

---

*Instructor:* Professor Josh DiPaolo  
*Office Hours:* Zoom by Appointment  
*Class:* Asynchronous

Summer 22 Online  
*Email:* [jdipaolo@fullerton.edu](mailto:jdipaolo@fullerton.edu)

---

*Tech Support:* Student Help Desk (657) 278-8888 or [StudentITHelpDesk@fullerton.edu](mailto:StudentITHelpDesk@fullerton.edu)

---

### **Description**

With the aim of *reducing* bias, the criminal justice system has turned to scientific artificial intelligence technology that appears to be *biased against* Blacks. By some estimates, as much as 90% of published medical information doctors rely on when diagnosing and treating patients is flawed. Nearly all climate scientists agree humans are responsible for climate change, while less than half of Americans believe this. Many believe intelligent design theory should be taught alongside the theory of evolution in public school science classes because evolution is *just a theory*, while US courts have consistently ruled that teaching intelligent design theory is unconstitutional because it is not science.

Science is supposed to be our best way of gaining knowledge. But each of these facts should make us wonder. That wonder will lead us to philosophical questions about science.

- Is artificial intelligence less biased than humans? What is bias? Is bias always bad? Should bias play a role in science?
- If we know doctors rely on flawed medical information, how can we change this? How does science change?
- Why is there such a large gap between expert opinion and public opinion on climate change? Why doesn't the public just listen to scientific experts? What is an expert? How can we tell genuine experts from imposters?
- If evolution is just a theory why shouldn't alternative theories like intelligent design be taught? What is a scientific theory? If intelligent design shouldn't be taught because it's not science, what is science?

This is how our class will unfold. We will begin each unit with a real-world problem and explore the philosophy behind it.

### **Truth-Seeking**

Philosophy classes differ from other kinds of classes. You will be a truth-seeker in this class, not a mere information consumer. Rather than just learning what others have thought, you will try to rationally justify your own answers to course questions.

---

**Learning Goals:** By the end of this semester, you should be able to:

1. Chart the development of major historical episodes in science
  2. Describe the traditional empiricist picture of science
  3. Explain some of the basic science behind climate change
  4. Contrast and evaluate explanations of science denial
  5. Understand the problem of identifying scientific experts
  6. Analyze the "replication crisis," including its causes and solutions
  7. Explain and apply Thomas Kuhn's theory of scientific activity and change
  8. Grapple with challenges associated with trusting science
  9. Analyze the roles of values and bias in science
  10. Describe algorithmic bias and some of its effects on criminal justice
  11. Judge parallels between algorithmic bias and other forms of bias in science
  12. Explain the demarcation problem, including its social and ethical significance
  13. Describe prominent theories of demarcation and their shortcomings, and apply this knowledge to teaching intelligent design in public schools
  14. Defend your own opinion on science denial, the replication crisis, bias in science, and the demarcation problem
-

### Website

We will be using Canvas. I recommend that you log onto Canvas **every weekday**.

### Texts & Resources

All texts & resources (videos, podcasts, etc.) will be freely available on Canvas. Expect to devote 10-15 hours weekly to this class.

### Fully Asynchronous

This class will be fully asynchronous. Though there will be due dates, and modules will gradually open (rather than all being immediately available), you will **not** be expected to be online at any particular time.

---

### Day to Day: What Will I Do in This Class?

---

Every week you will do FOUR things

1. **Log On:** Log onto Canvas and see what needs to be completed that week
2. **Content:** Study and take notes on assigned readings, podcasts, videos
3. **Quiz:** Complete a quiz based on all of that material
  - a. Only your **4** highest scores will count.
4. **Discussion:** Complete a discussion post
  - a. Only your **4** highest scores will count.

**Timing:** In Online classes, some students like to complete all their work for a class in one day. I strongly recommend against this. If you want to *learn* – and of course you do!– spread the coursework out throughout the week. You will learn much better that way.

