



COURSE GOALS:

BY THE END OF THE COURSE, YOU'LL BE ABLE TO:

1. List what makes science similar to and different from other human activities.
2. Describe in what ways scientific activity is a unique tool for building knowledge.
3. Identify a variety of experiment types and the variety of philosophical and practical problems surrounding data collection and interpretation.
4. Critically evaluate the relationship between scientific theories and the data that supports them.
5. Solve elementary statistical problems by using the bell-curve.
6. Evaluate the success of scientific models in capturing reality.
6. Critically analyze the impact of prejudice and non-scientific beliefs on the scientific representations of reality.

How Science Works - Online

Philosophy 1032, Spring 2014

Prof. Zvi Biener

Like a car, an airplane, or any other tool, science works in a particular way, for a particular purpose. So we can ask: what makes it go? What are its parts, and how do they fit together? What are they for?

We will explore these questions by looking at real-life scientific and technological innovations that shed light on the methods, procedures, and concepts of science. We will investigate types of experimental procedures and the evidence they can yield, the role of statistics, the relation between scientific "models" and reality, and the values and starting assumptions that influence scientific theories. This course will prepare students for more focused work in particular sciences and help non-science majors become more sophisticated consumers of scientific information.

A SIGNIFICANT PORTION OF THIS COURSE WILL BE CONDUCTED ONLINE. THERE ARE NO PREREQUISITES.

Professor: Zvi Biener
email: zvi.biener@uc.edu
Office: 261B McMicken Hall (Philosophy Department)
Office hours: At any time, by appointment.

Fulfills General Education Baccalaureate Competencies:

- Critical Thinking
- Knowledge Integration
- Information Literacy

Fulfills Breadth of Knowledge (BoK) requirements:

- (QR) Quantitative Reasoning
- (NS) Natural Sciences

REQUIRED TEXTS AND WEBSITE:

THERE IS NO TEXTBOOK FOR THE COURSE. ALL MATERIALS WILL BE MADE AVAILABLE VIA BLACKBOARD ([HTTP://BLACKBOARD.UC.EDU](http://blackboard.uc.edu)).

Course information about exams, cancellations, updates, grades, etc., will be posted on Blackboard. You will need to regularly access that site in order to keep up with the course.

Reading on phones is *not recommended*.



Main Components of the Course:

Readings:

Each reading assignment should be completed by the date listed in the schedule. Successful completion of classwork/online activities, projects, and exams will require careful reading of all materials.

Online Quizzes & Activities (200 points):

Online activities will lead you through the readings, test your understanding, and ask you to reflect on the concepts we've learned. Activities will take the form of quizzes, written work, blog posting/commenting and/or wiki authoring. They are mandatory.

Problem Sets (130 points):

The mathematical portion of this course will have to be written on paper and submitted through scanned or photographed copies. It will require calculation of simple mathematical equations and some drawing of pictures.

Projects (200 points):

The course contains two projects. Each project will give you the chance to dig more deeply into course topics and apply them to real-life examples. They will take the form of 4-6 page written essays.

Exams (370 points):

There will be two in-term exams (100 point each) and a final exam (170 points). Each in-term exam will focus on one unit from the course. The final exam will be cumulative. The topics and format of the exams will be discussed in advance.

Grading Policy:

- ★ **How will I be graded?** Grading rubrics for each assignment guide grade assignments and are attached as PDFs to each assignment or are accessible through the Blackboard GradeBook.

Rubrics specify how points for the assignment are distributed between categories such as "structure/organization", "depth of analysis", "proper use of sources", etc. Normally, each category is weighted equally: if there are 4 categories, each counts for 25% of the score. However, excellent performance in one category may override poor performance in others, and the other way around.

You are highly encouraged to study the grading rubric for each assignment before undertaking any work. The rubric advises you on how to structure your work, which features to attend to, and how to move past a first draft to a more polished work.

- ★ **Make-up exams or assignments** will only be allowed under special circumstances. If you are in such circumstances, please provide the relevant documentation. If you know ahead of time that you won't be able to complete a certain assignment, let me know immediately. In general, the earlier you contact me, the more forgiving I will be and the easier it will be to schedule a make-up. Don't wait till the last minute, or worse, till after the exam/assignment.
- ★ **Late submission** of assignments results in a penalty of 10% of the total assignment score per day. But note, if something comes up, it is always better to ask for an extension beforehand than to just plan on losing points from a late penalty.
- ★ **Plagiarism** is not tolerated. Plagiarism is using someone else's words without giving them proper credit. Any assignment that is plagiarized will result in zero points. You can learn about what constituted plagiarism at: <http://plagiarism.org>. If you don't know whether you have plagiarized, ask me! I'll only look kindly on it.
- ★ **Turnaround time** for assignment will usually be 72 hours. Projects may take about a week.

