

**Department of Mathematics and Science Education**  
**Secondary Science Teacher Education Program**  
**Spring Semester 2007**  
**ESCI 4450/6450, ESCI 4460/6460, and ESCI 3450**

Class Meeting Time: M-F 8:00-9:55

Meeting Locations: 215 Aderhold Hall & Barrow County Schools (Our practicum is a site based course and we have been given a homeroom at Haymon Morris Middle School).

Course Instructor:

Dr. Norman Thomson

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**ESCI 4450/6450 Science Curriculum and Learning**

Science curriculum models for students in grades 7 through 12 in relation to goals for science education and classroom practice. Development, selection, and evaluation of curriculum materials based on research in learning.

**ESCI 4460/6460 Methods of Science Teaching**

Science instructional strategies and classroom assessment for grades 7 through 12. Classroom management, lesson planning, and safety in the science classroom.

Prerequisite: EPSY 2020 and EFND 2030

**ESCI 3450 Practicum in Science Education**

Intensive school-based experiences in grades 7 through 12 requiring students to teach in varied cultural and regional settings.

Co-requisite: ESCI 3450 and ESCI 4450/6450

Prerequisite: EPSY 2020, EFND 2030, ESCI 4480

**Nature of Course Syllabi**

The course syllabi for ESCI 4450/6450, ESCI 4460/6460, and ESCI 3450 are general plans for the courses; deviations announced to the class by the instructor may be necessary. LiveText will serve as the platform for communicate and feedback about many of the course assignments. Information about how to use LiveText to facilitate your work will be presented in an early class session. In addition, you will be making one videotape of yourself teaching a lesson and this will be analyzed using the Video Analysis Tool.

**Attendance Policy**

Good attendance and punctuality are critical elements of teacher professionalism. It is recognized that students get sick, attend professional meetings, and have family emergencies, but attendance and participation are prerequisites to learning. For the purposes of class attendance only, the semester will be since we have 3 courses, 2 periods associated with each course will be allowed. Thus, it would not be considered professional to miss six successive days during the practicum phase of the semester.

If you miss no more than two periods during any phase, are on time each day, and participate fully in class activities, you may earn all the points for attendance and participation towards the grade for the course associated with that period. Two unexcused absences (without written documentation) will result in the deduction of points equivalent to 5% of your course grade. Each tardy beyond the first will result in the deduction of points equivalent to 2% from your course grade. Arriving more than 30 minutes late or leaving class with 30 minutes or more remaining will count as an absence. If you have extenuating circumstances that cause you to be absent more than twice during any period (serious illness with written documentation), please consult Dr. Thomson about how you might make up the missed days. If you are

absent from more than four successive class meetings during the semester, you may be dropped from the three block courses.

### **Academic Honesty**

The University of Georgia seeks to promote and ensure academic honesty and personal integrity among students and other members of the University community. In keeping with the University Honor Code and Academic Honesty Policy, each student is expected to do his/her academic work and to acknowledge fully any assistance and academic resources. All academic work must meet the standards contained in "A Culture of Honesty." All students are responsible to inform themselves about those standards before performing any academic work. Terms of this policy, resolution procedures, and consequences of violation are available at:

[http://www.uga.edu/ovpi/academic\\_honesty/culture\\_honesty.html](http://www.uga.edu/ovpi/academic_honesty/culture_honesty.html)

### **Requests for Modifications**

It is policy of the University of Georgia to make reasonable accommodations for qualified individuals with disabilities. If you are a person with a disability and want to request accommodations to complete your course requirements, please make an appointment with the course instructor as soon as possible to discuss your request. For information on documentation requirements, contact the office of Disability Services (2-8719).

