

PHIL 3350 HISTORY AND PHILOSOPHY OF SCIENCE

Fall 2018 SCIENCE VS SOCIETY

9:40AM-10:30AM MWF (GC 5310)

“Those who do not remember the past are condemned to repeat it”
- Jorge Agustín Nicolás Ruiz de Santayana y Borrás

Course content and objectives: The course offers a philosophically informed look at some important historical cases that relate to challenges facing scientists today. Students will develop and improve writing and critical thinking skills, and acquire the conceptual tools to be reflective and socially-engaged scientists and citizens. The five cases/units are different kinds of controversies, but some common themes will emerge over the semester. So students will also learn ‘case-based reasoning’ methods – how to identify key features in a complex case, and then look for parallels (or contrasts) other cases. By reflecting on these cases, students will gain understanding of interactions between science and society, learn about important episodes in history of science, and confront foundational questions of scientific method.

The course is organized into five independent units, based on five different cases of tension between science and (some aspect of) society: Galileo and the Church, teaching evolution, the Manhattan Project, de-extinction, and climate change. For each case, we’ll ask the following:

- 1) What is the conflict about? What scientific claims are the focus of controversy?
- 2) What are the societal effects? That is, how do these scientific claims impact society?
- 3) What ideas or assumptions underlie the conflict? We’ll identify key themes in each case.

This will be done through individual reading and group discussion.

The class is modular; each case 2-3 weeks, with a quiz and think-piece building up to a short paper. Although some themes recur across cases, each unit is a fresh start: beginning with introductory readings and a quiz, a short essay based on class discussion, and building on those assignments to write a short paper (5-6 pages). There will be a final exam at the end of the semester, focusing on shared themes and material from each case. (Details to be covered during a review session in the last week of classes). *3 Credits, no prerequisite*

Contact Information:

Melinda Fagan, Associate Professor of Philosophy

Office: CTIHB 421 (1-7424)

Email: mel.fagan@utah.edu

Office Hours: Wednesday 1-2pm and by appointment

To set up an appointment, please stay after class or send an email. For most issues, it is more efficient to meet in person. Please use email only to set up an appointment or to ask very quick specific questions about the course. (Note: please use your campus email account.)

Required Texts: (at campus bookstore)

Oreskes, N, and Conway, E (2011) Merchants of Doubt. Bloomsbury Press.

Rhodes, R (1986) The Making of the Atomic Bomb. Simon & Schuster.

Additional readings/materials posted on *Canvas* (on syllabus page).

Teaching and Learning Methods: Lecture and discussion. Students are expected to read assigned texts or view materials carefully before class, and come to class meetings prepared to discuss key issues and ideas. Course outcomes will be achieved by individual reflection, followed by discussion, and then articulation of ideas in writing. Assignments are structured so students build up to writing papers from earlier work they have done.

Grading and Evaluation:

The grading scale for this course is as follows:

≥100	A+	88-89	B+	78-79	C+	68-69	D+	0-59	F
93-99	A	83-87	B	73-77	C	63-67	D		
90-92	A-	80-82	B-	70-72	C-	60-62	D-		

Each requirement contributes a number of points toward the overall grade, corresponding to the percentage stated (max total=105). No curve.

Course Requirements:

1. *Participation* (10%) Thoughtful participation in class discussions is an important component of this course. Please come to each class meeting prepared to discuss the assigned readings. Participation in class (or lack thereof) will be noted at each class meeting.

2. *Quizzes* (10%) Five in-class quizzes will be given during the semester (see dates below). Each quiz will consist of questions about assigned reading and/or key issues previously raised in class, and will be worth 2% of the overall grade. No make-up quizzes will be given, except in cases of excused absence.

3. *Think-pieces* (20%) Five short writing assignments (1-2 pages, typewritten and double-spaced in a 12 point font) on basic and background issues for philosophy of science. Think-pieces are due at the beginning of class (see dates below). Late think-pieces will not be accepted, except in cases of excused absence. There will be an option to rewrite two (2) think-pieces per semester.

4. *Short papers* (50%) Five short papers (5-6 pages, typewritten and double-spaced in a 12 point font) on key issues from course readings and discussion. Topics will be assigned; papers are due at the beginning of class (see dates on the schedule below). Late papers will be penalized; for each day after the deadline, the grade declines by one half-letter (A to A-, B+ to B, etc.), except in cases of excused absence. Papers later than 1 week will not be accepted.

5. *Essay exam* (10%) Essay exam on the last day of class, on themes and ideas discussed throughout the course. Questions and topics will be covered during a review session during the last week of class.

