Eastern Illinois University

New/Revised Course Proposal Format

(Approved by CAA on 4/3/14 and CGS on 4/15/14, Effective Fall 2014)

CGS Agenda Item: 19-23
Effective Summer 2019

Banner/Catalog Information (Coversheet)

1. **__X__New Course or _____Revision of Existing Course**
2. **Course prefix and number:** ___BIO 5490_____
3. **Short title:** ___Genomics & Genetic Engineering _____
4. **Long title:** ___Genomics and Genetic Engineering_____
5. **Hours per week:** _4_ Class _0_ Lab _4_ Credit
6. **Terms:** ___ Fall _X__ Spring _X__ Summer ___ On demand
7. **Initial term**: ___ Fall ___ Spring _X_ Summer Year: __2019____
8. **Catalog course description:** This course will expand the student's understanding of genetic manipulation, further their knowledge of genome research, and explore the latest research and technologies advancing the science of genetic engineering and genomics.
9. **Course attributes:**

   General education component: _____

   ___ 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 3200: Genetics (or equivalent) _____**

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

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

    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): _____

15. Enrollment restrictions

a. Degrees, colleges, majors, levels, classes which <u>may</u> take the course: <u>Admission to the Graduate School or by permission of the Department Chair</u>.

b. Degrees, colleges, majors, levels, classes which may <u>not</u> take the course: __None___

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: ___

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

19. Special grading provisions:

___ Grade for course will <u>not</u> count in a student's grade point average.

___ Grade for course will <u>not</u> 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 <u>not</u> be judged equivalent.

Note: Upper division credit (3000+) will <u>not</u> be granted for a community college course, even if the content is judged to be equivalent.

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**: Genetic engineering, biotechnology, and genomics transformed the entire field of biology, are fundamental for full understanding of most processes in living organisms, and they revolutionized our understanding of nature and its applications in society. Discovering that DNA can be manipulated *in vitro* and transferred to various organisms led to developing transgenic techniques in yeast, plants, and animals. At the end of this course students will be able to demonstrate a clear understanding of the facts and basic concepts covered in the class including: techniques in recombinant DNA technologies, vectors for cloning, gene-cloning strategies, analyzing and changing cloned genes, cloning in prokaryotes and eukaryotes, mapping and sequencing genomes, phylogenetics, comparative genomics and phylogenomics, functional genomics, transcriptomics, proteomics, and metabolomics.
3. **Justifications for (answer N/A if not applicable)**
   Similarity to other courses: None
   Prerequisites: BIO 3200 (Genetics) provides fundamental knowledge in genetics
   Co-requisites: None
   Enrollment restrictions: May not have previously taken BIO5460I-001. The proposed course was offered as a special topics course (BIO5460I-001) in Summer 2018.
   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)

Please include the following information:

1. Course number and title: BIO5490/Genomics and Genetic Engineering
2. Catalog description: This course will expand the student's understanding of genetic manipulations, further their knowledge of genome research, and explore the latest research and technologies advancing the science of genetic engineering and genomics.
3. Graduate Goals for Learning

   GLG1. Depth of content knowledge
   GLG2. Effective critical thinking and problem solving
   GLG3. Effective oral and written communication
   GLG4. Advanced scholarship through research or creative activity

   Learning Objectives (Graduate Learning Goals Met)

   1. Understanding and properly interpreting, and critiquing the relevant data, information, and knowledge covered in lecture about recombinant DNA methods, gene cloning applications, and genomics in different organisms (GLG1, GLG2).
   2. During class and homework exercises students will use appropriate technology to collect and analyze data, and produce quantitative materials in the form of tables, graphs, and charts (GLG2, GLG3).
   3. Evaluating experimental and theoretical evidence, issues, ideas, and problems from lecture (GLG3, GLG4).

4. Course materials: T. A. Brown "Gene Cloning and DNA Analysis: An Introduction (7th Edition)"; ISBN: 978-1-119-07256-0.

5. Weekly outline of content.

(16 weeks semester)

Week	Content
1	Basic Techniques, Cutting and Joining DNA and Vectors
2	Gene-cloning Strategies
3	Analyzing and Changing Cloned Genes
4	Cloning in Prokaryotes
5	Cloning in Yeast (and Y2H)
6	Genetic Manipulation of Animals
7	Genetic Manipulation of Plants
8	Advanced Techniques for Gene Manipulation
9	The Organization and Structure of Genomes, Mapping Genomes (DNA Markers, Genetic Maps, Physical Maps)
10	Types of DNA sequencing, Whole genome sequencing
11	Transcriptomics
12	Functional Genomics
13	Proteomics

14	Metabolomics
15	Phylogenetics, Comparative Genomics and Phylogenomics
16	Final Exam

(4 weeks semester)

Week	**Content**
1	Basic Techniques Cutting and Joining DNA Vectors Gene-cloning Strategies Analyzing and Changing Cloned Genes
2	Cloning in Prokaryotes Cloning in Yeast and Y2H Genetic Manipulation of Animals Genetic Manipulation of Plants Advanced Techniques for Gene Manipulation
3	The Organization and Structure of Genomes Mapping Genomes - DNA Markers - Genetic Maps - Physical Maps Sequencing Genomes - NGS, TGS
4	Phylogenetics Comparative Genomics and Phylogenomics Functional Genomics Transcriptomics Proteomics Metabolomics
	Final Exam (the last class period)

6. Assignments and evaluation, including weights for final course grade.

Hourly exams (2 exams/10% each)	20%
Project assignments	40%
Class exercises and reports	20%
Final exam-comprehensive	20%

7. Grading scale: Grading scale:
A = 90 to 100%, B = 80 to 89%, C = 70-79%, D = 60-69%, F = < 60%

8. Correlation of learning objectives to assignments and evaluation.

Learning Objectives	Class exercises and reports (20%)	Exams (40%)	Project assignments (40%)
Understanding and properly interpreting, and critiquing the relevant data, information, and knowledge covered in lecture about recombinant DNA methods, gene cloning applications, and genomics in different organisms (GLG1, GLG2).	X	X	X
During class and homework exercises students will use appropriate technology to collect and analyze data, and produce quantitative materials in the form of tables, graphs, and charts (GLG2, GLG3).	X		X
Evaluating experimental and theoretical evidence, issues, ideas, and problems from lecture (GLG3, GLG4).	X	X	X

Date approved by the department or school: October 26, 2018

Date approved by the college curriculum committee: November 2, 2018

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

Date approved by CAA: **CGS:**