

BIOL 345 FUNDAMENTALS OF MICROBIOLOGY Winter 2001

Instructor: Craig L. Moyer
Office Hours: MWF: 3 - 4pm & by appointment @ BI 409
Lecture: MWF: 10am in BI 234 **PLUS W 3pm in BI 151 or R 5pm in BI 415**
Homepage: <http://fire.biol.wvu.edu/cmoyer/cmoyer.courses.html>
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Required Text: Madigan, Martinko and Parker. 2000. *Brock: Biology of Microorganisms*, 9th Edition. Prentice Hall Publishers.

Objectives of the Course:

Seven Central Themes will guide your successful study of Microbiology:

- I. Microbiology in its historical perspective;
- II. Microbes as cellular systems;
- III. Microbes as energy transducers;
- IV. Microbes as agents of environmental and geochemical change;
- V. Microbes as tools for the study of macromolecular processes;
- VI. Microbes as agents of infectious disease; and
- VII. Microbes as products of evolutionary change (This theme is intercalated throughout!)

Evaluation of Coursework:

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|----------------------------------|------------|
| Two lecture exams @ 150 pts each | 300 |
| <u>Comprehensive final exam</u> | <u>200</u> |
| Total Points: | 500 |

The two midterm exams are scheduled outside of the 50-minute lecture period to give you time to develop reasoned answers and essays. **Note the dates and times of the exams and work out possible conflicts now.** Make-up exams will be given only if you are excused from the exam **BEFORE** the scheduled date and time, or, in the event of illness, you have a note from a health professional confirming that you were unable to take the exam during the scheduled time.

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|----------------|---------------------|-------|---------------|
| EXAM I | Monday, January 29 | 5-8pm | BI 234 |
| EXAM II | Monday, February 12 | 5-8pm | BI 234 |
| FINAL | Thursday, March 1 | 5-8pm | BI 234 |

MICROBIOLOGY “TENTATIVE” COURSE OUTLINE

LECTURE DATE

TOPICS

THEME I. Historical Perspective

Jan 10 W Course Introduction: Why Study Microbes?
Jan 10/11 W/R Historical Perspectives on Microbiology

THEME II. Microbes as Cellular Systems

Jan 12 F An Overview: Comparing Prokaryotic and Eukaryotic Cells
Jan 17 W The Prokaryotic Cell: Organization and Structure
Jan 17/18 W/R The Prokaryotic Cell: Form and Function
Jan 19 F Microbial Taxonomy and Classification
Jan 22 M Phylogeny of Microorganisms
Jan 24 W Microbial Diversity

THEME III. Microbes as Energy Transducers

Jan 24/25 W/R An Overview: Metabolic Strategies for Generating ATP
Jan 26 F Heterotrophic Generation of ATP: Respiration
Jan 29 M Heterotrophic Generation of ATP: Fermentation
Jan 31 W Autotrophic Generation of ATP: Chemolithotrophy
Jan 31/Feb 01 W/R Autotrophic Generation of ATP: Photoautotrophy
Feb 02 F Microbial Origins of Life – Video “It came from Outer Space”
Feb 05 M Microbial Evolution – Metabolic Strategies of Primitive Microbes
Feb 07 W Effects of Environmental Factors
Feb 07/08 W/R Bacterial Growth Parameters and Measurements

THEME IV. Microbes as Agents of Environmental and Geochemical Change

Feb 09 F Extreme Environments & Biogeochemical cycles
Feb 12 M Microbial Modification of the Biosphere
Feb 14 W Bioremediation of Pollutants & Environmental Biotechnology

THEME V. Microbes & Molecular Processes

Feb 14/15 W/R Central Dogma Prokaryote Style
Feb 16 F Regulation of Gene Expression
Feb 21 W Bacterial Genetics: DNA Transfer
Feb 22 W/R Viruses: Characteristics & Lifestyles

THEME VI. Microbes as Agents of Infectious Disease

Feb 23 F Normal Flora, Virulence and Pathogenicity
Feb 26 M Microbial Death & Antibiotic Resistance
Feb 28 W Infectious Diseases
Feb 28/Mar 01 W/R Impact of Infectious Disease – Video “SmallPox Deadly Again?”

READING ASSIGNMENTS FOR BIOLOGY 345

Readings are from the required text: Madigan, Martinko and Parker. 2000. *Brock: Biology of Microorganisms*, 9th Edition. Prentice Hall Publishers.

| LECTURE TOPIC | READINGS |
|---|--|
| Overview and Historical Perspective | Chapter 1 (Review Chap. 2) |
| Microbes as Cellular Systems | |
| The Prokaryotic Cell | Chapter 3 |
| Microbial Taxonomy and Classification | Chapter 12 (12.9-12.10) |
| Phylogeny of Microorganisms | Chapter 12 (12.4-12.8) |
| Phylogeny of Microbial Diversity | Chapter 13 (Intro); Chapter 14 & 17 (Intro only) |
| Microbes as Energy Transducers | |
| Metabolic Strategies | Chapter 4 Chapter 15 (selected) |
| Microbial Evolution | Chapter 12 (12.1-12.3) |
| Microbial Growth | Chapter 5 |
| Microbes as Agents of Environmental Change | |
| Biogeochemical Cycling & Extreme Environments | Chapter 16 (16.13 only) |
| Bioremediation of Pollutants | Chapter 16 (16.19-16.22) |
| Microbial Modification of the Biosphere | Handouts Provided |
| Environmental Biotechnology | Chapter 10 (10.12 to review only) |
| Microbes & Molecular Processes | |
| Molecular Processes | Chapters 6 & 7 |
| Bacterial Genetics | Chapter 9 (Intro; 9.1-9.11) |
| Viruses | Chapter 8 (Intro; 8.1-8.7; 8.12;8.14; 8.20; 8.22; 8.23) |
| Microbes as Agents of Infectious Disease | |
| Normal Flora | Chapter 19 (Intro; 19.1-19.5) |
| Virulence and Pathogenicity | Chapter 19 (19.6-19.11) |
| Pathogenic Microbes | Chapter 22 (22.10); Chapter 23/24 (selected) |
| Antibiotics and Chemotherapeutic Agents | Chapter 18 (18.6-18.9); Chapter 11 (11.5-11.6) |
| Antibiotic Resistance | Chapter 18 (18.12-18.13) |