SOUTHERN WESLEYAN UNIVERSITY
SYLLABUS

Use Arrow or Tab Keys to Move Cursor

Year 2013 Fall _____ Spring X May Term _____ Summer School _____

Course Number/Name EDUC 4203 Methods of Teaching Science in the Secondary/Middle School

Instructor Michel E. Justus

The following check list indicates the information required for each SWU syllabus (see *Faculty Handbook* C-130).

X Instructor's name, office number (or telephone number), and office hours

X Course name and number (Including meeting room and time is helpful).

X Objectives stated in terms of student learning OUTCOMES

X Texts and other required material (author, title, publisher, year)

X Grading procedures

X Policies governing late work

X Policies on attendance and tardiness

X Assignments for semester, including reading, test dates (where possible)

X Outline of the course/topics to be covered

X One or more learning objectives relating to approaching issues from a Christian perspective

X One or more activities with a research component

X One or more activities giving the opportunity for the student to work with others

Also helpful:

X Prerequisites

X Reading list or bibliography

Signature Michel E. Justus 2/5/2013
Instructor Date

_____ _____
Dean Date

Southern Wesleyan University
Science Division of College of Arts and Sciences and School of Education
"Educators who demonstrate scholarship within a Christian ethic of care"
(Spring 2013)
EDUC 4203 Methods of Teaching Science in the Secondary/Middle School

Professor: Mrs. Michel E. Justus, Adjunct Faculty
Classroom and Lab: Daniel High School room 238
Class Time: Monday 3:30-6:00
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Course Description
An introduction to the philosophy and practice of teaching science, primarily biology, at the secondary school level. Topics include short- and long-term planning, effective instructional strategies, and multi-faceted assessment.

Rationale
This course attempts to help teacher candidates integrate cognitive and other learning models with modern approaches for teaching science at the secondary school level.

Prerequisites
Appropriate science and education courses.

Relationship to Conceptual Framework
The goal of the teacher education program is to prepare "*educators who demonstrate scholarship within a Christian ethic of care.*" The B.S. degree program in Biology Education directly relates to the conceptual framework by cultivating knowledge, skills, and dispositions in the minds of Biology Education teacher candidates through instruction in theory, research, and practice, which are organized and disseminated within five essential bases of preparation, including (a) Biblical foundations; (b) content and pedagogy; (c) liberal arts core; (d) professional development; and (e) learner characteristics. The competencies that are developed in Biology Education teacher candidates include (a) scholarship; (b) Christian ethic of care; (c) service; (d) reflection on teacher impact on student learning; and leadership through professional competence.

Response to Dispositions: Courses in the School of Education seek to integrate the following dispositions which reflect the core values and philosophical beliefs that are germane to educators:

- **The teacher candidate demonstrates an ethic of care towards self** by exhibiting a biblical approach to life that is demonstrated by a passion for learning.
- **The teacher candidate demonstrates an ethic of care towards learners** by displaying an enthusiasm about teaching as demonstrated by compassionate and respectful interactions with learners.
- **The teacher candidate demonstrates an ethic of care towards colleagues** by engaging in collaborative work practices as demonstrated by compassionate and respectful interactions with colleagues.
- **The teacher candidate demonstrates an ethic of care towards the community** by recognizing the community as an integral part of the learning process as demonstrated by valuing its pluralist nature.

Of these four dispositions, this course addresses all four.

Accommodations Statement: If you have a disability that interferes with your learning, test-taking, or completing assignments outlined in the syllabus, please contact Mrs. Martha Mishoe in the Center for Transformational Learning in the lower level of the Claude Rickman Library. She will help secure the right documentation, know what accommodations are appropriate, and authorize your teachers to accommodate your disability. She will disclose the information you request only to those whom you identify. Neither she nor your teachers can provide accommodations unless you specifically request these each semester. Documentation must meet the guidelines of the Americans with Disabilities Act (ADA). We want you to have equal opportunity to learn and have fair assessment of that learning. Your abilities, skills, and efforts should determine your success or failure, not your disability.

Technology Integration Teacher candidates will use multimedia presentation software (e.g., PowerPoint, “Smartboard”) to present lessons, utilize electronic databases for research, and evaluate software programs and electronic simulations to supplement instruction.

Culturally Responsive Teaching: Teacher candidates will address different learning styles and use a variety of instructional strategies in delivering model lessons. Teacher candidates will discuss textbook material concerning teaching students with limited English proficiency as well as students with various learning disabilities.

Required Textbooks and Materials

Chiappetta, E.L. and T.R. Koballa, Jr. 2010. *Science Instruction in the Middle and Secondary Schools, 7th ed*. Pearson, Pub., Upper Saddle River, NJ.

Additional Materials and Resources

Additional handouts may be provided by the instructor. Also, you should consider other possible resources that you have ready access to:

- Materials from professional education courses already taken in the School of Education
- Materials from content-related science courses already taken in the Division of Science
- Various journal articles or other texts that might be helpful in the Rickman Library
- Internet materials that might be helpful (see Online Resources for Teachers at the end of this syllabus in Appendix D
- Interviews with education and science professors and teachers of secondary science
- Preclinical cooperating teachers

Appendices at End of Syllabus

Southern Wesleyan Learning Outcomes, NSTA Standards, SC Biology Curriculum Standards, STEM, ADEPT Performance Standards, and InTASC Standards

Southern Wesleyan University Learning Outcomes (SWULOS)

The learning community at Southern Wesleyan University fosters in participants

- biblically informed personal wholeness reflected in health, growth-enhancing relationships with God, themselves, and others;
- the ability to participate articulately in the significant conversations of the human race from a well-informed, reasonable, and distinctively Christian perspective; and
- the ability to effect positive change through skillful, values-driven engagement with their world.

Such that graduates…

1. Bear witness to a deepening relationship with God through Christ reflected in integrity of thought, affections, and action.
2. Have established lifestyle habits that facilitate ongoing growth intellectually, spiritually, physically, socially and emotionally.
3. Approach issues of both a theoretical and practical nature from a consistently biblical perspective, tempered by awareness of personal biases and divergent views.
4. Lead positive change by seeking justice for, reconciliation with, and service to others in a manner that reflects understanding of social dynamics.
5. Recognize and value truth and beauty in themselves and their surroundings as reflections of the Creator.
6. Critically and creatively construct their own well-reasoned perspectives in discussion current trends, ideas and events, drawing on understanding of the breadth of human knowledge.
7. Demonstrate skill in listening, reading, scholarship, writing, public speaking, and the use of technology.
8. Solve problems effectively using scientific research, critical thinking, and creativity.
9. Work collaboratively in diverse cultural groups to achieve positive results.
10. Master professional or discipline-specific knowledge and skills sufficient to be productive in the field to which they are called.

National Science Teachers Association Program Standards

1. **Content: Teachers of science understand and can articulate the knowledge and practices of contemporary science. They can interrelate and interpret important concepts, ideas, and applications in their fields of licensure; and can conduct scientific investigations. To show that they are prepared in content, teachers of science must demonstrate that they:**
    a. understand and can successfully convey to students the major concepts, principles, theories, laws, and interrelationships of their fields of licensure and supporting fields as recommend by the National Science Teachers Association;
    b. understand and can successfully convey to students the unifying concepts of science delineated by the National Science Education Standards;
    c. understand and can successfully convey to students important personal and technological applications of science in their fields of licensure;
    d. understand research and can successfully design, conduct, report, evaluate investigations in science; and
    e. understand and can successfully use mathematics to process and report data, and solve problems, in their field(s) of licensure.

2. **Nature of Science: Teachers of science engage students effectively in studies of the history, philosophy, and practice of science. They enable students to distinguish science from non-science, understand the evolution and practice of science as a human endeavor, and critically analyze assertions made in the name of science. To show they are prepared to teach the nature of science, teachers of science must demonstrate that they:**
    a. understand the historical and cultural development of science and the evolution of knowledge in their discipline;
    b. understand the philosophical tenets, assumptions, goals, and values that distinguish science from technology and from other ways of knowing the world; and
    c. engage students successfully in studies of the nature of science including, when possible, the critical analysis of false or doubtful assertions made in the name of science.

3. **Inquiry: Teachers of science engage students both in studies of various methods of scientific inquiry and in active learning through scientific inquiry. They encourage students, individually and collaboratively, to observe, ask questions, design inquiries, and collect and interpret data in order to develop concepts and relationships from empirical experiences. To show that they are prepared to teach through inquiry, teachers of science must demonstrate that they:**
    a. understand the processes, tenets, and assumptions of multiple methods of inquiry leading to scientific knowledge; and
    b. engage students successfully in developmentally appropriate inquiries that require them to develop concepts and relationships from their observations, data, and inferences in a scientific manner.

4. **Issues: Teachers of science recognize that informed citizens must be prepared to make decision and take action on contemporary science- and technology-related issues of interest to the general society. They require students to conduct inquiries into the factual basis of such issues and to assess possible actions and outcomes based upon their goals and values. To show that they are prepared to engage students in studies of issues related to science, teachers of science must demonstrate that they:**
    a. understand socially important issues related to science and technology in their field of licensure, as well as processes used to analyze and make decision on such issues; and
    b. engage students successfully in the analysis of problems, including considerations of risks, costs, and benefits of alternative solutions; relating these to the knowledge, goals and values of the students.

5. **General Skills of Teaching: Teachers of science create a community of diverse learners who construct meaning from their science experiences and possess a disposition for further exploration and learning. They use, and can justify, a variety of classroom arrangements, groupings, actions, strategies and methodologies. To show that they are prepared to create a community of diverse learners, teachers of science must demonstrate that they:**
    a. vary their teaching actions, strategies, and methods to promote the development of multiple student skills and levels of understanding;
    b. successfully promote the learning of science by students with different abilities, needs, interests, and backgrounds;
    c. successfully organize and engage students in collaborative learning using different student group learning strategies;
    d. successfully use technological tools, including but not limited to computer technology, to access resources, collect and process data, and facilitate the learning of science;
    e. understand and build effectively upon the prior beliefs, knowledge, experiences, and interest of students; and
    f. create and maintain a psychologically and socially safe and supportive learning environment.

6. **Curriculum: Teachers of science plan and implement an active, coherent, and effective curriculum that is consistent with the goals and recommendations of the National Science Education Standards. They begin with the end in mind and effectively incorporate contemporary practices and resources into their planning and teaching. To show that they are prepared to plan and implement an effective science curriculum, teachers of science must demonstrate that they:**
    a. understand the curricular recommendations of the National Science Education Standards, and can identify, access, and/or create resources and activities for science education that are consistent with the standards; and
    b. plan and implement internally consistent units of study that address the diverse goals of the National Science Education Standards and the needs and abilities of students.

7. **Science in the Community: Teachers of science relate their discipline to their local and regional communities, involving stakeholders and using the individual, institutional, and natural resources of the community in their teaching. They actively engage**

students in science-related studies or activities related to locally important issues. To show that they are prepared to relate science to the community, teachers of science must demonstrate that they:

a. identify ways to relate science to the community, involve stakeholders, and use community resources to promote the learning of science; and
b. involve students successfully in activities that relate science to resources and stakeholders in the community or to the resolution of issues important to the community.

8. **Assessment: Teachers of science construct and use effective assessment strategies to determine the backgrounds and achievements of learners and facilitate their intellectual, social, and personal development. They assess students fairly and equitably, and require that students engage in ongoing self-assessment. To show that they are prepared to use assessment effectively, teachers of science must demonstrate that they:**
    a. use multiple assessment tolls and strategies to achieve important goals for instruction that are aligned with methods of instruction and the needs of students;
    b. use the results of multiple assessments to guide and modify instructions, the classroom environment, or the assessment process; and
    c. use the results of assessments as vehicles for students to analyze their own learning, engaging students in reflective self-analysis of their own work.

9. **Safety and Welfare: Teachers of science organize safe and effective learning environments that promote the success of students and the welfare of all living things. They require and promote knowledge and respect for safety, and oversee the welfare of all living things used in the classroom or found in the field. To show that they are prepared, teachers of science must demonstrate that they:**
    a. understand the legal and ethical responsibilities of science teachers for the welfare of their students k, the proper treatment of animals, and the maintenance and disposal of materials;
    b. know and practice safe and proper techniques for the preparation, storage, dispensing, supervision, and disposal of all materials used in science instruction;
    c. know and follow emergency procedures, maintain safety equipment, and ensure safety procedures appropriate for the activities and the abilities of students; and
    d. treat all living organisms used in the classroom or found in the field in a safe, humane, and ethical manner and respect legal restrictions on their collection, keeping, and use.

10. Professional growth: Teachers of science strive continuously to grow and change, personally and professionally, to meet the diverse needs of their students, school, community, and profession. They have a desire and disposition for growth and betterment. To show their disposition for growth, teachers of science must demonstrate that they:

a. engage actively and continuously in opportunities for professional learning and leadership that reach beyond minimum job requirements;
b. reflect constantly upon their teaching and identify ways and means through which they may grow professionally;
c. use information from students, supervisors, colleagues and others to improve their teaching and facilitate their professional growth; and
d. interact effectively with colleagues, parents, and students; mentor new colleagues; and foster positive relationships with the community.

South Carolina Biology Curriculum Standards

Scientific Inquiry

The skills of scientific inquiry, including a knowledge of the use of tools, will be assessed cumulatively on statewide tests. Students will therefore be responsible for the scientific inquiry indicators from all of their earlier grade levels.

