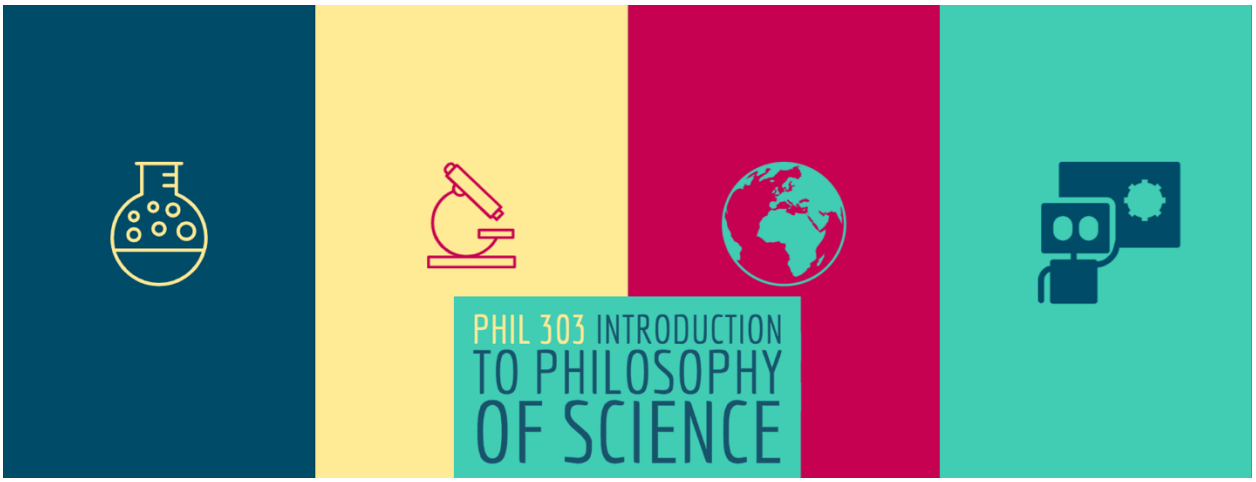

Instructor: Professor Josh DiPaolo
Office Hours: W 1-2pm; Th 10-11am & By Appointment
Phone: 818-470-7182
Tech Support: Student Help Desk (657) 278-8888 or StudentITHelpDesk@fullerton.edu

Fall 2020
Email: jdipaolo@fullerton.edu
Class: Zoom Thursdays 11:30-12:45

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. It's way better than Titanium! 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 5-6 hours each week to this class.

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

After Introduction Week, **every week you will do SIX 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 by **Wednesday** at 11:59pm
   a. Only your **10** highest scores will count.
4. **Discussion:** Complete a discussion post by **Thursday** at 11:59pm
   a. Only your **8** highest scores will count.
5. **Zoom Thursdays (Optional):** Attend class via Zoom on Thursdays (**not** Tuesdays: use that time to do 1-4)
6. **Final Project:** Make progress on your final project

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! you've decided to attend college in this incredibly difficult time – spread the coursework out throughout the week. You will learn much better that way.

- Use the Weekly Checklist

General Education (GE) Requirements and Learning Goals

GE Requirement This course meets the requirement for GE category B.5 – Implications and Explorations in Mathematics and Natural Science.

Grade A grade of D or higher is required to meet this GE requirement.

GE Learning Goals
a. Integrate themes in science, mathematics and/or quantitative reasoning from cross-disciplinary perspectives.
b. Solve complex problems that require science, mathematics and/or quantitative reasoning.
c. Relate science, mathematics and/or quantitative reasoning to significant social problems or to other related disciplines.
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.

Grading Policy

Grading

Weekly Quizzes	100 (25%)
Discussion Posts	160 (40%)
Final Project: Abstracts	20 (5%)
Final Project: Posts	20 (5%)
Final Project: Paper	20 (5%)
Final Project: Product	80 (20%)
	400 Points

Flip Grid Introduction To pass the class, you must complete your Flip Grid Introduction in the first week of classes.

A+	98-100%	392-400 Points
A	92-97%	368-391 Points
A-	90-91%	360-367 Points
B+	88-89%	352-359 Points
B	82-87%	328-351 Points
B-	80-81%	320-327 Points
C+	78-79%	312-319 Points
C	72-77%	288-311 Points
C-	70-71%	280-287 Points
D+	68-69%	272-279 Points
D	62-67%	248-271 Points
D-	60-61%	240-247 Points
F	0-59%	0-239 Points

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

Coursework Descriptions

Flip Grid Introduction

During the Introduction Week, you must complete a "Flip Grid Introduction." You will introduce yourself using Flip Grid (on Canvas) and you will comment on two other people's posts.

