

# PAR 345: Philosophy of Science

**Term:** Spring 2020      **Instructor:** Robert Smithson  
**Time:** MWF 12-12:50pm      **Email:** smithsonr@uncw.edu  
**Room:** BR 261      **Office:** Bear 266  
**Office Hours:** 11am-12pm MWF and by appt.

## Course Description

Scientific discoveries and scientific practice itself raise a number of interesting philosophical questions. Why should we think that our best scientific theories are true? Are we justified in making predictions about the future on the basis of observations made in the past? What are laws of nature, and in what sense do they govern physical events? What is the proper interpretation of fundamental physical theories like relativity and quantum mechanics? How do we distinguish science from pseudo-science? What are the distinctive aspects of the scientific method? In this introductory course, we will consider how philosophical arguments might be used to assess these and other questions.

## Course Goals

1. To provide students with a systematic overview of the types of reasoning involved in scientific inquiry.
2. To assess the various philosophical challenges to and defenses of scientific knowledge.
3. To provide students with an overview of how philosophy can help us better understand the content of specific scientific theories (physics, biology, etc.).

## Course Texts

All texts for the course will be posted to the course's Blackboard site.

## Grading

Short papers (2 pages each): 40%

Final: 25%

Homework: 25%

Attendance/Participation: 10%

The participation grade takes into account both attendance and discussion in class. Class attendance is mandatory. If you have an excused absence (such as a medical absence), please bring me a note or send me an email.

### **Papers**

There will be a series of writing assignments throughout the term, each 2 pages long (double-spaced). To facilitate anonymous grading, only include your identification number (and not your name) at the top of the document. For helpful advice on writing philosophy papers, see the folder on “Writing Philosophy Papers” on Canvas.

### **Homework**

The homework assignments for the course may include short problem sets, reading responses, etc. These assignments will be announced throughout the term.

### **Attendance**

The participation grade takes into account both attendance and discussion in class. Class attendance is mandatory. Students arriving late will receive reduced credit for attendance that day. Students leaving class early will also receive reduced credit.

The professor will accommodate a reasonable number of excused absences for religious holidays and official off-campus college business such as academic conference presentations and athletic competitions. However, students must discuss with the professor the dates of the anticipated absences no later than the last day of the drop period. Students must present to their professor written evidence of the anticipated absences and discuss with him/her how and when make-up work should be completed prior to missing the class. Students should not expect to receive allowance for excused absences if they do not meet with the professor beforehand and clarify the dates as necessary.

Absences will be addressed by the professor in accordance with his attendance policy. The professor retains the right to determine what would be considered to be a reasonable number of absences (excused or otherwise) for the course. A student will not fail a course because the number of religious observances and/or college business absences exceed the number of absences allowed, except if excessive absences make it impossible to fulfill the expectations of the course. The student’s class participation grade in the course, though, may still be affected.

### **Honor Code**

All students enrolled at UNCW are subject to the UNCW Student Academic Honor Code, which is intended to help every member of the UNCW community appreciate the high value placed on academic integrity and the means that will be employed to ensure its preservation. Students are expected to perpetuate a campus culture in which each student does his or her own work while relying on appropriate resources for assistance. In such a climate, students enjoy a special trust that they are members of a unique community in which one’s thoughts and words are attributed correctly and with proper ownership, and in which there is little need for systems to sanction those who cheat. As such, all UNCW students shall commit to the principles and spirit of the Honor Code by adhering to the following pledge:

As a student at The University of North Carolina Wilmington, I am committed to honesty and truthfulness in academic inquiry and in the pursuit of

knowledge. I pledge to uphold and promote the UNCW Student Academic Honor Code.

More information on the Honor Code is available at the following website:

<http://www.uncw.edu/odos/honorcode/>.

Please be especially familiar with UNCW's position on plagiarism as outlined in the UNCW Student Handbook. Plagiarism is a form of academic dishonesty in which you take someone else's ideas and represent them as your own. Here are some examples of plagiarism:

1. You write about someone else's work in your paper and do not give them credit for it by referencing them.
2. You give a presentation and use someone else's ideas and do not state that the ideas are the other person's.
3. You get ideas from some other reference material and do not reference that material.