Standard B-1: **The student will demonstrate an understanding of how scientific inquiry and technological design, including mathematical analysis, can be used appropriately to pose questions, seek answers, and develop solutions.**

Indicators

B-1.1 Generate hypotheses based on credible, accurate, and relevant sources of scientific information.

B-1.2 Use appropriate laboratory apparatuses, technology, and techniques safely and accurately when conducting a scientific investigation.

B-1.3 Use scientific instruments to record measurement data in appropriate metric units that reflect the precision and accuracy of each particular instrument.

B-1.4 Design a scientific investigation with appropriate methods of control to test a hypothesis (including independent and dependent variables), and evaluate the designs of sample investigations.

B-1.5 Organize and interpret the data from a controlled scientific investigation by using mathematics, graphs, models, and/or technology.

B-1.6 Evaluate the results of a controlled scientific investigation in terms of whether they refute or verify the hypothesis.

B-1.7 Evaluate a technological design or product on the basis of designated criteria (including cost, time, and materials).

B-1.8 Compare the processes of scientific investigation and technological design.

B-1.9 Use appropriate safety procedures when conducting investigations.

Standard B-2: The student will demonstrate an understanding of the structure and function of cells and their organelles.

Indicators

B-2.1 Recall the three major tenets of cell theory (all living things are composed of one or more cells; cells are the basic units of structure and function in living things; and all presently existing cells arose from previously existing cells).

B-2.2 Summarize the structures and functions of organelles found in a eukaryotic cell (including the nucleus, mitochondria, chloroplasts, lysosomes, vacuoles, ribosomes, endoplasmic reticulum [ER], Golgi apparatus, cilia, flagella, cell membrane, nuclear membrane, cell wall, and cytoplasm).

B-2.3 Compare the structures and organelles of prokaryotic and eukaryotic cells.

B-2.4 Explain the process of cell differentiation as the basis for the hierarchical organization of organisms (including cells, tissues, organs, and organ systems).

B-2.5 Explain how active, passive, and facilitated transport serve to maintain the homeostasis of the cell.

B-2.6 Summarize the characteristics of the cell cycle: interphase (called G1, S, G2); the phases of mitosis (called prophase, metaphase, anaphase, and telophase); and plant and animal cytokinesis.

B-2.7 Summarize how cell regulation controls and coordinates cell growth and division and allows cells to respond to the environment, and recognize the consequences of uncontrolled cell division.

B-2.8 Explain the factors that affect the rates of biochemical reactions (including pH, temperature, and the role of enzymes as catalysts).

Standard B-3: The student will demonstrate an understanding of the flow of energy within and between living systems.

Indicators

B-3.1 Summarize the overall process by which photosynthesis converts solar energy into chemical energy and interpret the chemical equation for the process.

B-3.2 Summarize the basic aerobic and anaerobic processes of cellular respiration and interpret the chemical equation for cellular respiration.

B-3.3 Recognize the overall structure of adenosine triphosphate (ATP)—namely, adenine, the sugar ribose, and three phosphate groups—and summarize its function (including the ATP-ADP [adenosine diphosphate] cycle).

B-3.4 Summarize how the structures of organic molecules (including proteins, carbohydrates, and fats) are related to their relative caloric values.

B-3.5 Summarize the functions of proteins, carbohydrates, and fats in the human body.

B-3.6 Illustrate the flow of energy through ecosystems (including food chains, food webs, energy pyramids, number pyramids, and biomass pyramids).

Standard B-4: The student will demonstrate an understanding of the molecular basis of heredity.

Indicators

B-4.1 Compare DNA and RNA in terms of structure, nucleotides, and base pairs.

B-4.2 Summarize the relationship among DNA, genes, and chromosomes.

B-4.3 Explain how DNA functions as the code of life and the blueprint for proteins.

B-4.4 Summarize the basic processes involved in protein synthesis (including transcription and translation).

B-4.5 Summarize the characteristics of the phases of meiosis I and II.

B-4.6 Predict inherited traits by using the principles of Mendelian genetics (including segregation, independent assortment, and dominance).

B-4.7 Summarize the chromosome theory of inheritance and relate that theory to Gregor Mendel’s principles of genetics.

B-4.8 Compare the consequences of mutations in body cells with those in gametes.

B-4.9 Exemplify ways that introduce new genetic characteristics into an organism or a population by applying the principles of modern genetics.

Standard B-5: The student will demonstrate an understanding of biological evolution and the diversity of life.

Indicators

B-5.1 Summarize the process of natural selection.

B-5.2 Explain how genetic processes result in the continuity of life-forms over time.

B-5.3 Explain how diversity within a species increases the chances of its survival.

B-5.4 Explain how genetic variability and environmental factors lead to biological evolution.

B-5.5 Exemplify scientific evidence in the fields of anatomy, embryology, biochemistry, and paleontology that underlies the theory of biological evolution.

B-5.6 Summarize ways that scientists use data from a variety of sources to investigate and critically analyze aspects of evolutionary theory.

B-5.7 Use a phylogenetic tree to identify the evolutionary relationships among different groups of organisms.

Standard B-6: The student will demonstrate an understanding of the interrelationships among organisms and the biotic and abiotic components of their environments.

Indicators

B-6.1 Explain how the interrelationships among organisms (including predation, competition, parasitism, mutualism, and commensalism) generate stability within ecosystems.

B-6.2 Explain how populations are affected by limiting factors (including density-dependent, density-independent, abiotic, and biotic factors).

B-6.3 Illustrate the processes of succession in ecosystems.

B-6.4 Exemplify the role of organisms in the geochemical cycles (including the cycles of carbon, nitrogen, and water).

B-6.5 Explain how ecosystems maintain themselves through naturally occurring processes (including maintaining the quality of the atmosphere, generating soils, controlling the hydrologic cycle, disposing of wastes, and recycling nutrients).

B-6.6 Explain how human activities (including population growth, technology, and consumption of resources) affect the physical and chemical cycles and processes of Earth.

STEM (Science, Technology, Engineering, Mathematics) Initiative and S^{2}TEM Centers SC

S^3 Biology Curriculum http://www.downloads.s2temsc.org/cat_view/168-standards-support-systems-ss-curriculum/243-ss-biology-curriculum-dp32

ADEPT Performance Standards

http://www.scteachers.org/Adept/evalpdf/adeptstandards.pdf

InTASC Principles

http://www.ccsso.org/Resources/Publications/InTASC_Model_Core_Teaching_Standards_A_Resource_for_State_Dialogue_(April_2011).html

General Course Objectives Upon the completion of this course, the student should be able to:

Objectives	NSTA Program Standards	SC Standards	SWUL OS	ADEPT PD #	InTASC Principles	ASSESSMENT	Readings
Philosophical and Methodological Aspects of Learning in Science, Objectives 1-7							
1. Demonstrate an understanding of the unifying concepts of science in terms of major concepts, principles, theories, laws, and interrelationships	1a,1b	B-2, B-3, B-4, B-5, B-6	6,8,7,10	6	1	Minor #1 and Major #9	National Board Certification Websites
2. Understand the nature of science and how it has developed from a cultural and historical perspective being able to distinguish the differences between science and non-science.	2a, 2b, 2c	B-1	3, 6, 7, 10	2, 3, 5, 6	1, 3, 7	Minor #6, #7, #9	Chiappetta Chapter 7
3. Describe the process of scientific inquiry.	1a, 1b, 2a, 3a	B-1	7, 8,10	6	1	Minor #12 and ALL	Chiapetta Chapter 8
4. Demonstrate knowledge of learning among secondary students, an understanding of modalities of learning, and cognitive approaches and strategies for teaching science to secondary students.	5a, 6c		7, 10	5	1, 2, 3, 4	Minor #15, #16, #18 and Major #6, #7, #8, #10	Chiappetta Chapters 5 & 10
5. Demonstrate an understanding of STEM in South Carolina and what distinguishes science from technology		B-1	7, 10			Major #5	Chiappetta Chapter 12
6. Demonstrate understanding of the treatment of socially important and controversial issues in the classroom. Socioscientific Issues (SSI)	4a, 4b, 4c, 5a		1, 3, 6 7, 10	6, 9	1	Major #5	Chiappetta Chapter 12

General Skills of Teaching—different strategies and methodologies for students with different abilities, interests, and backgrounds—Objectives 8—18							
7. Demonstrate the ability to plan to teach science: identifying who, what, and how you are planning to teach, including the ability to write measurable educational objectives for desired learner outcomes using various taxonomies.	2a, 2b, 6a, 6c, 8a		7, 10	2, 3, 4	1, 2, 4, 8	Discussion and Major #6, #7, and #10	Chiappetta Chapter 3
8. Discuss various teaching skills and compare and contrast the different methodologies of "presenting" science material (or different instructional strategies), discussing the pros and cons of each.						Minor #13, #14 and Major #2, #6, #7, #8, #10	Chiappetta Chapter 5, 11,13 &15
9. Discuss concepts that illustrate an understanding of student behavior, including cultural differences, how they might aid or hinder science instruction, and how one might create culturally responsive science learning environments.	4c, 5a, 5b, 5c, 5e, 6c, 7a, 8b, 10b,		3, 4, 7, 10	1, 4, 5, 6, 8, 9	3, 5, 7, 10, 11	Minor #3, #19	Chiapetta Chapter 9
10. Demonstrate an understanding of how electronic instructional materials and technology might be used effectively to help student learning	4a, 4b, 4c, 5a 5d,, 6a, 6c, 7b, 8a	B-1	7, 10	2, 4, 5, 6, 7, 8, 9, 10	1, 2, 3, 4, 6, 7	Minor #17 and Major #10	Chiappetta Chapter 15
11. Demonstrate an understanding of how to use multiple assessment tools and strategies to achieve your objectives, to help students and yourself to analyze student learning, and as a means of modifying your lesson plans.	8a, 8b, 8c		7, 10			Minor #20, #21 and Major #6, #9, #10	Chiappetta Chapter 4
12. Demonstrate the ability to plan, write and execute a biology laboratory for in-lab work and field work, including ethical use of organisms, biological and chemical safety issues, and proper waste disposal.		B-1	7,10			Major #4	Chiappetta Chapters 13 & 14 Appendix C

13. Discuss the advantages and challenges of science projects, field trips, and science fairs.	2b, 3b, 5a		7,10	4, 5, 6, 7, 8	1, 5, 6	Discussion	Chiappetta Chapters 8, 9, and 13
14. Identify ways to relate science to the local and regional communities, using resources of the community.	7a, 7b		3, 6, 7, 8	2, 3, 5, 6	3, 4, 7, 8	Major #8	Chiappetta Chapters 12 & 13
15. Design and deliver a lesson on an unfamiliar topic in biology, utilizing a variety of instructional strategies. See S.C. State Biology standards for possible topics with which you are particularly familiar.	4a, 4b, 4c, 5a, 8a	B-1, B-2, B-3, B-4, B-5, B-6	7,10	2, 3, 5, 6, 8	1, 2, 3, 4, 6, 8	Major #7	Chiappetta Chapters 1, 3, 5, 8 & 11
16. Develop a long-range instructional outline for a secondary school biology course.	1a, 1b, 6a, 7a	B-1, B-2, B-3, B-4, B-5, B-6	7,10	1	1, 7	Major #9	Chiappetta Chapters 1, 3, and 6
17. Design a complete instructional unit plan including major and minor topics (i.e., principles, unifying concepts, theories, interrelationships), role of technology, historical aspects, aspects related to nature of science and inquiry, issues—controversial and otherwise, SC and NSTA curriculum standards, community context, specific outcome objectives, daily lesson plans, demonstrations and/or laboratory exercises with materials, field trips, and multifaceted assessments. Use the S.C. State Biology Standards to choose the unit you want to use to develop your instructional unit.	1a, 1b, 2a, 2b, 3a, 3b, 5a, 5d, 5e, 6a, 8a, 8b	B-1, B-2, B-3, B-4, B-5, B-6	7,10	2, 3, 5, 6	1, 2, 4, 6, 8	Major #10	Chiappetta Chapters 3, 5, 8,9,11, & 13

Professional Issues Related to Science Teaching, Objectives 19-22							
18. Plan an effective classroom management strategy.	5c, 9a, 9b		7,10	4, 7, 8, 9	2, 5	Minor #3 and #5 and Major #6	Chiappetta Chapter 6
19. Demonstrate the understanding of ethical, legal, and safety issues involved in operating a secondary science laboratory.	5c, 9a, 9b	B-1	7,10	4, 7, 8, 9	2, 5	Minor #8, #10, #11, and Major #3	Chiappetta Chapters 13 & 14
20. Outline how you propose to continuously "grow" personally and professionally as a science teacher	10a, 10b, 10c, 10d		7,10			Major #1, #6	SC Life Howard Hughes Institute The Biology Teacher and NABT District PD Other Teachers
21. Develop a personal philosophy of science education and as part of that, describe how a Christian ethic of care can be demonstrated in a secondary school science classroom.	2a, 3b 7a, 10b, 10d		1, 3, 4, 6 7, 10	6, 7, 8, 9, 10	1, 2, 3, 5, 11	Minor #2, #4 and Major #1	

Instructional Methods will include written and oral presentation of lessons, one-on-one discussions with professor and classmates, hands-on practice with technology, creation of a long-range plan and an instructional unit, evaluation of materials, and various written reflection and reaction papers.

