



## Lakehead University

500 University Avenue Orillia

---

### BIOL 2711-Biology of Microorganism- WAO 2024

Lecture Timings: Tuesdays and Thursdays 8:30 – 10:00 am

Lecture Room: OA 2006, Orillia Campus

Office x3008-09 Office hours: Tuesdays and Thursdays 10:00 -11:00 am or by appointments

Course Instructor: Dr. Noreen Yaqoob, PhD

Email: [nyaqoob@lakeheadu.ca](mailto:nyaqoob@lakeheadu.ca)

Lab Timings: Mondays and Fridays 8:30 – 11:30 am

Lab Room: OA 3002, Orillia Campus

Lab Instructor: Dr. Usha Menon, PhD

Office: OA 3003, Phone 705-330-4010 Ext: 2988

Email: [umenon@lakeheadu.ca](mailto:umenon@lakeheadu.ca)

---

**Course Description:** An introduction to microbial cell biology, genetics and interactions between microorganisms and humans. Laboratory work includes basic microbiological techniques and identification of microorganisms.

**Learning outcome:** Three themes are covered in this course.

Theme 1: microbial cell structure, metabolism, and genetics

Theme 2: principles of immunology and microbial diseases

Theme 3: aspect of microbial ecology

### Course Resource

**Required textbook:** Nester's Microbiology: A human perspective, by Denise G. Anderson, Sarah Salm, Mira Beins, Tenth Edition, McGraw Hill Education ISBN: 9781265062316

Desk copy and e-copy with Connect access is available for purchase from [Home - Lakehead University Alumni Bookstore](#)

Lab Manual: BIOL 2711 Biology of Microorganisms- Laboratory Manual Fall 2021

e-copy available to download from course outline/syllabus folder in D2L

### Course Evaluation

Evaluation	Marks	Due Dates
Quiz 1 - in class	3.75%	Tuesday, February 6
Quiz 2 - in class	3.75%	Tuesday, March 19
Mid-Term Exam* - in class	25%	Thursday, February 29
Group Research Project Writing*	10%	Tuesday, March 19 at 11:59 pm
Group Research Project Presentation – in class	5%	Thursday, March 21 starting at 8:30 am
Final Exam – in class	25%	Exam dates to be announced on Uni website Exam period Apr 12 - 22
Lab	27.5%	Schedule on page 7, 8, 9
Total	100%	

## Course Schedule

Week	Date	Content	Required Readings/ Assessments
1	Jan 9 Jan 11	Course Outline/Syllabus & Introduction Humans and the microbial world	Chapter 1; Connect A-1
2	Jan 16 Jan 18	The molecules of life Cells and methods to observe them	Chapter 2; Connect A-2 Chapter 3; Connect A-3
3	Jan 23 - 25	Microbial growth	Chapter 4; Connect A-4
4	Jan 30 – Feb 1	Control of microbial growth	Chapter 5; Connect A-5
5	<b>Feb 6</b> Feb 6 Feb 8	<b>Quiz # 1</b> Microbial metabolism Microbial metabolism	<b>Quiz # 1</b> Chapter 6 Chapter 6; Connect A-6
6	Feb 13 - 15	The blueprint of life, from DNA to protein (DNA replication)	Chapter 7; Connect A-7
	<b>Feb 19 -23</b>	<b>Winter Study Week-No Classes</b>	
7	Feb 27 Feb 27 <b>Feb 29</b>	Bacterial genetics <b>Mid-term exam review</b> for content covered until the previous class <b>Mid-term Exam</b>	Chapter 8; Connect A-8  <b>Mid term Exam</b>
8	Mar 5 Mar 7	Prokaryotic classification Viruses, Prions and Viroids	Chapter 10; Connect A-9 Chapter 13; Connect A-10
9	Mar 12  Mar-14	Concept of immunology and Immunological disorders Host microbes interactions and Epidemiology	Chapter 14, 15, 17, 18; Connect A-11 Chapter 16, 19; Connect A-12
10	<b>Mar 19</b> Mar 19  <b>Mar 19</b> <b>Mar 21</b>	<b>Quiz # 2</b> Microbial ecology and Environmental Microbiology <b>Group Research Project Writing*</b> <b>Group Research Project Presentations*</b>	<b>Quiz # 2</b> Chapter 28, 29  <b>Due by 11:59 pm</b> <b>In class starts at 8:30 am</b>
11	Mar 26  Mar 28	Microbial Ecology and Environmental Microbiology Microbial pathogens/Infectious diseases	Chapter 28, 29; Connect A-13 To be assigned
12	<b>April 2</b>	Microbial pathogens/Infectious diseases <b>Final Exam Review</b> for content covered after Mid term exam	To be assigned
13	Apr 9 Apr 10	Make up class for Easter Monday-No Class Winter Exam Study Break- No Class	
	<b>Apr 12 – 22</b>	<b>Examination Period-Final Exam**</b>	<b>Final Exam**</b>

