PAR 345: Philosophy of Science

Term:	Spring 2022	**Instructor:**	Robert Smithson
Time:	TR 3:30-4:45pm	**Email:**	smithsonr@uncw.edu
Room:	BR 261	**Office:**	BR 266
		Office Hours:	TR 11am-12:15pm (or by appointment)

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 investigate the wider normative and social significance of science and scientific results.
3. To provide 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 Canvas.

Grading
Short papers (3 pages each): 40%
Final: 25%
Homework: 25%
Attendance/Participation: 10%

Papers
There will be a series of writing assignments throughout the term, each 3 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.

Health and Safetey Protocals
The University requires the use of face coverings indoors. **You will not be permitted to join an in-person class without a face covering**. Failure to comply will result in referral to the Dean of Students. Any student who has a medical concern with wearing a face covering should contact the Disability Resource Center at (910) 962-7555. If you are not already vaccinated, please consult with your healthcare provider and consider getting vaccinated. Vaccines are available through the UNCW Student Health Center. Effective August 23, any student on campus who has not provided proof of vaccination will be required to participate in weekly surveillance testing.

Please do not come to class when you are not feeling well or are experiencing any COVID-19 symptoms. Absences due to possible illness do not count against your attendance grade, and I am glad to work with you to make alternative arrangements for covering the material. If you have been exposed to COVID-19 or are

concerned about exposure, please contact the Student Health Center at (910) 962-3280 for specific information about testing, contact tracing and quarantine/isolation requirements, which differ for vaccinated and non-vaccinated individuals, according to CDC guidance. Remember, keeping healthy is essential to keeping campus open. Thank you for your help and compliance.

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. If you need to use technology for educational reasons, please let me know.

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. 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**
	OVERVIEW AND MYTHS
R 1/13	Class overview, the role of philosophy of science, the demarcation problem. *Reading*: Syllabus.
T 1/18	The demarcation problem, theory/observation distinction. *Reading*: Larry Laudan (1982) Science at the Bar.
R 1/20	Hypothesis testing, crucial experience. *Reading*: none.
	REALISM: WHY BELIEVE SCIENTIFIC THEORIES?
T 1/25	The No Miracles Argument. *Reading*: Excerpts from Anjan Chakravartty (2011). "Scientific Realism."

R 1/27	NMA, alternative explanations of scientific success. *Optional reading*: Kyle Stanford (2000). "An Antirealist Explanation of the Success of Science.", underdetermination arguments
T 2/01	The pessimistic meta-induction. *Reading*: Larry Laudan (1981). "A Confutation of Convergent Realism." Pessimistic meta-induction, writing philosophy papers. *Reading*: canvas documents on writing philosophy papers.
R 2/03	Underdetermination arguments, structural realism. *Reading*: John Worrall (1989). "Structural Realism: The Best of Both Worlds?" (excerpts).
T 2/08	Alternatives to realism: constructive empiricism, conventionalism. *Reading*: Bradley Monton & Chad Mohler (2017). "Constructive Empiricism." (excerpts).
T 2/15	The traditional problem of induction. *Reading*: Wesley Salmon (1974). "An Encounter with David Hume."
R 2/17	Induction, continued.
	SCIENCE AND VALUES
T 2/22	Social construction, paradigms. *Reading*: Thomas Kuhn (1962). *The Structure of Scientific Revolutions.* (excerpts)
R 2/24	**NO CLASS: CONFERENCE**
R 3/03	Social construction, paradigms, continued. *Reading*: Thomas Kuhn (1962). *The Structure of Scientific Revolutions.* (excerpts)
T 3/08	Incommensurability. *Reading*: Thomas Kuhn (1962). *The Structure of Scientific Revolutions.* (excerpts)
R 3/10	Feminist philosophy of science. *Reading*: TBA.
T 3/15	Fact and value. *Reading*: TBA.
R 3/17	Fact and value, continued. Science in society: anti-science attitudes?
	PHILOSOPHY OF PHYSICS: SPACE AND TIME
T 3/22	Absolutism vs. relationism, *Reading*: Tim Maudlin (2010). *Space and Time.* Ch. 1. (excerpts)
R 3/24	Geometric structure, historical background *Reading*: Tim Maudlin (2010). *Space and Time.* Ch. 2. (excerpts)
T 3/29	Arguments for absolutism, relativism. *Reading*: Tim Maudlin (2010). *Space and Time.* Ch. 2.
R 3/31	Minkowski geometry. *Reading*: Tim Maudlin (2010). *Space and Time.* Ch. 3. (excerpt)
T 4/05	Spacetime in special relativity, The Lorentz Invariant Interval. *Reading*: Tim Maudlin (2010). *Space and Time.* Ch. 3. (excerpt)

R 4/07	Geometric laws in special relativity, the twins paradox. *Reading*: Tim Maudlin (2010). *Space and Time*. Ch. 3. (excerpt)
T 4/12	Constructing Lorentz coordinates, time dilation, lorentz contraction. *Reading*: Tim Maudlin (2010). *Space and Time*. Ch. 3. (excerpt)
R 4/14	**NO CLASS: BREAK.**
	PHILOSOPHY OF QUANTUM MECHANICS
T 4/19	Locality, polarization. *Reading*: none.
R 4/12	Entangled states *Reading*: none.
T 4/26	Bell's Theorem, Aspect's Experiment. *Reading*: none.
R 4/28	TBA

OR: Philosophy of mathematics? AI? biology?