PELLISSIPPI STATE TECHNICAL COMMUNITY COLLEGE  
MASTER SYLLABUS  
CONCEPTS OF BIOLOGY  
BIOL 1310  

Class Hours: 2.0  
Laboratory Hours: 3.0  
Credit Hours: 3.0  
Revised: Fall 04  

Catalog Course Description:  
A survey of biology concepts and content as applicable to the Tennessee K-8 curriculum standards and the National Science Education Standards. Instructional topics to include: scientific method, cell structure and function, food production and energy for life, heredity and reproduction, diversity and adaptation among living things, interactions between living things and their environment, and biological change: develop, design, and implement hands-on science activities for K-8 students; create and develop course portfolio; collect and evaluate biologically related resources. This course will only count toward the education program at Tennessee Technological University and Lincoln Memorial University.  

Entry Level Standards:  
Must be eligible for enrollment in English 1010 and DSPM 0850 or higher. Must be interested in teaching K-8 science and applying to Tennessee Technological University’s teacher education program.  

Prerequisites:  
Successful completion of one year of high school science. Students enrolled in the lecture must also participate in the accompanying laboratory hands-on activities and outside class assignments.  

Textbook(s) and Other Course Materials:  


*Biology One: An Interactive Tutorial.* Volume 1 and Volume 2. Kendall/Hunt Publishing Company. Developed by F-One Design, this CD-ROM contains computer simulations of laboratory exercises, and students will be expected to work on these during class. The CDs will be provided in class and student purchase is not required.  

Access to the Internet and online services and databases is required. Home access is recommended, but these services can be accessed on campus.  

I. Week/Unit/Topic Basis:  

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1  Unit I: Science as Inquiry  
   Lecture: Chapter 1: Nature of Science  
   Lab: Hands-on activities

2  Unit II: Cell Structure and Function  
   Lecture: Chapter 2: Essential Chemistry for Life; Chapter 3: The Molecules of Life  
   Lab: Hands-on activities

3  Lecture: Chapter 4: A Tour of the Cell  
   Lab: Hands-on activities

4  Lecture: Chapter 5: The Working Cell  
   Lab: Hands-on activities  
   Test or Tests from Chapters 1-5 – 100 points

5  Unit III: Food Production and Energy for Life  
   Lecture: Chapter 7: Photosynthesis  
   Lab: Hands-on activities

6  Lecture: Chapter 6: Cellular Respiration  
   Lab: Hands-on activities

7  Unit IV: Heredity and Reproduction  
   Lecture: Chapter 10: Molecular Biology of the Gene  
   Lab: Hands-on activities

8  Lecture: Chapter 12: DNA Technology  
   Lab: Hands-on activities  
   Test or Tests from Chapters 6, 7, 10, 12 – 100 points

9  Lecture: Chapter 8: Cellular Basis of Reproduction and Inheritance  
   Lab: Hands-on activities

10 Lecture: Chapter 9: Patterns of Inheritance  
    Lab: Hands-on activities

11 Unit V: Biological Change  
   Lecture: Chapter 13: How Populations Evolve  
   Lab: Hands-on activities

12 Unit VI: Diversity and Adaptation Among Living Things  
   Lecture: Chapter 15: The Evolution of Microbial Life  
   Lab: Hands-on activities  
   Test or Tests from Chapters 8, 9, 13, 15

13 Lecture: Chapter 16: Plants and Fungi; Chapter 17: The Evolution of Animals  
   Lab: Hands-on activities  
   Test or Tests from Chapters 16, 17

14 Unit VII: Interactions Between Living Things and Their Environments  
   Lecture: Chapter 18: The Ecology of Organisms and Populations; Chapter 19: Communities and Ecosystems; Chapter 20: Human Impact on the Environment  
   Lab: Hands-on activities

15 Lecture: Last Day of Class/Final Exams  
   Final Exam from Chapters 18-20
II. Course Objectives*:

This course is an introductory biology course dealing primarily with the concepts of the scientific method, cell structure and function, food production and energy for life, heredity and reproduction, diversity and adaptation among living things, interactions between living things and their environment, and biological change.