Class Attendance Policy (refer to the current edition of the University *Catalog* but in general you may not miss more than 25% of the classes and get credit for the course)

Academic Integrity (refer to the current edition of the University *Catalog* but in general there is to be no dishonesty—cheating or plagiarism)

Grading Scale:

Percentages	Letter Grade
95-100	A
90-94	A-
87-89	B+
84-86	B
80-83	B-
77-79	C+
74-76	C
70-73	C-
67-69	D+
60-66	D
<60	F

Supplies/Notebooks:

- Small 3 ring binder for Minor Assignments and Class Activities.
- Large 3 ring binder with topical organizing tabs and optional page protectors for resources (see #4/5 on p. 141 and #8 on p. 193 and #6 and #9 on p. 268)

Class Topics and Schedule:

Class Schedule	Points	Grade
Initial Prep for 1/28/13 class		
Minor Assignment #1 - Print and use a graphic organizer to outline: • http://www.mrsruss.com/NBCandidates/nbbigideas.html • http://www.mrsruss.com/NBCandidates/Unifyingconcepts.pdf	10	
Minor Assignment #2: Take Science Teaching Inventory on p. 11	10	
Major Assignment #1 - Write your personal philosophy of science education. Begin with the prompt in #5 on p. 12, but do this before reading Chapter 1, please. This will be revised throughout the course, so it does not need to be "perfect"…yet. ☺	no submission will affect final grade on Major A #1	NA
Read Chapters 1 and 6	NA	NA
Minor Assignment #3 - Complete #1 and #2 on p. 97	20	
1/28/13		
Classwork: • Discuss First Days of School by reviewing sample syllabus and procedures handout • Discuss #3-4 on page 97 • Discuss #2 on p. 10 • Share personal philosophies and discuss #1 on p. 10 • Discuss #9 and #10 on p. 12 • Discuss Historical Context (using excerpts from Chapter 2)	20	
Homework:		
Major Assignment #1 continued - Begin to revise your personal philosophy as suggested in #11 on p. 12	graded later see Major A #1	NA
Major Assignment #2 - Start your resource notebook as suggested in #12 (but use topical organization instead). You will add to this throughout the course and it will be checked on the last day class.	graded later see Major A #2	NA
Minor Assignment #4 - Complete #1 on page 25	10	
Minor Assignment #5 - Complete #5 on page 98 (revise example for future use)	10	
Minor Assignment #6A - Take the Pre-Assessment on p. 101	see Minor A #6B below	NA
Read Chapter 7	NA	NA
Minor Assignment #6B - Complete #1 on p. 116	10	
Minor Assignment #7 - Complete #2 on p. 116	10	
Read Chapter 14. Minor Assignment #8 - Write down any questions you have while reading (try to have a minimum of 5).	10	

2/4/13			
Classwork: • Discuss Nature of Science with #3 and #4 on p. 116 • Discuss Lab Safety - Lab Safety Rules, Contract, Quiz, and Get 2 Know U Activity • Chemical Storage and Disposal and Proper Use of Equipment • Metrics, Measurement and Equipment Station Lab		20	
Homework:			
	Minor Assignment #9 - Complete #5 on p. 116	10	
	Minor Assignment #10 - Complete #8 on p. 253	10	
	Minor Assignment #11 - Start an MSDS Book – Print MSDS sheets for at least 5 chemicals commonly used in a Biology lab and Study for Lab Safety Test	10	
	Read Chapter 8	NA	NA
	Minor Assignment #12 - Complete #1 on p. 141	10	
2/11/13			
Classwork: • Major Assignment #3 - Test on Lab Safety • Discuss Inquiry and Examples (add to your Resource Notebook) • Microscope Lab		20 50	
Homework:			
	Read Chapter 13 (might start thinking about Major Assignment #4)	NA	NA
2/18/13			
Classwork: • Complete Inquiry-based Lab Activities and discuss setup of Lab Notebook and Lab Rubric • Add to your Resource Notebook		20	
Homework:			
	Major Assignment #4 - Complete Total Design and Implementation of Original Lab Assignment (be ready to present on 3/11/13)	50	
	Read Chapter 11	NA	NA
2/25/13			
Classwork: • Discuss using Lecture, Discussion and Demos • Bagful of Demos (Add to your Resource Notebook as suggested in #8 on page 193)		20	
Homework:			
	Minor Assignment #13 - Complete #5 on p. 193 (share on 3/11/13)	20	
	Minor Assignment #14 - Complete #7 on p. 193	20	
	Read Chapter 10	NA	NA
	Minor Assignment #15 - Complete #2 on p. 177	10	
	Minor Assignment #16 - Complete #5 on p. 177	10	
	Read Chapter 15	NA	NA
	Minor Assignment #17 – Complete Guiding Questions on Ch. 15	20	

3/4/13 Spring Break			
3/11/13			
Classwork: • Demo and Lab Share-a-thon • Discuss using Images, Analogies, Models including Color Coding based on Biochemistry • Discuss using Technology in Instruction using the Guiding Questions on Chapter 15 • Complete #5 on p. 268 • Add to your Resource Notebook (see #6 and #9 on p. 268)		20	
Homework:			
	Minor Assignment #18 - Complete #6 on p. 177	20	
	Read Chapter 9	NA	NA
	Minor Assignment #19 - Complete Guiding Questions on Ch. 9	20	
	Read Chapter 12	NA	NA
3/18/13			
Classwork: • Discuss Diversity and Differentiation using Guiding Questions for Chapter 9 • Discuss Technology and Societal Issues		20	
Homework:			
	Major Assignment #5 - Complete the Socially Important and Controversial Issues Assignment	30	
	Major Assignment #6 Start to arrange observations/interviews with classroom teachers (see 4/1/13 HW for details)	Graded later with Major A #6	NA
	Read Chapters 3, 4, and 5	NA	NA
	Minor Assignment #20 - Complete Guiding Questions on Ch. 4	20	
	Minor Assignment #21 - Complete #3 on p. 64	10	
3/25/13			
Classwork: • Discuss #7 on p. 65 and the Guiding Questions on Chapter 4 • Introduce and begin Lesson Plans		20	
Homework:			
	Major Assignment #7 - Work on Lesson Plan (see #6-7 on pp. 141-142 and p. 160 #3 and #5 on p. 64)	Graded later with Major A #7	NA
4/1/13 - no class In lieu of class and/or for Homework: • Major Assignment #1 - Complete the final revision of your Educational Philosophy (submit final document online by midnight) • Major Assignment #6 - Prepare for observations/ interviews using #3 on p. 79, #7 and #8 on p.12 and #6 on p. 193 and #7 on p. 177 and p. 160 #4 • Begin Major Assignment #8 - Science in the Community		50 50	

4/8/13		
Classwork: • Discuss Working with Community Resources and Professional Development • Questions on Lesson Plans	20	
Homework: Complete Lesson Plans and Interviews/Observations	Graded with Major A #6&7	NA
4/15/13		
Classwork: • Major Assignment #7 - Present Lesson Plans and work on Follow-Up • Major Assignment #8 – Turn in Community Resource Lesson Plan • Introduce threading, discuss relevance • Introduce Major Assignment #9 - Begin LRP with cut and paste standards activity (based in part on #4 on p. 45)	100 100	
Homework: Work on LRP and Finish Write-ups of Major Assignment #6 Interviews and Observations	Graded with Major A #9&10	NA
4/22/13		
Classwork: • Turn in Major Assignment #6 Interviews and Observations • Introduce Major Assignment #10 - Unit Plan • Work on LRPs and Unit Plan	100 Graded with Major A #9&10	
Homework:		
Work on Unit Plans and LRP	Graded with Major A #9&10	NA
Complete #4 on p. 79 (with videotape) for Extra Credit if desired/needed	EC 25	
4/29/13		
Classwork and Homework: Work on Unit Plans and LRP	Graded with Major A #9&10	NA
5/6/13 Classwork		
Major Assignment #10 - Present Final Unit Plan	200	
Major Assignment #9 - Turn in LRP	100	
Resource Binder Check	50	

Minor Assignments graded for completion only will be scored with a percentage determined by the percent completed.

Minor assignments graded for completion and quality will be graded as follows:

Description	Based on 10 pt. Total	Based on 20 pt. Total
All parts of the Assignment are completely addressed and no responses need improvement.	10	20
All parts of the Assignment are addressed, but a few responses need minor improvement.	9	18
All parts of the Assignment are addressed, but some responses need improvement. **OR** 25% or less of the Assignment is missing, but no responses need improvement.	8	16
All parts of the Assignment are addressed, but most answers need improvement. **OR** 25% or less of the Assignment is missing, but some responses need improvement.	7	14
25-50% of the Assignment is missing, but responses need little to no improvement.	6	12
50% or more of the assignment is missing	5	10

The 20 point allotment for specified classes will be partitioned based on participation in or completion of activities conducted in class but not graded as part of another Minor or Major Assignment.

Minor Assignment #17 - Guiding Questions for Discussion on How Electronic Instructional Materials and Technology Might Be Used Effectively to Help Student Learning

Instructions

Read **Chapter 15**, Computers and Electronic Technologies (along with Chapter 12, Science, Technology, and Societal Issues) in *Science Instruction in the Middle and Secondary Schools* by Chiappetta and Koballa. Additional resources may be used.

1. As a future biology teacher, what are some matters that you should consider when planning on integrating technology into science instruction? Remember you want sound pedagogy.
2. Does the technology enable students to engage in science learning in ways not possible without it? Or another way to put it, are the unique features of the technology used advantageously to support science learning? What would be some examples?
3. How can different media/multimedia forms be used to enhance science instruction? Give advantages and limitations of various media and electronic instruction materials, such as still pictures, animations, audio clips, "videos," simulations, or others. Give some specific examples related to a biology classroom where you might use each to enhance a learning experience to better reach a learning goal for students that might not occur or occur to a lesser extent without the media.
4. What kinds of computer-based technology can support students' collection and analysis of scientific data and what are possible advantages and limitations of these various types of technologies? For example, you might consider global positioning systems, remote sensing systems, geographic information systems, data acquisition through essentially mini-computers using a large number of different types of probes and sensors for biology, chemistry and physics, various types of spectrophotometers, electronically based microscopes of various types, oscilloscopes, electrophoresis apparati, and many others. How can online "databases" or sites like Google Earth, etc. be used to enhance student learning?
5. How can technology be used to encourage students' scientific communication and collaboration? Does the technology help reveal students' science misconceptions and guide students toward more scientifically acceptable ones?
6. Does the technology help students develop understandings about the relationship between science and technology and the interplay between science and society?
7. To illustrate your understanding, select a biology topic that really interests you, one that you would have to teach in your future classroom and that aligns with SC Biology Standard and the national science standards, develop lesson components, in essence part of a learning experience, with one or more learning objectives, and demonstrate how you might use multimedia, data acquisition or other technology, and the Internet to enhance the learning experience for the students.
8. **In later objectives make sure you utilize these ideas when you develop the individual lesson plans, which you will present, the long-range plan, and the unit plan.**

Minor Assignment #19 - Guiding Questions for Discussion on How Cultural, Socio-economic, and Other Differences Might Aid or Hinder Science Instruction

Instructions
Read **Chapter 9**, Diverse Adolescent Learners and Differentiated Instruction, (along with Chapter 6,The Science Learning Environment) in *Science Instruction in the Middle and Secondary Schools* by Chiappetta and Koballa. You may use additional resources.

1. What are the demographics of today's school-age population and their teachers in the U.S.? Try to also locate statistics relative to Oconee, Pickens, and Anderson counties.
2. What as a future biology teacher will you need to know about the diverse population of students in secondary school science classes in order to serve their academic needs?
3. Briefly describe a class of students that reflects the diversity of today's high school population, then choose one or students from your class description and discuss what factors are likely to affect this (these) student's success as a science learner.
4. How would you characterize the present more multicultural science education as being different from the more universalistic tradition of science education?
5. Cultural, linguistic, and gender harmony or disharmony are likely to be issues in the classroom, i.e., racism, language difference, stereotyping, gender inclusiveness, etc. Think of a personal science learning experience that you think would be a good illustration of compatibility between a student's "culture" and the expectations of the science classroom. What characteristics of the science learning environment related to cultural and linguistic diversity and gender inclusiveness do you associate with the personal science learning experience?
6. You are likely to have students in your classroom that may have learning disabilities or behavioral disorders. You may have to alter your regular lessons in some ways to address the special learning needs of students with learning disabilities and disorders in science classes. What are some "general" instructional modifications you might suggest for teaching students with learning disabilities, behavioral disorders or ADHD? Now think of lesson planning for a specific aspect of biology. Choose a learning outcome in a biology lesson you would want the students to accomplish and a general learning experience you might provide. How would you modify this learning experience to address the needs of students with learning disabilities, behavior disorders or ADHD?

