Phil 12: Scientific Reasoning
Winter 2022
MW 10am-10:50am CTR 113

Instructor: Nathaniel Greely   Email: ngreely@ucsd.edu
Office Hours: 9-10am MW RWAC Hum 440

Teaching Assistants:
Samantha Berthelette   Email: sberthel@ucsd.edu Office Hours: Tuesdays 11am-12pm
Ayoob Shahmoradi   Email: ayoob@ucsd.edu   Office Hours: M 1:00-3:00 pm

Course Description:
This course is an introduction to the logic of scientific discovery. Our lives are increasingly influenced by science and technology. But how can we distinguish science from pseudoscience, or good scientific studies from bad ones? And then how do we use that information to guide our own decisions? Students will learn how to evaluate the many types of scientific claims and arguments they will encounter in everyday life. Topics covered will include understanding and evaluating theoretical hypotheses, statistical models and probability, causal models and hypotheses, and models of decision making.

Textbook:
This course will use *Understanding Scientific Reasoning* (5th Ed.) by Giere, Bickle, and Mauldin as the primary text. It is available in the bookstore.

Learning Outcomes:
Students should be able to demonstrate their understanding of scientific reasoning by engaging in discussions, completing homework exercises, written exams, and composing essays.

Lectures:
Lecture attendance is mandatory and will be measured through online polls presented in lecture. Lecture attendance will comprise 10% of the final grade. You may miss up to two polls without losing points. Further missed polls may only be excused with documentation of illness or other extenuating circumstances. The readings listed on the schedule below are to be completed before the relevant lecture.

Assessments:
The assessments in this course are largely designed to keep you engaged with the lectures, readings, and other students in the course. Your grades for lecture attendance, discussion attendance, and exercise completion total 40% of your grade. It should be easy to do well on these components if you stay engaged. The exams and essay will be graded on quality, and to get top marks on these components you will be required to demonstrate understanding of the material. Your final grade in the course will be composed of the following:

Lecture Attendance – 10%

Lecture attendance will be assessed by answering online polls presented in the lecture. You may miss up to two polls without losing points. Further missed polls may only be excused with documentation of illness or other extenuating circumstances.

Discussion Attendance – 10%
Discussion attendance is mandatory. You may miss up to two sections without losing points. Further missed sections will only be excused with a documentation of illness or other extenuating circumstances. If you would like to attend a different discussion than the one for which you are registered, you must clear this with the TAs. You must attend the same discussion regularly to get credit for attendance.

Textbook Exercises – 20%
Assigned exercises from the textbook are to be completed and uploaded to canvas in PDF format by the date specified in the schedule below. Exercises are graded on effort, so a reasonable attempt will get full credit. Answers will be discussed in section. The due dates for the exercises are in the course schedule below.

Unit 1 and 2 Exams – 15% each (30% total)
Unit 1 and 2 will each be followed by a review session and an exam. The exams will consist of multiple choice, short answer, and short essay questions. The Unit 1 exam will be on 1/26 and the Unit 2 exam will be on 3/2.

Essay – 15%
Students will complete a short essay (3-5 pages, 12-point font, 1 inch margins) chosen from two prompts on the topics of statistical or causal reasoning. The essay prompts will be posted by 1/27. The essay should be uploaded to Canvas in PDF format by 11:59pm on 2/20.

Final Exam – 15%
The final exam will consist of multiple choice, short answer, and short essays covering material from the entire course. It will occur on Friday, Mar. 18 8am.

Course Schedule
Mon. 1/3 – Course Intro; Reading Ch. 1

Unit 1 – Theoretical Hypotheses
Wed. 1/5 – Understanding and Evaluating Theoretical Hypotheses part 1: Reading Ch. 2.1-2.6
Mon. 1/10 – Understanding and Evaluating Theoretical Hypotheses part 2: Reading Ch. 2.7-2.12
Wed. 1/12 – Historical Episodes: Reading Ch. 3; Exercises 2.1-2.3 due
Mon. 1/17 – Holiday No Class
Wed. 1/19 – Marginal Science: Reading Ch. 4; Exercises 3.1-3.3 due
Mon. 1/24 – Review for Unit 1 Exam; Exercises 4.1-4.3 due
Wed. 1/26 – Unit 1 Exam
Thurs. 1/27 - Essay prompts posted

