1. **COURSE TITLE\*:** Principles of Biology I
2. **CATALOG – PREFIX/COURSE NUMBER/COURSE SECTION\*: BIOL 1310**
3. **PREREQUISITE(S)\*:** H.S. Biology or BIOL 1104 or BIOL 1040 within the lastthree years

**COREQUISITE(S)\*: None**

1. **COURSE TIME/LOCATION/MODALITY: (*Course Syllabus – Individual Instructor Specific*)**
2. **CREDIT HOURS\*: 5 LECTURE HOURS\*: 4**

**LABORATORY HOURS\*: 1( 3 contact hours) OBSERVATION HOURS\*:**

1. **FACULTY CONTACT INFORMATION: *(Course Syllabus – Individual Instructor Specific)***
2. **COURSE DESCRIPTION\*:**

Students will be exposed to modern concepts of the chemical and cellular bases of life. Topics include: scientific methodology; chemistry of life; structure and function of cells; energy transformations; cellular reproduction; Mendelian genetics; DNA structure, function, replication; and the processes involved in protein synthesis; the influence of genetic material in life systems, human manipulations of DNA, fundamental concepts of the theory of evolution; biological diversity and evolutionary adaptations of organisms; bacteriology; and protists diversity. This course is for Associate of Science or pre-professional students wishing to transfer as biology majors.

1. **LEARNING OUTCOMES\*:**

Upon completion of this course the student will be able to:

1. Describe the characteristics of life.

2. Characterize the scientific method and its limitations in the search for answers to biological questions.

3. Describe the structure and function of basic molecules.

4. Demonstrate an understanding of the structures and processes associated with eukaryotic and prokaryotic cells.

5. Diagram and describe the process of cellular respiration and fermentation.

6. Diagram and describe the process of photosynthesis.

7. Make comparisons between photosynthesis and cell respiration.

8. Describe the basic mechanisms of cellular communication.

9. Diagram and describe the processes of a typical eukaryote cell cycle, mitosis and meiosis.

10. Solve genetics problems using Mendel's Laws.

11. Demonstrate an understanding of the concepts of gene linkage and chromosome mapping and describe their estimation and importance to biology.

12. Describe the structure and replication of nucleic acids.

13. Outline and describe the processes involved in protein synthesis.

14. Outline and describe some processes involved in regulation of gene expression including operons.

15. Demonstrate an understanding of the basics of viral reproduction.

16. Describe and perform basic biotechnology techniques.

17. Describe the processes of evolution that lead to adaptation and biological diversity.

18. Describe the history of the theory of evolution and how the unity and diversity of life on earth emerge as a result of genetic inheritance through DNA and evolution by natural selection.

19. Describe the evidence for evolution.

20. Describe the current theories of how populations evolve.

21. Describe the current theories of how new species originate.

22. List the currently accepted sequence of major events in the history of earth.

23. Describe the basic information relayed in a phylogenetic tree.

24. Describe the basic cell structure and biochemistry of bacteria and archaea.

25. Demonstrate an understanding of the distinguishing characteristics of major taxa of protists.

1. Demonstrate the ability to use the metric system, calculate metric conversions, and convert percentages, decimals, and fractions.
2. Demonstrate the ability to understand lab safety protocols and consequences of unsafe actions
3. Describe the process of scientific inquiry and the scientific method and its steps, that involve collecting data through observation and/or experimentation, data analysis, using data that are unique and that include random and/or systematic variability
4. Demonstrate the ability to take realistic measurements of physical quantities
5. Identify, and explain use and care of, standard laboratory equipment, including microscopes
6. Demonstrate the ability to use experimental apparatus, and realistic manipulation of tools/instruments and/or observed objects.
7. Demonstrate the ability to perform proper experimental protocols and confirm correctness of procedure.
8. Demonstrate the ability to interpret, discuss, and communicate results and critique experiments
9. Demonstrate the ability to collaborate/work with lab partner and/or groups
10. **ADOPTED TEXT(S)\*:**

Campbell Biology, 12th Ed with Modified MyLab and Mastering Access Card Package

Urry, Cain, et. al

Pearson Publishing, 2021

ISBN: 978-0-13-678080-9 (includes Inclusive Access E-text and Mastering Access).

ISBN for students not wanting Inclusive Access: 978-0-13-738143-2 (includes Mastering and E-text).

Investigating Biology Lab Manual

9th Edition

J. Morgan & M.E.B. Carter

Pearson Education, 2017

ISBN: 978-0-13-582654-6 (includes Inclusive Access E-text and Mastering Access).

ISBN for students not wanting Inclusive Access: 978-013-447346-8 (includes Mastering and E-text).

**9a: SUPPLEMENTAL TEXTS APPROVED BY FULL TIME DEPARTMENTAL FACULTY (INSTRUCTOR MUST NOTIFY THE BOOKSTORE BEFORE THE TEXTBOOK ORDERING DEADLINE DATE PRIOR TO ADOPTION) \*\*\*.**

1. **OTHER REQUIRED MATERIALS: (SEE APPENDIX C FOR TECHNOLOGY REQUEST FORM.)\*\***

The materials that accompany the text.

