University of Arkansas - Fort Smith
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General Syllabus

PHYS 4003V Undergraduate Research in Physics

Credit Hours: 1-3 hrs. Lecture Hours: 0 Laboratory Hours: 3-9

Prerequisite: consent of the instructor

Effective Catalog: 2026/27

I. Course Information

A. Catalog Description

Students learn and practice research methodology in physics, exploring a topic of interest or of faculty interest, mentored by a faculty member, using current methodology. Ideal preparation for students considering graduate work in a closely related field.

II. Student Learning Outcomes

A. Subject Matter

Upon successful completion of this course, the student will be able to:

1. Review published literature and design a research project
2. Design and conduct controlled experiments in the field or lab
3. Gather and analyze data to test a hypothesis
4. Modify experiments based on initial data
5. Present the results of research in a public forum
6. Talk about current research within the field related to their work

B. University Learning Outcomes

This course enhances student abilities in the following areas:

Analytical Skills
Critical Thinking Skills:
Students will identify a problem or issue and will research, evaluate, and compare information from varying sources in order to evaluate authority, accuracy, recency, and bias relevant to the problems/issues. Students will generate

solutions/analysis of problems/issues evaluated and will assess and justify the solutions and/or analysis.

Communication Skills (written and oral)
Students will communicate proficiently. Students will compose coherent documents appropriate to the intended audience and effectively communicate orally in a public setting.

III. Major Course Topics

A. Identifying questions related to physics in research areas of interest to instructor and student
B. Generating testable hypothesis
C. Designing experiments that generate data relevant to the hypothesis
D. Collection of quantitative and qualitative data
E. Evaluating data collected in relation to the hypothesis and making logical refinements in the experiments.
F. Effective communication of findings to a scientific and general audience