### **Accessibility Services**

It is very important that this classroom be an inclusive environment that meets the learning needs of all of its students. If you are a person with a disability and anticipate needing any type of academic accommodations in order to fully participate in your classes, please contact the Office of Disability Services (962-7555). Please give me a copy of the letter you receive from Office of Disability Services detailing class accommodations you may need. If you require accommodation for test-taking, please make sure I have the referral letter no fewer than three days before the test.

### **Title IX Statement**

UNCW practices a zero tolerance policy for any kind of violent or harassing behavior. If you are experiencing an emergency of this type contact the police at 911 or UNCW CARE at 962- 2273. Resources for individuals concerned with a violent or harassing situation can be located at <http://uncw.edu/noharm/resources/index.html>.

### **University Learning Center**

The University Learning Center's (ULC) mission is to help students become successful, independent learners. Tutoring at the ULC is NOT remediation: the ULC offers a different type of learning opportunity for those students who want to increase the quality of their education. ULC services are free to all UNCW students and include the following:

- Learning Services (University Learning Center) <http://uncw.edu/ulc/learning/>
- Math Services <http://www.uncw.edu/ulc/math/index.html>
- Supplemental Instruction <http://www.uncw.edu/ulc/si/index.html>
- Writing Services <http://www.uncw.edu/ulc/writing/index.html>

### **Electronic Device Policy**

In order to promote classroom discussion, no laptops, tablets, phones, etc. are permitted during class except by instructor permission.

In order to protect the integrity of the classroom experience, the use of recording devices is limited to either the expressed permission of the faculty member or with proper

documentation from the Office of Accessibility Services.

### Course Schedule

This schedule is subject to change, depending on the progress of the discussion in the class. If there are changes, I will make note of them in class and will send out an email about the changes. Next to each class period, there is an assigned reading. The readings for 1/15 should be completed before class on 1/15, etc.

Date	Topic
	<b>SCIENCE AND ITS SOCIAL ROLE</b>
M 1/13	Class overview, and the role of philosophy of science. <i>Reading:</i> Syllabus.
W 1/15	The demarcation problem. <i>Reading:</i> Larry Laudan (1982) <i>Science at the Bar</i> . <i>Optional background reading:</i> Carl Hempel (1966). <i>Philosophy of Natural Science</i> (ch. 3). Pierre Duhem (1954) <i>The Aim and Structure of Physical Theory</i> (ch. 3).
F 1/17	Myths about science: theory/observation distinction <i>Reading:</i> none.
M 1/20	Myths about science: hypotheses testing and crucial experiments <i>Reading:</i> none.
	<b>REALISM: WHY BELIEVE SCIENTIFIC THEORIES?</b>
W 1/22	Indispensability arguments. <i>Reading:</i> Excerpts from Anjan Chakravartty (2011). "Scientific Realism."
F 1/24	Alternative explanations of scientific success. Kyle Stanford (2000). "An Antirealist Explanation of the Success of Science.", underdetermination arguments
M 1/27	The pessimistic meta-induction. <i>Reading:</i> Larry Laudan (1981). "A Confutation of Convergent Realism."
W 1/29	Underdetermination arguments. <i>Reading:</i> none.
F 1/31	Alternatives to realism: structural realism. <i>Reading:</i> John Worrall (1989). "Structural Realism: The Best of Both Worlds?" (excerpts).
M 2/03	Alternatives to realism: constructive empiricism, conventionalism. <i>Reading:</i> Bradley Monton & Chad Mohler (2017). "Constructive Empiricism." (excerpts).
W 2/05	Catch-up day.
	<b>INDUCTION AND CONFIRMATION: HOW ARE THEORIES CHOSEN?</b>
F 2/07	Confirmation and acceptability. <i>Reading:</i> none.
M 2/10	The traditional problem of induction. <i>Reading:</i> Wesley Salmon (1974). "An Encounter with David Hume."

