

# Washtenaw Community College Comprehensive Report

## BIO 101 Concepts of Biology Effective Term: Winter 2019

### Course Cover

**Division:** Math, Science and Engineering Tech

**Department:** Life Sciences

**Discipline:** Biology

**Course Number:** 101

**Org Number:** 12100

**Full Course Title:** Concepts of Biology

**Transcript Title:** Concepts of Biology

**Is Consultation with other department(s) required:** No

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

**Reason for Submission:**

**Change Information:**

**Consultation with all departments affected by this course is required.**

**Distribution of contact hours**

**Outcomes/Assessment**

**Rationale:** Three year review as a result of an assessment report.

**Proposed Start Semester:** Winter 2019

**Course Description:** In this course, students will learn the basic principles and concepts of biological systems. Emphasis is placed on form and function, biological processes, diversity within and across taxonomic groups, and ecological interactions. Students will examine the fundamentals of biochemistry, cells, genetics, cellular energy, taxonomy, reproduction, evolution, ecology and sustainability. This course includes laboratory exercises designed to reinforce these concepts and their application to modern scientific research. BIO 101 serves as an introductory lab-based biology course for non-majors. Students requiring a full year of college biology should consider BIO 161 and BIO 162.

### 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

### Requisites

## **Prerequisite**

Academic Reading and Writing Levels of 6

## **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:**

## **Student Learning Outcomes**

1. Recognize the fundamental structures and functions of biological systems.

### **Assessment 1**

Assessment Tool: Five common exam questions

Assessment Date: Fall 2021

Assessment Cycle: Every Three Years

Course section(s)/other population: All

Number students to be assessed: All students

How the assessment will be scored: Answer key and rubric

Standard of success to be used for this assessment: 75% of the students will score 75% or higher

Who will score and analyze the data: Department faculty

2. Identify key aspects of cell metabolism, photosynthesis, genetics, and reproduction.

### **Assessment 1**

Assessment Tool: Five common exam questions

Assessment Date: Fall 2021

Assessment Cycle: Every Three Years

Course section(s)/other population: All

Number students to be assessed: All students

How the assessment will be scored: Answer key and rubric

Standard of success to be used for this assessment: 75% of the students will score 75% or higher

Who will score and analyze the data: Department faculty

3. Compare and contrast the evolution and biological characteristics of the six major taxa of living organisms.

### **Assessment 1**

Assessment Tool: Five common exam questions

Assessment Date: Fall 2021

Assessment Cycle: Every Three Years

Course section(s)/other population: All

Number students to be assessed: All students

How the assessment will be scored: Answer key and rubric

Standard of success to be used for this assessment: 75% of the students will score 75% or higher

Who will score and analyze the data: Department faculty

4. Identify the principles and mechanisms that regulate and sustain ecological systems.

**Assessment 1**

Assessment Tool: Five common exam questions

Assessment Date: Fall 2021

Assessment Cycle: Every Three Years

Course section(s)/other population: All

Number students to be assessed: All students

How the assessment will be scored: Answer key and rubric

Standard of success to be used for this assessment: 75% of the students will score 75% or higher

Who will score and analyze the data: Department faculty

5. Demonstrate the proper use and application of laboratory skills relating to biological investigation.

**Assessment 1**

Assessment Tool: Scientific method paper

Assessment Date: Fall 2021

Assessment Cycle: Every Three Years

Course section(s)/other population: All

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: 75% of the students will score 75% or higher

Who will score and analyze the data: Department faculty

**Course Objectives**

1. Identify each of the characteristics that distinguish living from non-living things.
2. Identify the function of the scientific method, each of the steps of the scientific method and the reason for doing a control experiment.
3. Recognize the structure of an atom and the characteristics and functions of each part.
4. Recognize the definitions of terms that relate to atoms.
5. Identify the six most significant biological elements, their chemical symbols and their atomic numbers.
6. Identify the characteristics of ionic and covalent bonding and where they occur.
7. Recognize the differences between molecular (chemical) and structural formulas and how they are written.
8. Recognize the characteristics and structure of water and how they relate to polarity and hydrogen bonds.
9. Identify the process of ionization and how it relates to pH measurement and the difference between acids and bases.
10. Identify the chemical formulas of common functional groups and the molecules that contain them.
11. Recognize the processes of dehydration synthesis (condensation) and hydrolysis.
12. Identify the functions and structures of the different types of carbohydrates, lipids, proteins and nucleic acids.
13. Recognize the four levels of protein structure and how this affects function.
14. Identify the three components of the cell theory.
15. Identify the differences and similarities between prokaryotic and eukaryotic cells and between plant and animal cells.
16. Recognize the structures of prokaryotic and eukaryotic cells and their functions.
17. Identify the structures and functions of the cell (plasma) membrane.
18. Identify the methods and mechanisms of all types of movement of materials in or out of cells.
19. Identify each stage of the cell cycle and recognize all of the processes and functions of each stage.
20. Identify the processes and functions of meiosis I and meiosis II.
21. Identify the differences between the overall processes of mitosis and meiosis.

