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Number: _____
Action: _____
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Action: App 3/28/95
Date: Senate App 5/2/95

CURRICULUM PROPOSAL COVER SHEET
University-Wide Undergraduate Curriculum Committee

I. Title/Author of Change

Course/Program Title: BI 250 Principles of Microbiology
Suggested 20 Character Course Title: Prin. of Microbiology
Department: Biology
Contact Person: Dr. Allan T. Andrew

II. If a course, is it being Proposed for:

- Course Revision/Approval Only
- Course Revision/Approval and Liberal Studies Approval
- Liberal Studies Approval Only (course previously has been approved by the University Senate)

III. Approvals

Robert P. Henderson
Department Curriculum Committee

Robert P. Henderson
Department Chairperson

[Signature]
College Curriculum Committee

W. J. Cole
College Dean*

Director of Liberal Studies
(where applicable)

Provost
(where applicable)

*College Dean must consult with Provost before approving curriculum changes. Approval by College Dean indicates that the proposed change is consistent with long range planning documents, that all requests for resources, made as part of the proposal, can be met, and that the proposal has the support of the University administration.

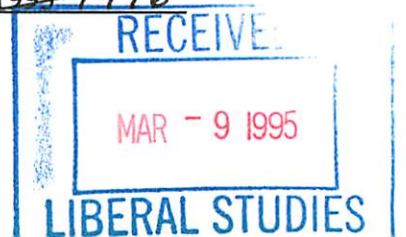
IV. Timetable

Date Submitted to LSC: _____
to UWUCC: _____

Semester to be Implemented:
Fall, ~~1996~~ 1997

Date to be published in Catalog:
~~1995-1996~~

re-submitted



V. DESCRIPTION OF CURRICULUM CHANGE**1. Catalog Description****BI 250 Principles of Microbiology****3 credits****2 lecture hours****Prerequisites: BI 111 and 112 or permission of
instructor****3 lab hours****(2c-3l-3sh)**

Study of structure, nutrition and biochemical activities of microbes. Survey of viruses, blue-green bacteria, bacteria, algae, fungi and protozoa and their diversity in natural environments. Course designed for biology, biology education and environmental health majors.

Course Syllabus

1. CATALOG DESCRIPTION

BI 250 Principles of Microbiology 3 credits
2 lecture hours
 Prerequisites: BI 111 and 112 or permission of instructor 3 lab hours
(2c-3l-3sh)

Study of structure, nutrition and biochemical activities of microbes. Survey of viruses, blue-green bacteria, bacteria, algae, fungi and protozoa and their diversity in natural environments. Course designed for biology, biology education and environmental health majors.

II. COURSE OBJECTIVES

1. Students will gain an understanding of the diversity of the microbial world.
2. Students will gain an understanding of the differences between eucaryotic and procaryotic cell structure and function.
3. Students will develop skills in aseptic technique and basic laboratory techniques when working with microorganisms.
4. Students will gain an understanding on the role that women and minorities have played in the discovery of knowledge related to the specific topics in the course.
5. Students will gain an appreciation of the importance of microorganisms in their daily lives.

III. COURSE OUTLINE (lectures of 60 minute duration assumed)

- A. Introduction (1.5 lectures)
 1. History of Microbiology
 2. Origin of Microbial Life
 3. Role in Transforming Organic Matter
 4. Role in Infectious Disease
 5. Microbiology in 20th Century
 6. Impact on Human Affairs
- B. Biochemical Background (Review) (4 lectures)
 1. Building Blocks: Atoms, Molecules & Chemical Bonds
 2. Characteristics of Major Biological Molecules: Carbohydrates, Lipids, Nucleic Acids and Proteins
 3. Enzymes

- C. Nature of the Microbial World (8 lectures)
 - 1. Procaryotes and Eucaryotes: A Comparison
 - 2. General Characteristics of Procaryotes and Eucaryotes
 - 3. Survey of Microorganisms (overview)
 - 4. Procaryotic Ultrastructure and Function
 - 5. Characteristics of Eucaryotes
 - 6. Eucaryotic Ultrastructure and Function (Review)
- D. Microbial Metabolism and Growth (6.5 lectures)
 - 1. Energy production in microorganisms
 - 2. Microbial Nutrition
 - 3. Microbial Growth
 - 4. Control of microbial growth
- E. Microbial Genetics (overview) (3.5 lectures)
 - 1. DNA and Plasmids
 - 2. Types of Genetic Recombination
 - 3. Recombinant Gene Transfer, Genetic Engineering and Recombinant DNA
- F. Viruses (2.5 lectures)
 - 1. General Characteristics of Viruses

Tentative Laboratory Schedule: Principles of Microbiology

Laboratory will meet twice a week. First meeting will be for two hours and second meeting will be for one hour. Class will be either a M-W or T-R sequence.

