BALL STATE UNIVERSITY
EDUCATION REDEFINED®

PHYC 396 The Teaching of Physics in the Secondary School

Course Description

Aims, nature of the subject matter, calculus concepts, and applications in the teaching of physics; amount and nature of laboratory work, standardized tests, and textbooks used in the teaching of physics. No regularly scheduled laboratory.

Prerequisite: 16 hours of credit in physics or permission of the department chairperson.
A total of 3 hours of credit may be earned.

Course Objectives

This course seeks to provide specific instruction aimed at developing pedagogical content knowledge. Students who complete this course will become aware of recent physics education research that should guide decisions made regarding curriculum scope and sequence, instructional methodologies, effective and appropriate uses of technology, assessment, and inquiry methodologies for laboratory investigations.

Course Rationale

Although most physics teachers enter the profession with a strong content knowledge and background, they most likely experienced little or no direct instruction in physics teaching and learning. The rationale for this course is to provide preservice physics teachers with a physics teaching methods course designed to facilitate their development into engaged educational experts who are sensitive and responsive to the contextual bases of teaching, learning, and development. Physics education research will guide the instruction in areas such as physics curriculum, the use of technology in teaching and learning, guided and unguided inquiry laboratory techniques, the role and use of assessments, the nature of science and its role in physics knowledge development, student misconceptions, and teaching for conceptual change.

Course Content, Format, and Bibliography

Content

Through literature research, interactive engagement, laboratory activities, and lesson plan development, students will examine and apply physics education research in several areas:

- commonly held physics misconceptions and conceptual change strategies
- assessment techniques and their role in informing curricular decisions
- the proper use of technology currently available for physics teaching and learning
- the nature of science and its historical role in the development of physics knowledge
- the value of inquiry methodologies in laboratory experiences

Format

This course may be offered during the spring and fall semesters, or as a five-week summer term course. Sessions will include lecture, discussion, and laboratory work. Student work used to determine the student's course grade may include classwork, homework, laboratory activities and investigations, and research reports.

This course is taught as a dual undergraduate/graduate course. Students will be required to complete activities appropriate for the level of the course in which they are enrolled. Student performance on homework, exams and/or labs will be evaluated using different standards for undergraduate and graduate students.

Bibliography

Teacher Education in Physics: Research, Curriculum, and Practice (2011). Edited by David E. Meltzer & Peter S. Schaffer. ISBN 978-0-9848110-0-7

Physics by Inquiry: Volume I, by Lillian C. McDermott (1996). ISBN 0-471-14440-1

Physics by Inquiry: Volume II, by Lillian C. McDermott (1996). ISBN 0-471-14441-X

Five Easy Lessons: Strategies for Successful Physics Teaching, by Randall D. Knight (2002). ISBN 0-8053-8702-1

Teaching Physics with the Physics Suite, by Edward Redish (2003). ISBN 0-471-39378-9

*Targeting Students' Science Misconceptions: Physical Science Concepts Using the Conceptual Change Model***,** by Joseph Stepans (2006). ISBN 1-891022-07-5