Biology 121: General Biology I
Three Rivers Community College, Norwich, CT
Instructor: Sarah B. Selke
Office Hours: Mon. 11:00am – 12:00pm, Tues. 12:00-12:30pm, 4:00 – 4:30pm & Wed. 11:00am – 12:00pm, or by appointment
Phone: 860-892-5706
Email: SSelke@trcc.commnet.edu

Required Text:
Mader, Sylvia S. 2007. Selected chapters in: *Biology* 9th ed. McGraw-Hill Custom Publishing, Boston

Course Prerequisites:
Current enrollment, or passing grade ("C" or better) in English 101 or an equivalent course. It is strongly recommended that a chemistry course has been completed as well.

Course Description:
This course stresses the unifying themes in biology including the life processes common to all organism and their strategies for survival. Topics include scientific method, evolution, chemical basis for life, cell components and processes, cell cycles, molecular genetics and patterns of inheritance. A complete listing of concepts covered is attached. This course meets for three hours of lecture and 3 hours of lab weekly for a total of 4 credit hours.

Course Objectives:
Upon completion of this course, the student will be able to recognize terminology, specific biological facts, and utilize general principles associated with the structural and functional organization of living things. The student will also obtain a more fully developed series of computer-based skills. This course also stresses critical thinking skills which are designed to allow the student to: develop more meaningful learning beyond rote memorization; extend beyond lower levels of learning (knowledge and comprehension) to higher levels of learning (application, analysis, synthesis and evaluation); apply concepts and principles to real world experience and situations; and enhance problem solving skills.

Attendance Policy:
Attendance of all class activities in lecture and laboratory is required. Absences are counted from the first meeting of class. More than four consecutive or more than six accumulative absences could result in a student receiving a "F" grade in this course. If a class or lab is missed due to circumstances beyond your control, please be sure to notify your instructor and make the necessary arrangements **with a classmate** for obtaining the lecture notes. **You will be responsible** for the material**.** Electronic devices (cell phones, pagers etc.) will be put in "Silent Mode" or turned off during both lecture and laboratory.

Grade Evaluation:
There will be three unit examinations and two lecture quizzes. There will be 9 lab write-ups. The lowest lab write-up will be dropped. Lab write-ups will be due the week following completion of the lab. Pages will be assigned during lab. A **cumulative** final exam will be administered during finals week. Exam and quiz questions will consist of multiple choice, short answers and/or essays.

Grading:
Final grade will based on the following:

Semester Grade*----------50%
Laboratory Grade**----------30%
Final Examination----------20%
100%

*Semester grade = 75% Unit exams + 25% Quizzes
**Laboratory grade = 8 lab write-ups

Final Grade:

100.0-93.5 = A	79.4-77.5 = C+
93.4-90.5 = A-	77.4-72.5 = C
90.4-87.5 = B+	72.4-69.5 = C-
87.4-84.5 = B	69.4-63.5 = D+
84.4-79.5 = B-	63.4-59.5 = D
	59.4-00.0 = F

College Withdrawal Policy:
The last day to withdraw is **December 15th**. Students who do not withdraw but stop attending **will receive** a grade of "F" for the final grade. **Verbal withdrawals cannot be accepted**.

Accommodations for Disabilities:
If you need assistance or modification of class procedure owing to any type of disability, please let me know so that arrangements for accommodation can be made. In order to receive accommodations, you must register with Chris Scarborough, learning specialist at 860-823-2985 or a counselor in the Student Services Development Center.

Academic Misconduct:
Academic dishonesty and plagiarism will not be tolerated. Plagiarism, cheating, or any form of academic dishonesty is **prohibited**. Plagiarism includes any instance of copying words or ideas from another person (ie. another student, author of a book, internet resource etc.) without properly acknowledging the source. Students guilty of academic dishonesty directly or indirectly will receive a **zero** for an exercise or exam and may receive an **F** for the course in addition to other possible disciplinary sanctions that maybe imposed through the regular institutional procedures.

Make-ups:
Make-up lecture exams and quizzes will be granted on an individual basis only following a conference with the instructor. All make-up tests will be scheduled during the week of final exams. Please be aware that the format of any makeup exam is at the discretion of the instructor. The format could be the same, oral, essay or other, depending on the circumstances. It will not be the same exam taken by the rest of the students in the class.
Due to scheduling issues, it is unlikely that a missed lab can be made up. No credit will be given for a lab write-up if you did not participate in the lab.

