



# MICR\*4010 Pathogenic Microbiology

Fall 2021

Section(s): C01

Department of Molecular and Cellular Biology

Credit Weight: 0.50

Version 3.00 - September 29, 2021

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## 1 Course Details

### 1.1 Calendar Description

This course focuses on the interactions between microbial pathogens and host animals, including immune and inflammatory responses of the host's defense mechanisms. The structural and physiological characteristics of a number of important microbes causing human and animal diseases are considered.

**Pre-Requisites:** MCB\*2050, MICR\*3230, (MBG\*3080 or MICR\*3240)

### 1.2 Course Description

- The aim of this course is to examine the fundamental aspects of microbial structure, physiology, genetics, and how these factors interact with host systems during infections.
- Through course assignments, each student will be required to obtain and synthesize information about several specific pathogens and will be expected to contribute knowledge about these pathogens to regular class discussions.
- In order to stimulate awareness of how bacterial pathogens shape the world around us, students will also be expected to keep abreast of current affairs during the course period as they relate to microbial pathogens.

### 1.3 Timetable

Mondays, and Wednesdays from 1:00-2:20 pm.

MCKN 231

## 1.4 Final Exam

Date: 07/12/2021

Time: 0830 -1030

Location: TBA

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## 2 Instructional Support

### 2.1 Instructional Support Team

**Instructor:** Muhammad Zaman  
**Email:** mzaman02@uoguelph.ca  
**Office:** SSC

### 2.2 Teaching Assistants

**Teaching Assistant (GTA):** Qazi Nisa  
**Email:** qnisa@uoguelph.ca

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## 3 Learning Resources

There is no required textbook for this course – as a senior level course, the primary and secondary literature is your textbook. The course coordinator will give advice and guidance on selected readings, and you will be expected to augment this with your own literature research.

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## 4 Learning Outcomes

By the end of this course, students will be expected to understand the fundamental components of host-pathogen (with a predominant focus on host-bacterial) interactions, and to apply these concepts to the study of *any* pathogen with a goal of understanding the likely outcome of infection. Students will also be expected to be proficient in the reading *and understanding* of the primary literature as it pertains to microbial pathogenesis, with the added ability to critically evaluate experiments and to suggest pertinent future directions for research.

### 4.1 Learning Objectives

This is an advanced course. Emphasis will be place on demonstrating the ability to ‘think, discuss, integrate and synthesize’. Students are expected to take responsibility for their own learning, and lectures should be seen as introductory to a given topic. More in depth reading

suggestions, from pertinent and recent scientific papers, will be provided during class time, and for full understanding, it is expected that students augment their class-time learning with home study.

On the first day of class, each student will be assigned names of three pathogenic bacterial species, “pet pathogens,” which will form the basis of their take home assignment 1. During class, students will be especially expected to contribute information about their pet pathogens to class discussions. The primary aims of the course are as follows: a) To develop an understanding of the molecular basis for bacterial pathogen-host interactions and some of the approaches and tools used to investigate them. b) To develop critical thought – the ability to take information from the literature, evaluate it, and to draw your own conclusions from it. c) To develop an awareness of the impact of bacterial pathogens on the world around us, and an appreciation for the importance of microbiology as a scientific discipline.

## 5 Teaching and Learning Activities

Each lecture will demonstrate a theme in microbial pathogen interactions. In general, only human disease will be discussed, although some microbial infections of agricultural and veterinary importance will also be explored as appropriate. A class schedule is given below. The schedule may be subject to slight change according to the needs of the class and availability of ‘just published’ hot topics in microbial pathogenesis.

