University of North Alabama
SCED-580 — Teaching Science in the Secondary Schools
Biology, Chemistry, General Science, and Physics
Syllabus 2013-2014

Brenda H. Webb

Office: 207 Floyd Science Building
Office Phone: 256-765-4130
Home Phone 256-766-9641
bhwebb@una.edu

Course Description

This course examines the problems of teachers in secondary science in integrating laboratory activities into the science curriculum as a basis for inquiry learning. The course provides experience in effective planning, preparing, and teaching in a context of inquiry learning as well as assessing student achievement. This course centers on active engagement of teaching candidates as they incorporate safety concerns, technology, resources, science education reform concepts, the Alabama Course of Study, and National Science Education Standards in their science major. This course cannot be used as a 400-level elective in any major or minor other than secondary education. Field trip(s) are required. Credit is awarded only in the science major—Biology, Chemistry, General Science or Physics). Two class periods; one two-hour laboratory period per week.

Prerequisites: ABI/FBI background clearance. Course fee: $30.00 (Fall)
Undergraduate science major and minor

Standards—Knowledge

Upon completion of the Program, candidates will demonstrate knowledge of the core competencies in Biology, Chemistry, Earth and Space Science, and Physics. This knowledge base is assessed in several content courses or this teaching methods course as required by the major.

In this course, candidates will demonstrate knowledge of: (Assessment descriptions are at the end of this syllabus.)

1. Contemporary scientific facts, history, principles, issues, laws and theories of the target science, contributions from different countries and cultures to the knowledge of science and the relationship of each science to the other sciences and their implications and applications.CF 1, 5
290-3-3-.14 (2)(a)2.(i)

2. the unifying concepts of science delineated by National Science Education Standards 290-3-3-.14 (2)(a)2.(ii)

3. multiple ways to organize perceptions of the world and how systems organize the studies and knowledge of science 290-3-3-.14 (2)(a)2.(I)

4. nature of scientific evidence and use of model for explanation 290-3-3-.14 (2)(a)2.(II)

5. measurement as a way of knowing and organizing observations of constancy and change 290-3-3-.14 (2)(a)2.(III)

6. evolution of natural systems and factors that result in evolution or equilibrium 209-3-3-.14 (2)(a)2.(IV)

7. interrelationships of form, function, and behaviors in living and nonliving systems 290-3-3-.14 (2)(a)2.(V);

8. personal and technological applications of science in the candidates' (their) field(s) of certification 290-3-3-.14(2)(a)2.(iii)

9. research and how to successfully design, conduct, report and evaluate investigations in science 290-3-3-.14 (2)(a)2.(iv);

10. procedures to organize and administer science laboratories with an emphasis on health safety procedures, purchase and control of supplies, proper disposal of waste materials, and proper care of instruments and laboratory equipment, and how to conduct laboratory demonstrations and field activities; CF 1, 2
290-3-3-.1 (1)(a) 5

11. the role and implications of the target science for daily living and techniques for CF 1,5; 290-3-3.14(1)(a)6

12. media and technology applications for instruction, including the use of microcomputers, related probeware and emerging technologies CF 1,4
290-3-3-.14(1)(a)(7)

13. the nature of science 290-3-3-.14(2)(b)1

14. the practice of science as a human endeavor, to include its historical development, philosophical tenets, assumptions, goals, and values that distinguish pure science from non-science, from technology, and from other ways of understanding the world 290-3-3-.14(2)(b)1;

15. the processes, tenets, and assumptions of multiple methods of inquiry leading to scientific knowledge 209-3-3-.14(2)(c)1.(i);

16. the role of hands on experiences (and cognitively engaging experiences) upon which learning is constructed 290-3-3-.14 (2)(c)1.(ii);

17. the methods of science and scientific inquiry and the ethical, technological, and environmental implications of the target science CF 1, 4
290-3-3-.14 (1)(a)2;

18. inquiry and its use in effectively teaching the target science; and inquiry as an effective learning strategy; CF1
(1)(a)4. CF

19. developmentally appropriate inquiry strategies for teaching science including those advocated by the Alabama, Math, Science, and Technology Initiative (AMSTI) 290-3-3-.14 (2)(c)1.(iii);

20. contemporary issues related to science and technology in their (candidates') field of certification 290-3-3-.14 (2)(d)1.(i)

21. processes used to analyze and to make decisions, including appropriate actions for addressing contemporary issues related to science and technology 290-3-3-.14 (2)(d)1.(ii);

22. a variety of classroom arrangements, groups, actions, strategies, and methodologies to show that they are prepared to foster a community of diverse learners 290-3-3-.14 (2)(e)2.(i);

23. the role, nature, limitations, and use of media and technology for instruction and scientific investigation, including the use of virtual labs, computers, probeware, and other emerging technologies 290-3-3-.14 (2)(e)2.(ii);

24. content standards and of the scope and sequence of the subject areas of one's teaching field(s) as defined in the Alabama Course of Study for those teaching fields 290-3-3-.03(1)(c)2.(i) and the National Science Standards 290-3-3-.14 (2)(f)2.

