Syllabus: BIO K121 - General Biology I (w/Lab)

Three Rivers Community College
574 New London Turnpike
Norwich, CT 06360

Fall Semester 2013: 8/26/2013 - 12/19/2013

Lecture:	Mon	**CRN:** 30472	**Section:** T5	6:30 PM – 9:30 PM	**Rm:**	D105
Lab:	Wed	**CRN:** 30473	**Section:** T5A	6:30 PM – 9:30 PM	**Rm:**	A215

Instructor: Daryl Simmons, adjunct instructor
Contact: dsimmons@trcc.commnet.edu – no office or campus telephone
Office Hrs.: before or after class or by appointment

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: 978-1-4292-1870-2.

Catalog Description:
BIO* K121 (formerly BIO K111) 4 CREDIT HOURS GENERAL BIOLOGY I 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. Corequisite: If a student has not met the above chemistry prerequisite, the student may take BIO* K121 by concurrently taking CHE* K111 or CHE* K121. 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 genetics. Three-hour lecture; one three-hour laboratory period.

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 recieve** 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.

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 two lab practicals. The points accumulated by the student are divided by the total points possible; that quotient will be multiplied by 100 to determine the course percentage corresponding to a letter grade (Table 1).

Weekly quizzes worth 10 points will be given on the previous week's lecture material. The highest 8 quiz scores will be counted (**80 points**).

Three unit tests will be given covering the topics shown on the course outline (**300 points**).

A **cumulative** final exam* will be administered during finals' week. Exam and quiz questions will consist of multiple choice and/or short answers (**200 points**).

Weekly **laboratory reports** worth 10 points are due the following week (**90 points**).

A formal lab report on the diffusion/osmosis lab from will be written and is due October 16 (**50 points**). A bonus 2 points will be given for early submission.

Two Lab Practicals worth 50 points will be given (**100 points**).

Any assignments turned in late will have 5 points deducted.

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'.
- Since the highest 8 quiz scores are being counted, there are NO MAKE-UPS for missed quizzes under any circumstances. A missed quiz is a 'zero' and counts as one of the low scores.
- Students can make-up a unit test on the same day as the final exam.

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 2013 Tentative Schedule

Lecture #	Date	Topic	Textbook Chapter	Exams	Lab (Wednesday)
1	M 8/26	Introduction	1		
	W 8/28				Lab safety & Intro to the Scientific Method
	M 9/2	NO CLASS			
2	W 9/4	Carbon & Organic Molecules	2		Lecture and Introduction to the microscope
3	M 9/9	DNA & Transcription	2 & 3		
	W 9/11	Proteins & Transcription			Chemical Composition of Cells
4	M 9/16	Proteins & Transcription	4		
	W 9/18	Cell Membranes, O & D			Microscopic Study of Animal and Plant Cells
5	M 9/23		5	**Test 1**	
	W 9/25	Cell Compartments			Membrane Selectivity: Diffusion and Osmosis
6	M 9/30	Energy, Enzymes	6		
	W 10/2	Cell Respiration I			Mitosis/meiosis Cellular Reproduction
7	M 10/7	Cellular Respiration II	7		
	W 10/9	Photosynthesis I			**Lab Practical 1**
8	M 10/14	Photosynthesis II & Cell Communication	8 & 9		
	W 10/16				Specialization and Differentiation of Animal Cells
9	M 10/21	Cell Form & Function		**Test 2**	
	W 10/23		10		Specialization and Differentiation of Plant Tissues
10	M 10/28	Cell Division I & II	11		
	W 10/30				Photosynthesis
11	M 11/4	DNA Replication	12		
	W 11/6				Enzymes
12	M 11/11	CLASS in Session Veteran's Day Mutation & DNA Repair	14	**Test 3**	
	W 11/13				Forensic DNA
13	M 11/18	Genetic Variation	15		
	W 11/20				Dragon Genetics

14	M 11/25	Genetic Variation	15		
	W 11/27	NO CLASS Thanksgiving			OPEN LAB
15	M 12/2	Mendelian Inheritance	16		
	W 12/4				**Lab Practical II**
16	M 12/9	Non-Mendelian Inheritance	17		
	W 12/11				Review for Exam 3
17	M 12/16	Genes & Environment	18		
	T 12/17	Final Exam (cumulative)		**Final Exam (cumulative)**	**Final Exam (cumulative)**

Syllabus Revisions:
This schedule may be subject to change as the instructor sees fit. The instructor will announce any changes in advance.