### **A Note About Observations**

During the semester you will be observed as you teach by your university instructor, the teaching assistant, intern, classroom teachers, and your classmates. These observations are opportunities to gain insight into your teaching through the perspectives of others. Talking about your teaching with others is an important mechanism for improving your understandings about science content, teaching, and student learning. An element of several assignments for ESCI 4450/6450 and ESCI 4460/6460 require that you make arrangements to have an instructor observe you teach. You will also make a video of yourself teaching one lesson in school and will critique this lesson. This video will be uploaded to the Video Analysis Tool in the Learning Performance Support Laboratory where an assessment instrument consistent with NSTA Standards will be used.

### **Textbooks**

#### **Required**

Chiappetta, E. L., & Koballa, T. R. (2006). *Science instruction in middle and secondary schools*. Upper Saddle River, NJ: Merrill Prentice-Hall.

Koballa, T. R., & Tippins, D. J. (2004). *Cases in middle and secondary science education: The promise and dilemmas*. Upper Saddle River, NJ: Merrill Prentice-Hall.

### **Semester Requirements and Grading Summary**

- 1. Attendance and participation 15% (=150 points)**
- 2. Development of NSTA Standards Assignments 50% (=1150 points)**
  - Standard #1: Content = 75 points**
  - Standard #2: Nature of Science = 75 points**
  - Standard #3: Inquiry = 75 points**
  - Standard #4: Issues = 100 points**
  - Standard #5: General Skills in Teaching = 300 points**
    - Learning Environment Plan = 100 points**
    - Demonstration Lesson = 100 points**
    - Laboratory Lesson = 100 points**
  - Standard #6: Curriculum = 150 points**
  - Standard #7: Science in the Community = 100 points**
  - Standard #8: Assessment = 100 points**
  - Standard #9: Safety and Welfare = 100 points**
  - Standard #10 Professional Growth = 100 points**

### **3. Teaching Practicum 25% (= 500 points)**

### **4. Final Portfolio 10% (= 200 points)**

### **Total Possible Points = 2000 points**

Grades are assigned by summing each students' points and dividing by 2000 to obtain a percentage with 93-100 percent = A; 90-92 percent = A-; 87-89 percent = B+; 83-86 percent = B; 80-82 percent = B-; 77-79 percent = C+; 73-76 percent = C; 70-72 percent = C-; etc.

### **ESCI 4450/6450: Science Curriculum and Learning**

In this course, you will learn about essential aspects of science curriculum and how curriculum can be used to enable student learning. The course is organized around three major themes: (1) science is a way of thinking and investigating as well as a body of knowledge, (2) effective instructional planning enables and facilitates student learning, and (3) standards and assessment are inextricably linked, guiding how teachers teach and what students learn. Topics to be addressed include: the nature of science, inquiry, social context of science teaching, context of science, curriculum, and professional practice.

The following driving questions will be explored in this course:

1. What is the nature of science? How can school science help students become scientifically literate citizens?
2. What does inquiry look like in the context of school science?
3. How can community resources and students' interests be used to plan science lessons that are relevant and appropriate?
4. What innovative instructional materials are available for use in guiding students' science learning?
5. How can teachers plan instructional units to actively engage students in meaningful science learning?
6. What are your personal teaching goals and philosophy of teaching? How can participation in activities of the professional community of science teachers enable you to develop as a teacher?

### **Course Goals**

By the end of this semester, you will be able to:

- Demonstrate your understanding of what constitutes a curriculum and plan a unit of study within your area of content specialization
- Plan and teach lessons that focus on issues and science in the school community and know how the community is part of the school and vice versa.
- Show that you understand the hierarchical organization of core concepts in the science discipline you will teach.
- Plan an instructional unit that help student learning and develop an interest in science.
- Be able to create and classroom environment that is safe and has the welfare for all who are a part of your teaching.

### **Course Participation**

**1. Attendance and participation (50 points)** – This assignment is explained in the introduction to the block courses.

### **ESCI 4450/5450 Curriculum Course Assignments**

If you have questions about any assignment, please consult the instructor. The assignments may have a performance (teaching) component to them, as well as a written component. All written components of the assignments must be typed.