6. *Extra credit* (maximum 5%) Throughout the semester, there will be talks at the U relevant to the course. I will announce upcoming talks in class; if you know of one that hasn't been announced, please let me know at least 3 days in advance. You can receive extra credit for attending a talk and writing a short (1-2 page) report describing its relation to issues in the course.

University policies:

- *The Americans with Disabilities Act*: The University of Utah seeks to provide equal access to its programs, services, and activities for people with disabilities. If you will need accommodations in this class, reasonable prior notice needs to be given to the Center for Disability Services, 162 Olpin Union Building, (801) 581-5020. CDS will work with you and the instructor to make arrangements for accommodations. All written information in this course can be made available in an alternative format with prior notification to the Center for Disability Services.
- *Addressing Sexual Misconduct*: Title IX makes it clear that violence and harassment based on sex and gender (which includes sexual orientation and gender identity/expression) is a civil rights offense subject to the same kinds of accountability and the same kinds of support applied to offenses against other protected categories such as race, national origin, color, religion, age, status as a person with a disability, veteran's status or genetic information. If you or someone you know has been harassed or assaulted, you are encouraged to report it to the Title IX Coordinator in the Office of Equal Opportunity and Affirmative Action, 135 Park Building, 801-581-8365, or the Office of the Dean of Students, 270 Union Building, 801-581-7066. For support and confidential consultation, contact the Center for Student Wellness, 426 SSB, 801-581-7776. To report to the police, contact the Department of Public Safety, 801-585-2677(COPS).
- *Drop/Withdrawal deadlines*: The last day to drop classes is Fri., Aug 31; the last day to withdraw from this class is Fri., Oct 19. Please check the academic calendar for more information pertaining to dropping and withdrawing from a course. Withdrawing from a course and other matters of registration are the student's responsibility.
- *Standards of Academic Conduct*: In order to ensure that the highest standards of academic conduct are promoted and supported at the University, students must adhere to generally accepted standards of academic honesty, including but not limited to refraining from cheating, plagiarizing, research misconduct, misrepresenting one's work, and/or inappropriately collaborating. For more information, see: <http://regulations.utah.edu/academics/6-400.php>
- *Accommodation Policy* (Sections O and Q): <http://regulations.utah.edu/academics/6-100.php>

Course policies:

- *Advising*: see <<http://philosophy.utah.edu/undergraduate/contact-advisor.php>>
- *Attendance and punctuality*: Success in this course requires showing up. Regular attendance is expected of everyone enrolled (see <http://regulations.utah.edu/academics/6-100.php>, Section O). Participation in discussion obviously requires attendance, so absences reduce this portion of your grade. In addition, many ideas and arguments relevant to the written assignments will be discussed in class. So absence puts one at a serious disadvantage. If you miss more than two classes consecutively, please see me asap to catch up on material you've missed. If you are absent on a day that an assignment is due, you will need to show that the absence is excused (due to illness, emergency, or similarly unavoidable circumstance) before handing in that assignment. If you are aware of any scheduling conflicts with class meetings, please see me asap so accommodations can be made in advance. For details on accommodations other than scheduling,

see Section Q of the Accommodations Policy (<http://regulations.utah.edu/academics/6-100.php>). Punctuality is also expected. Arriving late to class will result in a lower participation grade for that day.

- *Deadlines*: All written material is due in class, hard-copy, at the beginning of the class meeting. Exceptions can be made only for excused absence situations, or for assignments marked as ‘Canvas turn-in’ on the syllabus. Plan ahead, and start early!
- *Electronic etiquette*: Please turn off all electronic devices during class, except those required for note-taking and to access texts.
- *Food and drink*: Please do not bring food and drink to class.
- *Plagiarism*: “Plagiarism” means the intentional unacknowledged use or incorporation of any other person's work in, or as a basis for, one's own work offered for academic consideration or credit or for public presentation. Plagiarism includes, but is not limited to, representing as one's own, without attribution, any other individual's words, phrasing, ideas, sequence of ideas, information or any other mode or content of expression (see ‘Student Code’). Proper acknowledgment means using a citation to indicate where you make use of another person’s words or ideas. Citations may be in footnotes, or inserted in the main text; in either case, they should include the author surname and publication date. A bibliography with full citation information should appear at the end of your essay or paper (see course handouts for details and format). If you are unsure how to correctly cite a source or have questions about how the Student Code applies to written work, please consult me or an academic advisor.
- *Scheduling accommodations*: Absences due to participation in officially sanctioned University activities, government obligations, and religious obligations are excused, as a matter of university policy (see <http://regulations.utah.edu/academics/6-100.php>, Section O). If you have any scheduling conflicts with assignment due dates for these reasons, please let me know asap so accommodations can be made in advance.
- *Student code*: The Student Code (see: <http://regulations.utah.edu/academics/6-400.php>) applies throughout the course. If you have specific questions about its application in this course, consult me asap.
- *Student names and personal pronouns*: Class rosters are provided to the instructor with the student’s legal name as well as “Preferred first name” (if previously entered by you in the Student Profile section of your CIS account). While CIS refers to this as merely a *preference*, I will honor you by referring to you with the name and pronoun that feels best for you in class, on papers, exams, etc. Please advise me of any name or pronoun changes so I can help create a learning environment in which you, your name, and your pronoun will be respected.
- *Wellness*: Personal concerns such as stress, anxiety, relationship difficulties, depression, cross-cultural differences, etc., can interfere with a student’s ability to succeed and thrive at the University of Utah. For helpful resources contact the Center for Student Wellness at www.wellness.utah.edu or 801-581-7776.

