

BIOL 1510 Principles of Biology I Syllabus

PREREQUISITES: none

COURSE DESCRIPTION :

This course introduces the student to the organization of living systems, energy transfer, continuity of life, biodiversity, and classification of living things. The topics include: biological history; structure and functions of cells and cellular organelles; cell division; general biochemistry; cellular respiration; photosynthesis; DNA structure and function; protein synthesis; heredity; evolution; animal development; classification; and introductions to viruses, prokaryotes, Protista, and Fungi. This course has both a lecture and laboratory component. It provides the prerequisite for BIOL 1520 Principles of Biology II, and advanced courses in biology. This course and BIOL 1520 provide a general introduction to the biological sciences for the science major. (4 Credits; 6 contact hours: 3 lecture, 3 lab)

RATIONALE FOR COURSE: This course and BIOL 1520, Principles of Biology II, provide a general introduction to the biological sciences for the science major. This course is a core course for biology majors and an elective course fulfilling some of the requirements for an A.A. or A.S. degree or for transfer to a baccalaureate program at most colleges or universities.

TEXTS: *Biology* By E. P . Solomon, L. R. Berg, and D. W. Martin for Biology 1510 (split of 8th ed)
Thompson Publishing 2008 - Full 7th or 8th edition can be used

Laboratory Manual for General Biology Biol 1510 (from the 5th ed) by J. W. Perry, D. Morton, and J. B. Perry, Thompson 2008 (Full 2007 5th edition or 2002 edition can be used)

BIOL 1510 Principles of Biology I

Lecture Topic Outline

Week 1

I. Introduction

- A. Organization of the text book, overview of Biology, and study tips. Preface pp. xxix - xxxiv
 - B. Biology: Introduction Chapter 1 pp. 1 - 21
 - 1. Branches of Biology
 - 2. Characteristics of organisms.
 - 3. Biological Organization
 - a. Levels
 - b. Classification and Taxonomy pp. 9 - 11; Chapter 23, pp. 482 - 487; Appendix B.
 - 4. Biological principles/themes.
 - a. Cellularity
 - b. Information transfer
 - c. Evolution
 - d. Energy Flow
 - 5. Scientific Method.
- Summary and Review pp. 22 - 24

Week 2

II. The Chemical Basis of Life Chapter 2 pp. 25 - 42, Appendix A - periodic table, Inside back cover - scientific measurement

- A. Structure of matter (atomic structure, molecular structure, bonding and chemical reactions)
 - B. Inorganic compounds (salts, ions, acids and bases).
 - C. Water
- Summary and Review pp. 42 - 44

Week 3

D. Organic Molecules Chapter 3 pp. 45 - 70.

- 1. Enzymes Chapter 7, pp. 160 - 167.

Summary and Review Ch. 3, pp. 70 - 72; Ch. 7: Summary 9, 10, p. 168; Post-test 11 - 14, p. 169

III. Cells: An Introduction Chapter 4 pp. 73 - 80.

- A. Cell theory and history
- B. Cell Types, size limits, and basic components
- C. Methods used to study cells

Week 4-5

IV. How Cells are Organized Chapter 4, pp. 80 - 102

- A. Prokaryotes vs. Eukaryotes
- B. Ultrastructure of Prokaryotic cells
- C. Ultrastructure of Eukaryotic cells
 - 1. Cell membrane (plasma membrane)
 - 2. Nucleus (nuclear membrane, nucleolus, chromatin/chromosomes).
 - 3. Cytoplasm and Organelles
 - 4. Extracellular matrix
 - 5. Cell junctions Chapter 5 pp. 127 - 130.

D. Eukaryotic Origins - Endosymbiont Hypothesis p. 94; Ch. 21, pp. 453 - 454; Ch. 25 p. 532
Summary and Review Ch. 4, pp. 103 - 105; Ch. 21 Summary 5 p. 464.

