

Course discipline/number/title: PHIL 1010: Scientific Reasoning

A. CATALOG DESCRIPTION

1. Credits: 3
2. Hours/Week: 3 lecture
3. Prerequisites (Course discipline/number): None
4. Other requirements: None
5. MnTC Goals (if any): Goal 2/Critical Thinking

B. COURSE DESCRIPTION: This class provides a philosophical and historical introduction to scientific reasoning, with a special emphasis on learning to think critically and methodically about everyday issues related to science. Students will learn to think carefully about what distinguishes science from non-science, the limits to scientific knowledge, and how science has changed over time. Along the way, they'll be introduced to a variety of important scientific ideas and debates, both current and historical.

C. DATE LAST REVISED (Month, year): February, 2021

D. OUTLINE OF MAJOR CONTENT AREAS:

1. History and Philosophy of Science: Basic Concepts
2. Scientific Knowledge and its Limits
  - a) Formal vs Empirical Theories
  - b) Inductive vs Deductive Reasoning
3. Scientific Method
4. How Science Makes Progress
5. Distinguishing Science from Pseudoscience
  - a) Falsificationism and Testability
  - b) Scientific Paradigms
  - c) Other Criteria
6. Scientific Worldviews
  - a) Aristotle through the Middle Ages
  - b) The "Scientific Revolution"
  - c) The Newtonian World
  - d) Darwin, Wallace, and Evolutionary Theory
  - e) Einstein, Bohr, and Modern Physics
7. Contemporary Debates in History and Philosophy of Science

E. LEARNING OUTCOMES (GENERAL): The student will be able to:

1. Distinguish between science and non-science.
2. Explain how scientific theories are confirmed or falsified by observation.
3. Apply principles of scientific reasoning to current problems.
4. Describe how scientific theories have changed over time.
5. Compare historically important scientific theories and evaluate the arguments for these theories.
6. Use the principles of inductive and deductive logic to analyze the nature and import of scientific experiments.

F. LEARNING OUTCOMES (MNTC):

Goal 2: Critical Thinking. Students will be able to:

1. Gather factual information and apply it to a given problem in a manner that is relevant, clear, comprehensive, and conscious of possible bias in the information selected.
2. Imagine and seek out a variety of possible goals, assumptions, interpretations, or perspectives which can give alternative meanings or solutions to given situations or problems.
3. Analyze the logical connections among the facts, goals, and implicit assumptions relevant to a problem or claim; generate and evaluate implications that follow from them.

G. METHODS FOR EVALUATION OF STUDENT LEARNING: Methods may include but are not limited to:

1. Quizzes

- F. METHODS FOR EVALUATION OF STUDENT LEARNING: Continued. . .
2. Essays
  3. Exams
  4. Group Activities
  5. Participation
- H. RCTC CORE OUTCOME(S). This course contributes to meeting the following RCTC Core Outcome(s):  
Critical Thinking. Students will think systematically and explore information thoroughly before accepting or formulating a position or conclusion.
- I. SPECIAL INFORMATION (if any): None