Biology 3444-001: General Microbiology Spring 2013

Instructor	Dr. Woo-Suk Chang
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Office Hours	Tuesday and Thursday 9:00 - 9:30 am, 10:50 - 11:50 am
Course Number, Section Number, and Course Title	Biology 3444-001, General Microbiology

Course Location and Time ARCH 204, Tuesday and Thursday 9:30 - 10:50 am

Course Description: Fundamental principles of microbiology including the structure and function of microbial cells and their activities in nature.

Student Learning Outcomes: Upon completion of this course, students should be able to:

- i) Understand and use the basic vocabulary of microbiology
- ii) Diagram a bacterial cell, noting the differences in gram positive, gram negative, and archaeal cell structures.
- iii) Correlate differences in microbial cell structure with difference in cellular functions.
- iv) Explain the metabolic pathways used to generate energy within prokaryotic cells.
- v) Interpret bacterial growth curves, describing processes occurring at each phase.
- vi) Compare and contrast the processes of microbial transcription, translation, and replication.
- vii) Describe the causes and consequences of mutations on microbial growth, evolution, and the generation of microbial diversity.
- viii) Describe microbial pathogenic determinants and corresponding host defense mechanisms.
- ix) Explain how microbial diseases are identified, controlled.
- x) Demonstrate how microbes adapt to their environment.
- xi) Classify microbes into taxonomic categories and justify the classification scheme used.

Requirements: Biology 1441 (General Biology) or equivalent

Required Textbooks and Other Course Materials: Brock Biology of Microorganisms 13th ed., by Madigan et al. I will also often supplement the book with material from other sources.

Exams: There will be four exams during the course. The first three exams will cover the subject for that portion of the course (see tentative schedule of lectures). The final exam (4th) will be comprehensive. In the final exam, approximately half will cover the material presented since the third exam, and the rest will be comprehensive. You may be required to bring to each exam a NO. 2 lead pencil and a SCANTRON 882-ES electronic grading form. You may not have any other personal belongings at your desk during an exam. You will not be allowed to take an exam if you do not comply. The format of examinations may be multiple choice, true/false, and/or short essay questions.

Grading Policy: Your performance in this course will be assessed through four examinations as described above. While each exam will contribute 17% to your final grade, the comprehensive final exam will contribute 29% (See below for more detail). The grade you receive for the laboratory section of the course will be 20% of your final grade. Exams will be announced at least one week prior to the exam date. The schedule of exams will depend upon our progress through the material. The following grading scale will be used to determine your final grade.

<u>Source</u>	Portion	<u>Grade</u>	Percentile
Laboratory	20%	A	> 90%
Exam 1	17%	В	80 - 89%
Exam 2	17%	С	70 - 79%
Exam 3	17%	D	60 - 69%
Exam 4 (final)	29%	F	< 60%
Total	100%		

Attendance Policy: With the exceptions of exam dates, you are not required to attend lectures; however, you are responsible for all material covered in lecture including changes to the syllabus.

Drop Policy: Students may drop or swap (adding and dropping a class concurrently) classes through self-service in MyMav from the beginning of the registration period through the late registration period. After the late registration period, students must see their academic advisor to drop a class or withdraw. Undeclared students must see an advisor in the University Advising Center. Drops can continue through a point two-thirds of the way through the term or session. Last day to drop the class is March 29, 2013. It is the student's responsibility to officially withdraw if they do not plan to attend after registering. **Students will not be automatically dropped for non-attendance**. Repayment of certain types of financial aid administered through the University may be required as the result of dropping classes or withdrawing. Contact the Financial Aid Office for more information.

Make-up Exam Policy: You are required to be present for announced examinations. <u>Absences will</u> <u>be excused only with written request by a physician, other responsible professional, or with written proof of jury duty. No exceptions.</u> If you miss an exam, you will be given an exam score of zero. Exams missed due to excused absence must be taken within one day of your return to class. No other make-up exams will be given.

Important University Policies

Americans With Disabilities Act: The University of Texas at Arlington is committed to both the spirit and letter of federal equal opportunity legislation; reference Public Law 92-112 - The Rehabilitation Act of 1973 as amended. With the passage of federal legislation entitled *Americans with Disabilities Act (ADA)*.

It is your responsibility to inform me of your disability at the beginning of the semester and to provide authorized documentation through designated administrative channels. If you require accommodation based on disability, I would like to meet with you in my office the first week of class to discuss your special needs.