25. ways to relate science to the community, involve stakeholders, and use community resources to promote the learning of science 290-3-3-.14(2)(g)1.

26. current science safety policies according to the Alabama State Department of Education 290-3-3-.14 (2)(i)1.(i)

27. the legal and ethical responsibilities of science teachers for the welfare of their students and the proper treatment of animals 290-3-3-.14 (2)(i)1.(ii);

28. safe and proper techniques for the preparation, storage, dispensing, supervision, and disposal of all materials used in science instruction 209-3-3-.14 (2)(i)1.(iii)

29. an understanding of the UNA College of Education conceptual framework and how it relates to reflective practice, effective pedagogy, and professional development;

30. the rationale for the national movement of reformation in science education;

31. population dynamics and the impact of population on its environment 290-3-3-.15 (1)(a)1.(vi);

32. Earth and space sciences including energy and geothermal cycles, climate, oceans, weather, natural resources, and changes in the Earth (1)(a)2.(iii) how to design, conduct, and report research in the target science 290-3-3-15 (1)(a)1.(xiv);

33. environmental and atmospheric chemistry 290-3-3-.15 (1)(b)1.(x);

34. characteristics of land, atmosphere, and ocean systems on Earth 290-3-3-.15 (1)(c)1;

35. changes in the Earth including land formation, erosion, and plate tectonics 290-3-3-.15 (1)(c)(1);

36. Hydrological features of the Earth 290-3-3-.15 (1)(c)1.(vi);

37. basics of magnetism; and

38. applications of physics in environmental quality and to personal and community health 290-3-3-.15(1)(d)1.(xi)

Abilities

Candidates will demonstrate the ability to: (Assessment descriptions are at the end of this syllabus.)

1. convey to students the unifying concepts of science delineated by the National Science Education Standards and the rule 290-3-3-.14 (2)(a)2.(ii) 290-3.3.14 (2)(a)3.(i);

2. convey to students the use of mathematics to process and report data and solve problems in their fields 290-3-3-.14 (2)(a)3.(ii);

3. convey to students the important personal an technological applications of science 290-3-3-.14 (2)(a)3.(iii);

4. 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 290-3-3-.14 (2)(b)2.;

5. engage students in developmentally appropriate inquiries that require them to develop concepts and relationships from the observations, data and inferences in a scientific manner 290-3-3-.14 (2)(c)2.;

6. to engage students in the analysis of contemporary issues related to science, technology, including consideration of risks, costs, and benefits of alternative solutions 290-3-3-.14 (2)(d)2.;

7. organize, coordinate, and maintain the science classroom laboratory 290-3-3-.14 (2)(e)3.(i);

8. create a material-rich and an experience-rich environment that develops and extends students' desire to reason, problem-solve, and engage in hands-on learning 290-3-3-.14(2)(e)3.(ii);

9. use and justify a variety of classroom arrangements, groups, actions, strategies, and methodologies to show that they are prepared to foster a community of diverse learners 290-3-3-.14 (2)(e)3.(iii);

10. plan and implement units of study that address the needs and abilities of students, consistent with the *Alabama Course of Study: Science* and the National Science Education Standards 290-3-3-.14 (2)(f)3.

11. involve students in activities that relate science to resources and stakeholders in the community 290-3-3-.14 (2)(g)2.;

12. use multiple assessment tools and strategies to achieve goals that are aligned with methods of instruction, including inquiry learning and laboratory experiences;
13. 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 collections, keeping, and use. 290-3-3-.14 (2)(i)2.(i);

14. implement safety policies appropriate for the activity 290-3-3-.14(2)(i)2.(ii);

15. investigate scientific phenomena, interpret findings, and communicate them to others CF 1, 2;

16. address global and ethical issues in the target area and apply scientific processes to the solution of problems encountered in daily activities CF 1,2,5;

17. set up and conduct laboratory demonstrations, experiments and field activities and use the local environment to supplement laboratory activities CF 1;

19. conduct and lead students through facilitation students in inquiry in the target science activities and in activities that integrate science areas;

20. introduce students ~~about~~ to career opportunities in science and technology CF 1, 4 290-3-3-.14(2)(e)3.(iv);

