

The University of Georgia at Gwinnett
 Grade 7-12 Science Teacher Education Program
ESCI 4450/6450: Secondary Science Curriculum and Learning
Pre-requisite: EPSY 2020 & EFND 2030; **Co-requisite:** ESCI4460/6460

Instructor: Dr. Justus Inyega

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Class Meetings: Thursdays, **5:00 - 7:45pm.** GUC A 1390 & A1650

Office Hours: I will be pleased to provide individual assistance outside of class. Due to the nature of my work schedule, individual meetings can occur before or after class, at your teaching site, or by appointment. It is best to reach me through email. I hope to reply to your emails promptly.

Required Texts

Chiapetta, E. L., & Koballa, T. R. (2006). *Science instruction in the middle school and secondary schools: Developing fundamental knowledge and skills for teaching (sixth edition)*. Upper Saddle River, NJ: Merrill Prentice-Hall.

Koballa, T. R., & Tippins, D. J. (2004). *Cases in middle and secondary science education: The promises and dilemmas (second edition)*. NY: Merrill Prentice-Hall.

Roberts, D. A., & Ostman, L. (1998). *Problems of meaning in science curriculum*. Teachers College, Columbia University: Teachers College Press.

On-line Resources:

1. National Science Education Standards: Inquiry (NRC, 2004) <http://www.nap.edu/>
2. National Science Teachers Association <http://www.nsta.org>
3. Project 2061 Benchmarks, (AAAS, 1993) <http://www.project2061.org/>
4. Georgia Performance Standards <http://www.doe.k12.ga.us/index.asp>
5. **Gwinnett County AKS site:**
<http://www.gwinnett.k12.ga.us/aks.nsf?OpenDatabase&0~TeachingandLearning>

Other sources

Atwater, M. M., Radzik-Marsh, K., & Strutchens, M. (1994). *Multicultural education: Inclusion of all*. Athens, GA: The University of Georgia.

Danielson, C. (1996). *Enhancing professional development: A framework for teaching*. Alexandria, VA: Association for Supervision and Curriculum Development.

Good, T. L., & Brophy, J. E. (2003). *Looking in the classrooms (ninth edition)*. Boston: Pearson Education, Inc.

Course Description:

This course involves the science curriculum and learning in science for students in grades 7 to 12. It is modeled in relation to the goals for science education and classroom practices. Research on students' learning of science informs the development, selection, and evaluation of curricular materials. The course is guided by "practice-to-theory" approach through which various aspects of the science curriculum, teaching and learning, and evaluation will be discussed in relation to what pre-service teachers experience in schools. Pre-service teachers are expected to reflect upon their experiences as science learners and science teachers as they learn to teach middle and high school science. The selected readings are to act as a starting point for analyzing the science curriculum, and enhancing planning, implementation, and evaluation of daily science instruction in schools.

The following questions will assist us to focus on the science curriculum and learning in middle and high schools.

1. What are the components of the school science curriculum in the State of Georgia?
2. What are the essential features of classroom inquiry?
3. How can the goal of “teaching science as inquiry” be realized through a range of instructional activities, while still fulfilling the responsibility to teach the local and state science curriculum?
4. How can school science help students become scientifically literate citizens?
5. How can we plan instruction to actively engage students in meaningful science learning?
6. How effectively can we provide for learning environment in our middle and high school science education classrooms?
7. What are the most effective ways to evaluate students’ science learning?
8. What innovative instructional materials are available for our use in guiding and assessing students’ science learning?

Course Purposes

The purposes of this course include assisting you to:

1. Clarify and refine your beliefs and knowledge about science curriculum and learning in middle and secondary schools
2. Organize a positive learning environment for middle and secondary school students in science.
3. Understand ways of organizing/sequencing science curriculum content and assessing students’ learning in middle and secondary schools.

Course Expectations:

By the end of this semester, the pre-service teacher will be able to:

- Appreciate the merits and demerits of state and national teaching standards for guiding curricular selection and instructional decisions, and working with the hierarchical organization of core concepts in the science discipline that one teaches.
- Plan for a learning environment that supports students’ academic success and wellbeing.
- Recognize characteristics of learning science as an inquiry
- Plan for all types of student learning in middle and secondary school
- Assess middle and secondary school students’ learning in science
- Critically reflect on ones own and others’ science curriculum organization/learning, and areas for improvement.
- Determine ways of promoting “science for all” in middle and secondary school classrooms

Course Organization and Facilitation:

The course will be organized and facilitated in the following manner:

1. Creating a learning community where everyone can safely explore the concepts of learning science and the issues in science curriculum for middle and secondary schools.
2. You are expected to use the skills of inquiry, dialogue, and action learning to accomplish the science curriculum and learning course goals.
3. Each class session will include a balanced exploration of middle and high school science curriculum and learning through discussion, case studies, practical-oriented activities, reflection, and experiential exercises.
4. You are expected to be active learners and assume responsibility for learning and discovery. You are encouraged to feel free to question the intentions of the instructor and fellow students in class.
5. The use of cell phones is not permitted during class. If you bring a cell phone to class, you are expected to turn the ringer off and manage your telephone calls during scheduled breaks.

