

MBIO1010: Microbiology I **Winter 2021**

CRN: 51840, 51550

51715, 51551, 51552, 51714, 51553, 60651, 60652, 60653, 60654, 60655

Course Description

An introduction to the general principles of microbiology including cell structure, physiology, and molecular microbiology utilizing examples from ecologically beneficial as well as industrially relevant and pathogenic microbes.

Lectures

Instructors:

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Effective September 1, 2013, the U of M will only use your university email account for official communications, including messages from your instructors, department or faculty, academic advisors, and other administrative offices. Visit <http://umanitoba.ca/ist/email/studentemailindex.html> for more information.

Required Material

Brock Biology of Microorganisms 16th edition (Madigan, Bender, Buckley, Sattley and Stahl).

All course information including lecture presentations can be found on UM Learn at umanitoba.ca/d21. You will need your UMNNet Id and password to login.

Course Evaluation

Lecture: (80%)

Both lecture sections will have two mid-term exams and a final exam.

Tentative examination schedule:

Midterm 1*	15%	20 Multiple choice questions – Wednesday, February 24, 2021 (Online)
Midterm 2*	15%	20 Multiple choice questions– Wednesday, March 17, 2021 (Online)
Final exam	50%	60 Multiple choice questions (cumulative), date and time to be announced university) (online through UM Learn, exam duration 2 hours).

You will not be able to revisit a question once you submit your answer, so please budget your time accordingly. Further instructions about the midterms and exam will be posted on UM Learn within a week prior to these examinations.

*There will be no deferred midterm exams. Students who miss one midterm exam will write a final exam worth 15% more (e.g. 65% versus 50%). In the event that both midterms are missed, the final exam will be worth 80%.

Laboratory: (20%)*

The lab counts for 20% of your final grade in the course and marks will be allocated as follows:

- Lab safety quiz = 1%
- 8 online lab assignments = 8%
- 2 lab quizzes (3% each) = 6%
- In-class lab activities (including pre-labs and marked lab activities) = 5%

* *Note that to pass the course, you must:*

- Achieve a minimum 10 out of 20 in the lab.
- Complete a minimum of 6 out of 8 online lab assignments.
- Complete 2 in-person lab periods.

Lab information

Instructor: Dr. Chris Rathgeber (Chris.rathgeber@umanitoba.ca)

Online labs

Most labs will be done as online self-study modules, rather than hands on lab work. The labs will usually be available a few days before the scheduled lab date, and you will be able to work on them at a time of your own choosing. To keep you from falling behind on the lab material (ie. leaving all of the online labs until the last minute) a short lab assignment will be due at the end of each week. Late lab assignments may be subject to penalty, and no assignments will be accepted greater than 5 working days past the due date. You can find a complete schedule of labs, and the assignment due dates on UM Learn.

In-class lab activities

In addition to the online labs, you will have two in-class lab periods to learn hands on skills in microbiology. Because strict physical distancing will be in effect, each lab section B01 to B09, will be divided into two groups, and each group will be scheduled to attend the lab for two consecutive weeks between March 19 and April 16.

All in-class activities will be held in room 312 Buller during your regular scheduled lab period. You will be required to bring your own lab coat, permanent marker, and mask. (A pen and a calculator will be useful too.) All other materials you need to complete the labs will be provided. Details of the in-class lab activities, and how to prepare for them, will be available on UM Learn.

Note that you must remain available at your scheduled lab time throughout March and April until all groups have been scheduled (likely by the second week of classes.) Schedules for the in class activities will be posted on UM Learn.

If you are sick, or have recently been in contact with someone who is sick (or are self-isolating for any other reason) you won't be able to attend the in class lab periods, and will instead be scheduled for a make-up lab. If you are unable to attend your scheduled in-person lab for any reason, you should [contact the instructor](#) as soon as possible to arrange for accommodations. Due to strict distancing measures in effect, make-up labs during term may not be possible. In this case, make-up labs will be scheduled with the next course offering (i.e. summer session in May and June) and you will hold a grade of "incomplete" until your in-person labs have been completed.

Lab exemptions

Lab exemptions are available to students who have previously taken the course and completed the lab section with a minimum grade of 60% in the lab. For permission to register for the lab exemption, or to see if you qualify, [email the instructor](#).

Approximate grading scheme:

Letter grades will be assigned by taking into consideration the grade distribution in the class and the University of Manitoba's official descriptors ([Grades | University of Manitoba \(umanitoba.ca\)](#)) A⁺ (Outstanding), A (Excellent), B⁺ (Very Good), B (Good), C⁺ (Satisfactory), C (Adequate), D (Marginal), F (Failure). The goal is to provide grades that represent performance in the context of the class; the grades will not be curved to meet an expected distribution, but conversion of percentages to letter grades will be at the discretion of the instructors.

For this course, **a grade of 45% on the final exam is required to pass the class**. The grading scheme generally, but not always, will be close to the following: A+ (>90%), A (80-89.9%), B+ (75-79.9%), B (70-74.9%), C+ (65-69.9%), C (60.0-64.9%), D (50-59.9%), F (<50% total, or <45% in final exam). Note that in some courses, an A+ is received only for numerical grades of >93% (Nursing, Asper) so there is precedent for using grade boundaries higher than those listed above.

Course overview - Topics may be added or removed due to time constraints.

Course topics

Textbook sections

(Brock, 16th ed.)