Syllabus Revisions:
This schedule may be subject to change as the instructor sees fit. Any changes will be announced by the instructor in advance. Your patience as we move to the new campus is most appreciated.

BIO 121 Fall '08 Class Schedule*/Selke

Date	Topic	Mader Chpt.	Quizzes & Exams	Lab (Tuesdays or Fridays)
W 9/3	Introduction	1		White Powders
M 9/8	Chemistry I	2		Chemistry
W 9/10	Chemistry II	2		
M 9/15	Organic Molecules I	3		Enzymes I
W 9/17	Organic Molecules II	3		
M 9/22	Cell Structure & Function I	4	**Quiz I Chapters 1-3**	Enzymes II
W 9/24	Cell Structure & Function II	4		
M 9/29	Membrane Structure & Function I	5		Microscopes
W 10/1	Membrane Structure & Function II	5		
M 10/6	Exam I		**Exam I Chapters 1-5**	Diffusion & Osmosis I
W 10/8	Metabolism	6		
M 10/13	NO CLASS			Diffusion & Osmosis II
W 10/15	Cellular Respiration I	8		
M 10/20	Cellular Respiration II	8		Cell Respiration I
W 10/22	Photosynthesis I	7		
M 10/27	Photosynthesis II	7		Cell Respiration II
W 10/29	Cell Cycle & Mitosis I	9		
M 11/3	Exam II		**Exam II Chapters 6-8**	Photosynthesis
W 11/5	Cell Cycle & Mitosis II Meiosis I	9, 10		
M 11/10	Meiosis II	10		Mitosis/Meiosis I
W 11/12	Mendelian Genetics I	11		
M 11/17	Mendelian Genetics II	11		Mitosis/Meiosis II Genetics
W 11/19	Chromosomal Inheritance I	12		
M 11/24	Chromosomal Inheritance II	12	**Quiz II, Chapters 9-11**	No lab - Thanksgiving
W 11/26	Catch-up/Review			
M 12/1	DNA Structure & Function I	13		Human Variation
W 12/3	DNA Structure & Function II	13		
M 12/8	DNA $\rightarrow$ protein I	14		Protein synthesis (lec)
W 12/10	DNA $\rightarrow$ protein II	14		
M 12/15	Exam III		**Exam III Chapters 9-14**	Genetic engineering (lec)
W 12/17	Biotechnology	16		
M 12/22	Final Exam (cumulative)		**Final Exam (cumulative)**	

* Tentative schedule. Any announcements made in class supercede this schedule.

Course Objectives:

1. Distinguish between living organisms and non living things by describing the features and characteristics of life.

2. Using the procedure and terminology, describe the scientific method through examples.

3. Identify the principal elements that make up the body, give their chemical symbols and summarize the main functions of each.

4. Demonstrate knowledge of the atomic structure and its relationship to the interaction of atoms to form molecules.

5. Demonstrate knowledge of ionic, covalent and hydrogen bonds and give examples of each, Compare them in terms of the mechanisms by which they are formed and their relative bond strengths.

6. Define pH in terms of hydrogen ion concentration and be able to identify any given pH as acid, base, or neutral and discuss their properties. Describe how pH changes are minimized by buffers.

7. Describe the types and functions of organic and inorganic compounds found in the body.

8. Demonstrate knowledge of the cell organelles and their functions.

9. Demonstrate knowledge of the various mechanisms of active and passive transport relative to the plasma membrane.

10. Discuss the effect of the first and, second taws of thermodynamics and relate how they affect organisms and the ecosphere.

11. Explain the composition, classification, and function of enzymes. Explain and describe factors influencing an enzymes regulation.

12. Define and explain anabolic and catabolic mechanisms. Explain how anabolic and catabolic reactions are essential to a cell.

13. Explain how chemical energy (ATP) is released by respiratory processes (anaerobic and aerobic).

14. Explain the process of photosynthesis

15. Demonstrate knowledge and comprehension of mitosis and meiosis

16. Explain the role of genes in inheritance and how they are passed from one generation to the next.

17. Demonstrate knowledge of the Mendelian Laws of Genetics and solve genetic problems involving monohybrid and dihybrid crosses.

