MBIO1010: Microbiology I
Fall 2025

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:

Dr. Ivan Oresnik **Email**: Ivan.Oresnik@umanitoba.ca

Diana Mlinar **Email:** Diana.Mlinar@umanitoba.ca

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To receive a response, emails must be written by yourself and not external portal. Any email that requests information about things that have been said in the lecture will not receive a response. It is your responsibility to get missed content from another classmate if you are not able to attend class.

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

All course information including lecture presentations can be found on UM Learn at umanitoba.ca/d2l You will need your UMNet Id and password to login. Note that lecture attendance is also mandatory as anything written in the lecture is also considered to be examinable

Recording Lectures
The instructors of this course hold copyright over all lecture material and exam content. No audio or video recording of the lectures are permitted without prior consent from the instructor. You are not permitted to post any course material to external websites.

Course Evaluation
Lecture: (80%)
Both lecture sections will have one mid-term exam and one final exam.

Tentative examination schedule:

Midterm Exam*	30%	40 Multiple choice
Final exam	50%	80 Multiple choice questions, date and time to be announced (scheduled by the university), 2 hour duration

There will be no deferred midterm exam. Students who miss the mid-term exam will write a final exam worth 30% more (e.g. 80% versus 50%).

The final exam will cover all material outlined in the syllabus, lectures and material posted on UM Learn.

Laboratory: (20%)*

Lab term work	8%	Includes lab quizzes given online through UM Learn.
Lab exam	12%	Short answer questions and lab stations, date is given in the lab manual.

* **A mark of 10 out of 20 in the lab section is required to pass the course**. Lab marks are determined independently of marks obtained on the lecture midterm and final exams.
Because the laboratory and class material are integrated, knowledge of the laboratory material is expected for both the midterms and the course final.

Laboratory

Instructor: Dr. Chris Rathgeber **Email**: Chris.Rathgeber@umanitoba.c

Please see the attached laboratory syllabus for all lab related information.

Approximate grading scheme:

Letter grades are assigned taking into consideration the grade distribution in the class and the University of Manitoba's descriptors

A+ (Outstanding), A (Excellent), B+ (Very Good), B (Good), C+ (Satisfactory), C (Adequate), D (Marginal), F (Failure); see http://umanitoba.ca/student/records/grades/686.html

The grading scheme generally but not exactly follows that used by the Rady College of Medicine https://umanitoba.ca/faculties/health_sciences/medicine/admissions/8847.html. 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%).

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 – 1.3
• The history of microbiology	1.9 – 1.11
• The species concept and classification	13.8, 13.10
• Molecular phylogeny and the tree of life	13.3
• Growth of pure cultures	3.2, 5.9
Part 2: Microbial cell structure and function	
• Microscopy	1.5 – 1.8
• Cells of *Bacteria* and *Archaea*	2.1 – 2.2
• The cytoplasmic membrane and transport	2.3
• Cell walls of *Bacteria* and *Archaea*	2.4 – 2.6
• Other cell surface structures and inclusions	2.7 – 2.10
• Microbial locomotion	2.11 – 2.13
• Eukaryotic microbial cells	2.14 – 2.16
• The endosymbiotic hypothesis	13.4, 18.1
• Viruses	8.1 – 8.5
Part 3: Microbial Growth and Nutrition	
• Laboratory culture of microorganisms	5.5
• Energy classes of microorganisms	3.3
• Binary fission	5.1
• Population growth	5.2 – 5.4
• Measuring microbial growth	5.6 – 5.8
• Effect of temperature on microbial growth	5.9 – 5.11
• Evolution and life at high temperatures	17.11, 17.13
• Other environmental effects on microbial growth	5.12 – 5.14
• Control of microbial growth	5.15 – 5.17
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*	17.8 – 17.10
Part 5: Immunity and host defense	
• Overview of innate immunity	
• Physical and chemical barriers	26.2
• Cells of the immune system	26.3
• Innate immunity	26.1
• Innate response mechanisms	26.5-26.7
• Inflammation and Fever	26.8
• Adaptive response properties	27.1
• Primary and secondary immune response	27.3
• Immunogens and antigens	27.2
Part 6: Antimicrobial drugs and drug resistance	
• Antimicrobial drugs	28.10 – 28.11
• Antimicrobial Drug Susceptibility Testing	27.5
• Antimicrobial drug resistance	28.4
Part 7: Medical microbiology	
• Normal human microbial interactions	24.1-24.5
• Pathogenesis	25.1 – 25.8
• Superantigens: Overactivation of T cells	25.7
• Microbiological identification of pathogens	28.1-28.3
• Growth independent diagnostic methods	28.5 – 28.8
Part 8: Applied Microbiology	
• Food Microbiology	various sources
• Genetic engineering and biotechnology	various sources

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".