22. Identify the basic structure of chromosomes and all the steps in the process of DNA synthesis.
23. Recognize the definitions of the following terms: homologous chromosomes, haploid (1n), diploid (2n), alleles, crossing over, genetic recombination, independent assortment, spermatogenesis, oogenesis, zygote, somatic cells, gametes, sexual and asexual reproduction.
24. Recognize the definitions of the following terms: gene, locus, dominant, recessive, genotype, phenotype, heterozygous, homozygous, incomplete dominance, codominance, epistasis, pleiotropy, and polygenic traits.
25. Recognize Punnett squares for monohybrid or dihybrid crosses of complete dominance, incomplete dominance or codominance.
26. Identify the differences between sex chromosomes and autosomes; the genetic determination of gender in humans and the genotypes of normal human females and males.
27. Identify sex-linked diseases and other selected genetic diseases and Punnett squares regarding sex-linked characteristics.
28. Identify the following chromosomal aberrations: deletions, duplications, inversions, translocations, nondisjunctions leading to polyploidy and Down's syndrome.
29. Identify all of the components and the steps involved in the process of protein synthesis.
30. Recognize the definitions of the following terms: energy, work, kinetic energy, potential energy, metabolism, oxidation and reduction.
31. Identify the first and second Laws of Thermodynamics.
32. Identify the structure, characteristics and functions of protein enzymes.
33. Identify all of the components, processes and end products of photosynthesis, and why photosynthesis is important for life on earth.
34. Identify all of the components, processes and end products of anaerobic (fermentation) and aerobic (cellular) respiration.
35. Recognize the sequence of taxons in classifying organisms, the binomial system of nomenclature, the names of the three domains and the five kingdoms, and the classification of humans.
36. Recognize the structures, functions and reproduction of viruses and the characteristics of bacteriophages, retroviruses, viroids and prions.
37. Identify the different kinds of Protists, their characteristics, functions, negative and positive effects.
38. Identify the different types of Fungi and their characteristics.
39. Identify the major groups of the plant kingdom and their characteristics and the description of the phrase "alteration of generations."
40. Recognize the life cycles of the mosses, ferns, gymnosperms and the terms gametophyte and sporophyte.
41. Recognize the structures of plants and their functions.
42. Identify the following: structures and functions of a flower, the process of double fertilization, the process of pollination, seed dispersal, plant hormones, seed and fruit development.
43. Recognize the characteristics of animals, the main types of body symmetry, the types of digestive systems, the types of body support systems, and the terms cephalization, coelom formation and segmentation.
44. Identify the members and features of the following animal phyla: Porifera, Cnidaria, Platyhelminthes, Nematoda, Rotifera, Mollusca, Annelida, Arthropoda, Echinodermata, and Chordata (including the Chordate classes and the orders of the class Mammalia).
45. Identify the structures and functions of both the human male and the human female reproductive systems including the functions of hormones on each system.
46. Recognize the process of fertilization in humans including the formation of egg and sperm.
47. Identify the stages of development of a human embryo and the different germ layers that result from gastrulation and what each will eventually become.
48. Recognize the causes and characteristics of the various STD's.
49. Recognize the definitions of the following terms: biosphere, lithosphere, hydrosphere, atmosphere, ecosystem, biotic, abiotic, trophic levels, food web, primary producers, autotrophs, primary consumers, heterotrophs, secondary consumers, tertiary consumers, decomposers, detritivores, community, population, habitat, and niche.

50. Identify examples of predator adaptations, plant defenses, animal defenses, warning coloration, camouflage, batesian mimicry and Mullerian mimicry.
51. Identify the different types of species interactions, including competition, predator-prey, and symbiosis (commensalisms, mutualism, parasitism).
52. Recognize the two main observations that led Darwin to the concept of natural selection.
53. Identify the processes involved in the study of microevolution and the biological species concept.
54. Recognize the importance of the Theory of Evolution in the study of biology and the different techniques that scientists use to provide evidence that evolution occurs.
55. Identify each part and its function for the dissection microscope and the compound light microscope.
56. Demonstrate proper usage of both microscopes to locate specific organisms on slides.
57. Demonstrate the correct technique in handling prepared slides and in making wet-mount slides of living organisms and in using the compound light microscope to measure objects being observed.
58. Demonstrate the proper care of the microscopes.
59. Perform the steps of the scientific method in the Scientific Method Lab.

## **New Resources for Course**

### **Course Textbooks/Resources**

#### Textbooks

Open Stax College. *Concepts of Biology*, ed. OER, 2017

#### Manuals

Strayer, R.. Concepts of Biology Lab Manual, Hayden McNeil, 09-10-2010

#### Periodicals

#### Software

### **Equipment/Facilities**

<b><u>Reviewer</u></b>	<b><u>Action</u></b>	<b><u>Date</u></b>
<b>Faculty Preparer:</b> <i>Ross Strayer</i>	<i>Faculty Preparer</i>	<i>Dec 20, 2017</i>
<b>Department Chair/Area Director:</b> <i>Anne Heise</i>	<i>Recommend Approval</i>	<i>Dec 20, 2017</i>
<b>Dean:</b> <i>Kristin Good</i>	<i>Recommend Approval</i>	<i>Dec 20, 2017</i>
<b>Curriculum Committee Chair:</b> <i>David Wooten</i>	<i>Recommend Approval</i>	<i>Apr 25, 2018</i>
<b>Assessment Committee Chair:</b> <i>Michelle Garey</i>	<i>Recommend Approval</i>	<i>Apr 25, 2018</i>
<b>Vice President for Instruction:</b> <i>Kimberly Hurns</i>	<i>Approve</i>	<i>Apr 27, 2018</i>