Eastern Illinois University
New Course Proposal
BIO 5207, Microbial Ecology

CGS Agenda Item: 20-05
Effective Fall 2020

Banner/Catalog Information (Coversheet)

1. **X__ New Course or _____Revision of Existing Course**
2. **Course prefix and number:** BIO 5207
3. **Short title:** Microbial Ecology
4. **Long title:** Microbial Ecology
5. **Hours per week:** 3 Class 0 Lab 3 Credit
6. **Terms:** Fall Spring Summer _X_ On demand
7. **Initial term**: _X__ Fall __ Spring ___ Summer Year: 2020
8. **Catalog course description:** This course explores interactions and transformations of microbes in soil, water, built environments, and host organisms. Special emphasis will be placed on both theoretical foundations as well as modern methodology and its application.
9. **Course attributes:**

   General education component: N/A

   ___ Cultural diversity ___ Honors ___ Writing centered ___ Writing intensive ___Writing active
10. **Instructional delivery**
    Type of Course:

    X Lecture ___ Lab ___ Lecture/lab combined ___ Independent study/research

    ___ Internship ___ Performance __ Practicum/clinical ___ Other, specify: _____

    Mode(s) of Delivery:

    X Face to Face ___ Online ___ Study Abroad

    ___ Hybrid, specify approximate amount of on-line and face-to-face instruction_____
11. **Course(s) to be deleted from the catalog once this course is approved.** None
12. **Equivalent course(s):** None

    a. Are students allowed to take equivalent course(s) for credit? ___ Yes ___ No
13. **Prerequisite(s):** BIO 3300 (General Microbiology) or equivalent coursework

    a. Can prerequisite be taken concurrently? ___ Yes _X_ No

    b. Minimum grade required for the prerequisite course(s)? D

c. Use Banner coding to enforce prerequisite course(s)? ___ Yes _X_ No

d. Who may waive prerequisite(s)?

___ No one _X_ Chair _X_ Instructor ___ Advisor ___ Other (specify)

14. Co-requisite(s): None

15. Enrollment restrictions

a. Degrees, colleges, majors, levels, classes which may take the course: Admission to a graduate degree program in Biological Sciences or Chemistry and Biochemistry. Other students may be permitted to enroll with instructor approval.

b. Degrees, colleges, majors, levels, classes which may not take the course: All others.

16. Repeat status: X May not be repeated ___ May be repeated once with credit

17. Enter the limit, if any, on hours which may be applied to a major or minor: N/A

18. Grading methods: X Standard ___ CR/NC __ Audit ___ ABC/NC

19. Special grading provisions: N/A

___ Grade for course will not count in a student's grade point average.
___ Grade for course will not count in hours toward graduation.
___ Grade for course will be removed from GPA if student already has credit for or is registered in:
___ Credit hours for course will be removed from student's hours toward graduation if student already has credit for or is registered in: _____

20. Additional costs to students:
Supplemental Materials or Software_____

Course Fee X No ___Yes, Explain if yes_____

21. Community college transfer:

___ A community college course may be judged equivalent.

X A community college may not be judged equivalent.

Note: Upper division credit (3000+) will not be granted for a community college course.

Rationale, Justifications, and Assurances (Part I)

1. ___Course is required for the major(s) of _____

___Course is required for the minor(s) of _____

___Course is required for the certificate program(s) of _____

_X Course is used as an elective

2. Rationale for proposal: Microbial ecology is a subject that focuses on the relationships and interactions of populations and communities of microbes in various ecosystems including soil, water, built environments, and host organisms, such as the human body. Microbial ecology is a relatively

new discipline that emerged based on both microbiology and ecology; however, the significance and importance have increased in recent years, especially with the advancement of molecular technologies, bioinformatics, and our increased understanding of the human microbiome. This course complements existing graduate courses in Biological Sciences and related science majors, and will help students better understand the subject matter particularly in relation to their research area, thus helping them to be better prepared to accomplish their research goals.

