

# Essentials of Microbiology

## MBIO 1220

### Syllabus

Welcome to the University of Manitoba's Essentials of Microbiology course. The course will give you an understanding of how microorganisms play an important part in human health and disease. This will help with your decision making in patient care and treatment. We will focus primarily on bacteria and viruses that you will be treating on a daily basis.

### Course description

*The University of Manitoba Undergraduate Calendar* describes MBIO 1220, Essentials of Microbiology, as follows:

An introduction to the essential principles of microbiology including immunity, with emphasis on microbial disease. Not available to students who have previously obtained credit in or are currently enrolled in MBIO 1010 or MBIO 1011 (or the former MBIO 2100 or MBIO 2101). Prerequisite: any grade 12 or 40S Mathematics, or equivalent. This prerequisite is waived for students in the Baccalaureate Program for Registered Nurses. NOTE: MBIO 1220 is intended for students planning to enter the Faculty of Nursing or other health care or related programs. Students that have completed MBIO 1010 but wish to take MBIO 1220 to satisfy Faculty of Nursing entrance requirements must obtain departmental permission prior to registering for MBIO 1220. MBIO 1220 cannot be used to satisfy the requirements of the Microbiology Honours or Major degree programs. MBIO 1220 can be used as an elective course in any Science program.

### Course objectives

Upon completion of the course you should be able to:

- recognize that bacteria are an integral part of life;
- describe the basic structural features of bacteria, viruses and eukaryotic microorganisms;
- discuss the normal microbiota and its role in disease and in maintaining human health;
- describe nosocomial infections and how they can be prevented;
- analyze the pathogenic features of common microorganisms; and
- understand the medical importance of microorganisms.

### Course materials

#### Required

##### Bookstore

The following required materials are available for purchase from the [University of Manitoba Bookstore](#). Please order your materials immediately, if you have not already done so.

Anderson, D. E., S. Salm and D. Allen (2019). *Nester's Microbiology: A Human Perspective*. 9<sup>th</sup> ed. New York, NY: McGraw-Hill.

Please note: the online access code for the textbook is not required for this course.

# Course overview

There are 3 modules in the course each consisting of numerous units. Note that textbook chapters 9–11, as well as chapters 28–31, the final four chapters of the textbook, are not covered in this course.

## Topics

- Module 1 Life and Death of Microorganisms
- Module 2 Microorganisms and Humans
- Module 3 Infectious Diseases

## Learning activities

Unit activities will include assigned readings from the textbook (the summaries and/or guidelines provided with the reading list will direct you to the examinable parts of each textbook section), reading the study notes in this course manual and completing the self-tests in each unit. As an additional note about the course readings, there is a lot of material to read for this course. You will study two or three units every week. The course will make extensive use of the summary tables in many of the chapters and you will be guided to these summary tables frequently throughout the course.

Use the course schedule to stay on track in the course so that you do not fall behind.

The midterm exam dates are outlined in the next section. Note that it is very important to complete the assigned readings for each unit on time to ensure that you will have sufficient time to review your materials before the final exam. Also note that textbook chapters 9–11 and chapters 28–31 will not be required reading for the course.

## Evaluation and grading

### Distribution of marks

Evaluation	Percentage
Midterm test 1	25%
Midterm test 2	25%
Final examination	<u>50%</u>
Total	100%

### Midterm tests

Midterm tests will be one hour multiple choice tests, and will be given online. Students will be given a 24 hour window in which to write the online midterm tests. You can find detailed instructions on how to access the midterm tests on the course website as well as the exact dates that the midterm tests will be available.

## Final exam

The final examination for the course will be a two hour, closed book, and invigilated exam scheduled by the Registrar's office. The final exam will be written at the University of Manitoba (UM), Fort Garry campus or at an approved off-campus location. **Students needing to write at an off-campus location must declare a location by the specified deadline date** (see off-campus declaration and policy under Student Resources on course homepage). **Students writing at the UM Fort Garry campus do not need to declare an exam location.**

The Registrar's Office is responsible for the [final exam schedule](#) which is available approximately one month after the start of the course.

The exact date and time of the final exam will be posted to the course website when it is available (exam rooms are normally assigned about one month before the beginning of the exam period). Students must be available at the date and time that is scheduled by the Registrar's office. The final exam will consist of 100 multiple choice questions that cover material from all units of the course. Students must achieve a minimum mark of 45% on the final exam to receive a passing grade in the course. A sample examination and answer key is available on the course website.

## A word of caution about the midterm tests and the final examination

Some students find that they do very well on the midterm exams, but they do not do nearly as well on the final examination. While the midterm exams are intended to be of similar difficulty to the final examination, many students find the material covered at the end of the course to be more challenging than earlier material upon which the midterms will be based.

Please keep this in mind as you prepare for the examination. Follow the course schedule closely, to make sure that you have sufficient time to cover the challenging units at the end of the course. Once you have completed the course material, attempt to write the final practice exam in under 2 hours, with your books closed. (In other words, write it under the same conditions that you will have for the actual final exam).

