

Washtenaw Community College Comprehensive Report

BIO 161 General Biology I Ecology and Evolution

Effective Term: Spring/Summer 2016

Course Cover

Division: Math, Science and Engineering Tech

Department: Life Sciences

Discipline: Biology

Course Number: 161

Org Number: 12100

Full Course Title: General Biology I Ecology and Evolution

Transcript Title: Gen Bio I Eco Evo

Is Consultation with other department(s) required: No

Publish in the Following: College Catalog , Time Schedule , Web Page

Reason for Submission: Course Change

Change Information:

Consultation with all departments affected by this course is required.

Pre-requisite, co-requisite, or enrollment restrictions

Rationale: update pre-requisites

Proposed Start Semester: Winter 2017

Course Description: In this course, biology majors are given a detailed study of the concepts and evidence in evolutionary biology, an inclusive look at modern systematics and taxonomic organizations of all living organisms, an in-depth examination of the biological features (anatomy, physiology, and behavior) of all major groups of living things, and the application of these concepts into ecological systems. Basic concepts of genetics will also be covered. This course is part of a two course sequence which serves as a comprehensive, year-long sequence for biology majors which can be completed in any order.

Course Credit Hours

Variable hours: No

Credits: 4

Lecture Hours: Instructor: 45 **Student:** 45

Lab: Instructor: 45 **Student:** 45

Clinical: Instructor: 0 **Student:** 0

Total Contact Hours: Instructor: 90 **Student:** 90

Repeatable for Credit: NO

Grading Methods: Letter Grades

Audit

Are lectures, labs, or clinicals offered as separate sections?: NO (same sections)

College-Level Reading and Writing

College-level Reading & Writing

College-Level Math

Level 3

Requisites

Prerequisite

High school biology or high school chemistry or high school environmental science
or

Prerequisite

BIO 101 minimum grade "C"

or

Prerequisite

CEM 101 minimum grade "C"

or

Prerequisite

ENV 101 minimum grade "C"

General Education**MACRAO**

MACRAO Science & Math

MACRAO Lab Science Course

General Education Area 4 - Natural Science

Assoc in Applied Sci - Area 4

Assoc in Science - Area 4

Assoc in Arts - Area 4

Michigan Transfer Agreement - MTA

MTA Lab Science

Request Course Transfer**Proposed For:**

Central Michigan University
College for Creative Studies
Eastern Michigan University
Ferris State University
Grand Valley State University
Jackson Community College
Kendall School of Design (Ferris)
Lawrence Tech
Michigan State University
Oakland University
University of Detroit - Mercy
University of Michigan
Wayne State University
Western Michigan University

Student Learning Outcomes

1. Identify the processes and patterns in evolutionary biology.

Assessment 1

Assessment Tool: Departmental Exams

Assessment Date: Winter 2017

Assessment Cycle: Every Three Years

Course section(s)/other population: All sections

Number students to be assessed: All students

How the assessment will be scored: Item analysis of selected exam questions.

Standard of success to be used for this assessment: Seventy percent of students will score an overall average score of 70% or better on each assessment question.

Who will score and analyze the data: Appropriate life science faculty

2. Identify and recognize the biological characteristics of the six categories of living organisms.

Assessment 1

Assessment Tool: Departmental Exams

Assessment Date: Winter 2017

Assessment Cycle: Every Three Years

Course section(s)/other population: All sections

Number students to be assessed: All students

How the assessment will be scored: Item analysis of selected exam questions.

Standard of success to be used for this assessment: Seventy percent of students will score an overall average score of 70% or better on each assessment question.

Who will score and analyze the data: Appropriate life science faculty

3. Identify and evaluate the organization, processes, study of, and organismal relationships in ecological systems.

Assessment 1

Assessment Tool: Departmental Exams

Assessment Date: Winter 2017

Assessment Cycle: Every Three Years

Course section(s)/other population: All sections

Number students to be assessed: All students

How the assessment will be scored: Item analysis of selected exam questions.

Standard of success to be used for this assessment: Seventy percent of students will score an overall average score of 70% or better on each assessment question.

Who will score and analyze the data: Appropriate life science faculty

4. Perform laboratory exercises that reinforce and illustrate concepts in evolution, taxonomy, biodiversity, and ecology including designing, completing and interpreting a scientific experiment.

Assessment 1

Assessment Tool: Student Research Project and Paper

Assessment Date: Winter 2017

Assessment Cycle: Every Three Years

Course section(s)/other population: All sections

Number students to be assessed: All students

How the assessment will be scored: Departmentally-developed rubric.

Standard of success to be used for this assessment: Seventy percent of students will score an overall average score of 70% or better on the final project. Final project score will incorporate an evaluation of lab content and skills in the experiment, quality of writing in the scientific paper and a presentation.

