

## **Philosophy 3400: Philosophy of Natural Science Syllabus**

Fall 2021

T 1:55pm-2:45pm; R 1:55pm - 3:50pm

Matherly Hall, Room 116

### **Instructor Information**

Chris Dorst

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Office: 312 Griffin-Floyd Hall

Office Hours: T 12:00pm-1:00pm; W 12:00pm-2:00pm, or by in-person/Zoom appointment

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### **Course Description and Objectives**

This course is a general introduction to the philosophy of science. We will focus on both classic and contemporary issues in the field, including questions such as: What is the difference between science and pseudoscience? How do we confirm scientific theories, and what justifies our confidence in their correctness? What is the nature of scientific explanation, and how does it work? What are laws of nature, and why does science seek to discover them? Should we interpret our scientific theories as literally true descriptions of reality, or merely as pragmatic tools meant to improve our capacities for predicting and controlling the world? And lastly, how do the personal values of individual scientists affect the objectivity of science?

### **General Education Objectives and Learning Outcomes**

This course is a Humanities (H) subject area course in the UF General Education Program. Humanities courses provide instruction in the history, key themes, principles, terminology, and theory or methodologies used within a humanities discipline or the humanities in general. Students will learn to identify and to analyze the key elements, biases and influences that shape thought. These courses emphasize clear and effective analysis and approach issues and problems from multiple perspectives. A minimum grade of C is required for general education credit.

PHI 3400 accomplishes these goals by familiarizing students with some key philosophical topics and arguments concerning science: its methods, aims, presuppositions, and justification. Students will become adept at thinking critically, analyzing arguments, and writing clearly and persuasively.

The General Education Student Learning Outcomes (SLO's) divide into three areas: CONTENT—students demonstrate competence in the terminology, concepts, theories and methodologies used within the discipline; COMMUNICATION—students communicate knowledge, ideas and reasoning clearly and effectively in written and oral forms appropriate to the discipline; and CRITICAL THINKING—students analyze information carefully and logically

from multiple perspectives, using discipline-specific methods, and develop reasoned solutions to problems.

Students will satisfy the CONTENT SLO by demonstrating a mastery of some key philosophical concepts as well as central arguments in the discipline. The COMMUNICATION SLO will be achieved by two papers, take-home midterm and final exams, and regular participation in class. Students will be required to explain and evaluate various views in the philosophy of science. Students will also demonstrate achievement of the CRITICAL THINKING SLO through the papers and exams, which will be on assigned topics designed to test students' critical thinking abilities. These assignments will be graded on the basis of a student's comprehension of the relevant issues, development and cogent defense of her or his position, clarity of expression, and mechanics.

In short, at the end of the course, students will be able to:

- Explain some traditional positions in the philosophy of science as well as common objections to them
- Analyze, evaluate, construct, and present arguments for particular philosophical positions
- Think critically about difficult and complex topics

### **Academic Honesty**

UF students are bound by The Honor Pledge, which states, "We, the members of the University of Florida community, pledge to hold ourselves and our peers to the highest standards of honor and integrity by abiding by the Honor Code. On all work submitted for credit by students at the University of Florida, the following pledge is either required or implied: 'On my honor, I have neither given nor received unauthorized aid in doing this assignment.'"

The Honor Code (<http://www.dso.ufl.edu/sccr/process/student-conduct-honor-code/>) specifies a number of behaviors that are in violation of this code and the possible sanctions. Furthermore, you are obligated to report any condition that facilitates academic misconduct to appropriate personnel. If you have any questions or concerns, please consult with the instructor. Plagiarism on any assignment will automatically result in a grade of "E" for the course. Plagiarism is defined in the University of Florida's Student Honor Code as follows: "A student shall not represent as the student's own work all or any portion of the work of another. Plagiarism includes (but is not limited to): a. Quoting oral or written materials, whether published or unpublished, without proper attribution. b. Submitting a document or assignment which in whole or in part is identical or substantially identical to a document or assignment not authored by the student." Students found guilty of academic misconduct will be prosecuted in accordance with the procedures specified in the UF honesty policy.

