

BIO C17H3
Winter 2021
MICROBIOLOGY : THE BACTERIAL CELL

GENERAL INFORMATION

Instructor:

Professor. Shelley Brunt

Email: shelley.brunt@utoronto.ca

The main learning objective of this course is to provide you the background in basic and clinical microbiology, emphasizing eubacteria and introducing archaeobacteria, viruses and other acellular microorganisms. Emphasis will be placed on characteristics of the above that result in a number of these microorganisms being beneficial and others excellent pathogenic agents of numerous hosts.

This is a lecture course with an on line synchronous laboratory component. This term due to COVID 19 we have had to significantly modify your opportunity for hands on experience (see laboratories). **In addition to learning about microorganisms** in the laboratory **component ideally you would be acquiring laboratory skills that are useful in the job market. We are hoping to provide these skills** on how to cultivate, identify and work with bacteria through videos provided to you and class discussion. These are valuable techniques for jobs requiring microbiology background such as environmental sampling, food industry , biopharmaceuticals, cosmetic industry, government testing labs, blood services labs to name a few.

Major learning outcomes:

- Understand the role of microorganisms as nutrient cyclers and how these organisms interact with host organisms-both beneficial and determinate interactions
- Use correct terminology/scientific names in scientific writing
- Understand and apply the role of cell wall components, structural components and effector molecules in pathogenicity of bacteria
- Understand the basic components of viruses and compare and contrast the main structure of bacteriophages with those of animal viruses
- Understand the types of horizontal gene transfer and genetic exchange in microorganisms
- Apply basic microbiological techniques to the growth of bacterial cultures
- Evaluate scientific data from experimentation and understand the limitations of data collection and produce logical hypotheses based on experimentation
- Evaluate the role of genetic exchange in the evolution of antimicrobial resistance
- Compare and contrast the nature of bacterial and archaeobacterial cell walls
- Evaluate the role of bacterial cell structure, virulence factors and pathogenicity factors in host immune responses to pathogens
- Compare and contrast the DNA, RNA and protein structure of prokaryotes and eukaryotes
- Design appropriate oral and written presentations

Communication

Please use U of T account for email (I will not answer emails from non-U OF T accounts) and please indicate the course in the subject heading . I will answer emails between 9 and 5 pm on weekdays. If I will not be available on a particular day I will post on Quercus. General announcements and any material needed for the course will be posted on Quercus

Office hours

- On-line on Friday from 11 to noon immediately after class.

Course schedule

Lecture:

- on-line Friday from 9 am to 11 am with Blackboard Collaborate. Lectures will be recorded and posted after the lecture
- Lecture material will be posted a couple of days prior to the lecture .
- When on-line please turn your audio and video off. If you have a question you can turn your audio on to ask.

Laboratories:

- **All labs will run on-line synchronous. You must attend during the scheduled lab presentation for the lab you are registered in.** Attendance will be taken. There are 10 labs that must be attended. From the week of January 18 through to the week of March 29. Please see lab manual for details on individual laboratory weekly schedule.
 - All laboratories will require you to be interacting with the **TAs through Blackboard collaborate in real time and has required attendance.** We will provide the powerpoint information the week prior to the virtual synchronous laboratory. WE will record the laboratory and post for a 40 hr period should you have a acceptable reason for missing the labs.
 - Please turn audio and video off unless you are asking or answering a question
 - **Data will be provided** and you will analyse through a short assignment or a more formal research paper. Please see the outline in the lab manual.

Accessibility:

AccessAbility statement

Students with diverse learning styles and needs are welcome in this course. In particular, if you have a disability/health consideration that may require accommodations, please feel free to approach me and/or the AccessAbility Services Office as soon as possible. AccessAbility Services staff (located in Rm AA142, Arts and Administration Building) are available by appointment to assess specific needs, provide referrals and arrange appropriate accommodations 416-287-7560 or email ability@utsc.utoronto.ca. The sooner you let us know your needs the quicker we can assist you in achieving your learning goals in this course.

