MICR*2420 Introduction to Microbiology

Fall 2018
Section(s): C01

Department of Molecular and Cellular Biology
Credit Weight: 0.50
Version 3.00 - August 28, 2018

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1 Course Details

1.1 Calendar Description

This course will introduce students to the diversity of microorganisms, including, bacteria, viruses, and fungi, and the impact of microbes on everyday life. The interactions of microorganisms with the biotic and abiotic worlds will be discussed. Topics will include the roles of microorganisms in host-pathogen interactions in disease, the beneficial aspects of microorganisms in bioremediation and food production, and their application in biotechnology.

Pre-Requisite(s):	4.00 credits including (1 of BIOL*1070, BIOL*1080, BIOL*1090, CHEM*1040)
Restriction(s):	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 Timetable

Lectures: M, W, F 9:30 - 10:20 am, ALEX200

Labs: Mon., Tues., Wed. 2:30-5:20 pm, SSC4102

1.3 Final Exam

Thursday Dec. 13 2:30-4:30

Location *TBA*

Exam time and location is subject to change. Please see WebAdvisor for the latest information.

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2 Instructional Support

2.1 Instructor(s)

Wendy Keenleyside

Email: wkeenley@uoguelph.ca
Telephone: +1-519-824-4120 x53813
Office: SCC 3506
Office Hours: By appointment

Rohan Van Twest
Email: rvantwes@uoguelph.ca
Telephone: +1-519-824-4120 x54328
Office: SCC 4113
Office Hours: By appointment
Lab Coordinator

2.2 Instructional Support Team

Lab Co-ordinator: Debra Flett
Email: dflett@uoguelph.ca
Telephone: +1-519-824-4120 x52533
Office: SSC 3504
**Deb will be coordinating labs during the first ~1 month while Rohan is away

2.3 Teaching Assistant(s)

Teaching Assistant: Ashley Brott
Email: abrott@uoguelph.ca
**Ashley will be supporting Deb as lab technician/TA until Rohan's return

Teaching Assistant: Joseph Radford
Email: radford@uoguelph.ca

Teaching Assistant: Sierra Rosiana
Email: srosiana@uoguelph.ca

Teaching Assistant: Jacob Wilde
Email: jwilde@uoguelph.ca

Teaching Assistant: Mara Goodyear
Email: mgoodyea@uoguelph.ca

Teaching Assistant: Sharlaine Harris
Email: sharlain@uoguelph.ca

Teaching Assistant: Olivia Roscow
Email: oroscow@uoguelph.ca

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3 Learning Resources

3.1 Required Resource(s)

Microbiology (Textbook)
https://openstax.org/details/books/microbiology#faculty-resources
This is an Open resource e-book ***and is currently being updated for MICR2420 & MICR2430***. The augmented version of this textbook, by Keenleyside *et al.* will be available online, by the beginning of the fall semester and the url will be posted on Courselink.

Labratory Manual (Other)

Purchase in SSC3302, $10.00 CASH ONLY & exact change

- Thursday, Sept. 6: 9:30am – 11:30am & 1pm – 3pm
- Friday, Sept. 7: 9:30am – 11:30am & 1pm – 3pm
- Monday, Sept. 10: 9:30am – 11:30am & 1pm – 3pm

Courselink (Website)

The course website will be used extensively and will include all relevant course materials, discussion boards, links for additional readings & a course calendar.

REEFPolling (Software)

You will be required to purchase a subscription to REEF Polling (by iclicker), to allow participation in class polling. This is a cloud-based platform that allows you to use your laptop or digital device to respond to MCQs, short answer or targeting questions; ***the hand-held iclickers will not be used***.

- The access code is purchased at the bookstore - please keep this code until you are certain it has been entered correctly and you are able to participate in polling. Subscriptions are 6 months or a year: if you are taking MICR2430 W19, purchase a 1 year subscription, as the system will also be used in that course.
- Once you have the access code, you will need to register online
- Polling begins lecture 2 and the site is accessed 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*2420 F18 will be set up after the add period ends. 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 and criteria for high quality MCQs will be discussed in class. Dr. Keenleyside will provide some introductory/review questions to the MICR*2420 repository, to help you get started and lecture 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 midterm and final exams, 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! Participation can also be used to make up for missed REEFPolling, to a limit.