- Week 1 Introduction to Laboratory
Laboratory Safety
Microorganisms in the Environment
Use of Oil Immersion: Prepared Slides of Monera and Protista

Continue Above
- Week 2 Survey of Microorganisms
Protozoa

Continue Above:
- Week 3 Survey of Microorganisms (con't)
Cyanobacteria, unicellular algae

Continue Above

Week 4	Broth Culture ¹ Agar Slant ¹ Streak Plate ¹ Pour Plate ¹ Spread Plate ¹ Read Above	Aseptic Techniques Sterilization Procedures
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¹These are examples of laboratory exercises; as many will be performed as time allows.

Week 5	Staining Techniques Simple Stain Gram Stain Structural Stains Complete Above
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Week 6	Pipetting and Dilution Turbidmetric Estimation of Bacterial Growth Viable Count Technique Complete Above - Construct Standard Curve
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Week 7	Effect of Temperature on Growth ¹ Effects of Heat on Vegetative Cells and Spores of Bacteria, Yeast & Molds ¹ *Effects of Osmotic Pressure on Growth ¹ *Effects of pH of Medium on Growth ¹ Effects of Energy Source and Buffer on Growth ¹ Effects of Oxygen on Growth ¹ *Will use Mold and Yeast Along with Bacteria Complete Above
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Week 8	Enzymatic Reactions TSI IMViC Starch Hydrolysis Catalase Activity Oxidase Test Complete Above
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Week 9 Criteria in Identification of Filamentous Fungi
 Slime Mold Culture
 Slide Culture: Autotrophs

Continue Above

¹These are examples of laboratory exercises; as many will be performed as time allow.

Week 10 Axenic Isolation of Diatoms and Chlorophytes
 Zygosporangium Formation in *Rhizopus nigricans*
 Morphology and Reproduction of Yeasts

Protozoa in Common Laboratory Animals
 Continue Above

Week 11 Food Microbiology
 Yogurt Fermentation¹
 Analyses of Dried and Frozen Foods¹
 Analyses of Fresh and Marinated Foods¹

Complete Above

Week 12 Standard Analysis of Water
 Bacteriophage Isolation
 Microbial Population of Soil

Complete Above

Week 13 Normal Flora of Nose, Throat and Mouth
 Antibiotic Sensitivity Testing
 Antiseptics and Disinfectants

Complete Above

Week 14 Agglutination Experiments
 Blood Typing¹
 Bacterial Agglutination¹
 Final Lab Quiz

¹These are examples of laboratory exercises; as many will be performed as time allow.

Students will be required to identify unknowns twice during the semester. There will also be three laboratory quizzes (including final) given during the semester. Laboratory grade will make up 30% of the final course grade.

IV. EVALUATION METHODS

The final grade for the course will be determined as follows:

- 70% Tests on lecture material. Three examinations will be given during the semester. The final examination for the course will be comprehensive. Examinations may consist of multiple choice, completion, matching and short answer essay questions.
- 30% Laboratory. There will be three laboratory quizzes and two unknowns during the semester. Time for quizzes and unknowns will be placed in laboratory schedule at the beginning of each semester.

The final course grade will be based on the following scale:

A	90-100%
B	80-89%
C	70-79%
D	60-69%
F	< 60%

V. REQUIRED TEXTBOOKS, SUPPLEMENTAL BOOKS AND READINGS

Textbook: Boyd, Robert F. General Microbiology, 2nd edition, Times Mirror/
Mosby College Publishing. St. Louis, MO 1988.

Laboratory Manual: Seeley, et. al. Microbes in Action 4th edition. W.H. Freeman &
Company. New York, NY 1991.

VI. SPECIAL RESOURCE REQUIREMENTS

None

VII. BIBLIOGRAPHY

Cano, Raul and James S. Colome. Essentials of Microbiology. West Publishing
Company. St. Paul, MN 1988.

