1. Course #: BIOL 117,118

NAME OF COURSE: General Biology II and Lab

3. CURRENT DATE: 9/09

Please indicate whether this is a NEW COURSE or a REVISION: REV

DATE OF PRIOR REVISION: SPRING 06

4. NUMBER OF CREDITS 4

5. NUMBER OF CONTACT HOURS PER WEEK 5
   (3 lecture hrs; 2 lab hrs)

6. APPROXIMATE FREQUENCY OF OFFERING THIS COURSE: Every Semester
   [Every semester, fall, spring, or not offered every semester]

7. PREREQUISITES OR ENTRY LEVEL SKILLS High School biology, chemistry or equivalent

8. COREQUISITES: None

9. PLACE OF THIS COURSE IN CURRICULUM:
   ___ Required for Curriculum (name) _________
   X Part of Required/Recommended Sequence with (Number of Course) BIOL 115/116

10. IS THIS COURSE DESIGNED FOR TRANSFER TOWARD A SPECIFIC MAJOR? ___X_ Yes ___ No
    MAJOR(S) Biology

11. COURSE OUTCOMES:
    List the course’s learning outcomes and describe how each outcome will be measured.

<table>
<thead>
<tr>
<th>Outcome</th>
<th>Description</th>
<th>Measurement</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lecture</td>
<td>Describe the structure and growth of the flowering plant: root, stem and leaf.</td>
<td>Knowledge, understanding, and application of the material will be tested in the form of multiple choice, completion, matching, true/false, and essay questions, labeling of diagrams; interpretation of figures and graphs.</td>
</tr>
<tr>
<td>Lecture</td>
<td>Discuss how the flowering plant carries out life functions including transport of water and organics; reproduction and development; response and control.</td>
<td>Knowledge, understanding, and application of the material will be tested in the form of multiple choice, completion, matching, true/false, and essay questions, labeling of diagrams; interpretation of figures and graphs.</td>
</tr>
<tr>
<td>Lecture</td>
<td>Compare the major life function of the human with that of invertebrates.</td>
<td>Knowledge, understanding, and application of the material will be tested in the form of multiple choice, completion, matching, true/false, and essay questions, labeling of diagrams; interpretation of figures and graphs.</td>
</tr>
</tbody>
</table>
Describe how the human body carries out the processes of nerve conduction; muscle contraction, digestion, circulation, respiration and excretion. Knowledge, understanding, and application of the material will be tested in the form of multiple choice, completion, matching, true/false, and essay questions, labeling of diagrams; interpretation of figures and graphs.

Discuss the relationship of organisms to their environment and to each other. Knowledge, understanding, and application of the material will be tested in the form of multiple choice, completion, matching, true/false, and essay questions, labeling of diagrams; interpretation of figures and graphs.

Discuss the concept of the ecosystem, describing energy flow, productivity, biogeochemical cycles, succession and stability Knowledge, understanding, and application of the material will be tested in the form of multiple choice, completion, matching, true/false, and essay questions, labeling of diagrams; interpretation of figures and graphs.

**Lab Objectives**

| Describe the general characteristics of the kingdoms and identify members by looking at preserved and living specimens, microscope slides and diagrams. | Lab reports, written and practical tests using microscopes; diagrams; models; slides; preserved and living specimens. |
| Describe the general characteristics of representative plant phyla and identify members by looking at preserved and living specimens, microscope slides and diagrams. | Lab reports, written and practical tests using microscopes; diagrams; models; slides; preserved and living specimens. |
| Describe the microscopic and macroscopic structure of the root, stem, leaf of monocots and dicots. | Lab reports, written and practical tests using microscopes; diagrams; models; slides; preserved and living specimens. |
| Describe general characteristics and life functions of animals from representative invertebrate phyla accompanied by observation and dissection. | Lab reports, written and practical tests using microscopes; diagrams; models; slides; preserved and living specimens. |
| Dissect and observe the anatomy of the fetal pig. | Lab reports, written and practical tests using microscopes; diagrams; models; slides; preserved and living specimens. |
12. COURSE GRADE
Based on the above measures, how will the final course grade be calculated?
Lecture = 75%
  5 tests and comprehensive final
Lab = 25%
  4 tests = 90%
  Lab Reports = 10%

13. INSTRUCTIONAL METHODS: List the different instructional methods you might use, in the course of the semester. List supplementary learning options, if any.