Academic integrity/plagiarism

The University treats cases of cheating and plagiarism very seriously. The University of Toronto's Code of Behaviour on Academic Matters (<http://www.governingcouncil.utoronto.ca/policies/behaveac.htm>) outlines the behaviours that constitute academic dishonesty and the processes for addressing academic offences.

Potential offences in papers and assignments include using someone else's ideas or words without appropriate acknowledgement, submitting your own work in more than one course without the permission of the instructor, making up sources or facts, obtaining or providing unauthorized assistance on any assignment.

On tests and exams cheating includes using or possessing unauthorized aids, looking at someone else's answers during an exam or test, misrepresenting your identity, or falsifying or altering any documentation required by the University, including (but not limited to) doctor's notes. <http://www.uts.utoronto.ca/vpdean/academic-integrity>)

Examples of plagiarism

papers and assignments:

- Using someone else's ideas or words without appropriate acknowledgement.
- Submitting your own work in more than one course without the permission of the instructor.
- Making up sources or facts.
- Obtaining or providing unauthorized assistance on any assignment.

On tests and exams:

- Using or possessing unauthorized aids.
- Looking at someone else's answers during an exam or test.
- Misrepresenting your identity.

In academic work:

- Falsifying institutional documents or grades.
- Falsifying or altering any documentation required by the University, including (but not limited to) doctor's notes.

All suspected cases of academic dishonesty will be investigated following procedures outlined in the Code of Behaviour on Academic Matters. If you have questions or concerns about what constitutes appropriate academic behaviour or appropriate research and citation methods, you are expected to seek out additional information on academic integrity from your instructor or from other institutional resources (see <http://www.uts.utoronto.ca/aacc/academic-integrity>)

Use of Turnitin (plagiarism software) in BIOC17

All assignments will be deposited to Turnitin via Quercus submission

"Normally, students will be required to submit their course essays to Turnitin.com for a review of textual similarity and detection of possible plagiarism. In doing so, students will allow their essays to be included as source documents in the Turnitin.com reference database, where they will be used solely for the purpose of detecting plagiarism. The terms that apply to the University's use of the Turnitin.com service are described on the Turnitin.com web site".

Intellectual Property

Recording or photographing or video capture of any aspect of a university course - lecture, tutorial, seminar, lab, studio, practice session, field trip etc. – without prior approval of all involved and with written approval from the instructor is not permitted.

Grade breakdown:

- **For lecture and laboratory assignments that cannot be handed in on time:** late assignments will have a 10% per day deduction- no assignment will be accepted more than 5 days late. The weekly Pre and pos-lab questions cannot be submitted late.
- All assignments are submitted electronically to Quercus

Self-declaration for illness:

If you are self- declaring you must fill out the self-declaration form and submit it to myself and Jennifer Campbell within two days of the assignment due date.

Missing labs:

If you miss a laboratory you will require a self declaration. If you miss more than two additional labs regardless of the reason you forfeit all lab related grades. For the two labs you may miss with documentation you may submit the work related to these labs for credit. **If you miss labs without documentation you forfeit the grades. If you have internet issues during the on- line laboratories you must report them immediately this cannot be used as a viable excuse for not handing in assignments.**

Grade Breakdown

1. **Final take home exam:** is comprehensive and will be an essay based exam
 - Will include lab material (10%) and lecture material (33%)
- During final exam period [specifics will be posted prior to the exam period (43%)].**

LECTURE(53% including final exam above) :

2. Participation/group work submitted in lecture

- through one-minute writes/case studies/reflective practice (if you wish to opt out you may. Please inform me by the fourth week of classes and the 5% will be moved to the final lecture exam

- (minimum of 80% on assignments completed for full credit) **5%**

3. Lecture Assignment :

- **Mini-Review on a bacterial infection of your choice.** (1000 word double spaced 12 pt) that addresses the role of the virulence/pathogenicity factors in the infection. Specifics will be posted on Quercus
March 22 by 10 pm **15%**