---

### General Education (GE) Requirements and Learning Goals

---

<b>GE Requirement</b>	This course meets the requirement for GE category B.5 – Implications and Explorations in Mathematics and Natural Science.
<b>Grade</b>	A grade of D or higher is required to meet this GE requirement.
<b>GE Learning Goals</b>	<ol style="list-style-type: none"><li>a. Integrate themes in science, mathematics and/or quantitative reasoning from cross-disciplinary perspectives.</li><li>b. Solve complex problems that require science, mathematics and/or quantitative reasoning.</li><li>c. Relate science, mathematics and/or quantitative reasoning to significant social problems or to other related disciplines.</li><li>d. When deemed appropriate, apply disciplinary concepts from mathematics and the natural sciences in a variety of settings, such as community-based learning sites and activities.</li></ol>

---

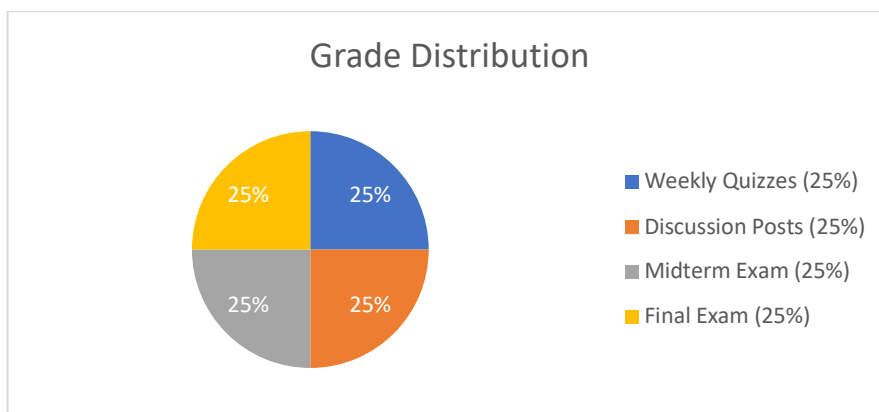
### Grading Policy

---

<b>Grading</b>	Weekly Quizzes (5)	100 (25%)
	Discussion Posts (5)	100 (25%)
	Midterm Exam	100 (25%)
	<u>Final Exam</u>	<u>100 (25%)</u>
		400 Points
<b>Introductory Post</b>	Every student must complete the <b>Introductory Post by 6/2</b> to pass.	

A+	98-100%	389-400 Points
A	92-97%	365-388 Points
A-	90-91%	357-364 Points
B+	88-89%	349-356 Points
B	82-87%	325-348 Points
B-	80-81%	317-324 Points
C+	78-79%	312-316 Points
C	72-77%	285-311 Points
C-	70-71%	277-284 Points
D+	68-69%	269-276 Points
D	62-67%	245-268 Points
D-	60-61%	237-244 Points
F	0-59%	0-236 Points

*Please ask questions about these policies if you do not understand them.*



### Coursework Descriptions

---

<b>Introductory Post</b>	During the first two days of class, you must complete an Introductory Post. You will introduce yourself (on Canvas) and you will comment on two other students' posts.
<b>Attendance</b>	The class is fully asynchronous. There is no attendance requirement. Aside from the assignment due dates, you have the freedom to complete the course material at your own pace.
<b>Quizzes</b>	5 Quizzes/25 Points Each. To help keep up with course content and to ensure you are understanding the material, five quizzes are assigned. Format: multiple-choice, true/false, matching, etc. Only your <b>4 highest</b> quiz scores will count towards your grade. <i>Satisfies a and c of B.5 GE Requirement</i>
<b>Discussions</b>	5 Discussion Posts/25 Points Each. To give you an opportunity to reflect, weekly discussions are assigned. Format: Discussions will be text-based (you write your answers). Only your <b>4 highest</b> discussion scores will count towards your grade. <i>Satisfies a-d of B.5 GE Requirement and Writing Requirement</i>
<b>Exams</b>	2 Exams/100 Points Each. To demonstrate your learning and critical thinking abilities, you will complete two exams. Exam 1 will test your understanding of the Introductory Material and Units 1 & 2. Exam 2 will test your understanding of Units 3 & 4. They include multiple choice, true/false, short answer and/or essay questions.