- Traditional lecture with use of chalkboard
- Learning objectives
- Overhead transparencies
- Power point presentations
- Computer assisted learning in the form of tutorials
- Computer practice testing
- Variety of CD ROMS
- Internet
- Models, slides
- Working in groups in lab
- Written and practical tests
- Films and tapers
- Learning Option – On-Line course is offered

14. CROSS-CURRICULAR OPPORTUNITIES:
A. General Education Enrichment:
Does this course provide opportunities to draw upon examples or concepts from outside the main objectives of this area of study? If yes, please briefly describe the content, activities or assignments.

B. Information Management:
Does this course provide opportunities to teach and/or require the students to apply information management skills? If yes, please briefly describe the content, activities or assignments.

C. Critical Thinking:
Are there components of this course which teach and/or require students to demonstrate Critical Thinking? If yes, please briefly describe the content, activities or assignments.

D. Student Engagement:
Does this course provide opportunities for students to participate in individual or group presentations or interactions? If yes, please briefly describe the content, activities or assignments.
Opportunities | Activities or Assignments
--- | ---
General Education | Relating course objectives to experiences outside the classroom, i.e., application of methods of transport; news; internet information.
Information Management | Students access power point presentations and supplementary material on Blackboard and utilize the website accompanying text. Honors option students submit internet assignments.
Critical Thinking | Test questions and lab reports require critical thinking. Lab on Scientific Method demonstrates the need. Students are encouraged to analyze information and draw conclusions. Certain topics lend to their expression of opinion, i.e., stem cell research, medical ethics, biotechnology.
Student Engagement | Students work as individuals and as a group in lab. Group activities require interaction and cooperation among members. Students are urged to participate and engage in discussions. Group study is encouraged.

15. TOPIC OUTLINE  Attached

16. UNIQUE ASPECTS OF COURSE (such as equipment, specified software, space requirements, etc.)
   Honors option and online course requiring computer access.

APPENDIX I: REQUIRED TEXTS AND/OR MATERIALS REQUIRED BY THE STUDENT (Include Supplementary Readings)

**Text:**
Biology, Campbell, Reece, and Mitchell. Benjamin Cummings.

**Lab Manual:**
Laboratory Studies in General Biology, Walsh, Kurtzberg, VanPatten, and Darwood. Kendall/Hunt Publ.

APPENDIX II: CATALOG DESCRIPTION:
(Approximately 65 words or less)

BIOL 117, 118  General Biology II and Lab  4 credits

A second course in a two-semester sequence designed to fulfill the science requirement for the college degree as well as for a science major. Covers animal structure and function, plant structure and function, and principles of ecology. *May be taken for Honors or online.* Class hrs. 3; Lab hrs. 2. Offered in the spring and summer semesters.
<table>
<thead>
<tr>
<th>Week</th>
<th>Topic</th>
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<tbody>
<tr>
<td>1</td>
<td>I. Plant Structure and Function (The lecture primarily pertains to the higher plants, the angiosperms. The lower plants are covered in the laboratory.)</td>
</tr>
<tr>
<td></td>
<td>A. The Plant Plan</td>
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<tr>
<td></td>
<td>1. unicellularity vs. multicellularity</td>
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<td>2. concept of division of labor in multicellular plants</td>
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<td></td>
<td>a. level of structural organization</td>
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<tr>
<td></td>
<td>1) cellular</td>
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<td>2) tissue</td>
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<td>3) organ</td>
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<td>4) system</td>
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<tr>
<td></td>
<td>B. Environmental Requirements of Higher Plants as Related to Structural Development</td>
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<tr>
<td></td>
<td>1. the requirements listed: C0₂, H₂O, light, minerals</td>
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<td>2. sources of the environmental requirements</td>
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<td>3. organs involved in the uptake of the environmental requirements</td>
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<td>4. necessity of vascular tissues in land plants</td>
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<td>2</td>
<td>C. The Vascular Tissues</td>
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<tr>
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<td>1. the two types present: xylem and phloem</td>
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<td></td>
<td>2. formation of xylem and phloem</td>
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<td>3. conducting cells of xylem: tracheids and vessel elements</td>
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<td>a. structure compared</td>
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<td>b. vessel formation</td>
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<td>c. types of plants in which they are found</td>
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<td></td>
<td>d. dead at functional maturity</td>
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<td></td>
<td>e. continuous throughout the body</td>
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<td>D. Leaf Anatomy</td>
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<td>1. tissue layers of leaves</td>
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<td>2. main function of each tissue layer</td>
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<td>3. significance of cuticle</td>
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<td>4. significance of stomata</td>
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<td>5. relationship of function of stomata to metabolic activities occurring in leaf cells</td>
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<td>E. The Concept of the Flower as the Reproductive Organ</td>
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<td>F. Seed</td>
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<td>1. structure and function of parts of mature seed</td>
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<td>a. monocot seeds</td>
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<td></td>
<td>b. dicot seeds</td>
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</tbody>
</table>
G. Seed Dormancy and Germination
1. dormancy defined
2. causes of seed dormancy
   a. conditions in seed coat
      1) impermeability to water & oxygen
      2) mechanically resistant seed coat
      3) presence of chemical inhibitors
      4) breaking of dormancy
   b. physiological conditions with the embryo
      1) examples
      2) how dormancy caused by this is broken
   c. biological significance of seed dormancy
   d. dormancy in mature plants
3. germination defined
4. establishment defined
5. environmental conditions favorable to seed germination
6. sequence of events within seeds leading to germination
7. patterns of seed germination
   a. dicots
   b. monocots

