

# PHIL 12: Scientific Reasoning

Professor: Karen Kovaka

Fall 2022

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Office Hours: Wed 10am-12pm

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Class Hours: Mon/Wed 12-12:50pm

Class Room: Center Hall 216

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## Course Description

Science is a special way of making knowledge. But what, precisely, is so special about it? How does it produce knowledge? Is scientific knowledge trustworthy in a way that other knowledge is not? What are the limitations of science? When should we trust science, and when should we be skeptical about it?

We will explore all of these questions in this course, with the goal of sharpening your ability to assess particular *scientific knowledge claims* (e.g. "Climate change has made a megaflood in California much more likely."), and *claims about science* (e.g. "We can learn facts about the world from simulations."). Both kinds of claims come up all the time in day-to-day life, and being able to evaluate them is an important part of being scientifically literate. This course will help you do exactly that.

## Course Structure

We will meet for in-person sessions twice a week (Mon/Wed) and then split into smaller, also in-person, discussion groups led by TAs on either Mon, Wed, or Fri. You will complete the required reading before each large class session, as well as an online weekly reading quiz (10 total, on Canvas) due each Wednesday. There are five additional homework assignments due throughout the quarter. These assignments allow you to practice scientific reasoning skills as we study them. At the end of the quarter, there will be an exam in open-note, short-answer format. The final component of the course is attendance and participation: there is no substitute for active engagement from everyone during both the large classes and smaller discussion sections. These classes and sections assume you've done the assigned reading and then build on what you've read, rather than duplicating it.

## Teaching Assistants

Your TAs for the course are Haggeo Cadenas and Eugene Chua.

### Haggeo Cadenas

- hcadenas@ucsd.edu
- office and office hours

### Eugene Chua

- eychua@ucsd.edu
- office and office hours

## Evaluation

1. Weekly Reading Quizzes 20%
2. Homework Assignments: 50%
  - (a) Experiment Assignment (due 10/10): 10%
  - (b) Modeling Assignment OR Inference Assignment (due 10/24): 10%
  - (c) Statistical Reasoning Assignment (due 11/7): 10%
  - (d) Explanation Assignment (due 11/21): 10%
  - (e) Values Assignment OR Trust Assignment (due 11/30): 10%
3. Final Exam (Thurs, 12/8): 20%
4. Participation: 10%

## Grading Scale

The TAs and I will assign letter grades, which correspond to the following percentages:

- |              |             |             |             |
|--------------|-------------|-------------|-------------|
| • A+: 97-100 | • B+: 87-89 | • C+: 77-79 | • D+: 67-69 |
| • A: 93-96   | • B: 83-86  | • C: 73-76  | • D: 60-66  |
| • A-: 90-92  | • B-: 80-82 | • C-: 70-72 | • F: <60    |

## Fine Print

- **Attendance:** I expect you to come to every class session except when illness or other personal circumstances prevent you. For our Mon/Wed sessions, I will keep track of attendance each week and forgive up to two absences with no questions asked. This means you do not need to contact me to explain your first two absences. After two absences, I will start deducting points from your final grade for each additional absence. For the Friday discussion sections, your TA will keep track of your attendance each week and forgive one absence with no questions asked. For each additional absence, they will start deducting points from your final grade. If circumstances require you to miss more than this many classes, you and I need to speak in person about alternative ways for you to participate in the course.

- **Participation:** Your TA will assess your participation grade based on your discussion section contributions. Attendance is necessary but not sufficient for earning full participation credit. Everyone who makes regular, thoughtful contributions will get full credit. Speaking up in class is best, so that everyone else can benefit from what you have to say. But if that really doesn't work for you, you can participate in other ways, such as visiting office hours or sending thoughts over email.
- **Late Work:** Your TA and I can grant extensions on assignments *if you request them in advance*. If you turn in work late without requesting an extension, we may reduce the grade of an assignment by 5% per day late. In general, however, we are happy to adjust deadlines in response to your circumstances. If you are experiencing difficulties turning in work, please talk to us proactively, rather than waiting until things pile up.
- **Accessibility:** We all learn differently, and I am committed to making this course accessible to everyone. Please come talk to me if some aspect of the course isn't working for you: we can collaborate on alternatives that suit your needs, interests, and learning style. If you have a disability (or think you might), it's also a good idea to contact [Services for Students with Disabilities](#).
- **Technology:** Our phones, tablets, and laptops are crucial tools for learning, yet they are also notorious distractions. I will leave it to you to regulate your technology use. But my expectation is that during class and discussion sessions, you do not check your email, message people, or use the Internet for things that aren't course-related.
- **Academic Integrity:** I take academic integrity very seriously. It's important that all the assignments you complete are your own work and that you know how to credit and cite sources appropriately. If you have any questions about my expectations for a particular assignment, be sure to talk to me! I also recommend you read the [UCSD Policy on Integrity of Scholarship](#).
- **Changes to the syllabus:** I may adjust the course readings and schedule as the quarter goes along. It is your responsibility to pay attention to Canvas and your email so that you are aware of any changes.