\* Please review Appendix 1 on p 10 for list of project topics. Appendix 2 & 3 for evaluation rubric on p 11& 12

\*\*Final exam dates to be announced on university website [Exam Timetable](#) | [Lakehead University](#)

**Note: Final date to withdraw or drop is Friday March 8, 2024**

## Teaching Mode: Lecture

On campus lectures to be delivered in class at the Orillia campus and presented as PowerPoint presentation (PPT) posted on D2L. All Assignments and Tests are graded within two weeks of submission.

## Announcements

All announcements will be posted on D2L including class cancellation and University closure due to inclement weather.

## Email Correspondence:

Please reach out to me, I will respond to your email within 24-to-48-hour Monday to Friday.

## Classroom Learning Expectations

- ✓ BYOD; Bring Your Own Device.
- ✓ Read required textbook chapters and come prepared for the class.
- ✓ Effective note taking is encouraged for successful completions of assigned tasks.
- ✓ Clarify doubts and seek timely advice and guidance.
- ✓ Students aiming for higher grades are advised to attend class regularly in addition to above expectations.

## Missed Tests and Exams

Students are required to timely inform the instructor for missed tests and assessments due to illness. Please follow the link for writing self declaration email [Missed Exam \(Medical/Personal\) | Lakehead University](#)

For any other unforeseen circumstances, students are required to take prior permission from the instructor. Granting testing accommodation is up to instructor discretion.

## The Lakehead University Program Policies are posted for your guidance

### Program Policies

The following policies have been adopted by the School of Kinesiology and apply to all programs offered by the School. Students are expected to be familiar with these policies and abide by them.

### Student Code of Conduct

Lakehead University is committed to the highest standards of academic integrity and honesty. Lakehead University has very strict policies regarding academic dishonesty, such as plagiarism and cheating.

Students are expected to be familiar with these standards and to uphold the policies of the University in this respect. [Please refer to the Student Code of Conduct pages.](#)

## Mutual Expectations

In order to promote a collegial and stimulating learning environment, it is important that students and course instructors abide by a mutual code of courtesy and respect.

Instructor's expectations of the students:

- Students are asked to be respectful to the instructor, the TAs, and their fellow class-mates during both class and laboratory sessions.
- Students must come prepared and on-time for lectures and laboratories (i.e., having completed required readings, wearing proper attire, etc.)
- Students must pay attention and are expected to be active participants in all lecture and laboratory sessions.
- Cell phones must be turned off and put away upon entering the classroom or laboratory (unless an arrangement has been made with the Instructor or TA ahead of time).
- Personal computer use is welcome during class time as long as it is related to the course. The volume must be muted.
- In the event that students must either arrive late or leave early, every effort should be made to minimize disruption when entering or leaving the classroom.
- Students are prohibited from making audio or video recordings of lectures or taking pictures of lecture material.

