

MBIO 4480: Microbes in our Environment

This course offers a survey of microbes and their activities in human-associated environments. Selected topics include microbiomes of people, animals and plants, and ways in which microbial activity is harnessed in human society.

Instructor: Dr. Muntahi Mourin Muntahi.Mourin@umanitoba.ca
Use your UofM e-mail address when corresponding with professors!

Dates & Times: *Lecture: MWF 10:30 - 11:20 am*

Location: Meeting via Zoom video conference; course materials made available through UM Learn.

Mon and Friday classes per week will be asynchronous (Recorded video or activity will be posted on UM Learn in lieu of lecture), Wednesday will be live Zoom class (Zoom link will be provided on UM learn.

Appointments at other times may be arranged by e-mail.

Lab: see lab manual. *Lab instructor:* Dr. Damien Rivers

Course credits: 3.00

Prerequisites: A minimum grade of 'C' in each of MBIO 3030 (Microbiology III) and MBIO/CHEM 2370/2371 (Biochemistry II).

Technology requirements: A computing device for creating and editing documents, an internet connection capable of accessing UM Learn and streaming videos, and a web-cam and microphone.

Background expected: This is a 4000 level course, which means that there will be some expectation with respect to background knowledge of biochemistry, microbial metabolism and molecular biology, as would have been taught in the prerequisite courses. Referring to general Biochemistry and Microbiology textbooks should provide the necessary background refreshers as needed.

Course content objectives: With respect to selected microbial communities that surround us, we will attempt to understand *who* is doing *what*, *where* these processes happen, and *why* these activities matter. We will also discuss methods & strategies for such inquiry (i.e., *how* do researchers gain these understandings?), with a strong emphasis on reading the primary scientific literature.

Learning objectives: Students will...

- practice reading primary scientific literature
- gain an appreciation of microbial diversity and its importance, from an ecological and human perspective
- become familiar with several of the strategies used to study and observe the microbial communities around us
- gain insight into how microbiomes interact with larger host organisms, including humans
- think critically about microbiological research, including experimental design, metadata, data interpretation, and how conclusions are drawn from scientific observations

Reading list: There is no text book for the lecture portion of this course. Rather, we will be drawing information from the primary literature. These references are available through the University of Manitoba e-library, and will be assigned as the course progresses. Every student is expected to know how to search for research articles and retrieve them through the university e-library system, when provided with a reference.

Evaluations:

- 1) ***Quizzes on readings (5% cumulative):*** I will post several short quizzes on UMan Learn that are intended primarily to incentivize reading the assigned papers ahead of their discussion in class.
- 2) ***Written assignment (2 @ 5% each).*** Instructions specific to each assignment will be provided a minimum of 2 weeks prior to the due date. **Assignments received up to 2 calendar days after the due date will be accepted with a 50% penalty. Assignments not submitted, or submitted more than 2 calendar days after the due date will receive a score of 0%.**
- 3) ***In-class presentation (7.5%).*** Specific instructions to follow.

Laboratory (20%). The laboratory instructor will provide a more detailed breakdown of this score. In order to pass the course, a passing grade is also required in the laboratory component.

Midterm exam (25%) will be held in class on the 8th of March, and will include material covered through the 5th of March. This exam will be a mix of short and longer questions. Some questions will measure recall of materials, while some will require critical thinking about the material presented and integration of various elements from different lectures. **The midterm exam cannot be deferred;** if you choose not to write the midterm, the points available through the midterm will be added to the value of the final exam. Viewing the midterm exam is sufficient to count as an attempt at writing the exam.

Final cumulative exam (32.5%) will be scheduled by the Student Records Office. The examination will consist of a mix of short and longer questions. Some questions will measure recall of material, some will require critical thinking about the material presented, and some questions will test integration of various elements from different lectures, or require you to apply approaches taken in lecture to interpret new data.