## Grading scale

Grades for the course will be assigned according the following table, with possible minor adjustments. You must receive at least a grade of C to get credit for this course in the B. N. program.

Letter grade	Percentage range	Description
A+	90 – 100	Exceptional
A	80 – 89	Excellent
B+	75 – 79	Very good
B	68 – 74	Good
C+	63 – 67	Satisfactory
C	55 – 62	Adequate
D	45 – 54	Marginal
F	less than 44	Failure

**Please note: All final grades are subject to departmental review.**

## Plagiarism, cheating and examination impersonation

You should acquaint yourself with the University's policy on plagiarism, cheating, and examination impersonation as detailed in the General Academic Regulations and Policy section of the University of Manitoba *Undergraduate Calendar*. Note: These policies are also located in your *Distance and Online Education Student Handbook* or you may refer to Student Affairs at <http://www.umanitoba.ca/student>.

# Distance and Online Education (DE) Student Resources

In your course website there are links for the following:

- Contact Distance and Online Education Staff
- Distance and Online Student Handbook
- Distance and Online Education Website

## Acknowledgements

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University of Manitoba, Distance and Online Education

# Module 1

## The Life and Death of Microorganisms

This module focuses on the basics of microbiology: the structure of microorganisms and the biological molecules they're made of. How microbes use nutrients to grow, and how we as microbiologists can prevent their growth when we need to. You'll also look at how genetic information is stored, how the information in genes confers unique properties to each different microbe, and how the genetic information can change allowing microbes to evolve new properties.

Module 1 covers the following units:

- Unit 1 (Chapter 1): Humans and the Microbial World
- Unit 2 (Chapter 2): The Molecules of Life
- Unit 3 (Chapter 3): Microscopy and Cell Structure
- Unit 4 (Chapter 4): Dynamics of Microbial Growth
- Unit 5 (Chapter 5): Control of Microbial Growth
- Unit 6 (Chapter 6): Microbial Metabolism: Fueling Cell Growth
- Unit 7 (Chapter 7): The Blueprint of Life, from DNA to Protein
- Unit 8 (Chapter 8): Bacterial Genetics

Concepts from Module 1 will make up the entirety of the first online midterm test, worth 25% of your final grade. Check the course website for instructions on accessing the midterm test, and the exact date and time that the test will be available.

In addition to the 1<sup>st</sup> midterm test, you should expect about 10 to 15 questions from Module 1 on your final examination.

Throughout the following modules, frequent reference will be made to concepts covered in Module 1. Although the final examination will be weighted heavily toward Module 3, it is imperative that you develop a strong understanding of the material in this module, to facilitate your learning of concepts covered later in the course.

# Module 2

## Microorganisms and Humans

This Module will help us understand how microorganisms interact with the human body to cause disease, how the human body responds to protect itself from invading microbes, and how we can use anti-microbial medications to overcome infection. Knowing how microbes interact with the body will allow us to understand the myriad of microbial diseases presented in the final module of the course.

Module 2 covers the following units:

- Unit 9 (Chapter 12): The Eukaryotic Members of the Microbial World
- Unit 10 (Chapter 13): Viruses, Viroids and Prions
- Unit 11 (Chapter 14): The Innate Immune Response
- Unit 12 (Chapter 15): The Adaptive Immune Response
- Unit 13 (Chapter 16): Host-Microbe Interactions
- Unit 14 (Chapter 17): Immunologic Disorders
- Unit 15 (Chapter 18): Applications of Immune Responses
- Unit 16 (Chapter 19): Epidemiology
- Unit 17 (Chapter 20): Antimicrobial Medications

Concepts from Module 2 will make up the entirety of the second online midterm test, worth 25% of your final grade. Check the course website for instructions on accessing the midterm test, and the exact date and time that the test will be available.

In addition to the 2<sup>nd</sup> midterm test, you should expect about 30 to 35 questions from Module 2 on your final examination.

# Module 3

## Infectious Diseases

This module is a survey of some of the most important and most interesting diseases caused by microorganisms. Some of the diseases you'll cover are very common, and it is likely that you will encounter them many times in your future career as a health care professional. The diseases are organized by the part of the body affected.

Module 3 covers the following units:

- Unit 18 (Chapter 21): Respiratory System Infections
- Unit 19 (Chapter 22): Skin Infections
- Unit 20 (Chapter 23): Wound Infections
- Unit 21 (Chapter 24): Digestive System Infections
- Unit 22 (Chapter 25): Blood and Lymphatic Infections
- Unit 23 (Chapter 26): Nervous System Infections
- Unit 24 (Chapter 27): Genitourinary Tract Infections

Please note: This module is an extremely important part of the course and will be weighted heavily on the final exam! Even though Module 3 will make up the majority of your final examination, you should continue to review your notes from earlier modules to ensure that you have sufficient background knowledge to understand the concepts covered in Module 3. It is especially important at this point in the course that you are familiar with the terminology learned in Modules 1 and 2.

As Module 3 will not be examined on either of the midterm tests, it will be weighted heavily on the final examination. You should expect about 50 to 60 questions from Module 3 on your final examination.