Unit 2 – Statistical and Causal Hypotheses
Mon. 1/31 – Statistical Models and Probability part 1 – Reading Ch. 5.1 - 5.6

Wed. 2/2 – Statistical Models and Probability part 2 – Reading Ch. 5.6 – 5.11
Mon. 2/7 – Evaluating Statistical Hypotheses part 1 – Reading Ch. 6.1-6.3; Exercises 5.1-5.5 due
Wed. 2/9 – Evaluating Statistical Hypotheses part 2 – Reading Ch. 6.4-6.7
Mon. 2/14 – Causal Models – Reading Ch. 7; Exercises 6.1-6.3 due
Wed. 2/16 - Evaluating Causal Hypotheses part 1– Reading Ch. 8.1-8.4; Exercises 7.1-7.3 due
Sun. 2/20 - Essay due 11:59pm
Mon. 2/21 – Holiday No Class
Wed. 2/23 – Evaluating Causal Hypotheses part 2– Reading Ch. 8.5-8.9
Mon. 2/28 – Review for Unit 2 Exam; Exercises 8.1-8.3 due
Wed. 3/2 – Unit 2 Exam

Unit 3 – Knowledge, Values, and Decisions
Mon. 3/7 – Models of Decision Making – Reading Ch. 9
Wed. 3/9 – Evaluating Decisions – Reading Ch. 10; Exercises 9.1-9.5 due
Mon. 3/14 – No Class; Exercises 10.1-10.3 due
Fri. 3/18 – Final Exam 8am -11am

Diversity and Inclusion:
Individuals of all ages, backgrounds, beliefs, ethnicities, genders (and identities & expressions thereof), national origins, religious affiliations, sexual orientations, ability - and other visible and non-visible differences are welcome in this course. All members of this class are expected to contribute to a respectful, welcoming and inclusive environment for every other member of the class. If you find that some part of this course interacts with these issues in a way that makes it difficult for you to complete it, send me an email and we'll see if there is a solution that we can all be happy with.

OSD Accommodation:
If you require any form of accommodation on the grounds of disability, please make sure you have registered with the Office for Students with Disabilities and have followed their guidelines for alerting instructors to your particular needs. The university's policy on the accommodation of disability can be found here: https://senate.ucsd.edu/Operating-Procedures/Senate-Manual/Appendices/3 Students requesting accommodations for this course due to a disability must provide a current Authorization for Accommodation (AFA) letter issued by the Office for Students with Disabilities (OSD) which is located in University Center 202 behind Center Hall. Students are required to present their AFA letters to Faculty (please make arrangements to contact me privately) and to the OSD Liaison in the department in advance so that accommodations may be arranged.
858.534.4382 (phone) l osd@ucsd.edu (email) l http://disabilities.ucsd.edu (website)

Religious Accommodation:
If you require any accommodation on religious grounds, please alert me in writing as soon as possible. The university's policy on religious accommodation can be found here: https://senate.ucsd.edu/operating-procedures/educational-policies/courses/epc-policies-on-courses/policy-exams-including-midterms-final-exams-and-religious-accommodations-for-exams/

Academic Integrity:
All instances of academic offences including plagiarism, cheating on exams, and multiple submission of work, will be handled in accordance with official UCSD policy, which can be found here: http://senate.ucsd.edu/Operating-Procedures/Senate-Manual/Appendices/2. Please read the policy and ensure that you understand it.

Integrity Statement:
"Academic Integrity is expected of everyone at UC San Diego. This means that you must be honest, fair, responsible, respectful, and trustworthy in all of your actions. Lying, cheating or any other forms of dishonesty will not be tolerated because they undermine learning and the University's ability to certify students' knowledge and abilities. Thus, any attempt to get, or help another get, a grade by cheating, lying or dishonesty will be reported to the Academic Integrity Office and will result sanctions. Sanctions can include an F in this class and suspension or dismissal from the University. So, think carefully before you act by asking yourself: a) is what I'm about to do or submit for credit an honest, fair, respectful, responsible & trustworthy representation of my knowledge and abilities at this time and, b) would my instructor approve of my action? You are ultimately the only person responsible for your behavior. So, if you are unsure, don't ask a friend—ask your instructor, instructional assistant, or the Academic Integrity Office. You can learn more about academic integrity at academicintegrity.ucsd.edu" (Source: Academic Integrity Office, 2018)