

Syllabus: Biology 3100 – Microbiology – Spring 2012

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Office: 2093 Bailey Science Center

Office hours: Mon., Wed., Fri. 11:00 – 11:50am or by appointment

Class: Mon., Wed., Fri. 10:00-10:50am Bailey Science Center Rm. 2022

Laboratory: Section A (CRN 21374) - Mon. and Wed. 12:00-1:25pm - Bailey Science Center Rm. 2068
Section B (CRN 21375) – Mon. and Wed. 2:00-3:25pm – Bailey Science Center Rm. 2068

Required texts (all available at the bookstore):

- 1.) **Brock Biology of Microorganisms, Thirteenth Edition**
by Madigan, Martinko, Stahl and Clark
Pearson 2011
- 2.) **Benson's Microbiological Applications, Complete Version, Twelfth Edition**
by Alfred E. Brown
McGraw Hill 2011
- 3.) **The Coming Plague: Newly Emerging Diseases in a World out of Balance**
by Laurie Garrett
Farrar, Straus and Giroux 1994

Course Description/Objectives: The objective of this course is to give you a foundation in microbiological concepts, as well as the laboratory skills required to answer a variety of microbiological questions (i.e. medical and ecological). This course will focus on concepts and critical thinking skills with emphasis on the scientific method. Supplementary scientific readings (both primary articles and reviews), lab reports and an oral presentation will be assigned in order to improve your critical thinking and communication (oral and written) abilities. In addition, at the end of this course, you should have an appreciation for the ubiquity and diversity of microbes, be able to apply your knowledge of microorganisms to real-life situations, and you should be able to evaluate various types of scientific reports. Specifically, you should be fully knowledgeable on aseptic technique, all lab techniques, the different types of microbes and their cell structures, various metabolic processes, dilution problems, DNA transcription, translation, replication, gene expression, mutation, and the basics of virology and immunology. These objectives fall under the VSU General Education Outcomes #4, 5, 7 as well as the VSU Department of Biology Education Outcomes # 1, 2, 3, 4.

Grading and assignments: Lab participation points will come from lab attendance (see attendance policy below). Exams will include both lecture and lab material with an emphasis on lecture material. The exam format is varied. It will include short answer, drawing, labeling figures, completing tables, word problems, fill in the blank and some multiple choice questions. In addition, **exams II, III and IV will have a comprehensive component**, meaning that these exams will have content that was covered on previous exams. I will do this in order to insure that you learn key concepts that you may have missed previously. I do not post answer keys to my exams so you will have to see me in my office to go over previous exam questions. **You have only one week after you receive your exam to contest any grading errors or point miscalculations** so go through your exam right away. **If you know that you cannot take an exam on the scheduled day, be sure to talk to me before the exam day and not after the exam.** If you have a situation, please come talk to me and we will try to work something out.

Exam I (F 2/10)	150 pts	Grading scale: 900-1000 pts = A 800-899 pts = B 700-799 pts = C 600-699 pts = D < 600 pts = F
Exam II (F 3/9)	150 pts	
Exam III (F 4/13)	150 pts	
Exam IV (F 5/4)	150 pts	
Lab exam I (TBA)	50 pts	
Lab exam II (M 4/30)	50 pts	
Lab report #1(TBA)	50 pts	
Draft of Lab report #2 (TBA)	10 pts	
Complete lab report #2 (TBA)	50 pts	
Oral presentation (TBD, 4/9-4/25 in lab)	95 pts	
HIV reading assignment (TBA)	20 pts	
Lab participation	75 pts	
Total	1000pts	

Lab report #1 – identification of the unknown

Lab report #2 – choose one of the following: most probable number, bacterial food counts, bacterial growth curves, transformation

Attendance and tardiness:

In order to do well in this class, you need to come to class. This is not a straight lecture/textbook-based course so you will miss a lot of material and learning opportunities if you do not come to class. In particular, you must attend all of the laboratory (including oral reports) sessions. The lab/oral report sessions are vital to your understanding of the material. **You will get only one free lab absence. You will lose 7.5 pts for each additional lab session missed. More than six absences will result in failure of the course. If you come to all the lab sessions, you will receive 7.5 bonus points.** In addition, since you have limited time during the laboratory sessions, **you need to be on time for the lab sessions! Coming to the lab/oral report sessions late three times equals one absence.** If you have a situation, please come talk to me and we will try to work something out.

Late assignments:

All assignments need to be in my office by 5pm on the due date.

