

**Research Studies in Science Education
CTSE 7510
Summer 2011 Course Syllabus and Timeline**



Course Number: 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: TWF 6:00pm-9:00pm 2462/4 Haley Center (Summer Session II-5 week)

Date Syllabus Prepared: September 2006, Revised June 2011

Texts:

Holly, M. L., Arhar, J., & Kasten, W. (2009). Action Research for Teachers: Traveling the Yellow Brick Road. 3rd ed. Upper Saddle River.

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 (AUBIE Cat and electronic mail)];
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.

Late/remedial work policy

No late assignments unless in accordance with AU missed work policy (i.e. excused absence)

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:

<u>Assignments</u>	<u>Points</u>
Assignment #1 (Problem statement and draft)	15
Assignment #2 (Article critique)	15
Final Exam	25
Final Mock action research proposal	20 (15 proposal; 5 presentation)
4 pop quizzes at 5 points	20
Article seminar presentation 5 at 1 point each	5
Field Experience	(R) 25 fields hours (Students may have already completed field hours).

The instructor for the course reserves the right to make minor amendments to the syllabus or course as necessary.

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). Each class meeting will entail a discussion of a featured chapter from the assigned textbook or additional assigned readings. You are expected to have read the chapter or assigned articles and bring prepared notes to use in contributing to class discussion. You may be invited to lead this discussion.

1. Assignment #1 (15 pts) Due date: July 13, 2011

This assignment will be the initial outline for the mock or mini research proposal. The topic or problem should be the basis for your mini action research proposal. The problem should be a current issue in the science classroom and it should have an Due date: July 13, 2011. The goal of this assignment is to design and present a suitable action research proposal in your discipline based on the specifications for a research proposal discussed and provided in class and in the assigned readings. The research topic should address issues of equity in science teaching and learning. 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 paragraph brief 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 (2 points)
- F. Data Collection strategies you propose (2 points)

2. Assignment #2 (15 pts) Due date: July 6, 2011

Article Critique

You will critique one article worth 15%. 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 5th or 6th edition. Please select an article from one of the following suggested journals:

Science Teacher
Science Scope
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
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.

Preferably the article should relate to current issues related to evaluation and assessment in science and/or science education. Please let me know if you have difficulty locating articles. Critique should address the criteria listed below and discussed in class. Write a maximum 3 page critique.

Format:

1. Attach a copy of the article.
2. All articles must be from research journals and no articles prior to 2000.
3. Include a complete citation for the article at the bottom of the last page in APA 5th or 6th edition style.
4. Allow sufficient margins for the instructor to make marginal notes and comments.
5. Please do not staple. Place a paperclip in the upper left corner

Criteria for grading assignments: 15 points total

Attach a copy of the article to the critique.

1. Writing must be clear, and paper well organized. Please type all papers. (2 points)
2. All articles must be from research journals and no articles prior to 2000. The article critique must include citations that support the stance of your critique (or even the authors assumptions if you are in agreement) from 2 other sources (2 points).
3. The soundness of your critique and validity of your perceptions of the article determine the value of your work. Please organize thoughts with the reader in mind. (2 points)
4. Discuss and critique at least 2 of the author's major assertions. (2 points)
5. Identify major themes of the article and discuss your perspective on these themes (2 points).
6. Please do not re-write article. Summarize the article in a brief introductory paragraph. All critiques should be in your own voice. (2 points)
7. You must discuss the data collection and data analysis strategies used in this article to come up with the authors conclusions or assertions. (1 point)
8. Discuss whether you agree or disagree with the data collection and data analysis techniques used (why or why not). (1 point)

The instructor for the course reserves the right to make minor amendments to the syllabus or course as necessary.

9. Propose how you would approach this study differently. (1 point)
10. Article must be a maximum 3 pages in length double-spaced and no less than 2 pages
Grades on assignments, as well as questions, or concerns can be discussed during appointment times.

3. Pop quizzes: (20 points total)

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

4. 20 point Final (Mock) Mini Action Research proposal project (15 pts) Presentation (5 pts) Due date: July 26