LABORATORY: (47%): (attendance is mandatory, you need a self declaration to be excused from live on-line lab- sent to myself and Jennifer Campbell- see department site)

Final exam lab component

See above description of final take home exam (all material posted whether on-line or in lab) **10%**

4. Lab reports and assignments (32%)- see Manual and Quercus for due dates

- (dates for formal assignments will be out before class begins (two lab reports - **12%**), Growth experiment (**3.5%**) unknown (**4%**) and **small on-line assignments for each lab (12.5%)**)

5. Lab participation

This is not an automatic grade. You must come prepared for lab and contribute constructively when on-line in a productive and collaborative manner.

5%

Lab Manual: Posted on Quercus

Useful website

Canadian Society of Microbiologists: <http://www.csm-scm.org>

American Society for Microbiology: <https://www.asm.org>

Text book recommended Pearson Collections BIOC17 Microbiology book- available through the bookstore or use this link <https://console.pearson.com/enrollment/96ma2j>

What you need to know for the final comprehensive take home exam. In Microbiology, there is an emphasis on factual knowledge including the names of important organisms discussed in lecture. Your lecture notes and posted lecture aids are your most important guide to what you need to know. The lecture exam questions will be taken from **the material covered in class**, whether on the **lecture PowerPoint slides**, or discussed in class. These will be comprehensive essay questions which will require you to interconnect major themes presented over the course.

Take home message

To get the most out of the course:

- (i) Try to attend on-line class
- (ii) attend laboratories (which are required)
- (iii) ask questions
- (iv) go over your lecture and lab notes as soon as possible after each class and
- (v) if possible, set up a on-line study group with other students in the class Studies have shown that the sooner you review your notes, the longer you retain the information ("positive reinforcement").

Full breakdown of laboratory attendance -

Laboratory component see lab manual for details on the weekly lab exercises

Attendance in labs is mandatory. To be excused from a lab requires self declaration or permission prior to the lab from Professor Brunt.

You must attend all labs for this course!

You are allowed a maximum of 2 excused absences (ie. you must provide a Self-Declaration of Student Illness form form to both Professor Shelley Brunt and Jennifer Campbell (Dept. of Biology Course Coordinator).

Consequences for missing laboratories:

- **3 or more absences from the lab** (regardless of thereason) will result in a loss of all marks associated with lab, resulting in failure of the course.
- **One unexcused absence** will lead to the loss of all the grades related to in class work/performance
- **Two unexcused absences you** forfeit all grades for class work and all of the participation/performance grade and an additional 3% of your lab grade.

Lecture schedule: Some topics will be covered over multiple lectures

TOPIC NUMBER

LECTURE TOPIC AND READING ASSIGNMENTS

Topic 1

Course Outline
The Development of Concepts in Microbiology

Topic 2

Microbial Diversity, metabolism
Evolution of cells
The "Endosymbiont Hypothesis"

Topic 3

Overview of Acellular Agents:
Viruses, Prions, Plasmids and
Transposons

Topic 4

Comparison of Selected Features of
Prokaryotic and Eukaryotic Cells

- Topic 5** Bacterial Cell Walls and Cell Envelopes (Gram positive and Gram negative highlighted:
(I)Peptidylglycan (Murein) Synthesis
(II)Teichoic Acids
(III) Medical Importance of Gram Positive Cell Walls
(IV)Gram Negative Outer Membrane
(V)Lipoproteins and Lipopolysaccharides
(VI)The Endotoxic (Inflammatory / Innate) Responses
(VII)Adaptive (Specific) Immune Responses
- Topic 6** Pili , Fimbriae and flagella and role in pathogenesis
- Topic 7** Capsules and Biofilms and role in pathogenesis
- Topic 8** Endospores and other developmental pathways