

Biology 331 Course Information – Winter 2012
General Microbiology (Writing Intensive, 4 credits)

Lecture Meeting Times: MW, 10:00-10:50 a.m.

Laboratory: T AND R, 8-10 a.m.

Instructor: Sarah Boomer, Ph.D.

Office/Hours: 221; 8-8209; office hours will be posted on-line and on my door

Website: www.wou.edu/~boomers/boomer.html (has links to course materials)

Email: boomers@wou.edu

This writing intensive biology core course is designed to give you a broad knowledge of microbiology in the context of the planet, humankind, and general science. Course pre-requisites include 200-level Biology (BI 211-3), 200-level Chemistry (BI 221-3), Genetics (BI 314), and Writing (WR 135).

Text and Required Course Materials: Brock's Biology of Microorganisms (11th, 12th, or 13th Edition). Each person will maintain a lab notebook; because you are not allowed to take the notebooks home (see lab policy section), it is STRONGLY recommended you purchase and use a carbon-copy style manual so you can tear out copies for study purposes after the lab. If you elect not to buy/use this, you will have to take sufficient notes to feel comfortable for the frequent in-lab mini-exams.

Writing: Informal writing is based on lab notebooks and video summaries. Formal writing is based on two reports that are based on reading and writing about primary research.

Lecture Exams: There are 2 lecture-based exams (including the final). Owing to pre-professional exam format (MCAT, DAT, GRE), 40% all lecture exams will be multiple-choice. Missed lecture exams cannot be made-up without a promptly provided excuse (e.g. university-sanctioned trip, note from doctor). Unless stated, exams are only based on my lecture notes and labs.

Lab Exams: There will be SEVEN mini-exams (15 pts. EACH, all short answer) that take place during the term in lab; each will be announced one lab prior to when they take place. In addition, there will be a comprehensive final (60 pts.) that will involve practical hands-on skill assessment, sight-recognition of lab materials, and data analysis. Because practical materials will be freshly made, NO MAKE-UP opportunities for the lab final are available; if you miss the lab final, you will receive an incomplete and have to take the lab final during the next term Biology 331 is offered.

In-Class Videos: Two or three videos will be shown in class. Each presentation is accompanied by 10 pts. of short-answer questions due in class.

Grade Breakdown and Scale

Lecture Mid-Term and Final: 2 X 100 = 200 pts.

90-100% (A)

Lab Mini-Exams (15 X 7) and Practical (60): 165 pts.

80-89% (B)

Lab Notebooks = 110 pts.

70-79% (C)

Research Paper Reports: 2 X 45 = 90 pts.

60-69% (D)

Video Summaries: 20 or 30 pts.

59% or less = F

TOTAL = 585-595 pts.

Course Syllabus – Winter 2012

Week Of	Lecture (Mondays & Wednesdays)	Lab (Tuesdays & Thursdays)
1/9-12	Syllabus and Pre-Test	Lab, Safety & Paper Overview – 9:00 a.m.
	Introduction and Diversity	Introduction Set-Up
1/16-18	MLK Holiday	All Projects Follow-Up - Paper Selection Due
	Prokaryotic Cell Biology	Lab One Mini-Exam – 9:00 a.m.

1/23-26	Unique Chemotrophs	Nitrogen Set-Up
	Phototrophic Bacteria	Antibacterials Set-Up
1/30-2/2	Video - Superbugs	All Projects Follow-Up – N PAPER DUE
	Prokaryotic Central Dogma	All Projects Follow-Up
2/6-9	Microbial Control	Applied Set-Up
	Ecology of You - Normal Flora	All Projects Follow-Up – Drug PAPER DUE
2/13-16	Unit One Exam	Enterics Set-Up
	Immunology	All Projects Follow-Up - Applied PAPER DUE
2/20-23	Bacterial Pathogens/Virulence	Immunodiagnostics and Epidemiology
	Video - Vaccines	All Projects Follow-Up - Campy PAPER DUE
2/27-3/1	Applied Immunology	Start Plasmid Lab
	Eukaryotic Pathogens	Plasmid Isolation - Immuno PAPER DUE
3/5-3/8	Virology I	Plasmid Fingerprinting
	Virology II	Plasmid Finish
3/12-15	Virology III, Epidemiology	Lab Practical I
	TBA	Lab Practical II
Final Exam – TBA, See University-Assigned Time		

Course Learning Outcomes: *At the end of the course, students should be able to describe...*

Unit One – Theme: Prokaryotic Diversity, Metabolism, and Ecology

Key prokaryotic cell structures, molecular biological features, and evolution

Unique prokaryotic metabolic strategies – both chemotrophic and phototrophic

Examples of environmental prokaryotic communities, including some pathogens and control issues

Examples of normal flora, including understanding their connection to nosocomial infection

Unit Two – Theme: Immunology, Medical Microbiology

Basic immunology, including key vaccines and vaccine strategies

Examples of prokaryotic virulence factors and how each contributes to bacterial pathogenesis

Examples of eukaryotic pathogens, emphasizing disease features, epidemiology, and control

Examples of viral pathogens, emphasizing molecular biology, disease features, and control

Lab

Carry out proper aseptic technique, culture-management, and microbial enumeration

Culture-Dependent methods, including strategies for selecting and differentially ID-testing bacteria

Culture-Independent methods, including immuno-diagnostics and DNA-based approaches

Cross-Cutting

Important historical figures, emphasizing microbial landmarks and detection methods

Examples of the many important microbial applications and biotechnology advances

Global examples of the impact of microbiology, and how evolution defines these issues

Guide to Your Text: Your text is a resource for helping you master course/lab materials, and performing additional research for your formal reports. I do not follow the explicit order of the text and cannot recommend specific reading - in part because I am allowing you to use multiple different editions (which have undergone some chapter-level changes). Therefore, you will be jumping around a lot in the book to follow my materials, and you need to be competent to use the index and locate appropriate reading sections on your own, in whatever edition you chose to buy/use.

