

Syllabus for Summer 2022 BIOL275-601 Elements of Microbiology

Lectures: Mon/Wed from 5:15 to 9:05 PM in Claire Fagin Hall 214
Labs: Tues/Thurs 12:00-3:30 in Stephen A. Levin Building L11
Instructors: Dr. Kieran Dilks (Lectures) and Jessica Ardis (Labs)
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Office Hours: After lecture or by appointment (K. Dilks) & Tues 11-1 PM in Levin L05 (A. Cottone)

Course Description Microbiology plays a central role in diverse areas of human life such as infectious disease, ecology, and biotechnology. BIOL275-601 Elements of Microbiology will cover aspects of modern microbiology with an emphasis on prokaryotic organisms. The topics will include basic aspects of microbial diversity, genetics, and pathogenesis as well as examples of applied microbiology. Prerequisites for this course are BIOL101 (Introduction to Biology A) or BIOL121 (The Molecular Biology of Life). BIOL221 (Molecular Biology and Genetics) or equivalent are strongly recommended.

Recommended Textbook Madigan *et al.* (2017) Brock Biology of Microorganisms, 15th edition, Pearson Benjamin Cummings (San Francisco, CA) [ISBN-13: 978-0134261928]. This textbook is available at the UPenn Bookstore (<http://upenn.bncollege.com/>). It includes a MasteringMicrobiology™ access card, which is an online homework, tutorial, and assessment product. It is not required.

Attendance Policy Lab attendance and lecture midterm/final attendance is mandatory. There will be no make-up lab sessions offered. Any quiz or labs performed that day will be automatic zeroes. If the lab is a multi-week procedure (excluding analysis only days), then the highest score you can receive on that result sheet is 2.5. Lab absences will likely also be reflected in your participation score. Any lecture exam missed will be an automatic zero.

Exceptions will be made for medical absences or professional/graduate school interviews. Documentation is required if either of these prevent you from attending Friday evening class. Personal absences (e.g., weddings, reunions, participation in non-NCAA sporting events, etc) will not be excused. Two unexcused lab absences will result in a failure for the course. Excused absences will exempt you from any relevant assignment (with exams and lecture quizzes being the exception).

Course and Exam Info In order to receive credit for this course, you must successfully complete the associated lecture and laboratory parts. Course materials for each weekly session (lecture slides, lab worksheets, *etc.*) will be posted on the Canvas course website (<https://canvas.upenn.edu>) and should be read before coming to class.

There will be two midterm exams and one final exam in the lecture part of the course. Each exam will be worth 100 points. The final exam will be comprehensive, covering learning materials from the entire course and worth 100 points. There will be two take-home quizzes based on assigned literature articles that will be worth 15 points each. No make-ups will be provided for any of these exams. A perfect course score for the lecture part will be 300 points.

The laboratory part of the course covers the basic techniques of handling pathogens safely, microbiological and molecular methods for identifying different species, and experiments that test the effects of different agents on microbial reproduction and growth. You will work in pairs or groups of 3 to complete lab experiments. The general topics for each lab section are indicated in the “Tentative Lecture and Lab Schedule” outline.

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Briefly, there will be five evaluation items for the lab part of the course. At the end of most lab sessions, you will hand in a result sheet for grading (each worth 5 points, overall 50 points).

The first half of lab cohesively involves identifying the species of four different unknown bacteria based upon empirical evidence, such as gram staining and DNA sequence analysis. This will culminate in an “unknown project” worth 25 points.

In order to assess preparedness for lab, there will be eight pop quizzes (worth 10 points each) administered throughout the semester. Your lowest quiz grade of the eight will be dropped. These quizzes will cover important theoretical concepts presented in the upcoming lab chapter as well as pertinent details related to the experimental design of that particular unit.

Lab participation will be evaluated ongoing throughout the semester. Consistently arriving to lab on-time, helping others, participating in discussions, and cleaning up carefully at the end of each session will result in full credit of 10 points.

In summary, your final grade will be based on the following:

Lecture Midterms (2x)	85 points each	170 points
Literature Quizzes (2x)	15 points each	30 points
Final Cumulative Exam (1x)	100 points	100 points
Lab Assignments/Result Sheets (10x)	5 points each	50 points
Unknown Project (1x)	25 points	25 points
Prelab Quizzes (7x)	10 points each	70 points
Lab Participation	10 points	10 points
TOTAL		455 points

Regrading for the lecture exams is an option. Only typed requests within a period of one week after official return will be considered by the instructor if (a) the request contains specific, supporting information to show that the answer as given on the respective exam or assignment is correct; and (b) the respective exam was taken in ink and no whiteout was used. If you pick up your exam later than the official return this does not extend your regrade period.