Note that

Letter grades will only be assigned at the end of the term, and will take into consideration the University of Manitoba's descriptors of each letter grade: A+ (Exceptional), 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 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 instructor. **For illustrative purposes only, a typical scheme for assigning letter grades may be something like: A+ (> 94%), A (85-93.9%), B+ (80-84.9%), B (75-79.9%), C+ (70-74.9%), C (60-69.9%), D (50-59.9%), F (< 50% overall, or < 45% in final exam). Both the lecture and the laboratory section of the course must receive a passing grade (> 50%) for the course as a whole to be passed.**

Important Dates:

Mid-term exam: March 16th (Class time) (Specific instruction will be given later)

Assignment 1 due- Feb 18

Assignment 2 due- April 1st

Winter Term break: Feb. 22 to Feb. 25, 2022

Final Exam: April 26-May 3

VW-April 25th

Student responsibilities: Students are expected to complete assigned readings ahead of the class period in which that reading will be discussed, to attend class and participate in class discussions, take informal notes in class, provide feedback on the learning process, hand in their assignments on time, and comply with the evaluation requirements. Additional expectations and responsibilities with respect to the laboratory component of this course may be communicated by the laboratory instructor.

Please review the guidance for this term from the Faculty of Science, which follows this syllabus.

Professional Conduct: It is recognized that these are unusual circumstances, and some adjustments need to be made when working virtually. At the same time, we do want to remind you that University policies, such as the Respectful Work and Learning Environment policy, still apply, as do basic expectations around how students will engage with each other and all members of the University. This means that when participating in classes, online meetings, etc., students are expected to behave professionally, and follow the same basic norms as they would in person, such as being properly clothed, not being

impaired, and participating respectfully. Essentially, if you wouldn't do it in an in-person class, don't do it in a virtual setting. Please familiarize yourself with the UM Respectful Work and Learning Environment (RWLE)

Section 2.5(c) of the Student Non-Academic Misconduct and Concerning Behaviour Procedure describes types of inappropriate or disruptive behaviour.

Reasonable Accommodation: Students with disabilities are directed to Student Accessibility Services to facilitate the implementation of accommodations.

Image Recordings: Screen shot capture and/or video recording of material presented by the instructor and/or classmate is strictly for personal use only due to copyright and/or privacy concerns. Posting of images that include lecture material and/or instructor and/or classmates on the internet is strictly prohibited. Recording and/or distribution of exam material in any format is strictly prohibited.

Academic Integrity: Guidelines are stated in your calendar regarding University policy with respect to academic dishonesty (particularly plagiarism and cheating) and behavior and absence from final exams. All work is to be completed independently unless otherwise specified. Please remember that group projects are subject to the rules of academic dishonesty, and every group member must ensure that a group project adheres to the principles of academic integrity. The Faculty of Science web page has detailed information regarding discipline (<https://catalog.umanitoba.ca/undergraduate-studies/policies-procedures/student-discipline-bylaw/>) along with a video message (<https://youtu.be/Ok-lilm4SeE>). Please read/watch and follow these guidelines, and ask if you have any questions.

Course Technological Requirements

Students enrolled in this course must ensure they satisfy the following minimum technological requirements:

- A computing device where one can create and edit documents,
- An internet connection capable of streaming videos and downloading software, and
- Access to a web-cam and microphone.

Timeline for electronic inquiry response: Please be respectful of the specific reply timelines that faculty members or staff members set for your course. **Generally, when a faculty member or staff member receives an electronic inquiry from you they will try to reply within one or two business days of receipt of the email. It is understood that sometimes the reply may come sooner or in some instances later than this, with a normal response envelope between 1-3 business days.**

Medical Notes

Students who are unable to meet a course requirement due to medical circumstances are currently not required to submit medical notes. However, students are required to contact their instructor or academic advisor by email to inform of the missed work and make arrangements for

extensions, deferrals, or make-up assignments. Please follow these guidelines, if you are unable to meet an academic requirement for your courses.

