



USC Dornsife

Dana and David Dornsife
College of Letters, Arts and Sciences

BISC 300L: Introduction to Microbiology

13017 - 4 units, Fall term

Tuesday & Thursday, 12:30 – 1:50 pm

LVL 16

Labs – ZHS 472

13272 Wed 1:00 – 3:50 pm

1327- Thurs 9:00 – 11:50 am

Instructor: Shirin Birjandi, Ph.D.

Office: ZHS 256

Office Hours - Lecture: Tue & Thurs: 2:30-3:30 pm

Office Hours - Lab: Mon: 1-2 pm and Wed: 4-5 pm

Contact Info: birjandi@usc.edu

Lab Manager: Celeste Chong-Cerrillo, Ph.D.

Office: ZHS 450

Office Hours: Open door policy

Contact Info: chongcer@usc.edu (Subject line should state “BISC 300”)

Course Description

Introduction to the biology of Bacteria, Protists and viruses; their structure, life cycles, geochemical activities, diversity, ecology and nutrition. Fundamentals of metabolism, genetics and genomics, microbial biotechnology, roles in health, disease and human immunological responses. Meant for students with fundamental understanding of general biology, molecular biology, and organic chemistry.

Learning Objectives

1. Understand and apply the scientific method, including forming hypotheses, designing experiments to test hypotheses, and collecting, analyzing, interpreting, and reporting data.
2. Understand the structure and function of prokaryotic and eukaryotic cells, as whole entities and in terms of their subcellular processes.
3. Understand how adaptation works through genomic exchange or mutations.
4. Understand the functioning of organisms at the molecular and cellular levels.
5. Understand the importance of microorganisms in biotechnology
6. Know the interrelationship between host and infectious agent and compare innate versus acquired immunity.

Prerequisites/Co-Requisites: BISC 320L – Molecular Biology (**FIRM**); CHEM 322a/325a– Organic Chemistry

Recommended Preparation: Familiarity with basic chemistry, physics, and algebra is assumed (along with prerequisites for BISC 320L). Basic general biology knowledge is also assumed, but also covered in the text.

Required Texts and Laboratory Manual

- *Prescott's Microbiology*, 10th ed. (or 9th ed.) by Prescott
- *Introduction to Microbiology Laboratory Manual*, Fall 2018 (available at the USC Bookstore)
- Additional readings from the primary literature may also be assigned.

Course Notes

Course exams follow the lecture, supplemental reading and text. Complete reading assignments and supplemental material will be posted on Blackboard prior to lecture. There will also be extra credit written reflections of four papers listed in the syllabus that will be posted online. Up to 5 points can be earned for each reflection. Students can choose to do all or none, but the paper reflection must be typed and turned in during class on the day the paper is listed on the syllabus. There will be three exams worth 100 points each plus a final exam worth 150 points. The final will be cumulative.

We will be using Blackboard (<https://blackboard.usc.edu/>) as our main form of communication. Blackboard will contain announcements, notes and assignments.

Blackboard is a convenient system to communicate scores and grades; however, those grades are not authoritative. It is the student's responsibility to notify the instructor or the Lab Manager ASAP in the event of any mistakes in your posted score.

Please remember that (1) the course mean given on Blackboard is also NOT authoritative, and (2) that only the total number of points earned by the end of the semester determines your course grade. We will be glad to discuss your performance, and your possible grades, at any time throughout the course. Help provided in this way should be considered only provisional. Your later performance may change (sometimes dramatically) the best-meant extrapolation.

Grading Breakdown

The course grade will be based upon 690 possible points:

Assignment	Points	Approx % of Grade
Midterm 1	100	14.5
Midterm 2	100	14.5
Midterm 3	100	14.5
Final Exam	150	22
Laboratory	240	35
TOTAL	690	100

The final examination will include material composed of questions that integrate concepts developed throughout the course, both in the lecture and the laboratory portions.

Grading Scale

Only the TOTAL number of points earned by the END of the course will determine the final letter grade. Course final grades will be determined using the following scale unless the average of the class is low then grades will be determined based on a curve.

A	90.1 - 100
A-	86.7 - 90
B+	83.3 - 86.6
B	80 - 83.2
B-	76.7 - 79.9
C+	73.3 - 76.6
C	70 - 73.2
C-	66.7 - 69.9
D+	63.3 - 66.6
D	60 - 63.2
D-	56.7 - 59.9
F	≤56.6

Chronic, unexcused absence from laboratory (more than two unexcused absences) will result in a grade penalty above and beyond missed work or exercises. Exceptions to the grading policy are not expected, and any student believing they have been granted a deviation from the grading policies defined in this syllabus must have a written agreement signed by Dr. Birjandi. Final exams will be kept on file for one semester. Challenges to the final grade must be made within 3 weeks of the beginning of the Spring 2019 semester.