7. You are also likely to have students in your classroom that may have physical disabilities such as visual impairments, hearing impairments, orthopedic/motor impairments, or other health impairments. You may also have to alter your regular lessons in some ways to accommodate these disabilities. Assume you have two students in your class with two different physical disabilities. Think of lesson planning for a specific aspect of biology, you might use the same one as previously. Choose a learning outcome in a biology lesson you would want the students to accomplish and a general learning experience you might provide. How would you modify this learning experience to address the needs of the two students with two different physical disabilities?
8. You are likely to have a spectrum of student academic abilities and motivation in your classroom. So you may have students who struggle on a spectrum up to the gifted and talented students. Again, think of lesson planning for a specific aspect of biology. Choose a learning outcome in a biology less you would want the students to accomplish and a general learning experience you might provide. How would you modify this learning experience to address the needs of the students with low ability, those with more average abilities, and those who might be gifted and talented?
9. What is differentiated instruction and how can differentiated instruction help today's diverse population of students excel in standards-based science classes? What are options you might have for differentiating the science learning experiences in which students may be engaged as part of a biology unit? Choose a biology unit you are interested in, address differentiating the science learning experience in general, but also give some specific differentiation you might use for the specific unit.

Minor Assignment #20 - Guiding Questions for Discussion on Using Multiple Assessment Tools and Strategies to Achieve Your Objectives, to Help Students and Yourself to Analyze Student Learning, and as a Means of Modifying Your Lesson Plans

Instructions

Read **Chapter 4**, Assessing Science Learning in *Science Instruction in the Middle and Secondary Schools* by Chiappetta and Koballa. Additional materials that you might locate may be used, including interviews with faculty and your pre-clinical supervisors, even old assessment materials that you might have or have been used in the past by teachers.

- Compare and contrast, in a general sense, formative vs summative assessment. Give a couple of examples.
- How would you go about assuring that your assessments are closely tied to the learning goals you establish and the learning experiences you create for your students—in essence dealing with validity and reliability? Give a couple of examples.
- Compare and contrast beginning-of-instruction, during-instruction, and end-of-instruction assessments and give possible examples that would illustrate each.
- Compare and contrast the advantages and limitations of various NON-TEST means of assessment of learning. Include in what circumstances you think that type of assessment might work best and why, including whether it would work for formative and/or summative assessment, or for beginning-of-, during-, and/or end-of-instruction assessments. Give possible specific examples of each type of assessment related to a learning goal and learning experience that you might use for a topic in a biology course you would be teaching.
- In terms of TESTS/Quizzes, discuss how they might be used for formative or summative assessment, for beginning-of-, during-, and/or end-of-instruction, how you could best tie test/quizzes to your learning goals and learning experiences, whether your tests/quizzes are in essence valid and reliable? Discuss how different types of tests might be used for different types of learning modalities and for various other types of diversity among learners; in essence are some types of tests/quizzes more advantageous or disadvantageous to certain types of learners.
- If you consider test construction, compare the advantages and limitations of using various types of test items: definitions, identification, fill-in-the-blank, true-false, sentence completion, short answer, multiple-choice, matching, short and long essay, problem solving, critical thinking questions, etc. Are there advantages and/or disadvantages to tests/quizzes being primarily one type or maybe two primary types of question vs being a broader spectrum of the various type of questions, and if so, what are those advantages or disadvantages?
- Provide two scenarios with one of more learning goals and a description of the learning experiences to help the learners accomplish those learning goals, and gives some specific examples of assessments by which you would determine whether or not those learning goals were met and whether or not those learning experiences could be improved.

Major Assignment #1: Reflection Paper on Personal Philosophy of Science Education and How to Demonstrate a Christian Ethic of Care in a Secondary Science Classroom

Instructions:
Having taken numerous professional education courses in Southern Wesleyan University's School of Education, a large number of content related science courses in biology, chemistry, physics, and math, have having prepared the various assignments for Methods of Teaching Science, write a reflection paper on your personal philosophy of science education and discuss how you could demonstrate a Christian ethic of care in terms of care towards self, learners, colleagues, and the community in a secular, public secondary school.

Scoring Guide:

Components	Possible Points	Earned Points
Clear Introduction	10	
Quality & thoroughness of discussion	50	
Christian ethic of care addressed	10	
Preliminary due dates met	10	
Correct English grammar and syntax	10	
Correct in-text citations and literature cited (MLS style)	5	
Appropriate length	5	
Total Points Earned		

Major Assignment #2: Resource Notebook

Rubric

Criterion	15	12	9	6	3
Neatness and Organization	Notebook displays neatness and is well organized by topic			Notebook neatness and organization needs improvement	
Number of Resources	Notebook contains between 40-50 resources.	Notebook contains between 30-39 resources.	Notebook contains between 20-29 resources.	Notebook contains between 10-19 resources.	Notebook contains between less than 10 resources.
Variety of Strategies Represented	Notebook includes examples of at least 5 different strategies	Notebook includes examples of at least 4 different strategies	Notebook includes examples of at least 3 different strategies	Notebook includes examples of at least 2 different strategies	All resources in notebook use the same strategy.

Total Score = Total points above + 5 if MSDS section is present **=** _____

Major Assignment #4: Total Design and Implementation of Original Laboratory

Background

Read Chapter 13, Laboratory Work and Fieldwork, Chapter 14, Safety in the Laboratory and Classroom, and Appendix C, Science Laboratory Activities in *Science Instruction in the Middle and Secondary Schools* by Chiappetta and Koballa. Additional resources may be used. Students will actually use their knowledge of the nature of science and inquiry to design an experiment in some aspect of the biology they might teach in a high school biology course. Later, they will also prepare appropriate inquiry and lab activities as part of their planning process for lesson plans and instructional unit plans and for their clinical experiences, which they will then implement in those experiences.

Instructions for Laboratory Designed by Teacher Candidate

Choose a topic in biological science for which you would be interested in developing an "original" laboratory experiment. Design all aspects of the experiment, both the written components and physical components and produce the laboratory. Make sure to trouble-shoot the laboratory and when all materials are completed, the laboratory will be presented to the professor. You want to include:

- Any pre-lab instructions, i.e., reading, quiz, questions, general safety precautions, need to have secondary containers under chemicals, use of hazardous chemicals or equipment, and any other needed pre-lab discussions.
- A list of all materials needed in the lab and amounts needed.
- Instructions for making any of the materials that are needed in the lab.
- Outcome objectives for the lab.
- Background information necessary for each component or activity in the lab, including any specific safety instructions for each part of the lab.
- Detailed instructions of each activity in the lab including any necessary diagrams, pictures, data tables, directions for use of equipment, etc.
- Questions about the activities or data that you want answered during the process of performing the lab.
- Calculations that you may want students do perform depending on the activities in the lab.
- Review sheets that you may want done during the lab and submitted before students leave or to be done outside of lab time and submitted at a later date.
- Post-laboratory instruction, i.e., discussion of results, whether objectives were met, discussion of which activities worked well, which didn't work well and why, any instructions for lab clean-up, instructions for disposal of materials, including hazardous materials, etc.

Scoring Rubric for Laboratory Design

Components	Points Available	Earned Points
Quality and thoroughness of pre-lab instructions and discussion	10	
Thoroughness and accuracy of materials needed for lab	10	
Thoroughness and accuracy of instructions for materials that must be produced	10	
Quality (i.e., learning taxonomies) of outcome objectives	10	
Background needed to perform lab components, including general safety information	10	
Thoroughness of detailed instructions for each activity in the lab including diagrams, data table, specific safety precautions, etc.	20	
Quality and thoroughness of questions or data to be collected throughout the lab	10	
Quality and thoroughness of review sheets	10	
Quality and thoroughness of post-lab instructions and discussion	10	
Total Points Available	100	

Major Assignment #5: Socially Important and Controversial Issues Assignment: Fact Sheet and Teaching Strategy on Controversial/Societal Issues in the Classroom

After reading Chapter 12, Science, Technology, and Society, in *Science Instruction in the Middle and Secondary Schools*, concerning the treatment of controversial issues/problems as they relate to teachers as individuals and to local and global communities, choose a socially important issue related to science and technology in biological sciences and, after obtaining permission from the instructor: 1. Construct a fact sheet outlining the issue, the causes, the risks and/or costs to society, and possible solutions to help address the issue, and 2. Design an interactive way to teach the issue to students. You may use additional resources.

Scoring Rubric for Controversial/Societal Issues in the Classroom
Fact Sheet and Teaching Strategy

Rating Scale

1. Below basic (BB, 1 point)—the biology teacher candidate displays no to minimal evidence of addressing the component of the assignment—a level of someone who may not want to be a scientist
2. Basic (B, 2 points)—the biology teacher candidate displays average evidence of addressing the component of the assignment—a level of someone at the beginning his or her career in science.
3. Proficient (P, 3 points)—the biology teacher candidate displays evidence of thoroughly addressing the component of the assignment—a level associated with a relatively experienced scientist.
4. Advanced (A, 4 points)—the teacher candidate displays evidence of thoroughly addressing the component of the reaction paper with some evidence of being exemplary in being able to discuss the component in the assignment—a level associated with an accomplished scientist.

Component	Possible Points	Rating
Introduction of background information related to the societal issue/problem as it relates to biological science, and basically why the issue is important to society.	2	
Thorough analysis of the reasons behind the problem and why the issue is a problem to society.	4	
Discussion of the risks and/or costs (not just monetary) of the issue to society.	4	
Discussion of possible solutions to the issue.	4	
Christian ethic of care addressed	2	
Correct grammar and English composition	2	
Correct in-text citations and literature cited	2	
Teaching Strategy (creative and accurate)	10	
Total Points Earned		
Percentage Earned=Points Earned/30		

Major Assignment #6: Interviews and Observations

Rubric and Scoring Guide to come…will involve student input.

Major Assignment #7: Individual Lesson Plan Presentation

Instructions:
Read Chapter 1, Thoughts and Actions of Beginning Science Teachers, Chapter 3, Planning to Teach Science, Chapter 5, Teaching Science, Chapter 8, Inquiry and Teaching Science, and Chapter 11, Discussion, Demonstration, and Lecture, in *Science Instruction in the Middle and Secondary Schools* by Chiappetta and Koballa. The science teacher candidate will develop one thorough lesson plan after choosing a topic on which he/she lacks confidence prior to the preparation of the lesson plan. See the S.C. State Biology Standards for possible topics. The topic should be approved by the professor.

Design the lesson and make sure to include:

- What state and/or national standards are being addressed.
- Lesson objectives in terms of a variety of expected learner outcomes.
- Materials, equipment, technology, and other teaching aids that will be needed.
- Accommodations that will be made for diverse learners.
- A clear introduction of the lesson and an "activity" to get the students' attention.
- Description why the lesson is relevant to the students' past, present, and/or future, to their community, to their socio-economic aspects, to professions they are interested in, to future material to be discussed in the course, etc.
- Use of a variety of instructional strategies (e.g., lecture, discussion, demonstration, reading, lab work, group work, simulation or game, case study, use of computer and/or Internet, recitation, handouts, etc.) and why these particularly ones are being used in the lesson. Since will be preparing lessons on two different topics, try to use a definite variety of instructional strategies.
- Material/explanation of material in lesson
- Practice, both guided and independent.
- Assessment strategies, both formative and summative.
- Closure (summary with student involvement)
- Documentation of student learning (was [were] objective[s] met?)
- Instructor reflection on the lesson

These lessons will then be" presented" by the teacher candidate, will be digitally recorded, and the professor and candidate will critique the "presentation."

Individual Lesson Plan Presentation Scoring Guide

Name _____ **Date** _____

Lesson Title _____

Lesson Plan Components	Possible Points	Earned Points
State and National Standards	10	
Lesson Objective(s)	10	
Materials (includes equipment, technology integration)	10	
Accommodations for diverse learners	10	
Introduction and Attention Getter	10	
Relevancy of Lesson to Learners	10	
Variety and appropriateness of instructional strategies	10	
Explanation of material in lesson	10	
Practice (guided and independent)	10	
Assessment strategies	10	
Closure (summary with student involvement)	10	
Student learning (Was the objective met?)	10	
Instructor reflection	10	
Total Points Earned		

Rating Received _____

Comments:

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Major Assignment #8: Science in the Community Assignment

Background

The assignment for Science in the Local Community will require students to identify ways to relate science, particularly biology, to an important issue in their local community. The teacher may gain information about this area by using appropriate Internet resources and interviewing secondary science teachers including the preclinical supervising teachers. Teacher candidates should utilize what they learned in this assignment as they prepare lesson plans and instructional unit plans and "deliver" lessons (related to other assignments in this document, not only in planning for and "delivering" scientific course content, but in relating that content to the nature of science, to important societal issues, and to community involvement related to science and issues. Part of the planning and assessment for the lesson plans and instructional units should involve the inquiry methods that are most effective and efficient in helping student learning.