### Communication

---

<b>Office Hours</b>	I will not have set office hours, but I will be MORE THAN HAPPY to setup meetings with you via Zoom whenever we can make it work if you'd like to meet. <b>I want to help you succeed!</b> Just email me. If it helps, you can use this script:  <i>"Hi Josh/Professor DiPaolo, I'm in your [CLASS NAME]. I'd like to schedule an appointment with you outside of your scheduled office hours. Do any of these times work for you [LIST THREE DIFFERENT TIMES YOU CAN MEET]? Thanks, [NAME]"</i>
<b>Contact</b>	You can reach me at my email address. I will usually respond within 24 hours. Feel free to get back in touch if I don't. <b>If you have a question about the course, please check the syllabus before emailing.</b>
<b>You</b>	I expect you to regularly check your email and Canvas for announcements.
<b>Ask a Question Boards</b>	On Canvas, there will be two "Ask a Question" discussion boards: (1) "Ask Josh a Question" and (2) "Ask Peers a Question." I will regularly check (1) and rarely check (2). You should check both often. Questions on these boards should be general. Think: "Could someone else benefit from knowing the answer to this question?" If Yes, post; if No, maybe just email me. If you have a question about the course, please check these boards before emailing.

**Accommodations** I will do my very best to help students with disabilities, special needs, or learning challenges succeed in this course. Students with disabilities who need accommodations, access to technology, or information about emergency building/campus evacuation processes should contact Disability Support Services. Services are available to students with a wide range of disabilities and conditions.  
 Phone: (657) 278-3112 Website: [www.fullerton.edu/dss](http://www.fullerton.edu/dss)

**“Netiquette”: How Should You Behave Online?**

**Make a Good Impression** Treat your interactions online as if they were happening in person. Education is a **professional environment**. One day you may want a letter of recommendation from me. You may want your peers to recommend you for some professional position. Assume you will want these things, and behave accordingly.

**Discussion Posts** Write as if you’re writing a paper. Proper grammar and punctuation.

**Academic Integrity & Plagiarism**

**Statement** Please only submit work that is your own. Doing otherwise is one of the worst mistakes you can make in your academic career. When students plagiarize in my classes, they receive a score of 0 points on the assignment and I refer them to the Dean of Students’ office.

**Plagiarism** The university defines ‘plagiarism’ as “the unacknowledged and inappropriate use of the ideas or wording of another writer” and instructs me to include the following info on my syllabus:

If plagiarism is found in your work, you will be subject to prosecution to the fullest extent of university code, which will result in a failure of the assignment and will probably result in your failure of the course. Confirmation of plagiarism precludes you from being eligible to repeat the course under the university’s course repeat and grade forgiveness policy. For complete details regarding the university’s policies about plagiarism and other forms of cheating, see

<http://www.fullerton.edu/integrity/student/AcademicIntegrityResources.asp>  
[http://www.fullerton.edu/senate/publications\\_policies\\_resolutions/ups/UPS%20300/UPS%20300.021.pdf](http://www.fullerton.edu/senate/publications_policies_resolutions/ups/UPS%20300/UPS%20300.021.pdf)

**Emergencies**

To be prepared for classroom emergencies, please visit: <http://prepare.fullerton.edu>

**Copyright**

Copyright 2022 (Joshua DiPaolo) as to this syllabus and all lectures in this course. During this course students are prohibited from selling notes to or being paid for taking notes by any person or commercial firm without the express written permission of the professor teaching this course. In addition, students in this class are not authorized to provide class notes or other class-related materials to any other person or entity, other than sharing them directly with another student taking the class for purposes of studying, without prior written permission from the professor teaching this course.

**Weekly Checklist**

Week 1	<input type="checkbox"/> Viewed Course Trailer <input type="checkbox"/> Viewed Josh’s Introduction Video <input type="checkbox"/> Carefully studied Syllabus <input type="checkbox"/> Took Notes on all Readings, Podcasts, Videos	<input type="checkbox"/> Completed Introductory Discussion (Due 6/2) <input type="checkbox"/> Completed Quiz (Due 6/3) <input type="checkbox"/> Completed Discussion (Due 6/3)
Week 2	<input type="checkbox"/> Took Notes on all Readings, Podcasts, Videos	<input type="checkbox"/> Completed Quiz (6/10) <input type="checkbox"/> Completed Discussion (6/10)
Week 3	<input type="checkbox"/> Took Notes on all Readings, Podcasts, Videos	<input type="checkbox"/> Completed Quiz (6/17) <input type="checkbox"/> Completed Discussion (6/17)
Week 4	<input type="checkbox"/> Took Notes on all Readings, Podcasts, Videos	<input type="checkbox"/> Exam 1 (Due 6/20) <input type="checkbox"/> Completed Quiz (Due 6/24) <input type="checkbox"/> Completed Discussion (Due 6/24)
Week 5	<input type="checkbox"/> Took Notes on all Readings, Podcasts, Videos	<input type="checkbox"/> Completed Quiz (6/29) <input type="checkbox"/> Completed Discussion (6/29) <input type="checkbox"/> Exam 2 (Due 7/1)