21. apply contemporary research findings, as well as major concepts of the other sciences, to the teaching of the target science 209-3--.14(1)(b)7; CF 1, 2;

22. evaluate, select and use media and appropriate instructional technologies 290-3-3-.14 (1)(b) 8. CF 1, 4;

23. plan, evaluate, adapt, and implement lesson plans and assessment strategies based on the 5 E learning Cycle;

(**There will be on site monitoring by the professor of students' required experiences.)**

24. demonstrate through a variety of assessment tools an understanding of the interrelationships of the sciences;

25. demonstrate an awareness of problems and solutions posed by science, technology, and society;

26. demonstrate an awareness of science and mathematics programs such as Alabama Mathematics, Science, and Technology Initiative (AMSTI), Alabama Science in Motion (ASIM) and Alabama Technology in Motion (ATIM) and their role in science education;

27. demonstrate the effective use of questioning to promote higher level thinking;

28. demonstrate an understanding of the role of evidence, explanation and argumentation in s cience—historically and through current events;

29. discuss science activities that incorporate the philosophical works of Dewey, Bruner, Lowery, and others;

30. demonstrate the ability to evaluate, explain and implement methods of science and scientific inquiry and the ethical, technological, and environmental implications of the target science (290-3-3-.14 1.a. 2):

31. locate and elaborate on the types of school and community resources for the target science (290-3-3-.14 (1)(a)8;

32. demonstrate a knowledge of the content standards and of the scope and sequence of the target science as defined by the Alabama Course of Study for the teaching field 290.3-3-.04 (1)(c)(i) CF 1

33. demonstrate an understanding of expository reading strategies for science content;

34. demonstrate an understanding of Earth's atmospheric make-up and weather and their implications for organisms from the perspective of the target science 290-3-CF 1;

35. demonstrate an understanding of the universe, the solar system, space, and space exploration and connections to the target science CF 1;

36. demonstrate a knowledge of the nature of the physical environment and the importance of conservation (from the perspective of the target science)

37. demonstrate knowledge of the content standards and of the scope and sequence of the subject areas of one's teaching field(s) as defined in the Alabama Course of Study for those teaching fields
290-3-3-.03 (1)(c)(i)

38 Provide opportunities for students to apply the target science in environmental quality and to personal and community health 290-3-3-.15(1)(d)1.(xi)

Course Content

I. Selected Scientific Contemporary Scientific Information, Issues, History, Principles, Generalizations, Laws and Theories Related to the Target Science and Other Sciences (National Science Education Standards) CF 1,5
209-3-3-.14 (2)(a)2.(i)

II. National Goals of Science Literacy
A. Benchmarks for Science Literacy--Project 2061
B. National Science Education Standards
290-3-3-.14 (2)(a)2.(ii)
290-3-3-.14 (2)(a)3.(i)
290-33-3.14 (2)(f)3;
C. Alabama State Standards CF 1
Develop knowledge of the content standards and of the scope and sequence of the Target Science area (as defined by the Alabama Course of Study: Science.
290.3-3-.03 (1)(c)2.(i)
290-3-3-.14 (2)(f)2.
290-3-3-.14(2)(f)3.

III. Reformation of Science Education

A. Scientific Inquiry and Effective Teaching of the Target Science CF 1
290-3-3-.14 (2)(c)1.(i)
290-3-3-.14 (2)(c)1.(ii)

B. Questions and Concepts that Guide Scientific Inquiry

IV. Design, Conduct, Report, and Evaluate Scientific Investigations CF 1, 4
290-3-3-.14 (2)(a)2.(IV)

V. Role of Technology and Mathematics in Science: Support and Limitations
290-3-3-.14 (2)(a)2.(III)
290-3-3-.14 (2)(a)2.(iii)
290-3-3-.14 (2)(a)3.(i)
290-3-3-.14 (2)(a)3.(ii)
290-3-3-.14 (2)(e)2.(ii)

VI. Nature of Scientific Evidence, Logic, Explanation, and Argumentation 290-3-3-.14 (2)(a)2.(II)

VII. Historical and Cultural Perspectives of Science 290-3-3-.14 (2)(a)2.(I)

VIII. Assessment and Evaluation:
290-3-3-.14 (2)(h)(2)

A. Role in Planning Science Instruction
B. Using and Creating Rubrics
C. Authentic Assessments
D. Types of Assessments and Impacts on Learning

IX. Connecting theory to pedagogy and decision-making in the science classroom
A. Piaget
B. Dewey
C. Bruner
D. Ausebel
E. Others

X. The Nature of Science
A. Science as a Dynamic Body of Information: Historical and Contemporary Issues of the Target Science
290-3-3-.14 (2)(d)1.(i)
B. Science as a Human Endeavor
290-3-3-.14 (2)(b)1.
C. Critiquing or Analyzing Assertions: Science vs. Pseudoscience Processes for Determination
290-3-3-.14 (2)(b)2.
290-3-3-.14 (2)(d)1.(ii)
290-3-3-.14 (2)(d)2.