Attendance

Class will not meet on Tuesdays. We will meet on Thursday for "Zoom Thursdays." Attendance to Zoom Thursdays is **optional**. Some students prefer to take online courses alone at their own pace. Others want to engage in real time with their peers and professors. In this class, it's **your choice**. During Zoom Thursdays, we will:

- Discuss, clarify, and expand on course ideas
- Discuss coursework
- Answer logistical questions about the course
- NOTE: Complete the readings, videos, podcasts before Zoom Thursday meetings

Weekly Quizzes

10 Points Each. To help keep up with course content and to ensure you are understanding the material, weekly quizzes are assigned. Format: multiple-choice, true/false, matching, etc. Only your **10 highest** quiz scores will count towards your grade. The rest will be dropped.

Satisfies a and c of B.5 GE Requirement

Weekly Discussions

20 Points Each. To give you an opportunity to reflect, weekly discussions are assigned. Format: Discussions will be text-based (you write your answers) or Flip Grid-based. You will be required to do an **original post** and **TWO commentary posts**. Only your **8 highest** discussion scores will count towards your grade. The rest will be dropped. (So, you may skip 4 discussions without hurting your grade.)

Satisfies a-d of B.5 GE Requirement and Writing Requirement

Final Project

Building Knowledge Project. This is a semester-long project. Throughout the semester, you will work on a project of your choice. The aim of the project is to share ideas related to philosophy of science with others. It can take many forms.

- Website: Construct a website that communicates a concept learned in class to the public, and that applies it to a real-world problem.
- Video: Create a video that communicates a concept learned in class to the public, and that applies it to a real-world problem.
- Game: Create a game (computer game, board game, parlor game, etc.) that illustrates a concept learned in class, and that could lead some players to arrive at interesting conclusions related to philosophy of science.
- Interview: Interview people who work in science related fields about philosophical questions they confront, and then create a video or a website in which you analyze your interview material.
- Other: Be creative. Do what interests you!

This project has three stages.

Stage 1: Early in the semester, you will choose a project to work on, and you'll set some goals to meet by the middle of the semester.

Stage 2: Throughout the semester, you will provide updates on your progress.

Stage 3: At the end of the semester, you'll submit a project portfolio. The project portfolio will include your (i) project, your (ii) update posts, and (iii) your final paper.

Project Assignments Overview
1. Submit Abstracts
2. Submit Goals
3. Submit Updates
4. Submit Portfolio: Product, Posts, and Paper

Remember: ***you*** get to select the type of project you work on. I want to give you an opportunity to work on something that genuinely interests you. And I want you to reflect on your own learning.

Satisfies a-d of B.5 GE Requirement and Writing Requirement

After completing the abstract assignment, this will be a **group project. We'll organize this around the 4th week of the semester.**

Final Project: Abstracts 2 Abstracts/10 Points Each. Science is collaborative. Scientists learn from other scientists. This assignment gives you an opportunity to mimic that learning structure. You will be assigned two course readings. Your job is to summarize each reading in 150-200 words. Those summaries will be used by you and your classmates for two purposes. First, students may read the abstract before doing that reading when it's assigned. Second, students will use the abstracts to guide them on their final project. Submit these on Canvas in a word document or pdf. I'll share them with the class. Others are relying on you. Do a good job!

Satisfies a and c of B.5 GE Requirement

Final Project: Posts 4 Posts/5 Points Each. Throughout the semester, you will provide updates on your progress. The first post will outline the goals for your project. The rest will ask you to assess and detail your progress.

Satisfies a-d of B.5 GE Requirement and Writing Requirement

Final Project: Paper 20 Points. You will write an 800-word paper describing your project, how it relates to what you learned in class, and what you'd like others to learn from it.

Satisfies a-d of B.5 GE Requirement and Writing Requirement

Final Project: Product 80 Points. This is what you create: the video, podcast, artwork, website, game, etc. If you create something physical (e.g., a game), you will share with me whatever components you can via Canvas and upload pictures of the rest.

Satisfies a-d of B.5 GE Requirement

Communication

Office Hours I will have Zoom Office Hours W 1-2pm, Th 10-11, and by appointment. You can just "drop in" to my scheduled office hours. A Zoom link will be available in Canvas. If those times don't work, you should ABSOLUTELY feel free to set an appointment with me. **I want to help you succeed!** Just email me. If it helps, you can use this script:

> *"Hi Josh,*
> *I'm in your [CLASS NAME & TIME]. 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]"*

Contact Outside of office hours, 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. **If you have a question about the course, please check the syllabus before emailing.**

You I expect you to regularly check your email and Canvas for announcements.