3.2 Recommended Resource(s)

Lecture Videos (Website)

Lectures will be captured and made available for streaming via Courselink

3.3 Campus Resources

The Academic Calendar is the source of information about the University of Guelph's procedures, policies and regulations which apply to undergraduate, graduate and diploma programs: http://www.uoguelph.ca/registrar/calendars/index.cfm?index

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

* make an appointment with a program counsellor in your degree program. http://www.bsc.uoguelph.ca/index.shtml or https://www.uoguelph.ca/uaic/programcounsellors

If you are struggling to succeed academically:

* 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. https://www.lib.uoguelph.ca/get-assistance

If you are struggling with personal or health issues:

The Department of Student Wellness provides support through Accessibility Services, Counselling Services, Health Services, Health & Performance Centre and Wellness Education & Promotion: https://wellness.uoguelph.ca/sws/

* 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.uoguelph.ca/~ksomers/

If you have a documented disability or think you may have a disability:

* Student Accessibility Services (SAS) can provide services and support for students with a documented learning or physical disability. They can also provide information about how to be tested for a learning disability. For more information, including how to register with the centre please see: https://www.uoguelph.ca/accessibility

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4 Learning Outcomes

Course Goals

This course serves as the foundation of the Microbiology program. It is designed to capture your interest by introducing you to the relevance of Microbiology in everyday life, discussing the global impact of microbes, and by providing an opportunity for hands-on experience with microbes in a laboratory setting. The course learning outcomes and the specific conceptual details associated with those outcomes (in bullet point) are listed below. Specific LOs and concepts will be identified at the beginning of each lecture and collectively will be assessed through the various graded components of the course. The list may be updated periodically during the semester, through deletion or addition, depending upon the pace and depth of coverage of a given topic. Course readings, class discussions and group work will also further develop the broader MCB Program Learning Outcomes (MCB Learning Outcomes) and the University of Guelph learning outcomes (UofG Learning Outcomes).

4.1 Course Learning Outcomes

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

1. By the end of the course, successful students will

    - Appreciate the roles of cells as the fundamental unit of life and the essential roles of the microbes in the biosphere, biotechnology, the food industry and health and

disease

2. By the end of the course, successful students will

    - Demonstrate an understanding of how cells, organelles and all major metabolic pathways evolved from early prokaryotic cells, the differences between the cellular microbes and the viruses and how the evolutionary history and relatedness of cellular life is depicted in the Universal tree of Life

3. By the end of the course, successful students will

    - Demonstrate an understanding that the properties and metabolic diversity among eukaryotes, prokaryotes and viruses are a function of the chemical structures of their constituent macromolecules and how their evolutionary history relates to the greater metabolic diversity of the prokaryotes compared to the eukaryotes

4. By the end of the course, successful students will

    - Demonstrate an understanding of the interactions of microbes with their environment, and specifically the macromolecular interactions that underlie cellular motility, biofilm formation, quorum sensing, antimicrobial therapy, immune recognition and response, and pathogenesis

5. By the end of the course, successful students will

    - Demonstrate an understanding that mutations, recombination and horizontal gene transfer have selected for a huge diversity of microorganisms and the various factors that affect the frequency of genotypes and phenotypes in a population over time

6. By the end of the course, successful students will

    - demonstrate an understanding of the scientific method, by describing or assessing the appropriate method of visualization and identification of example microbes, performing experiments using appropriate safety precautions, and microbiological techniques for the isolation, identification and enumeration of representative groups of bacteria, archaea and fungi, using appropriate and accurate mathematical calculations for microbial enumeration and successfully interpreting and communicating scientific data

4.2 UOG - Undergraduate Degree

Successfully completing this course will contribute to the following:

#	Outcome Set Name	Course Learning Outcome
1	Critical and Creative Thinking	1, 2, 3, 4, 5, 6
2	Literacy	6

#	Outcome Set Name	Course Learning Outcome
3	Global Understanding	4, 5, 6
4	Communicating	6
5	Professional and Ethical Behaviour	6

5 Teaching and Learning Activities

These **lectures** are approximate dates and are subject to minor alteration.

Lecture 1 is the Friday immediately prior to “week 1” for the labs.

Labs are subject to minor change.

5.1 Lecture

Topic(s): Lecture

Lecture #	Lecture Topic	Textb
1-3 (Sept. 7, 10, 12)	1. Introduction - relevance of microbes in health, industry, the environment, microscopy	Ch. 1
4-8 (Sept. 14, 17, 19, 21)	3. Specific characteristics of cellular microbes - distinguishing characteristics of bacteria, archaea, fungi and protists	Ch. 3,
9-10 (Sept. 24, 26)	4. Viruses/bacteriophages. Size, structure, unique properties, how they grow.	Ch. 6
11-15 (Sept. 28, Oct. 1, 3, 5, 10)	5. Microbial ecology. Microbes in different niches, factors that shape and define community structure, identifying the uncultivated	SEC. 4
16/*19-21 (Oct. 12, 15, 19, 22, 24)	6. Biotechnological applications of microbes. Bioremediation, biocontrol, food/beverage industries, vaccines and antibiotics	Sec. 8 18.5 &