1. **GRADING SCALE\*\*\*:**

Grading will follow the policy in the catalog. The scale is as follows:

A: 90 – 100

B: 80 – 89

C: 70 – 79

D: 60 – 69

F: 0 – 59

1. **GRADING PROCEDURES OR ASSESSMENTS: (*Course Syllabus – Individual Instructor Specific)***

**Grades will be based on:**

Tests 40%

Final Exam 10%

Lab assignments 25%

MyLab and Mastering assignments 20%

Miscellaneous assignments 5%

Total Possible Points: 100%

1. **COURSE METHODOLOGY: *(Course Syllabus – Individual Instructor Specific)***

This course may use face-to-face or recorded lecture, PowerPoint presentations, videos, in-class or online Discussions, chapter reading and writing assignments, individual or group projects, research papers, primary scientific literature, and online assignments, quizzes, and other activities. Both written and online quizzes, tests and exams may be used as appropriate to assess the course objectives. The hands-on portion of the lab course covers the modern concepts of the chemical and cellular bases of life. During the course, students will demonstrate the application of the methods and tools of scientific inquiry, by actively and directly identifying/collecting data, manipulating data, evaluating and analyzing data, and interpreting data, presenting findings, and using information to answer questions. Students will interact with the Instructor at several points during each lab activity and will receive synchronous feedback on following proper laboratory safety protocol. Laboratory exercises emphasize experimental design and critical thinking.

**14. COURSE OUTLINE: *(Course Syllabus – Individual Instructor Specific)***

***(Insert sample course outline with learning outcomes tied to assignments / topics.)***

**Lecture Material:**

Chapter 1 - Evolution, the Themes of Biology, and Scientific Inquiry

Chapter 2 - Basic Chemistry – Chemical Context of Life

Chapter 3 - Water and Life

Chapter 4 - Elementary Organic Chemistry

Chapter 5 - Organic Macromolecules

Chapter 6 - Basic Cell Biology

Chapter 7 - Membrane Structure and Function

Chapter 8 - Introduction to Cellular Metabolism

Chapter 9 - Cellular Respiration and Fermentation

Chapter 10 - Photosynthesis

Chapter 11 - Cell Communication

Chapter 12 - The Cell Cycle and Mitosis

Chapter 13 - Meiosis and Sexual Life Cycles

Chapter 14 - Mendelian Genetics

Chapter 15 - Chromosomes and Inheritance

Chapter 16 - DNA Structure and Replication

Chapter 17 - Protein Synthesis

Chapter 18 - Regulation of Gene Expression

Chapter 19 - Viruses

Chapter 20 - Biotechnology

Chapter 21 - Genomes and Their Evolution

Chapter 22 - Overview of the Theory of Evolution

Chapter 23 - Evolution of Populations

Chapter 24 - The Origin of Species

Chapter 25 - History of Life on Earth

Chapter 26 - Phylogeny and the Tree of Life

Chapter 27 - Bacteria and Archaea

Chapter 28 - Protists

**Laboratory Activities:**

Scientific Investigation:

