Auburn University Syllabus
CTSE 7510

Course Title: Research Studies in Area of Specialization: Secondary Science
Credit Hours: 3 semester hours
Prerequisites: Admission to departmental graduate program
Class meeting times: MWF 2462/4 Haley Center 6:00 pm-7:30pm (10 week Summer Session May 16, 2014-July 25, 2014)
Date Syllabus Prepared: September 2006, Revised May 2014
Students are required to check Canvas regularly for notes and important information. Please be sure to also check your AU email account regularly, as well.
Texts:
Recommended: Holly, M. L., Arhar, J., & Kasten, W. Action Research for Teachers: Traveling the Yellow Brick Road. 3rd edition (or most current edition required)
Additional Required Readings:
*Readings and articles will be disseminated or placed on reserve in the library or LRC. You are responsible for reading all materials prior to the class meetings and should be prepared to facilitate the group discussions on articles assigned. Lack of preparation and failure to have read assignments may result in point reductions from your final course grade.
Course Description:
Review, analysis, and interpretation of available research, with emphasis on interpreting new research to meet the changing needs of science teaching. Learn to recognize, use and apply results of both action and quasi-experimental research for the school environment. Research techniques will be discussed, with emphasis on their potential and limitations. Students will help write and defend a research proposal in their subject area. We will build and revise a model of how science learning occurs based on reading and interpretation of current research. We will examine how research has contributed to establishing national standards for classrooms.
Course Objectives: Upon completion of this course, students will be able to:
1. develop a model that explains how effective learning environments work with research that supports your model;
2. identify and use indices and other resources designed to help locate science research studies [ERIC, Dissertation Abstracts, other remote databases and library searching aids, and the internet.
3. learn to locate, read, and generalize from current research in science education - be a wise "consumer" of research;
4. learn to abstract research findings into a format easily shared with other science teachers; The instructor for the course reserves the right to make minor amendments to the syllabus or course as necessary.
5. describe those current national standards for science education that are derived from research and how research supports their implementation in your classroom;

6. identify current and probable future areas of promising science education research;
7. develop and defend a proposal to do research in an environment available to you.
8. address the issue of epistemology or knowing in research through: (a) study of different research paradigms in social science.
9. compare and contrast the two main methodologies in educational research.
10. be informed of some of the all-encompassing research findings on science learning.
11. become adept at using various library resources, as well as technology to learn about current research in the literature on science education.
12. develop a research proposal project on a specific classroom or school based issue in a particular area of interest in science education.
13. address issues of equity in science teaching.

Cultural Diversity
"I don't care that you know. I want to know that you care"
Author Unknown
This course reflects the College of Education's commitment to cultural diversity. The goal of professional education programs at Auburn University is to prepare outstanding educators who are competent, capable, and caring in complex, diverse educational arenas. Such individuals are
Effective in their roles as culturally responsive teachers, designing and implementing sound meaningful and balanced instruction with the full range of learners.
Effective as they assist learners in their comprehension of issues surrounding diversity; and
Effective in their contributions of thoughtful and informed discourse to their own educational communities as they work to build equitable and supportive environments learners.

Expectations
In this course I expect you to:
Reflect critically on all experiences and readings.
Be prompt and in attendance at all course sessions.
Demonstrate critical reflection through discussion, writing and course assignments.
Complete assignments to the best of your ability.
Communicate expectations and ideas.
Recognize and validate the values of other class members.

Course Requirements
Participation
This class is intended to be both interactive and collaborative. You are expected to come to class prepared to discuss assignments. We may also designate small groups during the initial class session, and you will spend some time doing group work. Learning is most effective when we fully participate in the process of constructing knowledge. In this course it is my expectation that everyone actively participate. Participation starts with preparation. It is my expectation that each class participant will be fully prepared for each day by having read the assigned materials and completed other work requested and required.

Please note that this is a course that moves quickly and students are expected to come prepared. The format of the course is discussion and student centered and the instructor promotes more student-student interaction.

In the event that you do have to miss a class please be advised that you may be required to make up the hours as field experience hours (at the discretion of the instructor for the course).

Late/remedial work policy
No late assignments unless in accordance with AU missed work policy (i.e. excused absence) and at the discretion of the instructor of the course.