## Tentative Schedule

Date	Topic	Resources (R = Reading, P = Podcast, V = Video)	Learning Outcomes & Assignments (A = Assignment)
Week 1 5/31-6/3	Introduction Week	<ul style="list-style-type: none"> <li>• Canvas Course Introduction Page</li> <li>• Course Trailer</li> <li>• Instructor Video</li> <li>• Syllabus/Course Introduction Videos</li> </ul>	1. Become familiar with course 2. “Meet” Classmates on Canvas <input type="checkbox"/> Introductory Discussion (A) <b>Due: 6/2</b>
	Background Scientific Revolution Traditional Empiricism	<ul style="list-style-type: none"> <li>• Godfrey-Smith “Sketch of the Scientific Revolution” (R)</li> <li>• Barker &amp; Kitcher “Modern Science: A Brief History” (R)</li> <li>• Lecture (V)</li> </ul>	1. Learn major episodes in history of science 2. Understand traditional empiricist approach to science <input type="checkbox"/> Quiz (A) <b>Due: 6/3</b> <input type="checkbox"/> Discussion (A) <b>Due: 6/3</b>
<b>Unit 1: Science Denial, Agnotology, Echo Chambers, and Expertise</b>			
Week 2 6/6-6/10	Climate Change & Science Denial	<ul style="list-style-type: none"> <li>• Broome “Science of Climate Change” (R)</li> <li>• Lecture (V)</li> <li>• Documentary: <i>Merchants of Doubt</i> (V)</li> </ul>	1. Understand the basics of climate change science 2. Begin to understand “tobacco strategy”
	Why don’t people believe in climate change?  Agnotology, Echo Chambers, & Epistemic Bubbles	<ul style="list-style-type: none"> <li>• Harker “Created Controversies &amp; How to Detect Them” (R)               <ul style="list-style-type: none"> <li>• This reading is long. Skim the first 6 pages, then read the rest carefully!</li> </ul> </li> <li>• Nguyen “Escape the Echo Chamber” (R)</li> <li>• Lecture (V)</li> </ul>	1. Deepen understanding of “tobacco strategy,” created controversy, and agnotology 2. Understand the difference between epistemic bubbles & echo chambers 3. Evaluate different explanations of science denial (bubbles, echo chambers, agnotology)
	Identifying Experts	<ul style="list-style-type: none"> <li>• Goldman “Expertise” (§3) (R)</li> <li>• Boyd “Swamping, Epistemic Trespassing, and COVID” (R)</li> <li>• Anderson “Democracy, Public Policy, and Lay Assessments of Scientific Testimony” (R)</li> <li>• Lecture (V)</li> </ul>	1. Understand the challenge of identifying experts 2. Understand and apply the concept of epistemic trespassing 3. Understand potential solutions to challenge of identifying experts 4. Evaluate these potential solutions <input type="checkbox"/> Quiz (A) <b>Due: 6/10</b> <input type="checkbox"/> Discussion (A) <b>Due: 6/10</b>
<b>Unit 2: Replication Crisis, Scientific Change, and Thomas Kuhn</b>			
Week 3 6/13-6/17	What is the replication crisis? What has caused it?	<ul style="list-style-type: none"> <li>• Dominus “When the Revolution Came for Amy Cuddy” (R)</li> <li>• Radiolab “Stereothreat” (P)</li> <li>• Lecture (V)</li> <li>• OPTIONAL: Engber “Everything is Crumbling” (R)</li> </ul>	1. Understand the nature of the replication crisis 2. Understand the distinction between direct and conceptual replications 3. Understand the causes of the replication crisis 4. Understand and judge what’s problematic about the replication crisis
	Kuhn’s Theory of Scientific Change	<ul style="list-style-type: none"> <li>• Freedman “Lies, Damned Lies, and Medical Science” (R)</li> <li>• Okasha “Scientific Change and Scientific Revolutions” (R)</li> <li>• Lecture (V)</li> </ul> <p>*This is the hardest material: read Okasha VERY carefully.*</p>	1. Understand the distinction between “context of discovery” and “context of justification” 2. Understand Kuhn’s theory of scientific activity and change 3. Interpret the replication crisis through the lens of Kuhn’s theory
	Trusting Science	<ul style="list-style-type: none"> <li>• Oreskes “Science isn’t Always Perfect, But We Should Still Trust it” (R)</li> </ul>	1. Reflect on how much trust science deserves in light of replication problems 2. Understand and evaluate solutions to replication crisis <input type="checkbox"/> Quiz (A) <b>Due: 6/17</b> <input type="checkbox"/> Discussion (A) <b>Due: 6/17</b>
<b>Exam 1</b>	<b>Exam 1</b>	<b>Exam 1</b>	<input type="checkbox"/> <b>Exam 1 (A) Due: 6/20</b>
<b>Unit 3: Algorithmic Bias and Bias &amp; Values in Science</b>			
Week 4 6/20-6/24	Algorithmic Bias	<ul style="list-style-type: none"> <li>• Angwin et al. “Machine Bias” (R)</li> <li>• O’Neil “The Era of Blind Faith in Big Data Must End” (V)</li> <li>• Hi-Phi Nation “Risky Business” (P)</li> <li>• Lecture (V)</li> </ul>	1. Understand basics of algorithms 2. Start understanding how algorithms can be biased 3. Reflect on why algorithms are adopted and how effectively they satisfy goals
	Algorithmic Bias	<ul style="list-style-type: none"> <li>• Buolamwini “Compassion Through Computation: Fighting Algorithmic Bias” (V)</li> <li>• Lecture (V)</li> </ul>	1. Understand what “pale male” data sets are 2. Understand “Garbage in, Garbage out” 3. Understand how algorithms can be biases

