GENERAL BIOLOGY I

SYLLABUS

THREE RIVERS COMMUNITY COLLEGE
NORWICH, CONNECTICUT 06360

Ms. Jean Skiba, Instructor of Anatomy & Physiology and Biology

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Office Hours:	Monday - Thursday:
	By Appointment:

Special Notice
If you have a visible or hidden disability which may require classroom and/or test-taking modifications, please see me as soon as possible. If you have not registered with Chris Scarborough, learning specialist at (860) 823-2985 or a counselor in the Student Services Development Center, please do so ASAP.

Summer 2010

Procedure for Dropping the Course: **College's Withdrawal Policy**
Any student who finds it necessary to discontinue this course MUST complete a withdrawal form in the Registrar's Office at the time of the withdrawal. If you cannot withdraw in person, you may call the Registrar's Office and provide them with the appropriate information. Verbal withdrawals are not acceptable. Students who do not withdraw, but stop attending class will be assigned an "F" grade for the course. Once you withdraw from class you are no longer eligible to take any remaining quizzes or tests.

Morning Class
Lecture: D221
Lab: A215

Course: BIO 121

Credits: 4 hrs. credit (6 hours of lectures and 6 hours of lab each week)

Texts: Campbell/Reese 2008 "Biology" 8th ed.

Optional: Pechenik, J.A. 2009 "A Short Guide to Writing About Biology" 5th ed.

Catalog Description:
An introduction to 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.

Primary Objectives:
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. The student also will be encouraged to gain intuition about current biological concerns such as: pollution, overpopulation, energy, food production, chemical food additives, and genetic engineering.

Attendance Policy:
Students are expected to attend class and laboratory sessions regularly. If a class or lab is missed due to circumstances beyond your control, **please,** be sure to notify your instructor and make the necessary arrangements for obtaining the lecture notes. **You will be responsible** for the material.

Grade Evaluation:
There will be three unit examinations, two laboratory practicals. Here will be eleven quizzes. The lowest quiz grade will be dropped. A **cumulative** final exam will be administered during finals' week. Exam and quiz questions will consist of multiple choice and/or short answers.

Add/Drop Procedures:
Please consult the school catalog for this policy.

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.

Grading:
Final grade will be based on the following:

Semester Grade*	50%
Laboratory Grade**	30%
Final Examination	20%
Total	100%

* Semester grade = 40% Unit tests + 10% quizzes
** Laboratory grade = 15% Lab practicals + 15% Lab reports

Final Grade:

100.0 – 99.0 =	A
98.9 – 93.5 =	A
93.4 – 90.5 =	A-
90.4 – 87.5 =	B+
87.4 – 84.5 =	B
84.4 – 79.5 =	B-
79.4 – 77.5 =	C+
77.4 – 72.5 =	C
72.4 – 69.5 =	C-
69.4 – 63.5 =	D+
63.4 – 59.5 =	D
59.4 – 00.0 =	F

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 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.

Exemption Policy:
The instructor will determine who is to be exempted from taking the final exam, not the student. Exemption is an earned privilege not an inherited right. Any student that is exempted from taking the final exam will be notified in writing. Students being considered for exemption MUST meet all of the following requirements: (No exceptions for any reason!)

1) Good classroom conduct.
2) Only 1 absence from lecture or laboratory (excused or non-excused)
3) No more than two tardies during course of semester in lecture or laboratory.
4) All unit tests and lab tests must be taken when scheduled (no make-ups).
5) No test score, (lecture or laboratory), lower than 88.
6) The average of the best seven quizzes cannot be lower than 90.
7) Must have an overall semester's average of 95 or higher. (No rounding off).
8) Must have a semester's lab grade of 95 or higher. (No rounding off).
9) Intangibles.

Make-ups:
Any assignment missed can be obtained from the instructor. Lab work may be made up during free time within a week of the missed assignment if the lab is available. Quizzes, scheduled or pop, 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; where the reason(s) for missing the test must be determined mitigating circumstances beyond the control of the student such as, illness, death in the family, or change in condition of employment. All make-up tests will be scheduled during the week of the final exams. If two unit tests are missed during the semester and/or if the final exam is missed the student will receive a "F" grade if he or she is failing other parts of the course or an "I" if the student is passing all other parts of the course.

Revisions to the Syllabus:

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 affects scheduled unit test a 48 hour notice will be given for the new test date.

Cellular phones and beepers:

Cellular phones and beepers are only allowed in class or lab if they are turned off or in silent mode. Under no circumstance 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.

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.

Detailed Course Objectives (cont.)

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

Detailed Course Outline - BIO K121 (cont.)

3. Elements common to all living organisms
    - a) carbon
    - b) nitrogen
    - c) oxygen
    - d) phosphorus
    - e) hydrogen
    - f) sulfur
    - 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

Detailed Course Outline - BIO K121 (cont.)

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 nucleus

- **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

Detailed Course Outline - BIO K121 (cont.)

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

Detailed Course Outline - BIO K121 (cont.)

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)

G) Cellular respiration
1. Glycolysis

2. The Kreb's cycle
3. The electron transport system
4. Fermentation

Detailed Course Outline - BIO K121 (cont.)

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

Detailed Course Outline - BIO K121 (cont.)

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

BIO K121 General Biology I w/Lab
Tentative Schedule

Date:	Topic:	Required readings in Chapters:
6/7	Orientation / The scientific method	
6/8	**LAB** - The scientific method	
6/9	Characteristics of Life	1
6/10	**LAB** (laboratory procedures/introduction to the microscope)	
6/14	Chemistry and life – **Quiz 1**	2
6/15	**LAB** (Chemistry)	
6/16	Chemistry and life (cont.) – **Quiz 2**	3, 4, 5
6/17	**LAB** (The structures of the cell/Models and microscope study)	
6/21	The cell – Structures and functions – **Quiz 3**	6
	The cell wall and membrane – structure and function	7
6/22	**LAB** (Diffusion and osmosis) – **Quiz 4**	
6/23	**UNIT EXAM I**	
6/24	**LAB** (Mitosis/meiosis)	
6/28	Cell division – mitosis and meiosis – **Quiz 5**	12, 13
6/29	**LAB PRACTICAL I**	
6/30	HISTOLOGY	
7/1	**LAB** (Microscopic study of animal tissues)	
	Animal tissue – **Quiz 6**	
7/6	**LAB** (animal tissues cont.)	40
7/7	Plant structure/function – **Quiz 7**	35
7/8	**LAB** (Microscopic study of plant tissues)	
7/12	Cellular metabolism – **Quiz 8**	8, 9
7/13	**LAB** (Photosynthesis)	
7/14	**UNIT EXAM II** - Photosynthesis	10
7/15	**LAB** (Inheritance)	
7/19	Inheritance – **Quiz 9**	14
7/20	**LAB** (Open – review) - **Quiz 10**	
7/21	Molecular Genetics - **Quiz 11**	15, 16, 17
7/22	**LAB PRACTICAL II**	
7/26	Molecular Genetics	
7/27	Major Lab Report due	
7/28	Final Notes/Review	
7/29	**UNIT EXAM III**	
8/2	**FINAL EXAM**	

Syllabus Revisions:
This schedule may be subject to change as the instructor sees fit. Any changes will be announced by the instructor in advance.