

**BIOLOGY K121: General Biology I (w/Lab)**  
**THREE RIVERS COMMUNITY COLLEGE**

Nicole St. George, Adjunct Professor

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Office Hours: 30 minutes before lectures or by appointment

**Fall Semester 2017:** 8/29/2017 - 12/14/2017

**Lectures:** Tuesdays & Thursdays 5:00 PM – 6:15 PM **Rm:** D128

**Lab:** Tuesday 6:30 PM – 9:15 PM **Rm:** A215

**Credit:** 4 credit hours consisting of 3 hours of lecture and 3 hours of laboratory per week during the semester.

**Required Text:**

Urry, L. et al. "Campbell Biology", Custom Edition for Three Rivers Community College

**Course Prerequisites:** Current enrollment, or passing grade ("C" or better) in English 101 or an equivalent course. A semester of college chemistry with a "C" or better, or current enrollment in a college chemistry course with a lab.

**Course Description:** This course stresses the unifying themes in biology including the life processes common to all organisms 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. An outline of concepts is attached.

**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. This course will stress critical thinking skills which are designed to allow the student to develop more meaningful learning and to apply concepts to real world situations.

**Methods of Instruction:** These will include lectures, laboratory activities, computer activities, demonstrations, and multimedia presentations. Exam material will be taken from topics covered in lecture as well as the textbook. A schedule of lectures, exams, and laboratories is attached. Please note these are subject to change with teacher discretion and/or weather interruptions.

**Add/Drop Procedures:** Please consult the school catalog for this policy. It is the student's responsibility to complete any paperwork in the Registrar's office for withdrawal from the course.

**Withdrawal Policy:** A student who finds it necessary to discontinue a course once class has met must provide written notice to the registrar. **See Registrar for dates.** After that period, a student wishing to withdraw must obtain written authorization of the instructor to receive a "W" grade on their academic record, non-punitive grade indicating termination of class participation. Students who do not withdraw, but stop attending **will receive** a grade of "F" for the final grade. **Verbal withdrawals cannot be accepted.**

**Attendance Policy:** Attendance will be taken at each lecture and lab session. Students are expected to attend class and laboratory sessions and be on time for each lecture and lab. Students are also expected to actively participate in lectures, discussions, and lab activities. If absent it is the student's responsibility for obtaining lecture materials. If a class or lab is missed due to circumstances beyond your control, please be sure to notify your instructor **BEFORE** the class.

YOU are responsible for the material.

**If 3 classes (and/or labs) are missed, a deduction of 10 POINTS will be taken from your final grade. For logistic reasons, labs cannot be made up for any reason.**

**Grading:** Your final grade will be based on the accumulation of points throughout the semester from four tests, a cumulative final exam, weekly chapter notes, and lab write-ups.

- **Weekly Chapter Notes** will be due to assess how much you are understanding from the reading. They will also help to improve your note taking skills. You will be required to submit them a class BEFORE we are reviewing that chapter together. Late notes will NOT be accepted. These notes are worth 20 points for each chapter.
- **Four Unit Tests** will be given covering the lecture materials. These exams will use a variety of question types and will be announced in advance. Unit tests will be worth 100 points each.
- **Cumulative Final Exam** will be administered during finals' week. The final exam will be worth 200 points.
- **Weekly Laboratory Assignments** are due by the following week. For each lab pages from your lab packet or a lab write up will be assigned. These are due the following week in lab. Late lab activities will not be accepted. Lab assignments will range in point value from 25 to 50 points depending on the amount of work required.
- **NO extra credit will be given**

**Grade Determination:** All grades will be determined using total points. You can determine your grade at any point during the semester, all you need to know are the total possible points and the total points you have earned so far. Please see me with questions about this.

WITHOUT EXEPTION:

- ◆ Students MUST be present in lab to earn lab report grades. Labs cannot be made up for logistic reasons. A missed lab report is a 'zero'.
- ◆ Students are responsible to bring all necessary materials to class. I will not provide individual students with materials or writing utensils.
- ◆ If you are having trouble with the material, please make arrangements to see me for help.
- ◆ Academic dishonesty and plagiarism will not be tolerated.

**YOUR GRADE IS YOUR RESPONSIBILITY!!!!**

Last day to drop September 11.

Last day to select pass/fail option November 7.

Last day to withdraw from class December 11.

Electronic devices (cell phones, PDA's, MP3's etc.) will be put in "**Silent Mode**" or turned off during both lecture and laboratory. **NO** electronic devices are allowed during any testing session.

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.

