



School of Science
BIOL 203
Microbiology
Term: Fall
Number of Credits: 3

Course Outline

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TIME/DATES: T/R 10:30 am – 12 pm (lectures) A2603 R 4 – 5:30 pm (scheduled lab) in A2805

OFFICE HOURS: anytime, schedule by email

COURSE DESCRIPTION

This second-year microbiology course explores microscopic organisms such as eukaryotes, Archaea, Bacteria, and viruses. Microorganisms are fundamental to all life on earth and students will leave with a greater appreciation of the interconnectedness of microbes to the rest of the natural world. Students will examine and contrast microorganisms through many lenses including cell morphology, signalling, growth/nutrition, metabolism, and genetics. These topics will be approached through a methods and application-based perspective, with an emphasis on how and why we study specific organisms and use specific techniques. We will investigate their role in the environment, health/medicine, food safety, and industry. Students will carry out research projects exploring microorganisms in the laboratory using aseptic technique, microscope and staining techniques, selective/differential growth, polymerase chain reactions, and phylogenetic analysis.

COURSE REQUIREMENTS

Prerequisite(s): Successful completion of BIOL 101 and BIOL 102 or equivalent, with a final minimum grade of C in both.

EQUIVALENCY OR TRANSFERABILITY

This course is awaiting articulation but is expected to transfer to most universities in BC as second-year Microbiology course. However, please be aware that receiving institutions determine final course transferability.

Find further information at:

<https://www.yukonu.ca/admissions/transfer-credit>

LEARNING OUTCOMES

Upon successful completion of the course, students will be able to:

- Differentiate Archaea, Bacteria, eukaryotes, and viruses based on cell morphology, biochemistry, and genetics.
- Describe key cellular processes related to nutrition/growth, metabolism, molecular biology, and genetics.
- Compare and contrast ways in which microbes interact with their environment through microbial communities and biogeochemical cycles.

- Describe different ways in which humans use or manage microbes in areas such as food production, industry, environmental conservation, and medicine.
- Consult scientific papers to identify specific technical details or scientific results through critical reading of the background, methods, results, and conclusions of the paper.
- Demonstrate safe and ethical selection and execution of lab techniques relating to microbiology such as aseptic technique, microscope and staining techniques, polymerase chain reactions, phylogenetic analysis, and analyse and communicate the results in a lab report.

COURSE FORMAT

This course will be delivered with the following breakdown per week: 3 hours of lecture, 3 hours of lab, and 0 hours of tutorial. Students have only 1.5 hours of time booked in the lab, however they should expect to spend an additional 1.5 hours outside of the normal class time working in the lab (or collecting samples). Although it will vary from individual to individual, students should expect to spend approximately 6 hours on course activities (reading, studying, completing assignments) outside of the classroom time per week.

Delivery format

This course will be delivered in a face-to-face (in person) format. Students will be expected to access the YukonU online learning platform for additional material (Moodle). Labs can only be conducted in person.

EVALUATION

Lecture Assignments	20 %
Midterm Exams (2)	20 %
Lab Quizzes	10 %
Lab Assignments	30 %
Final Exam	20 %
Total	100%

Lecture Assignments

Most assignments will be completed during lecture as in-class activities while other assignments will be taken home to be completed outside of class time.

Midterm Exams

Midterm exams are given during normally scheduled class time and take 45-90 minutes complete.

Lab Quizzes

Students are expected to read lab material before coming into the lab. Lab quizzes are designed to help students prepare for the weeks lab and improve understanding of experimental techniques.

Lab Assignments

Lab assignments are handed out at the beginning of lab sessions and are to be completed once lab exercises are completed. They are due within one week unless otherwise announced. Late assignments may be deducted -5% of marks per day. Some larger lab assignments may be assigned that build on material covered over multiple labs.

Final Exam

Students will use their knowledge of methods and applications in microbiology to answer multiple choice, short answer, and long answer questions.

Students must pass the lab and lecture portions of the course independently.

COURSE WITHDRAWAL INFORMATION

The Last date to withdraw without academic penalty is Nov. 2nd, 2023. Refer to the YukonU website for other important dates <https://www.yukonu.ca/admissions/important-dates>

TEXTBOOKS & LEARNING MATERIALS

This course uses a free open access textbook created by UBC (to be released end of summer 2023). A link to the text will be provided on the Moodle.

Students can choose to purchase Prescott's Microbiology; either as a hard copy from the YukonU bookstore, or an online eText access through the publisher (McGraw Hill). It will also be available on hold at the University library.

(optional) Prescott's Microbiology, 12th edition. 2023. J. Willey, Sandman, and Wood. McGraw Hill. Hoboken, NJ, USA.

Students will be expected to read and understand scientific articles relating to course material.

Lab materials (e.g., lab manuals) are provided in the form of three-hole punched pages at least one week prior to the scheduled lab.

Students are required to wear a lab coat during lab sessions. These can be purchased from YukonU for \$20. Students are also required to use disposable gloves and safety glasses on occasion. These are provided.

ACADEMIC INTEGRITY

Students are expected to contribute toward a positive and supportive environment and are required to conduct themselves in a responsible manner. Academic misconduct includes all forms of academic dishonesty such as cheating, plagiarism, fabrication, fraud, deceit, using the work of others without their permission, aiding other students in committing academic offences, misrepresenting academic assignments prepared by others as one's own, or any other forms of academic dishonesty including falsification of any information on any Yukon University document.

Please refer to Academic Regulations & Procedures for further details about academic standing and student rights and responsibilities. <https://www.yukonu.ca/policies/academic-regulations>

ACCESSIBILITY AND ACADEMIC ACCOMMODATION

Yukon University is committed to providing a positive, supportive, and barrier-free academic environment for all its students. Students experiencing barriers to full participation due to a visible or hidden disability (including hearing, vision, mobility, learning disability, mental health, chronic or temporary medical condition), should contact [Accessibility Services](#) for resources or to arrange academic accommodations: access@yukonu.ca.

TOPIC OUTLINE

General topic	Chapter	Topics	# Lectures
1. Unit 1	1	Brief Introduction to Microbes	1
	2	Microbial Cell Structures	2
	3	Microbial Growth	1
	4	Gene Expression and Regulation	2
	5	Sensing and Responding to the Environment	1
2. Unit 2	1	The Human Microbiome	2
	2	The Community Lifestyle of a Biofilm	1
	3	Bacterial Pathogenesis and Virulence	2
	4	Antimicrobials and Resistance	1
3. Unit 3	1	Chemistry for Microbiology	2
	2	Introduction to Microbial Metabolism and Energetics	2
	3	Catabolism and its Diversity	2
	4	Anabolism and its Diversity	2
	5	TBD (still being written)	1
4. Review	all		1

*Final exam – date set by administration and available on the website
<https://www.yukonu.ca/programs/courses/biol-203>*

Lab Schedule and List of Topics – Labs start in the second week of classes.

Labs take place in Room A2805

Lab 1 – Introduction to media, pipetting, and aseptic technique

Lab 2 – Environmental sampling and serial dilutions

Lab 3 – Colony morphology and counting

Lab 4 – Differential staining and selective media

Lab 5 – PCR and microbial genetics

Lab 6 – Bacterial transformation and antimicrobials

Lab 7 – Phages

Lab 8 – Bacterial metabolism

Lab 9 – Bacterial communities

Lab 10 – Presentations

Lab topics can change depending on availability of materials.