

Revised 2007

Ashland University
Dwight Schar College of Education
Department of Curriculum and Instruction
Course Syllabus

Graduate: Undergrad: X
Credit Hours: 3
Field/Clinical Hours: 0/4

Course Number: EDCI 432 SC

Course title for the catalog: Teaching Science in Grades 7-12

Catalog description:

A course designed to provide the student with classroom instructional skills, methods and strategies in teaching science in grades 7-12. To be taken concurrently with EDCI 330 Grades 7-12 Field Experience.

The prerequisite (s) for this course is (are):

EDCI 230, 287, PSYC 218, or permission

The enrollment restriction (s) for this course is (are):

None

Course and field/clinical experience objectives (including knowledge, skills, dispositions):

KNOWLEDGE:

The teacher education student will have knowledge of:

1. Science concepts and principles usually taught in grades 7-12.
2. The relationship of Science to other disciplines.
3. The relationship of science to contemporary events, research results, and the students daily lives.
4. A broad range of secondary school Science curricula and its significance in the K-12 curriculum, including curriculum design for different settings and The Model Competency-Based Education for Science formulated by Ohio Department of Education.
5. Issues of multicultural diversity, gender, exceptionality, and at-risk students in curriculum development.
6. Current trends/research in teaching secondary school Science.

7. Communication skills required in teaching Science grades 7-12.
8. Methodology of the discipline: including instructional strategies resource materials and instructional technology, as well as how to select those best suited for a given teaching and learning situation.
9. Appropriate and effective methods of assessment of student understanding for the purposes of instructional feedback, general Science achievement, program evaluation, and related intervention strategies.
10. Planning instruction and tests in conjunction with various taxonomies.
11. Principles of test construction, including item writing.
12. How to administer and score tests and other classroom assessments, qualitative and quantitative, formal and informal.
13. Various strategies for problem solving, critical thinking and application skills for grades 7-12.
14. NSTA (National Science Teachers Association) positions on issues in Science Education.
15. Opportunities for professional relationships and growth for science teacher.
16. Safety in classrooms, stockrooms, laboratories, and other areas used for science instruction.
17. Laboratory methods and management techniques.
18. The integration of laboratory and classroom activities.
19. How to use media and instructional technology to enhance teaching and learning.

SKILLS:

The teacher education student will have skills to:

1. Apply contemporary research findings to the teaching and learning of science.
2. Select, integrate and translate process, attitudes and content of the Science discipline appropriate for grades 7-12 to learners with a wide range of abilities and socioeconomic and ethnic background.
3. Plan instruction based on the prior knowledge and conceptualization of the students.
4. Identify instructional goals and make appropriate and effective use of methodology of the discipline: including instructional strategies, adaptations/accommodations, resource materials and instructional technology.
5. Identify and use various strategies for inquiry, problem solving, critical thinking and application skills appropriate for teaching grades 7-12 Science concepts in classroom and laboratory, including decision-making and value-analysis skills needed to explore issues and relationships involving scientific, technological, societal and individual human issues and cultural values.
6. Foster the development of student research skills in the laboratory and field.
7. Apply basic statistical methods and processes of data analysis to interpret scientific phenomena.
8. Make appropriate and effective use of a broad variety of science evaluation tools and strategies for assessment of student understanding; for the purpose of instructional feedback, general Science achievement, program evaluation, and related intervention strategies.

9. (CLINICAL) Accurately analyze learning outcomes/teaching behaviors.
10. Plan instruction and tests to parallel one another and to reflect various levels of the cognitive domain.
11. Write clear, fair items that measure stated instructional objectives.
12. Administer and score tests and other classroom assessments.
13. Utilize assessment format appropriate to instructional objectives.
14. Conduct item analysis to test the test.
15. Administer valid and reliable tests.
16. Conduct curriculum-based assessment that includes naturalistic assessment, portfolios, and process/product assessment. Conduct error analysis assessment.
17. Use oral, written and non-verbal communication effectively and appropriately.
18. Use effectively classroom management appropriate for grades 7-12 (that includes clear communication of concepts, decisions based on knowledge of current trends, a variety of teaching strategies and accommodation of various learning styles, abilities, and socioeconomic and ethnic backgrounds when teaching laboratory activities, leading class discussion, conducting field trips and carrying out daily classroom instruction in science.
19. Identify, establish, and maintain the highest level of safety in classrooms, stockrooms, laboratories and other areas used for science instruction.
20. Use appropriate media and electronic educational technology to enhance teaching and learning including computers, interactive video, telecommunications.