A. Develop an understanding of the K-8 curriculum content with respect to science education. I 6

B. Develop, design, and implement hands-on curriculum-based science activities for K-8 students. I 2; V 1-5; VI 1-6; VII 1-6

C. Access and interpret related biological information and educational resources. I 1-2, 4-7; V 1-5; VI 1-6; VII 1-6

D. Process skills related to observing, measuring, classifying, communicating and inferring. I 1-7; V 1-6; VI 1-6; VII 1-6

E. Apply the scientific method in scientific research. V 1-6

F. Develop an understanding of the basic unit of life, the cell, and its structure and function. V 1-6

G. Develop an understanding of the basic parts of plants, and investigate how plants produce food. V 1-6

H. Develop an understanding of the basic principles of heredity and how they relate to inheritance of traits in humans. V 1-6

I. Develop an understanding of the structure and function of DNA as a repository of genetic information. V 1-6

J. Develop an understanding of the diversity and adaptation among living things. V 1-6

K. Develop an understanding of the biological changes in the plant and animal kingdoms. V 1-6

L. Develop an understanding of how living things interact with one another and with non-living elements of their environment. V 1-6

M. Develop critical thinking skills. I 1, 6; V 1-6; VI 2, 3

*Roman numerals after course objectives reference TBR's general education goals.

III. Instructional Processes*:

Students will:

1. Read and critique scientific writings, including those from the text, biological journals, books, Internet and on-line reference sites. Communication Outcome, Natural Sciences Outcome, Mathematics Outcome, Technological Literacy Outcome, Active Learning Strategies

2. Listen to and discuss biological information presented by the instructor, educational videos,
guest speakers, and peers. Communication Outcome, Natural Sciences Outcome, Mathematics Outcome, Technological Literacy Outcome, Transitional Strategies

3. Work in teams to collect data, generate graphs and tables and summarize the data and draw conclusions using process skills such as: observing, measuring, classifying, communicating and inferring. Communication Outcome, Natural Sciences Outcome, Mathematics Outcome, Technological Literacy Outcome, Transitional Strategies, Active Learning Strategies

4. Develop portfolio notebook based on course content topics, laboratory hands-on activities, and collection of science resources. Communication Outcome, Natural Sciences Outcome, Mathematics Outcome, Technological Literacy, Transitional Strategies, Active Learning Strategies

5. Write essays. Communication Outcome, Natural Sciences Outcome, Technological Literacy, Active Learning Strategies

6. Design, develop, and implement curriculum-based hands-on science activities for K-8 students. Communication Outcome, Natural Sciences Outcome, Mathematics Outcome, Technological Literacy Outcome, Transitional Strategies, Active Learning Strategies

7. Locate, evaluate, and collect related scientific information on the Internet. Natural Sciences Outcome, Mathematics Outcome, Technological Literacy Outcome, Transitional Strategies, Active Learning Strategies

*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. Develop, design, and conduct K-8 science hands-on activities. C, D, E, F
2. Locate biologically related material and science education resources on the Internet. Evaluate biological information they read about or see on TV. D, E, F
3. Know current state of Tennessee science curriculum standards.
4. Explain the scientific method and be able to use in scientific inquiry.
5. Describe the structure and function of parts of the eukaryotic cell. A
6. Classify organisms into one of the Domains and Kingdoms of living things based on characteristics such as cell type, cell number, and means of nutrition. A, F, G
7. Recognize relationships within food chains and interactions among living things and with non-living elements.
8. Compare and contrast photosynthesis and cellular respiration. E
9. Explain the basic concepts of DNA and the role of DNA in inheritance. C, F
10. Work standard Mendelian genetics problems. B, F
11. Describe the differences among plants and animals of the same kind.
12. Explain biological changes, which relate past and present organisms.


