group & class discussions

- Make-up class for Good Friday

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. 11-13 | Exp. 1 - Soil microbiology | Laboratory 1 |
| 2 Jan. 18-20 | Exp. 1 - soil microbiology results Exp. 2 - Bacterial Physiological Diversity | Laboratory 2 |
| 3 Jan. 25-27 | Due to Dropbox: Report 1 Exp. 2 - results Exp. 3 - Comparative counting | Laboratory 3 |
| 4 Feb. 1-3 | Due to Dropbox: Report 2 Exp. 3 - results Exp. 4 - Growth curve (online) | Laboratory 4 |
| 5 | Due to dropbox: Reports 3 & 4 | Laboratory 5 |

| Week/dates | Lab Topic | Readings |
|---------------------|---|---|
| Feb. 8-10 | Exp. 5 – Biochemical tests Introduction to case study & case study teams - Assign Case study Ch. 1 questions | & Case Study - Introduction to the Winogradsky Columns |
| 6 Feb. 15-17 | Due to dropbox: Team charter Exp. 5 results Exp. 6 – Antimicrobials Ch 1 lab (virtual results) | Laboratory 6 Case Study Ch. 1 & Ch. 1 readings |
| 7 Mar. 1-3 | Due to dropbox: Reports 5 & Ch. 1 questions Exp. 6 results Ch. 1 team quiz Enrol for Ch. 2 questions on Courselink | Case Study Ch. 1 & Ch. 1 readings |
| 8 Mar. 8-10 | Due to dropbox: Report 6 & Team effectiveness feedback summary Ch. 2 lab (virtual results) | Case Study Ch. 2 & Ch. 2 readings |
| 9 Mar. 15-17 | Due to PEARTool : Ch. 2 draft answers Ch. 2 team quiz #1 | Case Study Ch. 2 & Ch. 2 readings |

| Week/dates | Lab Topic | Readings |
|------------------|--|---|
| | Assign Ch. 3 questions | |
| 10 Mar. 22-24 | Due to PEARTool : Ch. 2 reviews Ch. 2 team quiz #2 | Case Study Ch. 2 & Ch. 2 readings |
| 11 Mar. 29-31 | 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 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

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 encouraged 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 have a time limit of 20-25 min. Quizzes are available for 24h, beginning at 9:00AM (EST). All quizzes open on a Thursday and are followed by a **debrief** of the problem areas in the next day's seminar.

1. **Jan. 26-27** - Growth in the Environment and Lab
2. **Feb. 9-10** - Growth Kinetics and Enumeration
3. **Mar. 2-3** - The Cell Membrane and Transport
4. **Mar. 16-17** - Influence of the Environment on Microbial Growth
5. **Mar. 30-31** - The Biochemistry of Catabolism

- These are non-cumulative, questions are of an applied nature, and largely non-googleable. The relatively short time limit for each is calculated to be sufficient for those who have prepared but not for an "open-book" approach. As a result, students who have not kept up with the material and topic-related tasks are unlikely to perform well. It is therefore strongly recommended that students complete ALL work related to a topic, prior to the topic review seminar, 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 quiz debrief 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 free passes 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. 1-3**
2. Chapter 2 team quizzes - **Mar. 15-17** (1st attempt) & **Mar. 22-24** (2nd attempt)
3. Chapter 3 - **Mar. 29-31**

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: Fri, Jan 20, 1:00 PM - 2:20 PM

Learning Outcome: 12, 13

Through in-class polling using Mentimeter. 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 5-8 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: $\text{grade} = \frac{\text{\#student polls}}{\text{\#total polls} \times 0.95}$

Final exam (40%)

Date: Mon, Apr 24, 11:30 AM - 1:30 PM, TBA

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

In person, ^a2-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.

^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 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.

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 your lab day - 1 week following conclusion of the respective lab exercise (dates in Dropbox on Courselink). 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 free passes for 2 - 48h due date extensions**, no questions asked. To claim a free pass, students must e-mail Dr. Keenleyside and cc Catrien and the TA, **in advance of the deadline**, to inform them of their intent. Absent the use of a free pass, late submissions 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. In the **extremely rare situation**, where a team has been unable to resolve individual challenges, Dr. Keenleyside may be consulted, and the distribution of effort scores can be used to reflect individual team member's case study contributions (from 50% - 150%), with the individual's average score being used to assess individual case study grades, which may therefore end up higher or lower than the net grade

earned by the team.

7.2 Emails

1. Please only use your UofG e-mail account.
2. All questions related to Course/Lab Content should first be posted to the Discussion board on Courouselink. Dr. K. and Catrien will regularly check and respond to those posts, allowing the rest of the class to see the answers.
3. Use email for personal issues and for meeting appointments: these 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. 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.
2. **Lab attendance. Attendance is mandatory and will be taken during each lab period.** Students not present at that time will be required to do a make-up assignment, the details of which 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 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 lab. Preparing flow charts in advance of lab and 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, a notebook, and a permanent ink marker. 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. Turnitin plagiarism software is used to evaluate submitted 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. & Catrien in advance, cc'ing your

team members, agreeing to maintain academic integrity (i.e. consulting ONLY the lab manual, your concept question answers and, for Ch. 1 & 2, lab results and any other specified and approved resources) and specifying that one of the team members will be responsible for establishing the video link.

7. **Classroom polling:** students must answer 95% of the semester's polls for full marks. Unless a student is **unavoidably absent** for more than one class (i.e. requires academic accommodation due to medical, psychological or compassionate reasons), your polling numbers will not drop below the 95% response rate for 100% of the participation grade. **Contact Dr. K. only if you require academic accommodation for missing more than 1 class.**

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

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