H. Growth and Differentiation of the Plant Body
1. growth processes of plants: cell division and cell elongation
   a. concept of localized growth
   b. root zonation
   c. stem zonation
      1) development of leaf primordium
      2) definition of node and internode
      3) bud structure
      4) bud development
      5) axillary bud – development into branches
   d. primary growth defined
   e. secondary growth in dicots
      1) vascular cambium
      2) cork cambium
   f. secondary growth in monocots

I. Factors Effecting Plant Growth and Development
1. environmental factors
   a. light intensity
      1) growth and development in light/dark plants
      2) effect of variation in light on vegetative development
   b. light direction
      1) definition of photoperiod
      2) short-day plant, long-day plant and day-neutral plant
3) photoperiodic mechanism
   a) role of phytochrome
   b) biological clock mechanism
   c) change in hormone balance which induces flowering

c. temperature
d. availability of minerals
e. availability of moisture

5 2. internal factors
   a. plant hormones
      1) definition of a hormone
      2) plant hormones listed
      3) factors influencing plant hormones
         a) relative concentration in target tissue
         b) presence/absence of other hormones in a target tissue
         c) type of target tissue
      4) physiology of:
         a) auxins
         b) gibberellins
         c) cytokinins
         d) abscisic acid
         e) ethylene
         f) hypothetical hormone, florigen
   b. concept of gene regulation as it relates to development and differentiation

J. Water and Mineral Absorption by Roots
   1. mechanisms of water and mineral absorption
      a. diffusion
      b. active transport
   2. mineral absorption in ionic form
   3. mineral requirements of land plants

K. Xylem Transport
   1. review of leaf anatomy
   2. transpiration defined
   3. regulation of stomatal openings and relationship to transpiration and rate of metabolic activities in leaf cells
   4. cohesion-tension theory
   5. root pressure

L. Phloem Transport
   1. translocation defined
   2. mass flow hypothesis
   3. other hypotheses

M. Plant Reproduction
   1. flower anatomy
   2. development within male reproductive structure
3. development within female reproductive structure
4. pollination and double fertilization
5. fruit and seed development

6. II. Animal Structure and Function (Lecture primarily pertains to the human. The other animals are covered in the laboratory.)
   A. Introduction
      1. animal vs. plant
      2. overview of the human body
   B. Coordination and Response
      1. introduction
         a. homeostasis
         b. endocrine vs. nervous control
      2. organization of the nervous system
         a. central vs. peripheral
         b. somatic vs. autonomic
      3. nervous tissue
         a. neuroglia
         b. neuron
            1) structure and function of its parts
            2) types of neurons
               a) sensory (afferent)
               b) motor (efferent)
               c) connector (association)
            3) white vs. gray matter
            4) structure of a nerve
      4. nerve impulse
         a. resting state
            1) ion concentration
            2) resting membrane potential
            3) polarization
         b. stimulation
            1) ion concentration
            2) action potential
            3) depolarization
         c. threshold stimulus
         d. all-or-none law
         e. saltatory conduction
         f. repolarization and refractory period
      5. synaptic transmission
         a. synapse
         b. chemical transmitters
            1) cholinergic vs. adrenergic nerves
            2) action of acetylcholine and cholinesterase
         c. neuromuscular junction
6. muscle contraction
   a. anatomy of skeletal muscle
      1) gross structure
      2) microscopic structure
      3) molecular structure of myofilaments
   b. condition of a relaxed muscle
   c. events of contraction
      1) initiation by acetylcholine
      2) role of ATP and calcium
      3) changes in actin and myosin

