

MLS 630 **Reason to Relativity: Revolutions in Scientific Thought**

Course Description: Aristotle's description of the physical world stood for centuries as the gold standard. It shaped how generations of scholars saw and described their own world, i.e. e. until Newton arrived on the scene. Much later Einstein filled in the gaps that Newton's vision didn't adequately explain. Today Einstein's theories are being simultaneously verified and challenged by the next generation of scientists. This dynamic process has had its ups and downs since the time of Aristotle, both evolutionary and revolutionary while the search goes on. Our goal will be to view discoveries and revelations in the context of both their historical and scientific importance and discover what prompted great minds to take these leaps forward.

Course Outcomes

- Become acquainted with the major contributors to scientific thought
- Gain insight into the ways in which science develops models
- Understand the way scientific commonsense changes over time.

Course Requirements and Grading: Reading assignments will be principally from primary sources. These will be in the form of either material on the web or class handouts. The class will read selections from *The Republic* (Plato), *Physics* (Aristotle), *On the Heavens* (Aristotle), from the *Principia* (Newton), *On the Electrodynamics of Moving Bodies* (Einstein) selections from the *Almagest* for the Ptolemy topic, *Two World Systems* for the Galileo topic and for the one on significant experiments, *I thought I'd have a paper on the Michelson/Morley experiment* (although Einstein said he was unaware of it). Also suggested in addition for general reference is any good introductory physics text.

Grades will be based on class participation (30%), an oral class presentation on a scientific revolution (30%) and a written paper on a topic that enlarges the material of the course (40%). The subject of the paper will be selected after discussion with me.

Topical/ Course Outline

1. Introduction, Some Definitions and Common Sense, World Views and Scientific Paradigms.
2. The Pre-Socratic Beginnings
3. The Platonic Universe
4. The Aristotelian Model of the World
5. Saving the Appearances; Ptolemy's *Almagest*
6. The Copernican Revolution (Of the Heavenly Orbs).
7. Galileo Galilei; The Scientific Method and Some Important Discoveries
8. Tycho and Kepler; Circles and Ellipses
9. Isaac Newton; Basic Principles
10. Significant Experiments
11. Einstein and Relativity; Special and General

12. Oral Presentations
13. Oral Presentations
14. Science, Common Sense, World Views and Paradigms