### 5.1 Lectures

<b>Date</b>	<b>Topic</b>	<b>Assignments/notes</b>
Week 1	<p>Introduction to the course and first day of class bits &amp; pieces</p> <p>The normal bacterial microbiota of humans -not all bugs are bad!!</p> <p>Defining virulence/pathogenicity -what makes some bacteria pathogenic?</p>	<p><b>Hand out:</b></p> <p><b>Assignment 1</b></p> <p>“Bacterial Pathogens Top Trumps!”</p> <p>Pick pet pathogens</p>
Week 2		

	<p>Virulence factors:</p> <p>Adhesins</p> <ul style="list-style-type: none"> <li>-Mechanisms</li> <li>-Tissue tropism</li> <li>-Consequences</li> <li>-Prevention</li> </ul>	
Week 3	<p>Virulence factors:</p> <p>Invasins</p> <ul style="list-style-type: none"> <li>-Mechanisms</li> <li>-Consequences</li> <li>-Bacterial survival and growth after invasion</li> </ul>	
Week 4	<p>Virulence factors:</p> <p>Aggressins</p> <ul style="list-style-type: none"> <li>-The world of bacterial toxins</li> </ul>	
	NO CLASSES - Fall Break	

Week 5	<p>Virulence factors:</p> <p>Impedins</p> <ul style="list-style-type: none"> <li>-Immune defenses of the mucosa</li> <li>-The innate and adaptive immune responses to bacterial pathogens (brief review/refreshers*)</li> <li>-Bacterial evasion of host immune responses</li> <li>-Bacterial control of cell cycle and apoptosis</li> <li>-Mechanisms of microbiota control of pathogens</li> </ul>	<p><b>October 19th due date:</b></p> <p><b>ASSIGNMENT 1</b></p> <p><b>Wednesday, October 21st Hand out:</b></p> <p><b>Assignment 2</b></p> <p>“Build-a-Pathogen Workshop”</p>
Week 6	<p><b>MIDTERM EXAM – Monday, October 26th</b></p> <p>Guest lecture:</p>	<p>The midterm exam will be online during class hours</p>
Week 7	<p>Virulence factors:</p> <p>Modulins</p> <ul style="list-style-type: none"> <li>-Cytokines and cytokine networks</li> <li>-Bacterial interaction with the cytokine network</li> </ul>	
Week	<p>In-depth: 3 <u>bacterial</u> pathogens that have</p>	

8	shaped our history  (Can you guess what they are?)	
Week 9	Pathogenomics: using genomes to understand and predict virulence  Polymicrobial infections  Idiopathic diseases where microbes might be to blame	
Week 11	Antibiotics – “Miracle drugs” or “hazardous substances”?  Probiotics, prebiotics, synbiotics & ecobiotics  Alternative antimicrobial strategies in medicine	
Week 12	In-depth: an overview of the SARS-CoV-2 pandemic	<b>Wednesday, December 2nd Due date:</b>  <b>ASSIGNMENT 2</b>
Week 13	<b>FINAL EXAM</b>	TBA

## 6 Assessments

### 6.1 Marking Schemes & Distributions

Name	Scheme A (%)
Midterm	25

Name	Scheme A (%)
Assignment 1	20
Assignment 2	20
Final Exam	35
Total	100

## 6.2 Assessment Details

### Midterm (25%)

**Date:** Wed, Oct 27

Wednesday, October 27th, 2021. Please ensure you are present for the midterm exam, as there will be **NO** opportunity available to sit the exams at an alternative time. If the midterm is missed, academic consideration will only be given providing the appropriate documentation is presented (a note from a physician or academic counselor). In this event, the marks from the midterm will be transferred to the final exam.

### Assignment 1 (20%)

**Date:** Week 5

Due to COVID-19 restrictions, there will be no hard copy hand in for this assignment. All work **MUST** be submitted electronically through the Dropbox facility in the Course link site for this course, by 5 pm on the due date.

If the deadline for the assignment is missed, academic consideration will only be given providing the appropriate documentation is presented (a note from a physician or academic counselor). In this event, the marks from the assignment will be transferred to the final exam.

### Assignment 2 (20%)

**Date:** Week 12

Assignment 2 needs to be submitted electronically through the Dropbox (by 5 pm) facility in the Course link site for this course.

If the deadline for the assignment is missed, academic consideration will only be given providing the appropriate documentation is presented (a note from a physician or academic counselor). In this event, the marks from the midterm will be transferred to the final exam.

### Final Exam (35%)

**Date:** Online

TBA. The final exam will be worth 35% of the final grade.