Academic Dishonesty: It is the philosophy of The University of Texas at Arlington that academic dishonesty is a completely unacceptable mode of conduct and will not be tolerated in any form. All persons involved in academic dishonesty will be disciplined in accordance with University regulations and procedures. Discipline may include suspension or expulsion from the University. According to the UT System Regents' Rule 50101, §2.2, "Scholastic dishonesty includes but is not limited to cheating, plagiarism, collusion, the submission for credit of any work or materials that are attributable in whole or in part to another person, taking an examination for another person, any act designed to give unfair advantage to a student or the attempt to commit such acts."

Student Support Services Available: The University of Texas at Arlington supports a variety of student success programs to help you connect with the University and achieve academic success. These programs include learning assistance, developmental education, advising and mentoring, admission and transition, and federally funded programs. Students requiring assistance academically, personally, or socially should contact the Office of Student Success Programs at 817-272-6107 for more information and appropriate referrals.

Final Review Week: A period of five class days prior to the first day of final examinations in the long sessions shall be designated as Final Review Week. The purpose of this week is to allow students sufficient time to prepare for final examinations. During this week, there shall be no scheduled activities such as required field trips or performances; and no instructor shall assign any themes, research problems or exercises of similar scope that have a completion date during or following this week unless specified in the class syllabi. During Final Review Week, an instructor shall not give any examinations constituting 10% or more of the final grade, except makeup tests and laboratory examinations. In addition, no instructor shall give any portion of the final examination during Final Review Week. Classes are held as scheduled during this week and lectures and presentations may be given.

Bomb Threats: If anyone is tempted to call in a bomb threat, be aware that UTA will attempt to trace the phone call and prosecute all responsible parties. Every effort will be made to avoid cancellation of presentations/tests caused by bomb threats. Unannounced alternate sites will be available for these classes. Your instructor will make you aware of alternate class sites in the event that your classroom is not available.

The University of Texas at Arlington has adopted the University email address as an official means of communication with students. Through the use of email, UT-Arlington is able to provide students with relevant and timely information, designed to facilitate student success. In particular, important information concerning registration, financial aid, payment of bills, and graduation may be sent to students through email.

After Hours Safety Escort: The Sam Mav Escort service provides a service to assist students, faculty, staff, and campus visitors to reach their destinations after regular business hours. The hours of service are 7:00 p.m. to 1:00 a.m., Sunday through Saturday. 817-272-3381

Other Policies

Electronic Communication Policy: The University of Texas at Arlington has adopted the University "MavMail" address as the sole official means of communication with students. MavMail is used to remind students of important deadlines, advertise events and activities, and permit the University to conduct official transactions exclusively by electronic means. For example, important information concerning registration, financial aid, payment of bills, and graduation are now sent to students through the MavMail system. All students are assigned a MavMail account. *Students are responsible for checking their MavMail regularly.* Information about activating and using MavMail is available at http://www.uta.edu/oit/email/. There is no additional charge to students for using this account, and it remains active even after they graduate from UT Arlington.

Smoking, Food, and Drink in the Lecture Hall: University regulations prohibit smoking, eating, and drinking in lecture halls.

Cell Phone: <u>Ringers must be turned off during class.</u>

Mandatory Online Safety Training:

1. Go to http://www.uta.edu/training.

2. Log on using your network log-on ID and password (what you use to access email). If you do not know your NetID or need to reset your password, visit https://webapps.uta.edu/oit/selfservice/.

3. The available courses for completion will be listed under "Training I'm Enrolled In". Complete the course entitled 'Student Lab Safety Training – General.' ***NOTE: If you completed Wet, Dry or Biology Lab Safety Training course last semester for another class, that training is still applicable until the end of this academic year. Please follow instructions in #4 to print the certification page for your teaching assistant (TA).

4. Go to 'Training I've Completed' and print the displayed page for your TA. Verify that it shows clearly your name, and that 'General, Wet, Dry or Biology' training is completed/passed and the date when the training was completed. If you have just completed the training but it is not updated on the 'Training I've Completed' page, please log out of the system and log back in. If the training still does not show up on this page, call the Helpline at 817-272-5100.

5. If you were enrolled in a course with a lab last semester and did not complete the training or if you do not see training for this academic year listed, email compliance@uta.edu providing your name, a contact phone number, NetID and course (BIOL 3444-001) and request the appropriate training for your course.

6. Students who have not completed the training by <u>census date (January 30, 2013) may be</u> <u>dropped from the lab (and consequently the lecture).</u>

7. Lab Safety Training is required to be completed once every academic year. Training completed in the Fall semester is valid for the Fall, Spring and Summer sessions. It is your responsibility to print your training certification page and turn it in each semester to your TA for each course with a lab you are enrolled in.

For training specific questions, contact the Environmental Health and Safety office at 817-272-2185.