### **In-Class Expectations**

In response to COVID-19, the following practices are in place to maintain your learning environment, to enhance the safety of our in-classroom interactions, and to further the health and safety of ourselves, our neighbors, and our loved ones.

- If you are not vaccinated, get vaccinated. Vaccines are readily available at no cost and have been demonstrated to be safe and effective against the COVID-19 virus. Visit this link for details on where to get your shot, including options that do not require an appointment:  
<https://coronavirus.ufhealth.org/vaccinations/vaccine-availability/>.  
 Students who receive the first dose of the vaccine somewhere off-campus and/or outside of Gainesville can still receive their second dose on campus.
- You are expected to wear approved face coverings at all times during class and within buildings even if you are vaccinated. Please continue to follow healthy habits, including best practices like frequent hand washing. Following these practices is our responsibility as Gators.
  - Sanitizing supplies are available in the classroom if you wish to wipe down your desks prior to sitting down and at the end of the class.
  - Hand sanitizing stations will be located in every classroom.
- If you are sick, stay home and self-quarantine. Please visit the UF Health Screen, Test & Protect website about next steps, retake the questionnaire and schedule your test for no sooner than 24 hours after your symptoms began. Please call your primary care provider if you are ill and need immediate care or the UF Student Health Care Center at 352-392-1161 (or email [covid@shcc.ufl.edu](mailto:covid@shcc.ufl.edu)) to be evaluated for testing and to receive further instructions about returning to campus. UF Health Screen, Test & Protect offers guidance when you are sick, have been exposed to someone who has tested positive or have tested positive yourself. Visit the [UF Health Screen, Test & Protect website](#) for more information.
  - Course materials will be provided to you with an excused absence, and you will be given a reasonable amount of time to make up work.
  - If you are withheld from campus by the Department of Health through Screen, Test & Protect you are not permitted to use any on campus facilities. Students attempting to attend campus activities when withheld from campus will be referred to the Dean of Students Office.
- Continue to regularly visit [coronavirus.UFHealth.org](https://coronavirus.UFHealth.org) and [coronavirus.ufl.edu](https://coronavirus.ufl.edu) for up-to-date information about COVID-19 and vaccination.

### HyFlex

Classes will take advantage of HyFlex, so that students have the option to participate remotely via Zoom. **The default expectation is that students show up in person and participate in the classroom during our class meetings.** However, if a student is either (1) withheld from campus on ONE.UF, or (2) is strongly opposed to participating in person because of concerns about COVID-19, that student may participate via Zoom instead. Please let me know by email if you will be participating on Zoom for either of these reasons.

### Canvas e-Learning Environment

This course is supplemented by online content in the e-Learning environment known as

"Canvas." To login to the e-Learning site for this course, go to <https://lss.at.ufl.edu/>, click the **e-Learning in Canvas** button, and on the next page enter your Gatorlink username and password. You can then access the course e-Learning environment by selecting PHIL 3400 from the **Courses** pull-down menu at the top of the page. If you encounter any difficulties logging in or accessing any of the course content, contact the UF Computing Help Desk at (352) 392-4537. Please do not contact the course instructor regarding computer issues.

### **Online Course Evaluation**

Students are expected to provide professional and respectful feedback on the quality of instruction in this course by completing course evaluations online via GatorEvals. Guidance on how to give feedback in a professional and respectful manner is available at <https://gatorevals.aa.ufl.edu/students/>. Students will be notified when the evaluation period opens, and can complete evaluations through the email they receive from GatorEvals, in their Canvas course menu under GatorEvals, or via <https://ufl.bluera.com/ufl/>. Summaries of course evaluation results are available to students at <https://gatorevals.aa.ufl.edu/public-results/>.