## 7 Course Statements

## 7.1 When You Cannot Meet a Course Requirement

- If you miss the midterm, there is no make-up exam. Similarly, if you miss the assignment deadlines there are no make-ups. With adequate reason provided for your absence, Dr. Cox will re-weight your final exam accordingly.

# 8 Department of Molecular and Cellular Biology Statements

## 8.1 Academic Advisors

If you are concerned about any aspect of your academic program:

- Make an appointment with a program counsellor in your degree program. [B.Sc. Academic Advising](#) or [Program Counsellors](#)

## 8.2 Academic Support

If you are struggling to succeed academically:

- Learning Commons: There are numerous academic resources offered by the Learning Commons including, Supported Learning Groups for a variety of courses, workshops related to time management, taking multiple choice exams, and general study skills. You can also set up individualized appointments with a learning specialist. <http://www.learningcommons.uoguelph.ca/>
- Science Commons: Located in the library, the Science Commons provides support for physics, mathematic/statistics, and chemistry. Details on their hours of operations can be found at: <http://www.lib.uoguelph.ca/get-assistance/studying/chemistry-physics-help> and <http://www.lib.uoguelph.ca/get-assistance/studying/math-stats-help>

## 8.3 Wellness

If you are struggling with personal or health issues:

- Counselling services offers individualized appointments to help students work through personal struggles that may be impacting their academic performance. <https://www.uoguelph.ca/counselling/>



- Student Health Services is located on campus and is available to provide medical attention. <https://www.uoguelph.ca/studenthealthservices/clinic>
- For support related to stress and anxiety, besides Health Services and Counselling Services, Kathy Somers runs training workshops and one-on-one sessions related to stress management and high performance situations. <http://www.selfregulationskills.ca/>

## 8.4 Personal information

Personal information is collected under the authority of the University of Guelph Act (1964), and in accordance with Ontario's Freedom of Information and Protection of Privacy Act (FIPPA) <http://www.e-laws.gov.on.ca/index.html>. This information is used by University officials in order to carry out their authorized academic and administrative responsibilities and also to establish a relationship for alumni and development purposes.

For more information regarding the Collection, Use and Disclosure of Personal Information policies please see the Undergraduate Calendar. (<https://www.uoguelph.ca/registrar/calendars/undergraduate/current/intro/index.shtml>)

## 8.5 Course Offering Information Disclaimer

Please note that course delivery format (face-to-face vs online) is subject to change up to the first-class day depending on requirements placed on the University and its employees by public health bodies, and local, provincial and federal governments. Any changes to course format prior to the first class will be posted on WebAdvisor/Student Planning as they become available.

# 9 University Statements

## 9.1 Email Communication

As per university regulations, all students are required to check their e-mail account regularly: e-mail is the official route of communication between the University and its students.

## 9.2 When You Cannot Meet a Course Requirement

When you find yourself unable to meet an in-course requirement because of illness or compassionate reasons please advise the course instructor (or designated person, such as a teaching assistant) in writing, with your name, id#, and e-mail contact. The grounds for Academic Consideration are detailed in the Undergraduate and Graduate Calendars.

Undergraduate Calendar - Academic Consideration and Appeals  
<https://www.uoguelph.ca/registrar/calendars/undergraduate/current/c08/c08-ac.shtml>

Graduate Calendar - Grounds for Academic Consideration  
<https://www.uoguelph.ca/registrar/calendars/graduate/current/genreg/index.shtml>

Associate Diploma Calendar - Academic Consideration, Appeals and Petitions  
<https://www.uoguelph.ca/registrar/calendars/diploma/current/index.shtml>

### 9.3 Drop Date

Students will have until the last day of classes to drop courses without academic penalty. The deadline to drop two-semester courses will be the last day of classes in the second semester. This applies to all students (undergraduate, graduate and diploma) except for Doctor of Veterinary Medicine and Associate Diploma in Veterinary Technology (conventional and alternative delivery) students. The regulations and procedures for course registration are available in their respective Academic Calendars.