Other Policies:

Our course is governed by university-wide policies. If you are affected by any policies that require special accommodations or changes to course dates, please let me know ASAP.

- ★ **Add/Drop Procedure:** www.uc.edu/registrar/policies_and_procedures/add_drop_withdrawal.html
- ★ **Religious Observances:** www.uc.edu/registrar/policies_and_procedures/religious_observances_statement.html
- ★ **Disability Services:** www.uc.edu/aess/disability.html
- ★ **Code of Student Conduct:** www.uc.edu/conduct/Code_of_Conduct.html

You might also want to look at the office for **Academic Excellence and Support Services** which offers not only the Disability Services linked above, but other specialized services, and even a great writing center to which all students are encouraged to go. See <http://www.uc.edu/aess.html>.

FINAL-GRADE BREAKDOWN:

Total possible points: 900

Extra credit points: 85

A	92.5% - 100%
A-	90.0% & up.
B+	87.5% & up.
B	82.5% & up.
B-	80.0% & up.
C+	77.5% & up.
C	72.5% & up.
C-	70.0% & up.
D+	67.5% & up.
D	60.0% & up.
F	below 60.0%

TECHNOLOGY SUPPORT:

UCIT (UNIVERSITY OF CINCINNATI INFORMATION TECHNOLOGIES) HELPDESK
TROUBLESHOOTS BLACKBOARD PROBLEMS.



PHONE: (513) 556-1602

MONDAY -FRIDAY: 8 A.M. TO 11 P.M. EST

SATURDAY: 2 P.M. TO 6 P.M. EST

SUNDAY: 4 P.M. TO 11 P.M. EST



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INFORMATION AND ASK US A QUESTION. IT'S THAT EASY.

What are the minimal technical requirements for this course?

- Relatively easy access to a computer and a printer.
- A hi-speed Internet connection (an on-campus connection is preferred).
- The Firefox browser. Other browsers will work most of the time, but Firefox may save you headaches.
- A word-processor (Microsoft Word, Apple Pages, Google Docs, etc.)

I've got a pad/phone, isn't that enough? How about the Blackboard Mobile App?

- Not really. You can view much of the course content through a pad, but you'll have a REALLY hard time submitting assignments and taking exams. A traditional computer is recommended.
- The Blackboard Mobile Application will not work with this course. Don't try.
- Reading/writing on phones is highly discouraged. It will drive you mad.

I clicked on a file and it didn't open. What do I do?

- All files in this course are set to open in a new tab/window of your browser. So check first if there is an open tab/window that you didn't notice.
- If a window/tab opened without opening the file, you will need to download the file manually. Do to this, right click on the link and select "Save As" or "Download As" or "Save Link As" or the relevant choice in your browser. Save the file to your computer and then open it manually.

When I submit a document using *SafeAssign*, I get errors. What do I do?

- *SafeAssign* generates lots of harmless errors. If you need to make sure that your document has been accepted, navigate back to the submission link. If your submission didn't work, you'll be allowed to submit again. If it did, you'll see a record of it.