Detailed Course Objectives - BIO K121:

1) The student will develop 'critical thinking skills' through the analysis of scientific data.

2) The student will be able to describe the scientific methods through examples.

3) The student will be able to list and describe the characteristics of life shared by all living organisms.

4) The student will be able to identify the principle elements that make up living organisms, give their symbols and their biological importance.

5) The student will demonstrate knowledge of ionic, covalent, and hydrogen bonding.

6) The student will be able to list the types of organic and inorganic compounds common to all living organisms and describe the biological importance of each.

7) The student will be able define pH in terms of the concentration of hydrogen ions and be able to identify any given pH as acid, base, or neutral.

8) The student will be able to describe how pH changes are minimized by buffers.

9) The student will demonstrate knowledge of the cell history.

10) The student will be able to list the various organelles in a typical animal cell and a typical plant cell and explain the function of each organelle.

11) The student will be able to explain the difference between plant and animal cells.

12) The student will be able to list and explain the major differences between procaryotic and eucaryotic cells.

13) The student will demonstrate knowledge of of the various mechanisms of passive and active transport systems related to the cell membrane.

14) The student will demonstrate knowledge of the processes of cell division (mitosis and meiosis).

15) The student will demonstrate knowledge of the major classes of plant and animal tissues, list the types of tissues in each class and describe their function.

16) The student will be able define energy and state the laws of energy conservation.

17) The student will be able to explain the photosynthesis process.

18) The student will be able to define the term metabolism and explain the difference between anabolic and catabolic metabolism.

19) The student will be able to define the term enzyme, list the principle properties of enzymes, and describe enzymatic action.

20) The student will to demonstrate knowledge of chemical energy in cells and the cellular respiratory process.

21) The student will be able to explain the role of chromosomes and genes in inheritance and describe how they are passed from one generation to the next.

22) The student will be able to understand the relationship between meiosis.

23) The student will demonstrate knowledge of the Mendelian Laws of genetics.

24) The student will demonstrate knowledge of the various forms of gene interactions.

25) The student will be able to discuss some common forms of human genetic diseases.

26) The student will demonstrate knowledge of modern genetic concepts and molecular genetics (the role of DNA & RNA).

27) The student will be able to explain the process of protein synthesis.

Detailed Course Outline - BIO K121

Unit 1

I Introduction

- **A)** Early history and development of biology as a science
  - **1.** Biology as a science
  - **2.** The scientific method
- **B)** The characteristics of life
  - **1.** Level of organization
  - **2.** Irritability (response to stimuli)
  - **3.** Adaptability
  - **4.** Growth
  - **5.** Movement
  - **6.** Metabolism
  - **7.** Reproduction

II The chemistry of life

- **A)** Matter
  - **1.** Composition
  - **2.** Forms
    - **a)** solids
    - **b)** liquids
    - **c)** gases
  - **3.** Elements common to all living organisms
    - **a)** carbon
    - **b)** nitrogen
    - **c)** oxygen
    - **d)** phosphorus
    - **e)** hydrogen
    - **f)** sulfer
    - **g)** calcium
    - **h)** sodium
    - **i)** chlorine
    - **j)** iron
    - **k)** magnesium + other trace elements
- **B)** How the elements differ
  - **1.** The atom and it's structure
    - **a)** protons
    - **b)** electrons
    - **c)** neutrons
  - **2.** Atomic numbers
  - **3.** Atomic masses (weights)
  - **4.** Isotopes
- **C)** Electron arrangement and energy levels
- **D)** Electron arrangement versus reactivity
  - **1.** Chemical bonding
    - **a)** ions and ionic bonding
    - **b)** covalent bonding