Mitchell et. al. Zoology. Benjamin/Cummings Publishing Co., Inc. Menlo Park, CA
1988.

Raven, et. al. Biology of Plants 4th Ed. Worth Publishers Inc. New York, NY
1986.

Tortora et. al. Microbiology An Introduction, 3rd ed. Benjamin/Cummings
Publishing Co., Inc. Menlo Park, CA 1989.

VanDemark, Paul J., and Barry L. Batzeng. The Microbes An Introduction to their
Nature and Importance. Benjamin/Cummings Publishing Co., Inc. 1987.

Course Analysis Questionnaire

A. DETAILS OF THE COURSE

- A1. This course will be one of the three diversity courses being proposed for Biology majors. The course will be taken by students after completion of Principles of Biology I and II. The student would most likely take this course during the sophomore year. The course is intended for Biology, Biology Education and Environmental health majors. Other departments requiring microbiology may wish to review their requirements to determine if another course in the department will better suit their needs. The course is not proposed for inclusion in the Liberal Studies course list.
- A2. The development of the course is part of a revision in the BS program in biology. These changes are described in the proposal for program revision. With the addition of this course to the program, BI 361 Microbiology will be phased out.
- A3. Course follows traditional type of offering taught in the department.
- A4. This specific course has never been offered at IUP on a trial basis.
- A5. The course will not be a dual-level offering.
- A6. The course will not be offered for variable credit.
- A7. Most college and universities offer at least one microbiology course as part of their undergraduate program. See appendix 1.
- A8. No professional society, accrediting authority, law or external agency mandates the contents of this course.

B. INTERDISCIPLINARY IMPLICATIONS

- B1. The course will be taught by one instructor.
- B2. Since this course will replace BI 361 Microbiology, there is the possibility that in the future a higher level, more specialized course in microbiology might be developed.
- B3. There is no overlap between this course and courses taught in other departments.
- B4. Seats in this course can be made available to students in the School of Continuing Education.

C. IMPLEMENTATION**C1. Resources**

- a. Faculty currently in the Biology Department can teach this course.
- b. Laboratory room and lecture facilities are available in Weyandt Hall.
- c. Course can be taught with equipment in department.
- d. Current department budget will be used to purchase supplies.
- e. Library materials are adequate.
- f. No additional travel funds will be needed.

C2. None of the resources will be from grants.

C3. The course will be offered every semester.

C4. One lecture section will be offered every semester. It is anticipated that 2 to 3 laboratory sections will be taught.

C5. The lecture will accommodate 48 to 72 students. The laboratories are restricted to 24 students.

C6. No professional society mandates any component of this course.

C7. This course will be part of the revised BS program in Biology. It will be one of the three diversity courses that biology majors will take. It will be a pre-requisite for any upper level microbiology course.

Bowling Green State University

BIOL 313. Microbiology (4) I, II, III (on demand). Methods of isolation, culture and identification; physiological, genetic and applied aspects of microorganisms. Two one-hour lectures, two two-hour laboratories. Prerequisites: BIOL 204 and 205 and one year of chemistry. Lab fee.

Wright State University

202-5 Microbiology

Study of morphology, cultivation, and biochemical activities of microorganisms. Survey of viruses, bacteria, blue-green algae, and fungi and their diversity in natural environments. 3 hours lecture, 4 hours lab. Prerequisite: BIO 111, 112; CHM 141.

Indiana State University

374 General Microbiology—3 hours. A comparative study of the structural, chemical, functional, and regulatory features of prokaryotes and eukaryotes to develop and illustrate the fundamental principles of microbiology. Prerequisites: 102; Chemistry 351 and 351L.

University of Georgia

350-350L. Introductory Microbiology. 5 hours. Three lectures and two 2-hour lab periods. Prerequisite: 10 hours of biological science, 5 hours of physical science, organic chemistry, or concurrently. A survey of microorganisms with special emphasis on bacteria and their relationship to man.

University of Scranton

BIOL. 121 Fr. Beining, Dr. Evans
Microbiology (C, O) 4½ credits
 (Prerequisites: Biology 1-2, Chem. 11-12) Structure, function, growth, reproduction, heredity and relationships of bacteria, yeasts, molds, virus, including a brief survey of pathogens, and life cycles of parasitic microzoa, and also an introduction of disease and immunology. 3 hours lecture and 3 hours laboratory. For all student except nursing.