For full descriptions of the standards and their relationship to teaching see the course handbook on standards and assignments.

**2. Standard #4: Issues = 100 points**

**3. Standard #6: Curriculum = 150 points**

**4. Standard #7: Science in the Community = 100 points**

**5. Standard #9: Safety and Welfare = 100 points**

**6. Standard #10 Professional Growth = 100 points**

**Total Points = 600 points**

### **ESCI 4460/6460: Methods of Science Teaching**

In this course, you will learn the essential elements of planning, teaching, and assessment in the secondary science classroom. The course is organized around three major themes: (1) engaging students in active learning in science, (2) teaching science for all students, and (3) continuing to learn from your own teaching. Topics to be addressed include: science content, teaching skills, assessment, and environment for learning. The following driving questions will be explored in this course:

1. How do adolescents learn science? What is the difference between learning and just completing the task?
2. How can teachers plan instruction to actively engage students and present a variety of representations?
3. How can teachers teach so that all students may learn science?
4. How can teachers organize the classroom environment to facilitate student learning?
5. What are the most effective ways to assess students' science learning?

#### **Course Goals**

By the end of this semester, you will be able to:

- Demonstrate knowledge of the fundamental skills needed for planning, teaching, and assessing in the secondary classroom.
- Show that you can effectively engage students in active science learning through multiple teaching strategies.

**1. Attendance and participation (50 points)** – This assignment is explained in the introduction to the block courses.

#### **Course Requirements and Grading Summary**

If you have questions about any assignment, please consult the instructor. The assignments may have a performance (teaching) component to them, as well as a written component. All written components of the assignments must be typed.

For full descriptions of the standards and their relationship to teaching see the course handbook on standards and assignments.

- 2. Standard #1: Content = 75 points**
  - 3. Standard #2: Nature of Science = 75 points**
  - 4. Standard #3: Inquiry = 75 points**
  - 5. Standard #5: General Skills in Teaching = 300 points**
    - Learning Environment Plan = (100 points)**
    - Demonstration Lesson = (100 points)**
    - Laboratory Lesson = (100 points)**
  - 6. Standard #8: Assessment = 100 points**
- Total Points = 575 points**

Grades are assigned by summing each students' points and dividing by 500 to obtain a percentage with 93-100 percent = A; 90-92 percent = A-; 87-89 percent = B+; 83-86 percent = B; 80-82 percent = B-; 77-79 percent = C+; 73-76 percent = C; 70-72 percent = C-; etc.

### **ESCI 3450: Practicum in Science Education**

In this practicum, you will interact with students and teachers in schools. The intent of this practicum is to allow you to experience science teaching and learning in middle and high school classrooms. The practicum will also enable you to test some of your developing understandings about students, teaching, planning, assessment, and the learning environment. The topics addressed in the practicum are the same as those described for ESCI 4450/6450 and ESCI 4460/6460. While in science classrooms, you will observe, work with small groups of students, assist classroom teachers in many ways, and teach lessons. It is important to remember that while in schools and interacting with teachers and students, **YOU ARE THE UNIVERSITY of GEORGIA**. Please ensure that your dress and actions reflect well on yourself and the University.

The driving questions and course goals for this practicum are the same as those for ESCI 4450/6450 and ESCI 4460/6460. Your time in science classrooms should enable you to develop richer and better-informed answers for the driving questions and achieve the goals within the context of secondary school science.

### ***Course Requirements and Grading Summary***

- 1. Attendance and participation (50 points)** – This assignment is explained in the introduction to the block courses.
- 2. Judging a Science Fair 25 points**
- 3. Soaring in Science Day 25 points**
- 4. GSTA Presentation 50 points**
- 5. Teaching at the high school level = 200 points**
- 6. Teaching at the middle school level = 200 points**
- Teaching Experiences = 500 points**

Grades are assigned by summing each students' points and dividing by 500 to obtain a percentage with 93-100 percent = A; 90-92 percent = A-; 87-89 percent = B+; 83-86 percent = B; 80-82 percent = B-; 77-79 percent = C+; 73-76 percent = C; 70-72 percent = C-; etc.