7. central nervous system
   a. parts
   b. meninges
   c. cerebrospinal fluid
   d. brain
      1) location, description and function of parts
         a) cerebrum
         b) thalamus
         c) hypothalamus
         d) corpora quadrigemina
         e) cerebral peduncles
         f) cerebellum
         g) pons
         h) medulla oblongata
      2) function
         a) conduction pathway
         b) reflex center
         c) simple vs. conditioned reflex

8. peripheral nerves
   a. cranial nerves
   b. peripheral nerves

9. autonomic nervous system
   a. divisions
      1) sympathetic
      2) parasympathetic
   b. structure
   c. function and action
   d. cholinergic vs. adrenergic fibers

C. Digestion
   1. introduction
      a. processes
      b. general functions
2. structure and function of parts of human digestive tract
   a. mouth
   b. salivary glands
   c. pharynx
   d. esophagus
   e. stomach
   f. small intestine
   g. liver
   h. gall bladder
   i. pancreas
   j. large intestine
   k. rectum
   l. anus

3. mechanical actions
   a. mastication
   b. peristalsis
   c. emulsification

4. chemical actions
   a. enzymes
      1) site of production
      2) site of action
      3) substrate
      4) end products

5. absorption
   a. processes
   b. site

6. elimination

7. control of digestion
   a. nervous
   b. hormones involved

8. disorders of the digestive system

D. Circulation
   1. introduction
      a. components of the circulatory system
      b. general functions
   2. blood
      a. general characteristics
         1) whole blood
         2) plasma
         3) formed elements
         4) serum
      b. general functions
         1) transportation
         2) regulation
         3) protection
c. plasma
   1) composition
   2) functions

d. formed elements
   1) erythrocytes
      a) structure
      b) general size
      c) number
      d) function
      e) formation and destruction
      f) abnormalities
   2) leucocytes
      a) classification
      b) structure
      c) relative numbers and sizes
      d) functions
      e) site of formation
      f) abnormalities
   3) thrombocytes
      a) structure
      b) relative number and size
      c) function – clotting process
      d) site of formation
      e) abnormalities

3. heart
   a. location
   b. structure
   c. blood flow through heart
   d. conduction system
   e. cardiac cycle
   f. electrocardiogram
   g. heart abnormalities

4. circulatory pathways
   a. arteries vs. veins
   b. pathways
      1) systemic
      2) pulmonary
      3) fetal

5. blood pressure
   a. definition
   b. measurement
   c. pressure differences in vessels
   d. factors affecting pressure
   e. control of blood pressure
   f. abnormalities
   g. pulse
6. capillary exchange
   a. mechanisms
   b. factors affecting exchange
7. control of circulation
8. lymphatic system
   a. vessels
   b. lymph
      1) composition
      2) formation
      3) flow
   c. lymph nodes
   d. lymphatic tissue

11 E. Respiration
1. internal vs. external
2. structure and function of the respiratory system
   a. nasal cavity
   b. pharynx
   c. larynx
   d. trachea
   e. bronchi
   f. bronchioles
   g. lungs and alveoli
   h. diaphragm
3. mechanics of breathing
   a. inspiration
   b. expiration
4. gas exchange
   a. process
   b. oxygen transport
   c. carbon dioxide transport
5. control of respiration
6. abnormalities

F. Excretion
1. definition
2. means of excretion in the body
3. structure and function of the parts of the urinary system
   a. kidney
   b. ureter
   c. urinary bladder
   d. urethra
4. nephron
   a. structure
   b. function
5. urine formation
   a. glomerular filtration
   b. tubular reabsorption
   c. tubular secretion

6. urine
   a. general characteristics and composition
   b. abnormal constituents
   c. control of volume

7. abnormalities

G. Endocrine System
1. introduction
   a. ductless glands
   b. target tissue
   c. hormone action
   d. negative feedback

2. summary
   a. glands
   b. hormones
   c. hypo and hyper function

(Hormones have previously been mentioned in the study of other systems.)