Schedule of Topics and Readings: *

Week 1

M 8/20 Course introduction

- Barker and Kitcher 'Modern science: a brief history'

W 8/22 Galileo and the Church **Quiz 1** (start of class)

- 'Galileo Galilei' *Stanford Encyclopedia of Philosophy*

F 8/24 The Aristotelian worldview

- Kuhn (1957) Ch1 pages 25-37, Ch2 pages 50-55, Ch 3 pages 78-79
- DeWitt (2018) *Worldviews* Ch10-11

Week 2

M 8/27 The Copernican theory

- Kuhn (1957) Ch5 pages 134-144, 180-184
- DeWitt (2018) *Worldviews* Ch14
- Osiander (1543) 'Preface'

W 8/29 Galileo and the Church, revisited **Think-piece 1 due**

- Galileo 'To the discerning reader' (*Dialogue* pages 1-4)
- Kuhn (1957) Ch6 pages 192-200 (up to 'Tycho Brahe')
- (optional) Galileo 'Third Day' (excerpt; *Dialogue* pages 94-103)

F 8/31 The role of observation **Paper 1 assigned**

- Kuhn (1957) Ch1 pages 1-4, Ch6 pages 219-225
- DeWitt (2018) Ch17 'Galileo and the evidence from the telescope'

Week 3

M 9/3 Labor Day holiday, no class

W 9/5 Professor away, no class

F 9/7 Evolutionary theory basics **Paper 1 due**

- Sober (2000) 'What is evolutionary theory?' (pages 1-5)
- Lewontin (1970) 'The units of selection' (pages 1-2 only)

Week 4

M 9/10 Natural selection: theory and evidence **Quiz 2**

- Lyell, Hooker, Bennett (1858) 'Introduction'
- Wallace (1858) 'On the tendency...'
- Darwin (1858) 'Extract' and 'Abstract'

* There may be minor changes to the assigned readings and/or assignment due-dates as the semester progresses. Any such changes will be announced at least one week in advance, in class and by email announcement.

W 9/12 Creationism in the US

- Ruse 'Creationism' *Stanford Encyclopedia of Philosophy* (Sections 1 and 3)
- Pennock (2007) 'Biology and religion'
- Gregory (2009) 'The argument from design'

F 9/14 Controversy over teaching evolution **Think-piece 2 due**

- Larson (1997) 'Government by the people' (pages 56-59, 82-83, 89-92, 107-109)
- The Butler Act (1925)

Week 5

M 9/17 The Scopes trial

- Larson (1997) 'Introduction' (pages 3-8)
- Larson (1997) 'The trial of the century'

W 9/19 The Scopes trial, continued **Paper 2 assigned**

- 'Inherit the wind' (film)
- Gould (1999) 'The passion and compassion of William Jennings Bryan'

F 9/21 The rise of Intelligent Design

- Behe (2004) 'Irreducible complexity'
- Gould (1999) *Rocks of Ages* (excerpt)

Week 6

M 9/24 The Dover trial

- Discovery Institute (1998) 'The wedge'
- Jones (2005) 'Background,' 'Conclusion' (Sections A and H)

W 9/26 Scientific facts vs. alternative facts

- PSA Webinar (2017) 'Scientific facts vs. alternative facts (sic)'

F 9/28 The atom and nuclear physics (**Guest lecture: Gail Zasowski**)

- Close (2015) *Nuclear physics: a very short introduction* (excerpt)
- Andersen (2010) 'Joint acceptance and scientific change' ("Case" only, pages 254-261)