Assignments Rubrics and Submission Policy

Refer to Laboratory Syllabus and Policies regarding lab assignments.

Grading Timeline

Grades for Midterm Exams will be posted within one calendar week following the exam date.

Additional Policies

1. EXAM DATES ARE FIRM. An exam can be taken only on the scheduled date and at the scheduled starting time. **There are no makeup exams in the course.** If a student misses an exam due to a true emergency, official written documentation (what you feel is appropriate to demonstrate a legitimate reason for missing said exam) should be submitted to Dr. Chong-Cerrillo within 2 days of the missed exam. Students will only be excused from one exam with a valid excuse. If it is a medical excuse, you must also state in writing (a) the doctor's name and phone number and, (b) a signed statement authorizing us to discuss with the doctor whether you were too ill to take the exam. (Note that neither you nor the physician needs to tell us the nature of your illness.) Please note that your physician has to be licensed to practice medicine by the State of California (www.medbd.ca.gov) and that it's considered unethical and unwise for a physician to provide medical care for a family member. If you were seen at the Engemann Student Health Center, they no longer provide: 1) class excuse notes for illness, 2) clinical appointments for class excuse, and 3) authentication of outside physician certificates. The *Absence of Class - Self Verification Form* provided by the Student Health Center is insufficient documentation for our purposes. The recommended sanction for falsification of medical documentation is an F in the course and suspension or expulsion from the university. Your professors may, at their discretion, permit the use of the student's performance on other exams in determining the missed exam grade. If your excuse is judged not to be valid, or you do not provide it within the allotted time, you will receive a score of zero for the missed exam.
2. A student is not allowed to start an exam after the first student has left any exam room. You may be required to write your full name on EACH page of an exam. If you fail to do so, ½ point will be deducted for each page missing a full name. Seating arrangements may be specified by the faculty. No writing is allowed after the instructors/TAs say the exam period has ended.
3. There is a no-regrade policy. If you have any questions concerning exam points, you will need to make an

appointment to see the professor within one week upon receiving the graded exam.

4. No special assignments for extra credit can be offered to an individual student or subset of students, because that would be considered unethical.
5. Final exams will be kept on file for one semester. Challenges to the final grade must be made within 3 weeks of the beginning of the Spring 2019 semester.
6. Exceptions to the grading policy are not expected, and any student believing they have been granted a deviation from the grading policies defined in this syllabus must have a written agreement signed by Dr. Birjandi.
7. During lecture you will not be able to use your cell phone – please silence it and keep it either in your backpack/purse. We reserve the right to collect your cell phones during exam days, both in lecture and lab. Similarly no calculators, tablets, smart watches, Google glasses, etc. will be allowed.
8. It may be necessary to make adjustments to the syllabus during the semester; check BLACKBOARD for updates.

