PELLISSIPPI STATE TECHNICAL COMMUNITY COLLEGE
MASTER SYLLABUS

CELL BIOLOGY
BIOL 2110

Class Hours: 3.0  Credit Hours: 4.0
Laboratory Hours: 3.0  Revised: Spring 09

Catalog Course Description:

Study of basic biomolecules, cell structure and function, cellular respiration and photosynthesis, molecular genetics, cellular communication, cancer, and evolution of the cell. Course includes 3 hours of lecture and 3 hours of laboratory per week.

Entry Level Standards:

The student should have a good understanding of basic biology and chemistry.

Prerequisites:

BIOL 1110 and 1120 and CHEM 1110 and 1120, or two years of high school biology and ACT natural science score of 26 or higher, or permission of the instructor.

Textbook(s) and Other Course Materials:


I. Week/Unit/Topic Basis:

<table>
<thead>
<tr>
<th>Week</th>
<th>Topic</th>
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</table>
| 1 | Lecture: Chapter 1 - Introduction  
Lab: Critical Thinking, Reading Scientific Papers |
| 2 | Lecture: Chapter 2 - Chemistry  
Chapter 3 - Macromolecules |
| 3 | Lecture: Chapter 3 - Macromolecules  
Lab: Scientific Instrumentation, Titration |
| 4 | Lecture: Exam I  
Chapter 4 - Enzymes  
Lab: Protein Structure, Plant Tissue Culture |
| 5 | Lecture: Chapter 4 - Energetics  
Lab: Measurement of Enzyme Activity |
| 6 | Lecture: Exam II  
Chapter 5 - Cells |
Lab: Enzyme Kinetics Lab:

7 Lecture: Chapter 6 - Membranes and Transport
Lab: Microscopic Observations, Normal vs. Cancer Cells

8 Lecture: Exam III
Chapter 7 - Intermediary Metabolism
Midterm Lab Exam

9 Lecture: Chapter 7 - Intermediary Metabolism
Lab: Bioremediation, Plant Tissue Culture

10 Lecture: Chapter 7 - Intermediary Metabolism
Chapter 8 - Photosynthesis
Lab: Hill Reaction in Isolated Chloroplasts

11 Lecture: Exam IV
Chapter 9 - Cell Reproduction
Lab: Student-designed Experiments, Genetic Manipulation

12 Lecture: Chapter 10 - Chromosomes & Meiosis
Chapter 13 - DNA
Lab: Student-designed Experiments

13 Lecture: Chapter 15 – Eucaryotic Gene Regulation
Chapter 19 - Chemical Signaling
Lab: Final Lab Exam

14 Lecture: Stem Cells; Cancer
Lab: Plant Tissue Culture, Discussion of Current Events in Cell Biology Research

15 Lecture: EXAM VI

II. Course Objectives*:

A. Develop a thorough understanding of the structure and function of the cell and all its parts. V3,4,5

B. Develop a thorough understanding of the chemistry of the cell, including enzymatic action. V3,4

C. Understand energy flow within the cell. V3,4

D. Understand information flow within the cell, including current ideas on gene regulation. V3,4,5

E. Understand current ideas on chemical signaling, stem cell research, and the development of cancer. V3,4,5

F. Know how to read a scientific paper critically. V2,3

G. Be able to plan and execute a scientific experiment. V1,2

H. Understand the use of various laboratory techniques and equipment common to cell biology. V1

*Roman numerals after course objectives reference TBR's general education goals.
III. Instructional Processes*:

Students will:

1. Engage in teamwork to facilitate cooperative learning. *Active Learning Strategies*
2. Approach problems both mathematically and verbally. *General Education Mathematics Outcome, General Education Communication Outcome*
3. Use critical thinking to solve problems, both in lecture and experimentally in lab. This will be done in groups to encourage idea-sharing. *Active Learning Strategies, General Education Natural Sciences Outcome*
4. Use critical thinking to evaluate the scientific literature. *General Education Technology Literacy Outcome, General Education Natural Sciences Outcome*
5. Participate in laboratory research by doing student-directed experiments. *Active Learning Strategies, General Education Natural Sciences Outcome*
6. Learn the use of cell-biology related technology. *General Education Natural Sciences Outcome*
7. Gain the knowledge to have the solid foundation in Cell Biology which is necessary for moving on to upper level biology courses and eventually to the job. This will be done by a variety of means, including listening to lectures, experimenting, participating in field trips, viewing videotapes, and participating in group discussions. *Transitional Strategies; Active Learning Strategies; General Education Natural Sciences Outcome*

*Strategies and outcomes listed after instructional processes reference TBR's goals for strengthening general education knowledge and skills, connecting course work to experiences beyond the classroom, and encouraging students to take active and responsible roles in the educational process.

