

7Course Title:	Biology IA: CELL AND MICROBIOLOGY
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Cycle/Division:	High School
Grade Level:	Grade 10
Credit Unit:	1
Duration:	2 semesters / 5 periods per week

Department's Vision:	Create Innovators who can link to life, with scientific understanding and learning.
Department's Mission:	Provide students with the proper knowledge, skills and scientific principles through hands on activities, research and experimentations, and thus creating young innovators who are ready for real life challenges and problem solving.

COURSE DESCRIPTION:

This course covers basic cell biology, microorganisms, and ecology. Emphasis is on biological chemistry, cell structure and function, cellular metabolism, genetics, energy cycling in an ecosystem, groups of microorganisms, their structure, physiology, genetics, microbial pathogenicity, infectious diseases, immunology, and selected practical applications, and other related topics. Laboratory exercises focus on basic biological investigations and microscope technique with a term lab theoretical and practical assessment.

General Goals:

Understand the importance of biology in our lives and the characteristics of life starting with the cell.

Understand photosynthesis, respiration, and fermentation and how the cell reproduces by mitosis or asexual reproduction.

Understand ecology and the cycling of matter and food in food webs and chains.

Know the differences among different prokaryotes such as bacteria, archaea and Protists and how they act as pathogens comparing their mechanisms to viruses.

Skill Oriented Goals :

Evaluation skills: making judgment about knowledge by introducing new text to solve and tackle problems using the related knowledge taught.

Comprehension: given scientific text or diagrams to analyze and answer questions about, summarize, compare, relate, or experiment...

Communication and social skills: Making movies, ppt., projects, interviews, and presenting the work either individually or with a peer or as a group.

Investigative skills: lab work, research, journals, experimentation...

Mathematical skills: related to investigations in the lab and application in projects.

Technological skills used in science and computer labs.

Knowledge skills: list, define, show, demonstrate, invent, relate etc... using the taught concepts.

GENERAL COURSE LEARNING OBJECTIVES:

1. Use a Model to explain how systems within an organism interact at different levels to carry out functions necessary for life.
2. Explain how positive and negative feedback loops help an organism to maintain homeostasis.
3. Use a model to draw conclusions about the properties of atoms, ions, and molecules and the breaking and forming of bonds between these particles in chemical reactions.
4. Use evidence from models to construct an explanation about how carbon can form chains and ring structures in biomolecules and how the biomolecules are used in cell processes.
5. Use models to illustrate and explain how energy is transferred in the process of photosynthesis.
6. Construct explanations about changes in matter and energy during cellular respiration.
7. Use a model to illustrate the role of cellular division (mitosis) and differentiation in producing and maintaining complex organisms.
8. To explain how mitosis and differentiation in cells contribute to the maintenance and reproduction of multicellular organisms.
9. Compare and contrast different types of infectious diseases.
10. Identify the structures and shapes of viruses and describe the different types of viral infections.
11. Identify the names and symptoms of several viral diseases.
12. Describe how vaccines are made.
13. Describe the different types of prokaryotes.
14. Summarize the similarities and difference between bacteria and archaea.
15. Describe the survival strategies of bacteria.
16. Describe ways prokaryotes provide nutrients to humans and other animals.
17. Recognize the role prokaryotes play in the ecosystem.
18. Explain how bacterial causes diseases.
19. Describe how antibiotics work and the potential for antibiotic resistance .

STANDARDS/BENCHMARKS:

Structure and Function

HS-LS1-1 Construct an explanation based on evidence for how the structure of DNA determines the structure of proteins which carry out the essential functions of life through systems of specialized cells.

HS-LS1-2 Develop and use a model to illustrate the hierarchical organization of interacting systems that provide specific functions within multicellular organisms

HS-LS1-3 Plan and conduct an investigation to provide evidence that feedback mechanisms maintain homeostasis.

Matter and Energy in Organisms and Ecosystems

HS-LS1-5 Use a model to illustrate how photosynthesis transforms light energy into stored chemical energy.

HS-LS1-6 Construct and revise an explanation based on evidence for how carbon, hydrogen, and oxygen from sugar molecules may combine with other elements to form amino acids and/or other large carbon-based molecules.

HS-LS1-7 Use a model to illustrate that cellular respiration is a chemical process whereby the bonds of food molecules and oxygen molecules are broken and the bonds in new compounds are formed resulting in a net transfer of energy.

HS-LS2-3 Construct and revise an explanation based on evidence for the cycling of matter and flow of energy in aerobic and anaerobic conditions.

HS-LS2-4 Use mathematical representations to support claims for the cycling of matter and flow of energy among organisms in an ecosystem. **

HS-LS2-5 Develop a model to illustrate the role of photosynthesis and cellular respiration in the cycling of carbon among the biosphere, atmosphere, hydrosphere, and geosphere.

Interdependent Relationships in Ecosystems

HS-LS2-6 Evaluate the claims, evidence, and reasoning that the complex interactions in ecosystems maintain relatively consistent numbers and types of organisms in stable conditions, but changing conditions may result in a new ecosystem. **

Inheritance and Variation of Traits

HS-LS1-4 Use a model to illustrate the role of cellular division (mitosis) and differentiation in producing and maintaining complex organisms.



