GROSSMONT COLLEGE

COURSE OUTLINE OF RECORD

Curriculum Committee Approval: 05/25/2021

GCCCD Governing Board Approval: 06/15/2021

SCIENCE 110 - INTRODUCTION TO SCIENTIFIC THOUGHT

1. Course Number Course Title Semester Units

SCI 110 Introduction to Scientific Thought 3

Semester Hours

3 hours lecture 48-54 total hours 96-108 outside-of-class hours 144-162 total hours

2. Prerequisite

None

Corequisite

None

Recommended Preparation

None

3. Catalog Description

This is a course on the methodology, history and philosophy of science for those who have a background in neither science nor philosophy. It emphasizes what scientists do and how they think by drawing on the history of physical and biological sciences. The concepts of scientific revolutions, scientific skepticism, experimental design, the ethical implications of scientific discovery, and the impact of the scientific enterprise on the world are covered. Pseudoscientific claims are investigated, with an eye toward critical thinking. The relationship between science and religion is discussed.

4. Course Objectives

Students will:

1. Apply scientific thinking with regard to the methodology and limitations of science.
2. Explain the scientific enterprise from an historical point of view, including the effects science has had on religious and philosophical thought.
3. Analyze a scientific revolution and the nature of scientific paradigms in order to recognize the tentative nature of scientific theories.
4. Evaluate the ethical issues which science both causes and copes with.
5. Distinguish valid scientific discoveries from pseudoscientific claims and frauds.
6. Design a controlled experiment.
7. Distinguish cause and effect from correlation.

5. Instructional Facilities

Standard Classroom

6. Special Materials Required of Student

None

7. Course Content

1. The fundamental assumptions of science, as well as the inductive/deductive approach to knowledge are discussed.
2. Scientific methodology is discussed, including the role of mathematics, models, hypothesis, dependent, independent and control variables and the distinction between cause and effect and correlation.
3. The distinct nature of scientific laws, models, hypotheses and theories is explained.
4. The design of experiments and in particular the use of double-blind studies are emphasized.
5. The history and philosophy of science are covered, illustrated principally using important persons in the history of science, especially from the period of the scientific revolution.
6. The motivations and attitudes of scientists are discussed.
7. The course of scientific change is explained with particular emphasis on the ideas of scientific revolution and scientific paradigm. Examples include the development of the theory of evolution, quantum mechanics and so forth.
8. The ethics of science is discussed, both from the point of view of the ethics of doing science and the ethical implications of scientific discovery. The social problems such as pollution, overpopulation, reduction in genetic diversity and so forth which are produced by new technologies are revealed and discussed.
9. The distinction between basic and applied research and the development of new technologies is described.
10. The formal and informal limitations of science and the relation between science and religion are discussed.
11. The qualities which distinguish legitimate science from pseudoscience are presented, with particular emphasis on critical thinking and on developing a skeptical approach to novel explanations.
12. The relationship between science and technology is discussed.

8. Method of Instruction

1. Lecture, with emphasis on student note-taking skills
2. Discussions both in class and in LMS
3. Scientific projects
4. Student presentations
5. Integration of appropriate web-based and computer audiovisual materials, including animations, PowerPoints, videos, and other multimedia

9. Methods of Evaluating Student Performance

Examinations: quizzes, tests and a comprehensive final examination are given which may include fill-in-the-blank, short answer, multiple choice, and essay questions.

Homework and various assignments are used to teach and emphasize content including, but not limited to reading articles, texts, watching videos and submitting notes summarizing information, completing worksheets, writing assignments, presentations, etc.

c. A semester science project, such as a survey, presentation, and/or essay, which uses the scientific method to answer a question is required of each student.

1. Outside Class Assignments
2. Preparation of class presentations on topics related to course content
3. Homework such as reading articles, texts, watching videos, note taking, completing worksheets, etc.
4. Essays on topics related to the course content
5. Creation of a newsletter to advertise the course and its content
6. Complete surveys about the course or survey people about their perceptions of religion and science.

11. Representative Texts

* 1. Representative Text(s):
     1. Oakes, John. *An Introduction to Scientific Thought*. Cognella Press, 2014.
     2. Ewig, Carl. *What is Science? The Way Scientists Work and Think.*  Kendall Hunt Publishing, 2018.
  2. Supplementary texts and workbooks:

None

Addendum: Student Learning Outcomes

Upon completion of this course, our students will be able to do the following:

* 1. Demonstrate an understanding of how scientists discover the laws of nature.
  2. Describe the development of both the history and philosophy of science in multiple cultures.
  3. Evaluate whether a claim is scientific or pseudoscientific using logic, demonstration and skepticism.
  4. Distinguish between ethical and non-ethical behavior in science.