

**SYLLABUS**  
PHI 3400  
*Philosophy of Science*

Dr. Sergio Gallegos

Spring 2014

Office: Central Classroom 307J

Office Hours: M/W 12:00-2:30PM and by appointment

Email: [sgalle36@msudenver.edu](mailto:sgalle36@msudenver.edu)

Office Phone: 303-556-5237

**Required Texts:**

M. Curd, J.A. Cover and C. Pincock (eds.) *Philosophy of Science: the central issues* (W. W. Norton and Co.)

Additional readings will be made available through Blackboard. Those are indicated below with a star (\*).

**COURSE DESCRIPTION:** Science is one of the most important achievements of mankind. Indeed, through science, we have been able to eradicate diseases such as smallpox and to put men on the moon. And yet, in spite of (or perhaps because of) its crucial importance, science raises extremely important problems and questions. Some of these questions are the following: what is science? What distinguishes it from pseudoscience? Is science completely objective (as some of its practitioners claim) or do our values shape it in certain ways? If so, to what extent is science value-laden? Granting that science aims to provide explanations of natural phenomena, what is a scientific explanation? Are there different types of scientific explanation? Granting that science aims to measure and quantify, what is a measurement? Is it an operation through which we assign numbers to features? Is an operation through which we represent something?

This is an advanced course in the philosophy of science designed to introduce students to certain philosophical issues and problems that arise in the development and the practice of science. This course covers fundamental questions such as the abovementioned ones. Important cultural achievements, in the form of original and complete works, will be emphasized. (The course satisfies the requirement of the Method area for the Philosophy Major). The overall structure of the course will be thematic rather than historic: we will focus on certain central themes that have shaped philosophical discussions about science in the last one hundred years. However, within each theme, texts will be presented and discussed in a (roughly) chronological way. The themes that will be addressed are the following: (1) The Nature of Science and the Demarcation Problem, (2) Objectivity and Values in science, (3) Explanation in Science and (4) Measurement in Science

**COURSE OBJECTIVES:** Upon successful completion of this course the student should be able to:

1. a. Identify central philosophical topics and problems, especially within the context of the practice of science.  
b. Apply key terminology and technical vocabulary that overlaps philosophy and science, in particular crucial concepts such as objectivity, explanation, measurement and realism.
2. a. Criticize possible answers and proposed techniques for answering some philosophical problems that arise in the context of science.  
b. Suggest and consider alternate solutions that may involve either the reformulation or the rejection of the questions under consideration.

3. a. Appreciate the relevance of philosophy to understand both the history and the current practice of science.
- b. Critically address, both orally and in writing, some of the main questions that have shaped and continue to shape debates in philosophy of science.

**Grading for the Course:**

First research paper (6-10 pages): Due February 24 (30% of your grade)

Take-home exam: Due October 31 (20%)

Second and final research paper: (6-10 pages) Due Final's Week (30%)

First week assignment: (5%)

In-class presentation (details to be discussed): (10%)

Class participation: (5%)

Grades will be determined as follows:

A: 94-100

A-: 90-93

B+: 86-89

B: 84-85

B-: 80-83

C+: 76-79

C: 74-75

C-: 70-73

D: 60-69

F: 0-59

**Important notes regarding written assignments:**

Students are responsible to submit assignments on time. Written assignments must bear the name of their author, have their pages numbered and be stapled.

Students are required to submit a hard copy of their assignments. Electronic submissions will only be allowed for purposes of providing proof of timely submission, but will not be considered as fulfilling the assignment. It is the responsibility of students to provide a hard copy of their assignments to the instructor at their earliest convenience.

In case of late submissions, I reserve the right to accept the assignment. In addition, if I accept a late assignment, a grade deduction will be applied (a full letter grade per day).

**Important notes regarding timeliness and attendance:**

Attendance will be taken at the beginning of each class. If you do not respond to your name being called, you will be marked absent.

If you show up late, it is your responsibility to remind me at the end of class to modify the record from "absent" to "late". No changes will be allowed subsequently.

Constant absences and lateness will impact your final grade. Any three instances of lateness will be considered an absence. After three absences, your final grade will drop a full letter grade. After six absences, you will fail the course.

In case of absence, you are responsible for the material covered during the class period missed.

### **Classroom Behavior Policy:**

Disruptive and disrespectful behavior will be identified, warned and, if it continues, penalized appropriately. Respectful and non-disruptive behavior includes:

- \*Coming to class on time and not leaving early; informing Dr. Gallegos if you must leave early
- \*Coming to class prepared; being prepared means carefully reading the material by the assigned date. **Even if you have difficulty with it, still engage with the material**
- \*Asking thoughtful questions based on lecture, readings, and discussion
- \*Talking during class only when called upon or during class discussion by raising your hand.
- \*Keeping class discussion on topic rather than talking about your neurotic boss, dog, boyfriend, or girlfriend
- \*Not eating in class, though it is acceptable to drink water or coffee
- \*Listening to Dr. Gallegos or your classmates, and not your iPods, etc.
- \*Putting your cell phone on vibrate, and if you forget, not answering it if it rings during class; **No texting!!!** (I have to put this in bold because some students will still do this despite this warning; **if you do this, you will be immediately asked to leave**).
- \*Not using your tablets or computers in classroom for non-class purposes (internet surfing, Facebook, etc.).
- \*Not reading the newspaper, magazines, or other coursework
- \*Not behaving in ways that threaten or disparage other students or Dr. Gallegos
- \*Staying awake and paying attention during class
- \*If you are not prepared to do the above, stay home!**

### **Useful Policy Information**

#### **Accommodations for Students with Disabilities:**

Students who need an accommodation based on the impact of a disability should contact the instructor to discuss their specific needs. Students will need to provide the instructor with a disability verification letter from the ACCESS Center (located in the Auraria Library) before appropriate accommodations can be made. Failure to notify the instructor in a timely fashion may hinder the college's ability to assist students to successfully complete the course.