Academic Honesty Policy:

All academic work must meet the standards contained in “A Culture of Honesty”. Each student is responsible to inform themselves about those

standards before performing any academic work.

The policy holds you responsible for maintaining the highest standards of honesty and integrity. Penalties for academic dishonesty are severe and ignorance is not an acceptable defense.

Academic dishonesty includes plagiarism, cheating, lying, tampering, stealing, receiving unauthorized or illegitimate assistance from any other person, or using any source of information that is not common knowledge. You should read the policy at: <http://www.uga.edu/ovpi/honesty/acadhon.htm>.

Disability Policy

The University of Georgia is committed to providing equal educational opportunities for qualified students with disabilities in accordance with state and federal laws including the American Disabilities Act. Help for disabled students is available from the Disability Services/Learning Disabilities Center. More information is available at: <http://www.uga.edu/stuact/handbook/stuaffairs/disability.html>

1. Attendance and Participation Policy:

As a student, you are expected to attend all scheduled classes and be prepared to actively participate. You are also expected to contribute to the group's learning as well as your own during the class sessions. When you miss a class, other class members lose your unique contribution. If it is inevitable for you to miss class, it is your responsibility to notify the instructor prior to class. You are also advised that you make arrangements with fellow students to review the session. Unexcused absences can result in a loss of 3 points for each such absence. Getting late to class, after 50 minutes, will be counted as an absence from class. Missing 3 class sessions in a semester will result in you being withdrawn from the course. The course design is based on the assumption that all of us are resource persons as well as learners.

2. Reflective journal - Weekly Journal Entries:

You will be required to keep a journal throughout this course. The purpose of your personal journal is to give you an opportunity to reflect on this course and its meaning to you. You are advised to consider the reading materials and class discussions when writing your journal. Comment on how the course has influenced your beliefs about science curriculum and learning in middle and secondary schools. Keeping a personal journal assists you to understand and reflect on your philosophy of science teaching/learning. Try to write at least one paragraph in your journal every class day. Sometimes I will prompt your reflections with specific questions, and other times you will just respond based on your teaching experiences. I will read your reflections every two/three weeks to stay informed. The complete journal is **due two weeks to the end of the course/semester**.

Please do not leave your journal in places where it can be read by students or others who might not understand its purpose and take your comments out of context.

3. Standards-based reflection - Review the NRC [National Science Education Standards](#) overview, chapters 1 and 3 (available at: <http://www.nap.edu/readingroom/books/nses/html/>), and the AAAS [Benchmarks for Science Literacy](#), origin, chapter 1, and either chapter 4 (physical science) or chapter 5 (life science) (at <http://www.project2061.org/tools/benchol/bolintro.htm>).

This initial read will give you an introductory orientation to the standards and also allow you to relate these standards to your teaching work. There is much more of interest in both documents, so be sure to return to these sites (or buy the books) and continue on your own to connect more broadly to the science teaching standards relevant to your professional agenda.

For this assignment, write a thoughtful essay (around 1200 words) in which you compare the content of the science education standards to your teaching practice. Beyond this general requirement, consider any number of the following questions in your reflection. **(Due Jan. 26)**

- How would you differentiate between the *Standards* and *Benchmarks* for a science teaching colleague unaware of them?
- What are the merits of the *Standards* and *Benchmarks*?
- Can you offer any critique or challenge to these documents?
- Assess your own practice, or the science teaching you have observed this year, in relation to the inquiry emphasis of the *Standards*.
- Evaluate your teaching of the subject matter (and/or the Georgia Performance Standards) in relation to the *Benchmarks*. To what degree does your teaching match up to the thrust of either or both of these curricular frameworks?
- As you scan the other sections of the Standards or Benchmarks, what components merit further review for enhancing your growth as a science teacher?

4. Reflection Papers:

Write a **three to four page (double-spaced)** reflection on each assigned article or chapter. The paper should contain your critique of the learning topic/ideas presented. Say, in your own words, why you agree or disagree with the author's statements. You may use other readings to support your statements. The reading articles/chapter for reflection will be provided by the instructor in class. **Due Feb. 16, March 09**

5. Organization of core science concepts –In this assignment, you will construct a long term plan of the concepts/content/unit for a science course that you teach (e.g., middle school science/earth science or high school biology/chemistry/physics). In doing so, you will develop a visual representation of your understanding of the hierarchical structure and interconnections that exist among the core science concepts that comprise a science course at the level you teach. A handout and grading rubric will be given in class with more details. **Due Mar 30**

6. Reflections on student learning science– This assignment will give you the opportunity to reflect on student learning through effective instructional strategies, teacher decisions to enhance students' performance in science, and communicating students' performance results to relevant personnel. A handout and grading rubric will be given in class with more details. **Due Apr 13**

7. PACSS Portfolio - Completed, according to guidelines previously detailed in class. **Due April 27** (Items 3, 5, 6 & 7 adapted/modified from Dr. Michael Dias' 2005 ESCI4450/6450 evaluation tools)

Note: All assignments *are due at the beginning of class on the due date*. Late assignments are not accepted. Where applicable, all written assignments should be double-spaced and follow the APA Manual format, 5th Edition.

