

## BISC 614 – ADVANCED GENERAL MICROBIOLOGY – Spring 2017

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*Email is the best way to reach me and I'll generally reply quickly, provided that it's clear who the email is from and it's a coherent message. You can also stop by my office (Shoe 506) or research lab (Shoe 513), or find my in the Biology main office – I'm usually around.*

**Course Title and Description:** Advanced General Microbiology (BISC 614). Credit 4 hours.

Introductory microbiology for graduate students. A survey of the principles and concepts of microbiology including the biochemistry, cell biology, metabolism, genetics, ecology, evolution, and biodiversity of microorganisms, as well as the impacts of microorganisms on human affairs. Prerequisites are a C or higher in CHEM 105/106.

**Aims and/or Purpose of the Course:** To give graduate students a solid foundation in the fundamental concepts and principles of microbiology and to prepare those students to teach undergraduate courses in microbiology.

**Course Objectives:** 1. Expose students to general concepts and principles of microbiology. 2. Present a survey of the vast diversity of microorganisms. 3. Present concepts in clinical, environmental, and applied microbiology. 4. Train graduate students in the techniques used to teach undergraduate students how to study, manipulate, and identify microorganisms.

**Course Materials (textbook and lab manual):**

Lecture notes are available as the pdf textbook: "The Basics of General Microbiology, 2<sup>nd</sup> edition" (C. R. Jackson, 2009) and you have free access to those pdf files through Blackboard. Similarly, you will be provided with free access to pdf files of all laboratory exercises from the lab manual "The Basics of General Microbiology Laboratory Manual (C. R. Jackson, 2009).

The book chapters will be available on Blackboard a few days before we are scheduled to cover each topic. For labs, the exercises will be available the week preceding that lab activity. If you need any of the notes or exercises earlier than that, email me and I will provide them to you.

**Attendance:** Attendance is expected for all lectures and labs. Because you will be involved in teaching the course, you are expected to be attentive in lecture and engaged in class activities.

**Grading:**

Participation in instruction	80%
Exam 1	5%
Exam 2	5%
Final Exam	10%

A main purpose of this course is to train you and to give you experience in teaching microbiology at the college level. To that end, the major portion of your grade will come from your successful participation in instructional activities (see below). However, you will also be required to pass the exams given to the undergraduate microbiology course. Typically you will take these exams outside of class, and a few days before the undergraduates take them.

***How this translates to your grade:***

**A:** 90 or higher

**B:** 80-90

**C:** 70-80

**D:** 60-70

**F:** less than 60

**Participation in Instruction**

Students taking Bisc 614 are required to participate in the teaching of the undergraduate variant of this course (Bisc 333 “General Microbiology”). Most days this will involve attending the Bisc 333 lecture and assisting with any in-class activities. However, over the course of the semester each student enrolled in Bisc 614 is required to lead at least four sessions of the Bisc 333 course (essentially, you become the lecturer for that day).

Three of these sessions should be consecutive and, if possible, cover a single topic/section or group of topics from the syllabus. For example, a student might lead the three days assigned to Chapter 5 Metabolic Diversity, or the two days assigned to Chapter 9 Microbial Gene Expression followed by the one lecture on Chapter 10 Microbial Genetics. This can be more than three lectures if necessary to cover the chose topic if needed. You can choose any of the material that starts after 3-4 weeks into the semester (essentially from Chapters 4-11). Students should discuss with me the potential topics that they are interested in teaching and continue that discussion as they develop lecture materials for those topics. You are free to develop your own approach for teaching that material, but the content must generally match what students have available in the course notes/textbook. You will also develop and submit questions covering the material that you taught for the next course exam, and for the final exam.

In addition to the three topics on a section(s), each student in Bisc 614 is also required to lead a single class session from the section of the course that covers microbial diversity (Chapters 12-15 or Chapter 18). As with the previous material, you will also prepare and submit questions that cover this material for the undergraduate exams.