- Contact your instructor for term work such as a class, quiz, midterm/test, assignment, lab;
- Contact an advisor in your faculty of registration for a missed final exam (scheduled in the final examination period);
- Inform your instructor/advisor as soon as possible, do not delay. **Note for final exams, students must contact within 48 hours of the date of the final exam.**
 - Email your instructor/advisor from a U of M email address, and include your full name, student number, course number, and academic work that was missed within 48 hours of the date of the missed examination.

Please note that circumstances that result in missing multiple course assignments/tests/classes may require medical documentation (e.g., Authorized Withdrawal, Tuition Fee Appeal, Leave of Absence, or accessibility-related accommodations). Students are advised to speak with an advisor in their faculty/college/school of registration in this case.

Voluntary Withdrawal (VW), Authorized Withdrawal (AW) and Limited Access Policies

VW: Students have the opportunity to voluntarily withdraw (VW) from this class up to April 25, 2022. By then, you will have received feedback to allow you to assess your progress and determine if you are achieving the grade you are aiming for in this course. If you are unlikely to be successful in the course, or you are not achieving the grade that you are aiming for, you should consider a VW from the course. You may contact me to review your progress in more detail, or you may discuss the VW option with a Faculty academic advisor. Students enrolled in the course after the VW deadline will be assigned a final grade.

http://umanitoba.ca/u1/know_yourself/573.html

AW: At times medical or compassionate circumstances arise in a student's life that prevent them from performing as they would in normal circumstances. If you are in this position, please contact a Faculty academic advisor to discuss your options. Be prepared to provide documentation, which supports your situation.

http://www.umanitoba.ca/student/resource/student_advocacy/authorized-withdrawal/index.html

Limited Access Policy: The Senate Executive Committee approved, on behalf of Senate that section 2.5(a) of the Repeated Course Policy to be **suspended indefinitely**. **Sec 2.5 refers to Limited Access**. Suspension of LAP means that you can retake the course you have decided to VW in the next semester.

Students Accessibility Services

If you are a student with a disability, please contact SAS for academic accommodation supports and services such as note-taking, interpreting, assistive technology and exam accommodations. Students who have, or think they may have, a disability (e.g. mental illness, learning, medical, hearing, injury-related, visual) are invited to contact SAS to arrange a confidential consultation. Student Accessibility Services <http://umanitoba.ca/student/saa/accessibility/> 520 University Centre 204 474 7423

Student_accessibility@umanitoba.ca

Students - UM COVID-19

The University of Manitoba (the “UM”) is committed to maintaining a safe learning environment for all students, faculty, and staff. Should campus operations change because of health concerns related to the COVID-19 pandemic or other campus-wide emergency, it is possible that this course will move to a fully remote delivery format. Should the instructor be required to stay at home for an extended period and an alternate instructor not be available, the course may move temporarily to a remote delivery format. In that instance, you may be provided with an asynchronous option to minimize the impact the change may have on your schedule.

PPE and Mask Wearing

In a face-to-face environment, our commitment to safety requires students to observe all physical distancing (2m) and personal protective equipment (PPE) guidelines set by the University (<https://umanitoba.ca/coronavirus>)

While on campus and in class, you must wear PPE (Personal Protective Equipment) as stipulated in current University policies, procedures, and guidelines. Students who fail to comply are subject to disciplinary action in accordance with the Student Discipline Bylaw and the Non-Academic Misconduct and Concerning Behaviour Procedure.

Medical-grade 3-ply masks are available at many locations on campus, including specific classroom locations, designated by your unit, the Elizabeth Dafoe Library (Fort Garry Campus) and the Brodie Centre main doors (Bannatyne Campus). Additional PPE, if necessary for a specific learning environment, will be provided to you by the teaching unit.

If you do not follow masking and other requirements you will be asked to leave the learning space and may only return to the class already in progress when you have complied with these requirements. Repeated issues will result in disciplinary action as previously noted.