Science in the Community Assignment Guidelines:

1. Identify a locally important issue that involves the field of biology. Provide an explanation as to how this issue involves biology and relates to the community and possibly more broadly, society.
2. Describe the stakeholders, the positions they hold, and interview the stakeholders concerning the issue.
3. Explain what each stakeholder serves to gain and lose over the biologically related issue.
4. List community agencies that are involved in the issue and explain why they are involved and how they might help resolve the issue.
5. Describe how you and stakeholders think the issue should be resolved and explain your rationale.
6. As a means of using community resources to promote the learning of biology and science in general, design a lesson plan which involves students to address this issue. Include the following elements:
    a. NSTA standards, state standards, and specific learning outcome objectives
    b. Attention Getter/Set
    c. Strategies
    d. Closure
    e. Assessment

Science in Community Scoring Guide

Name_____ **Date**_____

	Below Basic 0 Points	Basic 3 Points	Proficient 7 Points	Advanced 10 Points	Total Points
Local Biological Issue	Student provides no appropriate issue nor explanation.	Student provides an example but it has no biological component.	Student provides an example that has a biological component but there is no explanation.	Student provides an example that has a biological component and includes an appropriate explanation.	
Stakeholders	Student provides no examples of stakeholders.	Student provides 1 example of a stakeholder but does not expound on positions.	Student provides 2 or more examples of stakeholders but does not expound on their positions.	Student provides 2 or more examples of stakeholders and expounds on their positions.	
Stakeholders' Potential Gains and Losses	Student provides no explanations for what stakeholders serve to gain or lose.	Student only provides explanations for what stakeholders serve to gain.	Student only provides explanations for what some stakeholders serve to gain or lose.	Student provides explanations for what all stakeholders serve to gain or lose.	
Community Agencies	Student lists no community agencies.	Student lists a community agency that is not involved in any way.	Student lists at least one community agency that is involved.	Student correctly lists at least one community agency and explains why it is involved.	
Opinion on Resolution	Student provides no opinion as to how the issue should be resolved.	Student provides an opinion as to how the issue should be resolved but includes no rationale.	Student provides an opinion as to how the issue should be resolved but an inappropriate rationale.	Student provides an opinion as to how the issue should be resolved and an appropriate rationale.	
Lesson Plan: Standards	Omits both or either State Standard and/or Learning Objective.	Contains a State Standard and a Learning Objective that are related.	Contains a State Standard and a Learning Objective that are related and clearly defines what students should know.	Contains a State Standard and a Learning Objective that are related and clearly defines what students should know and is written in measurable terms.	
Lesson Plan: Set	The Teacher Candidate (TC) may or may not refer to the lesson objective, but there is no reference to the planned activities.	The Teacher Candidate refers to the lesson objective, which is related to the planned activities. The lesson objective is related to the past, present, or future; but not to all three elements.	The TC refers to the lesson objective, which is related to the planned activities. The lesson objective is related to the past, present, and future. There is no "attention getter" or it is unrelated.	The TC refers to the lesson objective, which is related to the planned activities and relates the lesson objective to the past, present, and future. The set contains an "attention getter", which is related to the lesson.	
Lesson Plan: Strategies	Students do not actively participate in the lesson or are asked to do something they have not been taught. Lecture is the main teaching strategy.	Students are engaged throughout the lesson and have opportunity for guided and/or independent practice. The TC makes use of more than one teaching strategy.	Students are engaged throughout the lesson and have opportunity for guided and independent practice. The TC makes use of several teaching strategies. *There is evidence of teacher modeling.	Students are engaged throughout the lesson and have opportunity for guided and independent practice, as well as, cooperative learning practice. The TC makes use of several teaching strategies. *There is evidence of teacher modeling.	
Lesson Plan: Closure	Omits closure (summarization) from the lesson.	There are mini-closures during the lesson, but there is no closure (summarization) at the end of the lesson.	The TC may or may not provide mini-closures during the lesson, but does provide closure (summarization) at the end of the lesson.	The TC may or may not provide mini-closures during the lesson, but the TC and students provide closure through summarization at the end of the lesson.	
Lesson Plan: Assessment	Omits assessment from the lesson, assessment strategies do not correlate with the lesson objective, and/or strategies are not age and ability appropriate.	Some assessment strategies correlate with the lesson objective. These strategies are age and ability appropriate.	All assessment strategies correlate with the lesson objective and are age and ability appropriate. The assessment strategies may be formal or informal in nature.	All assessment strategies correlate with the lesson objective and are age and ability appropriate. There is evidence of formal and informal assessment strategies.	
				TOTAL POINTS	
				Percentage Earned=Total Points Earned/100	

Major Assignment #9: Long-range Planning Guide Assignment

Instructions:

Read Chapter 1, Getting Into Science Teaching, Chapter 3, Planning to Teach Science, and Chapter 6, The Science Learning Environment, in *Science Instruction in the Middle and Secondary Schools* by Chiappetta and Koballa. You may use additional resources including interviews with secondary biology teachers. Design a long-range (i.e. "year-long") plan for a for a typical, secondary biology course making sure to include all the aspects below, plus any additional ones you feel would be pertinent.

Long Range Planning Scoring Guide

Name _____ **Date** _____

Component	Possible Points	Earned Points
Appropriate developmental goals derived from the South Carolina State and National Standards	15	
Unit sequence for entire course	10	
Weekly timeline (Date, Standard, and Topic for each subject)	20	
Materials list (including plans for obtaining)	10	
Appropriate major assessment strategies and criteria for evaluating students' progress	10	
Grading scale	5	
Rules and consequences	10	
Non-essential routine procedure	10	
Parent communication	5	
Procedure to evaluate and adjust long-range plans	5	
Total Points Earned		

On another sheet of paper, please explain the problems you observed in this LRP. Tell what you feel should be done to improve your rating. Attach your comments to this form.

Comments:

_____

_____

Major Assignment #10: Instructional Unit Planning Assignment for EDUC 4203, Methods of Teaching Science in the Secondary School and EDUC 4502, Pre-clinical Experience

Unit Planning Assignment Description

General Comments:
Read Chapter 3, Planning to Teach Science, Chapter 5, Teaching Science, Chapter 8, Inquiry and Teaching Science, Chapter 9, Diverse Adolescent learners and Differentiated Instruction, Chapter 11, Discussion, Demonstration, and Lecture, and Chapter 13, Laboratory Work and Fieldwork, in *Science Instruction in the Middle and Secondary Schools* by Chiappetta and Koballa. You may use additional resources. The unit plan developed by the biology teacher candidate is to be a well-organized, coherent, and internally consistent sequence of teaching and learning activities. The unit plan will divide the curricular area(s) encompassed by the plan into instructional units and lesson plans that organize and sequence appropriate learning activities for learning new science content that is appropriate for the students served and other factors related to the classroom, school, district, and community served. The unit plan should encompass the means for reaching the content objectives related to the nature of science, biology specifically, while taking into account students' prior scientific knowledge and experiences. The unit plan should encompass both the procedural and conceptual knowledge for any new concepts and content as well as relating them to the resources that are available to the teacher and student. The unit plan should not just show how the biology teacher candidate will present content, conceptual, and procedural knowledge, but ensure student learning occurs, which should be demonstrated by a variety of assessment techniques. Develop a unit plan with all the components below.

The Unit Plan assignment aligns with the NSTA standards as follows:

Components of the Unit Plan	NSTA Standards
Section 1: Knowledge of Learner/Teaching Context—Student Characteristics, Classroom Factors, and School, District and Community Factors	5b
Section 2: Detailed Learning Goals	
Concept Map Related to Major Concepts, Principles, and Theories, and their Interrelationships	1a
Goals and Rationale Related to: Curriculum; Unifying Concepts, Personal and Technological Applications; Historical, Cultural Developments, and Evolution of Knowledge; and Processes, Principles, and Assumptions of Methods of Inquiry	6, 1b, 1c, 2a, 3a
Objectives and Standards of NSES	6

Section 3: Unit Planning Procedures	
Alignment and Structure with NSTA/NSES Standards	6
Variety of Instructional Strategies (e.g., laboratory, demonstrations, questions related to Bloom's taxonomy, various inquiry methods, field experiences, debates, simulations)	5a
Use of Technology, not just computers, to assess resources, to collect and process data to facilitate learning	5d
Section 4: Detailed Lesson Plans	
Nature of Science Engagement—Content and Procedures	2c
Science, Technology, and Society Related Issues in Community—Content and Procedures	1c, 4b, 7b
Science as Inquiry—Content and Procedures (e.g., asking questions, science process skills, discrepant events, inductive activities, deductive activities, problem solving activities, case studies, accessing and evaluating information from the Internet, experimentation, science projects, and individual, group, and cooperative learning formats)	3b
Relationship to Unifying Concepts and Principles of Science	1b
Resources, Materials, and Safety	5f
Section 5: Assessment Plan	
Use of Multiple Assessment Techniques, both informal (e.g., individual performance tasks, cooperative/collaborative learning, quizzes. Homework assignments, lab reports) and formal (e.g., teacher made tests, research papers, portfolios, oral question/answer, performance tests, pretest/posttest?	8a
Plan for modification of instruction based on assessment results	8b
Plan for use of assessment results for to analyze their own learning, including reflective self-analysis	8c

Section 1: Knowledge of Learner and Teaching context

The biology teacher candidate should discuss individual student differences that might affect teaching—learning processes and also broader factors that could affect the teaching—learning processes.

- As the biology teacher candidate designs the instructional unit plan and means of assessment of learning, the candidate must consider factors such as: age, gender, race/ethnicity, language, skill levels, and variety of learning styles or modalities, and students with various disabilities.
- The candidate must also consider the physical features of the classroom and/or laboratory, and what resources, including laboratory equipment, are available, and what technology, not just computers, are available.
- The candidate should consider such factors as characteristics of the administration and school in general, the level of parental involvement, geographical location, and characteristics of surrounding community, including the socio-economic and race/ethnicity demographics.

Section 2: Detailed Learning Goals

A. Concept Map Related to Major Concepts, Principles, and Theories and their Interrelationships

The biology teacher candidate should include a concept map of the concepts, principles, and theories, with appropriate examples and interrelationships, which comprise the topics included in the unit. Include statements about how prior content and future content relate to the unit being planned. The concept map will be used to determine the objectives and instructional strategies for the later components of the unit plan.

B. Goals and Rationale of the Unit as a Whole, Unit Learning Objectives, and Standards Related to Concepts and Principles, to Unifying Concepts, Historical and Cultural Developments, Personal and Technological Applications, and Inquiry

1. The biology teacher candidate should include a general statement of what is to be achieved in this unit, for example, “I want the students to understand the structure and function of the nucleic acids, DNA and various forms of RNA, in the processes necessary for protein production.” The candidate will then indicate how the stated goal relates to the unifying concepts in science. Also establish the rationale for the unit to establish its importance for why students should learn the material. The age-old question that students ask is, “Why do I have to learn this stuff?” You want to address appropriate questions:

    - How does this unit apply to the needs and interest of my students and how might it have a future effect?

- Can the unit help students deal with an important science related issue and how does it relate to the broader societal issues?
- How does this unit address the nature of science and how does it relate to scientific inquiry/methodology?
- Why is this unit important to science education, is it relevant to the students and society, is it relevant to future scientific endeavors, does it address important issues, how does it relate to future technology, and other such questions?

2. The teacher candidate should provide a list of objectives that address the content knowledge, process knowledge and skills, and attitudes/affective behaviors you want your students to achieve through the teaching—learning techniques utilized in the unit. Objectives are what you will match certain activities to in order to promote student learning and your assessment techniques to, in order to measure student learning. You will want to code (e.g., O1, O2) your objectives to use in Section 3.
3. The teacher candidate should provide a list of the National and State Science content and other standards that are to be met through the unit plan. Write out the standard, and then identify any indicators or benchmarks that are to be met in the instructional unit.

Section 3: Unit Planning Procedures

- The biology teacher candidate should describe how the unit will be introduced to the student, including how the students' attention will be captured and their interest maintained.
- The biology teacher candidate should complete a table that includes each coded objective from Section 2, the appropriate national and/or state content standard that applies, one or more instructional activities and strategies for each objective, and how much "time" (e.g., 1 period) will be allotted for each Assignment. Make sure that you use a variety of instructional strategies and make use of a variety of technology available to facilitate student learning.

Objective	National or State Standard	Assignment Description	Instructional Strategy	Time
1				
2				

Section 4: Detailed Lesson Plans

From your unit plan, select a teaching sequence that would take 4-5 days, and write at least 3 detailed lesson plans. Make sure your lesson plans include:

- Appropriate specific concepts, principles, theories, and processes
- Relationships to unifying concepts and principles of science
- Use a variety of appropriate instructional activities and strategies
- Include use of technology, not just computers
- Designate what resources and materials are needed and address appropriate safety issues
- Target the nature of science engagement related to content and procedures
- Emphasize science as inquiry related to content and procedures
- Target science, technology, and societal related issues important to the students, community, as well as a more global importance

At least one of the lesson plans must rely on a 4-E learning cycle—engage, explore, explain, and evaluate. Assessment, which is part of lesson planning, is dealt with in section 5.

5. Assessment Plan

- The biology teacher candidate will design an assessment plan that will be used to monitor student learning and the progress that is being made toward accomplishing the goals in the unit. As part of the assessment plan the candidate should plan to assess learning before, during, and after instruction. The plan should include multiple assessment techniques, both formative and summative, both informal (e.g., individual performance-based tasks, cooperative/collaborative learning, quizzes, homework assignments, lab reports, personal communication), and formal (e.g., teacher made tests, research papers, portfolios, oral question/answer, performance tests, pretest/posttest). The assessment plan process should include justification of why the assessment techniques are appropriate for measuring learning as it relates to the stated goals. The plan should also describe how the teacher candidate will use the assessment results to guide and possibly modify his or her instructional strategies, the assessment processes, or even the classroom environment for the future.
- For each goal in the unit include the assessments that will be used to measure student performance, the format of each assessment technique, and adaptations that may need to be made for the individual needs of students based on knowledge of learner context from section 1 or any pre-assessment factors. Detail how pre-assessments and post-assessments will be evaluated. Also include what criteria will be used to assess whether student performance meets the goals. In the assessment plan, provide copies

of the actual planned assessments, directions for administering the assessments, and criteria for evaluating student performance (e.g., scoring rubrics, test answer key, observational checklists).