3. **Justifications for (answer N/A if not applicable)**

   Similarity to other courses: Microbial Ecology will necessarily include some fundamental concepts from General Microbiology (BIO 3300) and several ecology courses, such as Population Ecology (BIO 5208) and Community Ecology (BIO 5209). General Microbiology is a foundational undergraduate course for microbiological concepts. Population Ecology and Community Ecology will share theoretical aspects, such as population dynamics, trophic interactions, theoretical and statistical aspects of biodiversity and community structure-function relationship. Microbial Ecology is more than a mere combination of these two courses because the major focus is applying these ecological principles to microbes.

   Prerequisites: None

   Co-requisites: N/A

   Enrollment restrictions: N/A

   Writing active, intensive, centered: N/A

4. **General education assurances (answer N/A if not applicable)**

   General education component: N/A

   Curriculum: N/A

   Instruction: N/A

   Assessment: N/A

5. **Online/Hybrid delivery justification & assurances (answer N/A if not applicable)**

   Online or hybrid delivery justification: N/A

   Instruction: N/A

   Integrity: N/A

   Interaction: N/A

Model Syllabus (Part II)

1. **Course Number, Title, Credit Hours**
   BIO 5207, Microbial Ecology, 3-0-3

2. **Catalog Description**
   This course explores interactions and transformations of microbes in soil, water, built environments, and host organisms. Special emphasis will be placed on both theoretical foundations as well as modern methodology and its application.

3. **Learning Objectives (Goals)**
   a. Integrate multidisciplinary aspects of microbial ecology from molecular biology to ecosystem ecology to multivariate statistics (GLG1)
   b. Apply understanding in microbial ecology to interpret results, critically evaluate and discuss classical and contemporary literature (GLG1, 2, 4)
   c. Explore the research literature and present findings in structured and open settings (GLG3, 4)
   d. Formulate a research topic and synthesize research findings through peer and faculty feedback (GLG4)

4. **Course Materials**

   Textbook: *Brock Biology of Microorganisms*, 15th ed., 2018.Madigan, Bender, Buckley, Sattley & Stahl. Pearson. ISBN: 978-0134261928.

5. **Weekly Outline of Content**

   Week 1: History of microbiology and microbial ecology.

   Week 2: Microbiology fundamentals.

   Week 3: Microbial evolution.

   Week 4: Microbial systematics.

   Week 5: Microbial physiology.

   Week 6: Molecular biology.

   Week 7: Bacterial genetics.

   Week 8: Metabolism introduction.

   Week 9: Metabolic diversity.

   Week 10: Biogeochemical cyclings.

   Week 11: Quantitative ecology: abundance, biomass and metabolic activity.

   Week 12: Molecular microbial ecology.

   Week 13: Molecular microbial ecology, continued.

   Week 14: Microbial interactions.

   Week 15: Microbial community and ecosystem ecology.

   Week 16: Final Exam.

6. Evaluation

3 exams (15%+15%+20%)	50%
Project: special topic (talk)	10%
Project: "My Favorite Microbe" (talk & paper)	30%
2 critical reviews	10%
Total	**100%**

7. Grading Scale

90% or more = A; 80-89% = B; 70-79% = C, 60-69% = D; <60% = F

8. Correlation of learning objectives to assignments and evaluation

Learning Objectives	Exams (50%)	Projects (40%)	Critical Review (10%)
Integrate multidisciplinary aspects of microbial ecology from molecular biology to ecosystem ecology to multivariate statistics (GLG1)	X	X	X
Apply understanding in microbial ecology to interpret results, critically evaluate and discuss classical and contemporary literature (GLG1, 2, 4)	X	X	X
Explore the research literature and present findings in structured and open settings (GLG3, 4)		X	X
Formulate a research topic and synthesize research findings through peer and faculty feedback (GLG4)		X	X

Date approved by the department or school: November 22, 2019 Date approved by the college curriculum committee: January 22, 2020

Date approved by the Honors Council *(if this is an honors course):*

Date approved by CAA:

Date approved by CGS: 2-18-2020