Here are some top tips for working with the textbook:

- If you have forgotten pre-requisite knowledge, there are “review” concepts in the first 2 text units, including chapters about Biomolecules, Metabolism, and Molecular Biology/Genetics.
- Understand that there is a major unit called MICROBIAL DIVERSITY and it contains MANY CHAPTERS about specific groups of Bacteria, Archaea, Eukarya, and Viruses. You will be consulting each whenever a microbe is named (which is OFTEN, throughout the whole class).
- Understand that there is a major text unit called METABOLIC DIVERSITY/ECOLOGY and it contains a LOT of information related to unique prokaryotic metabolic strategies. These units (each represented by SEVERAL chapters) will be used extensively during the first half of class.
- Understand that there are several units related to disease and defense: PATHOGENICITY, IMMUNOLOGY, INFECTIOUS DISEASE, and MICROBIAL DISEASES. These units (each represented by SEVERAL chapters) will be used extensively during the second half of class.

Study Tip Throughout Term: for every named GENUS, you need to know which DOMAIN, PHYLUM and/or GROUP it belongs to - in addition to other specific features or processes highlighted in lecture. It is wise to develop study note-cards based on each named GENUS.

Lab Policy

Lab Attendance: Lab attendance is mandatory and you CANNOT miss introductory labs because that is when we go over and practice key safety activities. There are no opportunities to make up any other lab because each involves significant preparation, including growing fresh materials overnight. For these and other safety reasons, access to the lab is only during scheduled lab times.

Individual Lab Notebooks:

NOTEBOOKS DO NOT LEAVE THE LAB. ALL work MUST OCCUR in the lab and I will note books at the end of every lab and grade them at random times throughout the term. At the end of the term, you may keep your notebook if you sign a “notebook honor promise” statement not to share your materials. As stated previously: It is STRONGLY recommended you purchase and use a carbon-copy style manual so you can tear out copies for study purposes after the lab (cost = \$15-20 on-line). If you elect not to buy/use such a notebook, you will have to take sufficient notes to feel comfortable for the frequent in-lab mini-exams.

The goal of a notebook is to keep a legible, organized, detailed account of EVERYTHING you do, see, or generate. Before the first day of lab, divide your notebook into 7 sections (reflecting projects above), leaving 10-15 pages between each and making labeled tabs that identify each section above. Within each project section, DATED entry(ies) must appear every day you work on a given project. Within each project section, you need to treat entries as linear-temporal journals (i.e. write down everything you do each day, in dated time-order within each project section). Throughout each lab handout, there are BOLD instructions for project-specific things I will be looking for. In addition and for ALL projects, remember to do the following:

1. Record what you label your plates and tubes so you can identify things later
2. Record where materials are at end of each day (incubator, refrigerator, discarded, etc.)
3. For visual tests, describe what you see (i.e. avoid just saying "test was +")

Formal Research Papers: Building on lab projects are advanced, primary research papers and accompanying questions (see on-line course materials link to WRITING section). For this class, each person will choose TWO of these options and write extensive formal reports. Each is worth 45 points and will require significant homework in the form of careful reading, additional research, and thinking.

Pathogens and Safety Rules in the Lab: During lab, you will handle some known pathogens (e.g. Staphylococcus, Salmonella). You may also encounter unknown pathogens from personal and grocery samples. The following rules will be applied at all times to prevent contamination and promote safety. Misconduct or failure to abide by these rules in lab will result in automatic expulsion and course failure.

1. Bring lab handouts to every lab, along with writing tools, course text, and a calculator. Label ALL materials carefully and keep organized records.
2. Store all other items on the shelves at the end of the lab benches - NOT on the floor or in your work area. NO drinks or food in lab. NO gum-chewing, nail-biting, or pen-nibbling.
3. Wash desktops with 10% bleach at the beginning and end of lab. Wash hands at the beginning and end of lab, and before/after using the restroom.
4. Follow appropriate sterile technique when handling ALL materials in lab.
5. Many items in this lab cannot be replaced if you drop, lose, or squander them. If you spill a live culture, there will not be a back-up available. If you misuse or break expensive supplies, second copies will not be available and you will lose points.
6. If you spill or break contaminated materials, follow these procedures:
 - a. If personal injuries occur, stabilize bleeding and clean wound first.
 - b. Next, disinfect spill by soaking with bleach for at least five minutes.
 - c. Alert your instructor while spill is disinfecting and she will direct further clean-up
7. Equipment that can be flame/alcohol sterilized at the bench (e.g. loops, forceps, dally rods) is kept in white trays on your bench after you have appropriately decontaminated them.
8. All other trash goes in the following designated areas: small items go in waste buckets on benches; large items go on front autoclave cart.
9. Be careful with Bunsen burners. Double-check that they are off as you leave the lab.

Microscope Rules: Microscopes cost hundreds to repair, thousands to replace; handle and clean microscopes and prepared slides as directed (if you don't, you will lose points):

1. Avoiding moving microscopes; if you have to, use both hands, carrying upright and gently
2. Clean oil from lenses with lens paper; clean stage with Kimwipe tissues and cleaner
3. Store microscope covered with lowest power down when finished