Course Requirements and Grading Summary		Standards
-Attendance and participation	10%	A = 90 – 100 points
-Reflective journal	15%	B = 80 – 89 points
-Article/chapter reflections (2 articles)	20%	C = 70 – 79 points
-Standards-based reflection	10%	D = 60 – 69 points
-Organization of core science concepts	10%	F = below 60 points
-Reflections on student's learning science	15%	Note: A grade of "I" (incomplete) will only be given in the rare case of a medical emergency.
-PACSS Portfolio	20%	

Tentative Schedule for Spring 2006

Class Date	Topic(s)	References/Assignments	Remarks
Week 1 1/12	-Introduction -Course overview/Expectations -Science Curriculum -National Standards, Deliberation, and design: The dynamics of developing meaning in science curriculum	-Chiapetta & Koballa (2006): Chapter 1 & 2 -Roberts & Ostman (1998) Chapter 11 by Rodger W. Bybee	-Need email address & phone numbers for all the enrolled students - Assignment questions: -What do you understand by the terms “science curriculum” and “learning”? -Of what importance is the curriculum in the teaching and learning of science in middle and high schools?
Week 2 1/19	Reform and science curriculum Case 3.1: Too much content, not enough time by John Karl Kemper; Time and content on the block by Miriam Jordan; What to teach on the block? By Dava C. Coleman Case 3.2: Does it matter beyond my school? By Michael Padilla; Does it matter beyond my school? Indeed it does! By Frank Crawley Case 3.3: Fixing the engine while driving at 65mph by Gloria B. Lindner Case 3.4: To read or not to read...In a science classroom by Angie Fiske; I am a science teacher, not a reading teacher: An unfortunate categorization by Leslie S. Rush	Koballa, T. R., & Tippins, D. J. (2004). Chapter 3, pp. 47-71	
Week 3 1/26	Analyzing the school science courses: The concept of companion meaning -How companion meanings are expressed by science education discourse	Roberts & Ostman (1998) Chapter 1 by Douglas A. Roberts -Chapter 5 by Leif Ostman	Standards-based reflection due
Week 4 2/2	-Learning inside and outside schools: Discursive practices and sociocultural dynamics -Border crossing: Culture, school science, and assimilation of students	Roberts & Ostman (1998): Chapter 4 by Rodger Saljo -Chapter 7 by Glen S. Aikenhead	
Week 5 2/9	Learning/diversity in the middle and high school science classrooms	Chiapetta & Koballa (2006): Chapter 8	(Guest speaker, Dr. Norman Thomson)
Week 6 2/16	-Managing the science classroom environment	Chiapetta & Koballa (2006): Chapter 5	- Article reflections 1 due

Week 7 2/23	-Intellectual independence: A potential link between science teaching and responsible citizenship -Analyzing discourse about controversial issues in the classroom	-Roberts & Ostman (1998): Chapter 8 by Hugh Munby and Douglas A. Roberts -Chapter 9 by Arthur N. Geddis	
Week 8 3/2	Organizing a positive learning environment Cases 5.1-5.4	Koballa, T. R., & Tippins, D. J. (2004). Chapter 5, pp. 100-130	-
Week 9 3/9	Learning in the science classroom Cases 6.1-6.4	Koballa, T. R., & Tippins, D. J. (2004). Chapter 5, pp. 131-162	- Article reflections 2 due
Week 10 3/16	Spring Break	Mar 13-17	
Week 11 3/23	Student teaching and mentoring Cases 11.1-11.3	Koballa, T. R., & Tippins, D. J. (2004). Chapter 5, pp. 270-292	
Week 12 3/30	Guest speaker	Dr. Thomas R. Koballa, Jr.	Organization of core science concepts assignment due
Week 13 4/6	Learning in the laboratory and informal settings Cases 7.1-7.3	Koballa, T. R., & Tippins, D. J. (2004). Chapter 5, pp. 163-182	Reflective journal due
Week 14 4/13	Controversial issues in the science classroom Cases 8.1-8.4	Koballa, T. R., & Tippins, D. J. (2004). Chapter 5, pp. 183-211	Reflections on student's learning science due
Week 15 4/20	Assessment in science Cases 10.1-10.4	Koballa, T. R., & Tippins, D. J. (2004). Chapter 5, pp. 241-292	
Week 16 4/27	Open week to accommodate Guest speaker between the other weeks		
Week 17 5/3-5	Final Examinations	Final Examinations	PACSS Portfolio due

Special Note: *This syllabus is a tentative course plan that may be changed.*

All University of Georgia policies on Academic Honesty will be upheld and enforced during the course.