Strategies for Success A great deal of material will be covered in BIOL275-601; thus it is important to keep up with the coursework on a regular basis. If you encounter difficulties with any learning materials, you can turn to the instructors for help with the subject matter or for more general academic advice. Moreover, you may wish to contact the Learning Resource Center (<http://www.vpul.upenn.edu/lrc/lr/>) or the Department of Academic Support Programs (http://www.vpul.upenn.edu/dasp/dasp_home.html) for tutoring or help with studying and test-taking skills.

Code of Academic Integrity The UPenn Code of Academic Integrity will be strictly enforced. Any violation will result in failure in the course.

Consult http://www.upenn.edu/provost/PennBook/academic_integrity_code_of for more information.

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Tentative Lecture and Lab Schedule

Date	Lecture Topics and Lab Chapters	Due Today
5/23	Lecture 1: Introduction and Functional Cell Anatomy	Lab: Microscopy Result Sheet (RS)
5/24	Lab 1; Microscopy - Using a microscope, measuring specimens; end of Lab 1 Lab 2: Pure Culture Unknowns (Part I) - quadrant streaking & serial dilutions of unknown species	
5/25	Lecture 2: Microbial Growth, Microbial Metabolism	
5/26	Lab 2: Pure Culture Unknowns (Part II) - growing pure cultures via quadrant streaking Lab 3: Staining Lab - gram staining, negative staining, and KOH analysis of unknown species	
5/30	NO CLASS	
5/31	Lab 2: Pure Culture (Part III) - colony morphology description; end of Lab 2 Lab 3: Staining Lab continued if necessary; end of Lab 3 Lab 4: Motility (Part I) - inoculate motility butts and proteus plate	Lab: Staining RS Lab: Pure Culture Unknowns RS
6/1	Lecture 3: Microbial Molecular Biology & Microbial Genetics	
6/2	Lab 4: Motility (Part II) - analyze motility butts and proteus plates; end of Lab 4 Lab 5: PCR & Electrophoresis (Part I) - PCR amplify 16s RNA from unknowns	Lab: Motility RS
6/6	Midterm Lecture Exam 1 (remote) Quiz #1 due at the beginning of class	Lecture: Quiz #1
6/7	Lab 5: PCR & Electrophoresis (Part II) - gel electrophoresis, exo-sap, and submit PCR samples for sequencing Lab 6: Diagnostic Testing (Part I) - dry exercise using Bergey's	
6/8	Lecture 4: Microbial Evolution	
6/9	Lab 6: Diagnostic Testing (Part II) - analyze sequence data using BLAST, set up diagnostic tests for unknowns	Lab: PCR & Electrophoresis RS
6/13	Lecture 5: Virology; Virus Journal Club	
6/14	Lab 6: Diagnostic Testing (Part III) - Interpret diagnostic tests, identify additional tests to unambiguously identify each unknown End of UNKNOWN SPECIES ANALYSES	Lab: Diagnostic Testing RS
6/15	Lecture 6: Immunology, Microbe:Host Interactions	
6/16	Lab 7: Bacterial Growth Curve - Measure growth of <i>E. coli</i> at several temperatures; end of Lab 7	Lab: Unknown Project
6/20	NO CLASS	
6/21	Lab 8: Phage Growth Curve (Part II) - analyze phage/bacteria plates; end of Lab 8 Lab 9: Enumeration (Part II) - analyze MPN results; end of Lab 9	
6/22	Midterm Lecture Exam 2 (remote) Quiz #2 due at the beginning of class	Lecture: Quiz #2 Lab: BGC RS Lab: PGC RS Lab: Enumeration RS
6/23	Lab 10: Antibiotic Sensitivity (Part I) - Kirby-Bauer and MIC plates	
6/27	Lecture 7: Current Topics in Microbiology	

6/28	Lab 10: Antibiotic Sensitivity (Part II) - analyze plates; end of Lab 10	
6/29	Cumulative Final Lecture Exam (remote)	Lab: Antibiotic Sensitivity RS