Students' expectations of the Instructor:

- Instructors will come prepared and on-time for lectures and laboratories.
- Questions, discussions, and constructive comments pertaining to class material will be encouraged and are always welcome.
- Instructors will be approachable. If a student is having problems with any aspect of the course, Instructors will be available during office hours or by appointment as indicated on the course outline.
- Instructors will respond to student emails in a timely manner.
- Instructors will return graded material or provide feedback in a timely manner.

[Student Code of Conduct - Academic Integrity 0.pdf \(lakeheadu.ca\)](#)

In addition, students are to embrace diversity in peers and instructors by being respectful in their communications and listening to the spoken words not the person. Avert stereotyping to create healthy classroom learning environment. [Legislation and Regulations - Canada.ca](#)

## APA Formatting

The School of Kinesiology follows the guidelines of the American Psychological Association (more commonly known as APA) as the standard method of formatting for all submitted work, unless otherwise stated by an instructor. Students should refer to the course material (course outline, assignment instructions, D2L, etc.) for specific instructions and guidance to ensure that documents are formatted properly. [APA Formatting for Assignments | Lakehead University](#)

## Examinations

All examinations must be written on the scheduled day and time as noted on the course outline or on the final exam schedule. Students who miss exams without a valid reason will receive a mark of “0” for that exam.

When a student knows in advance that he/she will miss an exam, or in the case of a missed exam due to unexpected reasons, the instructor must be notified as soon as possible. Following a review of the circumstances, alternative arrangements may be considered by the instructor if the reason is determined to be valid.

All electronic communication devices (e.g., laptop computers, cell phones, etc.) are strictly prohibited during examinations unless previously approved by the instructor. Any student found using any type of electronic communication device during an exam will receive a mark of “0” on the exam.

Cheating will result in “0” on the exam.

Please bring valid ID for Mid term and Final Exams

## Program Specific Regulations

- It is the responsibility of each student registering at Lakehead University to be familiar with the specific requirements of the degree, diploma, or certificate which he/she seeks.
- Each student is responsible for ensuring that the courses selected at registration satisfy the program requirements of the degree sought. Academic advice and counselling for all who need assistance are freely available.
- It is also understood that every student, by the act of registering, agrees to abide by all rules and regulations of the University.
- Each student is expected to be familiar with the General Information outlined in the Academic Calendar as well as the information pertaining to the faculty or school in which he/she is enrolled. For further information

## Student Resources

Please follow the link for student resources [Orillia Campus Student Life & Services | Lakehead University](#)

## Land Acknowledgment

Lakehead University respectfully acknowledges its campuses are located on the traditional lands of Indigenous Peoples. Lakehead Thunder Bay is located on the traditional lands of the Fort William First Nation, Signatory to the Robinson Superior Treaty of 1850. Lakehead Orillia is located on the traditional territory of the Anishinaabeg. The Anishinaabeg include the Ojibwe, Odawa, and Pottawatomi nations, collectively known as the Three Fires Confederacy. Lakehead University acknowledges the history that many nations hold in the areas around our campuses, and is committed to a relationship with First Nations, Métis, and Inuit Peoples based on the principles of mutual trust, respect, reciprocity, and collaboration in the spirit of reconciliation. [Land Acknowledgement | Lakehead University](#)

## Lakehead University Winter Term Schedule

### Winter 2024 Term Courses

First Day of Classes	Monday, January 8, 2024
Final Day of Classes	Tuesday, April 9, 2024
	*Monday April 8th is a make-up day for classes that did not take place on Good Friday
	*Tuesday April 9th is a make-up day for classes that did not take place on Easter Monday
Final Date to Register (Add)	Friday, January 19, 2024
Final Date to Withdraw (Drop)	Friday, March 8, 2024
Examination Period	Friday April 12, 2024 - Monday, April 22, 2024 (11 Days)
Exam Contingency Date	Tuesday, April 23, 2024
Marks Due	Friday, April 26, 2024