- Since assessment should be both formative and summative, the teacher candidate will discuss his or her plans for formative assessment that will be used to monitor and evaluate student progress toward meeting the goals as instruction progresses through the unit.
- It is important that not only the teacher candidate should make use of assessment results but also the students. In the assessment plan explain how the assessment results can be used by students to evaluate their own learning and the students can be engaged in some form of reflective self-analysis of their own progress.
- The biology teacher candidate could make use of a table to organize assessment information.
  For example,

Type of Assessment	**Day Given**	**Goals/Objectives/Standards Assessed**	**Cognitive Demand**	**Point Value**
Pre-test	1	Objectives 1, 5, 7 Standard 6	Low-basic recall of previously known material	
Case Study	4	Objective 2, 4 Standard 4	Medium to high-involves some comparison and analysis	
Post-test	5	Objectives Standard		

Unit Planning Scoring Rubric

Each biology teacher candidate should achieve a minimum of a basic rating on each criterion. 120 points are available, percentage calculation will go in a points toward overall grade. At least 50% of the criteria must be at the proficient or advanced level.

1. **Below basic (BB, 1point)—**the biology teacher candidate displays little to no evidence of meeting the criterion—a level of someone who has little to no scientific background, a level well below the minimum expectations of the program.
2. **Basic (B, 2 points)—**the biology teacher candidate displays minimum to average evidence of meeting the criterion or of displaying a minimum to average performance in relation to essential knowledge, skills, or dispositions required—a level of someone at the beginning his or her career in science, less than would be expected of a senior about to graduate.
3. **Proficient (P, 3 points)—**the biology teacher candidate displays average to thorough evidence of meeting the criterion or of displaying and average to thorough performance in relation to essential knowledge, skills, or dispositions required—a relatively high level associated with a senior about to graduate.
4. **Advanced (A, 4 points)—**the teacher candidate displays comprehensive evidence of meeting the criterion with evidence of being exemplary , displaying performance above just the essential knowledge, skills, or dispositions—a level associated with an accomplished scientist or the best seniors about to graduate.

Section 1: Knowledge of Learners and Teaching Context

Criterion	BB (1)	B (2)	P (3)	A (4)
Knowledge of classroom, school, and community factors that may affect learning.				
Knowledge of characteristics and differences among students that might affect learning (e.g., development, interests, culture, abilities/disabilities)				
Knowledge of students' varied approaches to learning (e.g., learning styles, learning modalities)				
Knowledge, general and specific, of students' skills and prior knowledge, and understanding of how that would affect learning				
Implications for instructional planning and assessment based on individual differences and classroom, school, and community and how these implications would affect learning.				

Section 2: Detailed Learning Goals and Objectives

Criterion	BB (1)	B (2)	P (3)	A (4)
Concepts presented on concept map with appropriate relationships, with propositions and crosslinks being consistent and appropriate, with concepts flowing from general to specific and appropriate examples displaying understanding.				
Accurate representation of content, displays awareness and congruence with big ideas or structure of the discipline.				
Significance of goals—are rational and relevant, and are established through connections to personal needs, community and societal needs, science, technology and society related issues, scientific inquiry and the history, philosophy, and nature of science				
Challenge and variety of objectives—display different types and cognitive levels of learning which are significant and challenging.				
Clarity of objectives—objectives clearly stated in terms of learner outcomes.				
Appropriateness for students—objectives are appropriate for the development, pre-requisite and prior knowledge, skills, experiences, needs, etc. of the students.				
Alignment with national and state standards—goals and objectives are explicitly aligned.				

Section 3: Unit Planning Procedures

Criterion	BB (1)	B (2)	P (3)	A (4)
Alignment with learning goals—lessons, activities, assignments, resources, etc. are explicitly linked to learning objectives and all learning objectives are addressed.				
Accurate representation of content—content is accurate and the focus is congruent with the unifying concepts and principles in the discipline.				
Lesson and unit structure—lessons in the unit have clear and coherent introductions are logically organized and useful in helping students achieve the learning objectives, and have clear and coherent closure.				
Use of a variety of instruction, activities, assignments, and resources—variety including, but not limited to lecture, inquiry, laboratory, and demonstration that make a clear contribution to student learning				
Use of technology—teacher integrates appropriate technology, not just use of computers, that makes an appropriate contributor to teaching and learning.				

Section 4: Detailed Lesson Plans

Criterion	BB (1)	B (2)	P (3)	A (4)
Content to be taught—lesson identifies and makes clear the main concepts, processes, and skills to be taught in the lesson and their relationship to unifying concepts and principles. The main concepts, processes, and skills relate to the nature of science engagement and/or science, technology, and society related issues in the community, and/or science as inquiry				
Resources, materials, and safety—supporting human and material resources that should enhance learning, including community resources if applicable, are identified and connected to the appropriate part of the lesson. Relevant safety issues are addressed.				
Instructional sequence for at least 3 lesson plans—at least one being a 4E lesson (engage, explore, explain, and evaluate). (Evaluation, particularly self-assessment and reflection by students, should be addressed in the assessment plan.)				
All lessons in terms of explanation highlight the main ideas, key questions that help students to construct the main ideas, and the relationship to unifying concepts and principles. Process skills that would be used to apply/extend the main idea(s) in the activities should be identified.				
All lessons display activities that are clear and detailed enough that another person could teach the lesson using just the plan. The lesson activities are explicitly connected to the nature of scientific engagement, science as inquiry, and personal and technological applications that relate to societal issues in terms of community resources.				
Exploration components should indicate which process skills are to be used as part of the Assignment and should be inductive in nature.				

Section 5: Assessment Plan

Criterion	BB (1)	B (2)	P (3)	A (4)
Alignment with learning goals and instruction—each objective assess through the assessment plan; assessments are appropriate for learning objectives in content and cognitive complexity.				
Clarity of criteria and standard for performance—assessment criteria are clear and explicitly linked to the learning objectives.				
Multiple techniques of assessment—different and appropriate techniques, both informal and formal assessments, as well as formative and summative assessments are used.				
Technical soundness—assessments are valid and reliable and have been justified in the plan. Scoring procedures are explained, items and prompts are clearing written, and directions and procedures are clear to students.				
Adaptations based on the individual needs of students—the teacher makes adaptations to assessments that are appropriate to meet the individual needs based on the knowledge of the various characteristics of the students.				
Teacher candidate plans for modification of instruction based on assessment results.				
Plan for student self-evaluation and reflection—teacher describes strategy for engaging students in evaluation of their own results on the unit assessments and for students' reflection on their progress.				

Instructional Unit Scoring Guide—Possible Alternate Rubric
(Not used in Methods of Science Course)

Unit Title: _____

Name: _____ Date: _____

The teaching unit (TU) is submitted with an Instructional Unit Checklist and includes:

- **South Carolina Standards and Objectives** **Earned Points** _____
  Unacceptable (0 pts) – TU does not contain integrated lessons with standards and objectives or is not relevant to Long-Range Planning (LRP).
  Acceptable (8 pts) – TU contains integrated lessons for five to ten days, which are derived from the State Standards as outlined in LRP.
  Target (15 pts) – TU contains integrated lessons for five to ten days, which are derived from the State Standards as outlined in LRP. The standards and objectives are stated in full, appropriate for the ability and developmental levels of the students, and set appropriately high expectations for all students - allow for the accommodation of diversity and special needs students.

- **A Daily Variety of Instructional Strategies** **Earned Points** _____

___	demonstrations	___	independent study
___	questions (HOTS)	___	field experiences
___	discussion	___	inquiry method
___	laboratory/shop method	___	brainstorming
___	role play	___	debates
___	collaborative learning	___	simulations
___	direct instruction	___	projects
___	contracts	___	drill and practice
___	independent activities	___	academic games
___	individualized instruction	___	competition

Unacceptable (5 pts) – TU contains three strategies. (fewer than three strategies – no pts.)
Acceptable (10 pts) – TU contains four to five strategies.
Target (15 pts) – TU contains six or more strategies.

- **Content In Multiple Formats** **Earned Points** _____

___	texts	___	charts/diagrams
___	periodicals	___	drawings/illustrations
___	resource/reference books	___	bulletin board
___	handouts	___	resource person
___	manipulatives	___	work-study
___	exhibits/displays	___	problem-solving situations
___	audio/visual aids	___	photographs
___	computers		
___	study guides		
___	Internet		
___	project worksheets		

Unacceptable (5 pts) – TU contains fewer than four formats
Acceptable (10 pts) – TU contains four to five formats
Target (15 pts) – TU contains six or more formats

- **Informal Assessment Strategies** **Earned Points** _____
  (non-graded activities)

___ individual performance tasks
___ group performance tasks (cooperative learning)
___ checklists
___ method for recognition of student participation: _____
___ other appropriate means of assessment: _____
___ homework assignments
___ observing and questioning students
___ quizzes

Unacceptable (0 pts) – TU contains no informal assessment strategies.
Acceptable (5 pts) – TU contains one informal assessment strategy.
Target (10 pts) – TU contains two or more other informal assessment strategies.

- **Formal Assessment Strategies** **Earned Points** _____
  (graded activities)

___ book tests
___ projects
___ teacher-made tests
___ research papers
___ performance tests
___ oral question/answer
___ performance test during learning (teacher assisted)
___ quizzes
___ portfolios
___ pretest/posttest
___ other appropriate means

Unacceptable (0 pts) – TU contains no formal assessment strategies.
Acceptable (5 pts) – TU contains one formal assessment strategies.
Target (10 pts) – TU contains two or more formal assessment strategies or a pretest/posttest.

- **Explicit Criteria For Evaluating Student Performance**
  Earned Points _____

___ scoring guide with criteria
___ test with an answer key
___ other appropriate means of evaluation with explanation: _____

Unacceptable (0 pts) – TU does not contain explicit criteria.
Acceptable (5 pts) – TU contains a scoring guide with criteria or test with an answer key.
Target (10 pts) – TU contains one or more other explicit criteria, which are appropriately matched to types of assessments and allows for reliable and valid interpretations and judgments about student progress and achievement.

- **Grammar and Spelling** **Earned Points _____**

<u>Unacceptable</u> (0 pts) – TU contains five or more grammatical and spelling errors.
<u>Acceptable</u> (8 pts) – TU contains one to four grammatical and spelling errors.
<u>Target</u> (10 pts) – TU is free of grammatical and spelling errors.

- **Unit Presentation Requirements** **Earned Points _____**

The unit must be presented in an appropriate folder or notebook and contain the following:

___ Title Page
___ Table of Contents
___ Evaluations
___ Unit Reflection:
- teacher candidate's point of view about the strengths and weaknesses of the unit, and
- an explanation on how you could adapt the unit for other grades or levels

___ Correlation to other subjects with state standards and objectives

<u>Unacceptable</u> (0 pts) *– TU is unorganized and/or does not contain all elements of the Unit Presentation Requirements. The Daily Lesson Plans (DLP) are not sequential and material lacks cohesion.*

<u>Acceptable</u> (8 pts) *– TU is well organized and contains all elements of the Unit Presentation Requirements. The DLP are sequential and the materials are relevant to the objectives.*

<u>Target</u> (15 pts) *– TU is well organized and contains all elements of the Unit Presentation Requirements. The DLP are sequential, the materials are relevant to the objectives, and the unit contains at least one of the following items:___ samples of student work ___ teaching aids ___ pictures ___ drawings*

Total Points _____

<u>Rating Scale</u>

<u>0 - 80 points = Unacceptable 81 - 94 points = Acceptable 95 - 100 points = Target</u>

Unit Points/SWU Grading System

100/4.0, 99/3.9, 98/3.8, 97/3.7, 96/3.7, 95/3.6, 94/3.5, 93/3.5, 92/3.4, 91/3.3, 90/3.3, 89/3.2, 88/3.1, 87/3.0, 86/2.9, 85/2.8, 84/2.8, 83/2.7, 82/2.6, 81/2.5, 0-80/0.0 No Credit

Unit Planning Assignment for Clinical Experience (not used in Science Methods)

Planning assessment of pedagogical and professional knowledge, skills, and dispositions: assessment that demonstrates candidates' knowledge, skills, and dispositions are applied effectively in practice—ADEPT evaluation. This is to be used during the clinical experiences and not in the science methods course.

1. Description of the assessment and its use in the program

The instrument known as Assisting, Developing, and Evaluating Professional Teaching (ADEPT) program is the South Carolina state-mandated comprehensive assessment of candidates' knowledge, understanding, and application of the ten ADEPT Performance Standards (APS). These standards focus on competencies in planning, instruction, assessment, environment, and professionalism. The ADEPT Evaluation Instrument and scoring guide (Attachment 1) were developed by the School of Education. The instrument has been modified to assess the biology teacher candidates' competency in long-range and short-range planning, as well as in the identification, development, and application of effective and appropriate assessment, instructional, curricular, and behavior management strategies. The professionalism competency assesses the candidates' skills in effective communication, student advocacy, professional demeanor and behavior, and life-long learning. In addition, candidates are assessed throughout their clinical experience on their effectiveness in facilitating student academic progress. Each of the ADEPT performance standards used to assess the biology teacher candidate's teaching has been aligned with a specific NSTA standard.

