

Department of Biology Course Outline

SC/BIOL 2905 3.00 Introduction to Clinical Microbiology
Fall 2020-21

All components of this course are online

There are no in-person interactions on campus.

This course is presented in Toronto time - Eastern Standard Time (EST)

Technological Requirements

You **must have access to reliable high-speed internet connection (wi-fi) and a computer** in order to take this course.

Some aspects of the course will involve video conferencing software (e.g. Zoom). Exams and other assessments may be conducted with the aid of an online proctoring service.

Reliable access to Moodle and ability to stream videos from Moodle is required.

Course Description

Medical microbiology for students interested in nursing and other health fields. This course is an introduction to concepts of medical microbiology, human-microbe interactions, mechanisms of microbial diseases, control of microbial growth, immunology and epidemiology.

Prerequisites (strictly enforced)

At least 30 credits towards a degree program; six credits from the following: SC/BIOL 1000 3.00, SC/BIOL 1001 3.00, SC/BIOL 1010 6.00; SC/NATS 1610 6.00, SC/NATS 1650 6.00, SC/NATS 1660 6.00, SC/NATS 1670 6.00, SC/NATS 1675 6.00, SC/NATS 1680 6.00, HH/KINE 2011 3.00, HH/KINE 2031 3.00; or permission of the Instructor.

Course credit exclusions: SC/BIOL 2900 3.00, SC/BIOL 3150 3.00 (prior to Fall 2016), or SC/BIOL 3150 4.00.

Note: Not eligible for Biology credit towards a Biology or Biochemistry program.

Course Instructor(s) and Contact Information

Instructor: Dr. Joseph Smuczek

Email: jsmuczek@yorku.ca

Schedule

Course Schedule and Location: Pre-recorded lectures will be posted to Moodle at the start of each week.

Live Chat Sessions: Thursdays from 7:00pm – 8:30pm (EST)

- These sessions will allow you to ask questions in an open chat room. Please keep in mind that these chat sessions are **open forums**. It is an opportunity for you to ask any questions you have about the course material. Please remember to be professional and respectful when using the chat room function.

Evaluation

Exams (75%):

Test 1	20%	Online on Thursday, September 24th, 2020 from 6:00pm-8:00pm (EST)
Test 2	27.5%	Online on Thursday, November 5th, 2020 from 6:00pm-8:00pm (EST)
Final Exam	27.5%	Online. Scheduled during the exam period (Dec 9th – Dec 23rd)

Tests and exams are **not** cumulative. Any combination of the following question types may be used on tests and exams: multiple choice, short answer, essay style, case studies, and/or calculations.

Lecture-based quizzes (10%)

- Quiz 1 Must be completed between **Mon. Sept. 14th at 9:00am and Fri. Sept. 18th at 5:00pm**
Quiz 2 Must be completed between **Mon. Oct. 5th at 9:00am and Fri. Oct. 9th at 5:00pm**
Quiz 3 Must be completed between **Mon. Oct. 26th at 9:00am and Fri. Oct. 30th at 5:00pm**
Quiz 4 Must be completed between **Mon. Nov 9th at 9:00am and Fri. Nov 13th at 5:00pm**
Quiz 5 Must be completed between **Mon. Nov. 23rd at 9:00am and Fri. Nov. 27th at 5:00pm**

Each lecture based quiz is worth 2% of your final grade each. They will be in multiple choice and/or case-based format. They will only include information discussed in lecture material posted on the week the quiz is written (i.e. you should listen to and review the lecture for that week before attempting the quiz). A maximum of one attempt and a maximum time of 45 minutes is allowed for each quiz.

Independent study (15%)

The independent study will cover the following topics: **basics of the immune system, basic virology, and HIV.**

A series questions will be given to you to answer about each topic. All questions can be answered using information found in the required textbook for the course. The answers to your questions are not to be handed in. Each component of the independent study will be evaluated by an online quiz worth 5% of your final grade and will have a maximum time of 60 minutes to complete. You only get one attempt to complete each quiz. The due dates for the independent study quizzes are as follows.

- Independent Study Quiz #1 (Basics of the Immune System) – **October 2nd, 2020 at 5:00pm**
Independent Study Quiz #2 (Basic Virology) – **October 30th, 2020 at 5:00pm**
Independent Study Quiz #3 (HIV) – **November 20th, 2020 at 5:00pm**

Online Proctoring for Examinations

This course may use online proctoring for examinations. The instructor may use an online proctoring service to deliver the exam(s), which would be administered through the Learning Management System (e.g. Moodle, Canvas, etc.). Students are required to have access to minimum technology requirements to complete examinations. If an online proctoring service is used, students will need to become familiar with it at least five days before exam(s). For technology requirements, Frequently Asked Questions (FAQs) and details about the online proctoring service visit: <https://registrar.yorku.ca/proctortrack-faq>. Students are required to share any IT accommodation needs with the instructor as soon as they are able.