Ask a Question Boards 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

"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

Written Posts: Write as if you're writing a paper. Proper grammar and punctuation.

Flip Grid Posts: These are less formal. Show your personality. If you want to use emojis, or filters, or whatever, that's great. Just don't go overboard.

Zoom Thursdays

Video: I prefer you have your video on, but I will not require it. If you have your video **on**, please don't be distracting.

Mute: Mute your sound when it's not your turn to speak.

Chat: Sometimes I will ask for verbal responses, but if you have questions or do not feel comfortable speaking up, you may use the Chat Function.

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

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

Copyright

Weekly Checklist

Week 1	☐ Viewed Course Trailer ☐ Viewed Josh's Introduction Video ☐ Viewed Course Overview Video	☐ Completed Flip Grid Introduction ☐ Response 1 ☐ Response 2
Week 2	☐ Took Notes on all Readings, Podcasts, Videos	☐ Completed Quiz ☐ Completed Discussion ☐ Response 1 ☐ Response 2
Week 3	☐ Took Notes on all Readings, Podcasts, Videos	☐ Completed Quiz ☐ Completed Discussion ☐ Response 1 ☐ Response 2 ☐ Completed Final Project: Abstracts
Week 4	☐ Took Notes on all Readings, Podcasts, Videos	☐ Completed Quiz ☐ Completed Discussion ☐ Response 1 ☐ Response 2
Week 5	☐ Took Notes on all Readings, Podcasts, Videos	☐ Completed Quiz ☐ Completed Discussion ☐ Response 1 ☐ Response 2 ☐ Completed Final Project: Post #1
Week 6	☐ Took Notes on all Readings, Podcasts, Videos	☐ Completed Quiz ☐ Completed Discussion ☐ Response 1 ☐ Response 2
Week 7	☐ Took Notes on all Readings, Podcasts, Videos	☐ Completed Quiz ☐ Completed Discussion ☐ Response 1 ☐ Response 2
Week 8	☐ Took Notes on all Readings, Podcasts, Videos	☐ Completed Quiz ☐ Completed Discussion ☐ Response 1 ☐ Response 2 ☐ Completed Final Project: Post #2
Week 9	☐ Took Notes on all Readings, Podcasts, Videos	☐ Completed Quiz ☐ Completed Discussion ☐ Response 1 ☐ Response 2
Week 10	☐ Took Notes on all Readings, Podcasts, Videos	☐ Completed Quiz ☐ Completed Discussion ☐ Response 1 ☐ Response 2
Week 11	☐ Took Notes on all Readings, Podcasts, Videos	☐ Completed Quiz ☐ Completed Discussion ☐ Response 1 ☐ Response 2 ☐ Completed Final Project: Post #3
Week 12	☐ Took Notes on all Readings, Podcasts, Videos	☐ Completed Quiz ☐ Completed Discussion ☐ Response 1 ☐ Response 2
Week 13	☐ Took Notes on all Readings, Podcasts, Videos	☐ Completed Quiz ☐ Completed Discussion ☐ Response 1 ☐ Response 2 ☐ Completed Final Project: Post #4
Week 14	☐ Ate Pie	☐ Relaxed
Week 15-16	☐ Catch-Up	☐ Made Progress on Final Project
Week 17	☐ Submit Final Project Portfolio	☐ Posts ☐ Final Paper ☐ Final Product