Macromolecules and Enzymes

Cells and Microscopy

Osmosis and Diffusion

Cellular Energetics, Respiration, & Fermentation

Photosynthesis

Cell Cycle

Mendelian Genetics

DNA and its Replication

Biotechnology & Genomics

Evolution and Phylogenetics

Bacteriology

Protists

**SAMPLE** Course Calendar

|  |  |  |
| --- | --- | --- |
| Week | **Content** | **SLO** |
| (1) | **Lecture** **and Chapter Review** – Ch 1 Evolution, the Themes of Biology, and Scientific Inquiry  **Ch 1 Quiz; Mastering Activity**: Scientific Investigation and the Metric System  **Lab**: Scientific Investigation | **1, 2**  **26 – 34** |
| (2) | **Lecture** **and Chapter Reviews** – Ch 2 The Chemical Context of Life, Ch 3 Water and Life  **Ch 2 and 3 Quizzes, Mastering Activity**: Biological Chemistry  **Lab**: Macromolecules and Enzymes | **3**  **26 – 34** |
| (3) | **Lecture** **and Chapter Reviews** – Ch 4 Carbon and the Molecular Diversity of Life, Ch 5 The Structure and Function of Large Biological Molecules  **Ch 4 and 5 Quizzes Mastering Activity**: Macromolecules and Enzymes  **Lab**: Cells and Microscopy | **3**  **26 – 34** |
| (4) | **Test 1** – Ch 1-5  **Lecture** **and Chapter Reviews** – Ch 6 A Tour of the Cell, Ch 7 Membrane Structure and Function  **Ch 6 and 7 Quizzes; Mastering Activity**: Cells and Microscopy; **Lab**: Osmosis and Diffusion | **4**  **26 – 34** |
| (5) | **Lecture** **and Chapter Reviews** – Ch 8 An Intro to Metabolism, Ch 9 Cell Resp and Fermentation  **Ch 8 and 9 Quizzes; Mastering Activity**: Cellular Energetics, Respiration, & Fermentation  **Lab**: Cellular Energetics, Respiration, & Fermentation | **4, 5**  **26 – 34** |
| (6) | **Lecture** **and Chapter Review** – Ch 10 Photosynthesis  **Ch 10 Quiz; Mastering Activity:** Photosynthesis; **Lab**: Photosynthesis | **6**  **26 – 34** |
| (7) | **Test 2** – Ch 6-10  **Lecture** **and Chapter Reviews** – Ch 11 Cell Communication, Ch 12 The Cell Cycle and Mitosis, Ch 13 Meiosis and Sexual Life Cycles, **Ch 11-13 Quizzes; Mastering Activity:** Cell Communication, Mitosis and Meiosis; **Lab**: Cell Cycle | **8, 9**  **26 – 34** |
| (8) | **Lecture** **and Chapter Reviews** – Ch 14 Mendel, Ch 15 The Chromosomal Basis of Inheritance  **Ch 14-15 Quizzes; Mastering Activity**: Mendelian Genetics, Linkage and Inheritance  **Lab**: Mendelian Genetics | **10**  **26 – 34** |
| (9) | **Test 3** – Ch 11-15  **Lecture** **and Chapter Reviews** – Ch 16 The Molecular Basis of Inheritance, Ch 17 Gene Expression Ch 18 Regulation of Gene Expression, **Ch 16-18 Quizzes; Mastering Activity**:DNA and its Replication; **Lab**: DNA and its Replication | **11 – 13**  **26 – 34** |
| (10) | **Lecture** **and Chapter Reviews** – Ch 19 Viruses, Ch 20 DNA Tools and Biotechnology, Ch 21 Genomes and Their Evolution  **Ch 19-21 Quizzes; Mastering Activity**: Viral Replication, Biotechnology, and Genomics  **Ch 22 Quiz; Lab**: Biotechnology and Genomics | **14 – 16**  **26 – 34** |
| (11) | **Test 4** – Ch 16-21  **Lecture** **and Chapter Review** – Ch 22 Descent with Modification  **Writing Lab** | **17 – 19** |
| (12) | **Lecture** **and Chapter Reviews** – Ch 23 Evolution of Populations, Ch 24 The Origin of Species  **Ch 23-24 Quizzes; Mastering Activity:** Evolution and Speciation  **Lab**: Evolution and Phylogenetics | **17 – 19**  **26 – 34** |
| (13) | **Lecture** **and Chapter Reviews** – Ch 25 The History of Life on Earth, Ch 26 Phylogeny and the Tree of Life; **Ch 25 and 26 Quizzes; Mastering Activity:** Phylogenetics  \*\***Research Paper Due** | **22, 23**  **26 – 34** |
| (14) | **Test 5** – Ch 22-26  **Lecture** **and Chapter Reviews** – Ch 27 Bacteria and Archaea, Ch 28 Protists  **Ch 27 and 28 Quizzes; Mastering Activity:** Bacteria, Archaea, and Protists  **Lab**: Bacteriology | **24, 25**  **26 – 34** |
| (15) | **Test 6** – Ch 27-28  **Presentations**  **Lab**: Protists | **24, 25**  **26 – 34** |
| (16) | **Final Exam** – All comprehensive  **Final Lab Exam** | **1-34** |

**15. SPECIFIC MANAGEMENT REQUIREMENTS\*\*\*:**

Final grade in this course will be determined by mastery of course material as assessed by quizzes, tests, exams, and other assignments.

**16. FERPA: \***

Students need to understand that their work may be seen by others. Others may see students’ work when being distributed, during group project work, or if it is chosen for demonstration purposes. Students also need to know that there is a strong possibility that their work may be submitted to other entities for the purpose of plagiarism checks.

**17. ACCOMMODATIONS: \***

Students requesting accommodations may contact Ryan Hall, Accessibility Coordinator at rhall21@sscc.edu or 937-393-3431, X 2604.

Students seeking a religious accommodation for absences permitted under Ohio’s Testing Your Faith Act must provide the instructor and the Academic Affairs office with written notice of the specific dates for which the student requires an accommodation and must do so no later than fourteen (14) days after the first day of instruction or fourteen (14) days before the dates of absence, whichever comes first. For more information about Religious Accommodations, contact Ryan Hall, Accessibility Coordinator at [rhall21@sscc.edu](mailto:rhall21@sscc.edu) or 937-393-3431 X 2604.

**18. OTHER INFORMATION\*\*\*:**

**SYLLABUS TEMPLATE KEY**

**\*** Item cannot be altered from that which is included in the master syllabus approved by the Curriculum Committee.

**\*\*** Any alteration or addition must be approved by the Curriculum Committee

**\*\*\*** Item should begin with language as approved in the master syllabus but may be added to at the discretion of the faculty member.