[Navigator Suite - Catalog - View Catalog \(lakeheadu.ca\)](#)

### Other important dates:

Family Day	Monday, February 19, 2024	University Closed
Winter Study Week	Monday, February 19, 2024 - Friday, February 23, 2024	No Classes
Winter Exam Study Break	Wednesday April 10, 2024 - Thursday, April 11, 2024	No Classes
Good Friday	Friday, March 29, 2024	University Closed
Easter Sunday	Sunday, March 31, 2024	University Closed
Easter Monday	Monday, April 1, 2024	University Closed

[Navigator Suite - Catalog - View Catalog \(lakeheadu.ca\)](#)

## **BIOL 2711L- Biology of Microorganism-WO1 & WO2, 2024**

The general outline of the lab component of BIOL 2711L is given below. The list of topics is subject to change. Changes in the model organisms listed in the manual and modifications in procedure might be there depending on the flow of the course. Some experiments will be demonstrated only depending on the safety guidelines in practice.

Lab sessions: Session 1 - Mondays 8:30am -11:30 am

Session 2- Fridays 8:30 am -11:30 am

### **BIOL 2711L Schedule**

This is a tentative lab schedule and please note that the lab session times may be interchanged with lecture times as and when required. Please contact Dr. Usha Menon for any lab related questions.

**Week of Jan 8<sup>th</sup> - NO LAB**

**Week of Jan 15<sup>th</sup> INTRODUCTION/SAFETY**

QUIZ #1 Lab safety quiz

1-2 Media preparation

1-3 Microorganisms in the environment

**Week of Jan 22<sup>nd</sup> MICROSCOPY**

QUIZ #2

2-1 Assignment of Unknown Cultures

2-2 Use and Care of the microscope

2-3 Examination of living organisms

**Week of Jan 29<sup>th</sup> STAINING METHODS**

QUIZ #3

3-1 Preparation of smears and simple staining

3-2 Differential stains- The Gram Stain

3-3 Structural stains- Endospores, capsules, and flagella

**Week of Feb 5<sup>th</sup> TECHNIQUES FOR CULTIVATING BACTERIA**

QUIZ #4

4-1 Isolation and Transfer of bacteria using aseptic techniques.

4-2 Special media for isolating bacteria

**MICROBIAL METABOLISM**

5-1 Exoenzymes (Starch hydrolysis and Gelatin hydrolysis)

5-2 Carbohydrate Catabolism I, respiration Part I

Oxidase test

Catalase test

**Week of Feb 12<sup>th</sup> MICROBIAL METABOLISM (Contd...)**

QUIZ #5

5-1 Observations on exoenzymes and Carbohydrate Catabolism I, Respiration Part I

5-2 Carbohydrate Catabolism I, respiration Part II

5-3 Carbohydrate Catabolism II, fermentation

5-4 Protein Catabolism

**Week of Feb 19<sup>th</sup> WINTER STUDY WEEK – NO LAB**

**Week of Feb 26<sup>th</sup> RECORD RESULTS FROM MICROBIAL METABOLISM**

**Week of March 4<sup>th</sup> SYSTEMATIC IDENTIFICATION OF BACTERIA**

QUIZ # 6

Observations on Biochemical tests

6-1 Primary Characteristics

6-2 Secondary Characteristics

6-3 Identification of your unknown bacteria



**Week of March 11<sup>th</sup> MICROBIAL GROWTH**

QUIZ #7

7-1 Atmospheric requirement

7-2 Temperature

7-3 pH (theory only)

7-4 Osmotic pressure (theory only)

**Week of March 18<sup>th</sup> CONTROL OF MICROBIAL GROWTH**

QUIZ #8

8-1 Physical agents of control: Heat

8-2 Physical control- Ultra-Violet Radiation

8-3 Chemical Control Non-Microbial – food (garlic, turmeric etc.)