XI. Content: Learning Cycles and the 5 E Instructional Model

A. Earth's Atmospheric Make-up and Weather and Implications for Organisms 290-3-3-.15 (1)(a)3.(ii); CF 1
B. Universe, Solar System, Space and Space Exploration Connections to the Target Science 290-3-3-.15 (1)(a)3.(ii); CF 1;
C. Nature of the Physical Environment and Conservation 290-3-3 .15 (1)(a)3.(iv); CF 1;
D. Physics in environmental quality and to personal and community health 290-3-3-.15(1)(d)1.(xi)

XII. Effective and Ineffective Questioning: Impacting Learning

XIII. Methods of Science and Scientific Inquiry and the Ethical, Technological, and Environmental Implications Related to the Target Science (s).
290-3-3-.14 (1)(a)2; CF 1, 4
A. The Scientific Method in Real Scientific Research
B. Inquiry in Real Scientific Research
C. The Value of Problem Solving in the Science Classrooms
D. Ethics in Science: Honesty, Integrity in Communication, and Peer Review

XIV. Identifying and Changing Science Misconceptions or Alternative Conceptions
A. Sources
B. Language Implications

XV. The Interrelationship of Sciences Core Competencies

XVI. Interdependence of Biotic and Abiotic Elements CF 1, 4, 5
290-3-3-.14 (2)(a)2.(iv)
290-3-3-.14 (2)(a)2.(V)
A. Populations
B. Environments
C. Resources
D. Form, Function, Behaviors
E. Scale of Impact: Local to Global
F. Personal and Community Health

XVII. Procedures for Organizing and Administering a Science Laboratory CF 1, 2
290-3-3-.14 (2)(e)2(i)
290-3-3-.14 (2)(e).(i)
290-3-3-.14 (2)(i)1.(i)
290-3-3-.14 (2)(i)1.(ii)
290-3-3-.14 (2)(i)1.(iii)
290-3-3-.14 (2)(i)2.(i)
290-3-3-.14 (2)(i)2.(ii)
A. Health and Safety Issues for Humans and Animals in Laboratories/Classrooms and All Learning Environments
B. Legal and Ethical Responsibilities

C. Purchase and Control of Supplies
D. Proper Disposal of Waste Materials
E. Proper care of Instruments and Laboratory Equipment
F. Conducting Laboratory Demonstrations/Activities
G. Investigate Scientific Phenomena, Interpret Findings, and Communicate Findings to Others

XIII. Integrating Research-based Pedagogy into Lesson Planning, Peer Teaching, and Field Experience Teaching
290-3-3-.14 (1)(b)7; CF 1, 2
A. Developing and Implementing Lesson Plans
B. Constructivism vs. Traditionalism: The Continuum-- Expository to Discovery
290-3-3-.14 (2)(c)1.(ii)
C. Motivating Middle School and High School Students: Teaching Students vs. Teaching Science to Students
D. Equity Issues
1. Gender
2. Special Needs
E. High Stakes Testing: Impacts on Learning
F. Integrating All Disciplines and Domains of Science
G. Teaching Evaluations
H. Applying Contemporary Research Findings to Pedagogy as Well as Major Concepts of Other Sciences to Teaching the Target Science CF 1, 2
290-3-3-.14 (1)(b)7
I. Global and Ethical Issues in the Target Science-- Solution of Problems Encountered in Everyday Activity 290-3-3-.14 (1)(b)2 CF 1,2,5;

IXX. Role and Implications of the Target Science and Technology Career Choices CF 1, 4
290-3-3-.14 (2)(e)3.(iv)
XX. Writing from a Scientific Perspective

XXI. Issues of Community and School and Community Resources for the Target Science Programs
209-3-3-.14 (1)(a). 8
209-3-3-.14 (2)(g)1.
209-3-3-.14 (2)(g)2.

