

**Eastern Illinois University**  
**New Course Proposal**  
**BIO 1094G, Practical Microbiology, Honors**

**1. Catalog Description**

- a. BIO 1094G
- b. Practical Microbiology, Honors
- c. 1-4-3
- d. F, S, Su
- e. Prc Micro Honors
- f. Using practical laboratory experiences student will learn characteristics and activities of microorganisms with emphasis on the performance of standard procedures and techniques used to study microbes. The course culminates with a student designed original research project. Does not count toward the Biological Sciences major or minor. Credit for BIO 1094G will not be granted if the student already has credit for or registration in BIO 1004G or BIO 3300.
- g. Admission to the University Honors College
- h. Fall 2006

**2. Student Learning Objectives and Evaluation**

- a. **Student Learning Objectives:** In accordance with the goals of general education, students will:
  - describe the nature of science and the use of scientific methodology as a problem solving tool (critical thinking)
  - analyze procedures and techniques utilized by microbiologists in medical, government, business and industry laboratories (critical thinking)
  - identify the vital ecological, applied, and infectious roles that microorganisms have on the planet Earth. (global citizenship)
  - evaluate literature reviews of experimental data and give oral presentations of results to practice effective speaking skills. (speaking)
  - apply their understanding of microbiology through various writing assignments to include laboratory reports (writing)
  - describe ethical issues related to microbiology, for example the responsible use of antibiotics or genetic engineering. (citizenship, speaking)
  - design and conduct original research projects in environmental microbiology (critical thinking)
  - write in a format suitable for publication the results of original research (writing)

b. **Student Performance Evaluation**

Two hourly exams and a final exam (40%): Exams will cover material from both lectures and laboratories. Exams will include objective, short answer and essay types of questions.

Written literature reviews (10 %): Reviews will require students to make critical judgments of contemporary microbiological research, and assess and predict its impact on society.

Laboratory reports (20%): Laboratory reports will include specific essay type questions that require proficient writing skills and critical thinking. Some of the reports require mathematical analysis of data and graphing of analyzed data.

Laboratory practicals (10%): Laboratory practical examinations will be included to assess students' ability to apply theory learned in the classroom and laboratory.

Class project and publication (20%): Students will develop, design and conduct an original research project using the data collected as a basis for drafts of a research paper suitable for publication. Each

student will be responsible for conducting repetitions of a class project and also a portion of the paper to be submitted for publication.

	Two hourly exams and final exam 40%	Literature Reviews 10%	Laboratory Reports 20%	Laboratory Practicals 10%	Class project and paper 20%
Nature of Science and Scientific Methodology	X	X	X	X	X
Lab techniques			X	X	X
Ethical Issues	X	X			X
Original Research		X	X		X
Written Report		X	X		X
<b>GE – Speak Effectively</b>		X			X
<b>GE – Write Effectively</b>	X	X	X		X
<b>GE – Think Critically</b>	X	X	X	X	
<b>GE – Function as Responsible Global Citizens</b>	X	X			X

- c. The course is not technology delivered.
- d. The course is not a graduate-level course.
- e. This course meets the criteria of a writing active course because it requires the students to complete frequent writing activities as mentioned in the description for a writing active course. These writing activities include lab reports, short essay questions on the exams and a research paper suitable for publication. These activities require students to demonstrate the ability to organize information, to analyze experimental data, to apply theories, and discuss conclusions.

### 3. Course Outline

a. One 50 minute lecture/week for 15 weeks; Two 100 minute laboratories/week for 15 weeks

Week	Lecture Topics	Laboratory Topics
1	<b>Scope of Microbiology:</b> Historical perspectives; Morphology, Structure and Composition of Microorganisms	<b>Introduction:</b> Ubiquitous nature of microbes; Aseptic Technique; Laboratory Safety
2	<b>Structure and composition of microorganisms:</b> prokaryotic cells	<b>Transfer Techniques Laboratory and Culture Techniques:</b> Media Preparation; Plating, Isolation.
3	<b>Microbial Diversity:</b> Prokaryotes; Eukaryotic Microbes; Viruses	<b>Enumeration:</b> Spread-plate, pour-plates; membrane filtration.

