



## BIOL 310 – MICROBIAL DIVERSITY AND CELL FUNCTION Fall 2025

**Territorial acknowledgement:** The University of Regina is situated on the territories of the nêhiyawak, Anihšînāpēk, Dakota, Lakota, and Nakoda, and the homeland of the Métis/Michif Nation. The Regina campus is on Treaty 4 lands, and Saskatoon classes are on Treaty 6 lands.

**Course Instructor:**

Dr. Ahmed Khairalla

Office: RIC 326

Office phone: (306) 585-5224

Email using UR Courses only\*\*

\*\* Please see more details on page 3

**Lab Instructor:**

Ms. Heather Dietz

Office: LB 414.2

Office phone: (306) 585-4286 (MWF only)

Email using UR Courses only\*\*

**Lectures:**

The class will be delivered face-to-face: TR: 1:00 pm -2:15 pm.

Lecture room: Classroom Building 110

**Labs:**

Labs are every week, alternating between online (off-campus) and in-person (LB432) locations on Wednesdays or Thursdays from 2:30-5:15 p.m. Expect to spend 2.5 hours doing lab work every week for the semester.

**Office hours:**

- The instructors are available anytime that they are in their offices with the door open.
- The lab instructor also has *scheduled* office hours: Monday (LB414.2) 3:00-4:00, Tuesday (Zoom with advance email notice to get Zoom link) 3:00-4:00, and Friday (LB414.2) 10:00-11:00.
- Additionally, appointments to meet with either instructor can be made through email delivered via UR Courses email function.

All times are local Regina time.

**Course summary and Objectives**

**Course Description**

This course offers a broad overview of the structure, function, and diversity of microorganisms, with a primary focus on prokaryotic microbes. Therefore, it will: (i) explore the diversity of Bacteria and Archaea in selected ecosystems at an organismal level; (ii) investigate the structural, functional, and metabolic adaptations allowing these prokaryotic microbes to thrive in diverse environments; and (iii) examine the interactions and relationships among different microbes and their surrounding environment. The lab will examine select concepts within these foci.

**Course Objectives:**

1. Students will develop and demonstrate proficiency in understanding microbial diversity in nature.
2. Students will develop the ability to classify microbes, and to understand their general structure and functions.
3. Students will be able apply their knowledge to a variety of areas such as medicine, food microbiology, nutritional science, agricultural and environmental sciences.

**Prerequisites:**

BIOL 288 or BIOC 220.

**Mode of Instruction and Teaching Strategies:****▪ Class Delivery**

All lectures will be delivered in person, via face-to-face instruction at the UofR main campus, with a strong emphasis on student participation and problem solving.

There will be a short summary lecture/discussion at the end of each topic (or a couple of topics). The aim of these is to provide the students with opportunities to share their ideas with each other and their instructor. I encourage students to ask questions during these lectures to clarify any concepts with which they are having difficulty. Additionally, the various activities included in these lectures, e.g., giving feedback in pairs, small group discussions, gamification activities via Kahoot, and other practical activities will engage students and enable a deeper understanding of the related issues.

**▪ Term Tests and Quizzes**

To assess student learning, there will be a quiz for each topic on the syllabus, consisting predominantly of multiple-choice questions. The lowest quiz grade for the semester will be dropped.

There will be 3 term tests in this course. These three tests will be held in-person, during the scheduled class time (the dates are on the lecture schedule; page 7).

**▪ Lab Delivery**

All labs consist of both online and in-person instruction at the UofR main campus. Good lab practice and lab safety / biosafety form the backbone of practical problem solving in the form of short experiments. Students will create and maintain an up-to-date laboratory notebook throughout the semester.

**▪ Final Lab Practical Exam**

An open lab notebook end-of-term final lab exam will be used to evaluate students' lab skills (both practical and conceptual).

**Course Specific Policies****▪ Attendance Policy**

Lecture attendance is strongly recommended to maximize learning. Attendance is mandatory for all quizzes, term tests, make-up tests (if applicable), the laboratory exam, and all in-person laboratory sessions. Each missed laboratory session will result in a 5-point deduction from the overall laboratory grade.

**▪ Expectations for Preparation and Participation**

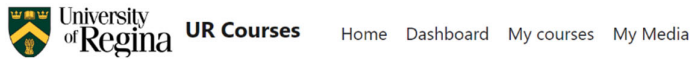
We expect every student will be prepared for each class and lab by having read all course materials and prepared the cases and / or quizzes. Also, everyone is also expected to participate fully in class and lab, contributing to your peers and your own learning. Please be familiar with this Course Outline and its requirements.

**▪ Recording of Materials**

The lectures and labs will not be recorded due to student privacy concerns and you may not record any portion of a lecture or a lab (either in audio or visual formats) without the prior and explicit written permission of the lecturer or lab instructor.