Grading policy
General grading rubric for assignments
100%: beyond the call of duty; strikingly impressive; excellent in every way
90%: both complete and showing evidence of original, active, critical thought
80%: all specified aspects of assignments minimally completed
<80% one or more aspects of assignments missing or unacceptable

Grading Scale:
A 92%-100%
B 80%-91%
C 70%-79%
D 60%-69%
F <60%

Course Evaluation
Your final course grade will be based on the following:

Assignments	**Points**
Article/Seminar critiques 7 (5 points each)	35
4 pop quizzes (5 points)	20
Annotated bibliography on research interest	10
Midterm exam	20
Final project proposal	15
Field Experience (R) 15 fields hours	Required (failure to complete the 15 required hours may result in an automatic 15 point deduction from the final grade unless otherwise specified by the course instructor. Students must complete this field time or points may be deducted from their final grade)

Please pay special attention to specific course assignment due dates. There will be no late assignments accepted unless in accordance with AU policy for missed work (i.e. due to an excused absence). Some class meetings will entail a discussion of a featured chapter from the assigned readings. You are expected to have read assigned readings or assigned articles and bring prepared notes to use in contributing to class discussion. You may be invited to lead this discussion.

Article/Seminar paper and presentation guidelines

1. **Assignment must be a maximum 2 pages in length double-spaced and no less than 1 page. You are to present the article and upload the paper to Canvas on the assignment due date. Students are to use Prezi and at least 5 slides to present the "essence" of each article presented. Each student has 10 minutes to conduct the presentation and discussion for 5 minutes.**

Critique on article selected must be on "hot topics" in science education (preferably). Articles can address technology, equity, technology in the science classroom, NGSS, ELL in the science classroom, or any other recent topics in science and STEM education. Students will present the article (give a brief overview) 7 at 5 points each (35 points total).

Guidelines for in class presentations on seminar articles:
--Essentially we will share what we are learning from reading current published research. You will be asked to select an article that describes a quality research study in science education for grades 6-12.
--Each student will present a 10 minute presentation on the scheduled presentation days on their article selection for the week and respond to suggestions and criticism. You should use technology (Prezi) and other media to help us understand your main ideas. After the presentations there will be a 5 minute question/answer/discussion session.

Attention! Attention!

Additional guidelines: You will critique and discuss 7 articles and provide an overview or critique worth 35pts for all 7 articles (paper and presentation) for the seminar article. You will select a research article to critique from a science education journal which addresses hot topics and challenging issues in the area of science and science education. All assignments must be typed, double-spaced and in APA style 6th edition. Please select an article from one of the following suggested journals:
Science Teacher
Science Scope
Journal of Science Teacher Education
Journal of Research in Science Teaching
Science Education
School Science and Mathematics
Additional journals that may address issues related to science and science education may include:
Review of Educational Research
Journal of Negro Education
Journal of Counseling Psychology
Journal of Teacher Education
Educational Researcher
You may also access many journals online via Askeric.com or onlinejournals.com, or Auburn University library systems journals database. If there is a question about the journal you would like to use please see me. Please bring me the title of the journal and article that you plan to critique prior to the assignment due date for article critiques.
The journals are listed in order of potential usefulness for science education research studies. Avoid others except with prior approval.
Journal of Research in Science Teaching (1963-present), bimonthly, published by the National Association for Research in Science Teaching through John Wiley & Sons, Inc.: New York, NY, call number Q 181 .A1 J6
Science Education (1929-present), six per year, published by John Wiley & Sons, Inc.: New York, NY, call number Q1 .S385
American Educational Research Journal, quarterly, published by the American Educational Research Association: Washington, DC, call number L 11 .A66
Journal of Educational Research (1920-present), frequency varies, published by the American Educational Research Association, call number Folio L 11 .J75
Review of Educational Research (1931-present), five per year, each issue devoted to a specific topic with bibliography, call number L 11 .R35
Journal of Biological Education (1967-present), quarterly, pub. by Institute of Biology, call number QH 301 .J59
Journal of Chemical Education (1924-present), monthly, published by the Division of Chemical Education of the American Chemical Society, call number QD 1 .J93
Dissertations in science education (RBD Library and others available through Interlibrary Loan)

Preferably the article should relate to current issues related to science education. Please let me know if you have difficulty locating articles.

Please share with the class your article selection during the prior class meeting to ensure that students do not present on the same article. Also be sure not to present subsequent articles on an article that has already been presented. Discuss with your classmates articles so as not to duplicate assignment presentations.
Format:

1. Attach a citation of the article and scan the article and post it to Canvas assignment posting no later than 30 minutes prior to the class meeting time/due date for the assignment and attach the assignment to Canvas as well. All assignments are to be turned in electronically. If there is no posting for the assignment on Canvas then students are to email the assignment no later than 30 minutes prior to the class meeting time for the due date of the assignment.
2. All articles must be from research journals and no articles prior to 2004.
3. Include a complete citation for the article at the bottom of the last page in APA 6th edition style.
4. Writing must be clear, and paper well organized. Please type all papers.
5. If possible attach the assignment in a PDF file on Canvas or MS word document so that I can make comments in the document through edit options.