PAR 345: Philosophy of Science

- W 2/12 Responses to the traditional problem.  
*Reading:* none.
- F 2/14 Responses, continued.  
*Reading:* none.
- M 2/17 NO CLASS (new child, makeup class TBA)
- W 2/19 The new problem of induction.  
*Reading:* none.
- F 2/21 The new problem of induction, continued.  
*Reading:* none.

**LAWS AND GENERALIZATIONS: HOW DO THEORIES EXPLAIN?**

- M 2/24 Scientific explanation.  
*Reading:* None.  
*Background reading:* Carl Hempel (1966). *Philosophy of Natural Science* (ch. 5).  
James Woodward (2014). "Scientific Explanation." (excerpts)
- W 2/26 NO CLASS (Conference- makeup class TBA)
- F 2/28 Motivations for non-Humeanism.  
*Reading:* Helen Beebe (2000). "The Non-Governing Conception of Laws of Nature."
- M 3/02 Humean Supervenience.  
*Reading:* Ned Hall (manuscript). "Humeanism about laws of nature." (excerpts)

**SCIENCE AND VALUES**

- W 3/04 Social construction, paradigms.  
*Reading:* Thomas Kuhn (1962). *The Structure of Scientific Revolutions*. (excerpts)
- F 3/06 Social construction, paradigms, continued.  
*Reading:* none.
- M 3/08-F 3/12 **SPRING BREAK**
- M 3/16 Feminist philosophy of science.  
*Reading:* none.
- W 3/18 Standpoint theory.  
*Reading:* none.
- F 3/20 Scientific objectivity  
*Reading:* none.
- M 3/23 Science and ethics.  
*Reading:* Heather Douglas (2003) "The moral responsibilities of scientists."
- W 3/25 Kristen Intemann (2001). "Science and Values: Are Value Judgments Always Irrelevant to the Justification of Scientific Claims?"
- F 3/27 TBA

**PHILOSOPHY OF PHYSICS**

PAR 345: Philosophy of Science

M 3/30	Absolutism vs. relationism, <i>Reading:</i> Tim Maudlin (2010). <i>Space and Time</i> . Ch. 1. (excerpts)
W 4/01	Geometric structure, historical background <i>Reading:</i> Tim Maudlin (2010). <i>Space and Time</i> . Ch. 2. (excerpts)
F 4/03	Arguments for absolutism <i>Reading:</i> Tim Maudlin (2010). <i>Space and Time</i> . Ch. 2.
M 4/06	Arguments for relationism. <i>Reading:</i> none.
W 4/08	Minkowski geometry. <i>Reading:</i> Tim Maudlin (2010). <i>Space and Time</i> . Ch. 3. (excerpt)
F 4/10	Spacetime in special relativity, The Lorentz Invariant Interval. <i>Reading:</i> Tim Maudlin (2010). <i>Space and Time</i> . Ch. 3. (excerpt)
M 4/13	Geometric laws in special relativity, the twins paradox. <i>Reading:</i> Tim Maudlin (2010). <i>Space and Time</i> . Ch. 3. (excerpt)
W 4/15	Constructing Lorentz coordinates, time dilation. <i>Reading:</i> Tim Maudlin (2010). <i>Space and Time</i> . Ch. 3. (excerpt)
F 4/17	Lorentz contraction, the “constancy of the speed of light.” <i>Reading:</i> Tim Maudlin (2010). <i>Space and Time</i> . Ch. 3. (excerpt)
M 4/20	Locality, polarization. <i>Reading:</i> none.
W 4/22	Entangled states <i>Reading:</i> none.
F 4/24	Bell’s Theorem, Aspect’s Experiment. <i>Reading:</i> none.

**PHILOSOPHY OF BIOLOGY**

M 4/27	TBA
W 4/29	TBA
TBA	Review Session.
05/04 11-30am-2:30pm	<b>EXAM</b>