

Master Syllabus

PHY 2780 - Scientific Thought & Method

Division: Science, Mathematics and Engineering

Department: Physics

Credit Hour Total: 3.0

Lecture Hrs: 2.0 **Lab Hrs:** 2.0

Prerequisite(s): PHY 2201

Other Prerequisite(s): AND Restricted to Majors

Date Revised: February 2017

Course Description:

Exploration of methods employed in the natural sciences primarily through an undergraduate research project designed to illustrate scientific thinking and related mathematical skills especially as they apply to physics. Intended for physics majors. Two classroom, two lab hours per week.

General Education Outcomes:

- Critical Thinking/Problem Solving Competency
- Information Literacy Competency

Course Outcomes:

Hypotheses

Develop testable hypotheses. Design tests of competing hypotheses. Derive predictions from a hypothesis.

Assessment Method: Portfolios

Performance Criteria:

Passing grade: D or higher

Experiments and scientific investigation

Design scientific investigations, based on testable questions, taking into account variable definition (e.g. independent and dependent) and incorporating experimental controls where appropriate.

Assessment Method: Portfolios

Performance Criteria:

Passing grade: D or higher

Observation, inference and measurement

Discuss the role of direct observation and inference in scientific research. Discuss the difference between observation and inference including the role of probability and statistics in drawing conclusions. Apply proper measurement techniques accounting for uncertainties.

Assessment Method: Portfolios

Performance Criteria:

Passing grade: D or higher

Nature of science

Distinguish between the terms theory, law and hypothesis. Describe the tentative nature of scientific ideas and the role of testable questions in scientific research.

Assessment Method: Portfolios

Performance Criteria:

Passing grade: D or higher

Outline:

Undergraduate Research Project:

- (1) Literature Search
- (2) Development of Proposal
- (3) Research Completion
- (4) Final Report