Important Dates

Important Administrative Dates: <https://registrar.yorku.ca/enrol/dates/fw20>

- Drop Deadline:** Fri. Nov. 6, 2020 (last day to drop without course on transcript)
Course Withdrawal: Sat. Nov. 7 to Dec. 8, 2020 (course still appears on transcript with 'W')

Test 1	Thursday, September 24th, 2020 from 6:00pm-8:00pm (EST)
Test 2	Thursday, November 5th, 2020 from 6:00pm-8:00pm (EST)
Final Exam	To Be Announced

See “**Evaluation**” section for lecture-based quiz and independent study quiz due dates.

Resources

Required Textbook:

“Microbiology with Diseases by Taxonomy, 6th Edition” Bauman, Pearson Publishing.

ISBN: 9780135800010

E-text is also perfectly acceptable. If you have a previous edition (4th, or 5th) that is also perfectly acceptable.

Optional Resources

I make use of two other resources in this course. You are not required to purchase them, but in my opinion they are good clinical and microbiology resources.

“Microbiology. Fourth Edition”, Cornelissen et al., Wolters Kluwer Publishing.

ISBN: 9781975118051

“Brock Biology of Microorganisms. Sixteenth Edition” Madigan et al., Pearson Publishers.

ISBN: 9780135860717

Learning Outcomes

Upon successful completion of this course, students should be able to:

- Describe the basic structure and function of bacteria and viruses
- Recognize select bacteria based on Gram staining, morphology, arrangement and results of other laboratory techniques/methods
- Describe the various ways that microorganisms can cause disease in humans (i.e. pathogenic mechanisms)
- Identify classes of bacteria and their clinical importance in human disease
- In specific disease processes where more than one microorganism can be the cause, differentiate those organisms based on laboratory techniques and findings
- Describe the mechanisms of action of the classes of anti-microbial agents and the mechanisms of antimicrobial resistance
- Describe the basic structure and function of the human immune system
- Describe the meaning and significance of the terms: basic reproduction number, effective reproductive number and herd immunity
- Complete basic calculations involving basic reproduction number, effective reproduction number, and herd immunity.

Course Content

Tentative Lecture Topics and Schedule (Subject to change)

Overview of Microbiology/Introduction to Microbiology

I. Overview of Microbiology

II. Prokaryotic vs Eukaryotic Cells

III. Bacteria:

- i. The Gram Stain
- ii. Differences between gram positive and gram negative bacteria
- iii. Bacterial replication and genetic variation
- iv. Microbial growth cycle and quantification of exponential growth of bacteria
- v. Factors affecting bacterial growth
- vi. Growth media and culturing techniques
- vii. Sterilization techniques/Aseptic technique

Basic Concepts in Medical Microbiology and Medically Important Microbes

I. Normal Human Microflora

II. Harmful/pathogenic bacteria and interactions with humans

III. Specific bacteria and the diseases they cause:

a. Gram Positive Cocci:

- i. *Staphylococcus*
- ii. *Streptococcus*

b. Gram Positive Rods:

- i. *Corynebacterium diphtheria* (Diphtheria)
- ii. *Bacillus anthracis* (Anthrax)
- iii. *Listeria monocytogenes* (Listeriosis) –

c. Gram Negative Cocci:

- i. *Neisseria gonorrhoeae* (Gonorrhea)
- ii. *Neisseria meningitides* (Meningitis)

d. Gastrointestinal/Enteric Gram Negative Rods

- i. *Escherichia coli* (ETEC and EHEC) and the Walkerton Water Crisis
- ii. *Salmonella*
- iii. *Vibrio cholerae* (Cholera)
- iv. *Helicobacter pylori* (Peptic ulcers and gastritis)

e. Non-gastrointestinal Gram Negative Rods

- i. *Bordetella pertussis* (Whooping Cough)
- ii. *Pseudomonas aeruginosa* (Multiple infection types)

f. Other Gram Positive Rods

- i. *Clostridium botulinum* (Botulism and Botox)
- ii. *Clostridium tetani* (Tetanus)
- iii. *Clostridium difficile* (Antibiotic-associated diarrhea)

g. Spirochetes and Rickettsiae

- i. *Treponema pallidum* (Syphilis)
- ii. *Borrelia burgdorferi* (Lyme Disease)
- iii. *Rickettsia rickettsia* (Rocky mountain spotted fever)
- iv. *Rickettsia prowazeki* (Typhus)

- h. Chlamydiae
 - i. *Chlamydia pneumoniae* (Pneumonia)
 - ii. *Chlamydia trachomatis* (Chlamydia)

IV. Antibiotics

- a. Beta lactams
- b. Tetracyclines
- c. Inhibitors of Protein Synthesis
- d. Mechanisms of Resistance

V. Basic Reproduction Number and Herd Immunity

VI. Virology (Independent Study Questions)

VII. Immune System (Independent Study Questions)

Experiential Education and E-Learning

Course Website: Moodle

To access Moodle, please follow these instructions:

- a. Go to: <http://moodle.yorku.ca>
- b. Log in with your Passport York account.

