

UCIRVINE | SUMMER SESSION

Physics 21: Science from Superheroes to Global Warming

Summer 2008

Class Meeting Information

This course meets online from June 23 to Aug. 29

Instructor Information

Name: Michael Dennin

As a Professor of Physics at UC Irvine, I have taught physics courses at all levels from introductory courses to graduate level courses. One of the more interesting experiences has been teaching a range of Freshmen Seminars on the Physics of Superheroes. This experience has lead directly to the creation of this course.

Prerequisites — Classes or Knowledge Required for this Course

There are no specific prerequisites for this course. However, it will rely heavily on your everyday experience with the physical world!

Course Objectives

After completing this course, the student will be able to:

- Define key scientific terms
- Evaluate the use of numbers in an argument
- Explain simple functions and algebraic expressions
- Evaluate if a particular argument follows the scientific method
- Provide a qualitative analysis of a physical situation in terms of fundamental scientific principles
- Identify if a particular question can be answered by scientific methods
- Design and execute a “simple” scientific experiment

Course Text or Online Resources

The course uses the online textbook: Science Appreciation: Introduction to Science Literacy, by John White and Michael Dennin. You will also be provided various articles and videos through the course website.

Course Outline

Week 1	Science Literacy
Topics/Reading	Read Chapter 1 of textbook
Objectives	By the end of this lesson, the student should be able to: <ul style="list-style-type: none"> ➤ Provide definitions for the list of terms found at the beginning of Chapter One. ➤ Analyze an argument explaining a particular natural phenomenon and determine if it is based on modern science or Aristotelian views. ➤ Explain the limits of modern science techniques and provide an argument justifying whether or not scientific methods can provide an answer to a particular question.
Assignments Due	Students must complete the assigned end of chapter questions, take the online quiz, and complete the journal writing assignment for this week.
Method of Instruction	There are two online forums the students will participate in this week.
Week 2	Numbers and Equations
Topics/Reading	Read Chapter 2 of textbook
Objectives	By the end of this lesson, the student should be able to: <ul style="list-style-type: none"> ➤ Provide definitions for the list of terms found at the beginning of Chapter Two. ➤ Determine the accuracy and the precision of a measurement ➤ Analyze a numerically based argument in a news article ➤ Interpret a graph
Assignments Due	Students must complete the assigned end of chapter questions, take the online quiz, and complete the journal writing assignment for this week.
Method of Instruction	There are two online forums the students will participate in this week.
Week 3	Science Methodology
Topics/Reading	Read Chapter 3A – 3C of textbook
Objectives	By the end of this lesson, the student should be able to: <ul style="list-style-type: none"> ➤ Execute a quantitative experiment ➤ Propose an explanation of the results for the experiment ➤ Propose further tests of their explanation
Assignments Due	Students will conduct an experimental study of the period of the pendulum, keeping notes on the experiment in their journal.
Method of Instruction	Students will discuss the results of their experiment in the online forum.
Week 4	Scientific Community
Topics/Reading	Finish Chapter 3 of textbook
Objectives	By the end of this lesson, the student should be able to: <ul style="list-style-type: none"> ➤ Provide definitions for the list of terms found at the beginning of Chapter Three. ➤ Determine if a particular method of analysis is scientific or not. ➤ Discuss the sociology of the practice of science

Assignments Due	Students must complete the assigned end of chapter questions, take the online quiz, and complete the journal writing assignment for this week.
Method of Instruction	There are three online forums the students will participate in this week.

Week 5	Classical Mechanics
Topics/Reading	Read Chapter 4 of textbook: WARNING – THIS IS THE MOST CHALLENGING WEEK
Objectives	By the end of this lesson, the student should be able to: <ul style="list-style-type: none"> ➤ Provide definitions for the list of terms found at the beginning of Chapter Four. ➤ Describe the motion of an object in terms of its position, velocity, and acceleration. ➤ Analyze a physical situation to determine when there is a net force on an object from either a description of its motion or the interactions it has with other objects. ➤ Identify “correct” and “incorrect” physical motions and interactions in video clips
Assignments Due	Students must complete the assigned end of chapter questions, take the online quiz, and complete the journal writing assignment for this week.
Method of Instruction	There are two online forums the students will participate in this week.

Week 6	Superhero Week!!
Topics/Reading	GROUP PROJECT: DESIGN YOUR OWN SUPERHERO DUE AT WEEKS END
Objectives	By the end of this lesson, the student should be able to: <ul style="list-style-type: none"> ➤ Justify the origin and powers of a self-designed superhero ➤ Rate the origin and powers of the other superheroes
Assignments Due	A description of their superhero must be provided by the middle of the week. Evaluation of the other superheroes due by the end of the week.
Method of Instruction	Examples of superheroes and an analysis of their powers will be provided.

Week 7	More science
Topics/Reading	Read Chapter 5 of textbook
Objectives	By the end of this lesson, the student should be able to: <ul style="list-style-type: none"> ➤ Provide definitions for the list of terms found at the beginning of Chapter Five. ➤ Explain the range of applicability of a scientific theory ➤ Explain the difference between disproving a theory and expanding a theory.
Assignments Due	Students must complete the assigned end of chapter questions, take the online quiz, and complete the journal writing assignment for this week.
Method of Instruction	There are two online forums the students will participate in this week.

Week 8	Science Fiction or Science Fact?
Topics/Reading	Video clips and links to articles
Objectives	By the end of this lesson, the student should be able to: <ul style="list-style-type: none"> ➤ Identify fundamental versus technological limits. ➤ Use your understanding of these limits to evaluate the likelihood of various technologies.
Assignments Due	Students must complete the journal writing assignment for this week.
Method of Instruction	There are two online forums the students will participate in this week.

Week 9	Science and Society
Topics/Reading	Read Chapter 6 of textbook
Objectives	By the end of this lesson, the student should be able to: <ul style="list-style-type: none"> ➤ Provide definitions for the list of terms found at the beginning of Chapter Six. ➤ Explain the arguments presented in the case studies in Chapter 6. ➤ Provide their own analysis of at least one of the case studies.
Assignments Due	Students must complete the assigned end of chapter questions, take the online quiz, and complete the journal writing assignment for this week.
Method of Instruction	There are two online forums the students will participate in this week.

Week 10	Preparation for final assignments
Topics/Reading	Read Links of Intelligent Design and Global Warming
Objectives	By the end of this lesson, the student should be able to: <ul style="list-style-type: none"> ➤ Evaluate whether or not Intelligent Design is a scientific theory ➤ Evaluate the issue of global warming using the criteria developed in this class
Assignments Due	Students must complete the journal writing assignment for this week.
Method of Instruction	There are two online forums the students will participate in this week.

