

# BIO K121: General Biology I, Spring 2014

## Three Rivers Community College, Norwich, CT

**Instructor:** Nicola Ricker

**Meeting Times:** M/W 6:30pm – 9:20pm

**Office Hours (C270):** M/W 4pm- 5pm and 5:30pm – 6:30pm & T/R 2pm – 3pm

**Phone:** 860-892-5706

**Email:** [Nricker@trcc.commnet.edu](mailto:Nricker@trcc.commnet.edu)

### **Required Text:**

Biology How Life Works, 1<sup>st</sup> edition, Morris et al, 2013.

Textbook and access code to LaunchPad, the textbook website, are required.

### **Course Prerequisites:**

CHE K111 or CHE K121, either course with a “C” grade or better; ENG K101 placement or ENG K100 passed with a “C” grade or better; or permission of the Department Chair.

If a student has not met the above chemistry prerequisite, the student may take BIO K121 by concurrently taking CHE K111 or CHE K121.

### **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 the scientific method, evolution, chemical basis for life, cell components and processes, cell cycles, molecular genetics and patterns of inheritance. A complete listing of covered concepts is attached. This course is four credits.

**This course is a web-enhanced course**, which means that some required activities are conducted online in our Blackboard Learn course shell and on the textbook website.

- The Blackboard portion of the course can be accessed through <http://my.commnet.edu/>. There are two course shells associated with this class, one for lab and one for lecture. **All online course information is in the lecture shell.**
- LaunchPad, the textbook website can be accessed at <http://www.whfreeman.com/launchpad/morris1e/22250/ECommerce/Unauthenticated>. Further information about registering for the textbook website will be given the first day of class and posted on Blackboard.

### **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 at all class sessions is required. If a class 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 notes. **You will be responsible** for the material.

Due to scheduling issues, a missed lab cannot be made up.

Electronic devices (cell phones, pagers etc.) will be put in “Silent Mode” or turned off while class is in session.

### **Grading Overview:**

Your grade is based on a 1250 point scale.

Reading quizzes = 120 points

Homework assignments = 50 points

Tests & Final = 600 points

Labs = 450 points

Lab Quizzes = 30

**No individual extra credit assignments will be given, so please do not ask.**

- **Grading for reading quizzes (120 points)**

There is a reading quiz associated with each chapter in the textbook. Quizzes are conducted online through LaunchPad, the textbook website. Each quiz must be taken **before** coming to class. **Reading quizzes are open-book and time-unlimited.** Each of the quizzes is worth 10 points, and there are 15 quizzes over the course of the semester. The highest 12 quizzes will be counted for a total of 120 points.

- **Grading for Lab quizzes (30 points)**

There will be 5 lab quizzes throughout the semester, each worth 10 points. The highest 3 will be used.

- **Grading for Tests & Final (600 points)**

There are four unit tests each worth 100 points for a total of 400 points. Each test will consist of 100 multiple choice questions.

The final is worth 200 points. It will consist of multiple choice questions. **The final exam is cumulative.** The final exam is scheduled for Monday, May, 19th during your normal class time.

**A #2 pencil is required for each exam.** This item will not be supplied in class.

The final exam must be taken to pass this course.

- **Grading for Lab (450 points)**

There are eleven graded lab activities. Your lab assignment is due at the beginning of the following lab period. Each lab is worth 45 points. The lowest lab grade will be dropped. Late labs will be penalized 5 points if turned in the following day and 10 points thereafter. You are allowed one late lab with no penalty (your “oops” lab). **No late labs will be accepted once the corrected labs are returned.**

**10 labs x 45 points each = 450 points**

- **Online homework assignments (50 points)**

Several online homework assignments will be assigned, 5 of them must be done. Each one is worth up to 10 points.

**How to calculate your grade:**

To determine your grade, I suggest creating 2 columns of scores. The first is the number of points each assignment is worth; the second is the points you earned on that assignment. To determine your grade, add up each column and divide **your points** by the **total points**.