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**Table 1.** Percentages of points accumulated by students and the corresponding letter grades.

Letter Grade*	Percentages for Letter Grade	
A	100	94
A-	93.999...	90
B+	89.999...	87
B	86.999...	84
B-	83.999...	80
C+	79.999...	77
C	76.999...	74
C-	73.999...	70
D+	69.999...	67
D	66.999...	64
D-	63.999...	60
F	59.999...	0

\* The instructor reserves the right to use subjective evaluation, especially in cases where the final percentage score is on a borderline between grades.

### **Disabilities Statement:**

If you are a student with a disability and believe you will need accommodations for this class, it is your responsibility to contact the Disabilities Counseling Services. To avoid any delay in the receipt of accommodations, you should contact the counselor as soon as possible. Please note that I cannot provide accommodations based upon disability until I have received an accommodation letter from the Disabilities Counselor. Your cooperation is appreciated.

### **Academic and Classroom Misconduct:**

The instructor has the primary responsibility for control over classroom behavior and maintenance of academic integrity, and can order the temporary removal or exclusion from the classroom, and/or laboratory, of any student engaged in conduct violative of the general rules and regulation of the institution. Extended or permanent exclusion from classroom, and/or laboratory, or further disciplinary action can be effected only through appropriate college procedure. Plagiarism, cheating, or any form of **academic dishonesty is prohibited**. 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. Any student that believes he or she has been erroneously accused may appeal the case through the appropriate institutional procedures if their grade was affected.

**BIO K121 General Biology I**  
**Fall 2017 Tentative Schedule**

This schedule is subject to change as the instructor sees fit. The instructor will announce any changes. Snow Days may result in changes.

<b>Week</b>	<b>Date</b>	<b>Lecture Topic</b>	<b>Lab Topic</b>	<b>Chapter Notes Due</b>
1	8/29	Intro, Evolution, Inquiry	Scientific Method	None
	8/31	Chemical Context of Life		Chapters 1 & 2
2	9/5	Water and Life	Atoms and Molecules	Chapter 3
	9/7	NO CLASS		
3	9/12	Carbon Molecules	Water and Polar Molecules	Chapters 4 & 5
	9/14	Organic Molecules		
4	9/19	Finish & Review Chapters 1-5	Organic Molecules	
	9/21	Test #1		
5	9/26	Cells	Microscopes	Chapter 6
	9/28	Cells		Chapter 7
6	10/3	Membranes	Diffusion	
	10/5	Membranes		
7	10/10	Metabolism & Enzymes	Tissues	Chapter 8
	10/12	Cellular Respiration		
8	10/17	NO CLASS (reading day)	No Lab	
	10/19	Photosynthesis		Chapters 9 & 10
9	10/24	Finish & Review Chapters 6-10	CR or PSN	
	10/26	Test #2		
10	10/31	Cell Comm & Cell Cycle	Mitosis	Chapters 11 & 12
	11/2	Cell Cycle		

11	11/7	Meiosis	Meiosis & Finish & Review Chapters 11-13	Chapter 13
	11/9	Test #3		
12	11/14	Mendel & Genes	Genetics	Chapter 14
	11/16	Chromosome Genetics		Chapter 15
13	11/21	Genetics and DNA	Genetics	Chapter 16
	11/23	NO CLASS Thanksgiving Break		
14	11/28	DNA & RNA	DNA	Chapter 17
	11/30	Gene to Protein		Chapter 18
15	12/5	Regulation of Genes & Biotechnology	TBA	
	12/7	Test #4		
16	12/12	Finish Class Review for Final	Review for Final	
	12/14	Final Exam (Cumulative)		

*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 laws 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 a knowledge of the Mendelian Laws of Genetics and solve genetic problems involving monohybrid and dihybrid crosses.
18. Demonstrate a knowledge of the various forms of gene interaction.
19. Demonstrate basic knowledge of genetic engineering,
20. Discuss some common forms of human genetic disease.
21. Explain the role of DNA and RNA in inheritance, protein productivity and life processes.

***INFORMATION MAY BE PRESENTED IN A DIFFERENT ORDER THAN OUTLINED BELOW***

*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. Electron 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 and 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
- (d1/2 Cell Communication: reception, transduction, response)
- 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. (G1) Gap I phase
  - 2. (S) Synthesis phase
  - 3. (G2) 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) (ploid vs somic)
  - 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. Klinefelters 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 gene
- b. Promoter region
- c. Regulator gene
- d. Structural gene

## XI. Genetic engineering

- a. Enzymes involved
- b. Common Techniques