XXII. Classroom Management
209-3-3-.14 (2)(e)2.(i)

A. Developmental Issues
B. Curricula Decisions
C. Independent and Collaborative Engagement of Students: grouping Strategies
D. Establishing a Learning Environment
E. Classroom Behavior Expectations

F. Case Studies
G. Learning Communities
H. Organize, Coordinate, and Maintain the Target Science Classroom, Laboratory, and Field Activities Emphasizing Safety

XXIII. Current Events and Teaching/Learning

XXIV. Professional Development
A. Conceptual Framework & Professional Dispositions
B. Involvement in Professional Organizations
C. Outcome of Professional Development on Student (Middle School and High School) Learning
D. Action Research
E. Journal Articles and Poster Sessions Apply Contemporary Research Findings, as well as the Major Concepts of the other Sciences, to the Teaching of the Target Science 290-3-3-.14 (1)(b)7; CF 1, 2
F. Summer Institute Opportunities
G. Technological Resources
H. Career Opportunities in Science and Technology CF 1, 4 290-3-3-.14 (1)(b)6;

Course Requirements and Assessment:

Notes:

Candidates will observe and/or teach science in appropriate classrooms of target field(s) and document 15 hours of observation/teaching according to directions given by the professor. In addition to these requirements, graduate students will engage in some level of research and/or create an appropriate graduate paper which is underpinned by the tenets of inquiry-based learning, contemporary issues, and integration of sciences, mathematics, and technology.

There will be on site monitoring by the professor of students' required experiences.

Candidates will

1. Attend all class meetings at established times and locations.

2. Develop and implement up to six lesson plans, minimum of five, that reflect research-based, guided inquiry strategies and engage students in developmentally appropriate inquiries that require them develop concepts and relationships from the observation, data, and inferences in a scientific manner.
A rubric/checklist, prepared by university faculty or classroom teacher, will indicate observed skills.
290-3-3-.03 (1)(c)(i)
290-3-3-.14 (2)(c)2.

290-3-3-.14 (2)(c)1.(i) CF 1, 2;
290-3-3-.14 (2)(c)1.(ii) CF 1;
290-3-3-.14 (2)(c)1.(iii) CF 1;

A. A minimum of three lesson plans should integrate the science major and other sciences General Science Majors will develop four integrated plans;

290-3-3-.14 (2)(a)(i) CF 1, 5;

B. Lesson plans will reflect unifying concepts delineated by the National Science Education Standards and to the Alabama Course of Study as well as the content/ability standards in the current-PATS-- pre-service teachers demonstrate the ability to convey unifying concepts. Learners taught in peer teaching will be asked to identify relationships between and among concepts in science areas or domains as they respond to traditional and informal assessments.

CF 1,5

290-3-3-(1)(a)1.
290-3-3-.03 (1)(c)2.(i)
290-3-3-.14 (2)(a)2.(ii); 290-3-3-.14 (2)(f)2.; 290-3-3-.14 (2)(f)3.
290-3-3.14 (2)(a)3.(i);

C. All lesson plans developed and teaching demonstrations will identify and incorporate safety issues involved and how safety issues are addressed **as well as** legal and ethical responsibilities. CF 1, 2

290-3-3-.14 (2)(i)1.(i)
290-3-3-.14 (2)(i)1.(ii)
290-3-3-.14 (2)(i)1.(iii)
(2)(i)2.(i)
(2)(i)2.(ii)

D. Lesson plans, as well as responses to selected activities, will demonstrate and understanding that there are multiple ways to organize perceptions of the world and how systems organize the studies and knowledge of science; the evolution of natural systems and factors that result in evolution or equilibrium; and the inter-relationships of form, function, and behaviors in living and non-living systems.

290-3-3-.14 (2)(a)2.(I)
290-3-3-.14 (2)(a)2.(IV)
290-3-3-.14 (2)(a)2.(V)

E. Use multiple assessment tools and strategies to achieve goals that are aligned with methods of instruction, including inquiry learning and laboratory experiences. You will assess simulated students' work using multiple assessments such as rubrics, written responses, and performances as part of course assignments. These will be graded and provide feedback for general discussion by the class.

CF 1, 4
290-3-3-.14 (2)(h)2.;
290-3-3-.14 (1)(a)2
290-3-3-.14 (2)(h)2.

3. Plan and implement lessons to include evidence of engaging 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. Students should understand~~ing~~ the nature of scientific evidence and use of models for explanations. You are expected include historical examples such as Continental Drift and Plate Tectonic theories (genus and species development) as well as current issues, including pop culture—the walking dead.
290-3-3-.14 (2)(a)2.(II)
290-3-3-.14 (2)(b)1
290-3-3-.14(2)(b)2

4. Collaboratively and independently critically analyze false assertions made in the name of science; document the accuracy of science content with reliable resource(s).
290-3-3-.14 (2)(a)2.(II)
290-3-3-.14(2)(b)2.

