

## **Biology 121: General Biology (w/Lab) Syllabus**

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**Bio K121, Four sem. hrs. credits**  
**CRN#/Sec.: #30472/T4 & #30473/TA**  
**Lecture: Mon., 6:00 – 8:45pm, rm: KTRCC D228;**  
**Lab: Wed., 6:00 – 8:55pm, rm: KTRCC A215**  
**Fall 2017**  
**Three Rivers Community College**  
**Norwich, CT 06360**

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**Recommended Text: (YOU SHOULD PURCHASE MASTERING BIOLOGY ACCESS)**

**Campbell Biology** Edition: 11<sup>th</sup>

**Author:** Urry

**ISBN:** 9780134093413

**Copyright Year:** 2017

**Publisher:** Pearson

**OR**

**Campbell Biology (TRCC Custom)** Edition: N/A

**Author:** Urry

**ISBN:** 9781323626993

**Copyright Year:** 2017

**Publisher:** Pearson Learning Solutions

### **Course Prerequisites:**

Current enrollment, or passing grade (“C” or better) in English 101 or an equivalent course. A semester of college chemistry with lab 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 the 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 (A BIG STUDY GUIDE!) 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 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:**

Students are expected to attend class and laboratory sessions regularly, as in accordance with school attendance policy. If a class or lab is missed due to circumstances beyond your control, **please**, be sure to notify your instructor in advance and make the necessary arrangements for obtaining the lecture notes. **You will be responsible** for the material. Labs cannot be made up for any reason. Unit tests can only be made up by

special arrangement with the instructor. Makeup tests will be granted on an individual basis only following a conference with the instructor.

### **Evaluation and Testing:**

Your final course grade will be based on:

- 3 exams- 100 pts. each
- 13 laboratory write-ups- 20pts. Each ~260pts
- 14 Chapter Homeworks (Quizzes) --140pts
- 1 cumulative final exam- 200 pts.

Total: 900pts.

### **Exams**

Each midterm will consist of ~40 multiple choice, true/false, short answer or essay questions. The cumulative final will consist of ~80 similar questions. You will have one hour to complete each exam. You will have two hours to complete the final exam. When you complete the exam, you may leave. Once you leave the room you are considered to have completed the exam, there is no re-entry, (so use the facilities before you arrive!).

On the day of an exam you must arrive to class on time. The exam will begin at the start of class and will end exactly one hour after it starts, if you are late, you lose that time. A #2 pencil is required for each exam. This item will not be supplied; you must bring it to each exam date. No make-up exams will be given without previous notification to the instructor. The final exam must be taken to pass this course.

### **LAB WRITE-UPS**

Lab write-ups will be due the week following completion of the lab. Pages from each lab packet will be assessed for the points. Once you complete and submit the homework activity in lab, your points earned will be recorded. Late activities are not accepted (they are all due at the start of the next lab).

All but one (your “oops it’s late” assignment) of the assignments must be turned in on time. If more than one assignment is late, the work will not be graded unless the instructor has been notified prior to the due date.

### **Chapter Homework Activities** (Quizzes)

It is expected that you will read the chapter and take notes on it before the lecture series. Through *Mastering Biology Access*, you will complete a homework activity before 5pm the day of lecture. This will count as a quiz grade for that chapter. This will allow students to come to class prepared to participate in class discussion. If this is not completed on time, it will result in a grade reduction of 50% for that quiz.

### **NO INDIVIDUAL EXTRA CREDIT ASSIGNMENTS WILL BE GIVEN!!!**

#### **Final Grade Distribution is as follows:**

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

## **General Information:**

### **College Withdrawal Policy:**

A student who finds it necessary to discontinue a course once class has met must provide written notice to the registrar. Withdrawal forms are available at the Registrar's office on both campuses and the office at the Subase. Nonpunitive "W" grades are assigned to any withdrawal requested before the various unrestricted withdrawal deadline. 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. Students are advised that withdrawal from 50% or more of their classes will result in being placed on **Progress Probation** for the following semester Eligibility for refund of tuition is based upon date of withdrawal when received by the Registrar. **Verbal withdrawals cannot be accepted.** All students are required to maintain a learning portfolio in Digication that uses the (Three Rivers) College Template.

### **Disabilities Statement:**

If you have a hidden or visible disability, which may require classroom or test-taking modifications, please see me as soon as possible. If you have not already done so, please be sure to register with disability counselors by contacting Student Services Office.

## **UNITED STATES DEPARTMENT OF EDUCATION AND OFFICE OF CIVIL RIGHTS TITLE IX STATEMENT OF POLICY:**

"Title IX of the Education Amendments of 1972 (Title IX) prohibits discrimination based on sex in education programs and activities in federally funded schools at all levels. If any part of a school district or college receives any Federal funds for any purpose, all of the operations of the district or college are covered by Title IX.