## Texts

All of the required reading for the course will be posted on Canvas. Our primary text is called *Recipes for Science*, by Angela Potochnik, Matteo Colombo, and Cory Wright. If you wish to purchase a hard copy (not at all necessary), you can find one online for \$35-\$40.

# Reading Schedule

Date	Content
Mon. 9/26	<b>What Is Science?</b> <ul style="list-style-type: none"> <li>• <b>Required Reading:</b> <i>The Knowledge Machine</i>, Michael Strevens, Introduction (pp. 7-15)</li> </ul>
Wed. 9/28	<ul style="list-style-type: none"> <li>• <b>Required Reading:</b> <i>Recipes for Science</i>, Angela Potochnik, Matteo Colombo, and Cory Wright, 1.1, 1.2, and 1.3 (pp. 7-45)</li> </ul>
Mon. 10/3	<b>Experiments and Studies</b> <ul style="list-style-type: none"> <li>• <b>Required Reading:</b> <i>Recipes for Science</i>, 2.1 and 2.2 (pp. 46-72)</li> </ul>
Wed. 10/5	<ul style="list-style-type: none"> <li>• <b>Required Reading:</b> <i>Recipes for Science</i>, 2.3 (pp. 72-88)</li> </ul>
Mon. 10/10	<b>Models and Modeling</b> <ul style="list-style-type: none"> <li>• <b>Required Reading:</b> <i>Recipes for Science</i>, 3.1 (pp. 89-102)</li> </ul>
Wed. 10/12	<ul style="list-style-type: none"> <li>• <b>Required Reading:</b> <i>Recipes for Science</i>, 3.2 and 3.3 (pp. 102-124)</li> </ul>
Mon. 10/17	<b>Patterns of Inference</b> <ul style="list-style-type: none"> <li>• <b>Required Reading:</b> <i>Recipes for Science</i>, 4.1 and 4.2 (pp. 125-149)</li> </ul>
Wed. 10/19	<ul style="list-style-type: none"> <li>• <b>Required Reading:</b> <i>Recipes for Science</i>, 4.3 (pp. 150-166)</li> </ul>
Mon. 10/24	<b>Statistics and Probability</b> <ul style="list-style-type: none"> <li>• <b>Required Reading:</b> <i>Recipes for Science</i>, 5.1 and 5.2 (pp. 167-182)</li> </ul>
Wed. 10/26	<ul style="list-style-type: none"> <li>• <b>Required Reading:</b> <i>Recipes for Science</i>, 5.3 (pp. 182-206)</li> </ul>
Mon. 10/31	<b>Statistical Inference</b> <ul style="list-style-type: none"> <li>• <b>Required Reading:</b> <i>Recipes for Science</i>, 6.1 (pp. 207-221)</li> </ul>
Wed. 11/2	<ul style="list-style-type: none"> <li>• <b>Required Reading:</b> <i>Recipes for Science</i>, 6.2 and 6.3 (pp. 221-241)</li> </ul>
Mon. 11/7	<b>Causal Reasoning</b> <ul style="list-style-type: none"> <li>• <b>Required Reading:</b> <i>Recipes for Science</i>, 7.1 and 7.2 (pp. 242-262)</li> </ul>
Wed. 11/9	<ul style="list-style-type: none"> <li>• <b>Required Reading:</b> <i>Recipes for Science</i>, 7.3 (pp. 262-274)</li> </ul>

Date	Content
Mon. 11/14	<b>Explaining and Theorizing</b> <ul style="list-style-type: none"> <li>• <b>Required Reading:</b> <i>Recipes for Science</i>, 8.1 (pp. 275-288)</li> </ul>
Wed. 11/16	<ul style="list-style-type: none"> <li>• <b>Required Reading:</b> <i>Recipes for Science</i>, 8.2 (pp. 288-297)</li> </ul>
Mon. 11/21	<b>Values, Diversity, and Objectivity</b> <ul style="list-style-type: none"> <li>• <b>Required Reading:</b> <i>Recipes for Science</i>, 8.3 (pp. 297-309)</li> </ul>
Wed. 11/23	<ul style="list-style-type: none"> <li>• <b>Required Reading:</b> <i>A Tapestry of Values</i>, Kevin Elliott, chapter 1</li> </ul>
Mon. 11/28	<b>Trust in Science</b> <ul style="list-style-type: none"> <li>• <b>Required Reading:</b> <i>A Tapestry of Values</i>, Kevin Elliott, chapter 6</li> </ul>
Wed. 11/30	<ul style="list-style-type: none"> <li>• <b>Required Reading:</b> "Trust of Science as a Public Collective Good," Matthew Slater and Emily Scholfield</li> </ul>