### **Accommodation for Students with Disabilities**

Students with disabilities requesting accommodations should first register with the Disability Resource Center (352-392-8565, [www.dso.ufl.edu/drc/](http://www.dso.ufl.edu/drc/)) by providing appropriate documentation. Once registered, students will receive an accommodation letter which must be presented to the instructor when requesting accommodation. Students with disabilities should follow this procedure as early as possible in the semester.

### **Counseling and Wellness Center:**

<http://www.counseling.ufl.edu/cwc/Default.aspx>, 392-1575

### **University Police Department:**

392-1111 or 9-1-1 for emergencies.

### **Course Text**

There is one required textbook for this course:

- *Philosophy of Science: The Central Issues, Second Edition*, edited by Martin Curd, J. A. Cover, and Christopher Pincock. Published by W. W. Norton and Company.

This book is available from the bookstore and on Amazon. The majority of our readings will come from it; other readings will be provided on Canvas.

### **Course Requirements**

Participation: 5%

Reading Quizzes: 15%

Paper 1: 15%

Paper 2: 20%

Take-Home Midterm Exam: 20%

Take-Home Final Exam: 25%

## **Participation**

Respectful participation is expected of everyone. It can take a variety of forms: contributing to class discussions, coming to office hours, emailing me with questions, etc. Each class has assigned readings, which will require critical engagement and reflection. You should come to class prepared to discuss these readings and demonstrate that you have thought critically about them beforehand.

## **Reading Quizzes**

To prepare for our discussions, we need to study the readings carefully. As you study the reading, I suggest that you repeatedly ask yourself the following types of questions: What is the author's main claim? What are their principal reasons in support of that claim? What alternative position(s) do they consider, and why do they not adopt those alternatives? To reward you for doing this work, there will be unannounced reading quizzes interspersed throughout the semester. Each quiz will contain two or three true-false, multiple-choice, or short answer questions about the required reading for that day's class. If you miss a reading quiz, you will not be able to retake it, but at the end of the semester I will drop your three lowest reading quiz grades. The drop policy is meant to accommodate unforeseen illnesses, emergencies, and the like. If you will miss a reading quiz for a religious holiday or another official university activity, you must notify me ahead of time; quizzes missed for these reasons will *not* count toward your three dropped quizzes for the semester.

## **Papers**

You will write two papers for this course. For each paper, you will be given the choice of several prompts, of which you must choose one and write a 4-5 page paper in response. The prompts will concern topics we have read about and discussed in class. The papers give you the opportunity to illustrate your understanding of the material, as well as to develop your own views. (For a basic overview of how to write a philosophy paper, the following website is worth exploring: <http://www.jimpryor.net/teaching/guidelines/writing.html>.) Late papers will be deducted 1/3 of a letter grade (i.e. a +/- increment) for each day past the due date.

## **Midterm Exam**

The midterm exam is a take-home exam due by October 15 at 11:59pm (to be submitted on Canvas). The exam prompts will be provided at least a week before the due date. You will have to choose a subset of them to answer with a relatively short essay. The questions will concern the readings and topics we have discussed over the first half of the semester. While you may discuss the question prompts with other students, *you may not work with anyone else on the preparation of your answers.*

## **Final Exam**

The Final Exam is a take-home exam, due by December 13 at 11:59pm (to be submitted on Canvas). The exam will be similar in format to the midterm: it will consist of around five questions, and you will have to choose a subset of them to answer with a short essay. The questions will concern the readings and topics we have discussed over the course of the entire

semester. While you may discuss the question prompts with other students, *you may not work with anyone else on the preparation of your answers.*

### Grading

The following grade scale will be used to assign final letter grades for the course. See UF grading policies for assigning grade points at:

<https://catalog.ufl.edu/ugrad/current/regulations/info/grades.aspx>.

Grade Scale	Grade Value
100-93=A	A=4.0
92-90=A-	A-=3.67
89-87=B+	B+=3.33
86-83=B	B=3.00
82-80=B-	B-=2.67
79-77=C+	C+=2.33
76-73=C	C=2.00
72-70=C-	C-=1.67
69-67=D+	D+=1.33
66-63=D	D=1.00
62-60=D-	D-=0.67
59-0=E	E=0.00

### Course Schedule

The following is a tentative schedule for the course. Any changes to the schedule will be announced in class and over email. The syllabus is divided into weeks; the items listed for a given week are to be read before classes that week. Note: “CCP” stands for Curd, Cover, and Pincock, the course text listed above.