Cheating/plagiarism:

Cheating and plagiarism will absolutely not be tolerated! Although you will be doing work in groups and with a lab partner, you must write-up your work in your own words; this is the only way to assess your learning. If I get two lab reports that look identical or nearly identical, both parties will fail the assignment. You must also be diligent in citing all of your references, including websites.

Paraphrasing does not mean changing a word or two; if you are taking the bulk of someone else's words, you must quote them. The best way to ensure that you do not plagiarize is to read the material, then step away from it for a day or two, and then begin writing. This method also allows you to gauge your understanding of the material.

Classroom/Laboratory conduct:

Turn off your cellphones and be respectful of others. Disruptive behavior will not be tolerated. Anyone who is disruptive will be asked to leave the classroom and/or laboratory, and will be counted as absent. If the disruptive student does not leave, the instructor will contact campus police to have them removed from the class. In addition, lab aprons will be provided and must be worn during the lab. Sandals, flip-flops and other open shoes are not permitted in the lab. If you do not show up for lab in appropriate attire you may lose points. You must bring a dedicated lab notebook, your lab manual and a pen to every laboratory session.

Accommodations Statement:

“ Valdosta State University complies fully with the requirements of the Americans with Disabilities Act (ADA). If you believe that you are covered under this act, and if you have need for special arrangements to allow you to meet the requirements of this course, please contact the Access Office for Students with Disabilities in Nevins Hall, 245-2498. Also, please discuss this need with the instructor at the time of the first class.” -from the Academic Affairs webpage

This is a tentative schedule; changes will be announced in class. Due dates will be announced in class.

Date	topic	Reading assignments (please read before coming to class)
M1/9	syllabus, class expectations, benefits of microbes	Ch. 1, 25.6, 25.8
M1/9lab	what to bring to lab, introductions, watch the movie “Contagion” – take notes and write down questions	Ch. 1
W1/11	brief history of microbiology	
W1/11lab	continue “Contagion”, discussion	
F1/13	continue history of microbiology, cursory review	Ch. 1

	of macromolecules	
M1/16	MLK holiday	
W1/18	domains and evolution of life	Ch. 2, 16, 20
W1/18lab	lab safety rules, media preparation, handwashing, instructions for water collection for M1/23lab	handouts
F1/20	domains and evolution of life	Ch. 2, 16, 20
M1/23	eukaryotic microbes - protists	Ch. 20, 34.5, 35.6
M1/23lab	aseptic technique, streak plate and most probable number with collected natural water sample	handout, Ex. 9, 10, 59, must have natural water sample for most probable number and streak plate
W1/25	eukaryotic microbes - protists	Ch. 20, 34.5, 35.6
W1/25lab	most probable number cont., evaluate streak plate and restreak, microscope rules	Ex. 59, 9, 10, handout
F1/27	eukaryotic microbes - fungi	Ch. 20, 26, 34.8
M1/30	bacteria and archae cell structure	Ch. 3
M1/30lab	most probable number cont., streak plate cont., simple stain of teeth and gums, pondwater microscopy	Ex. 59, 9, 10, 11, 12, 6
W2/1	bacteria and archae cell structure	Ch. 3
W2/1lab	stock unknown, simple stain and wet mount of yeast and bacteria mixture, fungal culture	Ex., 11, 12, 8
F2/3	bacteria and archae cell structure	Ch. 3

M2/6	bacteria and archae cell structure	Ch. 3
M2/6lab	mold microscopy (at least two different molds, be sure to see spores and hyphae), more pondwater microscopy	Ch. 8, 6
W2/8	microbial growth	Ch. 5
W2/8lab	dilution problems, negative stain	Handouts, Ex. 13
F2/10	Exam I	
M2/13	metabolism	Ch. 4
M2/13lab	Gram-stain	Ex. 14
W2/15	metabolism, catabolism of organics	Ch. 4, 14
W2/15lab	Gram-stain cont., endospore stain, UV irradiation	Ex. 14, 16, 31
F2/17	chemolithotrophy and major biosyntheses	Ch. 13, 24, 25.3, 25.12
M2/20	chemolithotrophy and major biosyntheses	Ch. 13, 24, 25.3, 25.12
M2/20lab	acid-fast stain, UV irradiation cont., finish Gram and endospore stains, set up bacterial growth curves	Ex. 17, 14, 16, 31
W2/22	photosynthesis	Ch. 13
W2/22lab	genomic DNA extraction, show bacterial growth curves results, plan bacterial food count experiment	handout
F2/24	metabolism catch-up	
M2/27	DNA structure, replication	Ch. 6
M2/27lab	bacterial food counts, restriction digests	handout
W2/29	replication, PCR, Sanger sequencing	Ch. 6, 12.1, 12.2
W2/29lab	bacterial food counts cont., DNA gels	handout