### **Final Portfolio 10% (= 200 points)**

A selection of 20 items, 2 each that represent the ten National Science Standards and reflect your preparation for the teaching profession at the end of the course. See details in course packet.

### ***Daily Practicum Tasks***

1. Find the appropriate place to park in the school lot. Introduce yourself at the office as a future science teacher representing the University of Georgia. Always be patient and courteous, wear a smile, and comment positively about the school, students, and teachers. Your positive comments may make someone's day, it's infectious, and they will remember and look forward to your arrival each day.
2. "Sign in" in the office upon your arrival, get a nametag, and "sign out" when you exit the school. Remember that the principal is responsible for knowing at all times who is in her/his building.
3. Walk around the campus so you get to know more about the high school and middle school science areas, where the faculty restrooms are located, etc.
4. If one exists, consider visiting the faculty workroom to find out what goes on there. It is recommended that you not discuss politics or religious affiliation. For issues that involve the politics of the school remain neutral or quiet—you are a visitor and guest of the school, not a sounding board, mediator, or negotiator. Similarly, some teachers may use the faculty workroom to complain about colleagues or students. Avoid the discussion, but learn from what you hear.

### ***Possible Practicum Experiences***

1. Examine the school's web site. From the web site or other sources, learn about the school motto, mascot, philosophy and rules. If you don't find the student handbook and school calendar, ask where this information can be obtained. The student handbook includes information about school rules, grading, homework arrangements, curriculum, extracurricular activities, etc.
2. Make a sketch of the classrooms you are working in and learn the names of students. Do this the first day and memorize the names of students the first night. This is not only the first element of effective classroom management, but it shows the students that you care about who they are. Ask your teacher about how she/he prepares for the first day of school, introduces the year's work and classroom rules. What are the safety rules in the science classroom and how are emergencies handled, first aid, and fire extinguishers? Is students' work displayed in the classroom? If teachers are using a computerized system for record keeping, ask to see how it is done. 3. Conduct interviews with first-year teachers and ask them about the joys and challenges that they associate with their jobs.

Write a report summarizing the teachers' responses and giving your opinion about whether you share their ideas about the joys and challenges of teaching.

4. Interview a science teacher who has served as the mentor for beginning teachers in the past. Ask the teacher about his or her expectations for a beginning science teacher in the areas of lesson planning, instruction, classroom management, and learning assessment. Prepare a report summarizing your findings and drawing conclusions regarding your own preparation for science teaching.
5. The National Science Teachers Association (NSTA) is the largest organization in the world committed to the advancement of science teaching. Access the NSTA web site [[www.nsta.org](http://www.nsta.org)] and check out its teacher resources, events for science teachers, and professional journals—*The Science Teacher*, for high school teachers, and *Science Scope*, for middle school teachers. Join NSTA as a student member.
6. Start a notebook of science teaching ideas and materials. Organize your notebook into sections (e.g., classroom management, assessment, safety, demonstrations, etc.) and add your reflections regarding the usefulness of ideas and materials included.
7. Interview two students about their science learning experiences. In a paragraph, describe how their comments reflected the themes of scientific literacy: (1) science as a way of thinking, (2) science as a way of investigating, (3) science as a body of knowledge, and (4) science and its interactions with technology and society.
8. Gather instructional materials from a teacher that he or she uses to teach students about the nature of science. Compare the concepts taught by the teacher with those discussed by Dr. William McComas in his chapter about the myths of science. [This chapter is available on-line at Dr. McComas' web site.]
9. Administer Chiappetta and Koballa's "Myths of Science" quiz to several teachers or students and then discuss their answers with them. Write a paragraph that describes their responses to the quiz and thinking about the nature of science. [The quiz is in the November 2004 issue of *The Science Teacher*, page 58-61 and on page 90 of your textbook.
10. Draw a floor plan for a middle school or high school classroom that would facilitate quality science instruction and reduce the probability of student misbehavior. On the floor plan, show the location of students' and teacher's desk, student laboratory stations, safety equipment (e.g., first aid kit, fire blanket, safety shower, etc.), materials and equipment storage, chalkboard or overhead projector and screen, and doorways. Also draw lines to represent student traffic patterns.
11. Observe a science class taught by a veteran teacher and pay particular attention to how he or she addresses the areas of classroom management, including interpersonal relationships, organization and management, and lesson design and teaching. Arrange to meet with the teacher after the class to discuss your observations. Direct the discussion to have the teacher talk about his or her reasons for the management decisions and strategies you observed.
12. Talk with a school principal or the assistant principal in charge of discipline. Ask about the school's disciplinary procedures and under what conditions it is considered appropriate for teachers to send students to the school office for discipline 13. Select a concept or topic from a middle or high school science course that you believe student find boring. Develop a plan to teach the concept or topic in a way that will motivate students to be engaged science learners.
14. Interview two science teachers about their lesson assessment practices. Ask about alignment among standards, instruction, and assessment.