4	<b>Microbial Diversity:</b> Prokaryotes; Eukaryotic Microbes; Viruses <b>Microbial Growth and Metabolism:</b> Nutrition; Growth; Control of Growth; Physiology	<b>Enumeration:</b> Spread-plate, pour-plates; membrane filtration.
5	<b>Microbial Growth and Metabolism:</b> Nutrition; Growth; Control of Growth; Physiology	<b>Microscopy Techniques:</b> use of a oil immersion lens; phase contrast microscope. <b>Morphology and Staining:</b> Simple, Gram, and Endospore Stains
6	<b>Microbial Growth and Metabolism:</b> Growth; Control of Growth;	<b>Molecular and Physiological Characteristics:</b> Enzymological and Physiology Biochemical Activities of Microorganisms; Bacterial Unknown Identification
7	<b>Microbial Growth and Metabolism:</b> Nutrition; Growth; Control of Growth; Physiology	<b>Environmental Factors Affecting Growth:</b> Temperature; pH; Osmotic Pressure; Oxygen
8	<b>Microbial Genetics:</b> Molecular and Cellular Genetics; Recombinant DNA Technology	<b>Genetics-recombinant DNA:</b> conjugation, plasmids and gene transfer
9	<b>Food Microbiology:</b> Human Foodborne Pathogens  Food Preservation; Role of Microorganisms in Food Spoilage and Production; Fermentation Technology	<b>Food Microbiology:</b> Enumeration of Microorganisms in Food and Dairy Products; Methods for the Rapid Industrial Detection of Foodborne Pathogens; Selective Preparation of Fermented Food Products
10	<b>Medical Microbiology:</b> Human Infectious Diseases; Antimicrobial Drugs	<b>Medical Microbiology:</b> Effects of Antiseptics, Disinfectants, and Antibiotics on Bacteria; Hemolysis of Red Blood Cells; Normal Flora of Humans
11	<b>Medical Microbiology:</b> Human Infectious Diseases; Antimicrobial Drugs	<b>Environmental Microbiology:</b> Detection of Pathogens in Recreational and Drinking Water
12	<b>Medical Microbiology:</b> Human Infectious Diseases; Antimicrobial Drugs	<b>Environmental Microbiology:</b> Detection of Pathogens in Recreational and Drinking Water
13 – 15	<b>Class Project</b>	<b>Develop, design and conduct original research using techniques, skills and knowledge acquired from class discussion, lectures and literature reviews.</b>

b. This is not a technology delivered course.

## 5. Rationale

a. This course meets the requirements of the biological sciences component of the Scientific Awareness segment of the General Education core. Students will learn basic facts and principles of microbiology,

including cell structure, classification, growth, physiology, and molecular biology. This information will help them understand the applied aspects of microbiology as they relate to medical, food, and environmental microbiology. Course content will also include discussion of possible career opportunities in microbiology. During the hands-on laboratory experiments, students will learn how the scientific method is used to aid in our understanding of microbiology and science in general.

- b. This is an introductory course with no prerequisites so it is appropriate for a freshman level course.
- c. This course is a modification of BIO 1004G and includes a more detail-oriented curriculum and more in-depth discussion than BIO 1004G. Topics may overlap slightly with BIO 3300 (General Microbiology). However, General Microbiology is a majors' course with information geared for majors in Biological Sciences and a prerequisite of BIO 1100.
- d. This course is not required for any major but rather as an option for Honors program students.

## **6. Implementation**

- a. Faculty members to whom the course will be assigned: Steven Daniel, James McGaughey or other qualified faculty in the Department of Biological Sciences.
- b. Textbook: *Microbiology: An Introduction* (2000) by G. J. Tortora, B. R. Funke, and C. L. Case. 7<sup>th</sup> edition, Benjamin/Cummings Publishing Company. Laboratory handouts or manual will be prepared by the instructor.
- c. Course fee of \$10.00 for laboratory supplies (Pending approval by President's Council)

**7. Community College Transfer:** A community college course may be judged equivalent to this course.

**8. Date approved by the department:** October 6, 2005

**9. Date approved by the University Honors College:** 24 October 2005

**10. Date approved by the COSCC:** October 28, 2005

**11. Date approved by CAA:** December 16, 2005