5. Connect lesson plans to everyday experiences Apply scientific processes to the solution of problems encountered every day. CF 1, 2, 5

6. <u>Develop a two week unit of study</u>: Ten lesson plans will include requirements A-D listed below. (Lesson plans developed for Course Requirement # 2 may be used in this assignment.)

   A. Plan and implement a two week unit of study that address the needs and abilities of students, consistent with the *Alabama Course of Study: Science* and the National Science Education Standards. The criteria for the plans include specified needs, challenges, and abilities of students that should be reflected in each lesson plan.

290-3-3-.14 (2)(f)(2).
290-3-3-.14 (2)(f)3.

   B. Develop a "white paper" that explains the role, nature, limitations, and use of media and technology for instruction and scientific investigation, including the use of virtual labs, computers, probeware, and other emerging technologies to be included in the unit. A rubric will be given. CF 1, 4

290-3-3-.14 (2)(e)2.(ii)

   C. Include, in the lesson plans of this two week unit of study, where students will provide at least five examples illustrating the importance of personal and technological applications of science. Students will provide examples which may include regularly used items and they will explain how these items have

influenced culture: a) those which are results of space exploration b) such as smoke detectors, c) enriched baby foods and formulas, d) cool ear thermometers; windmills in wind-farms for energy production; GPS; cell phone cameras.

290-3-3-.14 (2)(a)3.(iii)

D. Demonstrate (your choice of method) your knowledge of the contemporary issues of technology related to your field(s) of certification and the processes used to analyze and make decisions for actions for addressing contemporary issues related to science and technology. Classroom activities will provide a foundation for this inclusion in the unit.

290-3-3-.14 (2)(d)1.(i)
290-3-3-.14 (2)(d)1.(ii)

E. Create a material-rich and environmental rich environment that develops and extends students' desire to reason, problem-solve, and engage in hands-on and cognitively engaging learning Lesson plans and the implementation of two plans in peer-teaching and/or classroom teaching will be used to assess this skill.

290-3-3-.14 (2)(e)3.(ii)

7. Plan and conduct at least one laboratory experiment through field activities/lesson using the local environment to supplement laboratory activities. The plan will include integrated content and you will create a material-rich environment that develops students' desire to reason, problem solve, and engage in hand-on, and cognitively engaging learning by developing problem-based activity. A rubric will be used to assess the quality of criteria implemented.
8. The experiment will include application of physics in environmental quality and to personal and community health.

   CF 1
   290-(1)(d)1. (xi)
   290-3-3-.14 (2)(e)3.(ii)
   290-3-3-.14 (2)(e)3.(iii)

9. Create and introduce to the class potential careers in your field of science certification and related technology. Incorporate technologies such as PP, YouTube, other video clips. Assessment will focus on thoroughness of information—minimum of three careers, level of preparation, enthusiasm, and presentation skills to an audience.

   290-3-3-.14 (2)(e)3.(iv)

10. Demonstrate in a classroom activity, a simulation, that you understand how to organize, coordinate and maintain the biology, chemistry, or physics science classroom laboratory, and implement field activities, conduct scientific investigations, interpret findings, and communicate them to others. You will prepare plans to create a classroom laboratory—purchasing, maintaining, and storage to accommodate 20 laboratory experiences in your

teaching field. The activity will require you to connect safety standards to your decisions. A checklist will be used to assess skill development, CF1

290-3-3-.14 (1)(a) 5;
290-3-3.14 (2)(e)3.(i)

11. Develop and share summaries of assigned readings (Use APA.) which address (trends of contemporary research findings) contemporary scientific information (facts), history, principles, issues, laws and theories of the target science, contributions from different countries and cultures to the knowledge of science and the relationship of each science to the other sciences and their implications and applications CF 1, 2

290-3-3-.14 (2)(a)2.(i)
209-3-3-.14 (2)(a)2.(ii)

12. Complete instructor-designed activities which demonstrate comprehension of and skills to incorporate:

A. measurement as a way of knowing and organizing observations of constancy and change and the ability to convey to students the use of mathematics to process and report data and solve problems in the field

290-3-3-.14 (2)(a)3.(ii);

Responses in activities will be assessed using a rubric to communicate quality of responses.

1. Classroom experiences require candidates to keep records of changes in plant growth over time, they will note problems in plant growth as influenced by variables such as plants' exposure to salt water, limited light, and geo-tropism influences.

2. Candidates will interpret climate change data charts to identify global, national changes and compare those to regional change. An example is that students will review precipitation levels across the country and identify economic impacts related to these levels (i.e. Corn production levels due to timely and sufficient rainfall and economic changes due to lack of precipitation in the Colorado or other western mountains) Collaboratively they will develop potential solutions to these problems.