8-4 Chemical methods of control-Antimicrobial agents

**Please note the results of this lab will be provided to you the following week by the instructor on D2L.**

**Week of March 25<sup>th</sup> Week of GOOD FRIDAY- NO LAB UNIVERSITY CLOSED**

**Week of April 1<sup>st</sup> Week of EASTER MONDAY – NO LAB UNIVERSITY CLOSED**

**Week of April 8<sup>th</sup> FINAL LAB EXAM**

**Monday April 15<sup>th</sup>, 2023 - IDENTIFICATION LAB REPORT DUE**

Lab 6 in the manual gives guidelines for the report.

Expectations for the report will be discussed in the lab.

## Appendix 1: List of topics for Research Project Writing Assignment

1. Microbiology of food production
2. Microbiology of food spoilage
3. Microbiology of food preservation
4. Biofuels
5. Ebola
6. Antibiotics producing microorganisms
7. Role of microorganisms in genetic engineering
8. “Flesh-eating” streptococci
9. *Helicobacter pylori* and ulcer
10. Prions and mad cow disease
11. MRSA (Methicillin Resistant *Staphylococcus aureus*)
12. Antibiotic resistance
13. COVID-19
14. SARS (Severe Acute Respiratory Syndrome)
15. *Escherichia coli* O157:H7/Walkerton Tragedy
16. Viroid’s
17. Bioterrorism/*Bacillus anthracis*
18. West Nile Virus
19. Microbial productions of chemicals and pharmaceuticals
20. Microbial life in extreme environments
21. Bioluminescence bacteria
22. Oil spill bioremediation
23. Microbial indicators of water pollution
24. Biocorrosion (Microbiologically Influenced Corrosion)
25. Bioleaching
26. Biomineralisation
27. Biosolids
28. Bacterial pathogens in aquaculture

Note: Detailed rubric is also provided in the assignment folder group research project writing.

## Appendix 2: Rubric for Research Writing (10%)

Elements	85-100%	75-84%	60-74%	<60%
Writing (/20)	<ul style="list-style-type: none"> <li>-conforms to APA standards (headings, manuscript header, margins, page numbers, referencing style) - good spelling and grammar</li> <li>- very good sentence structure</li> <li>- paragraphs are well planned and have excellent flow</li> </ul>	<ul style="list-style-type: none"> <li>-conforms to APA standards (headings, manuscript header, margins, page numbers)</li> <li>- limited spelling or grammatical errors</li> <li>- good sentence structure and paragraph flow</li> </ul>	<ul style="list-style-type: none"> <li>- some mistakes in APA format</li> <li>- some spelling and grammatical mistakes</li> <li>- sentences are somewhat difficult to understand</li> <li>- paragraphs have too many ideas</li> </ul>	<ul style="list-style-type: none"> <li>- mistakes in APA format</li> <li>- mistakes in spelling and grammar take away from understanding</li> <li>- sentences are poorly structured</li> <li>- paragraphs are confusing</li> </ul>
Research/ Referencing (/20)	<ul style="list-style-type: none"> <li>- excellent referencing within the text</li> <li>- 3 journal articles</li> <li>- wide variety of sources (different journals, books, and other information sources)</li> <li>- Reference list follows APA</li> </ul>	<ul style="list-style-type: none"> <li>- good referencing within the text</li> <li>- 2 journal articles</li> <li>- variety of sources (different journals)</li> <li>- Reference list follow APA</li> </ul>	<ul style="list-style-type: none"> <li>- missing some referencing in the text</li> <li>- 1 journal articles</li> <li>- multiple use of same journal or edited volume)</li> <li>- mistakes in reference list</li> </ul>	<ul style="list-style-type: none"> <li>- very limited referencing within the text</li> <li>- 1 web sources</li> <li>- no variety of sources</li> <li>- many mistakes in reference list</li> </ul>
Content (/40)	<ul style="list-style-type: none"> <li>- all aspects of the assignment are completed</li> <li>- information is accurate, up to date and goes beyond what is required</li> <li>- information is synthesized and connected to course material, as well as connections being made between literature sources</li> <li>- argument is well constructed and connects strongly to conclusion</li> </ul>	<ul style="list-style-type: none"> <li>- all aspects of the assignment are completed</li> <li>- information is accurate and up to date</li> <li>- good synthesis of information and connection between literature sources</li> <li>- well constructed argument and connects to conclusion</li> </ul>	<ul style="list-style-type: none"> <li>-missing some required elements of the assignment</li> <li>- some information is inaccurate or out of date</li> <li>- the information is summarized but not well connected to literature</li> <li>- argument is difficult to follow to the conclusion</li> </ul>	<ul style="list-style-type: none"> <li>-several missing elements</li> <li>- information is often inaccurate</li> <li>- there is limited connection between literature or purpose of paper</li> <li>- limited development of argument; no real conclusions</li> </ul>