### ▪ **Contacting Instructors**

Students are encouraged to contact their instructors if they have any questions regarding the course/lab or its content, and an appointment can be set up if needed. The preferred method of communication in this course is through the UR Courses Internal email function. Please do not send emails to personal URegina email address during the semester and don't send URCourses "Messages" (chat) (Please refer for the illustration below). Please be patient. Allow a reasonable amount of time to receive a response back – usually 24 hours during the week and longer during weekends.



To contact Ms. Dietz about scheduling or administrative matters (e.g. illness or time conflicts), please use the UR Courses Internal email function (Please refer for the illustration above). For all non-administrative "content" questions, please see Ms. Dietz during office hours:

- Monday (LB414.2) 3:00-4:00
- Tuesday (Zoom with advance email notice to get Zoom link) 3:00-4:00
- Friday (LB414.2) 10:00-11:00

### ▪ **Technical Support**

Contact IT Support for any technical assistance (IT.Support@uregina.ca or 306.585.4685).

## **Required Materials/ Resources**

### ▪ **Course Website**

Two UR Courses websites for this course (one for lecture and one for labs) are available and will be continually updated with lecture notes, supplements, quizzes, lab handouts, and other material. Login at <https://urcourses.uregina.ca/login/index.php> using your uregina.ca username and password.

Please visit UR Courses before every class and every lab session to ensure you have updated information and access to any extra resources. Both instructors regularly post messages on URCourses.

### ▪ **Lecture materials:**

No textbook is required for this course. A variety of resources to support your understanding of the concepts covered will be made available on UR Courses website.

### ▪ **Lab materials:**

The required text *Microbiology techniques multimedia lab manual for BIOL310*, is available from TopHat

Lab handouts and associated learning materials are provided free of charge using the URCourses platform.

### ▪ **Additional Lab requirements:**

You are required to bring both a lab coat and safety glasses – and a bag to transport them in – to each lab session.

## Evaluation

You must achieve at least 50% to pass the course. The mark distribution is as follows:

Assessment	Value	Notes
Term Test #1 (Oct. 2)	15%	Covers topics 1-4, 75 minutes
Term Test #2 (Oct. 30)	15%	Covers topics 5-8, 75 minutes
Term Test #3 (Nov. 27)	15%	Covers topics 9-11, 75 minutes
*Lab	40%	Students must attend all in-person laboratory sessions. Please see below for Lab Syllabus.
Quizzes (5 × 3%)#	15%	#With usually about 7 such quizzes per semester, only the highest 5 quizzes will count towards your final mark.
MAKE-UP TEST		<b>Tuesday, December 2, during lecture time</b> The make-up test will ONLY be provided in extenuating circumstances with documented evidence of the circumstances provided to the course instructor immediately, and is evaluated on a case-by-case basis. The content and format of the make-up test will be the same as the test that was missed.

### \*Grading for the Lab component

The laboratory is worth 40% of the total course grade. All assignments must be submitted, even if late, by the last day of classes to receive a passing grade in the laboratory. Unofficial final laboratory grades will be posted by December 20<sup>th</sup>.

Online Labs (aggregate TopHat score)	= 10 points
In-Lab Quiz (5* at 5 points each)	= 25 points
Lab notebook checks	= 15 points
Lab Practical Exam	= 50 points

### Late assignments/assessment policy:

Late lab assignments or assessments will earn a zero, starting at a minute after the due time, and will not receive feedback.

## Policies and Procedures for Marks and Term tests

- This course **does not have a final exam**.
- In addition to **quizzes**, there will be **three term tests**, all held in **Classroom Building, Room 110 (CL 110)** during the scheduled class time (1:00 pm -2:15 pm).
- The term tests and quizzes are to be completed individually and are **NOT open book**.
- The **term tests** are **not cumulative** in terms of specific questions, but you are expected to understand and make connections to concepts covered in previous evaluations.
- Since they are non-cumulative, the term tests cannot replace each other (in other words, **all students are expected to write all three term tests**).
  
- **Missing a quiz will result in a grade of zero for the quiz.**
- If a student misses a term test, the student must email the instructor immediately (within **48 hours**) explaining the situation and providing any necessary documentation.
- The **make-up test will ONLY be offered in extenuating circumstances** (e.g., urgent medical appointments, personal emergencies, counseling, or a funeral). Clear, dated documentation of the circumstances must be provided to the course instructor within **48 hours of the scheduled test date, including weekends, not just workdays**. The request will be evaluated on a case-by-case basis.
- **Make-up test(s) for approved students will be held on December 2, during lecture time.**
- **If a student misses a term test and does not receive approval or fails to contact the instructor within 48 hours of the scheduled test time (including weekends), a grade of 0% will be assigned for that test.**
- **“Deferred” final exams can only be granted by the Associate Dean, Academic** (for Faculty of Science students), or by the Deans and/or Associate Deans of other Faculties or Federated Colleges. Course instructors cannot grant deferred final exams.
  