Rubric for grading the seminar presentation articles submitted
Criteria for grading assignments: 5 points total (7 total critiques due). Total credit for all 5 seminar articles will be 35 points.
1. Overview that describes the article in NO more than 1-2 paragraphs (failure to adhere to this policy will result in 1 point deduction). The paper is to be written as a ritique and validity of your perceptions of the article determine the value of your work. Please organize thoughts with the reader in mind. (1 point)
2.After the first 1-2 paragraphs you must then discuss and critique each of the author's major assertions or major themes. Discuss your perspective on these themes. You must provide sound evidence to support your argument for or against the author's stance. Please do not re-write article. Summarize the article ONLY in a brief introductory paragraph. All critiques should be in your own voice. (1 point)
3. You must discuss the data collection and data analysis strategies used in this article to come up with the author's conclusions or assertions. (1 point)
4. Discuss whether you agree or disagree with the data collection and data analysis techniques used (why or why not). (1 point)
5. Discuss what you would have done differently if you were to conduct this study and why. (1 point)

2. ---There will be 4 Pop quizzes: 20 points total (5 points each quiz)

There will be 4 unannounced pop quizzes at 5 points each. (20 pts). These pop quizzes will be on assigned readings and discussions in class

3. Annotated bibliography: List 5 citations of articles of similar research studies and provide an annotated bibliography that briefly addresses their findings. Annotated bibliography on topic of interest. You should be able to provide a brief 1 paragraph annotation/overview of the article and findings, etc. **10 points (2 point each article annotation).**

4. Midterm exam: May include short answer, description format. More details to be provided prior to exam. 20 points

5.Final project proposal and presentation 15 points total. (10 points paper and 5 point presentation)
. This assignment will be the initial outline proposal. The topic or problem should be the basis for your mini/mock action research proposal. The problem should be a current issue in the science or STEM classroom. Due date: July 21, 2014. Moreover, the design and purpose of this proposal project should be an area of research that examines methods for improving student learning or science teaching so that we ensure educators that science is for ALL students.

Overview of proposed mini action research proposal

A. 1-2 paragraph introduction of the problem (also known as the problem statement) you are investigating (2 points)
B. Rationale for this proposal or action research endeavor (2 points)
C. 2-3 pages of a review of literature (2 points) that has already been conducted on this topic; Brief discussion of findings (2 points); Include at least 2 citations of prior research studies on this topic (1 points)
D. 2 questions that you will use to guide your investigation (2 points)
E. Description of how you propose to investigate the problem. For example what research methodology will be most appropriate for the study quantitative or qualitative, etc. Be sure to provide justification of your paradigm. (2 points)
F. Data Collection strategies you propose and sampling strategies and techniques most appropriate for the study you are proposing (2 points)

Presentation no more than 10 minutes in PREZI. Highlight main points of proposal. At least 5 slides (5 points total)

6. Field experience hours (Required to complete 15 hours). Additional guidelines are included in the files section of Canvas. For further questions contact your advisor.
Students are required to document and complete at least 15 field experience hours either tutoring or working with some type of summer camp or summer program/outreach experience, or teaching in a classroom for summer school (see field experience guide provided in Secondary Science Education Graduate Student Orientation). Please note that some if not all of the hours may be completed at the approved summer field experience sites only and may be supervised by the graduate students working with this course of course instructor. Please keep in mind that all outreach activities must first be approved by the instructor of the course. Moreover, outreach activities are based on availability of programs and with prior approval from the instructor for the course and at the sole discretion of the instructor for the course. In addition, some students may have already completed the program hours required (total 150 field hours) prior to taking this course. Tentatively a Project Wild/Learning Tree training workshop will be held from 8:00-3:30pm CST. An additional field trip may also be scheduled for the Forest Ecology Preserve or Arboretum. TBA
Additional guidelines for 5th year students field experience requirements are available from your assigned advisor relative to how to complete the hours and guidelines for completing the hours. Please see your advisors for details or questions.