Tentative Schedule

Date	Topic	Resources (R = Reading, P = Podcast, V = Video)	Learning Outcomes & Assignments (A = Assignment)
Week 1	Introduction Week	• Canvas Course Introduction Page • Course Trailer • Instructor Video • Syllabus/Course Introduction Video	1. Become familiar with course 2. "Meet" Classmates on FlipGrid ☐ FlipGrid Introduction (A)
Week 2	Background Scientific Revolution Traditional Empiricism	• Godfrey-Smith "Sketch of the Scientific Revolution" (R) • Barker & Kitcher "Modern Science: A Brief History" (R) • Lecture (V)	1. Learn major episodes in history of science 2. Understand traditional empiricist approach to science ☐ Quiz (A) ☐ Discussion (A)
Unit 1: Science Denial, Agnotology, Echo Chambers, and Expertise			
Week 3	Climate Change & Science Denial	• Broome "Science of Climate Change" (R) • Lecture (V) • Documentary: *Merchants of Doubt* (V)	1. Understand the basics of climate change science 2. Begin to understand "tobacco strategy" ☐ Quiz (A) ☐ Discussion (A) ☐ Final Project: Abstracts **DUE: 9/11 11:59pm** (A)
Week 4	Why don't people believe in climate change? Agnotology, Echo Chambers, & Epistemic Bubbles	• Harker "Created Controversies & How to Detect Them" (R) • Nguyen "Escape the Echo Chamber" (R) • Lecture (V)	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) ☐ Quiz (A) ☐ Discussion (A)
Week 5	Identifying Experts	• Goldman "Expertise" (§3) (R) • Boyd "Swamping, Epistemic Trespassing, and COVID" (R) • Anderson "Democracy, Public Policy, and Lay Assessments of Scientific Testimony" (R) • Lecture (V)	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 ☐ Quiz (A) ☐ Discussion (A) ☐ Final Project: Post #1 **DUE 9/25 11:59pm** (A)
Unit 2: Replication Crisis, Scientific Change, and Thomas Kuhn			
Week 6	What is the replication crisis? What has caused it?	• Dominus "When the Revolution Came for Amy Cuddy" (R) • Radiolab "Stereothreat" (P) • Lecture (V) • OPTIONAL: Engber "Everything is Crumbling" (R)	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 ☐ Quiz (A) ☐ Discussion (A)
Week 7	Kuhn's Theory of Scientific Change	• Freedman "Lies, Damned Lies, and Medical Science" (R) • Okasha "Scientific Change and Scientific Revolutions" (R) • Lecture (V)	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 4. Understand and evaluate solutions to replication crisis ☐ Quiz (A) ☐ Discussion (A)
Week 8	Trusting Science	• Oreskes "Science isn't Always Perfect, But We Should Still Trust it" (R) • Ioannidis "Why Science isn't Necessarily Self-Correcting" (R) • OPTIONAL: What's the Point? "Science is Hard" (P)	1. Reflect on how much trust science deserves in light of replication problems ☐ Quiz (A) ☐ Discussion (A) ☐ Final Project: Post #2 **DUE 10/16 11:59pm** (A)

Tentative Schedule

Unit 3: Algorithmic Bias and Bias &Values in Science			
Week 9	Algorithmic Bias	• Angwin et al. "Machine Bias" (R) • O'Neil "The Era of Blind Faith in Big Data Must End" (V) • Hi-Phi Nation "Risky Business" (P) • Lecture (V)	1. Understand basics of algorithms 2. Understand how algorithms can be biased 3. Reflect on why algorithms are adopted and how effectively they satisfy goals ☐ Quiz (A) ☐ Discussion (A)
Week 10	Bias & Values in Science	• Saul "Bias in Science" (R) • Buolamwini "Compassion Through Computation: Fighting Algorithmic Bias" (V) • OPTIONAL: Zollman "What It Means When Scientists Disagree" (R) • Lecture (V)	1. Understand the stages where bias enters science 2. Understand the bias paradox 3. Understand the value free ideal and its challenges 4. Understand what "pale male" data sets are 5. Understand why feminists and others think bias can improve science ☐ Quiz (A) ☐ Discussion (A)
Week 11	Parallels between Algorithmic Bias & Bias in Science	• TED Radio Hour "Trust in Numbers" (P)	1. Reflect on the parallels between bias in science and algorithmic bias 2. Reflect on solutions to bias in science and algorithms ☐ Quiz (A) ☐ Discussion (A) ☐ Final Project: Post #3 **DUE 11/6 11:59pm** (A)
Unit 4: Demarcation, Evolution, and Intelligent Design			
Week 12	Teaching Intelligent Design in School?	• PBS Nova "Judgment Day: Intelligent Design on Trial" (V)	1. Understand the basics of intelligent design theory 2. Understand the basics of evolution 3. Understand the controversy over teaching intelligent design in public schools 4. Identify standard argument strategies in favor of teaching intelligent design ☐ Quiz (A) ☐ Discussion (A)
Week 13	Demarcation Problem & Intelligent Design	• Ruse "Creation Science is Not Science" (R) • Laudan "Science at the Bar" (R) • Lecture (V)	1. Understand demarcation problem 2. Reflect on the social and ethical significance of demarcation problem 3. Understand falsificationism criterion of science 4. Understand Kuhnian criticism and alternative 5. Understand the debate about classifying intelligent design/creation science as non-science 6. Defend your opinion on intelligent design in schools ☐ Quiz (A) ☐ Discussion (A) ☐ Final Project: Post #4 **DUE 11/20 11:59pm** (A)
Week 14	**FALL BREAK: NO SCHOOL**		
Week 15	Catch-Up		☐ Final Project: Make Progress
Week 16	Catch-Up		☐ Final Project: Make Progress
Week 17	**FINALS WEEK: Project Portfolio Due 12/14 11:59PM**		

****All of this is subject to change depending on our progress and on how the pandemic is unfolding.****