Schedule - All Readings and Assignments on Blackboard

1/6/14	Course Introductions & Readiness Exercises (40 Points), Due 1/13/14.
1/8/14	Read: Science & Everyday Life Bertrand Russell - <i>General Effects of Scientific Technique</i>
1/10/14	Post to Blog: Science & Everyday Life, Part 1 (10 points) due 1/13/14 10:00 AM Post to Blog: Science & Everyday Life, Part 2 (10 points) due 1/15/14 10:00 AM
1/13/14	
1/15/14	Read: What is Science? Peter Godfrey-Smith - <i>Theory and Reality, Excerpts from Chapter 1</i>
1/17/14	Continue.
1/20/14, 1	Watch and Read: Confirmation Bias (Wikipedia) Post to Blog: Confirmation Bias, Part 1 (15 points) due 1/22/14, 10:00 AM Post to Blog: Confirmation Bias, Part 2 (5 points) due 1/24/14, 10:00 AM
1/22/14	
1/24/14	Read: Science & Pseudoscience Janet Stemwedel - <i>Drawing the line between science and pseudo-science.</i> Quiz Yourself: Science & Pseudoscience (20 points) due 1/27/14 10:00 AM
1/27/14	Read: Science and the Natural World UC Berkeley's "Understanding Science" Project - <i>Natural Matters</i>
1/29/14	Start working on Unit 1 Project (100 points), due 2/5/14 10:00 AM
1/31/14	Read: Evaluating Scientific Claims Janet Stemwedel - <i>Evaluating Scientific Claims</i>
2/3/14	Read: Relating Evidence and Ideas UC Berkeley's "Understanding Science" Project - <i>The Core of Science</i>
2/5/14	Read: But it isn't that Simple! UC Berkeley's "Understanding Science" Project - <i>Excerpts</i> Unit 1 Project Due (100 points)
2/7/14	Quiz Yourself: The Core Logic of Science (20 points) due 2/10/14 10:00 AM
2/10/14	Read: Types of Experiments John Norton - <i>How Science Works, Chapter 3, Part 1</i>
2/12/14	Read: Further Experimental Strategies John Norton - <i>How Science Works, Chapter 3, Part 2</i>
2/14/14	Write and Grade: Real Life Experiments (40 points) due 2/19/14 10:00 AM

Schedule - All Readings and Assignments on Blackboard

2/17/14	
2/19/14	Read: Types of Argument and the Problem of Induction Peter Godfrey-Smith - <i>Theory & Reality</i> , Chapter 3.1 - 3.2
2/21/14	Construct for Yourself: Types of Arguments (20 Points) due 2/24/14 10:00 AM
2/24/14	Watch and Review: The Problem of Induction
2/26/14	Read: The Ravens Paradox Peter Godfrey-Smith - <i>Theory & Reality</i> , Chapter 3.3
2/28/14	Prepare for Exam: (30 Points + 20 extra-credit points) due 3/3/14 10:00 AM
3/3/14	Exam on Unit 2 (100 Points)
3/5/14	Read: Cheating and The Power of Statistics John Norton - <i>How Science Works</i> , Chapter 1
3/7/14	Experience for Yourself: How Can Data Be Too Good? (10 points) due 3/10/14 10:00 AM
3/10/14	Read: The Basic Rules of Probability John Norton - <i>How Science Works</i> , Chapter 9 Problem Set (30 points) due 3/14/14 10:00 AM.
3/12/14	
3/14/14	Read: Meet the Bell Curve John Norton - <i>How Science Works</i> , Chapter 10 Problem Set (30 points) due 3/24/14 10:00 AM.
3/17/14 to 3/21/14	Spring Break
3/24/14 to 3/28/14	Read: Hypothesis Testing John Norton - <i>How Science Works</i> , Chapter 11 Problem Set (30 points) due 3/31/14 10:00 AM.
3/31/14	Read: Sampling & Estimation John Norton - <i>How Science Works</i> , Chapter 12 Problem Set (30 points) due 4/4/14 10:00 AM.
4/2/14	
4/4/14	Prepare for Exam: Problem Sets (30 Points + 20 extra-credit points) due 4/7/14 10:00 AM
4/7/14	In-Class Exam: Unit 3 (100 Points)
4/9/14	Watch and Read: Scientific Models Excerpts from "Scientific Models", Stanford Encyclopedia of Philosophy
4/11/14	Begin work on Unit 4 Project (100 points) due 4/18/14 10:00 PM

Schedule - All Readings and Assignments on Blackboard

4/14/14 Watch and Read: The San Francisco Bay Model
Pacific Standard Magazine, Dec. 5 2011 Article

4/16/14 Watch and Read: The Prisoner's Dilemma
Robert Axelrod - *The Evolution of Cooperation, Chapter 1*
Extra-Credit Question: The Prisoner's Dilemma (15 points)

4/18/14 **Unit 4 Project Due (100 points)**

4/21/14 **Final Exam (160 points)**

Course Materials are taken from self-cited web-sources, authored by the instructor, or:

Axelrod, Robert (1983). *The Evolution of Cooperation*. New York: Basic Books.

Godfrey-Smith, Peter (2003). *Theory and Reality: An Introduction to the Philosophy of Science*. Chicago: University of Chicago Press.

Norton, John (1998). *How Science Works*. New York: The McGraw Hill Companies.

Russell, Bertrand (1952). *The Impact of Science on Society*. New York: Simon and Schuster