13 III. Ecology
A. Concept of Ecosystem
   1. structural components
   2. functional aspects
   3. relationship between structural components and functional aspects

B. Introduction to Ecosystem Function
   1. concept of production
   2. mechanisms of production
      a. chemosynthesis
      b. photosynthesis
   3. concept of consumption
      a. cellular respiration
      b. roles of obligate & facultative anaerobes
   4. concept of decomposition
      a. steps in decomposition process
      b. significance of abiotic and biotic decomposition

C. Concept of Energy Flow
   1. definition of energy
   2. laws of thermodynamics
   3. relationship of energy to biological organization and stability
   4. outline of energy flow in ecosystem
5. concept of gross and net primary productivity  
   a. average overall efficiency of each  
   b. factors influencing efficiency of each  
6. concept of standing crop biomass  
7. concept of food chain  
   a. mechanism of energy transfer  
   b. efficiency of energy transfer  
   c. concept of trophic levels  
   d. pyramids of energy and biomass  
8. universal model for ecological energy flow  
14 D. Concept of Nutrient Cycling  
   1. definition of biogeochemical cycles  
   2. two major components of biogeochemical cycles  
      a. reservoir pool  
      b. exchange pool  
   3. types of biogeochemical cycles  
      a. gaseous  
      b. sedimentary  
      c. mixed  
   4. relationship of energy flow to nutrient cycling  
   5. description of significant biogeochemical cycle  
      a. carbon dioxide cycle  
      b. nitrogen cycle  
      c. oxygen cycle  
      d. phosphorus cycle  
      e. sulfur cycle  
      f. water cycle  
15 E. Factors Affecting Species’ Success in Ecosystem  
   1. concept of physical limiting factors to species distribution  
      a. definition of a limiting factor  
      b. Liebig’s Law of the Minimum  
      c. Shelford’s Law of Tolerance  
   2. concept of factor compensation  
      a. definition of factor compensation  
      b. mechanisms of factor compensation  
         1) species level  
         2) community level  
      c. relationship of factor compensation to ecosystem homeostasis  
      d. environmental conditions as regulatory factors  
      e. ecological indicators  
   3. concept of biological interactions  
      a. definition of a community
b. species’ interrelationships within communities
   1) symbiosis
      a) commensalism
      b) mutualism
      c) parasitism
   2) predator-prey relationships
   3) interspecific competition
   4) intraspecific competition

F. Concept of Ecosystem Stability
   1. dominant vs. subdominant species
   2. factors contributing to ecosystem stability
   3. stability of complex communities

G. Ecosystem Development
   1. definition of succession
   2. causes of succession
   3. patterns of ecological succession
      a) terrestrial
      b) aquatic

H. Current Environmental Issues
   1. air
   2. water
   3. land
# WESTCHESTER COMMUNITY COLLEGE

## GENERAL BIOLOGY II

### LABORATORY SCHEDULE

<table>
<thead>
<tr>
<th>Week</th>
<th>Laboratory Exercise</th>
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<tbody>
<tr>
<td>1</td>
<td>Classification and Survey of the Kingdoms: Prokaryote; Protista; Fungi</td>
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<tr>
<td>2</td>
<td>Bryophyta, Psilophyta, Lycophyta, and Sphenophyta</td>
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<tr>
<td>3</td>
<td>Pterophyta, Coniferata, Anthophyta</td>
</tr>
</tbody>
</table>
| 4    | **TEST**: Lower Plants  
Begin Anatomy of the Flowering Plant |
| 5    | Anatomy of the Flowering Plant |
| 6    | Anatomy of the Flowering Plant |
| 7    | **TEST**: Anatomy of the Flowering Plant  
Porifera |
| 8    | Coelenterates, Annelids, Molluscs |
| 9    | Arthropods, Echinoderms |
| 10   | **TEST**: Lower Animals  
Begin Fetal Pig |
| 11   | Fetal Pig |
| 12   | Fetal Pig |
| 13   | **TEST**: Fetal Pig |
| 14   | Using and Constructing a Taxonomic Key |
| 15   | Hand In and Review Taxonomic Keys |