- V. Cell Membrane Structure and Transport mechanisms Chapter 5 pp. 106 - 126. (Passive transport mechanisms will be primarily covered in the laboratory)
Summary and Review pp. 130 - 133

Week 6

- VI. Cellular Reproduction in Eukaryotic Cells - Chapter 10 (Mechanics of cell division covered primarily in the laboratory)
- A. Chromosomes pp. 211 - 215
 - B. Cell Cycle and Simple Cell Division - Mitosis pp. 215 - 223.
 - C. Meiosis and Sexual reproduction pp. 223 - 229. Karyotypes Ch. 16 pp. 347 - 348
 - D. Mitosis, Meiosis and the life cycle (Gametogenesis, Sporogenesis, and Alternation of generations) p. 228 - 230; Asexual vs. sexual reproduction Ch. 49, pp. 1052 - 1054.
- Summary and Review pp. 231 - 233

Week 7

- VII. Inheritance Chapter 11 pp. 234 - 256.
- A. Basic Principles - Mendelian genetics (primarily covered in the laboratory)
 - 1. Monohybrid and Dihybrid crosses
 - B. Genes and Gene Interactions.
 - C. Genes and Chromosomes (linkage, crossing over/recombination, mapping)
Summary and Review pp. 257 - 259
 - D. Human Genetics (chromosomal abnormalities, sex linkage) Chapter 16, pp. 351 - 359
Summary and Review pp. 364 - 367.

Week 8

- VIII. DNA, RNA, and Protein Synthesis.
- A. DNA: The Genetic Material Chapter 12 pp. 260 - 276. Summary and Review pp. 276 - 278.
 - B. Genetic Code and Its Translation (RNA and Protein Synthesis) Chapter 14 pp. 279 - 300; Summary and Review pp. 300 - 303.
 - C. Gene Regulation Chapter 14, pp. 304 - 321. (Time Permitting)
 - D. DNA Technology Chapter 14, pp. 322 - 345. (Time Permitting)

Week 9 - 10

- IX. Energy Transfer Through Living Systems
- A. Energy and Metabolism Chapter 7, pp 152 - 167; Summary and Review pp. 168 - 170.
 - B. Cellular respiration and the Mitochondrion Chapter 8, pp. 171 - 188
Summary and Review pp. 188 - 190.
 - C. Photosynthesis and the Chloroplast Chapter 9, pp. 191 - 207.
Summary and Review pp. 208 - 210.

Week 11

- X. Prokaryotes Bacteria and Archaea Ch. 24 pp. 512 - 526
Summary and Review pp. 527 - 529; Summary 7 - 12, Post-test 7, 9 - 19

Week 12

XI. Protista Chapter 25 pp. 530 - 554 (Protist groups and structure will be covered in the laboratory)
Basis of Protist Classification
Locomotion, Energy productions, and Reproduction
Summary and Review pp. 551 - 554.

XII. Viruses, Viroids, and Prions Chapter 24 pp. 500 - 511
Summary 1 - 6 p. 527; Post-test 1 - 8, p. 528.

Week 13

XIII. Fungi Chapter 26 pp. 555 - 577 (Fungal groups and structure will be covered in the laboratory)
A. Characteristics
B. Reproduction
C. Economic importance
Summary and Review pp. 578 - 580.

Week 14 - 15

XIV. Evolution and the Species Concept
A. Evolutionary Theory, Natural Selection, Chance, and modern Synthesis
Ch. 1, pp. 9 - 12; Ch. 18, pp. 390 - 409; Summary and Review pp. 409 - 411.
B. Evolutionary Change in Populations. Chapter 19, pp. 412 - 425
Summary and Review pp. 425 - 427.
C. Speciation and Macroevolution Chapter 20 pp. 428 - 444; Summary and Review pp. 444 - 446.
D. Systematics Chapter 23 pp. 482 - 497; Summary and Review pp. 497 - 499.

XV. Introduction to the Animal Kingdom Ch. 29, pp. 619 - 620 (overview)

- A. Reproduction Chapter 49 pp. 1041 - 1053
1. Gametogenesis (Gametic meiosis) pp. 1054 - 1056, Figs. p. 1056; pp. 1059 - 1060, Fig. 49-11 p. 1062.
Summary and Review Ch. 49, pp. 1076 - 1079 Summary 1 - 3, 5 - 6, 9; Post-test 1 - 4, 8, 10
- B. Animal Development
1. Ovulation and fertilization Chapter 49 pp. 1068 - 1070.
2. Development (Cleavage, Gastrulation, cell differentiation, embryonic tissues, Neurulation, Organogenesis, Determination and induction, extraembryonic membranes) Chapter 50 pp. 1080 - 1093.
Summary and Review Ch. 50, pp. 1098 - 1100 Summary 1 - 9; Post - test 1 - 13.

Week 16

Final Exam