A partial example:

Points assignment is worth	Points I earned
10 (a quiz)	8
45 (a lab)	35
100 (a test)	75
Total = 155	Total = 118

$$118/155 = 0.761 = 76\% = C$$

**Make-ups:**

Make-up exams will be granted on an individual basis only following a conference with the instructor. **All make-up tests must be completed within a week of the original exam date.** 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, a missed lab cannot be made up.

**No credit will be given for a lab write-up if you did not participate in the lab.**

**Final Grade:**

93.5-100.0 = A	77.5-79.4 = C+
89.5-93.4 = A-	73.5-77.4 = C
87.5-89.4 = B+	69.5-73.4 = C-
83.5-87.4 = B	63.5-69.4 = D+
79.5-83.4 = B-	59.5-63.4 = D
	00.0-59.4 = F

**College Withdrawal Policy:**

The last day to withdraw is **December 10<sup>th</sup>**. Students who do not withdraw but stop attending class **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.

**Blackboard Learn & your TRCC email address:**

Your Blackboard Learn courses are automatically connected to your college-provided email account. For more information about this email account, visit the college home page and click the "New student email" button. This email account is the only official electronic means that the college will communicate course and non-emergency information to you. Make sure that you check it weekly at a minimum. Another option is to set up to forward your email from the college address to your preferred address. **Important class information is frequently communicated through the Blackboard Learn email function.**

**myCommNet Alert:**

myCommNet Alert is a system that sends text messages and emails to anyone signed up in the event of a campus emergency. Additionally, TRCC sends messages when the college is delayed or closed due to weather. All students are encouraged to sign up for myCommNet Alert. A tutorial is available on the Educational Technology and Distance Learning Students page of the web site.

[http://www.trcc.comnet.edu/div\\_it/educationaltechnology/Tutorials/myCommNetAlert/MIR3.html](http://www.trcc.comnet.edu/div_it/educationaltechnology/Tutorials/myCommNetAlert/MIR3.html)

## 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 ecosystem.
11. Explain the composition, classification, and function of enzymes. Explain and describe factors influencing an enzyme's 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. Discuss some common forms of human genetic disease.

## Topic Outline

\* **NOTE: Class lectures will present this information in a different order.**

### 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
- 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. (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. 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 region
- b. Promoter region
- c. Regulator gene
- d. Structural gene

<u>Date</u>	<u>Lecture Material/Chapter to be covered</u>	<u>Laboratory Portion</u>
Week 1 1/23	No Class	
Week 2 11/27-01/31	<b>Chapter 1</b> Chapter 2	Termites
Week 3 2/3-2/7	Chapter 3 Chapter 4	white powders
Week 4 2/10-2/14	Chapter 4 Chapter 5	atoms and molecules
Week 5 2/18-2/21	<i>No classes on Mon. 2/17</i> Chapter 5	enzymes
Week 6 2/24-2/28	<b>Unit Test I (1-5)</b> Chapter 6	diffusion/osmosis1
Week 7 3/3-3/7	Chapter 7	fermentation
Week 8 3/10-3/14	Chapter 8	Photo/cell resp
Week 9 3/17-3/21	<b>SPRING BREAK, NO SCHOOL</b>	
Week 10 3/24-3/28	Chapter 9 Chapter 10	Microscopes
Week 11 3/31-4/4	<b>Unit Test II (6-10)</b> Chapter 11	Tissues
Week 12 4/7-4/11	Chapter 11 Chapter 12	mitosis/meiosis
Week 13 4/14-4/17	Chapter 14	M & M & Genetics
Week 14 4/21-4/25	Chapter 15	Genetics
Week 15 4/28-5/2	<b>Unit Test III (11, 12, 14, 15)</b> Chapter 16	Genetic engineering
Week 16 5/5-5/9	Chapter 17	Gel electrophoresis
Week 17 5/12-5/16	Chapter 18	<b>Unit Test IV (16, 17, 18)</b>
Week 18 Mon. 5/19	<b>Cumulative Final</b>	<b>No Labs</b>