Course Number: SCI 101

Name of Course: Scientific Method

Delivery Mode: On-campus

Instructor Information: Tom R. Herrmann
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Prerequisites: MATH 070 or equivalent.

Course Description: The first term of a three-term introductory science course designed to provide students with a broad background in the physical sciences with emphasis on the scientific method, optics and motion. The curriculum stresses both theoretical principles and applications of concepts using experimentation as a vehicle for modeling scientific process. This course is especially suited for students preparing for elementary school science teaching and may be helpful to students seeking preparation for the National Teaching Examination in General Knowledge or General Science.

Required Text and Other Materials:
- A calculator with scientific functions.
- A looseleaf binder for laboratory work.
- A protractor, a straightedge, and a stapler.

Course Objectives. This course is designed to:

1. give students an introduction to science and to the scientific method as a tool to ask and answer questions about the physical world;
2. provide an introduction to the history of science, how the scientific method was developed and who were the significant figures in this;
3. give a knowledge of general physics laws related to simple mechanics and optics;
4. stimulate critical thinking and active learning;
5. provide some basic skills in teaching science at the elementary level.

Rationale for Course Structure This course will use a standard physical science textbook, but it is not organized around the textbook. Rather, we take an historical approach, relating most course material to the seminal work of Galileo Galilei.

Galileo is an important figure in the history of science because he made significant contributions to the fields of physics and astronomy. Equally important, Galileo is the originator...
of the modern scientific method. His life also illustrates that science is a human endeavor and that scientists are influenced by their cultural backgrounds, personal values, and experiences. In turn Galileo’s interaction with the Church also serves as a model for one of many different ways in which intelligent people relate science and faith in their own lives. Galileo’s groundbreaking work in cosmology and the study of motion is roughly reflected in the course structure. You will observe this as you get to know Galileo’s life’s work during the progress of the course.

Scientists derive everything that they believe they “know” through observation. Scientists test all scientific theories and laws by observing phenomena. In this course, you will use the natural world as the authority to answer questions posed. To “answer” questions concerning how a phenomenon occurs, you can follow a few simple steps. First, you need to design an experiment to observe the phenomenon. Next you need to perform the experiment to make the observations. Lastly, you try to draw conclusions (i.e., look for patterns and generalities) about the phenomenon using the observations as evidence. The conclusions that you draw become your understanding of the phenomenon. Course work in this class will be based on hands-on manipulation and observation, to allow you to draw your own conclusions based on your own experiments and observations. Our goal for the course is to have you draw conclusions from multiple observations of phenomena (reason inductively) and then apply these conclusions to predict the outcomes of other experiments (reason deductively). To achieve these goals, you will work both individually and in groups, pooling your ideas, your prior knowledge, and your observations of the phenomena, to draw testable conclusions and apply them. The group work is important in that it encourages the synthesis of multiple viewpoints, thereby strengthening the understanding of the individual.

In summary, we expect students in this class to

- actively investigate scientific phenomena, interpret results, and make sense of science;
- collaborate with peers in scientific inquiry;
- construct scientific knowledge by integrating prior knowledge with new information and experience; and
- reflect on scientific understanding and application.

**Methods of Assessment:** You will be evaluated using

- attendance and observation of your active participation. This includes lab write-ups (20% weight); *Each missed class will result in 5% subtracted from your final weighted score, in addition to any other points you lose.*
- homework (15% weight);
- term paper (biography) (10% weight: 6% written / 4% oral);
- short quizzes on the assigned reading (15% weight);
- examinations: one mid-term and one final exam. This is your chance to show you have learned some skills and content. (40% weight).

Letter grades will be assigned based on the following scale:

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<th>Grade</th>
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**Brief Outline of Course Content:**

1. The course will be roughly divided into “Unit I: Light and the telescope” and “Unit II: Motion and Gravity.”
2. Each lesson will consist of a reading assignment from the textbook (Tillery) and another reading, usually from Sobel’s book. In SCI 101 we will cover chapters 1, 2, 3, and 7 of Tillery. (If you have the 5th edition, we do chapter 8, not chapter 7.) The textbook does a good job at tying the concepts explained to our common experience.
3. We will complete several laboratory exercises.
4. Homework will be assigned daily.
5. There will be quizzes on the material from each chapter and on the readings from Sobel’s book.
6. There will be a mid-term exam and a final exam.
7. The URL for the course web page is


   This page will contain links to a course schedule, the homework assignments, and some review sheets.

**Course Requirements:**

1. Attendance, especially since there will be a lab component nearly every day.
2. You need to complete all text readings, quizzes and laboratory assignments.
3. You will be required to perform simple experiments and report them according to the guidelines provided.
4. You will also be required to write one short paper (approximately 1500 words) on a scientist of your choice, subject to the instructor’s approval. It will be a good idea to discuss the selected topic with your instructor prior to starting the paper. A rough draft will be turned in initially for comments, followed by the final draft. More on this is in a separate handout.
5. There will be one mid-term exam and one (comprehensive) final exam. The exams will cover text material and experiments.
6. Bring a calculator to all classes and exams.

**Statement on Academic Misconduct:** Eastern Oregon University places a high value upon the integrity of its student scholars. Any student found guilty of an act of academic misconduct (including, but not limited to, cheating, plagiarism, or theft of an examination or supplies) may be subject to having his or her grade reduced in the course in question, being placed on probation or suspended from the University, or being expelled from the University — or a combination of these. (Please see the 2004-05 on-line Student Handbook: Campus Citizenship - Academic and Behavior, at the following web address:

   [http://www2.eou.edu/saffairs/handbook/honest.html](http://www2.eou.edu/saffairs/handbook/honest.html)

**Statement on Americans with Disabilities:** If you have a documented disability or suspect that you have a learning problem and need accommodations, please contact the Disability Services Program in Loso Hall 234. Telephone: 962-3081.

Syllabus prepared by Tom R. Herrmann, June 2007