Course Schedule: Introduction to Microbiology

Wk	Day	Date	Topic	Chapter
1	Tuesday	Aug 21	Introduction/ microbes in the news; Historical perspectives	Ch 1 (p. 1-19)
	Thursday	Aug 23	Microscopy The bacterial cell: structure and function	Ch 2 (22-40) Ch 3 (p. 42-77)
2	Tuesday	Aug 28	Eukaryotic cell structure	Ch. 5
	Thursday	Aug 30	Viruses	Ch. 6
3	Tuesday	Sept 4	Microbial growth	Ch. 7
	Thursday	Sept 6	Control of microbial growth	Ch. 8 (p. 172-184) Ch. 9 (p. 188-203)
4	Tuesday	Sept 11	Control of microbial growth	Ch. 8 (p. 172-184) Ch. 9 (p. 188-203)
		Extra Credit		Ling, 2015
	Thursday	Sept 13	MIDTERM 1	
5	Tuesday	Sept 18	Respiration, catabolism and anabolism	Ch. 11 (p. 227-245; 248-252)
	Thursday	Sept 20	Respiration, catabolism and anabolism	Ch. 11 (p. 227-245; 248-252)
6	Tuesday	Sept 25	Fermentation and food microbiology	Ch. 11 (p. 245-248) Ch. 41 (p. 937-945)
	Thursday	Sept 27	Horizontal gene transfer	Ch. 16 (p. 383-397)
7	Tuesday	Oct 9	Genomes and mutations	Ch. 16 (p. 369-384)
	Thursday	Oct 11	Genomes and mutations	Ch. 16 (p. 369-384)
		Extra Credit		Oliver, 2000
8	Tuesday	Oct 16	Transcription and Translation	Ch. 16 (p. 369-384)
	Thursday	Oct 18	MIDTERM 2	
9	Tuesday	Oct 23	Transcriptional regulation	Ch. 13 (p. 301-307) Ch. 14 (p. 321-339)
	Thursday	Oct 25	Motility and chemotaxis Quorum sensing	14 (p. 334-335), Ch. 14 (p. 339-341); Ch. 14 (p. 342-344)
		Extra Credit		Kroupitski, 2009
10	Tuesday	Oct 30	Molecular Tools	Ch. 17 (p. 400-403; 406-414) Ch. 18 (p. 420-428)
	Thursday	Nov 1	Molecular Tools	Ch. 17 (p. 400-403; 406-414) Ch. 18 (p. 420-428)
11	Tuesday	Nov 6	Innate Immunity	Ch. 33 (p. 707-734)
	Thursday	Nov 8	Innate Immunity	Ch. 33 (p. 707-734)
12	Tuesday	Nov 13	MIDTERM 3	
	Thursday	Nov 15	Adaptive Immunity	Ch. 34 (p. 736-760)
13	Tuesday	Nov 20	Adaptive Immunity	Ch. 34 (p. 736-760)
	Thursday	Nov 22	Thanksgiving	
14	Tuesday	Nov 27	Microbiome	Ch. 32 (p. 698-706)
		Extra Credit		Gill, 2006
	Thursday	Nov 29	Introduction to infectious diseases and epidemiology	Ch. 35 (p. 770-784) Ch. 37 (p.806-808)
	Tuesday	Dec 11	Final Exam, 11:00 am-1:00 pm	

Statement on Academic Conduct and Support Systems

Academic Conduct:

Plagiarism – presenting someone else’s ideas as your own, either verbatim or recast in your own words – is a serious academic offense with serious consequences. Please familiarize yourself with the discussion of plagiarism in *SCampus* in Part B, Section 11, “Behavior Violating University Standards” policy.usc.edu/scampus-part-b. Other forms of academic dishonesty are equally unacceptable. See additional information in *SCampus* and university policies on scientific misconduct, <http://policy.usc.edu/scientific-misconduct>.

Support Systems:

Student Counseling Services (SCS) – (213) 740-7711 – 24/7 on call

Free and confidential mental health treatment for students, including short-term psychotherapy, group counseling, stress fitness workshops, and crisis intervention. engemannshc.usc.edu/counseling

National Suicide Prevention Lifeline – 1 (800) 273-8255

Provides free and confidential emotional support to people in suicidal crisis or emotional distress 24 hours a day, 7 days a week. www.suicidepreventionlifeline.org

Relationship and Sexual Violence Prevention Services (RSVP) – (213) 740-4900 – 24/7 on call

Free and confidential therapy services, workshops, and training for situations related to gender-based harm. engemannshc.usc.edu/rsvp

Sexual Assault Resource Center

For more information about how to get help or help a survivor, rights, reporting options, and additional resources, visit the website: sarc.usc.edu

Office of Equity and Diversity (OED)/Title IX Compliance – (213) 740-5086

Works with faculty, staff, visitors, applicants, and students around issues of protected class. equity.usc.edu

Bias Assessment Response and Support

Incidents of bias, hate crimes and microaggressions need to be reported allowing for appropriate investigation and response. studentaffairs.usc.edu/bias-assessment-response-support

The Office of Disability Services and Programs

Provides certification for students with disabilities and helps arrange relevant accommodations. dsp.usc.edu

Student Support and Advocacy – (213) 821-4710

Assists students and families in resolving complex issues adversely affecting their success as a student EX: personal, financial, and academic. studentaffairs.usc.edu/ssa

Diversity at USC

Information on events, programs and training, the Diversity Task Force (including representatives for each school), chronology, participation, and various resources for students. diversity.usc.edu

USC Emergency Information

Provides safety and other updates, including ways in which instruction will be continued if an officially declared emergency makes travel to campus infeasible. emergency.usc.edu

USC Department of Public Safety – UPC: (213) 740-4321 – HSC: (323) 442-1000 – 24-hour emergency or to report a crime.