Part 1: Microbiology and Microorganisms

- Introduction and major themes of microbiology 1.1 – 1.2, 1.4 – 1.5
- The history of microbiology 1.11 – 1.13
- The species concept and classification 13.12
- Molecular phylogeny and the tree of life 13.3
- Growth of pure cultures 4.2, 4.4

Part 2: Microbial cell structure and function

- Microscopy 1.7 – 1.10
- Viruses 5.1 – 5.4
- Cells of *Bacteria* and *Archaea* 1.3
- The cytoplasmic membrane and transport 2.1 – 2.2
- Cell walls of *Bacteria* and *Archaea* 2.3 – 2.5
- Other cell surface structures and inclusions 2.6 – 2.8
- Microbial locomotion 2.9 – 2.12
- Eukaryotic microbial cells 2.13 – 2.15
- The endosymbiotic hypothesis 13.4, 18.1

Part 3: Microbial Growth and Nutrition

- Laboratory culture of microorganisms 4.1 – 4.2
- Metabolic classes of microorganisms 3.1
- Binary fission and the bacterial growth curve 4.6
- Quantitative aspects of growth 4.7
- Measuring microbial growth 4.3 – 4.4
- Effect of temperature on microbial growth 4.11 – 4.13
- Evolution and life at high temperatures 17.12, 17.14
- Other environmental effects on microbial growth 4.14 – 4.16
- Control of microbial growth 4.17 – 4.19

Part 4: Microbial Diversity

- Making sense of microbial diversity 15.1

Domain *Bacteria*

- *Cyanobacteria* 15.3
- *Proteobacteria* 16.1 – 16.5
- *Firmicutes*, *Tenericutes*, and *Actinobacteria* 16.6 – 16.12
- *Bacteroidetes* 16.13
- *Chlamydiae*, and *Planctomycetes* 16.15 – 16.16
- *Deinococcus-Thermus* 16.20

Course topics, continued

Textbook sections

Domain *Archaea*

- *Euryarchaeota* 17.1 – 17.4
- *Thaumarchaeota, Nanoarchaeota and Korarchaeota* 17.5 – 17.7
- *Crenarchaeota* 17.9 – 17.11
- *Asgard Archaea* 17.8

Part 5: Applied Microbiology

- Food Microbiology various sources
- Biotechnology various sources

Part 6: Immunity and host defense

- Overview of immunity 26.1 – 26.2, 26.4
- Innate response mechanisms 26.5-26.7
- Inflammation and Fever 26.8
- Adaptive response properties 27.1 – 27.2
- Primary and secondary immune response 27.3

Part 7: Antimicrobial drugs and drug resistance

- Antimicrobial drugs 28.5 – 28.6
- Antimicrobial Drug Susceptibility Testing 29.4
- Antimicrobial drug resistance 28.7

Part 8: Medical microbiology

- Normal human microbial interactions 24.1-24.5
- Mechanisms of pathogenesis 25.1 – 25.4
- Enzymes and toxins 25.5 – 25.8

Student Responsibilities

It is your responsibility to make sure that all eligibility requirements are met to be registered in this class. This means:

- You have taken the appropriate prerequisites, as noted by the calendar description, or have documented permission from the instructor to waive these prerequisites.
- You have not previously taken, and are not concurrently registered in this course and another that has been identified as "not to be held with".

Faculty of Science Statement on Academic Dishonesty

The Faculty of Science regards acts of academic dishonesty in quizzes, tests, examinations, laboratory reports or assignments as serious offences and may assess a variety of penalties depending on the nature of the offence. Acts of academic dishonesty include but are not limited to bringing unauthorized materials into an exam, copying from another individual, sharing screenshots during exams, using answers provided by tutors, forging documents, plagiarism, and examination personation. Guidelines are stated in your calendar regarding University policy with respect to academic dishonesty (particularly plagiarism and cheating) and behaviour and absence from final exams.

The Faculty of Science web page has detailed information (Click here for the weblink: [Academic Integrity - Faculty of Science \(umanitoba.ca\)](#)). Please read and follow these guidelines and ask if you have any questions.

You are also encouraged to view the following video on Academic Integrity:

[Message from Associate Dean Krystyna Koczanski - YouTube](#)

In cases of cheating during examinations, the test in question will be given a grade of 0% and the student will be reported to the appropriate authorities for disciplinary action.

Important Information about Delivery Mode:

Since the mode of delivery of this course is online, you must ensure that you meet the minimum technological requirements:

1. A computing device where one can create and edit documents
2. An internet connection capable of streaming videos and downloading software, and
3. Access to a webcam and microphone

Below you will find the 'Recommended Minimum Technology Requirements at the UM, [Student-Connectivity-Recommendations.pdf \(umanitoba.ca\)](#)

All synchronous material (introduction to the lecture topic, review material, etc) will be delivered via Zoom. Please make sure that your computing device can run Zoom (you may have to download Zoom software on your computer).

The link for the Zoom class will be sent to you each week.

While entering the Zoom class, you are required to enter your name as it appears on the UMLearn class list. If your name does not match with any names on the class list, you will be denied entry.

Online invigilation

The midterms and final exam for this course may be invigilated through the use of Respondus monitor, Zoom, Cisco WebEx, or another invigilation system of the instructor's choosing. If online invigilation is used, you will be notified and given a chance to try the online invigilation system before it is used. In the case that online invigilation is used, you will require a working Webcam and microphone to write the exam.

If you foresee problems using online video invigilation (for example, if you don't have a webcam, or if you live outside of Winnipeg and have slow internet access) you are encouraged to contact the instructor well in advance of the exam date to determine if accommodations can be made.