#### **Academic Dishonesty:**

As students, faculty, staff and administrators of Metropolitan State University of Denver, it is our responsibility to uphold and maintain an academic environment that furthers scholarly inquiry, creative activity and the application of knowledge. We will not tolerate academic dishonesty. We will demonstrate honesty and integrity in all activities related to our learning and scholarship. We will not plagiarize, fabricate information or data, cheat on tests or exams, steal academic material, or submit work to more than one class without full disclosure. **If you engage in any kind of academic dishonesty (even unwillingly) in an assignment, this will immediately result in a failing grade for the assignment in question and may bring further sanctions. If you have any doubts or questions regarding what kind of sources you may use for your assignments or how you should use them, I strongly encourage you to discuss them with me in advance.**

### **Class Attendance on Religious Holidays**

Students at Metropolitan State University of Denver (MSU Denver) who, because of their sincerely held religious beliefs, are unable to attend classes, take examinations, participate in graded activities or submit graded assignments on particular days shall without penalty be excused from such classes and be given a meaningful opportunity to make up such examinations and graded activities or assignments provided that advance written notice that the student will be absent for religious reasons is given to the faculty members during the first two weeks of the semester.

### **Reading Schedule:**

Philosophy can be very difficult reading. Take your time to slowly and carefully read the material by the following date (if this becomes too unwieldy, we'll modify it):

First Theme: The Nature of Science and the Problem of Demarcation

T, January 21: Course Introduction

Th, 23: No class (I am away for a conference). View "The Point" available at [www.youtube.com/watch?v=eTCLLUUCxOY](http://www.youtube.com/watch?v=eTCLLUUCxOY) First week assignment given

T, 28: K. Popper (1963), 'Science: Conjectures and Refutations'

Th, 30: T. Kuhn (1970), 'Logic of Discovery or Psychology of Research?' First week assignment due.

T, February 4: I. Lakatos (1973), 'Science and Pseudo Science'

Th, 6: P. Thagard (1978), 'Why Astrology is a Pseudo Science'. First Paper Topics Handed Out.

T, 11: L. Laudan (1983), 'The Demise of the Demarcation Problem' (\*)

Th, 13: M. Mahner (2013) 'How to demarcate after the (alleged) demise of the demarcation problem' (\*)

Second Theme: Objectivity and Values in Science

T, 18: R. Carnap (1932) 'The Elimination of Metaphysics through logical analysis of language' (\*)

Th, 20: C. Hempel (1965) 'Science and Human Values' (\*)

T, 25: T. Kuhn (1974), 'Objectivity, Value Judgment and Theory Choice'

Th, 27: E. McMullin (1982) 'Values in Science' (\*) First Paper Due

T, March 4: H. Longino (1990) 'Values and Objectivity'

Th, 6: Daston and P. Galison (1992) 'The Image of Objectivity' (\*)

T, 11: G. Okruhlic (1994) 'Gender and the Biological Sciences'

Th, 13: R. Giere (1995) 'The Feminism Question in the Philosophy of Science' (\*)

Third Theme: Explanation in Science

T, 18: C. Hempel (1962), 'Two basic types of scientific explanation'

Th, 21: C. Hempel (1966), 'Inductive-statistical explanation' Take Home Exam Handed Out

T, 25: Spring Break. No class.

Th, 27: Spring Break. No class.

T, April 1: Van Fraassen (1977), 'The Pragmatics of explanation' (\*) Take Home Exam due.

Th, 3: P. Railton (1978), 'A deductive-nomological model of probabilistic explanation'

T, 8: P. Kitcher (1981) 'Explanatory unification'

Th, 10: J. Woodward (2005) 'The Manipulability Conception of Causal Explanation'  
Fourth theme: Measurement in science  
T, 15: H. von Helmholtz, 'Numbering and Measuring from an epistemological viewpoint'  
(\* ) Second Paper Topics Handed Out.  
Th, 18: N. Campbell (1920), 'Fundamental measurement' (\*)  
T, 22: S. Stevens (1946) 'On the theory of scales of measurement' (\*)  
Th, 24: Joel Michell (2003), 'Epistemology of measurement' (\*)  
T, 29: L. Mari (2003) 'Epistemology of measurement' (\*)  
Th, May 1: B. Van Fraassen (2007) 'Measurement as representation.1' (\*)  
T, 6: B. Van Fraassen (2007) 'Measurement as representation.2' (\*)  
Th, 8: Houle et al. (2011) 'Measurement and Meaning in Biology' (\*)  
Finals week: Second and final paper due