WILLIAM CAREY UNIVERSITY
Teaching Biology in the Secondary School
BIO 340
Winter 2011-2012

Instructor: Mrs. Clara Short
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Office Hours: by Appointment only

Class Time: Tuesday 5:55pm- 9:55pm
Location: Greene Hall
Course Description: (4 hours) This is a four hour course designed to prepare future Biology teachers.

Course Description:

This four hour course is designed to teach the six unifying principles of biology and the appropriate pedagogical skills and dispositions suitable for teaching High School Biology I and Biology II students. This content and instructional methods used in the courses are aligned to the Mississippi Science (Biology) Frameworks and the National Science Education Standards. The course requirements and activities are guided by the National Science Teachers Association Standards for the Preparation of Science Teachers (2003). Teacher candidates are introduced to a variety of teaching method using the constructivist perspective and the underlying learning theories. Both authentic and performance-based assessments are introduced and used in evaluation the candidates’ products in the courses.

Inquiry is the basic tenet that guides the instructional methods used in this course to illustrate the basic concepts of biology and the science process skills used in scientific investigations. This is an opportunity for teach candidates to experience working thinking like a scientist. The resident instructor serves as a mentor. Here, the candidates spend time observing students and instructional methods in classroom management, assisting mentor in preparing for the class or laboratory activity, tutoring small groups of students, and finally teaches an assigned lab. In addition to providing a model of teaching and classroom management, the mentor provides feedback and evaluates the autonomous teaching of the candidate.

Learning outcomes:

This course is designed to help the pre-service secondary teacher develop and understanding of the needs of pre-adolescents and adolescents. Through in-class activities and school observations, the student learns how to implement various teaching strategies that research identifies as effective and productive. The student is given opportunity to apply these strategies to his/her specific teaching area. Emphasis is placed on the development of teaching units in the teaching area. The student practices writing objectives, lesson plans, and evaluation procedures for specific units and lessons.
The nature and process of reading at the middle and secondary level is included in the topics addressed in the course. Other topics included the nature of adolescent learners’ competences needed by the secondary teacher planning courses, units, and daily lessons’ motivating students, instructional strategies’ using instructional aids’ grading and evaluation’ and current issues in secondary education.

The objectives of this course are derived from the NSTA Standards for the preparation of Science Teachers (2003). Standard I Content assures that candidates will know the three levels of competencies to be able to teach effectively. These competencies are similar to those required in the Mississippi Science (Biology I and II) Frameworks.

This course is congruent with the mission of William Carey University with its emphasis on a high level of scholarship and the cultural value of the arts and sciences. Additionally, students are provided the opportunity to increase their professional skills, thus assuming a more responsible leadership role in the community at large and the public school in particular.

Content Standard C:
As a result of their activities, candidates will be able to lead biology students in grades 9-12 in a manner in which students should develop an understanding of:

a. Structure and function in living systems
b. Reproduction and heredity
c. Regulation and Behavior
d. Populations and Ecosystems
e. Diversity and adaptation of organisms

Student Learning Outcomes (continued)

The student learning outcomes of this course is derived from the NSTA Standards for the preparation of Science Teachers (2003). Standard 1 Content assures that candidates will know the three levels of competencies to be able to teach effectively. These competencies are similar to the content competencies required in the Mississippi Science (Biology I and II) Frameworks. The objectives related to these content competencies are as follow.

A. To demonstrate core competencies, the candidate will be able to lead students to understand the following concepts:
   1. Life processes in living systems including organization of matter and energy.
   2. Similarities and differences among animals, plants, fungi, microorganisms, and viruses.
   4. Scientific theory and principles of biological evolution.
   5. Ecological systems including the interrelationships and dependencies of organisms with each other and their environments.
   6. Population dynamics and the impact of population on its environment.
   7. General concepts of genetics and heredity.
   8. Organization and functions of cells and multi-cellular systems.
9. Behavior of organisms and their relationships to social systems.
10. Regulation of biological systems including homeostatic mechanisms.
11. Fundamental processes of modeling and investigation in the biological sciences.
12. Applications of biology in environmental quality and in personal and community health.

B. To demonstrate advanced competencies, all teachers of biology as a primary field should be prepared to effectively lead students to understand.

