

**BIO C17H3**  
**Summer 2021**  
**MICROBIOLOGY : THE BACTERIAL CELL**

## **GENERAL INFORMATION**

### **Instructor:**

Professor. Shelley Brunt

Email: [shelley.brunt@utoronto.ca](mailto: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 during the pandemic.** During COVID 19 we have had to significantly modify your opportunity for hands on experience (see laboratory Manual). **In Lab you will learning about microorganism characteristics and relevance to pathogenicity, understanding the design of laboratories that address important question regarding bacterial responses to a variety of stressors and interpreting data. Ideally you would be acquiring laboratory skills that are useful in the job market. We have designed these virtual labs to introduce you to these skills and allow you to vialize when, where and how you would use them. You will be immersed in** how to cultivate, identify and work with bacteria through videos provided to you and importantly 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. **Participation in these labs through either verbal or chat functions is required and represents 5% of your grade.**

### **Major learning outcomes:**

- Discuss 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
- Explain the stucture bacterial and archaeobacterial cell walls and illustrate the differences
- Demonstrate the significance of acellularar microbiolial agents
- Understand the basic components of viruses and compare and contrast the main structure of bacteriophages with those of animal viruses
- Compare and contrast the DNA, RNA and protein structure of prokaryotes and eukaryotes
- Understand the types of horizontal gene transfer and genetic exchange in microorganisms and analyze the role this plays in the acquisition of new traits
- Evaluate the role of cell wall components, structural components and effector molecules in pathogenicity of eubacteria.
- Review and integrate the role of bacterial cell structure, virulence factors and pathogenicity factors in host immune responses to pathogens

- Integrate the concepts of genetic exchange in the evolution of antimicrobial resistance
- Apply basic microbiological techniques to concepts of growth of unknown bacterial cultures.
- Understand the parameters of experimental design, data collection and build appropriate protocols
- Analyze and Evaluate scientific data from experimentation
- Understand and demonstrate in written and oral work the limitations of scientific knowledge acquired from data and apply this to your laboratory work.
- Construct logical hypotheses based on laboratory experimentation and literature.
- Design appropriate oral and written presentations that demonstrate a clear understanding of the topic addressed.

## 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 10 to 10:45 am and 2 to 2:45 pm on Tuesday in Bb collaborate. Please come and ask question and it is nice to hear and see you during this time
- **Course schedule**

## Lecture:

- on-line Synchronous noon to 2 pm on Tuesdays with Blackboard Collaborate. **There will be in class assignments for some lectures that will be due by the end of the day, we will discuss these questions in breakout groups where you will be able to formulate your answers with peer work.**
  - Lectures will be recorded and posted after the lecture. But given there is a comprehensive final and many lecture present interconnected information and interconnect to lab your success will be significantly enhanced by attending the live virtual 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 please turn your audio on and if possible your video on.

## Laboratories:

- **All labs will run on-line synchronous. You must attend during the scheduled lab presentation time for the lab you are registered in.** Attendance will be taken and you must participate to receive lab participation grades. There are 10 labs. From Tuesday May 18<sup>th</sup> through to July 27<sup>th</sup>. The labs will run for approximately 2.5 hours most weeks but some will take 3 hrs.
- 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 record the laboratory and post for at least a 40 hr period to allow for problems with your internet or should you have an acceptable reason for missing the labs.
- Please turn audio and video off unless you are asking or answering a question. But we encourage you to turn on your audio and video when asking questions.
- Each laboratory will have a PRE-lab and POST-Lab assignment that replaces the lab notebook you would be using in an in-person lab. Dates and requirements will be in the assignments list and provided by your TA.
- Please see the outline in the lab manual for assignment requirements

## **Equity Statement:**

- The University of Toronto is committed to equity, human rights and respect for diversity. All members of the learning environment in this course should strive to create an atmosphere of mutual respect where all members of our community can express themselves, engage with each other, and respect one another's differences. U of T does not condone discrimination or harassment against any persons or communities.

## **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](mailto: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.utsc.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.

<https://www.utsc.utoronto.ca/vpdean/faq-0>

## **Use of Turnitin (plagiarism software) in BIOC17**

[All assignments and your final take home exam 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.

### INSTRUCTOR PERMITS AUDIO RECORDINGS WITH NO DISTRIBUTION RIGHTS

Students may create audio-recordings of the lectures for their personal use. Recordings are intended to permit lecture content review so as to enhance understanding of the topics presented. Audio-recordings are not substitutes for attending class.

Students should note that since audio recordings are to be permitted, their voice may be recorded by others during the class. Please speak to the instructor if this is a concern for you.

In accordance with the Accessibility for Ontarians with Disabilities Act, 2005, persons who have special needs will be accommodated.

Students agree to the following terms when creating audio recordings of lectures:

- Recordings are not to be distributed without the permission of the instructor via the Internet, using social media such as Facebook, peer-to-peer file sharing such as One Drive or Dropbox, or other distribution channels.
- Recordings are not to be shared with other classmates unless they are to be used in collaborative assignments, or if the instructor permits for other reasons.

### **Grade breakdown and self declaration for work that cannot be completed:**

- **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. If you are ill you must submit biology specific self declaration within 24 hrs of the due date
- 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 24 hrs of the assignment due date. **See department web site <https://www.uts.utoronto.ca/biosci/node/389>**

### **Full breakdown of laboratory attendance and required documentation :**

**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!

### Consequences for missing laboratories:

- If you miss a laboratory you will require a self declaration.
- **3 or more absences from the lab** (regardless of the reason) 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.
- **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 (41%): is comprehensive and will be an essay based exam**
  - **Will include lab material (10%)- separate submitted from the lecture component**
  - **lecture material which can require you to connect to lab material (31%)**

### LECTURE(53% including lecture component of final exam described 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 immediately be moved to the final lecture exam. But if for some reason you are unable to complete these and do well if you do better on the lecture component of the final exam I will move the 5% to your final exam grade
  - (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 with specifics the role of the virulence/pathogenicity factors in a bacterial infection. Specifics will be posted on Quercus

**July 6 th at 10 pm**

**17%**

**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 (32.5%)- see Manual and Quercus for due dates

- o (dates for formal assignments will be out before class begins ( two lab reports - 12%), and **small on-line assignments for each lab (20.5%) – see lab manual for the assignments listed and percentages and quercus**

## 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.

4.5%

**Lab Manual:** Posted on Quercus

Useful website

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

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

**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"). This will allow you to interconnect the concepts.

**FullComprehensive breakdown of laboratory attendance discussed above - 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 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 the reason) 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 grades 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