Other Information

Tips on studying for this course:

For the exams, you must know and understand the material presented in the lectures and the information included in the independent study topics.

The textbooks can help consolidate and expand understanding of the material. However, specific material in the textbook not covered through the lectures or independent study topics will **not be on any of the exams**.

Course Policies

Policies for a Missed Midterm Test(s)

There is **no** make up for any missed test.

- If you miss one midterm test, the grade for the missed test will be the final exam grade (see policy under Lecture Component-Grading above)
- **You must write at least one midterm tests to be eligible to write the final exam.**
- If you access or view a test in any way it will be considered completed. The grade of the test (even if you do not complete any part of it and the grade is zero) will apply.

Policy for Quizzes

Quizzes cannot be re-opened after they close. Quiz deadlines will not be extended. You should plan to complete all quizzes with sufficient time before the posted deadline. If you access or view a quiz in any way, it is considered completed (even if you do not complete any part of it).

For reappraisal of lecture material you must submit a written rationale for a reappraisal based on academic grounds* to jsmuczek@yorku.ca within one week of the graded material being made available to you. If it is determined that you have offered sufficient academic grounds, the material will be regraded.

Note: Reappraisal may result in the grade being raised, confirmed or lowered.

**Academic grounds means you make an academic argument for why your answer is correct – statements such as “this grade does not reflect my knowledge” or “I really studied hard and I deserve a better grade” are not academic grounds.*

I appreciate that grades are important to you and all of your classmates. In order to be fair and consistent with regard to the entire class, individual grades are not negotiable. I cannot offer “extra credit” assignments. Marks for assignments and tests are not “rounded” nor “bell-curved”.

University Policies

Academic Honesty and Integrity

York students are required to maintain the highest standards of academic honesty and they are subject to the Senate Policy on Academic Honesty (<http://secretariat-policies.info.yorku.ca/policies/academic-honesty-senate-policy-on/>). The Policy affirms the responsibility of faculty members to foster acceptable standards of academic conduct and of the student to abide by such standards.

There is also an academic integrity website with comprehensive information about academic honesty and how to find resources at York to help improve students' research and writing skills, and cope with University life. Students are expected to review the materials on the Academic Integrity website at - <http://www.yorku.ca/academicintegrity/>

Access/Disability

York University is committed to principles of respect, inclusion and equality of all persons with disabilities across campus. The University provides services for students with disabilities (including physical, medical, learning and psychiatric disabilities) needing accommodation related to teaching and evaluation methods/materials. These services are made available to students in all Faculties and programs at York University.

Students in need of these services are asked to register with disability services as early as possible to ensure that appropriate academic accommodation can be provided with advance notice. You are encouraged to schedule a time early in the term to meet with each professor to discuss your accommodation needs. Please note that registering with disabilities services and discussing your needs with your professors is necessary to avoid any impediment to receiving the necessary academic accommodations to meet your needs.

Additional information is available at the following websites:

Counselling & Disability Services - <http://cds.info.yorku.ca/>

Counselling & Disability Services at Glendon - <https://www.glendon.yorku.ca/counselling/>

York Accessibility Hub - <http://accessibilityhub.info.yorku.ca/>

Religious Observance Accommodation

York University is committed to respecting the religious beliefs and practices of all members of the community, and making accommodations for observances of special significance to adherents. Should any of the dates specified in this syllabus for an in-class test or examination pose such a conflict for you, contact the Course Director within the first three weeks of class. Similarly, should an assignment to be completed in a lab, practicum placement, workshop, etc., scheduled later in the term pose such a conflict, contact the Course director immediately. Please note that to arrange an alternative date or time for an examination scheduled in the formal examination periods (December and April/May), students must complete and submit an [Examination Accommodation Form](#) at least 3 weeks before the exam period begins. The form can be obtained from Student Client Services, Student Services Centre or online at <https://secure.students.yorku.ca/pdf/religious-accommodation-agreement-final-examinations.pdf>

Student Conduct in Academic Situations

Students and instructors are expected to maintain a professional relationship characterized by courtesy and mutual respect. Moreover, it is the responsibility of the instructor to maintain an appropriate academic atmosphere in the classroom and other academic settings, and the responsibility of the student to cooperate in that endeavour. Further, the instructor is the best person to decide, in the first instance, whether such an atmosphere is present in the class. The policy and procedures governing disruptive and/or harassing behaviour by students in academic situations is available at - <http://secretariat-policies.info.yorku.ca/policies/disruptive-and-or-harassing-behaviour-in-academic-situations-senate-policy/>