290-3-3-.14 (2)(a)2.(III);
290-3-3-.14 (2)(a)2.(iii);
290-3-3-.14 (2)(a)3(.ii)

B. safe and proper techniques for the preparation, storage, dispensing, supervision, and disposal of all materials used in science instruction

209-3-3-.14 (2)(i)1.(iii);

C. legal and ethical responsibilities of science teachers for the welfare of their students and the proper treatment of animals

290-3-3-.14 (2)(i)1.(ii); and

D. safe and proper techniques for the preparation, storage, dispensing, supervision, and disposal of all materials used in science instruction
209-3-3-.14 (2)(i)1.(iii)

13. You will engage in a collaborative project—Plan, use and justify variety of classroom arrangements, groups, actions, strategies, and methodologies to show that-you are prepared to foster a community of diverse learner. You will share with the small group to which you have been assigned for peer feedback. Then an additional draft, along with the original draft of these plans will be submitted. (a minimum of two classroom arrangements; assignments of students to two potential heterogeneous groups; two teaching strategies and methodologies)
290-3-3-.14 (2)(e)2.(i)
290-3-3-.14 (2)(e)3.(iii)

14. Explain through the development and presentation of PP and other technologies the role, nature and limits of technologies in instruction and scientific investigation.
290-3-3-.14 (2)(e)2.(ii);

15. Demonstrate through presentations, conversations, assessment an understanding that the practice of science as a human endeavor, to include its historical development, philosophical tenets, assumptions, goals, and values that distinguish pure science from non-science, from technology, and from other ways of understanding the world
290-3-3-.14 (2)(b)1;

16. Demonstrate a depth of understanding the role of inquiry in science and as effective teaching and learning strategies through using

A. the processes, tenets, and assumptions of multiple methods of inquiry leading to scientific knowledge
209-3-3- (1)(a)2.
209-3-3-.14 (2)(c)1(i);

B. the role of hands on experiences (and cognitively engaging experiences) upon which learning is constructed
290-3-3-.14 (2)(c)1.(ii);

C. critical analysis of false or doubtful assertions made in the name of science
290-3-3-.14 (2)(b)2 and

D. effective pedagogy indicated by trends in science learning/teaching research.

17. Demonstrate through peer-teaching sessions and classroom or field teaching experiences successful student engagement in the methods of science and scientific inquiry along with-the ethical, technological, and environmental implications of the Target Science; Through teaching demonstrations, engage students in the analysis of contemporary issues including

risks, costs, and alternative solutions A rubric/checklist completed by the university professor or classroom teacher will indicate skills observed. CF 1, 4.
290-3-3-.14 (2)(b)2
290-3-3-.14 (2)(c)2
290-3-3-.14 (2)(d)2

18. Prepare a PowerPoint Presentation for the unit conveying to students the important personal and technological applications of science and a poster for a Poster Session 290-3-3-.14 (2)(a)3.(iii) CF 1, 4;

19. Attend and participate in all field trips to learn content and pedagogy,

21. Prepare an electronic science portfolio that features work for this course and that may be used as a future resource in the Education program;

22. Engage in problem solving activities through evaluation, discourse, and developing plans concerning procedures for organizing and administering science laboratories with an emphasis on safety, set up and conduct laboratory demonstrations, experiences, and field activities, and use the local environment to supplement laboratory activities. CF 1
290-3-3-.14 (2)(e)3.(i)

23. 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 collections, keeping, and use. Demonstration of appropriate care will be assessed by university faculty observation during outdoor environmental study field trips and brief follow-up written report on the ethical and legal treatment of organisms will be submitted for evaluation of understanding of this standard. CF1
290-3-3-.14 (2)(i)2.(i)

24. You will collaboratively plan and involve students in activities that relate science to resources and involve stakeholders in the community or to the resolution of issues important to the community during your classroom field teaching experience in this course. This project will require evidence of student learning. You will also attend and develop a brief news article on at least one event held in the community or on campus to learn how government and organization may communicate their positions on issues. The article will be evaluated, using a rubric provide, on your responses to who, what, when, where, and why. 290-3-3-.14(2)(g)1.
290-3-3-.14 (2)(g)2.