Course Content and Schedule:
Week 1
May 16
Overview of course
Get acquainted. Discuss syllabus and course objectives. Discuss resources available for this course.
Action research and its value for improving classroom teaching. Attempt to define effective teaching, and build a working model for how it works: inputs and outputs. Discussion on action research. Students are assigned to look up the term action research and begin working on a literature search for topics they are interested in learning more about relative to STEM or Science Education.
May 19
AMSTI site- Inquiry based instruction
May 21
Guest Speaker-Informal Science Education

Week 2
May 23
What can educational research tell us about effective science teaching? Discuss action research and its value for improving classroom teaching. Investigate current research on effective teaching in the science classroom, and build a working model for how it works: inputs and outputs. Discussion on action research.
May 26-Memorial Day
May 28
Article Critique #1 due-Mustbe on an action research based topic in STEM or Science Education
Discussion on action research

Week 3
May 30:
Library research day/students will work in the LRC only: Students are assigned to select a research interest that is a problem in science education or STEM education (either in or outside of the science classroom) and upload the answers to the following questions no later than 7:30pm pm CST: What is your research interest? Why is this a problem? How would you investigate this topic? Why does it interest you?
June 2
Annotated bibliography due. There will be a link posted to Canvas.
Report to class on your selected research topic for your final proposal. Bring a 1 page draft of what you propose to investigate for your proposal project. Be sure to include the following information: What is your research interest? Why is this a problem? How would you investigate this topic? Why does it interest you?
Discussion of proposed research interest for final proposal
June 4
Article Critique #2 due-Must be on an equity issue in STEM or Science Education. Upload to Canvas no later than 7:30pm.
Conducting a study; Introduction, literature review-SLO-5

Week 4
June 6
Library research day:
List 5 citations of similar research studies from a research article on your research topic of interest and provide an annotated bibliography (1-2 paragraph overview of article) that briefly addresses their findings (SLO 1-5). This assignment is to be uploaded to Canvas no later than 7:30 pm CST.
June 9
Guest Speaker-Tentative field trip (TBA)
June 11
Article Critique #3 due-Must be on Informal STEM or Science Education. Upload to Canvas no later than 7:30pm
Guest Speaker-Tentative field trip (TBA)

Week 5
June 13
Library resource day: Article critique #4 due. Must be on a topic related to technology in STEM education Upload assignment to Canvas no later than 7:30pm
June 16
Qualitative and Quantitative research methods
June 18
Midterm exam

Week 6
June 20 Library research day
Conducting a study; literature review, statement of the problem (SLO 1-5)
IRB procedures and protocols; Ethic in research
Ethics in research
Data collection; Sampling strategies
June 23
Ethics in research
Data collection; Sampling strategies
June 25
Data collection
Article Critique #4 due- Topic of your choice in STEM education

Week 7
June 27
Students meet with partners and collaborate on data collection strategy with classmate (interviewing assignment)
June 30
Data collection
July 2
Library Resource Day; Research on mock proposal topic

Week 8
July 4 Independence Day- No class
July 7
Data analysis
July 9
Data analysis

Week 9
July 11
Library resource day: Article Critique #5 due-Must be on assessment in STEM education
July 14
Data reporting
Guest speaker

July 16
Data reporting

Week 10
July 18
Library Research Day: Article Critique #6 due-Topic of your choice in STEM or Science Education
July 21 Mock Proposal due (This will be considered the final exam for the class). Failure to complete and turn in by the due date may result in not passing the class since no credit will be received for this assignment and no make up allotted (unless documentation of illness in accordance with AU absence policy is provided or if the student is excused based on the AU absence policy at the discretion of the instructor for the course).
July 23
Article Critique #7- Must be on ELL or Emergent Bilinguals in STEM or Science Education
Review of Action Research topics covered
July 25
Last day of class-Review
Reading day-July 26
Final exam period-July 28-30 No Final Exam

Examples of research journals:
Use only these journals to locate research articles that you will read and abstract. The journals are listed in order of potential usefulness for science education research studies. Avoid others except with prior approval. Please verify that the location in the library is current.
Journal of Research in Science Teaching (1963-present), bimonthly, published by the National Association for Research in Science Teaching through John Wiley & Sons, Inc.: New York, NY, call number Q 181 .A1 J6
Science Education (1929-present), six per year, published by John Wiley & Sons, Inc.: New York, NY, call number Q1 .S385
American Educational Research Journal, quarterly, published by the American Educational Research Association: Washington, DC, call number L 11 .A66
Journal of Educational Research (1920-present), frequency varies, published by the American Educational Research Association, call number Folio L 11 .J75
Review of Educational Research (1931-present), five per year, each issue devoted to a specific topic with bibliography, call number L 11 .R35
Journal of Biological Education (1967-present), quarterly, pub. by Institute of Biology, call number QH 301 .J59
Journal of Chemical Education (1924-present), monthly, published by the Division of Chemical Education of the American Chemical Society, call number QD 1 .J93
American Biology Teacher
Dissertations in science education (RBD Library and others available through Interlibrary Loan)

Class Policy Statements:
Participation: Students are expected to participate in all class discussions and participate in all exercises. It is the student's responsibility to contact the instructor if assignment deadlines are not met. Students are responsible for initiating arrangements for missed work. The instructor for the course reserves the right to make minor amendments to the syllabus or course as necessary.