It is your responsibility to make sure you understand the rules regarding cheating and plagiarism at the University of Manitoba.

• Read the Faculty of Science Statement on Academic Dishonesty (can be found below) • Refer to the student discipline bylaw and academic integrity information in the University of Manitoba Academic calendar: (http://umanitoba.ca/calendar)

• Read statements on academic dishonesty, including plagiarism, cheating and examination impersonation found on the Faculty of Science webpages.

• 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.

Faculty of Science Statement on Academic Misconduct

The Faculty of Science and The University of Manitoba regard 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 a test or exam, copying from another individual, using answers provided by tutors, plagiarism, and examination personation.

Note: cell phones, pagers, smart watches, PDAs, MP3 units or electronic translators are explicitly listed as unauthorized materials, and must not be present during tests or examinations. **This means that these devices are not permitted in the exam room. If any of these devices are found, an academic dishonesty case will be initiated against you.**

Penalties that may apply, as provided for under the University of Manitoba's Student Discipline By-Law, range from a grade of zero for the assignment or examination, failure in the course, to expulsion from the University. The Student Discipline By-Law may be accessed at: http://umanitoba.ca/admin/governance/governing_documents/students/student_discipline.html

Suggested minimum penalties assessed by the Faculty of Science for acts of academic dishonesty are available on the Faculty of Science web-page.

All Faculty members (and their teaching assistants) have been instructed to be vigilant and report all incidents of academic dishonesty to the Head of the Department.

Lab information

Instructor

Dr. Chris Rathgeber
Email: chris.rathgeber@umanitoba.ca
Office: 419 Buller building
Office hours: I am available for meetings on Tuesday mornings, and Monday and Friday afternoons. Please email me for an appointment. I'm also available for consultation in the lab room during your scheduled period.

Laboratory grade: (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 pre-lab quizzes (0.5% each) = 4%
- 2 lab assignments (1% each) = 2%
- Midterm lab quiz (online) = 3%
- Final lab exam = 10%

* Note that to pass the course, you must:

- Achieve a minimum 10 out of 20 in the lab.
- Attend and complete at least 6 out of 8 scheduled lab periods.

Check the lab schedule on UM Learn for quiz, exam, and lab assignment due dates.

Lab attendance

All labs this term will be held in-person, in room 312 Buller during your scheduled lab period. See the official lab schedule on UM Learn for the days that you have labs. Lab attendance is mandatory. Because the lab is full and we change equipment for each lab period, make-up labs for missed lab periods are not possible. Nonetheless, if you are sick, you should still stay home! See the missed lab policy below.

Missed labs – You may miss up to two lab periods for medical or compassionate reasons (no doctor's note required.) If you miss a lab, you should submit the self-declaration of temporary absence form to the drop-box on UM Learn. (The self declaration drop-box can be found in the assignments folder.) It will be your responsibility to catch up on the lab material by studying the pre-lab, and lab review material online, and looking at the results obtained by other students in the class as necessary. The lab reviews that appear on UM Learn after each topic has been covered are excellent resources for studying, especially if you miss a lab.
Please note that you can miss a maximum of two lab periods. If you miss any more than two, you will not have completed the lab requirement for this class, and you will receive a failing grade in the course.
Late assignments – If you cannot submit an assignment before the due date, you should submit a temporary absence form to the assignment drop-box within 2 days of the missed assignment date. Submission of the temporary absence form will extend your due date by a further five days. (2 days to submit the form + 5 days extension = 7 days total). Assignments that are submitted late without a form of temporary absence may be assessed a 10% penalty per day that they are late, up to a maximum of 7 days. After 7 days, the assignment drop box will be closed and late assignments will no longer be accepted.
Midterm lab quiz – is held online on UM Learn. If you cannot write the quiz by the day it is due, you should email a temporary absence form to the instructor as soon as possible. It may be possible to write the missed quiz in the next few days. Note: that the answers to the quizzes will be released shortly after the due date, and it won't be possible to write the quiz after the answers have been released. After the answers have been released, the only accommodation possible is to add the value of the missed quiz to your lab exam.

Final lab exam – will be held in-person in the lab room during your regular lab period. If you cannot attend on the day of the lab exam, you should submit a temporary absence form to the drop-box on UM learn, within 2 days of the missed exam. A make-up lab exam will be scheduled approximately a week later.

Lab schedule: A complete lab schedule with the dates of all labs, quizzes, assignments, and lab exam will be posted on the lab UM Learn page.

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.