I’ll warn you right now: developing and preparing to teach this material effectively will take much more time than you are expecting. A general rule for effective and efficient college teaching is to spend 2-3 hours outside of class to develop each hour of in-class content, and many professors spend much more than that (although they shouldn’t). The 2-3 hours assumes a strong fundamental knowledge of the material to be taught, so expect that you might be spending upwards of 5 hours preparing each lecture session. You should also be prepared for the possibility that specific dates you have selected may change based on how the course progresses or unexpected course cancellations. Keep the dates around the topics chosen open as well as the specific dates of the topics to prepare for that.

Your effectiveness in instruction and grade on this section will be determined from my own assessment plus comments that I will solicit from undergraduate students in the course. I may also use external review of your teaching by other members of the Department of Biology.

<b>BISC 333 - General Microbiology</b>		<b>Lecture Schedule</b>	<b>Spring 20167</b>
<b>Date</b>	<b>Topic</b>		<b>Notes pages</b>
Mon Jan 23	Ch 1: Introduction to microbiology		1-6
Wed Jan 25	Ch 1: Introduction to microbiology		1-6
Fri Jan 27	Ch 1: Introduction to microbiology		1-6
Mon Jan 30	Ch 2: Review of chemistry		7-15
Wed Feb 1	Ch 3: Microbial cell biology		17-32
Fri Feb 3	Ch 3: Microbial cell biology		17-32
Mon Feb 6	Ch 3: Microbial cell biology		17-32
Wed Feb 8	Ch 4: Microbial metabolism		33-46
Fri Feb 10	Ch 4: Microbial metabolism		33-46
Mon Feb 13	Ch 4: Microbial metabolism		33-46
Wed Feb 15	Ch 5: Metabolic diversity		47-57
Fri Feb 17	Ch 5: Metabolic diversity		47-57
Mon Feb 20	Ch 5: Metabolic diversity		47-57
Wed Feb 22	<b>Exam 1</b>		
Fri Feb 24	Ch 6: Biogeochemistry		59-65
Mon Feb 27	Ch 7: Microbial growth and growth control		67-75
Wed Mar 1	Ch 7: Microbial growth and growth control		67-75
Fri Mar 3	Ch 8: Molecular biology of bacteria		77-96
Mon Mar 6	Ch 8: Molecular biology of bacteria		77-96
Wed Mar 8	Ch 8: Molecular biology of bacteria		77-96
Fri Mar 10	Ch 8: Molecular biology of bacteria		77-96
<i>Spring Break (no class Mon Mar 13, Wed Mar 15, Fri Mar 17)</i>			
Mon Mar 20	Ch 9: Microbial gene expression		97-103
Wed Mar 22	Ch 9: Microbial gene expression		97-103
Fri Mar 24	Ch 10: Microbial genetics		105-112
Mon Mar 27	Ch 11: Microbial evolution and systematics		113-119
Wed Mar 29	Ch 12: Bacterial Diversity I – Proteobacteria		121-135
Fri Mar 31	Ch 12: Bacterial Diversity I – Proteobacteria		121-135
Mon Apr 3	Ch 12: Bacterial Diversity I – Proteobacteria		121-135
Wed Apr 5	<b>Exam 2</b>		
Fri Apr 7	Ch 13: Bacterial Diversity II – Firmicutes, Actinobacteria		137-144
Mon Apr 10	Ch 13: Bacterial Diversity II – Firmicutes, Actinobacteria		137-144
Wed Apr 12	Ch 14: Bacterial Diversity III – Other Bacteria		145-154
Fri Apr 14	<i>No class – Good Friday</i>		
Mon Apr 17	Ch 14: Bacterial Diversity III – Other Bacteria		145-154
Wed Apr 19	Ch 14: Bacterial Diversity III – Other Bacteria		145-154
Fri Apr 21	Ch 15: Archaeal Diversity		155-160
Mon Apr 24	Ch 15: Archaeal Diversity		155-160
Wed Apr 26	Ch 18: Microbial Eukarya		183-188
Fri Apr 28	Ch 18: Microbial Eukarya		183-188
Mon May 1	Ch 17: Human Microbial Interactions		171-182
Wed May 3	Ch 17: Human Microbial Interactions		171-182
Fri May 5	Ch 17: Human Microbial Interactions		171-182