F2/2	gene unit, transcription	Ch. 6
M3/5	translation, archae and eukaryotic molecular biology	Ch. 6, 7
M3/5lab	motility, cultural characteristics, oxidation and fermentation reactions of unknown, label probe for Southern blot	Ex. 37, 38, 39, handout
W3/7	archae and eukaryotic molecular biology	Ch. 7
W3/7lab	motility, cultural characteristics, oxidation and fermentation reactions of unknown cont., recruit volunteers for pre- and post-class Southern blot work (no extra credit)	Ex. 37, 38, 39, handout
F3/9	Exam II	
M3/12-F3/16	Spring Break	
M3/19	gene expression	Ch. 8
M3/19lab	hydrolytic and degradative reactions of unknown, hydrogen sulfide test, using <i>Bergey's</i> , blood agar and <i>Streptococci</i> , set up Southern blot transfer during class (volunteers need to come before class, after class, Tuesday)	Ex. 40, 41, 42, 70, handout
W3/21	gene expression	Ch. 8
W3/21lab	hydrolytic and degradative reactions of unknown, hydrogen sulfide test, using <i>Bergey's</i> , blood agar and <i>Streptococci</i> , wash and perform Southern blot detection	Ex. 40, 41, 42, 70, handout
F3/23	gene expression, microarrays	Ch. 8, 12.7
M3/26	prokaryotic genetics	Ch. 10
M3/26lab	effectiveness of alcohol, antibiotics and antiseptics, set up 16S rRNA PCR	Ex. 33, 34, 35, handout

W3/28	prokaryotic genetics	Ch. 10
W3/28lab	effectiveness of alcohol, antibiotics and antiseptics cont., ligation of PCR product into vector, dialyze ligation, run PCR gel	Ex. 33, 34, 35, handout
F3/30	prokaryotic genetics	Ch. 10
M4/2	antibiotics and antibiotic resistance	Ch. 26
M4/2lab	transformation of cloned PCR product (calcium chloride and electroporation)	handout
W4/4	antibiotics and antibiotic resistance	Ch. 26
W4/4lab	transformation cont., conjugation	handouts
F4/6	virology	Ch. 9, 21
M4/9	virology, colds, influenza, HIV	Ch. 9, 21, 33.7, 33.8, 32.6, 33.14
M4/9lab	oral presentations , conjugation cont., <i>Staphylococcus</i> , phage plaque assay	Ex. 69, handouts
W4/11	virology, hepatitis, herpes, HPV, antivirals	Ch. 9, 21, 33.11, 33.13, 26.10
W4/11lab	oral presentations , <i>Staphylococcus</i> cont., phage plaque assay cont., urinalysis	Ex. 69, handouts
F4/13	Exam III	
M4/16	prions, innate immunity	Ch. 9, 28, 29, 30
M4/16lab	oral presentations , <i>Staphylococcus</i> cont., urinalysis cont.	Ex. 69, handout
W4/18	innate immunity	Ch. 28, 29, 30
W4/18lab	oral presentations , urinalysis cont.	Ex. 44, handout
F4/20	adaptive immunity	Ch. 28, 29, 30
M4/23	adaptive immunity	Ch. 28, 29, 30
M4/23lab	oral presentations	

W4/25	adaptive immunity, immunological techniques	Ch. 28, 29, 30, 31
W4/25lab	oral presentations , ELISA worksheet	
F4/27	host-microbe interactions	Ch. 27
M4/30	catch-up lecture	
M4/30lab	Lab exam II	
F5/4, 8-10am	Exam IV	

How to study for this class:

- 1.) **Take very good notes during class.** If you are having trouble listening and taking notes, then you need to read the text before coming to class. You may bring a tape recorder to record the lectures.
- 2.) **Rewrite your lecture notes as complete thoughts, not fragments, and make drawings alongside.** As you rewrite your notes, you will likely find that your notes are incomplete or unclear. Go to your textbook to augment your lecture notes. If you are still unclear, see me. Do this regularly; you cannot wait until the week before the exam to study.
- 3.) **Test yourself by explaining the material verbally or in writing (without notes)** to a classmate or to me during my office hours. Alternatively, write your own exam questions and responses; you can bring them to me and I will be happy to check them.
- 4.) **Use this same study method for lab exams as well.** Also, making connections between lab and lecture will help you.