# SYLLABUS- Spring 2017

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

Lisa Mazzaro, Department of Natural Sciences Adjunct Professor
Contact information: lmazzaro@trcc.commnet.edu
Office Hours: 30 minutes before lectures and labs or by appointment

**Spring Semester 2016**: 8/29/2016 - 12/14/2016
**Lecture:** Mon **6**:30 PM – 9:15 PM **Rm:** D???
**Lab:** Wed 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:**
Morris, J., Hartl, D., Knoll, A., Lue,R., Berry, A., Biewener, A., Farrell, B., Holbrook, N.M., Pierce, N., Viel, A. 2013. Biology: How Life Works. W.H. Freeman & Co. ISBN-13: 9781464142109.

**All students are required to maintain a learning portfolio in Digication that uses the (Three Rivers) College Template**

**Catalog Description:**
**BIO* K121 (formerly BIO K111); 4 Credit Hours; GENERAL BIOLOGY I**
Prerequisites: ENG* K101 or ENG* K101S placement or completion of ENG* K096 with a "C+" grade or better. Corequisites: CHE* K111 or CHE* K121, either course with a "C" grade or better.
Please note: if completing CHE* K111 or CHE* K121 prior to enrolling in BIO* K121, a grade of "C" or better is required for registration into this course.

This course introduces the major principles and concepts of modern biology. Topics to be covered include molecular and cellular biology, cell division, cellular transport systems, cellular metabolism, the specialization and differentiation of both plant and animal cells, and modern

**Primary Learning Outcomes:**

In addition to developing an understanding of the biological sciences as it relates to other scientific disciplines, the student will be aided to contrive an awareness of the interdependence of all life forms on natural laws that ensure their own stability. An understanding of life processes and the interrelationship between humans and other life forms will be developed.

**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**.

**Suggestions for the course:**

To gain a better understanding be sure to read the required reading sections **before** coming to class. Also, be prepared to participate in classroom discussions.

**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. 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:**

The final grade will based on the accumulation of points throughout the semester from three tests and a cumulative final exam, weekly quizzes, lab reports and lab practicals.

- **Weekly quizzes** will be given on the previous week's lecture material.
- **Four unit tests** will be given covering the lecture materials.
- A **cumulative** final exam will be administered during finals' week.
- Weekly **laboratory assignments** are due by the following week.
- **One formal lab report** will be.
- **Three Lab Practicals** will be given.

**Grade Breakdown**

- Weekly Lecture Quizzes- 10%
- Unit Tests – 40%
- Final Exam- 20 %
- Lab Practicals- 20%
- Weekly Lab Assignments- 10%

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'.
- Quizzes will be given at the start of lecture. NO MAKE-UPS for missed quizzes under any circumstances. A missed quiz is a 'zero.

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

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

Last day to drop May 8.
Last day to apply for graduation March 15
Register for next semester is Apr 3..
Electronic devices (cell phones, PDA's, MP3's etc.) will be put in **"Silent Mode"** or turned off during both lecture and laboratory. All electronic devices are disallowed 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.

**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.

**BOARD OF REGENTS FOR HIGHTER EDUCATION AND CONNECTICUT STATE COLLEGES AND UNIVERSITIES POLICY REGARDING SEXUAL MISCONDUCT REPORTING, SUPPORT SERVICES AND PROCESSES POLICY**

**Statement of Policy for Public Act No. 14-11: An Act Concerning Sexual Assault, Stalking and Intimate Partner Violence on Campus:**

"The Board of Regents for Higher Education (BOR) in conjunction with the Connecticut State Colleges and Universities (CSCU) is committed to insuring that each member of every BOR governed college and university community has the opportunity to participate fully in the process of education free from acts of sexual misconduct, intimate partner violence and stalking. It is the intent of the BOR and each of its colleges or universities to provide safety, privacy and support to victims of sexual misconduct and intimate partner violence."

**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.

Title IX protects students, employees, applicants for admission and employment, and other persons from all forms of sex discrimination, including discrimination based on gender identity or failure to conform to stereotypical notions of masculinity or femininity. All students (as well as other persons) at recipient institutions are protected by Title IX – regardless of their sex, sexual orientation, gender identity, part-or full-time status, disability, race, or national origin-in all aspects of a recipient's educational programs and activities."

If any student experiences sexual misconduct or harassment, and/or racial or ethnic discrimination on Three Rivers Community College Campus, or fears for their safety from a threat while on campus, please contact Edward A. Derr, the Diversity Officer and Title IX Coordinator:

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

| Week # | Date | Topic<br>M-Lecture, W- Lab | Textbook Chapter | Exams/graded assignments |
|---|---|---|---|---|
| 1 | M<br>1/23 | Life<br>Molecules of life | 1<br>2 | |
| | W<br>1/25 | White Powders | | |
| | M<br>1/30 | Molecules of Life<br>DNA | 2<br>3 | Quiz 1 |
| 2 | W<br>2/1 | Atoms and Molecules | | |
| 3 | M<br>2/6 | DNA to Protein<br>Translation and proteins | 3<br>4 | Quiz 2 |
| | W<br>2/8 | DNA to Protein | | |
| 4 | M<br>2/13 | Translation and Proteins<br>Cell Structures | 4<br>5 | Quiz 3 |
| | W<br>2/15 | Enzymes | | |
| 5 | M<br>2/20 | NO CLASS | | Take home quiz 4 |
| | W<br>2/22 | Diffusion/osmosis<br>Fermentation? | 6 | |
| 6 | M<br>2/27 | Metabolism | | **Test 1 Chapters 1-4** |
| | W<br>3/1 | Fermentation | | |
| 7 | M<br>3/6 | Cellular Respiration<br>Photosynthesis | 7<br>8 | Quiz 5 |
| | W 3/8 | Photosynthesis/Cell respiration | | |
| 8 | M<br>3/13 | NO CLASS | | **Take home quiz 6** |
| | W<br>3/15 | NO CLASS | | |
| 9 | M<br>3/20 | Cell Communication Cell Form and Function | 9<br>10 | **Test 2 Chapters 5-9** |
| | W<br>3/22 | Microscopes | | **Lab Practical 1** |
| 10 | M<br>3/27 | Cell Division<br>Tissues (not in book) | 11 | |
| | W<br>3/29 | Tissues | | |

| | | | | |
|---|---|---|---|---|
| 11 | M<br>4/3 | DNA Replication | 12 | **Test 3 Chapters 10-11 and Tissues** |
| | W<br>4/5 | Mitosis/meiosis | | |
| 12 | M<br>4/10 | Genomes<br>Mutations and DNA repair | 13<br>14 | Quiz 7Quiz 8 |
| | W<br>4/12 | Genetics | | |
| 13 | M<br>4/17 | Genetic Variation<br>Mendelian inheritance | 15<br>16 | |
| | W<br>4/19 | Genetics | | |
| 14 | M<br>4/24 | Beyond Mendel<br>Genetics | 17<br>18/19 | Quiz 9 |
| | W<br>4/26 | Gel Electrophoresis | | |
| 15 | M<br>5/1 | Review for Final | | **Test 4 Chapters 12-19** |
| | W<br>5/3 | Make up lab if needed | | **Lab Practical 2** |
| 16 | M<br>5/8 | **Final Cumulative Exam** | | |

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

*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 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. 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

(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. (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) (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. 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 gene
b. Promoter region
c. Regulator gene
d. Structural gene

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