14. Interpret and draw conclusions from graphically presented data. F, G

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

V. Evaluation:

A. Testing Procedures: 75% of grade

Each lecture unit will be evaluated using one or more tests. Exams will be a mix of discussion questions and objective questions. The tests may be alternative assessments. There are no makeup lecture tests. The additional 150 points associated with lecture will be earned by doing a variety of activities determined by your instructor. Students will receive one grade for Concepts of Biology. The total number of points on which your grade will be based is 865. In lecture, you may accumulate as many as 650 points, which constitutes about 75% of the grade. In lab, you may accumulate as many as 215 points, which constitutes about 25% of the grade.

B. Laboratory Expectations: 25% of grade

1. Students are expected to participate in lab and hands-on activities and complete the assignments in a timely manner. Laboratory work will not be accepted late.

2. Students are expected to dress appropriately for the laboratory to minimize the possibility of the spread of contamination and risk to personal safety. No open-toed shoes are allowed, and garments that cover the legs are recommended. Students are required to report to their laboratory instructor any concern for personal safety or injury sustained during various exercises.

3. Students are encouraged to work cooperatively together to complete the exercises in a timely fashion but not to plagiarize notebook work nor to communicate during the practical.

4. During and after each lab exercise, students are required to complete the post-laboratory report. These post-laboratory reports will be collected and graded on 5 randomly selected dates. Each graded set of post-laboratory report assignments will be worth 20 points. Post-laboratory reports will not be accepted late.

5. Students are required to read the scheduled lab exercise before coming to class.

6. Students will conduct a scientific inquiry study during the semester. The main requirements for this project will be carrying out a long-term investigation, writing a laboratory-style report for the investigation, and presenting the study to the class.

7. Students are expected to complete computer simulations of selected laboratory exercises. Students will use the class CD-ROMS with these exercises and the computers in class or an open laboratory on campus to complete the assignments.

8. Drink, food, or any form of tobacco is not allowed in the classroom or laboratory.

C. Field Work:

1. Students may be required to read supplemental articles, papers, or books on reserve in the library.

2. Students may be required to conduct scientific experiments outdoors.

3. Students may be required to conduct scientific experiments outside of class time.
4. Students may be required to participate in cooperative teams with inservice teachers.

D. Other Evaluation Methods:

See instructor for specific information when warranted.

E. Grading Scale:

Grading Scale (out of a total of 865 possible points)
90-100% (778-865 points) A
87-89% (752-777 points) B+
80-86% (692-751 points) B
77-79% (666-691 points) C+
70-76% (604-665 points) C
60-69% (519-603 points) D
0-59% (0-518 points) F

Point Distribution
Lecture tests Laboratory and assignments
Exam 1 100 points Post-Laboratory Reports 100 points (5X20)
Exam 2 100 points Inquiry Study 115 points
Exam 3 100 points
Exam 4 100 points
Exam 5 100 points
Assignments 150 points
TOTAL 650 points
TOTAL 215 points

VI. Policies:

A. Attendance Policy:

Consistent tardiness and excessive absenteeism may lower the final grade. Institutional policy mandates that a student be present for at least 75% 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:
1. 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.
2. 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.
3. Purchasing or otherwise obtaining prewritten essays, research papers, or materials prepared by another person or agency that sells term papers or other academic materials to be presented as one’s own work.
4. Taking an exam for another student.
5. Providing others with information and/or answers regarding exams, quizzes, homework or other classroom assignments unless explicitly authorized by the instructor.
6. Any of the above occurring within the Web or distance-learning environment.

C. Accommodations for disabilities:

If you need accommodation 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. Privately after class or in the instructor's office.

To request accommodations students must register with Services for Students with Disabilities: Goins 127 or 131, Phone: (865) 539-7153 or (865) 694-6751 Voice/TDD.

D. Other Policies:

Classroom disruptions during lecture or laboratory, any form of communication during testing, or any form of behavior that may prove distracting to others will not be tolerated and may lower the final grade.

Students are expected to work on biology related materials and participate in meaningful discussion where time permits.

Visitors are not allowed in the classroom or the laboratory.