1) polar
2) non-polar

c) hydrogen bonding

2. Molecules

E) Inorganic compounds important to living organisms
1. Acids
2. Bases
3. Salts
3. Water

F) Organic compounds important to living organisms
1. Vitamins
2. Carbohydrates
3. Lipids
4. Proteins
5. Nulcleic acids

III Cells

A) The cell theory
B) Cytoplasmic organelles (structure and function)
1. Endoplasmic reticulum
2. Golgi complex
3. Mitochondria
4. Lysosomes
5. Ribosomes
6. Centrioles
7. Plastids (Chloroplast)

C) The cell nulceus

D) Appendages of the cell
1. Flagella
2. Cilia

E) The differences between plant and animal cells

F) The differences between procaryotic and eucaryotic cells

G) The cell membrane
1. Composition
2. Membrane transport mechanisms
a) diffusion
b) osmosis
c) dialysis
2. Membrane transport mechanisms (cont.)
d) facilitated diffusion
e) active transport
f) endocytosis
1) phagocytosis

2) pinocytosis

g) exocytosis

h) filtration

IV Cellular reproduction

A) The cell's cycle of growth

1. Interphase

a) growth phase 1 or gap 1 phase

b) synthesis phase or s phase

c) growth phase 2 or gap 2 phase

2. Mitosis

a) prophase

b) metaphase

c) anaphase

d) telophase

B) Meiosis

1. Reproductional division - Meiosis I

a) prophase I

b) metaphase I

c) anaphase I

d) telophase I

2. Equational division - Meiosis II

a) prophase II

b) metaphase II

c) anaphase II

d) telophase II

C) Gametogenesis

1. spermatogenesis

2. oogenesis

Unit II

I The differentiation and specialization of cells (Histology)

A) Tissues (defined)

B) Major classes of animal tissues (structure and functions)

1. Epithelial tissues

a) simple squamous

b) simple cubodial

c) simple columnar

d) stratified squamous

e) stratified columnar

f) psuedo-stratified ciliated columnar

g) transitional

2. Connective tissues

a) loose connective

1) aerolar

2) adipose

b) dense connective

1) tendons

2) ligaments

2. Connective tissues (cont.)

c) special connective

1) blood

2) reticular tissue

3) cartilage

4) bones

3. Muscle tissue

a) smooth

b) cardiac

c) skeletal

4. Nervous tissue

a) neurons

b) neuroglial

C) Membranes

1. Serous

2. Mucous

3. Cutaneous

4. Synovial

D) The major classes of plant tissues (structure and function)

1. Epidermal tissue

a) stoma

b) guard cells

2. Vascular tissue

a) xylem

b) phloem

3. Meristematic tissue

a) cambium - cork cells

b) apical meristem

c) lateral meristem

4. Fundamental tissues

a) parenchyma cells

b) chloroenchyma cells

c) collenchyma cells

d) sclerenchyma cells

II Energy transformations

A) Energy and chemical directions

1. The first law of thermodynamics

2. The second law of thermodynamics

B) Cell energy molecule

1. ATP

C) Metabolism

1. Anabolic reactions

2. Catabolic reactions

D) Enzymes
- **1.** Chemical properties
- **2.** Action
- **3.** Classification
- **4.** Factors affecting enzymatic activity

F) Photosynthesis
- **1.** Essential factors of photosynthesis
  - **a)** carbon dioxide
  - **b)** water
  - **c)** light
  - **d)** chloroplast - chlorophyll
- **2.** The process of photosynthesis
  - **a)** the light reaction - photophosphorylation
  - **b)** the calvin cyle - carbon fixation (dark reaction)
  - **c)**

G) Cellular respiration
- **1.** Glycolysis
- **2.** The Kreb's cycle
- **3.** The electron transport system