IV. Expectations for Student Performance*:

Upon successful completion of this course, the student should be able to:

1. Discuss the organic chemistry of the cell, especially with regard to the four types of macromolecules. *B*
2. Describe the internal and external components of the cell, and discuss their physiological mechanisms. *A*
3. Explain the manner in which enzymes are active within the cell. *B*
4. Discuss the structure of membranes and the physiological mechanisms of cellular transport across the membranes. *A*
5. Discuss intermediary metabolism and photosynthesis. *C*
6. Explain the concept and details of the Central Dogma: the transfer of information from DNA to RNA to proteins. *D*
7. Explain regulation of gene expression. *D*
8. Explain the use of hormones and receptors by the cell. *E*
9. Discuss current research in the area of stem cells. E
10. Discuss the manner in which normal cells become cancerous. E
11. Read a scientific paper analytically. F
12. Write a scientific paper. F, G, H
13. Plan an experiment and carry it out to reach a logical conclusion. G, H
14. Use biological instrumentation and techniques successfully. H

*Letters after performance expectations reference the course objectives listed above.

V. Evaluation:

A. Testing Procedures:

There will be 5 exams consisting of a mixture of essay and multiple choice questions. Each test is worth 1/5 of the overall lecture grade. The final exam is not comprehensive. Lecture will comprise about 2/3 of the overall grade.

Any student missing an exam without a valid, documented excuse will receive a 0 an that exam. Valid excuses include severe illness, death in the family, jury duty, and military service. The instructor should be notified by phone ahead of time, if possible, and a written excuse will be required.

B. Laboratory Expectations:

The lab grade will be determined from lab reports, scientific paper writeup, and two exams. The laboratory component will comprise 1/3 of the overall grade. Labs may not be made up. Late writeups will be docked 10% per weekday.

C. Field Work:

N/A

D. Other Evaluation Methods:

N/A

E. Grading Scale:

<table>
<thead>
<tr>
<th>Score Range</th>
<th>Grade</th>
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<tbody>
<tr>
<td>90 - 100</td>
<td>A</td>
</tr>
<tr>
<td>80 - 89</td>
<td>B</td>
</tr>
<tr>
<td>70 - 79</td>
<td>C</td>
</tr>
<tr>
<td>60 - 69</td>
<td>D</td>
</tr>
<tr>
<td>below 60</td>
<td>F</td>
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Pluses will be given when warranted.

VI. Policies:

A. Attendance Policy:

Pellissippi State Technical Community College expects students to attend all scheduled instructional activities. As a minimum, students in all courses must be present for at
least 75 percent of their scheduled class and laboratory meetings in order to receive credit for the course.

B. Academic Dishonesty:

Academic misconduct committed either directly or indirectly by an individual or group is subject to disciplinary action. Prohibited activities include but are not limited to the following practices:

- Cheating, including but not limited to unauthorized assistance from material, people, or devices when taking a test, quiz, or examination; writing papers or reports; solving problems; or completing academic assignments

- Plagiarism, including but not limited to paraphrasing, summarizing, or directly quoting published or unpublished work of another person, including online or computerized services, without proper documentation of the original source

- Purchasing or otherwise obtaining prewritten essays, research papers, or materials prepared by another person or agency that wells term papers or other academic materials to be presented as one's own work

- Taking an exam for another student

- Providing others with information and/or answers regarding exams, quizzes, homework or other classroom assignments unless explicitly authorized by the instructor

- Any of the above occurring within the Web or distance-learning environment.

C. Accommodations for disabilities:

If you need accommodations because of a disability, if you have emergency medical information to share, or if you need special arrangements in case the building must be evacuated, please inform the instructor immediately. Please see the instructor privately after class or in his/her office. Students must present a current accommodation plan from a staff member in Services for Students with Disabilities (SSWD) in order to receive accommodations in this course. Services for Students with Disabilities may be contacted by going to Goins 127 or 131 or by phone: 694-6751(Voice/TTY) or 539-7153.