**L18: Midterm*

21-24 (Oct. 24, 26, 29, 31)	7. Microbial Associations – biofilms, quorum sensing, symbioses, human microflora	Sec. 4
25-36 (Nov. 2-30)	8. Microbes in health and disease - innate vs. acquired immunity, Koch's postulates, characteristics of a pathogen, select infectious diseases – diagnosis, treatment, control, resistance	Ch.15 case s
37 (Fri. Nov. 20)	Classes rescheduled from Thanksgiving holiday –completion of last topic & review	

5.2 Lab

Topic(s): Labs

Week	Lab Topic	Readings
1	Rules & regulations, biosafety; aseptic techniques, streak plate isolation, brightfield microscopy, yeast cellular morphology, Gram's stain	Week 1
2	Culturing microorganisms, preparation of tryptic soy agar (TSA), direct isolation with selective and differential media, enrichment and isolation of *Halobacterium*, efficacy testing of hand washing & alcohol-based gel disinfection of hands	Week 2
3	Pour plate count, enrichment and isolation of bacteriophage from soil	Week 3
4	Bioluminescence of *Vibrio fisheri*, bacterial swimming and swarming motility, complete *Halobacterium* isolation	Week 4
5	Complete all observations and submit final laboratory data sheets	

5.3 Method of Presentation

This course is designed to capture students' attention and interest; as such classroom teaching

will be interactive wherever possible, and centered on microbiology as it pertains to everyday life, current affairs and news items. The lab component consists of 4 2-hour labs and will provide hands-on experience as well as demonstrations. Classes will include Powerpoint slides, skeleton versions of which will be posted prior to class, and to facilitate a more interactive class, REEF polling questions (a cloud-based “clicker” system) will be used. The midterm and final will also have a collaborative component. Lectures will be recorded and made available after class.

5.4 Important Dates

These will also be identified in the Courselink calendar

Fri. Sept. 7 - First class

Sept. 10-12 - Labs begin for sec. 0101-0103

Mon. Oct 8 - Thanksgiving holiday – no classes

Tues. Oct. 9 - Fall study break day - no classes

Mon. Oct. 15 - In-class Case study quiz #1

Wed. Oct. 17 - In-class MIDTERM

Oct. 22-24 - labs begin for sec. 0104-0106

Nov. 2 - 40th class day – drop deadline

Fri. Nov. 30 - Last day of classes: Case study quiz #2 in class

Final exam: Cumulative, Wed. Dec. 13, 2:30-4:30

See lab manual for report due dates & mark distribution

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6 Assessments

These are subject to change depending on changes in lecture progress. Any changes will be reflected in an updated course outline on Courselink. Lower case letters refer to LO-associated concepts, and can be found in the posted file “MICR2420 Learning outcomes & concepts”.

6.1 Marking Schemes & Distributions

For those students who wrote the midterm, the instructor will determine the distribution scheme based on whether they did better on the midterm or final exam

Name	Scheme A (%)	Scheme B (%)
REEFPolling	5	5
PeerWise Bonus Marks	0	0
Midterm	25	0
Lab	20	20
Independent Study Assignment	0	0

Name	Scheme A (%)	Scheme B (%)
Case study group quizzes	5	5
Final exam	45	70
Total	100	100

6.2 Assessment Details

REEFPolling (10%)
Each lecture will include 2 or more clicker questions which, depending upon the difficulty level, may be polled, discussed, then re-polled, prior to revealing answers. 1 mark per question answered, with an estimated semester total of 80-90 marks.

PeerWise Bonus Marks (0%)
Date: Wed, Sep 6 - Sat, Dec 2
Can be used to recover lost marks from REEFPolling, and will be added onto REEFPolling grade, which be allowed to exceed 100%. 2 marks per authored PEERWise question, 1 mark per PEERWise question answered, to a maximum of 16 marks.

Midterm (25%)
Date: Wed, Oct 17, In class
2-stage format: consists of shorter individual, with largely higher level MCQs, followed by group test on a subset of the MCQs, using IF-AT cards (http://www.epsteineducation.com/home/). Group grade will only be used if it is no lower than the individual grade. The midterm will not be handed back however there will be ample opportunity to view and discuss midterms. Because of the nature of the 2-stage exams, students registered with SAS are asked to contact Dr. Keenleyside ASAP.

Students who miss the midterm will write a 70% (cumulative) final exam.

Lab (20%)
Lab reports (data sheets) are due weekly and are worth a total of 10%. 5% pre-lab online quizzes; 5% in-lab quizzes.

Case study group quizzes (5%)
Date: in class
There are two group quizzes (2.5% each) - the first Mon. Oct. 15, and the second Fri. Nov. 30. Students are assigned to groups through Courselink, work together outside of class, and write a 10-MCQ quiz together using IF-AT cards.