Who will score and analyze the data: Appropriate life science faculty

Course Objectives

1. List, define, or write essays about the properties of life.
2. Define or identify the parts of the experimental method; explain the purpose of a control in an experiment.
3. Define, identify, or write essays from among the following central themes in biology: cell theory, molecular basis of inheritance, descent with modification (evolution), cells are information-processing systems, living systems exist in non-equilibrium states, and function follows structure.
4. Distinguish differences in cell division between animals and plants.
5. Define and give examples of terms relating to development, including things such as: determination, commitment, stem cells, nuclear reprogramming, cell division, A/P and D/V axis formation, homeobox genes, cell migration, and apoptosis.
6. Identify some of the issues involved in development, such as reproductive and therapeutic cloning.
7. Identify principles of Mendelian inheritance; recognize the patterns of inheritance of recessive, dominant, linked and sex-linked traits.
8. Define what a gene and a chromosome are.
9. Describe the genetic basis for continuous variation and nondisjunction.
10. Define and identify examples of evolution, population genetics, natural selection, and evolutionary fitness.
11. Compare and contrast frequency-dependent selection, oscillating selection and

- heterozygote advantage. Compare and contrast disruptive, stabilizing, and directional selection.
12. Explain how experiments can be used to test evolutionary hypotheses.
 13. Describe how different types of selective pressures (biotic and abiotic) drive evolutionary change in a species.
 14. Contrast the process of artificial, sexual and natural selection.
 15. Describe the different types of evidence for evolution including fossils, analogous and homologous structures, vestigial structures, genetics, biochemistry, embryology, biogeographical distribution, and Hardy-Weinberg principle.
 16. Characterize the criticisms of evolutionary theory and explain counterarguments that can be made.
 17. Distinguish between different definitions of species including the biological species concept, the ecological species concept and the phylogenetic species concept.
 18. Define and explain the concepts of reproductive isolating factors, genetic drift, gene flow, founder-effect, genetic bottlenecks, sympatric and allopatric speciation.
 19. Contrast the processes of gradualism and punctuated equilibrium in relation to adaptive radiations.
 20. Define mass extinction and identify when major mass extinctions have occurred.
 21. Describe what a phylogeny represents.
 22. Demonstrate how a cladogram is constructed and the information that can be obtained by its interpretation.
 23. Compare and contrast the historical versus modern perspectives on taxonomy and classification schemes.
 24. Discuss how a phylogenetic tree can indicate the timing of species diversification and corresponds with extinction events.
 25. Describe the characteristics of "living" things.
 26. Describe the formation and conditions of early Earth.
 27. Describe the categories and application of the Linnean Hierarchy.
 28. Describe the three domain/six kingdom system of taxonomy and the characteristics of each type of organism within those groups.
 29. Describe the basic anatomy of a virus and a prion.
 30. Understand the mechanism of viral replication.
 31. Distinguish between the pathology of several common viruses.
 32. Describe the mechanism of vaccines.
 33. Describe the basic features for bacteria and archaea.
 34. Describe the three basic shapes of bacteria.
 35. Describe the asexual and sexual reproduction mechanisms of bacteria.
 36. Describe the ecology of bacteria, both non-pathogenic and pathogenic.
 37. List the biological characteristics of Protists.
 38. Compare and contrast the structures and ecology between different groups of Protists.
 39. Describe the significance or impact of pathogenic protists, diatoms and choanoflagellates.
 40. Explain the major events in the evolution of plants, both aquatic and terrestrial.
 41. Compare and contrast the major types of plant groups including algae, bryophytes, pterophytes, gymnosperms and angiosperms.
 42. Describe the parts of a plant including roots, stem, leaf, and reproductive structure.
 43. Describe the roles of some animals in the angiosperm life cycle.
 44. Explain ecological role of plants in global ecosystems.
 45. Identify characteristics that distinguish fungi from other eukaryotes.
 46. Describe the basic anatomy of a fungus.
 47. Describe the feeding mechanisms of different types of fungi.
 48. Compare and contrast the three major taxonomic groups of fungi in relation to structure, life cycle, feeding, and ecology.
 49. Describe the ecological role of fungi including medical, agriculture, and biotechnology.
 50. Describe examples of fungal associations with different organisms.
 51. Identify the biological features that uniquely characterize animals.
 52. Describe the different types of animal body plans and symmetry.
 53. Distinguish between ectothermic and endothermic thermoregulation.

54. Compare and contrast the taxonomy, anatomy, physiology, reproduction, behavior and ecology between major animal phyla including Porifera, Cnidaria, Platyhelminthes, Nematoda, Annelida, Mollusca, Arthropoda, Echinodermata, and Chordata.
55. Perform lab work and demonstrate skills in things such as: scientific method, graphing, use of the metric system, dissection (one lab to be performed in the WCC cadaver room) and light microscopy.
56. Perform lab work and be able to do things such as: identify structure and function of bacteria, archaea, protists, plants, fungi and animals; show an understanding of evolutionary processes; recognize the principles and patterns in ecological systems; compare and contrast different types of animal behaviors.
57. Pose hypotheses, design and set up appropriate experiments with controls, interpret the data, draw conclusions from data, accept or reject the hypothesis, present analysis of the experiments in written form and as an oral report. Perform one or more inquiry-based experiments.
58. In a short paper, relate one of the topics covered to sustainability issues facing the world today.

New Resources for Course

1. \$2,500 for materials needed for new labs

Course Textbooks/Resources

Textbooks
Manuals
Periodicals
Software

Equipment/Facilities

<u>Reviewer</u>	<u>Action</u>	<u>Date</u>
Faculty Preparer: <i>Anne Heise</i>	<i>Faculty Preparer</i>	<i>Oct 22, 2015</i>
Department Chair / Area Director: <i>Anne Heise</i>	<i>Recommend Approval</i>	<i>Oct 22, 2015</i>
Dean: <i>Kristin Good</i>	<i>Recommend Approval</i>	<i>Oct 22, 2015</i>
Curriculum Committee Chair: <i>Kelley Gottschang</i>	<i>Recommend Approval</i>	<i>Nov 11, 2015</i>
Assessment Committee Chair:		
Vice President for Instruction: <i>Michael Nealon</i>	<i>Approve</i>	<i>Nov 17, 2015</i>