Week 7

M 10/1 Professor away, no class (**Paper 2 due**, turn in on Canvas)

W 10/3 Science on the eve of WWII **Quiz 3**

- Rhodes (1986) 'Exodus' and 'Neutrons' (pages 184-194, 292-297)
- Merton (1942) 'The normative structure of science'

F 10/5 Origins of the Manhattan Project

- Einstein (1939) 'Letter to Roosevelt'
- Rhodes (1986) Einstein and Roosevelt (pages 303-308)
- Rhodes (1986) Wartime research (311-327), the MAUD report (367-369)

10/6-10/14 **Fall Break**

Week 8

M 10/15 Physics, uncertainty, and values

- Frayn 'Copenhagen' (film)

Professor away, no class meeting; see online discussion questions

W 10/17 Professor away, no class

F 10/19 The Manhattan Project and Los Alamos

- Conant (2005) *109 East Palace*, excerpts (pages 28-34, 84-87)
- Rhodes (1986) 'Physics and desert country' (pages 447-461)

Week 9

M 10/22 Physicists on politics

- Bohr (1944) 'Memo to Roosevelt'
- Rhodes (1986) Compartmentalization, Bohr's memo (pages 502-512, 517-538)

W 10/24 The Trinity test **Think-piece 3 due**

- Rhodes (1986) 'Trinity' (pages 652-678, pictures 77-91)
- Hempel (1966) 'The test of a hypothesis' (Sections 3.1-3.3 only)

F 10/26 Scientists and the state: postwar era **Paper 3 assigned**

- Bohr (1950) 'Open letter to the United Nations'
- Oppenheimer (1953) 'Atomic weapons and American policy'

Week 10

M 10/29 The Bomb

Professor away, no class meeting; see online discussion questions

- Rhodes (1986) 'Tongues of fire' (pages 710-715, 728-729)

W 10/31 Scientists and the state: postwar era, continued

- Rhodes (1986) 'Epilogue' (pages 749-755)
- Conant *109 East Palace* excerpts (pages 364-373, 377-387)
- Bird and Sherwin (2005) 'Preface' and 'A manifestation of hysteria'

F 11/2 Professor away, no class

Week 11

M 11/5 Resurrection biology - introduction **Paper 3 due**

- Lewis (2012) 'Pleistocene Park'
- Liesowska (2018) 'Will a hybrid elephant-mammoth be next?'

W 11/7 The science of de-extinction

- Shapiro (2017) 'Pathways to de-extinction'
- Piaggio et al (2017) 'Is it time for synthetic biodiversity conservation?'

F 11/9 De-extinction: arguments for and against **Quiz 4**

- Sherkow and Greeley (2013) 'What if extinction is not forever?'
- Schulz (2016) 'Should we bring extinct species back from the dead?'

Week 12

M 11/12 Functional ecology: beyond molecules? **Think-piece 4 due, Paper 4 assigned**

- Schulz (2017) 'Bringing back extinct species... conservation efforts?'
- McCauley et al (2017) 'A mammoth undertaking'

W 11/14 Ecology, function, philosophy

- Rosenberg and McShea (2008) 'Function, homology, and homoplasy'

F 11/16 The Tobacco Strategy

- Oreskes and Conway 'Introduction' (pages 1-9)
- Oreskes and Conway 'Doubt is our product' (pages 14-25, 29-35, 144-148)

Week 13

M 11/19 Countering science **Paper 4 due**

- Oreskes and Conway 'Constructing a counternarrative' (pages 125-135)
- Singer (1989) 'My adventures in the ozone layer'

W 11/21 Global warming controversy **Quiz 5**

- Oreskes and Conway 'The denial of global warming' (pages 169-215)

F 11/23 Thanksgiving holiday, no class

Week 14

M 11/26 Bias, coherence, and doubt **Think-piece 5 due**

- Lewandowsky et al (2018) 'Alice in Wonderland mechanics of the rejection of (climate) science'
- Steel (2018) 'Wishful thinking and values in science' (pages 1-7 only)

W 11/28 Uncertainty, error, and reproducibility **Paper 5 assigned**

- Oreskes and Conway 'Bad science' (pages 153-168)
- Martinson et al (2005) 'Scientists behaving badly'

F 11/30 Science and political thought

- Oreskes and Conway 'Of free speech and free markets' (pages 240-265)

Week 15

M 12/3 Concluding thoughts

- Oreskes and Conway 'Epilogue' (pages 266-274)
- Oreskes and Conway 'The Orwellian problem' (pages 236-239)

W 12/5 Review session, final discussion **Paper 5 due**

Final exam period

W 12/12 **Essay exam**