H) Fermentation

Unit III

I Genetics

A) Meiosis and genetics

B) Mendal and his work

C) Terms
- **1.** Chromosomes
- **2.** Genes
- **3.** Alleles
  - **a)** homozygous
  - **b)** heterzygous
- **4.** Genotype
- **5.** Phenotype
- **6.** Dominance
- **7.** Recessiveness
- **8.** Epistasis
- **9.** Parent or P 1 generation
- **10.** First filial or F 1 generation
- **11.** Hybrid
- **12.** Second filial or F 2 generation
- **13.** Incomplete dominance or co-dominance

D) The law of segregation

E) Monohybrid crosses

F) The law of independent assortment

G) Dihybrid crosses
- **1.** The punnett square
  - **a)** genotypical ratios
  - **b)** phenotypical ratios
- **2.** Probability

H) Back crosses

- **I)** Test crosses
- **J)** Gene interaction
  - **1.** Epistasis
  - **2.** Complementary genes
  - **3.** Supplementary genes
- **K)** Quantitative inheritance
  - **1.** Multiple alleles
  - **2.** Polygenetic inheritance
- **L)** Sex linked traits
  - **1.** The sex determining chromosomes
  - **2.** X - linked genes
  - **3.** Y - linked genes
- **M)** The Hardy-Weinberg law
- **N)** Linkage and chromosome mapping

- **O)** Changes in chromosome numbers
  - **1.** Aneuploid cells
    - **a)** monosomic cells
    - **b)** trisomic cells
    - **c)** polyploid cells

- **P)** Chromosomal abberations
  - **1.** Mutations
  - **2.** Deletions
  - **3.** Duplications
  - **4.** Inversion
  - **5.** Translocation
- **Q)** Genes and diseases
  - **1.** Sickle cell anemia
  - **2.** Thalassemia
  - **3.** Cystic fibrosis
  - **4.** Tay-Sachs disease
  - **5.** PKU
  - **6.** Lesch-Nyhans disease
- **R)** The role of RNA and DNA in inheritance
  - **1.** Protein synthesis
    - **a)** transcription
    - **b)** translation
  - **2.** The operon theory
    - **a)** operator gene
    - **b)** promoter gene
    - **c)** regulator gene
    - **d)** structural gene

II Evolution

- **A)** Heredity and evolution
  - **1.** Historical perspective
  - **2.** Evidence of evolution
  - **3.** Adaptation and evolution

4. The modern concepts of evolution

FALL 2013 Calendar

Aug 26 Classes Begin/Late Registration Begins
Add/Drop Period Begins
Aug 27 Professional Day – No Classes in Session
Sep 2 Labor Day - College Closed
Sep 4 Convocation AND Instructor Signature Required to Add Classes
Sep 10 Last Day of Add/Drop and Partial Tuition Refund for 15 Week Session
Sep 17 Constitution Day – Classes In Session
Sep 24 Last Day to Select Audit Option for 15 Week Session
Oct 14 Columbus Day Observed – Classes In Session
Nov 4 Continuing Student Registration for Winter Intersession and Spring Semester
Nov 5 Last Day to Select Pass/Fail Option for 15 Week Session
Last Day to Submit Incomplete Work from Spring ’12 and Summer ‘12 Semesters
Nov 11 Veteran’s Day Observed – College Open Classes Not In Session
Nov 15 Last day to apply for Spring Graduation (May ’13 and for Summer (August ’13) completers who wish to attend the May ‘13 ceremony
Nov 26-27 Make-up/Supplemental sessions - Instructor Discretion
Nov 28-Dec 1 Thanksgiving Recess – No Classes in Session
Dec 10 Last Day to Withdraw from classes
Dec 17 Last Day of 15 Week Session
Dec 18-19 Makeup/Supplemental sessions – Instructor Discretion
Dec 20 Final Grades Due Registrar’s Office
Dec 31 Grades available on web