Provides overall safety to USC community. dps.usc.edu

Introduction to the Microbiology Laboratory Policies

Laboratory: ZHS 472, Section 13272 - Wednesday, 1:00 p.m. – 3:50 p.m.
Section 1327_ - Thursday, 9:00 a.m. – 11:50 a.m.

Laboratory Manager: **Dr. Chong-Cerrillo, PhD**

Office: ZHS 450

E-mail: chongcer@usc.edu (**the subject line should state: "BISC 300"**)

Office Hours: Open door policy and by appointment

Lab Instructor: Shirin Birjandi, PhD

Office Hours: TBD

Required Text: *Introduction to Microbiology Laboratory Manual*, Fall 2018, Celeste Chong-Cerrillo, PhD (USC Custom Publishing)

Web Site: Blackboard (<https://blackboard.usc.edu/>)

General Policies

You are required to attend all lab sessions. You will not be able to make up any missed labs. If a student misses a lab due to a true emergency situation, an acceptable written excuse must be submitted within 3 days to Dr. Chong-Cerrillo. Then it will be at her discretion to determine whether the lab will be made up. However, if the documentation is not received within this time frame, you will not be allowed to make up the missed lab.

In addition, switching labs is not allowed; you must attend the lab section you are registered for. If you have a compelling reason for not being able to attend your lab section AND you speak to Dr. Chong-Cerrillo in advance (the sooner the better), exceptions may be allowed. If you make up the work in another lab section but you have not spoken to Dr. Chong-Cerrillo, you will still be marked absent for that lab.

Please come to class and lab on time and do not schedule any appointments during your regular lab period. You are required to remain for the entire lab session or until excused by your Lab Instructor.

Come to lab prepared (i.e., read and know your lab exercise BEFORE you come).

Each student will be assigned a microscope to use throughout the semester. It is your responsibility to keep them clean and in good working condition. Moreover, a clean scope is important for proper microscopic analysis and will be critical for your Diagnostic Unknown project.

You will be given a storage box containing a set of common laboratory supplies that you will use throughout the semester. Please properly maintain these supplies as they will not be replaced unless absolutely necessary.

You are required to wear a 100% cotton, long-sleeve, below-the-waist lab coat at all times in the lab (aprons are not allowed). **You will need to provide your own lab coat** (available at the bookstore or a uniform store) and bring it to the first scheduled lab session.

All students must sign and abide by the “Laboratory Safety Rules and Regulations” Contract.

Keep the ringers of your cell phones either off or on vibrate. If you need to speak on the phone to anyone for any reason during lab, take your conversations out of the room and away from Dr. Chong-Cerrillo’s office.

Laboratory Grade[§]

The laboratory grade, worth 240 points, breaks down as follows:

2 Lab Exams (25 points each)	50
Lab Reports:	
Organisms in the Environment	15
Bacterial Transformation	15
Winogradsky Column	40
Formal Lab Report	50
Diagnostic Unknown	50
Lab Notebook Check	10
<u>Subjective*</u>	<u>10</u>
Laboratory Total	240

*Based on class participation, attendance, initiative, attitude

[§]Chronic, unexcused absence from laboratory (more than two unexcused absences) will result in a grade penalty above and beyond missed work or exercises.

Lab Exams

Lab exams will test your ***understanding*** and ***application*** of the topics and exercises covered in the laboratory sessions. Lab exams will be at the beginning of the lab session.

It is your responsibility to be present on the days of the lab exams. If you miss a lab exam due to a true emergency, you must present a valid excuse with official documentation to the Lab Manager within two (2) days of the missed exam. A valid medical excuse must state in writing (a) the doctor’s name and phone number and (b) a signed statement authorizing us to discuss with the doctor whether you were too ill to take the exam. (Note that neither you nor the physician need to tell us the nature of your illness.) Please note that your physician has to be licensed to practice medicine by the State of California (www.medbd.ca.gov) and that it’s considered unethical and unwise for a physician to provide medical care for a family member.

We will contact the doctor and decide whether you have a valid excuse. If you were seen at

the USC Engemann Student Health Center, they do not provide notes and their *Statement for Absence of Class - Self Verification Form* is **insufficient documentation** for our purposes. If you have a valid excuse, the Laboratory Manager may, at her discretion, allow you to take the exam in another lab section that week or permit the use of an adjusted* score from the other exam in determining the grade. If you do not have a valid excuse or fail to provide it within the allotted time, you will receive zero points for the missed lab exam.

