

1. Department of Curriculum and Instruction
ESE 561/761 Teaching Science in the Secondary School
Credit Hours: 3
2. Course Description:
Prerequisite: Admission to teacher education
Designed to introduce prospective teachers to the modern materials and methods of teaching physical or life science at the secondary level. ESE 561: 40 field/clinical hours required. ESE 761: 90 field/clinical hours required
3. Texts:
Llewellyn, D. (2005). *Teaching High School Science through Inquiry*. Thousand Oaks, CA: Corwin Press.
Other Materials Needed: 3-ring binder

Everyone in the class is required to join the National Science Teacher's Association (NSTA). Information can be found at <http://www.nsta.org/membership>. *Be sure to register as a student to get the discount price.* Members receive a free monthly journal/magazine as part of their membership. Be sure to sign up for The Science Teacher, the journal for teaching science in the high school classroom. You will also need to join the science teacher listserv (<http://nsta.org/listservsabout>). This listserv is a community that uses emails from teachers to post ideas, questions and responses regarding all aspects of the science classroom. You may only choose to sign up for one (e.g. physics, earth science, chemistry, physical science, etc), or you may choose to sign up for more. Many emails are sent through weekly, but some really wonderful info, tips and tricks go across the listserv every day.

4. Course Objectives:
The students will be able to:
 - a. Define science and explain the nature of science (KTS 1, NSTA 1).
 - b. Explain the current science education reform efforts and the role of scientific literacy in these efforts. (KTS 1, NSTA 1)
 - c. Explain the science Academic Expectations, the Core Content for Assessment and the Program of Studies. (KTS 2.1)
 - d. Describe how students learn science and the role of prior knowledge and misconceptions in the learning process.
 - e. Administer and interpret Piagetian tasks in conjunction with a discussion of applied learning theory including constructivism to become more aware of developmental level of secondary students.(KTS 2.5, 3.3)
 - f. Prepare a lesson plan designed for conceptual change based on the 5E learning cycle and targeting the Program of Studies/Core Content for Assessment. (KTS 2, NSTA 5).
 - g. Demonstrate the use of effective science teaching strategies that counteract misconceptions including concept maps, the learning cycle, and cooperative learning. (KTS 1, NSTA 3, 5)
 - h. Utilize, select and evaluate current various types of educational technology including computer software and applications.(KTS 6, NSTA 5)
 - i. Develop an awareness of science teaching strategies and materials that address physical, social, and cultural diversity and begin to show sensitivity to these differences. (KTS 3.3, NSTA 5, 6a)
 - j. Develop strategies appropriate for effective classroom management including motivations, promotion of positive student behaviors, time use, equipment use and safety factors. (KTS 3, NSTA 5, 9)

- k. Demonstrate effective science teaching behavior by planning and implementing an inquiry-based secondary science lesson. (KTS 1, 2, 4, NSTA 1a-c, 2c, 3, 5)
- l. Become familiar with the current resources available for secondary science instruction including various textbooks and curriculum projects. (KTS 2, NSTA 6a)
- m. Use different levels of questions in his/her teaching a lesson. (KTS 4.5)
- n. Write authentic assessment instruments appropriate for the secondary school science classroom. (KTS 5.1-5.3, NSTA 8a)
- o. Reflect on teaching lessons based on student outcomes. (KTS 7)
- p. Evaluate personal strengths and weaknesses in relation to their teaching ability in order to develop a professional development plan. (KTS 9.1-9.3, NSTA 10)
- q. Demonstrate their content knowledge by successfully completing 3-5 science activities appropriate for a secondary science classroom. (KTS 1, NSTA 1)
- r. List, demonstrate, and self report on appropriate professional dispositions (KTS 3, 7, NSTA 10).
- s. Revise action research projects (MAT students only). (KTS 1, NSTA 1d)

5. Evaluation Methods:

- a. The course grade will be based on an accumulation of points on course requirements. Grade equivalents for accumulated points are as follows:

Undergraduate	Graduate
A = 90-100%	A = 92-100%
B = 80-89%	B=83-91%
C = 70-79%	C=74-82%
D = 60-69%	D=65-73%
F = < 60%	F=<65%

- b. The final grade will be derived from the following sources:
 - i. Points earned on the learning tasks listed above, daily tasks, performance events and open response questions. The items will be evaluated using scoring guides. There will be a penalty for late assignments—10% for each week late.
 - ii. Professional dispositions--Using a scoring guide, students will do a self-evaluation of their professional dispositions at the conclusion of the course. Examples of professional dispositions are: interest in learning, positive attitude, general enthusiasm, participation in classroom discussions, preparation for class activities, positive leadership qualities and cooperation with peers on group projects.

6. Student Progress:

The instructor will provide students with written information on their progress in the course at least once prior to the mid-point of the course through feedback on learning tasks.

7. Attendance Policy:

Daily attendance is expected. Absences equating 20% of the class meetings will result in automatic failure. Class sessions missed as a result of late entry into the class will be counted as absences. The student is responsible for presenting adequate reasons for absence to the instructor in order to be given opportunity to make up missed work. Adequate reasons include personal illness, death or serious illness in the immediate family or participation in an approved University activity. Chronic tardiness will be considered the same as being absent.

8. Last Day to Drop/Withdraw:

The last day to drop the course or to withdraw from the University is included in the class schedule.