14. Biochemical interactions or organisms with their environments.
15. Molecular genetics and heredity and mechanisms of genetic modification.
17. Causes, characteristics and avoidance of viral, bacterial, and parasitic disease.
18. Issues related to living systems such as genetic modification, uses of biotechnology, cloning, and pollution from farming.
19. Historical development and perspectives in biology including significant contributions of underrepresented groups, and evolution of theories in biology.
20. How to design, conduct, and report research in biology.

C. To demonstrate supporting competencies, all teachers of biology should be prepared to effectively apply concepts from other sciences and mathematics to the teaching of biology including basic concepts of:

22. Chemistry, including general chemistry and biochemistry with basic laboratory techniques
23. Physics including light, sound, optics, electricity, energy and order, magnetism, and thermodynamics.
24. Earth and space sciences including energy and geochemical cycles, climate, oceans, weather, natural resources, and changes in the Earth.
25. Mathematics, including probability and statistics.

In addition to attaining content competencies, the candidates will be able to:

D. Understand the nature of science, the processes of scientific investigations, and how to engage junior high and high school students to pursue learning in science.
E. Make informed decisions on contemporary science and technology related issues of interest to society and guide biology students in developing critical thinking in order that they can develop decision making skills on similar issues.
F. Provided all students with motivation and opportunities to learn by using best practices instructional methods to help students construct their knowledge in science.
G. Plan and implement coherent lesson plans consistent with the goals of the Mississippi Science (Biology) Curriculum Frameworks and the National Science Education Standards.
H. Use effective assessment strategies to evaluate diverse skills of learners to achieve standards and benchmarks in science literacy.
I. Organize safe and effective learning environments that promote success and the care of living things used in the classroom.
J. Reflect on his/her teaching practice and develop a disposition for personal growth through summer institutes, workshops, and offered by professional organizations.

**Teaching Methods**

The teaching methods used to achieve the goals and objectives of the course include lecture, demonstration, small group activities, application problems, observations of actual biology classes and labs, and a first-hand experience of teaching.

**Course requirement and policies**

1. Attend and actively participate in all class sessions. Absences can affect your grade.
2. Read the text book and all assigned handouts
3. Take and successfully pass all scheduled examinations.
4. Read and critique journal articles (within the last 4 years)
5. Complete a five-day unit meeting National and Mississippi Science Standards complete with team learning, bulletin board, simulation, circle of knowledge, brainstorming, learning center, role playing etc.
6. Teach a module in a professional manner to classmates.
7. SUCCESSFULLY COMPLETE ALL ASSIGNMENTS

An absence will be classified as excused if you have documentation of the following:

a. Personal medical emergency
b. Death in the immediate family
c. College-sponsored event
d. Other circumstances of which I am notified of

*Please note that an excused absence from class does not relieve you of any obligations in terms of coursework.*

**Grading Scale**

The grading scale for the course is a 10-point scale (90-100 A; 80-89 B; etc)

**Exam Format**

Examinations will be a combination of multiple choice, matching, true/false, short answer (a question that can be answered by a few phrases or sentences) and discussion questions (answers will be given in complete sentences and paragraphs). The focus of exams in this class will not be only to regurgitate information memorized, but will also be the synthesis and application of concepts. You should make sure that you completely understand concepts as we go along. Teaching experiences will follow a rubric given by the instructor and graded accordingly.

**Make-up work and exams**
a. Only students with documented excused absences may make up assignments or exams.
b. Exams must be made up within one week after the exam was originally given.

**Americans with Disabilities Act**

Students with disabilities, who are protected by the American with Disabilities Act of 1990 and require special accommodations, should contact Mrs. Brenda Waldrip at 601-318-6188. Mrs. Waldrip is located in the Student Services Office in Lawrence Hall.

**3. Academic Integrity**

William Carey University seeks to create an environment that encourages continued growth of moral and ethical values, which include personal honesty and mutual trust. The university places the highest value on academic integrity and regards any act of academic dishonesty as a serious offense. Academic dishonesty is considered unethical and in violation of William Carey University’s academic standards and Christian commitment. If such an incident occurs, students, faculty, and/or staff are obligated to initiate appropriate action. Depending upon the seriousness of the offense, sanctions could include failure of the assignment, failure of the course, and could lead to suspension of dismissal from the university. A full explanation of the procedures for responding to instances of academic dishonesty is contained in the college’s Policies and Procedures manual and in the student handbook, *The Lance*.