For technical assistance with the training, please contact the Office of Institutional Compliance at 817-272-5100 or email compliance @uta.edu

Spring 2013 3444 (Sections 003 - 009) General Microbiology Lab Syllabus

Graduate TA: Office Hours/Location: Class day & Time: Monday – Thursday, 2:00 – 4:50 p.m.

Email:

Room: LS 338 & 341

Lab Manual:Microbiology Laboratory Theory and Application: Third Edition.
Morton Publishing Company, Leboffe and PierceSupplements:UTA Microbiology Lab Handouts
Available for purchase on the first day of lab from the GTA.
Price: \$15.00

Lab Kits for Microbiology Lab available for purchase the first day of lab from GTA. **Price: \$10**

Lab	Dates	Topic/Title	Reading
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1. 、	Jan. 28 - 31	Introduction to Micro Lab	
		Refer to Microbiology Lab Notebook Handouts (MLNH) pages 6-7	
		Safety and Laboratory Guidelines	p.1-6
		Orientation & Safety	MLNH p. 4
		Media Prep	Ex. 1-2
		Steam Sterilization	Ex. 2-12
		Evaluation of Media	Ex. 2-5
		Microscopy	Ex. 3-1
		Wet Mount Preparation	р. 83
		Microscopic Examination of Pond Water	Ex. 3-4
		Ubiquity of Microorganisms	Ex. 2-1
		Aseptic Techniques	Ex. 1-3
		Observe pictures of bacteria on pages 37-43 Growth Patterns on Slants Growth Patterns in Broth	Ex. 2-3 Fx 2-4
			LA. 2-4
		Staining I	
		Bacterial Structure	p. 95 - 99
		Smear Preparation and Simple Staining	Ex. 3-5
		Gram Staining	Ex. 3-7
		Acid-Fast Staining: Ziehl-Neelsen Method	Ex. 3-8
3.	Feb. 11 - 14	Gram Stain and Microscope Practical	
		Staining II & Streaking	
		Refer to Microbiology Lab Notebook Handouts (MLNH) pages 10 - 13	
		Capsule Staining	Ex. 3-9
		Endospore Staining: Schaeffer-Fulton Method	Ex. 3-10
		Pure Culture Techniques	

	T-Streak	MLNH p. 12 - 13
4. Feb. 18 - 21	Biochemical Tests I Refer to Microbiology Lab Notebook Handouts (MLNH) pages 14 - 15	
	Read Aerotolerance section	р. 48
	Fluid Thioglycollate Medium	Ex. 2-7
	Anaerobic Jar	Ex. 2-8
	Read – A Word About Biochemical Tests and Acid-Base Reactions	р. 150
	Read - Introduction to Energy Metabolism Tests	p. 151
	Biochemical Tests: Differential Tests	
	Read Fermentation Tests	р. 158
	Glucose - Phenol Red Broth	Ex. 5-3
	Methyl Red and Voges-Proskaeur Tests	Ex. 5-4
	Test Identifying Microbial Ability to Respire	p. 165
	Catalase	Ex. 5-5
	Nitrate Reduction Test	Ex. 5-7
	Media Reference Guide	MLNH p. 43 - 47
5. Feb. 25 - 28	Biochemical Tests II Refer to Microbiology I ab Notebook Handouts (MI NH) pages 16 - 18	
	Nutrient Utilization Media	n 175
	Citrato Tost	p. 175
	Citale Test	EX. 5-0
	Tests Detecting Hydrolytic Enzymes	р. 184
	Starch Hydrolysis	Ex. 5-12
	Urea Hydrolysis	Ex. 5-13
	Casein Hydrolysis Test	Ex. 5-14
	Gelatin Hydrolysis Test	Ex. 5-15
	Combination Differential Media	p. 202
	SIM Medium	Ex. 5-20
	Triple Sugar Iron Agar (TSIA)	Ex. 5-21
6. Mar. 4 - 7	Midterm	
	Streak Plate Practical	
	Receive gram-negative unknown	
	Gram Negative Unknown	
	Refer to Microbiology Lab Notebook Handouts (MLNH) pages 19 - 24	
	Hand-in notebooks (1 st time)	
Mar. 11 – 15	Spring Break	
7. Mar. 18 - 21	Environmental Factors Affecting Microbial Growth	
	Refer to Microbiology Lab Notebook Handouts (MLNH) pages 25 - 26	
	The Effect of Temperature on Microbial Growth	Ex. 2-9
	The Effect of pH on Microbial Growth	Ex. 2-10
	The Effect of Osmotic Osmotic Pressure on Microbial Growth	Ex. 2-11
	The Lethal Effect of Ultraviolet Radiation on Microbial Growth	Ex. 2-13
8. Mar. 25 - 28	Control of Microbial Growth/Selective and Differential Media	
	Refer to Microbiology Lab Notebook Handouts (MLNH) pages 27 - 33	
	Medical Microbiology	p. 263
	Bring antiseptic to lab to test	