Students should not eat or drink during class time.

Illness

Remember: **STAY HOME IF YOU HAVE SYMPTOMS OR ARE ILL.** If you become sick or are required to self-isolate you should notify your instructor by email so you can develop a plan to complete the course learning outcomes while you are absent.

If you have symptoms, do not come to campus or any UM facilities. Complete the selfassessment

on the Manitoba Public Health site and follow the guidelines, which may include booking a COVID-19 test.

What to do if you become ill while at UM:

1. Leave the classroom, lab or workspace immediately. Continue to wear your mask while leaving the premises and/or while waiting for transportation.
2. Perform hand hygiene (soap and water or hand sanitizer) and avoid contact with others, and minimize contact with the physical environment.
3. Once at home, complete the MB self-assessment and follow the directions that are provided.
4. Inform your supervisor(s), instructor(s) or, if in residence, the appropriate individual.
5. You must remain off campus and all UM facilities until cleared to return in accordance with self-assessment, testing results, or MB Health requirements.

Recommended transportation options (in order):

1. Drive yourself home.
2. Pick-up by family or friend – remember to keep your mask on and to distance as much as possible, and where possible, open a window to improve ventilation.
3. Pickup by taxi/Uber:
 - Remain masked and perform hand hygiene before entering the vehicle.
 - o Avoid touching the inside of the vehicle
 - o Keep your mask on for the duration of the ride
 - o Where possible, open a window to improve ventilation.
4. Winnipeg Transit buses - Winnipeg Transit has indicated that individuals that are ill **must not use Transit.**

Class plan

(Please note that class plan may be changed, so it is advised to check UM learn for update and follow class instructions)

Jan 24 - course introduction

Jan 26 - Degradation of plant pathogenic fungi by *Trichoderma harzianum*

Jan 28- Degradation of plant pathogenic fungi by *Trichoderma harzianum* **(Quiz 1)**

Jan 31- Degradation of plant pathogenic fungi by *Trichoderma harzianum*

Feb 2- Taxonomic and metabolic incongruence in the ancient genus *Streptomyces*

Feb 4- Taxonomic and metabolic incongruence in the ancient genus *Streptomyces* **(Quiz 2)**

Feb 7- Taxonomic and metabolic incongruence in the ancient genus *Streptomyces*

Feb 9- Transcriptomic dissection of *Bradyrhizobium* sp. strain ORS285 in symbiosis with *Aeschynomene* spp.

Feb 11- Transcriptomic dissection of *Bradyrhizobium* sp. strain ORS285 in symbiosis with *Aeschynomene* spp. **(Quiz 3)**

Feb 14- Transcriptomic dissection of *Bradyrhizobium* sp. strain ORS285 in symbiosis with *Aeschynomene* spp.

Feb 16- Bipartite interactions, antibiotic production and biosynthetic potential of the *Arabidopsis* leaf microbiome

Feb 18 - Bipartite interactions, antibiotic production and biosynthetic potential of the *Arabidopsis* leaf microbiome **(Assignment 1 Due)**

Feb 22-25 break

Feb 28-Bipartite interactions, antibiotic production and biosynthetic potential of the *Arabidopsis* leaf microbiome

March 2- Microbiome of drinking water

March 4- Microbiome of drinking water (**Quiz 4**)

March 7- Microbiome of drinking water

March 9- March - human microbiome

March 11- March - human microbiome

March 14- March - human microbiome

March 16- MID term

March 18- Symbionts of Insects

March 21- Symbionts of Insects

March 23- Symbionts of Insects

March 25- Interactions among cheese bacteria & fungi

March 28- Interactions among cheese bacteria & fungi (**Quiz 5**)

March 30- Interactions among cheese bacteria & fungi

April 1- Review (**Assignment 2 Due**)

April 4- In class PPT

April 6- In class ppt

April 8- In class ppt

April 11- In class ppt

April 13- review for final