Your midterm lab exam will be handed back to you and reviewed in lab. If you feel an error was made in the grading of your exam, you must submit your exam, along with a thoroughly written explanation of why you think your answer deserves more credit, to your Lab Instructor within 2 days of the time it was returned to the entire lab. Oral and e-mail requests will not be considered. If you took the exam in pencil or used white out, we will not honor a regrade request. The entire answer will be re-graded, not just the part you think deserves more credit. Your score may increase or decrease as a result of a re-grade.

Laboratory Reports

There are a few Chapters where you are required to turn in Lab Reports consisting of data and data analysis for that exercise. Those excersies are as follows:

Chapter	Lab
3	Organisms in the Environment
6	The Winogradsky Column
12	Diagnostic Unknown
23	Bacterial Transformation

The lab reports are to be handed in during lab, at the beginning of the lab session. Please refer to the Lab Schedule for the due dates. For every 12-hour increment any report is handed in late, you will lose 10% of the total possible points [i.e., if the report is past 5 days (120 hrs) late, you will receive no points for that assignment].

Laboratory Notebook Check

Even though you are not required to hand in weekly lab reports, there will be **random notebook checks** throughout the semester (i.e., you will receive NO warning or “heads-up,” therefore keep up with your data recording and answering of questions at the end of each chapter). Properly documented data and results will help you later in the semester, especially for the Diagnostic Unknown.

Diagnostic Unknown

The Diagnostic Unknown, Chapter 12, is a 10-week, **independent** project where you will be required to identify bacterial species of a unknown mixed culture by using microbiological staining, cultural, and biochemical procedures. The general protocol will require: (1) Gram staining, (2) streak-plating for observation of colonial characteristics and separation of mixed culture, (3) the performance of appropriate biochemical tests as indicated in the dichotomous keys outlined in Appendix C, and if necessary (4) information in *Bergey’s Manual of Systematic Bacteriology*. More detailed information and guidelines are in the chapter.

*based on your performance relative to the average of the class.

You will be able to work in the laboratory outside of your regularly scheduled lab section following these guidelines:

- There is no ongoing laboratory class. For the most part, you may **not** enter during the first ~1½ - 2 hrs, even to transfer a culture. If the lab is towards the end of the weekly experiment within this time frame, it will be OK. Please check with the Lab Manager or Instructor **BEFORE** entering.
- There is a free station to work at.
- The Lab Instructor (or if absolutely necessary, the Lab Manager) is available to supervise (please DO NOT ask the Lab Technician to supervise). **Think and plan ahead!** Do not expect that there will be someone around last minute to supervise or follow-up on your cultures.
- You have complete Personal Protective Equipment (PPE).

The Lab Instructor's office hours will be held in the lab and you are welcome to come in and work during those times.

Submission of the lab report and final identification of your species will be due at the beginning of the last lab session. The Diagnostic Unknown is worth 50 points; more detailed information regarding the grade breakdown can be found within the chapter.

Formal Laboratory Report

You will be required to submit one Formal Laboratory Report for *Chapter 10 - Nutrition and Growth of Bacteria*. Please refer to the "Formal Laboratory Report Format Guidelines" located in this section for policies and guidelines regarding the Formal Lab Report. The lab reports listed above do NOT follow this format.

The Formal Laboratory Report must be ORIGINAL WORK by the student involved. Plagiarism is strictly forbidden and will be treated with the usual University policies if it is encountered.

An electronic copy of your Formal Lab Report will be submitted through TurnItIn on your LAB Blackboard site under the "Assignments" tab. Make sure the document you submit is a single file and your FINAL version as you will not have another opportunity to upload again. If you do not receive an email confirmation, your upload was NOT successful. Do not wait until the last minute to submit your paper. Blackboard can have issues that we are not responsible for and 5:01 pm is considered late. You will also be required to hand in a hard copy to your Lab Instructor the following lab session.

For every 12-hour increment the Formal Report is handed in late, 10% of the total possible points will be deducted (i.e., if the report is past 5 days late, you will receive no points for that assignment).

Blackboard and Posting of Grades/Scores

Blackboard (<https://blackboard.usc.edu/>) is used as a convenient way to communicate scores and grades; however, **those grades are not authoritative**. Blackboard will list BISC 300 lecture and lab sections as "separate courses". All scores (lecture and lab) are posted in your LAB section. However, be sure to check for additional postings and announcements both in the lecture section and the lab section on a weekly basis. It is the student's responsibility to notify your Lab Instructor or Lab Manager ASAP in the event of any mistakes in your posted score.