15. Develop a set of class rules that you would display in your classroom. Show the class rules to science teachers and ask what changes they would recommend. Write a paragraph that describes how you would introduce class rules to students. Include in your paragraph information about the level of student involvement in constructing the class rules.
16. Ask a veteran science teacher to assess his or her own lesson assessment practices using the checklist presented in Table 6.3 of the textbook. Discuss your own thoughts with him or her about lesson assessment and determine what changes he or she would suggest to improve the checklist and your own thinking about lesson assessment.
17. Interview two science teachers about the new Georgia Performance Standards for the courses that they teach. Ask how they new standards will impact their teaching and student learning.
18. Show your map of the core concepts in the science discipline you plan to teach to veteran science teachers. Have them comment on your map and describe how a map that they might construct would be different from your map.
19. Talk with teachers about web sites and computer software that they consider valuable resources for teaching science. Explore one or more of the site or software packages. Describe in a paragraph how the sites or software could be used to help student learn science.
20. Ask teachers to allow you to examine curriculum units that they have developed. After examining the units, talk with the teachers about them. Ask about the vision and philosophy that supports the unit, the standards addressed in the unit, and how student learning of unit content is assessed.
21. Make arrangements to observe a lesson taught by a veteran middle or high school science teacher and to speak with the teacher after the lesson. Ask the teacher about the lesson's purpose, planning, instruction, classroom management, and assessment. Write a paragraph about your experience in which you compare your thoughts about the lesson with those of the teacher. Share your paragraph with other beginning teachers.
22. Find out what resources are available for teaching science. Also, check out the library/media center for science books, videos, etc. What is the annual science budget for science? Is the budget the same or different for other subjects?
23. Interview any two of the following school staff people to gain their perspectives of the school, their role in the lives of students and teachers, and why they enjoy their careers: office staff worker, cook, custodian, nurse, guidance counselor, security officer, bus driver, etc.
24. During one lesson observation make a seating chart and record the distribution of classroom discussion by making a tally of the way the period is spent. Your recording categories could be: discussion, worksheet assignments, group work, question-and-answer, student note taking, etc. Your tallies may reveal differences by gender, race, or room position. Write a paragraph that summarizes your observations.
25. Observe two lessons that are other than science. Carefully focus on the style of instruction. How do the lessons compare to science lessons? Based on your observations, what seems to make science lessons unique? Summarize your responses to the questions in a paragraph.
26. Request a copy of the year's syllabus for the classes you observe. Also, ask for some sample lesson plans and tests. Become familiar with the Georgia Performance Standards for the classes you observe.
27. Teach as often as possible. First consider team-teaching with a peer or your mentor teacher. Also, request to teach small groups of students. Then, try to teach a lesson or part of a lesson on your own.