#### Week 1: August 24, 26

- Article from *Nature*: “Pseudoscience and COVID-19—we’ve had enough already” (provided on Canvas)
- Karl Popper, Excerpt from *Conjectures and Refutations* (CCP pp. 3-10)
- Imre Lakatos, “Science and Pseudoscience” (CCP pp. 20-26)

#### Week 2: August 31, September 2

- Paul Thagard, “Why Astrology is a Pseudoscience” (CCP pp. 27-36)
- Michael Ruse, “Creation Science is not Science” (CCP pp. 37-46)
- Larry Laudan, “Commentary: Science at the Bar—Causes for Concern” (CCP pp. 47-52)

**Week 3: September 7, 9**

- Wesley Salmon, “The Problem of Induction” (provided on Canvas)

**Week 4: September 14, 16**

- Nelson Goodman, “The New Riddle of Induction” (CCP pp. 451-456)
- Frank Jackson, “Grue” (provided on Canvas)
- **Paper 1 due by September 17 at 11:59pm (submit on Canvas)**

**Week 5: September 21, 23**

- Pierre Duhem, Excerpt from *Physical Theory and Experiment* (CCP pp. 227-249)
- W. V. O. Quine, “Two Dogmas of Empiricism” (CCP pp. 250-270)

**Week 6: September 28, 30**

- Larry Laudan, “Demystifying Underdetermination” (CCP pp. 288-320)

**Week 7: October 5, 7**

- Rudolf Carnap, “The Value of Laws: Explanation and Prediction” (CCP pp. 651-656)
- Carl Hempel, “Two Basic Types of Scientific Explanation” (CCP pp. 657-666)

**Week 8: October 12, 14**

- Alex Rosenberg, “Scientific Explanation” (provided on Canvas)
- Philip Kitcher, “Explanatory Unification” (CCP pp. 711-734)
- **Midterm Exam due by October 15 at 11:59pm (submit on Canvas)**

**Week 9: October 19, 21**

- James Woodward, “The Manipulability Conception of Causal Explanation” (CCP pp. 735-753)
- Alex Rosenberg, “Why Do Laws Explain?” (provided on Canvas)

**Week 10: October 26, 28**

- David Lewis, Excerpt from *Counterfactuals* (provided on Canvas)
- Tim Maudlin, Excerpt from *The Metaphysics within Physics* (provided on Canvas)

**Week 11: November 2, 4**

- Nancy Cartwright, “Do the Laws of Physics State the Facts?” (CCP pp. 871-884)
- Sandra Mitchell, “Dimensions of Scientific Law” (provided on Canvas)

**Week 12: November 9 (November 11 is a holiday—no class)**

- Grover Maxwell, “The Ontological Status of Theoretical Entities” (CCP pp. 1049-1059)
- **Paper 2 due by November 12 at 11:59pm (Submit on Canvas)**

**Week 13: November 16, 18**

- Bas van Fraassen, “Arguments Concerning Scientific Realism” (CCP pp. 1060-1082)
- Alan Musgrave, “Realism versus Constructive Empiricism” (CCP pp. 1083-1107)

**Week 14: November 23 (November 25 is Thanksgiving—no class)**

- Juha T. Saatsi, “On the Pessimistic Induction and Two Fallacies” (CCP pp. 1129-1139)

**Week 15: November 30, December 2**

- Thomas Kuhn, “Objectivity, Value Judgment, and Theory Choice” (CCP pp. 94-110)
- Helen Longino, “Values and Objectivity” (CCP pp. 144-164)

**Week 16: December 7**

- Make-up Day/Course Wrap-up

**Final Exam due by December 13 at 11:59pm (submit on Canvas)**