9. Disability Statement: If you are registered with the Office of Services for Individuals with Disabilities, please make an appointment with the course instructor to discuss any academic accommodations you need. If you need academic accommodations and are not registered with the Office of Services for Individuals with Disabilities, please contact the Office on the third floor of the Student Services Building, by email at disserv@eku.edu or by telephone at (859)622-2933 V/TDD. Upon individual request, this syllabus can be made available in alternative forms.

10. Academic Integrity Statement: Students are advised that ECU's Academic Integrity policy will strictly be enforced in this course. The Academic Integrity policy is available at www.academicintegrity.eku.edu. Questions regarding the policy may be directed to the Office of Academic Integrity limitations described in the undergraduate catalog.

11. Course Requirements:

- a. Prepare a discrepant event demonstration and implement in a school setting
- b. Administer Piagetian tasks to children
- c. Prepare high school lesson plans
- d. Evaluate technology applications appropriate for secondary school science instruction
- e. Research scientific misconceptions held by secondary students
- f. Develop an authentic assessment instrument
- g. Rewrite a secondary science activity to incorporate the learning cycle
- h. Develop a unit plan with a resource file
- i. Daily accountability assignments
- j. Maintain and submit a portfolio
- k. Professional dispositions of evaluation
- l. Revise your action research project (MAT)

12. Course Outline:

- a. Nature of science and science teaching
- b. Current science education trends
- c. Kentucky curriculum documents: science Academic Expectations, Core Content for Assessment, Program of Studies, National Science Education Standards
- d. Learning Theory and Science Education
- e. Misconceptions in secondary school science
- f. 5E Learning Cycle
- g. Technology in secondary school science
- h. Science curricula/textbooks
- i. Teaching a high school lesson
- j. Classroom management considerations
- k. Authentic assessment
- l. Diversity and special needs
- m. Questioning techniques
- n. Self evaluation of instruction
- o. Self evaluation of professional dispositions

13. Additional requirements:

For the Master of Arts in Teaching candidate = revision of the action research project.

Advanced program candidates will be required to write a research paper on the best practices of science instruction at the secondary level. 10-15 pages in length. APA style.

Official E-mail: An official EKU e-mail is established for each registered student, faculty, and staff member. All university communications sent via e-mail will be sent to this EKU e-mail address.

Course P/N	Course Title
ESE 561/761	Teaching Science in the Secondary School

RELATIONSHIP TO:

CONCEPTUAL FRAMEWORK ELEMENTS
CF1: Knowledge - Enables candidates to construct understanding of the complexity and

richness of the teaching/learning process.
CF2: Pedagogical Skills - Enables the professional educator to facilitate learning for all students.
CF3: Dispositions - Includes the professional attitudes, values and beliefs that support student learning and development.
CF4: Technology - Focuses on preparing candidates who are able to use educational technology to help all students learn.
CF5: Diversity - Reflects the Unit's commitment to preparing candidates to support learning for all students

College of Education Conceptual Framework

K- Basic Knowledge, A- Application, PA- Portfolio Artifact, KA 1, 2, 3, 4, 5, 6- Key Assessments				
CF1	CF2	CF3	CF4	CF5
K, A	K, A	K	K	K, A

TEACHER STANDARDS (2008)	
STANDARD 1:	The teacher demonstrates applied content knowledge
STANDARD 2:	The teacher designs and plans instruction
STANDARD 3:	The teacher creates and maintains learning climate
STANDARD 4:	The teacher implements and manages instruction
STANDARD 5:	The teacher assesses and communicates learning results
STANDARD 6:	The teacher demonstrates the implementation of technology
STANDARD 7:	Reflects on and evaluates teaching and learning
STANDARD 8:	Collaborates with colleagues/parents/others
STANDARD 9:	Evaluates teaching and implements professional development
STANDARD 10:	Provides leadership within school/community/profession

Kentucky Teacher Standards – Advanced

K- Basic Knowledge, A- Application, PA- Portfolio Artifact, KA 1, 2, 3, 4, 5, 6- Key Assessments									
TS1	TS2	TS3	TS4	TS5	TS6	TS7	TS8	TS9	TS10
K, A, PA	K, A, PA	K, A, PA	K, A, PA	K, A, PA	K	K, A	K, A	K	K

EKU GOALS

EKU-G1. To promote and support an inclusive climate that respects and celebrates diversity by attracting, developing and educating a diverse student, faculty, and staff population.

EKU-G2. To continuously assess and improve the services and infrastructure of the University to support and maintain high quality programs.

EKU-G 3. To promote learning through high quality programs, research, and support services.

EKU-G4. To develop and enhance an environment facilitating intellectual curiosity, cultural opportunities and problem-solving abilities for members of the University community.

EKU-G5. To increase and enhance external and internal constituency engagement, while maintaining a connection with the southeastern region of Kentucky.

EKU Goals K, A

EKU-G1	EKU-G2	EKU-G3	EKU-G4	EKU-G5
X	-	X	X	X

KERA Initiatives

Identify the initiative number(s) for each category			
Learner Goals/Academic Expectations	Program of Studies: Understandings	Program of Studies: Skills & Concepts	Core Content
AE 1, 2.1-2.6, 5 and 6	All Science (8-12)	All Science (8-12)	All Science (8-12)

EPSB Themes

K- Basic Knowledge, A- Application, PA- Portfolio Artifact, KA 1, 2, 3, 4, 5, 6- Key Assessments					
COURSES	Diversity	Technology	Literacy	Code of Ethics	Leadership
ESE 561/761	K	K, A	K	K, A	K

SPA

NSTA (Not needed for Advanced Programs)
Standards 1, 3, 5, 6a, 8, 9, and 10