- **Grades posted on URCourses are provisional and unofficial.** They are subject to review and approval and may change after final assessment.
- Final marks for the course are based on a total assessment of each student's record. **It is a student's responsibility to make sure that their marks are complete and correct.**
  
- If there is an issue with one of your grades, you must notify the instructor in writing using the **Grade Re-evaluation Request Form** (the form can be accessed by using the UR Courses website). The completed form **MUST** be sent in an email to the course instructor **within 4 business days** of receiving the grade. Please do not resubmit it to the UR Courses website.
- Students have **20 business days** from the date they receive their grade **to initiate an appeal**. Please refer to the **Academic Calendar** for specific procedures:  
<https://www.uregina.ca/registrar/assets/docs/pdf/calendar/2025-2026.pdf>
- This course falls under the Academic Regulations of the University of Regina and the Faculty of Science (these regulations are printed in the General Calendar, available at <https://www.uregina.ca/student/registrar/resources-for-students/academic-calendars-and-schedule/undergraduate-calendar/index.html>)
  
- **All students' course grades are determined based on the same graded components and a consistent rubric.** Individual grades will not be adjusted on an arbitrary basis.
- **The grading scheme for the course is the same for all students in the course.** There is no opportunity to boost a grade by doing “extra work”, and there are no adjustments to grade allocations for the various tests and assignments.
- There are **no alternative assignments** that can be completed by students for the purpose of increasing their final grade.
- **The value of a term test or a quiz cannot be transferred to any other course component.**
- **Term tests and quizzes cannot be retaken** under any circumstances.
- **The minimum passing grade for this course is 50%.**

## Important Dates

Sep. 2	Start of the Fall 2025 term
Sep. 30	The National Truth and Reconciliation Day (no classes)
Oct. 2	Term test 1
Oct. 30	Term test 2
Nov. 10-16	Fall break (no classes)
Nov. 27	Term test 3
Dec. 2	Make-up test (if needed)
Dec. 3/4	Final Practical Lab Exam (2:30 or 4:00, depending on lab section)
Dec. 9 – 22	December final exam period. BIOL 310 will NOT have a final exam.

## Lab schedule:

All dates and topics are subject to change, as necessitated by illness, closures, or other unforeseen circumstances.

Week / Date	096/098	097/099	Topic
Classes start Tuesday, September 2			
1. Sept. 3/4	In-lab visit 2:30-3:30	In-lab visit 4:00-5:00	<b>Lab Tour: Introduction to the lab &amp; lab safety</b>
1. Sept. 3/4	Online		<b>Module 1 - Basic techniques &amp; biosafety</b> Subculturing and working with liquid cultures
2. Sept. 10/11	In-lab 2:30*	Online	
3. Sept. 17/18		In-lab 2:30*	
3. Sept. 17/18	Online		<b>Module 2- Media and the physical environment</b> Using the spectrophotometer to estimate microbial growth
4. Sept. 24/25	In-lab 2:30*	Online	
5. Oct. 1/2		In-lab 2:30*	
5. Oct. 1/2	Online		<b>Module 3 – Quantifying microbial growth.</b> Part 1 – Direct counting and the Great Plate Anomaly
6. Oct. 8/9	In-lab 2:30*	Online	
7. Oct. 15/16		In-lab 2:30*	
7. Oct. 15/16	Online		<b>Module 3 – Quantifying microbial growth.</b> Part 2 - Indirect counting and the Viable Plate count
8. Oct. 22/23	In-lab 2:30*	Online	
9. Oct. 29/30		In-lab 2:30*	
9. Oct. 29/30	Online		<b>Module 3 – Quantifying microbial growth.</b> Part 3 - The bacterial growth curve
10. Nov. 5/6	In-lab 2:30*	Online	
12. Nov. 19/20		In-lab 2:30*	
13. Nov. 26/27	In-lab 2:30	In-lab 4:00	Module 3 – Calculations tutorial (optional)
14. Dec. 3/4	In-lab 2:30	In-lab 4:00	Lab Exam
Classes end Friday, December 5			

## Tentative Lecture schedule

This is a tentative schedule. All dates and topics are subject to change as conditions dictate.