	Bias & Values in Science Parallels between Algorithmic Bias & Bias in Science	<ul style="list-style-type: none"> <li>• Sauli "Bias in Science" (R)</li> <li>• TED Radio Hour "Trust in Numbers" (P)</li> </ul>	<ol style="list-style-type: none"> <li>1. Understand the stages where bias enters science</li> <li>2. Understand the bias paradox</li> <li>3. Understand why feminists and others think bias can improve science</li> <li>4. Reflect on the parallels between bias in science and algorithmic bias</li> <li>5. Reflect on solutions to bias in science and algorithms</li> </ol> <input type="checkbox"/> Quiz (A) <b>Due: 6/24</b> <input type="checkbox"/> Discussion (A) <b>Due: 6/24</b>
<b>Unit 4: Demarcation, Evolution, and Intelligent Design</b>			
Week 5 6/27-7/1	Teaching Intelligent Design in School? Demarcation Problem	<ul style="list-style-type: none"> <li>• PBS Nova "Judgment Day: Intelligent Design on Trial" (V)</li> <li>• Ruse "Creation Science is Not Science" (R)</li> <li>• Laudan "Science at the Bar" (R)</li> </ul>	<ol style="list-style-type: none"> <li>1. Understand the basics of intelligent design theory</li> <li>2. Understand the basics of evolution</li> <li>3. Understand the controversy over teaching intelligent design in public schools</li> <li>4. Identify standard argument strategies in favor of teaching intelligent design</li> <li>5. Understand the debate about classifying intelligent design/creation science as non-science</li> </ol> <input type="checkbox"/> Quiz (A) <b>Due: 6/29</b> <input type="checkbox"/> Discussion (A) <b>Due: 6/29</b>
<b>Exam 2</b>	<b>Exam 2</b>	<b>Exam 2</b>	<input type="checkbox"/> <b>Exam 2 (A) Due: 7/1</b>