	Antimicrobial Susceptibility Test: Kirby-Bauer Method	Ex. 7-3
	Demonstration	
	Pipette HandlingAppendix C	p. 437-440
	Slide Coagulase Test	Ēx. 5-27
	Selective Media	p. 129
	Mannitol Salts Agar	Ēx. 4-4
	MacConkey Agar	Ex. 4-5
	Eosin Methylene Blue Agar	Ex. 4-6
	Bile Esculin	Ex. 4-3
	SF Medium Agar	MLNH p. 32
	Blood Agar	Ex. 4-2
10 Apr 8-11	Refer to Microbiology Lab Notebook Handouts (MLNH) pages 34 - 37	
10. Apr. 8 -11	Refer to Microbiology Lab Notebook Handouts (MLNH) pages 34 - 37 OPEN LAB	
10. Apr. 8 -11 11. Apr. 15 -18	Refer to Microbiology Lab Notebook Handouts (MLNH) pages 34 - 37 OPEN LAB Yogurt and Water Quality	
10. Apr. 8 -11 11. Apr. 15 -18	Refer to Microbiology Lab Notebook Handouts (MLNH) pages 34 - 37 OPEN LAB Yogurt and Water Quality Refer to Microbiology Lab Notebook Handouts (MLNH) pages 39 - 42	
10. Apr. 8 -11 11. Apr. 15 -18	Refer to Microbiology Lab Notebook Handouts (MLNH) pages 34 - 37 OPEN LAB Yogurt and Water Quality Refer to Microbiology Lab Notebook Handouts (MLNH) pages 39 - 42 Making Yogurt	Ex. 9-2
10. Apr. 8 -11 11. Apr. 15 -18	Refer to Microbiology Lab Notebook Handouts (MLNH) pages 34 - 37 OPEN LAB Yogurt and Water Quality Refer to Microbiology Lab Notebook Handouts (MLNH) pages 39 - 42 Making Yogurt Bacteriological Examination of Water: Qualitative Tests	Ex. 9-2 MLNH p. 40
10. Apr. 8 -11 11. Apr. 15 -18	Refer to Microbiology Lab Notebook Handouts (MLNH) pages 34 - 37 OPEN LAB Yogurt and Water Quality Refer to Microbiology Lab Notebook Handouts (MLNH) pages 39 - 42 Making Yogurt Bacteriological Examination of Water: Qualitative Tests	Ex. 9-2 MLNH p. 40 Ex. 1-5
10. Apr. 8 -11 11. Apr. 15 -18	Refer to Microbiology Lab Notebook Handouts (MLNH) pages 34 - 37 OPEN LAB Yogurt and Water Quality Refer to Microbiology Lab Notebook Handouts (MLNH) pages 39 - 42 Making Yogurt Bacteriological Examination of Water: Qualitative Tests Spread Plate Method Standard Plate Count: (Viable Count)	Ex. 9-2 MLNH p. 40 Ex. 1-5 Ex. 6-1
10. Apr. 8 -11 11. Apr. 15 -18	Refer to Microbiology Lab Notebook Handouts (MLNH) pages 34 - 37 OPEN LAB Yogurt and Water Quality Refer to Microbiology Lab Notebook Handouts (MLNH) pages 39 - 42 Making Yogurt Bacteriological Examination of Water: Qualitative Tests Spread Plate Method Standard Plate Count: (Viable Count) Membrane Filter Technique	Ex. 9-2 MLNH p. 40 Ex. 1-5 Ex. 6-1 Ex. 8-12
10. Apr. 8 -11 11. Apr. 15 -18	Refer to Microbiology Lab Notebook Handouts (MLNH) pages 34 - 37 OPEN LAB Yogurt and Water Quality Refer to Microbiology Lab Notebook Handouts (MLNH) pages 39 - 42 Making Yogurt Bacteriological Examination of Water: Qualitative Tests Spread Plate Method Standard Plate Count: (Viable Count) Membrane Filter Technique Closed-System Growth (Read Only)	Ex. 9-2 MLNH p. 40 Ex. 1-5 Ex. 6-1 Ex. 8-12 Ex. 6-4

Notebook check (2nd time)

12. Apr. 22 - 25 Clean-up/Check-out Mixed unknown reports due Final Lab Exam

You will be responsible for reading the designated exercises before coming to each week's lab. What you will actually be doing in the lab that day may vary somewhat from what is written in the lab manual. You will be informed of any changes made to the lab procedure at the beginning of that lab period.