Undergraduate Calendar - Dropping Courses  
<https://www.uoguelph.ca/registrar/calendars/undergraduate/current/c08/c08-drop.shtml>

Graduate Calendar - Registration Changes  
<https://www.uoguelph.ca/registrar/calendars/graduate/current/genreg/genreg-reg-regchg.shtml>

Associate Diploma Calendar - Dropping Courses  
<https://www.uoguelph.ca/registrar/calendars/diploma/current/c08/c08-drop.shtml>

### 9.4 Copies of Out-of-class Assignments

Keep paper and/or other reliable back-up copies of all out-of-class assignments: you may be asked to resubmit work at any time.

### 9.5 Accessibility

The University promotes the full participation of students who experience disabilities in their academic programs. To that end, the provision of academic accommodation is a shared responsibility between the University and the student.

When accommodations are needed, the student is required to first register with Student Accessibility Services (SAS). Documentation to substantiate the existence of a disability is required; however, interim accommodations may be possible while that process is underway.

Accommodations are available for both permanent and temporary disabilities. It should be noted that common illnesses such as a cold or the flu do not constitute a disability.

Use of the SAS Exam Centre requires students to book their exams at least 7 days in advance and not later than the 40th Class Day.

For Guelph students, information can be found on the SAS website  
<https://www.uoguelph.ca/sas>

For Ridgetown students, information can be found on the Ridgetown SAS website  
<https://www.ridgetownc.com/services/accessibilityservices.cfm>

## 9.6 Academic Integrity

The University of Guelph is committed to upholding the highest standards of academic integrity, and it is the responsibility of all members of the University community-faculty, staff, and students-to be aware of what constitutes academic misconduct and to do as much as possible to prevent academic offences from occurring. University of Guelph students have the responsibility of abiding by the University's policy on academic misconduct regardless of their location of study; faculty, staff, and students have the responsibility of supporting an environment that encourages academic integrity. Students need to remain aware that instructors have access to and the right to use electronic and other means of detection.

Please note: Whether or not a student intended to commit academic misconduct is not relevant for a finding of guilt. Hurried or careless submission of assignments does not excuse students from responsibility for verifying the academic integrity of their work before submitting it. Students who are in any doubt as to whether an action on their part could be construed as an academic offence should consult with a faculty member or faculty advisor.

Undergraduate Calendar - Academic Misconduct

<https://www.uoguelph.ca/registrar/calendars/undergraduate/current/c08/c08-amisconduct.shtml>

Graduate Calendar - Academic Misconduct

<https://www.uoguelph.ca/registrar/calendars/graduate/current/genreg/index.shtml>

## 9.7 Recording of Materials

Presentations that are made in relation to course work - including lectures - cannot be recorded or copied without the permission of the presenter, whether the instructor, a student, or guest lecturer. Material recorded with permission is restricted to use for that course unless further permission is granted.

## 9.8 Resources

The Academic Calendars are the source of information about the University of Guelph's procedures, policies, and regulations that apply to undergraduate, graduate, and diploma programs.

Academic Calendars

<https://www.uoguelph.ca/academics/calendars>

## 9.9 Disclaimer

Please note that the ongoing COVID-19 pandemic may necessitate a revision of the format of course offerings, changes in classroom protocols, and academic schedules. Any such changes will be announced via CourseLink and/or class email.

This includes on-campus scheduling during the semester, mid-terms and final examination schedules. All University-wide decisions will be posted on the COVID-19 website

(<https://news.uoguelph.ca/2019-novel-coronavirus-information/>) and circulated by email.

## 9.10 Illness

Medical notes will not normally be required for singular instances of academic consideration, although students may be required to provide supporting documentation for multiple missed assessments or when involving a large part of a course (e.g.. final exam or major assignment).

## 9.11 Covid-19 Safety Protocols

For information on current safety protocols, follow these links:

- <https://news.uoguelph.ca/return-to-campus/how-u-of-g-is-preparing-for-your-safe-return/>
- <https://news.uoguelph.ca/return-to-campus/spaces/#ClassroomSpaces>

Please note, these guidelines may be updated as required in response to evolving University, Public Health or government directives.

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