Please remember that (1) the course mean given on Blackboard is NOT authoritative, and (2) that only the total number of points earned determines your course grade. We will be glad to discuss your performance, and your possible grades, at any time throughout the course. Help provided in this way should be considered only provisional. Your later performance may change (sometimes dramatically) the best-meant extrapolation.

Academic Accommodations

Students requesting academic accommodations based on an academic disability are required to register with Disability Services and Programs (DSP) each semester. A letter of verification for approved accommodations can be obtained from DSP when adequate documentation is filed. Please be sure the letter or notification is delivered to Dr. Chong-Cerrillo as early in the semester as possible. DSP is open Monday-Friday, 8:30 am - 5:00 pm, GFS 120, Email: ability@usc.edu, Phone: (213) 740-0776.

Microbiology Laboratory Schedule

Unit	Wk	Date	Chapter	Laboratory	Lab Events
I	1	8/22	- 1 2	Lab Orientation Lab Fundamentals in Microbiology Spontaneous Generation of Microbes	
	2	8/29	3 4 5 6	<i>Isolation of Microorganisms from the Environment/Manipulation of Cultures</i> Microscopy Determination of Bacterial Motility <i>Winogradsky</i>	
II	3	9/5	3 7 8 9	Macroscopic Observation of Microorganisms (from Environment)/ Manipulation of Cultures (cont'd) Preparation of Smears and The Gram Stain Endospore Stain Acid-Fast Stain	
III IV	4	9/12	7 - 9 10 11 12	Analysis of stains (if necessary) <i>Nutrition and Growth of Bacteria</i> Anaerobic Culture Techniques <i>Diagnostic Unknown - Independent Project</i>	Chapter 3 Lab Report Due
V VI	5	9/19	10 11 13 14 15 16 17	Nutrition and Growth of Bacteria (cont'd) Anaerobic Culture Techniques (cont'd) Starch Hydrolysis Fat (Lipid) Hydrolysis Carbohydrate Fermentation Oxidase Test Identification and Differentiation of Enterics - IMViC Test	
VII VIII	6	9/26	13 14 15 17 18 19 20 21	Starch Hydrolysis (cont'd) Fat (Lipid) Hydrolysis (cont'd) Carbohydrate Fermentation (cont'd) Identification and Differentiation of Enterics - IMViC (cont'd) Catalase Test Differentiation and Identification of <i>Staphylococcal</i> Pathogens Differentiation and Identification of <i>Streptococcal</i> Pathogens Coliform Analysis	
VIII IX	7	10/3	15 19 20 21 22 23	Carbohydrate Fermentation (cont'd) - Alkaline Swing Differentiation and Identification of <i>Staphylococcal</i> Pathogens (cont'd) Differentiation and Identification and of <i>Streptococcal</i> Pathogens (cont'd) Coliform Analysis (cont'd) Wine Production <i>Bacterial Transformation</i>	Chapter 10 Formal Lab Report Due 5 pm, Friday 10/5
IX	8	10/10	23 24	Bacterial Transformation (cont'd) Ames Test for Detection of Chemical Carcinogenicity	Lab Midterm Exam
X	9	10/17	24 25 26 27	Ames Test for Detection of Chemical Carcinogenicity (cont'd) Antimicrobial Testing. The Kirby-Bauer Method Effects of Commercially Available Disinfectants and Antiseptics Lethal Effects of Ultraviolet Light	Chapter 23 Lab Report Due

Labs in *blue italics* require Lab Reports.

Unit	Wk	Date	Chapter	Laboratory	Lab Events
XI	10	10/24	25	Antimicrobial Testing. The Kirby-Bauer Method (cont'd)	
			26	Effects of Commercially Available Disinfectants and Antiseptics (cont'd)	
			27	Lethal Effects of Ultraviolet Light (cont'd)	
			28	Protists	
			29	Mycology - Introduction to Filamentous Fungi	
XII	11	10/31	30	The Cultivation and Enumeration of Bacterial Viruses	
XIII	12	11/7	30	The Cultivation and Enumeration of Bacterial Viruses (cont'd)	
			31	ELISA	
	13	11/14	31	ELISA (cont'd)	
	14	11/21	<i>Thanksgiving Break</i>		
	15	11/28	1 - 31	Lab Final Exam (cumulative)	Ch. 6 - Winogradsky Lab Report & Diagnostic Unknown Due