Week #	Topic	Quizzes
<b>Fundamental Properties of Prokaryotic Microorganisms</b>		
Week 1 Sep. 1 – Sep. 5	Introduction to the course Topic 1: Introduction to Microbiology Topic 2: Bacterial Cell Structure and Function	
Week 2 Sep. 8 – Sep. 12	Topic 2: Bacterial Cell Structure and Function ( <i>cont.</i> ) Topic 3: Archaea Cell Structure and Function	
Week 3 Sep. 15 – Sep. 19	Topic 3: Archaea Cell Structure and Function ( <i>cont.</i> ) Topic 4: Microbial Growth	Quiz 1, Sep. 16, during class time, Topics 1-2
<b>Microbial Growth and Metabolism</b>		
Week 4 Sep. 22 – Sep. 26	Topic 4: Microbial Growth ( <i>cont.</i> ) Topic 5: Introduction to Microbial Metabolism	Quiz 2, Sep. 23, during class time, Topics 3-4
Week 5 Sep. 29 – Oct. 3	<b>Term test 1: Thursday Oct. 2 (written in class time)</b>	
Week 6 Oct. 6 – Oct. 10	Topic 5: Introduction to Microbial Metabolism ( <i>cont.</i> ) Topic 6: Winogradsky Column: A Model for Microbial Diversity	Quiz 3, Oct. 9, during class time, Topic 5
Week 7 Oct. 13 – Oct. 17	Topic 7: Metabolic Diversity of Microorganisms (Part I: Phototrophy and Autotrophy)	
Week 8 Oct. 20 – Oct. 24	Topic 8: Metabolic Diversity of Microorganisms (Part II) (Part II: Chemolithotrophy and Nitrogen Metabolism)	Quiz 4, Oct. 21, during class time, Topics 6-7
<b>Microbial Evolution, Ecology and Interactions</b>		
Week 9 Oct. 27 – Oct. 31	Topic 9: Microbial Evolution <b>Term test 2: Thursday Oct. 30 (written in class time)</b>	Quiz 5, Oct. 28, during class time, Topic 8
Week 10 Nov. 3 – Nov. 7	Topic 9: Microbial Evolution ( <i>cont.</i> ) Topic 10: Microbial Adaptation to Environmental Conditions	
Week 11 Nov. 10 – Nov. 14	Fall break (no classes)	
Week 12 Nov. 17 – Nov. 21	Topic 10: Microbial Adaptation to Environmental Conditions ( <i>cont.</i> ) Topic 11: Microbial Associations and Interactions	Quiz 6, Nov. 18, during class time, Topics 9-10
Week 13 Nov. 24 – Nov. 28	Topic 11: Microbial Associations and Interactions ( <i>cont.</i> ) <b>Term test 3: Thursday Nov. 27 (written in class time)</b>	Quiz 7, Nov. 25, during class time, Topic 11
Week 14 Dec.1- Dec. 5	<b>Make-up test (if needed): Tuesday Dec. 2 (written in class time)</b> No BIOL 310 classes   Lab Exam Week	
December final exam period Dec. 9 – 22	BIOL 310 will not have a final exam.	

### **Important Note**

The instructors and university reserve the right to modify elements of the course during the term. The university may change the dates and deadlines for any or all courses in extreme circumstances. If any modification becomes necessary, reasonable notice and communication with the students will be given with explanation and the opportunity to comment on changes. It is the responsibility of the student to check their UofR email and UR Courses website weekly during the term and to note any changes. Changes will be communicated through regular communication channels, such as UR Courses website and/or UofR email.

**Late submission of work/missed exam policy:** Late lab assignments or assessments will earn a zero, starting at a minute after the due time, and will not receive feedback. If you miss a term test, contact the instructor immediately and provide valid documentation. Deferred" final exams are granted only by the Associate Dean, Undergraduate (for Faculty of Science students), or by the Deans and/or Assistant Deans of other Faculties or Federated Colleges. There are no exceptions.

**Academic integrity:** Academic integrity requires students be honest. Quizzes and exams are to help students learn; grades show how fully this goal is attained. Thus, all work and grades should result from a student's own understanding and effort.

Students are expected to complete assignments, tests, and other academic evaluations using their own knowledge and abilities. The use of generative AI tools, including but not limited to ChatGPT, is considered a breach of this expectation.

Acts of academic misconduct violate academic integrity, and are considered serious offences by the University. Examples include, but are not limited to, cheating on tests or exams, plagiarizing, copying from others, falsifying lab results, etc. Instances of academic misconduct will be reported to the Associate Dean Academic for investigation. Similarly, any use of generative AI tools in academic work is considered academic misconduct and will be reported to an investigating Dean. Full details are provided in the [Undergraduate academic calendar](#). Students are encouraged to understand their obligations as a student, as well as their rights.

**Accommodations:** Students in this course who may have need for specialized accommodations, should contact the Centre for Student Accessibility (Riddell Centre 229, 585-4631), and must discuss their accommodation letter with their instructor.