25. Demonstrate the ability to implement safety policies appropriate for the activity during field trips, peer teaching, and field teaching experiences connected with this course. Observations will be conducted by university faculty member and assigned classroom teachers. Written feedback will be provided if policies are not followed.
290-3-3-.14 (2)(i)(2(ii)

26. Evaluate science textbooks, lesson plans, teaching strategies, and instructional websites using a rubric.

27. Research the literature and share with the class contributions of at least one scientist including scientific facts and the history, principles, issues, generalization and/ or laws related to this person and science, contributions made from different countries and cultures to the knowledge of science and the relationship of each science and their implications and application from a historical or contemporary context; use media and technology to support learning and presentations CF 1, 4, 5;

28. Develop and implement teaching behaviors as documented after reflection on teaching experiences, the poster session, and evaluating selected resources

29. Participate in collaborative presentation of global and ethical issues discussions/activities; make connections of issues to everyday life and apply solutions of problems encountered to everyday life solutions. CF 1, 2, 5

30. Through class activities, demonstrate knowledge of the research and how to scientifically design, conduct, report, and evaluate investigations in science. CF 1, 2; 290-3-3-.14 (2)(a)2.(iv)

31. Meet deadlines for assignments.

32. Demonstrate professional attitudes and behavior.

33. Read, discuss and write cases studies.

34. Develop a short paper that a demonstrate an awareness of science and mathematics programs such as Alabama Mathematics, Science, and Technology Initiative (AMSTI), Alabama Science in Motion (ASIM) and Alabama Technology in Motion (ATIM) and their role in science education
290-3-3-.14 (2)(c)1.(iii).

35. Through teaching activities, address the role and implications of the Target Science and technology for daily living and techniques for addressing global and ethical issues. Include current events. Use APA—more information will be given at the time of assignment CF 1,2,5
290-3-3-.14 (2)(d)1.(i)

36. Convey to students the use of mathematics to process and report data and solve problems in your field by requiring the use of mathematics in your peer teaching experience(s). This will be assessed as part of the lesson plan and your pedagogy (rubric).
290-3-3-.14(2)(a)3.ii

Specific content will involve selected concepts and will be learned and viewed from an integrated perspective of the target science.

37. Collaboratively develop a learning activity that is developmentally appropriate to communicate information about the Earth's atmospheric make-up and weather and their implications for organisms including catastrophic historic and current events—nationally and globally. CF 1;

38. (EARTH SCIENCE) Participate in a panel discussion related to the universe, the solar system, space, and space exploration as related to the target sciences or field(s) of certification. CF 1

39. Develop a scientific report of field experiences (class field trip) focused on the nature of physical environment and the importance of conservation from the perspective of the target science(s). CF 1

40. Demonstrate knowledge of core target science content—particularly ecological relationships.

41. Demonstrate through planning, teaching, and classroom activities a knowledge of the target science content , including fundamental principles of chemistry and the origin, structure, composition, classification, and interrelatedness of matter. CF 1
290-3-3-.15 (1)(a)2

Grading: Total Maximum Points for Each Category

Lesson Plans	100 points
Peer Teaching	100 points
Field Teaching	150 points
Unit	100 points
Review of Selected Resources	50 points
Case Studies	50 points
Scientist Presentation	25 points
Exams (2)	200 points
Final	100 points
Paper	100 points
Class Participation (requires attendance)	200 points

A	90-100
B	80-89
C	70-79
D	60-69
F	below 60

College of Education & Human Sciences

Conceptual Framework

***Click here* for a printable version of the complete Conceptual Framework Commitments - Updated Spring 2012**

The Conceptual Framework establishes a shared vision in preparing educators to work effectively in P-12 schools and provides direction for programs, courses, teaching, candidate performance, scholarship, service and accountability. The Conceptual Framework is continuously evaluated in an outcome based system, and is knowledge-based, articulated, shared and consistent with the University of North Alabama's institutional mission -

Changing lives. Creating futures.

The Conceptual Framework is designed to reflect current research-based knowledge and effective practices through professionalism, assessment, collaboration, technology, diversity and reflection. The UNA College of Education & Human Sciences prepares

"Knowledgeable Practicing Professionals" who:

1. Have content and pedagogical knowledge to demonstrate **professionalism** through a set of beliefs, actions, dispositions and ethical standards that form the core of their practice;
2. Have the knowledge and ability to use **assessment** strategies to guide teaching and learning, especially impact on student learning, and to strengthen instruction and increase professional growth
3. Form communities of learners with other teachers, parents, and members of the community, through **collaboration**, teamwork, and research-based approaches;
4. Use **technology** to support assessment, planning and instruction for promoting student learning;

5. Value and plan for **diversity** in curriculum development, instructional strategies and in the promotion of social consciousness;
6. Know and use self-awareness and **reflection** as decision-making tools for assuring student learning, professional performance and personal growth.

Graduates of the University of North Alabama's College of Education & Human Sciences are knowledgeable practicing professionals who are prepared as outstanding educators and leaders through achievement of the highest standards of knowledge and practice to assist all students to learn.