DISPOSITIONS:

The teacher education student will:

1. Display a willingness to understand and practice a variety of appropriate classroom instructional skills, methods and strategies and safety procedures in teaching Science to pupils in grades 7-12.
2. Value the role of the teacher in generating enthusiasm for Science and for learning in general.
3. Provide students with information about career opportunities in science and technology.
4. Value all students regardless of multicultural background, gender, learning styles, and/or at risk and/or handicapping condition.
5. Value the need to analyze learning outcomes/teaching behaviors.
6. Value writing clear, fair items that reflect instructional objectives both in content and format.
7. Value valid and reliable tests.
8. Appreciate the teachers responsibility that all students learn.
9. Appreciate naturalistic assessments, including observation, portfolios, and other process/product assessments.
10. Exhibit a willingness to become a life-long learner committed to professional growth.
11. Value the importance of participation/membership in professional organizations/learned societies of the discipline.
12. Appreciate the role of technology in the classroom.

13. Value a collaborative approach to meeting student needs.
14. Fulfill the professional and legal obligations of science teaching.

Suggested texts and/or references:

Lawson, A. E. (1995). Science Teaching and the Development of Thinking. U.S.A.: Wadsworth Publishing Co.

Ohio Department of Education (1994). Science: Ohio's Model Competency-Based Program. Ohio Department of Education.

Trowbridge, L. Becoming a secondary school science teacher. Merrill Publishing Co., Latest edition.

Electronic resources: Current for year 2001

<http://www.nap.edu/readingroom/books/nse/html/overview.html>

<http://www.enc.org/>

<http://books.nap.edu/books/0309053269/html/index.html> (complete copy of NSES)

<http://www.nap.edu/books/0309070333/html/>

--Educating Teachers of Science, Mathematics, and Technology: New Practices for the New Millennium (2000)

<http://www.nap.edu/books/0309064767/html/>

Inquiry and the National Science Education Standards: A Guide for Teaching and Learning (2000)

<http://www.nap.edu/books/0309065275/html/>

Designing Mathematics or Science Curriculum Programs: A Guide for Using Mathematics and Science Education Standards (1999)

<http://www.nap.edu/books/0309058880/html/index.html>

Improving Student Learning in Mathematics and Science: The Role of National Standards in State Policy (1997)

<http://bob.nap.edu/html/stp/>

SCIENCE TEACHER PREPARATION IN AN ERA OF STANDARDS-BASED REFORM

Suggested instructional strategies:

Discussion, reflection, problem solving, analysis of teaching videotapes, peer teaching, exams, quizzes.

Description of field/clinical experiences:

FIELD EXPERIENCE

CLINICAL EXPERIENCE

Review of teaching videotapes/peer teaching to analyze learning outcomes/teaching

behaviors.

Evaluation of students:

Completion of assignments. Review of lesson plans by cooperating teacher and university supervisor during field experience. Observation by cooperating teacher and university supervisor during field experience. Review of teaching videotapes/peer teaching. Exams. Quizzes.

Faculty who frequently teach the course:

Faculty with certification and classroom experience in teaching science 7-12.

Licensure programs in which course is required:

Integrated Science, Life Science, Earth Science, Physical Science

If the course is offered for either undergraduate or graduate credit, identify the respective difference in expectations:

Bibliography (Learned Societies, etc.)

Anderson, Lorin. (1989). The effective teacher. Random House.

Bybee, R. W. and Deboer, G. E. (1994). Research on Goals for the Science Curriculum. In D.L. Gabel (Ed.), Handbook of Research on Science Teaching and Learning (pp.357-387). New York, N.Y.: National Science Teachers Association.

Finsham P. J. (1992). Science and Technology. In P.W. Jackson (Ed.), Handbook of Research on Curriculum (pp. 749-788). New York, N. Y.: American Educational Research Association.

Kim and Kellough. (1991). A resource guide for secondary school teaching. Macmillan

Hammond, L. D. and Snyder J. (1992). Curriculum Studies and the Traditions of Inquiry: The Scientific Tradition. In P.W. Jackson (Ed.), Handbook of Research on Curriculum (pp. 41-78). New York, N. Y.: American Educational Research Association.

Lawson, A. E. (1995). Science Teaching and the Development of Thinking. U.S.A.: Wadsworth Publishing Co.

McNeil and Wiles. (1990). The essentials of teaching. Macmillan.

National Sciences Teachers Association. (1984). Standards for the preparation and certification of teachers of science grades K-12. Washington DC: NSTA.

National Research Council, (1995) National Science Education Standards, Washington DC: NRC

Tobin, K., Tippins, D.J., & Gallard, A.J. (1994). Research on Instructional Strategies for Teaching Science. In D.L. Gabel (Ed.), Handbook of Research on Science Teaching and Learning (pp. 45-93). New York, N.Y.: National Science Teachers Association.