This will be the more detailed final version of the initial draft of this assignment completed on July 13. Please remember the purpose of this project was to design and present a suitable action research study in your discipline based on the specifications for a research proposal discussed in class and in the assigned reading. The research topic should address issues of equity in science teaching and learning. Moreover, the design and purpose of this 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. Proposal will be presented and student presentations will also be evaluated. You will also be critically evaluated on the degree of professionalism of the presentation. Additional guidelines for proposal as well as evaluation rubric will be disseminated prior to due dates. Presentation must consist of a 10 minute overview of proposal and contain no more than 5 slides that address the action research proposal. Please be prepared for questions. The research proposal should be in APA style 6th ed. All projects must be a maximum of 10 pages and no less than 5 pages double-spaced. No creative margins, please. The assignment should also be double-spaced. No late proposal assignments or presentations will be accepted unless in accordance with the AU policy for missed work (i.e. excused absence) Please note that the proposal project final grade may also include routine checks on the status of your research proposal. Periodically work *completed on research proposals may be turned in for the professor to assess progress. Please make sure to bring all work done on proposals to each class meeting. Failure to be prepared for these checks on research proposals may result in point deductions from your final grade.*

5. Weekly seminar presentations on articles on action research in the science classroom (unless you find an interesting topic outside of the science classroom). (5 at 1 point each)

--In addition, 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 seminar on the scheduled seminar days which presents their article selection for the week and responds to suggestions and criticism. You should use technology and other media to help us understand your main ideas. In addition, we will share what we are learning from reading current published research on a weekly basis as a seminar on scheduled Fridays.

--You will provide the instructor with a 1 page summary and overview of the study and any major findings or assertions made from the article.

Use 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.

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)

6. Final exam period August 1-3, 2011 (25 points)

7. Field experience hours (R)

Students must document 25 field experience hours either tutoring or working with some type of summer camp or summer program/outreach experience (see field experience guide provided in Secondary Science Education Graduate Student Orientation). Please note that due to the fact that this course is offered in a 5 week mini session there may be some flexibility of when field hours can be completed and students are allowed to complete some of the hours outside of the specified 5 week summer session. Please keep in mind that this is also 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.

Course Content and Schedule:

Class meeting dates (Tentative Schedule)

Week 1

June 28, 29, July 1

Overview of course

Get acquainted. Discuss syllabus and course objectives. Discuss resources available for this course.

Discussion of research methodology in science education. What can educational research tell us about effective science teaching?

Discuss 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.

July 1: Articles on current research in the classroom. (Seminar)

The instructor for the course reserves the right to make minor amendments to the syllabus or course as necessary.

Week 2

July 5, 6, 8

What can educational research tell us about effective science teaching? Discuss 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.

Assignment #2 Article critique due July 6

July 8: Articles on current research in the classroom (Seminar)

Week 3

July 12, 13, 15

July 12- Designing an Action Research Study Doing Action Research research in LRC

Assignment #1 due July 13 (see guidelines provided)

Discussion on Action Research in education (and science education)

Discussion of research methodologies: Qualitative vs. Quantitative

Ethics in research

July 15: Articles on current research in the classroom (Seminar)

Week 4

July 19, 20, 22

July 19 Discussion of research methodologies: Qualitative vs. Quantitative

Action Research in education: Data Collection and research in LRC

July 20- Designing an Action Research Study; Data Analysis

July 22: Articles on current research in the classroom (Seminar)

Week 5

July 26, 27, 29

Last week of class

Data Collection and IRB process

Ethics in research

July 26 presentation of mini-action research proposal and proposal due

July 27 Articles on current research in the classroom (Seminar)

July 29 Last day of class wrap up

July 30

Reading day

Final Exam period August 1-3 (August 1 7:00pm to 9:30pm)

If you have any questions, comments, or do not understand a specific assignment please make arrangements immediately to meet with the professor to discuss your issues.

- I. Please keep in mind that each class meeting will entail a discussion of a featured chapter from the assigned textbook or additional assigned readings. You are expected to have read the chapter or assigned articles and bring prepared notes to use in contributing to class discussion. You may be invited to lead this discussion.
- I. In addition, we will share what we are learning from reading current published research on a weekly basis as a seminar on scheduled Fridays. You will select an article that describes a quality research study in science education for grades 6-12 and discuss this article briefly with the class on the scheduled seminar days. You will provide the instructor with a 1 page summary and overview of the study and any major findings or assertions made from the article.
- II. For the mini action research proposal you will explore a research theme of common interest. You will prepare a research proposal related to an action research question that "needs" an answer in a local school setting. An example and evaluation criteria will be provided.
- IV. As a final presentation of your final mini action research proposal each student will present a 10-minute seminar, which presents their research proposal and responds to suggestions and criticism. You should use technology (includes 5 slides) and other media to help us understand your main ideas. This research proposal and seminar should be on a topic selected to be of real interest to your classmates, well designed, and likely to be carried out. An example of format will be provided.

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

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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.

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 Tiger Cub. 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. 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 and

*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 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

University 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.

The instructor for the course reserves the right to make minor amendments to the syllabus or course as necessary.