18. Demonstrate knowledge of the various forms of gene interaction.

19. Demonstrate basic knowledge of genetic engineering,

20. Discuss some common forms of human genetic disease.

Topic Outline:

I. Life and science
- a. Life
- b. Characteristics of life
- c. The scientific method
- d. Development of the scientific attitude
- e. Biology today
- f. Biology as a science

II. Chemistry
- a. Matter and elements
- b. How elements differ
- c. Structure of matter
- d. Election arrangement
- e. Electron arrangement vs. Reactivity
- f. Chemical bonding
  1. Ionic bonding
  2. Covalent bonding
     a) polar
     b) non-polar
  3. Hydrogen bonding
  4. VanderWaals Forces
- g. Inorganic compounds
  1. Acids
  2. Bases
  3. Salts
  4. Water
- h. Organic compounds
  1. Carbohydrates
  2. Lipids
  3. Proteins
  4. Nucleic acids

III. Cells
- a. The cell theory
- b. The cell and its parts (structure and function)
  1. Membrane
  2. Endoplasmic reticulum
  3. Ribosomes
  4. Golgi complex
  5. Mitochondria
  6. Vacuoles
  7. Plastids
  8. Centrioles
  9. Cilia and flagella
  10. Nucleus
- c. Prokaryotic and eukaryotic cells
- d. Compare and contrast between plant an animal cells;

IV. The cell membrane/wall
- a. The cell membrane/wall structure and function
- b. The transport of materials across the membrane
  1. Passive transport
     - a) osmosis
     - b) diffusion
     - c) dialysis
  2. Active transport
  3. Endocytosis
     - a) pinocytosis
     - b) phagocytosis
  4. Exocytosis
  5. Filtration

V. Energy transformations
- a. Chemical directions
  1. The first law of thermodynamics
  2. The second law of thermodynamics
  3. Entropy and enthalpy
- b. Cells energy
  1. ATP
- c. Metabolism
  1. Anabolic reactions
  2. Catabolic reactions
- d. Enzymes
  1. Characteristics
  2. Chemical and physical properties
  3. Classification
  4. Action
  5. Inhibition
- e. Cellular respiration
  1. Glycolysis (aerobic and aerobic respiration)
  2. Transfer reaction
  3. Kreb's cycle (citric acid cycle)
  4. Electron transport chain and chemiosmosis
  5. Fermentation
- f. Photosynthesis
  1. Requirements
  2. Light reaction (photophosphorylation)
  3. Dark reaction (carbon fixation)

VI. The cell cycle
- a. Control of cycle
  1. Cancer
- b. Interphase
  1. (GI) Gap I phase
  2. (S) Synthesis phase
  3. (GII) GapII phase
- c. Mitosis
  1. Prophase
  2. Metaphase

3. Anaphase
4. Telophase

d. Meiosis
1. Gametogenesis
a) spermatogenesis
b) oogenesis

VII. Genetics

a. Genes
1. Composition
2. Function

b. Chromosomes
1. Structure
2. Role
3. Number

c. Mendelian inheritance
1. Dominance
2. Independent assortment
3. Segregation

d. Monohybrid and dihybrid crosses
1. Homozygous organism
2. Heterozygous organism
3. Genotype
4. Phenotype
5. Alleles
6. Dominance
7. Recessive

e. Laws of Probability
1. The sum law
2. The product law
3. Application

f. Gene interaction
1. Incomplete dominance
2. Epistasis
3. Codominance

g. Quantitative genetics
1. Polygenic inheritance
2. Multiple alleles
3. Pleiotropy

h. Sex-linked traits
1. The sex determining chromosome
2. X-linked (and influenced) genes
a) color blindness
b) hemophilia

3. Y-linked genes

VIII. Human genetics

a. Chromosomal abnormalities
    1. Irregular numbers (aneuploid)
    2. Monosomic cells
    3. Trisomic cells
b. Genes and disease
    1. Sickle cell
    2. Cystic fibrosis
    3. Neurofibromatosis
    4. Huntington disease
    5. Tay-Sachs disease
    6. PKU
    7. Trisomy 21 (Down's syndrome)
    8. Turners syndrome
    9. Kleinfelters syndrome
    10. Super male
    11. Meta female
c. Chromosomal aberrations
    1. Mutation
    2. Deficiency
    3. Duplication
    4. Inversion
    5. Translocation

IX. DNA and the genetic code

a. Protein synthesis
    1. DNA
    2. Transcription
    3. Translation

X. Gene regulation (operon theory)

a. Operator region
b. Promoter region
c. Regulator gene
d. Structural gene

XI. Genetic engineering
a. Enzymes involved
b. Common Techniques