In this class, if you are caught engaging in an act of academic dishonesty (cheating on an exam by looking on another person’s paper or using notes during a test, lab practical, or lab quiz; plagiarism in written work; etc.) you will fail the course.

**4. Technology**

Your textbook has an incredibly useful website that has a variety of learning tools to help you master the topics on each chapter. These include review quizzes for each chapter, electronic flashcards, animations, and links to other websites and articles on current events in biology. You are strongly urged to make full use of this website. As an incentive to do so, for each chapter review quiz on which you score 90% or higher, you will be awarded 2 bonus points on the lecture exam covering that chapter. **PLEASE NOTE that bonus points cannot be obtained retroactively.**

I also encourage you to make use of email as an efficient way to maintain communication with me. I am always happy to assist you, in whatever way I can, in learning material of this course.

**5. Academic Schedule**
It is imperative that you make note of the following dates in the academic calendar.

March 13, 2009: last day to drop with a “W”
March 23, 2009: Last day to drop a glass with a grade of “WP” or “WF”.

If you find that you have gotten in over your head, I strongly encourage you to drop the class as soon as possible. A grade of “I” (incomplete) will not be given to a student who should have dropped the course. (Please see the college’s policy on incompletes, next section.)

6. College policy on incompletes

A grade of “I” (incomplete) will be assigned only when avoidable circumstances prevent completion of the work of the course on schedule and must be approved by the instructor and the academic dean. Requests are made using the Incomplete Grade Request form obtained from the registrar’s office.

Purpose and Rationale:

This course is designed to give students a real-world teaching practicum experience at local high schools. The practicum is under the supervision of a university faculty. A student registering for 4 hours must complete 60 hours onsite observation and teaching at a local middle school or high school.

Course Schedule
Winter 2011-2012

Part 1
Overview of the course
Lecture-discussion on Developing Biological Literacy Executive Summary
Goals for a High School Biology Program
Expectations for Classroom
The 5E learning cycle as an instructional model
Curriculum Themes
Assessment Strategies

Assignment:
Research and be prepared to share in a class presentation the following learning theories.
Behaviorism
Operant conditioning
Social learning theory
Theory of Cognitive Development by Jean Piaget
Socio-cultural Constructivism by Lev Vygotsky
Discovery Learning by Jerome Bruner
Learning By Doing by John Dewey
Multiple Intelligences by Howard Gardner

Part 2
Lecture-discussion: How People Learn
Brain Development and the Science of Learning
Concept maps as graphic organizers
Assignment: Download the curriculum framework for seventh and eighth grade science, Biology I, Biology II, and Introduction to Biology.

Part 3
Lecture-discussion: What is scientific literacy?
The Nature of Science
Planning for Instruction
Instructional Objectives: Cognitive Domain by Bloom, Affective Domain, and Psychomotor Domain

Part 4
Class Discussion: Competencies in the MS Framework Science grades 7, 8, Biology I, Biology II, and Introduction to Biology that are aligned to the unifying principle of Evolution
Questioning Techniques: How to Ask the Right Questions
Motivating Students

Part 5
First Exam
Planning for Instruction
Dr. Harry Wong
Classroom Management

Part 6
Planning for Instruction
Instructional Strategies
Class activity- Mitosis and cytokinesis
Genetic Continuity and Reproduction
Classroom Management- inclusion classroom, students with special needs
Approaches to discipline

Part 7
Planning for Instruction
Classroom Management
Dealing with disruptive behaviors
Dealing with non-disruptive behaviors

Part 8
Planning for Instruction
Class Activity- Building the DNA model
Dealing with controversial issues in biology
-Animal dissection
-Teaching Evolution

Part 9
Assessment
-Traditional vs. authentic; performance-based
-Anecdotal records, observations, journals, projects, portfolios
Developing Rubrics for use in the classroom

**Part 10**
Professionalism
-Knowledge of content
Building network through professional organizations
Teaching by students
Turn in Portfolio
Final Exam