2. Description of how this assessment specifically aligns with the NSTA standards

Performance standards 1 to 3 deal with effective long-range and short range planning and assessment. The long- and short-range plans and assessment are assessed in assignments in the Methods of Teaching Science in the Secondary/Middle School (EDUC 4203) and Clinical Experiences I and II (EDUC 462 and 463). Performance standards 4 (establishing and maintaining high expectations), 5 (using instructional strategies to facilitate learning), 6 (providing content for learners), 7 (monitoring and enhancing learning), and 8 (maintaining an environment that promotes learning) deal with effective instruction; and APS 9 deals with managing the classroom. These performance standards primarily relate to NSTA standards, 5a-f. APS 10 deals with fulfilling professional responsibilities. This performance standard aligns with NSTA standard 10a-d. Unfortunately ADEPT does not deal with safety and welfare in the classroom and lab, which is important in science classrooms. Southern Wesleyan is adding a Performance Standard 11 to the ADEPT instrument relative to safety and welfare in the classroom and/or laboratory. See the highlighted area in Attachment 1. APS 11 would address NSTA standard 9.

A revised ADEPT/NSTA Evaluation form is found below.

ADEPT/NSTA Clinical Observation Form

Clinical Experience Final Summary

Teacher Candidate (TC) _____ School_____

Cooperating Teacher (CT) _____ Grade/Subject_____

Domain One					Domain Two							
1	2	3	4	Average	5	6	7	8	9	10	11	Average

Domain One and Two Average Score	Domain One and Two average score minus 0.1 point for each day LRP and/or TWS submitted past due date(s)	Clinical Experience Grade and Rating

Scale: 0 – 1.99 points = Below Basic 2.0 – 2.99 points = Basic

3.0 – 3.59 = Proficient 3.6 - 4 points = Advanced

SWU Grading System

100/4.0/A, 99/3.9/A, 98/3.8/A-, 97/3.7/A-, 96/3.6/A-, 95/3.5/B+, 94/3.4/B+, 93/3.3/B+, 92/3.2/B, 91/3.1/B, 90/3.0/B, 89/2.9/B-, 88/2.8/B-, 87/2.7/B-, 86/2.6/C+, 85/2.5/C+, 84/2.4/C+, 83/2.3/C+, 82/2.2/C, 81/2.1/C, 80/2.0/C, 0-79/0.0 No Credit

(Minimum Required Clinical Experience Grade = 2.5)

Teacher Candidate _____ _____
(Signature) (Date)

Cooperating Teacher _____ _____
(Signature) (Date)

Supervisor I _____ _____
(Signature) (Date)

Supervisor II _____ _____
(Signature) (Date)

Coordinator of
Field Studies _____ _____
(Signature) (Date)

Final Summary Scoring Guide for Consensus Rating

1 Point/Below Basic: The Teacher Candidate demonstrates minimal accomplishment in all or most of the performance standard abilities and dispositions.

2 Points/Basic: The Teacher Candidate demonstrates some accomplishment in all or most of the performance standard abilities and dispositions, or significant accomplishment in most with minimal accomplishment in some areas.

3 Points/Proficient: The Teacher Candidate demonstrates significant accomplishment in most of the performance standard abilities and dispositions with no minimal accomplishment in any performance standard abilities and dispositions.

4 Points/Advanced: The Teacher Candidate demonstrates significant accomplishment in all performance standard abilities and dispositions

DomainOne	
1. Long-Range Planning in Science (APS 1, NSTA 5e)	Comments: Score: _____ Assessor: Coordinator
2. Short-Range Planning in Science (APS 2, NSTA 5) Key Elements: A The TC develops unit objectives that facilitate student achievement of appropriate academic science standards and long-range learning and developmental goals. B The TC develops instructional plans that include science content, strategies, materials, and resources that are appropriate for the particular students. C The TC routinely uses student performance data to guide short-range planning of science instruction. D The TC submits weekly science lesson plans to the CT for review at least one school day prior to implementation.	Comments: Scoring Components: 1. Teacher Work Sample Planning Score: _____ 2. Scoring Guide Evaluated Lesson Plans-Average Score: _____ 3. Lesson Planning Checklist Average Score: _____ Average of Components 1-3: ☐ 2-Placement Clinical Experience: Component 1 is used in 1st Pl only and Supervisor I must evaluate at least 2 lesson plans for a 2nd Pl lesson plan average score.

3. Planning Science Assessments and Using Data (APS 3, NSTA 5) Key Elements: A The TC develops/selects and administers a variety of appropriate science assessments. B At appropriate intervals the TC gathers and accurately analyzes student performance data and uses this information to guide science instructional planning. C The TC uses assessment data to assign grades (or other indicators) that accurately reflect student progress and achievement relative to science standards.	Comments: Scoring Components: 1. Teacher Work Sample Assessment Score: _____ 2. Assessment Checklist Average Score: _____ Average of Components 1 and 2: ☐ 2-Placement Clinical Experience: Component 1 is used in 1st Pl only, which means Component 2 is the APS 3 score for 2nd placement.
4. Fulfilling Professional Responsibilities (APS 10, NSTA 5) Key Elements: A The TC is an advocate for the students. B The TC works to achieve organizational goals in order to make the entire school a positive and productive learning environment. C The TC is an effective communicator. D The TC exhibits professional demeanor and behavior. E The TC is an active learner. F The TC is a reflective practitioner.	Comments: APS 10 Documentation: __ Professional Responsibilities Log __ Conference Log __ Reflective Journal Scoring Components: 1. E-folio Score: _____ 2. APS 10 Documentation/Supervisor and Coordinator Consensus Score _____ Average of Components 1 and 2: ☐ 2-PlacementClinicalExperienceProcedure 1st Placement: Component 2 only 2nd Placement: Components 1 and 2
DomainTwo	
5. Establishing and Maintaining High Expectations (APS 4, NSTA 5) Key Elements: A The TC establishes, communicates, and maintains high expectations for student achievement. B The TC establishes, communicates, and maintains high expectations for student participation. C The TC helps students assume responsibility for their own participation and learning.	Comments: Supervisors/Coordinator/CT Consensus Score: _____

6. Instructional Strategies Used To Promote Learning (APS 5, NSTA 5a, b, c) Key Elements: A The TC uses a variety of instructional strategies to promote multiple skills and levels of understanding. B The TC successfully promotes the learning of science by students with different abilities, needs, interests and backgrounds. C The TC uses instructional strategies to effectively engage students in collaborative learning.	Comments: Supervisors/Coordinator/CT Consensus Score: _____
7. Providing Content For Learners (APS 6, NSTA 5) Key Elements: A The TC demonstrates a thorough command of the discipline that he or she teaches. B The TC provides appropriate content. C The TC structures the content to promote meaningful learning.	Comments: Supervisors/Coordinator/CT Consensus Score: _____
8. Monitoring, Assessing, and Enhancing the Learning (APS 7, NSTA 5) Key Elements: A The TC continually monitors student learning by using information from informal and formal assessment strategies. B The TC enhances student learning by using information from informal and formal assessments to guide instruction. C The TC enhances student learning by providing appropriate instructional feedback to all students.	Comments: Supervisors/Coordinator/CT Consensus Score: _____
9. Maintaining an Environment That Promotes Learning (APS 8, NSTA 5f) Key Elements: A The TC creates and maintains the physical environment of his or her classroom as a safe place that is conducive to learning. B The TC creates and maintains a positive affective climate in his or her classroom. C The TC creates and maintains a culture of learning in his or her classroom.	Comments: Supervisors/Coordinator/CT Consensus Score: _____

10. Managing the Classroom (APS 9, NSTA 5d) Key Elements: A The TC manages student behavior appropriately. B The TC makes maximal use of instructional time. C The TC manages essential non-instructional routines in an efficient manner.	Comments: Supervisors/Coordinator/CT Consensus Score: _____
11. Safety and Welfare in the Science Classroom and Laboratory (NSTA 9) Key Elements: A Demonstrate an understanding of the legal and ethical responsibilities of science teachers for the welfare of themselves and of their students, and in the proper treatment of animals through demonstration of best practices, written materials distributed and oral instructions given. B Demonstrate understanding of safe and proper techniques for preparation, storage, dispensing, supervision, and disposal of all materials used in science instruction through demonstration of best practices, written materials distributed and oral instructions given. C Demonstrate understanding and application of safety procedures appropriate for the activities and abilities of students as they relate use of personal protective equipment, maintenance of equipment, including safety equipment, and emergency procedures through demonstration of best practices, written materials, and oral instructions given. D Demonstrate understanding of the safe, humane, and ethical treatment of living organisms and legal issues as they relates to the collection, maintenance and use of organisms in the classroom or field, through demonstration of best practices, written materials, and oral instructions.	Comments: Supervisors/Coordinator/CT Consensus Score: _____

Legal, Safety, and Ethical Issues in the Laboratory and Classroom
Scoring Guide

Rating Scale:

1. Below basic (BB, 1)—the biology teacher candidate displays no to minimal evidence of knowing about and promoting safe learning environments relative to legal and ethical principles related to the particular criterion—
   a level of someone who is a lay person with little or no scientific background.
2. Basic (B, 2)—the biology teacher candidate displays average evidence of knowing about and promoting safe learning environments relative to legal and ethical principles—a level of someone at the beginning his or her career in scientific endeavors.
3. Proficient (P, 3)—the biology teacher candidate displays evidence of having a thorough knowledge about and promoting safe learning environments relative to legal and ethical principles related to the particular criterion— a level associated with a relatively experienced scientist.
4. Advanced (A, 4)—the teacher candidate displays evidence of having a thorough knowledge about and promoting safe learning environments with some evidence of being exemplary in knowing about and promoting safe learning environments relative to legal and ethical principles related to the particular criterion.

All criteria must be met at the minimum level of "Basic."

Criteria	1	2	3	4
1. Overall thoroughness of the plan, inspection checklist, and safety contract				
2. Teacher candidate demonstrates understanding of the legal and ethical responsibilities of science teachers for issues of safety and welfare of themselves, their colleagues, their students, and living organisms.				
3. Teacher candidate demonstrates understanding and practice (observation in lab and as lab assistant) of general good laboratory "housekeeping" policies and procedures (e.g., nothing in aisles, no loose fitting clothing, no open-toed shoes, no shorts, no food or drink, keep work area clean and organized) for a safe, efficient, and effective laboratory experience.				
4. Teacher candidate demonstrates understanding and practice (observation) of the legal and ethical issues for proper treatment of animals, particularly vertebrates, and other living organisms as relates to collection or obtaining, maintenance, use, and disposal.				
5. Teacher candidate demonstrates knowledge (by the prepared documents) and practices (observation) safe and proper techniques for preparation, storage, dispensing, supervision, and disposal of all materials in general used in science instruction.				
6. Teacher candidate demonstrates understanding and proper use (observation) of chemical hazard classes and reactivities, proper use of chemicals, proper labeling of chemicals, proper storage of chemicals, use of MSDS, use of secondary containment, chemical spill cleanup, and proper chemical waste disposal.				
7. Teacher candidate demonstrates knowledge of and ability to use (observation) personal protective equipment (i.e., goggles, gloves, mask, ear plugs) and emergency equipment (e.g., fire extinguisher, fire blanket, eyewash, safety shower) and emergency evacuation from lab or building.				
8. Teacher candidate demonstrates knowledge of and ability to use (observation) various biological and chemical equipment appropriately and safely (e.g., pipets, scalpels, needles, lancets, glassware, fume hoods, biosafety cabinets, centrifuges, autoclaves, blenders, compressed gas cylinders)				
9. Teacher candidate demonstrates knowledge of and ability to work with and dispose of properly (observation) hazardous materials (allergens, blood or blood borne pathogens, microbiological or infectious organisms, sharps)				
10. In the planning process for safety, the teacher candidate has made allowances for students of differing abilities.				
AVERAGE SCORE				

APPENDIX A

Bloom's Taxonomy

In 1956, Benjamin Bloom and his colleagues published the *Taxonomy of Educational Objectives: The Classification of Educational Goals*, a groundbreaking book that classified educational goals according to the cognitive processes that learners must use in order to attain those goals. The work, which was enthusiastically received, was utilized by teachers to analyze learning in the classroom for nearly fifty years.

Levels of Learning and Outcome Terminology
(Bloom's Taxonomy—Highest Level of Thinking to Lowest)

6. Evaluation—evaluates the adequacy of principles

Appraise, choose, decide, defend, evaluate, judge, justify, prioritize, rank, select, support, in your opinion

5. Synthesis—synthesizes concepts

Change, compose, construct, create, design, find an unusual way, formulate, generate, invent, originate, plan, predict, pretend, produce, reconstruct, reorganize, revise, suggest, suppose, visualize, write

4. Analysis—interprets data

Analyze, categorize, classify, compare, contrast, debate, determine the factors, diagnose, diagram, differentiate, dissect, distinguish, examine, specify

3. Application—applies principles to related situations

Apply, compute, conclude, construct, demonstrate, determine, draw, find out, give an example, illustrate, make, operate, show, solve, state a rule or principle, use

2. Comprehension—understands principles

Describe, explain, interpret, put in order, paraphrase, restate, retell in your own words, summarize, trace, translate

1. Knowledge—knows important facts and terms

Define, identify, label, list, locate, match, memorize, name, recall, spell, state, tell, underline, fill in blank

However, research during that time span generated new ideas and information about how learners learn and how teachers teach. Education practice is very different today. Even the measurement of achievement has changes; teachers now live in a standards-based world defined by state accountability systems.