*Traditional Masters students- Please note that traditional Class A certification students will be required to complete a field project and 30 clock hours of field experience hours as a requirement for this course.
Attendance/Absences: Attendance is required at each class meeting. If an exam is missed, a make-up exam will be given only for University-approved excuses as outlined in the student eHandbook. Arrangement to take the make-up exam must be made in advance. Students who miss an exam because of illness need a doctor's statement for verification of sickness and should clear the absence with the instructor the day they return to class. Other unavoidable absences from campus must be documented and cleared with the instructor **in advance**. Attendance is mandatory and participation is paramount for success in this class. You are responsible for attending all class sessions. In the event of an emergency (or something pretty close to it) please make every effort to notify me in advance (prior to the class meeting). You are required to contact the instructor personally in advance for the absence via e-mail, telephone, or leave a message with the administrative asst. Mary Lin, or Elaine Prust in the Dept. of Curriculum and Teaching (844-4434) if you are unable to contact me personally in the event of an emergency. Students are allotted one absence (either excused or unexcused) but you are still required to contact the professor in advance. Failure to contact the professor prior to this absence may result in a 5 point deduction per absence from the actual grade earned for the class. In addition, each absence may result in a five point deduction per absence. After three absences students will be recommended for withdrawal from the class. Should an extended illness or family emergency arise please notify your instructors as soon as possible. In the event that there is an absence it must be in accordance with Tiger Cub policies on absences in order to be excused. Please remember that assignments are still due, in the event that you are absent. Attendance is mandatory. *Please arrive at each class on time (6:00 pm) and be prepared to discuss and respond to issues and topics covered in the class. Excessive tardiness will not be accepted and two tardies (more than 10 minutes late) will be considered as one absence and will result in a 5 point deduction from your final grade. Moreover, late students may not be permitted to enter class and may be counted as an unexcused absence at the discretion of the professor of the course.
*If you miss a class, you are still required to turn in the assignments on time for full credit. Please contact me prior to turning in your assignment via e-mail as an attachment only. In the event that you are have an excused absence in accordance with AU's excused absence policy all assignments must be turned in no later than 3 days after the date you miss class. Preferably, unless you have a medical emergency make every effort to turn assignments in on the date that they are due even if you have an excused absence.

Unannounced quizzes: There will be 4 unannounced quizzes.

Accommodations: Students who need accommodations are asked to arrange a meeting during office hours the first week of classes, or as soon as possible if accommodations are needed immediately. If you have a conflict with my office hours, an alternative time can be arranged. To set up this meeting, please contact me by e-mail. Bring a copy of your Accommodation Memo and an Instructor Verification Form to the meeting. If you do not have an Accommodation Memo but need accommodations, make an appointment with the Program for Students with Disabilities at 1244 Haley Center, 844-2096 (V/TT).

Honesty Code: The University Academic Honesty Code and the Tiger Cub Rules and Regulations pertaining to Cheating will apply to this class.
"As members of the academic community, students are expected to recognize and uphold standards of intellectual and academic integrity. The university assumes as a basic and minimum standard of conduct in academic matters that students be honest and that they submit for credit only the products of their own efforts. Both the ideals of scholarship and the needs for fairness require that all dishonest work be rejected as a basis for academic work." (AU Bulletin) Any questions related to academic honesty will be subject to the Policy on Academic Honesty as stated in the Auburn University Bulletin.

Professionalism: As faculty, staff, and students interact in professional settings, they are expected to demonstrate professional behaviors as defined in the College's conceptual framework. These professional commitments or dispositions are listed below:

Engage in responsible and ethical professional practices

Contribute to collaborative learning communities

Demonstrate a commitment to diversity

Model and nurture intellectual vitality

Auburn University's official Contingency Plans will apply to this course in the event of an emergency, etc.

Justification for Graduate Credit
Graduate courses "should be progressively more advanced in academic content than undergraduate programs" and should "foster independent learning" (SACS guidelines 3.6.1 and 3.6.2).
Factors to consider in evaluating a course for graduate credit include but are not limited to the following:
use of specific requisites; content of sufficient depth to justify graduate credit (materials beyond the introductory level); content should develop the critical and analytical skills of students including their application of the relevant literature; rigorous standards for student evaluation (all students in a 6000-level course must be evaluated using the same standards); course instructor must hold graduate faculty status or be approved by the Dean of the Graduate School.