

# BIOL 812P-80 Microbial Diversity

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**COURSE OBJECTIVES**

1. To introduce students to the diversity of microorganisms and provide them with a basic understanding of the complexity of relatedness.
2. To develop an understanding of the importance of microorganisms beyond those of medical importance.
3. To create an appreciation for the difficulty we have in identifying and characterizing microorganisms.
4. To introduce students to the tools used to identify and characterize microorganisms.

## REQUIRED MATERIALS

Suggested Text: Prescott's Microbiology, 8<sup>th</sup> Edition  
Joanne Willey, Linda Sherwood, and Chris Woolverton  
ISBN-9780073375267

**Computer and Software:** Access to a computer with Internet access (the faster the better, but modem speed will be adequate) and a word-processing software program. We require you to use Microsoft Office 2007 versions as they have the edit-tracking feature that will be used to mark your work. No other formats, such as ".wpd," will be accepted. Microsoft Office 2007, Academic Version is available from our bookstore inexpensively. A school ID, or other verification of enrollment (or employment as a teacher) may be required. The software is available for PC and Mac OS.

Additional software will be used for phylogenetic analysis in assignments and the final project. All of these are available as freeware. In most cases this software is available for both PC and Mac OS or can be used via an online server. There is however one instance where different programs will be used based on the particular operating system. More details to come.

## INSTRUCTION

Students are not required to come to UNK for this course. Instead for this class we will use an online course management system called Blackboard. This provides standard interfaces for grades, assignments, discussions, and other functions. You will need to become familiar with

this application. There is some online help, and in addition we will talk about this software in the first lecture to you. There are two important things to remember about this system:

- 1) You **must check and use your UNK email address** to receive and send emails pertaining to this class. The Blackboard system does not allow us to enter any other email address that you may be using now.
- 2) Check the announcements page of Blackboard for breaking news. Any information we need to get to the class as a whole will be on this opening page. We will tell you how to get to this page in our first lecture to you!

In addition, you will find other useful material at the class web site. Among the things on the webpage will be the syllabus and other useful documents, links to other sites that have information you may need to visit to learn information and your grades.

All lectures will be posted on Blackboard in the Course Documents section. We will also post the outline for each lecture on the Blackboard web site. (Remember that this information is copyrighted, so it is illegal to copy this material and distribute it.) These outlines are not a substitute for doing class work (viewing lectures, reading papers and the text, and viewing internet sites). The notes will allow you to listen during lecture without the need to frantically copy each word spoken on the tape. However, the notes are skeletal, and we do talk about more than is on the notes. This means that total reliance on the notes will result in poor understanding of class material.

We also expect you to keep up with the pace of the course. If this is your first distance class, you will find that these classes are rigorous and fast paced. If you fall behind, you will have a difficult time catching up, getting an A, or maybe even completing the course. Please do not procrastinate.

## GRADES AND GRADING

Your grade for this course is weekly quizzes, project assignments and a final paper. Your Grade will be calculated as follows:

Graded Assignments	Points
Quizzes	100
Project (4 parts)	50
Final Project Paper	50
<b>Class Total</b>	<b>200</b>

**Grading Scale.** Grades will be assigned using the standard grading scale for the Department of Biology, as follows: A (93-100%), A- (90-92%), B+ (88-89%), B (83-87%), B- (80-82%), C+ (78-79%), C (73-77%), C- (70-72%), D+ (68-69%), D (63-67%), D- (60-62%), and F (below 60%).

## **QUIZZES**

There will be weekly assigned quizzes worth 10 points each. The quizzes will cover the material that we cover in the lectures that week. The quiz schedule is included with the syllabus outline. You are responsible for remembering and taking each quiz on Blackboard. The quizzes will be saved in the Assignments section. You will only be able to take the quiz one time. The quizzes are timed so as not to allow you to use your books or notes. The grade will be automatically entered in the grade book on Blackboard. If you have any problems accessing the quiz, please let me know immediately. You will have 12 quizzes assigned, but we will drop the two lowest quiz grades.

## **RESEARCH PROJECTS**

A substantial component of your grade (50%) is based on completion and interpretation of a research project. For this project you will be assigned a set of DNA sequences and will use phylogenetic analyses to classify the corresponding microorganism. The project is broken up into four parts and a final paper. The assignment schedule is indicated below. Each part of the project is dependent on the proceeding part and feedback will be given before moving on to the next step. It is very important that you complete each assignment on time and heed the suggestions given. It is possible that you will have to redo one or more of the steps in order for the subsequent steps to work. I highly suggest working on each part as early as possible, in case problems arise.

For the final paper your project results will be written up as a journal article in which you will provide background, describe methodology, and interpret your results. The paper will include the standard sections found in scientific journals (Introduction, Materials and Methods, Results, and Discussion) and will require the use of primary literature. More information will be made available at a later time.

## **LECTURE TOPICS**

- Lecture 1: Introduction to the course
- Lecture 2: Microbial Evolution and the Tree of Life
- Lecture 3: Speciation Concept
- Lecture 4: Techniques Used to Identify Microorganisms
- Lecture 5: Introduction to Tree-thinking and Phylogenetics
- Lecture 6: Inference of Phylogenetic Trees
- Lecture 7: Research Projects Introduction
- Lecture 8: The True Bacteria: Cell Membranes and Cell Walls
- Lecture 9: The True Bacteria: Structures Internal to Cell Walls
- Lecture 10: Classification of Bacteria: Alpha and Betaproteobacteria
- Lecture 11: Classification of Bacteria: Gammaproteobacteria
- Lecture 12: Classification of Bacteria: Delta and Epsilonbacteria
- Lecture 13: Classification of Bacteria: Gram - Nonproteobacteria
- Lecture 14: Classification of Bacteria: Low GC Gram + Bacteria
- Lecture 15: Classification of Bacteria: High GC Gram + Bacteria

Lecture 16: Archaea  
 Lecture 17: Classification of Archaea  
 Lecture 18: Eukarya  
 Lecture 19: Eukaryotic Tree of Life  
 Lecture 20: Protists and Algae  
 Lecture 21: Fungi  
 Lecture 22: Protist Classification  
 Lecture 23: Fungal Classification

## SCHEDULE

Week	Lectures to View	Readings	Assignments
January 9	1	Chpt 1 (pp1-13)	None
January 16	2 & 3	Chpt 16	Quiz 1
January 23	4 & 5	Chpts 2 & 17	Quiz 2
January 30	6 & 7	None	Quiz 3
February 6	8 & 9	Chpt 3	Quiz 4, Part 1 of project due
February 13	10 & 11	Chpt 20	Quiz 5
February 20	12 & 13	Chpt 19	Quiz 6, Part 2 of project due
February 27	14 & 15	Chpts 21 & 22	Quiz 7,
March 5	16 & 17	Chpt 18	Quiz 8, Part 3 of project due
March 12	18 & 19	Chpt 4	Quiz 9
March 19	None	None	<b>Spring Break</b>
March 26	20 & 21	None	Quiz 10, Part 4 of project due
April 2	22	Chpt 23	Quiz 11
April 9	23	Chpt 24	Quiz 12
April 16	None		Work on Project
April 23	None		Final Project Due

Quizzes will be posted on Fridays. They will be available Friday by 5 p.m. until the next Monday at 8 a.m. Please make every effort to get them taken within that time limit. If you have any problems let me know as soon as possible.

Project assignments are due on Fridays at 5 p.m. and the final project is due on Mon., April 23 at 5 p.m.