HS-LS3-1 Ask questions to clarify relationships about the role of DNA and chromosomes in coding the instructions for characteristic traits passed from parents to offspring.

Natural Selection and Evolution

HS-LS4-1 Communicate scientific information that common ancestry and biological evolution are supported by multiple lines of empirical evidence.

Engineering Design

HS-ETS1-1 Analyze a major global challenge to specify qualitative and quantitative criteria and constraints for solutions that account for societal needs and wants.

HS-ETS1-2 Design a solution to a complex real-world problem by breaking it down into smaller, more manageable problems that can be solved through engineering.

HS-ETS1-3 Evaluate a solution to a complex real-world problem based on prioritized criteria and trade-offs that account for a range of constraints, including cost, safety, reliability, and aesthetics, as well as possible social, cultural, and environmental impacts.

HS-ETS1-4 Use a computer simulation to model the impact of proposed solutions to a complex real-world problem with numerous criteria and constraints on interactions within and between systems relevant to the problem.

RESOURCES:

HOLT Biology book and online resources

One Stop Planner, Linked Lesson presentations, Extended Visual Labs

You Tube movies

E-games and links

Teacher's Extended Handouts

Lab Handouts

COURSE OUTLINE:

UNIT:1 LIVING SYSTEMS.

Lesson 2: Organisms: Cells to Body Systems.

Exploration 1: Interacting Systems in Organisms.

Exploration 2: The Cell System.

Lesson 3: Mechanisms of Homeostasis.

Exploration 1: Control Systems in Organisms.

Exploration 2: Homeostasis in the Human Body.

Exploration 3: Homeostasis in Other Organisms.

Lesson 4: Bioengineering (Research topics)

Unit: 2 CHEMISTRY IN LIVING SYSTEMS.

Lesson 1: Chemical Bonds and Reactions

Exploration 1: Atoms, Elements and Compounds.

Exploration 2: Properties of Water.

Exploration 3: Chemical Reactions and Enzymes.

Lesson 2: Carbon-Based Molecules.

Exploration 1: Properties of Carbon.

Exploration 2: Structure and Function of Carbon -Based Molecules.

Exploration 3: Chemical Energy.

Exploration 4: Food and Energy.

UNIT: 3 MATTER AND ENERGY IN LIVING SYSTEMS.

Lesson 1: Photosynthesis

Exploration 1: Matter and Energy in Photosynthesis.

Exploration 2: Transforming Light Energy into Chemical Energy.

Lesson 2: Cellular Respiration

Exploration 1: Matter and Energy in Cellular Respiration.

Exploration 2: Using Chemical Energy.

UNIT: 5 CELLS: STABILITY AND CHANGE.

Lesson 1: The Cell Cycle

Exploration 1: Overview of the Cell Cycle.

Exploration 2: Factors Affecting Cell Growth.

Exploration 3: A Brief History of Cell Cycle.



Lesson 2: Mitosis and Differentiation

Exploration 1: Chromosomes

Exploration 2: Mitosis and Cytokinesis.

Exploration 3: Cell Differentiation.

Chapter 18: VIRUSES AND PROKARYOTES (HOLT McDOUGAL TEXT BOOK)

18.1 Studying Viruses and Prokaryotes.

18.2 Viral Structure and Reproduction

18.3 Viral Diseases

18.4 Bacteria and Archaea

18.5 Beneficial Roles of Prokaryotes.

18.6 Bacterial Diseases and Antibiotics.

GRADING:

1. Quizzes /tests are given every other week as assigned by school. **Our tests and assessments** consist of multiple-choice, short answer, direct application problems, critical thinking situations, refer to figures, texts, graphs and/or open response items. They are aligned with Michigan benchmarks. A student failing any of his quizzes would have to sit for a **support class and retest** to achieve his 60% which is our passing mark. **A progress report is sent to the parent eventually after sitting for the make up exam.** 40 % is given to students that do not have a medical excuse for missing such an assessment.

2.Skill Based Assignments are done in class where a student has his resources all opened in front of him to answer a set of questions under verbal, nonverbal, quantitative, and spatial domains.

3. Research Sessions are done where students can debate as groups and check the internet for resources and answers to support their ideas. This kind of assessment is under **Research /Project/ Lab Sessions /Journals**. They are evaluated to info, creativity, presentation, discussion and relation to the subject.

4. Daily assessments and drop quizzes take place to check the understanding of students.

5. Laboratory work is checked for research, completeness, accuracy, understanding the experiment, group and individual reports and attendance with the lab coats. Every semester has one term practical assessment.

7. Projects are integrated across and assigned for every term. They are evaluated to accuracy, creativity, info and relation to the subject.

Grade Distribution:

SCIENCE DEPARTMENT GRADE DISTRIBUTION	
HIGH SCHOOL	
End of semester assessment	30%
Quizzes	30%
Skill based Assessment	5%
Project	10%
Research/Journal	5%
Labs	10%
MAP	5%
Drop Quizzes	5%

Cross-Curricular Project(s):

- Once per semester across disciplines.