Independent Study Assignment (0%)
Date: On final exam
Tested on the final exam ~10% of exam grade. Independent research on chosen organism - Investigation of a chosen microorganism (instructions will be provided), done independently throughout the semester and tested on the final exam. Exam questions will represent ~10% of the final exam grade. Students cannot bring notes into the exam, so they must study their independent assignment along with the rest of the course material.

Final Exam (45%)
Date: Thu, Dec 13, 2:30 PM - 4:30 PM
Cumulative, includes questions on independent assignment. 2-stage format (individual, followed by group test with IF-AT cards. Group grade will only be used if it is no lower than the individual grade. Because of the nature of the 2-stage exams, students registered with SAS are asked to contact Dr. Keenleyside ASAP.

7 Course Statements

7.1 Instructor Policies

Grading

1. Midterm - students who MISS the midterm write a 70% (cumulative) final exam. For students who DO write the midterm, but perform better on the final, the midterm grade will be dropped and the grade weight transferred to the final exam.

2. Assignments/reports - data sheets for laboratory observations are to be written up and submitted prior to leaving the lab in which those observations were completed; the time for submission of other assignments will be announced. For ALL assignments/reports, deductions for late submissions will be 10% per day (the weekend will cost a 20% grade reduction), up to a 30% deduction. After 3 days, the submission will not be accepted.

3. Quizzes - Lab quizzes are written at the beginning of the lab periods; please contact Rohan if you have valid grounds for being unable to complete one or more of these – you may be able to write the quiz later, or simply drop that particular quiz from the lab quiz grade – however this requires documentation. See above for information on academic consideration.

4. Collaborative tests (midterm & final exams) - For the 2-stage midterm and final, the individual grade will contribute 100% of that grade item if higher than the collaborative component. Students who choose to write the individual component only will similarly have that count as 100% of that grade item. Students registered with SAS may a) write early so that they can join the class for the collaborative portion, b) write a 100% individual test, or c) get the class average of the group test as their group component.

E-mails

1. Student enquiries will not be answered on nights, weekends or holidays. In addition, because of the sheer volume of e-mails your instructor receives, e-mail enquiries for which the answer is easily available by checking the lab manual, course outline or other information on the courselink site will not be answered.

Student responsibilities

1. Respectfulness: students are expected to treat lab partners, classmates, the instructor and teaching staff with respect at all times. 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. Laboratory attendance: participation and completion of laboratory components is mandatory. If you cannot attend a laboratory session, and have valid grounds for academic consideration, please e-mail Rohan to provide your documentation and enquire about making up the missed activities.

3. Laboratory preparedness: you must have read the relevant laboratory exercise in advance of the lab, and completed the associated online lab quiz, prior to coming to the lab. A flow chart for what you will be doing in the lab is an excellent way to ensure you are well prepared to complete the exercises quickly, and efficiently. You must bring with you: closed-toed shoes, a lab coat, your lab manual, an elastic for long hair, and a notebook. If you wear contact lenses, you must also bring safety glasses.

4. Classroom polling: students are expected to resolve any connectivity issues with their device immediately and inform the instructor when such issues arise. These issues are generally the result of either: 1) Bluetooth interference with the wifi - students are asked to turn off the bluetooth function(s) on their device(s) when they enter class, or 2) the wireless function of the device, in which case, disconnecting and reconnecting your devices' wifi will allow you to access the first available router, so will allow you to reconnect more quickly. If you cannot attend MORE THAN 1 CONSECUTIVE seminars, and have valid grounds, please e-mail the instructor to provide your documentation. Academic accommodations for instances where a student cannot meet a course requirement, are discussed below.

5. Lab partners & lab reports: Students are responsible to their lab partners. They are expected to work collaboratively, to communicate effectively with each other and the demonstrators, and to hand in independently written lab books.

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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.
- 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: Chemistry & Physics Help and 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.
- Student Health Services is located on campus and is available to provide medical attention.
- 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.

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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 regulations and procedures for Academic Consideration are detailed in the Undergraduate Calendar.

9.3 Drop Date

Courses that are one semester long must be dropped by the end of the fortieth class day; two-semester courses must be dropped by the last day of the add period in the second semester. The regulations and procedures for Dropping Courses are available in the Undergraduate Calendar.

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 book their exams at least 7 days in advance, and not later than the 40th Class Day.

More information: www.uoguelph.ca/sas

9.6 Academic Misconduct

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 discourages misconduct. 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.

The Academic Misconduct Policy is detailed in the Undergraduate Calendar.

9.7 Recording of Materials

Presentations which are made in relation to course work—including lectures—cannot be recorded or copied without the permission of the presenter, whether the instructor, a classmate 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 which apply to undergraduate, graduate and diploma programs.