Microbiology Lab Notebook Handouts (MLNH)

PLEASE NOTE THE Microbiology Lab Notebook Handouts (MLNH) ARE VERY IMPORTANT, THEE HANDOUTS ARER THE DIRECTIVES THAT WILL GUIDE YOU IN THE LAB!

Laboratory Policies

Attendance is required; **this will often include checking cultures 24-48 hours or more post-inoculation**. Missed labs can only be "made up" by having permission to attend another lab section the same week since equipment and supplies for each exercise are only available during the week the exercise is scheduled. As lab sections are full, you must obtain permission from both your Graduate TA and the Graduate TA of the alternative lab section you plan to attend prior to your making up the lab. Students with disabilities please contact your Graduate TA to discuss any special needs that you may have. PLEASE DO NOT PLAN TO ATTEND ANOTHER LAB SECTION WITHOUT PRIOR PERMISSION.

Make-up Exam Policy:

Students are required to be present for quizzes and examinations. Whether or not an absence for an exam or quiz will be excused is at the discretion of the instructor. An exam missed due to an excused absence must be taken as directed by the GTA (in the presence of the GTA). An unexcused absence for an exam will result in an exam grade of zero.

Grading	
Weekly quizzes*	20%
Midterm	20%
Final	20%
Unknowns	20%
Practicals	15%
Notebook	5%
TOTAL	100%

*Weekly quizzes will typically be composed of approximately 60% material from the last week's lab and 40% from reading material assigned for that week's lab. The lowest quiz grade will be dropped before calculating the final lab grade. The final exam will be comprehensive.

"A grade of I (incomplete) may be assigned for a course if, in the opinion of the instructor, there are extenuating documentable circumstances which prevent the student from completing the required work within the semester of enrollment for the course. The incomplete must be removed by the end of the final examination period of the following semester, excluding the summer session, for the student to receive credit for the course. If the incomplete is not removed during the allotted time period, it will revert automatically to an F."

Lab Supplies

A loose leaf notebook is required in which you will accumulate any handouts, the lab lecture notes, the results and quizzes for each of the labs. This notebook will be graded twice during the semester.

Lab Kit

Individual components are available in the bookstore or you may lease a kit from Phi Sigma (the Biology Graduate Student Society) and the Mu Sigma Microbiology Society. These items will be available for purchase of \$10. You may rent these kits during the first couple weeks of lab.

- Inoculating loop
- Lens Paper (10-15 sheets)
- Bibulous paper (5-6 sheets)
- 10 glass microscope slides
- 1 Clothespin (spring-type, for holding slides)
- Matches

Aprons and Goggles must be worn at all time while in the lab – you will be given an apron and a pair of goggles to use during the semester, but the goggles must be returned at the end of the semester. Please note that if you do not wear your lab apron and goggles, you may be asked to leave the lab.

You will need the following for lab:

Sharpie permanent marker Gloves will be provided Lock for drawer (optional) - Please let the Graduate TA know which drawer you take.

IMPORTANT NOTE:

All microbiology lab students, please note that at the end of the semester, during the lab clean-up, if you do not clear out ALL ITEMS with your name, initials, and or lab section, from the cold room, hot room, incubators, lab drawers, and benches, you will receive 5 points off your overall lab grade.

Mandatory Online Safety Training:

1. Go to http://www.uta.edu/training.

2. Log on using your network log-on ID and password (what you use to access email). If you do not know your NetID or need to reset your password, visit <u>https://webapps.uta.edu/oit/selfservice/</u>.

3. The available courses for completion will be listed under "Training I'm Enrolled In". Complete the course entitled 'Student Lab Safety Training – General.' ***NOTE: If you completed Wet, Dry or Biology Lab Safety Training course last semester for another class, that training is still applicable until the end of this academic year. Please follow instructions in #4 to print the certification page for your TA.

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5. If you were enrolled in a course with a lab last semester and did not complete the training or if you do not see training for this academic year listed, email <u>compliance@uta.edu</u> providing your name, a contact phone number, NetID and course (e.g. BIOL 1441-005) and request the appropriate training for your course.

6. Students who have not completed the training by <u>census date may be dropped from the lab (and consequently the lecture).</u>

7. Lab Safety Training is required to be completed once every academic year. Training completed in the Fall semester is valid for the Fall, Spring and Summer sessions. It is your responsibility to print your training certification page and turn it in each semester to your TA for each course with a lab you are enrolled in.

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