In order to reflect the new data and insights about teaching and learning that he past fifty-five years of research have yielded—and to refocus educator's attention on the value of the original Bloom's taxonomy—Lorin Anderson and David Krathwohl led a team of colleagues in revising and enhancing that system to make it more usable for aligning standards, instruction, and assessment in schools. The results of their work were published in 2001 as *A Taxonomy for Learning, Teaching, and Assessing: A Revision of Bloom's Taxonomy of Educational Objectives*—a book that is important to educators because it provides the common understanding of expectations that is critical for improving student achievement in all subjects.

The revised taxonomy is two-dimensional, identifying both the kind of knowledge to be learned (knowledge dimension) and the kind of learning expected from students (cognitive processes) to help teachers and administrators improve alignment and rigor in the classroom. This taxonomy will assist educators to improve instruction, to ensure that their lessons and assessments are aligned with one another and with the state standards that their lessons are cognitively rich, and that instructional opportunities are not missed.

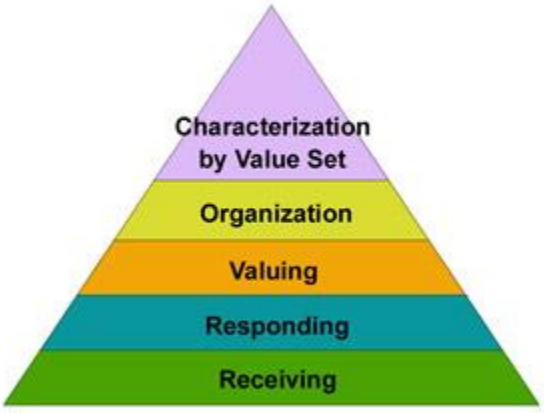
Science goes well beyond simple recognition and the memorization of facts that many people mistake for scientific literacy. Therefore, many of the main verbs in the indicators of the South Carolina science standards reflect the cognitive processes described in the revise Bloom's taxonomy under the category *understand*. This category requires *interpreting, exemplifying, classifying, summarizing, inferring, comparing, and explaining* from students—understanding rather than rote memorization of materials. Students might have to *compare* two organisms or *explain* how variations in habitats affect the survival of an organism. Several indicators require students to demonstrate two even higher categories of cognitive processes—*analyze* and *evaluate*—by *organizing* and *critiquing* data and/or the results of scientific investigation, for example.

Table 1 and 2 on the following pages are reproduced from Anderson and Krathwohl's *Taxonomy for Learning, Teaching, and Assessing*, pages 46 and 67 respectively. These are provided as a template for teachers to use in analyzing their instruction as they seek to align standards, units/lessons/activities, and assessments. Examples and more information about specific uses of the matrix can be found in the *Taxonomy for Learning*.

Table 2: The Cognitive Process Dimension		
Categories & Cognitive Processes	**Alternate Names**	**Definitions and Examples**
1. Remember—Retrieve relevant knowledge from long-term memory		
Recognizing	**Identifying**	**Locating knowledge in long-term memory that is consistent with presented material (e.g., recognize the dates of important events in U.S. history)**
Recalling	**Retrieving**	**Retrieving relevant knowledge from long term memory (e.g., recall the dates of important events in U.S. history)**

2. Understand—Construct meaning from instructional messages including oral, written, and graphic communication.		
Interpreting	**Clarifying, paraphrasing, representing, translating**	**Changing from on form of representation (e.g., numerical) to another (e.g., verbal) (e.g., paraphrase important speeches and documents.**
Exemplifying	**Illustrating, instantiating**	**Finding a specific example or illustration of a concept or principle (e.g., give examples of various artistic painting styles)**
Classifying	**Categorizing, subsuming**	**Determining that something belongs to a category (e.g., classify observed or described cases of mental disorders)**
Summarizing	**Abstracting, generalizing**	**Abstracting a general theme or major point(s) (e.g., write a short summary of events portrayed on a videotape**
Inferring	**Concluding, extrapolating, interpolating, predicting**	**Drawing a logical conclusion from presented information (e.g., in learning a foreign language, infer grammatical principles from examples)**
Comparing	**Contrasting, mapping, matching**	**Detecting correspondences between two ideas, objects, and the like (e.g., compare historical events to contemporary situations**
Explaining	**Constructing models**	**Constructing a cause-and-effect model of a system (e.g., explain the causes of important 18th century events in France)**
3. Apply—carry out or use a procedure in a given situation		
Executing	**Carrying out**	**Applying a procedure to a familiar task (e.g., divide one whole number by another whole numbers, both with multiple digits)**
Implementing	**Using**	**Applying a procedure to an unfamiliar task (e.g., use Newton's Second Law in situations in which it is appropriate**
4. Analyze—break material into its constituent parts and determine how the parts relate to one another and to an overall structure or purpose.		
Differentiating	**Discriminating, distinguishing, focusing, selecting**	**Distinguishing relevant from irrelevant parts or important from unimportant parts of**

		presented material (e.g., distinguish between relevant and irrelevant numbers in a mathematical word problem.
Organizing	**Finding coherence, integrating, outlining, parsing, structuring**	**Determining how elements fit or function within a structure (e.g., structure evidence in a historical description into evidence for and against a particular historical explanation)**
Attributing	**Deconstructing**	**Determine a point of view, bias, values, or intent underlying presented material (e.g., determine the point of view of the author of an essay in terms of his or her political perspective.**
5. Evaluate—make judgments based on criteria and standards		
Checking	**Coordinating, detecting, monitoring, testing**	**Detecting inconsistencies or fallacies within a process or product; determining whether a process or product has internal consistency; detecting the effectiveness of a procedure as it is being implemented**
Critiquing	**Judging**	**Detecting inconsistencies between a product and external criteria, determining whether a product has external consistency; detecting the appropriateness of a procedure for a given problem (e.g., judge which of two methods is the best way to solve a given problem.**
6. Create—Put elements together to form a coherent or functional whole; reorganize elements into a new pattern or structure		
Generating	**Hypothesizing**	**Coming up with alternative hypotheses based on criteria (e.g., generate hypotheses to account for an observed phenomenon)**
Planning	**Designing**	**Devising a procedure for accomplishing some task (e.g., plan a research paper on a given historical topic)**
Producing	**Constructing**	**Inventing a product (e.g., build habitats for a specific purpose)**



APPENDIX B

Krathwohl's Taxonomy of Affective Domain

Krathwohl's affective domain taxonomy is perhaps the best known of any of the affective taxonomies. "The taxonomy is ordered according to the principle of internalization. Internalization refers to the process whereby a person's affect toward an object passes from a general awareness level to a point where the affect is 'internalized' and consistently guides or controls the person's behavior (Seels & Glasgow, 1990, p. 28)."

Receiving is being aware of or sensitive to the existence of certain ideas, material, or phenomena and being willing to tolerate them. Examples include: to differentiate, to accept, to listen (for), to respond to.

Responding is committed in some small measure to the ideas, materials, or phenomena involved by actively responding to them. Examples are: to comply with, to follow, to commend, to volunteer, to spend leisure time in, to acclaim.

Valuing is willing to be perceived by others as valuing certain ideas, materials, or phenomena. Examples include: to increase measured proficiency in, to relinquish, to subsidize, to support, to debate.

Organization is to relate the value to those already held and bring it into a harmonious and internally consistent philosophy. Examples are: to discuss, to theorize, to formulate, to balance, to examine.

Characterization by value or value set is to act consistently in accordance with the values he or she has internalized. Examples include: to revise, to require, to be rated high in the value, to avoid, to resist, to manage, to resolve.

References:

Krathwohl, D.R., Bloom, B.S., and Masia, B.B. (1964). *Taxonomy of educational objectives: Handbook II: Affective domain*. New York: David McKay Co.

Seels and Glasgow (1990). *Exercises in instructional design.* Columbus OH: Merrill Publishing Company.

APPENDIX C

Experiential Taxonomy
(Steinaker and Bell 1979)

1.0 Exposure	
1.1 Sensory	I hear the song.
1.2 Response	I enjoy it.
1.3 Readiness	I want to hear the song again.
2.0 Participation	
2.1 Representation	I attempt to reproduce the melody.
2.2 Modification	I add my own emphasis or style.
3.0 Identification	
3.1 Reinforcement	I repeat the song and the style often.
3.2 Emotion	It is now one of "my" songs.
3.3 Personal	I prefer "my" version or as "I" feel I first heard it to others.
3.4 Sharing	
4.0 Internalization	
4.1 Expansion	Based on previous reactions, it is not just one of my songs, it's "me" and I find opportunities to use it.
4.2 Intrinsic	The words and music now have a special meaning to me that they may not have for others.
5.0 Dissemination	
5.1 Informational	I provide opportunities for others to use and experience "my" version.
5.2 Homiletic	I feel and act as though others must feel as "I" do about "my" version.

APPENDIX D

Online Resources for Science Teachers

http://biologos.org/ The BioLogos Forum: Science and Faith in Dialogue

http://petersj.people.cofc.edu/CCLI/ Civic Engagement in Introductory Biology, College of Charleston

http://ed.sc.gov/agency/Standards-and-Learning/Academic-Standards/old/cso/ Curriculum and Standards for South Carolina

http://www.nap.edu/openbook.php?record_id=4962 National Science Education Standards

http://ed.sc.gov/agency/Standards-and-Learning/Academic-Standards/old/cso/standards/science/?CFID=860490&CFTOKEN=60434657&jsessionid=cc3011115010855711548 89TR Science Standards South Carolina Dept. of Education

http://biology.about.com/ Biology About.com

http://evanevodialogue.blogspot.com/ Evangelical Dialogue on Evolution

http://www.jove.com/ Journal of Visualized Experiments

http://www.thegateway.org/ Gateway to Educational Materials

http://www.sln.org/ Science Learning Network

http://www.hhmi.org/biointeractive/ Howard Hughes Medical Institute Biointeractive

http://www.hhmi.org/ Howard Hughes Medical Institute (HHMI) Research

http://www.hhmi.org/about/research/training.html HHMI Laboratory Safety Training

https://www.nabt.org/websites/institution/index.php?p=1 National Assoc. of Biology Teachers

http://www.prometheanplanet.com/en/professional-development/getting-started/get-started-with-planet/ Promethean Planet

http://nsdl.org/resources_for/university_faculty/ The National Science Digital Library

http://www.scivee.tv/ SCIVEE, Making science visible

http://www7.nationalacademies.org/bose/Standards_Framework_Homepage.html
Conceptual Framework for New Science Education Standards

http://sciencecases.lib.buffalo.edu/cs/ **National Center for Case Study Teaching in Science**

http://www.nap.edu/openbook.php?record_id=5774&page=292 **Resources for Teaching Middle School Science**

http://ed.sc.gov/agency/pr/Standards-and-Curriculum/old/cso/standards/science/
South Carolina Science Standards

http://www.ericdigests.org/pre-9212/problem.htm **Teaching Problem Solving in Secondary School Science**

http://eric.ed.gov/ERICWebPortal/search/detailmini.jsp?_nfpb=true&_&ERICExtSearch_SearchValue_0=EJ723652&ERICExtSearch_SearchType_0=no&accno=EJ723652
Using an Inquiry Approach to Teach Science to Secondary School Science Teachers

http://www.eduref.org/Virtual/Qa/archives/Subjects/Science/Biology/biology.html
What resources do you have for teaching high school biology?

http://www.teachervision.fen.com/teaching-methods/resource/5810.html
TeacherVision, Teaching Methods

http://www.mhhe.com/socscience/education/methods/resources.html **Teaching Methods Web Resources**

http://ffh.films.com/digitallanding.aspx **Films on Demand**

http://streaming.discoveryeducation.com/ **Discovery Education—Streaming Video**

http://www.discovery.org/csc/ **Center (Discovery Institute) for Science and Culture**

http://www.scetv.org/education/streamlinesc/ **etvStreamlineSC**

http://www.howstuffworks.com/ **howstuffworks**

http://www.nature.com/scitable?nlp=13514591&nlpTrkUsp=7207931 **Scitable by Nature Education**

http://rubistar.4teachers.org/index.php **rubistar (types of rubrics)**

http://www1.teachertube.com/ **TeacherTube**

http://www.pubinfo.vcu.edu/secretsofthesequence/ Virginia Commonwealth University Free Videos

http://www.johnkyrk.com/ Cell Biology Animation

http://www.cellsalive.com/ Cells alive!

http://edutraining.googleapps.com/?utm_source=us-en-email-nurture_q3&utm_medium=email&utm_campaign=nurture Google Apps Education Training Center

http://www.ncbi.nlm.nih.gov/sites/entrez PubMed.gov

http://www.ets.org/ Praxis II

http://www.atomseek.com/Biology/Physiology/Simulations/index.html Biology: Physiology: Simulations

http://www.s2temsc.org/ S^2TEM Centers SC

Join Linkedin social network and join the following groups:

- **Life Sciences**
- **NABT Open Forum Group**
- **National Science Teachers Assoc.**
- **Science Teacher Network**