### **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, which may be 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.

### **Cellular phones and/or beepers:**

Cellular phones and beepers are only allowed in class or lab if they are turned off or in silent mode. Under no circumstances are phones to be answered in class. When there are extenuating circumstances that require that a student be available by phone or beeper, that student must speak to the instructor prior to class, so that together they can arrive at an agreement. **No electronic devices are allowed during exams.**

### **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 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.

21. Explain the role of DNA and RNA in inheritance, protein productivity and life processes.

## **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

(dl/2 Cell Communication: reception, transduction, response)

- e. Cellular respiration
  - 1. Glycolysis (aerobic and anaerobic respiration)
  - 2. Transfer reaction
  - 3. Krebs'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) Gap II 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 V
  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



## Tentative Fall 2017 Schedule

Date	Topic	Chapter
8/30 Wednesday – Lab	Intro Lect. & White Powder Lab	1
<b>9/4 Monday – (Cancel - Labor Day)</b>		
9/6 Wednesday -- Lab	Chemistry Lect. & Atoms & Molecules Lab	2 & 3
<b>9/11 – Monday – Class 1</b>	<b>Carbon &amp; Large Biological Molecules</b>	<b>4 &amp; 5</b>
9/13 – Wednesday -- Lab	DNA to Protein	
<b>9/18 – Monday – Class 2</b>	<b>Exam I</b>	<b>Ch. 1 - 5</b>
9/20 – Wednesday -- Lab	Enzymes	
<b>9/25 – Monday – Class 3</b>	<b>The Cell</b>	6 & 7
9/27 – Wednesday – Lab	Diffusion/Osmosis	
<b>10/2 – Monday – Class 4</b>	<b>Cellular Respiration</b>	<b>8 &amp; 9</b>
10/4 – Wednesday -- Lab	Fermentation	
<b>10/9 – Monday – Class 5</b>	<b>Photosynthesis &amp; Cellular Communication</b>	<b>10 &amp; 11</b>
10/11 – Wednesday -- Lab	Photosynthesis/Cellular Respiration	
<b>10/16 – Monday – Class 6</b>	<b>Exam II</b>	<b>Ch. 6 - 11</b>
10/18 – Wednesday	Microscopes	
<b>10/23 – Monday – Class 7</b>	Cell Cycle & Meiosis	12 & 13
10/25 – Wednesday – Lab	Tissues	
<b>10/30 – Monday – Class 8</b>	<b>Genetics</b>	<b>14 &amp; 15</b>
11/1 – Wednesday – Lab	Mitosis/Meiosis	
<b>11/6 – Monday – Class 9</b>	<b>Genetics II</b>	16 & 17
11/8 – Wednesday – Lab	Mitosis/Meiosis	
<b>11/13 – Monday – Class 10</b>	<b>Exam III</b>	<b>Ch. 12 - 17</b>
11/15 – Wednesday – Lab	Genetics	
<b>11/20 – Monday – Class 11</b>	<b>Regulation of Gene Expression</b>	<b>18</b>
11/22 – Wednesday – Lab (Cancel, Thanksgiving)		
<b>11/27 – Monday – Class 12</b>	<b>Viruses</b>	<b>19</b>
11/29 – Wednesday -- Lab	Gel Electrophoresis	
<b>12/4 – Monday – Class 13</b>	<b>DNA Tools &amp; Biotechnology</b>	<b>20</b>
12/6 – Wednesday -- Lab	Genetic Engineering	
<b>12/11 – Monday – Class 14</b>	<b>Genomes and Evolution</b>	<b>21</b>
12/13 – Wednesday -- Lab	Make-ups?	
<b>12/18 – Monday – Class 15</b>	<b>Cumulative Final Exam</b>	

### ALL HOMEWORK ASSIGNMENTS DUE BY 5PM ON LECTURE DAY.

#### **\*\*Important Dates\*\***

9/4 – No - Class Labor Day	11/22/17 – No Lab – Thanksgiving
9/11/17 – Last day to drop classes	12/11/17 – Last day to withdraw
9/18/17 – Exam I	12/15/17 – Cumulative Final Exam
10/16/17 – Exam 2	12/22/17 – Grades Due
11/13/17 – Exam 3	

**Syllabus Revisions:**

Students are responsible for learning all of the objectives and all of the items in the course outline whether they are discussed in lecture and/or laboratory or not. The instructor reserves the right to revise the objectives, topical outline, or academic schedule contained in this syllabus without notice. However, if the revisions affect scheduled unit tests a 48-hour notice will be given for the new test date.