Source: Adopted from LU CourseOutlineGuide.pdf with slight modifications

## Appendix 3: Oral presentation Rubric (5%)

Name: \_\_\_\_\_ Score: \_\_\_\_\_

### Oral Presentation Rubric

	4—Excellent	3—Good	2—Fair	1—Needs Improvement
<b>Delivery</b>	<ul style="list-style-type: none"> <li>Holds attention of entire audience with the use of direct eye contact, seldom looking at notes</li> <li>Speaks with fluctuation in volume and inflection to maintain audience interest and emphasize key points</li> </ul>	<ul style="list-style-type: none"> <li>Consistent use of direct eye contact with audience, but still returns to notes</li> <li>Speaks with satisfactory variation of volume and inflection</li> </ul>	<ul style="list-style-type: none"> <li>Displays minimal eye contact with audience, while reading mostly from the notes</li> <li>Speaks in uneven volume with little or no inflection</li> </ul>	<ul style="list-style-type: none"> <li>Holds no eye contact with audience, as entire report is read from notes</li> <li>Speaks in low volume and/or monotonous tone, which causes audience to disengage</li> </ul>
<b>Content/ Organization</b>	<ul style="list-style-type: none"> <li>Demonstrates full knowledge by answering all class questions with explanations and elaboration</li> <li>Provides clear purpose and subject; pertinent examples, facts, and/or statistics; supports conclusions/ideas with evidence</li> </ul>	<ul style="list-style-type: none"> <li>Is at ease with expected answers to all questions, without elaboration</li> <li>Has somewhat clear purpose and subject; some examples, facts, and/or statistics that support the subject; includes some data or evidence that supports conclusions</li> </ul>	<ul style="list-style-type: none"> <li>Is uncomfortable with information and is able to answer only rudimentary questions</li> <li>Attempts to define purpose and subject; provides weak examples, facts, and/or statistics, which do not adequately support the subject; includes very thin data or evidence</li> </ul>	<ul style="list-style-type: none"> <li>Does not have grasp of information and cannot answer questions about subject</li> <li>Does not clearly define subject and purpose; provides weak or no support of subject; gives insufficient support for ideas or conclusions</li> </ul>
<b>Enthusiasm/ Audience Awareness</b>	<ul style="list-style-type: none"> <li>Demonstrates strong enthusiasm about topic during entire presentation</li> <li>Significantly increases audience understanding and knowledge of topic; convinces an audience to recognize the validity and importance of the subject</li> </ul>	<ul style="list-style-type: none"> <li>Shows some enthusiastic feelings about topic</li> <li>Raises audience understanding and awareness of most points</li> </ul>	<ul style="list-style-type: none"> <li>Shows little or mixed feelings about the topic being presented</li> <li>Raises audience understanding and knowledge of some points</li> </ul>	<ul style="list-style-type: none"> <li>Shows no interest in topic presented</li> <li>Fails to increase audience understanding of knowledge of topic</li> </ul>
<b>Comments</b>				