# LPS 60: Making Modern Science

Fall, 2020

Instructor: Aydin Mohseni
Classroom: Remote
Synchronous Discussions: F 11:00–11:50 am (PT)
Instructor Student Hours: MW 11:00–11:50 am (PT)
Instructor Email: amohseni@uci.edu

Teaching Associate: Rebecca Korf
Teaching Associate Student Hours: ThF 9:00–9:50 am (PT)
TA Email: rkorf@uci.edu

## 1 Description

This course concerns the history of science from the 17th century to the present. Main topics covered include the origins and development of science, main historical figures, practices and reasoning strategies viewed as representative of "the scientific method," and the social impact of science on society. Specific topics addressed include: the scientific revolution, ecology, genetics, the human sciences, the birth of statistics and experimental method, and the contemporary replication crisis in the social and biomedical sciences.

## 2 Learning Objectives

By the end of this course, students will be equipped to:

1. Examine changes in methods and reasoning in science from the 17th C on.
2. Analyze and explain primary literature from the history of science.
3. Describe some of the significant challenges facing modern science.
4. Evaluate and defend theses regarding the nature and status of science with historical evidence.

## 3 Textbooks

The main readings for this course will come from Bowler and Moruss *Making Modern Science* (The University of Chicago Press), while supplemental readings will be located on the course website (`https://canvas.eee.uci.edu/`).

## 4 Course Structure

This course will be taught entirely online. Each week I will release **assigned readings** to the CANVAS site covering a different topic. I will also release a simple but mandatory **reading quizzes** accompanying each of the assigned readings. Reading quizzes will be due each week *prior to* that week's Synchronous discussion (reading quizzes will make up 25% of your grade). The idea is that we have all done the readings, completed the reading quizzes, and come prepared to discuss them *thoughtfully* and *respectfully*.

**Synchronous discussions** will typically be held at the end of the week. Usually this will be on Friday from 11:00 to 11:50 am (PT). When there is a holiday on Friday, the synchronous discussion will be moved to Wednesday from 11:00 to 11:50 am (PT). Attending the synchronous discussions provides points for attendance (this makes up 10% of your grade). It is highly recommended you attend all synchronous discussions.

Also during synchronous discussion, you may be given a **text analysis assignment** aimed at getting you to analyze some scientific text. You will often start the assignment during discussion, but they will be due the following week, typically by Wednesday (text analysis assignments will compose 25% of your grade). Text analysis assignments should be submitted via Gradescope. Your lowest grade for the assignments will be dropped.

There will also be two exams: a **midterm exam** and a **final exam**. The midterm exam will consist of short answer questions reading material, lectures, and discussions from the first have of the course. The final exam will consist of short answer questions based on the reading material, lectures, and discussions from the second half of the course. So, the final will *not* be cumulative. (Each exam will compose 20% of your grade.)

All exams will be made available on the CANVAS site at 9:00 am (PT) on exam day. You will have all day to complete the exams; and they will be due by 11:59 pm (PT) that day. Late exams will not be accepted.

However, if you need to miss an exam for a serious reason, please do reach out to me ahead of time (preferably weeks in advance) and we will arrange a make-up exam on a difference date. In such a case, you must provide official documentation (e.g., a medical note).

The exam will be open-book: please feel free to use any notes or books during both the exams and homework assignments.

## 5 Summary of Course Requirements

| | Assignment | Weight |
|---|---|---|
| 1 | Attendance | 10% |
| 2 | Reading Quizzes | 25% |
| 3 | Text Analysis Assignments | 25% |
| 3 | Midterm Exam | 20% |
| 4 | Final Exam | 20% |

**Attendance** This portion of the grade is determined by your attendance in your discussion section.

**Reading Quizzes:** This portion of the grade is determined by your completion of participation quizzes that accompany weekly readings and lecture videos.

**Text Analysis Assignments:** This portion of the grade is determined by your completion of text analysis assignments that will be provided during weekly discussions.

**Midterm Exam:** The midterm exam will consist of short answer questions based on the lectures and reading material.

**Final Exam:** The final exam will consist of short answer questions based on the lectures and reading material.

## 6 Grading Scale

| A: 90–100 | B: 80–89 | C: 70–79 | D: 60–69 | F: $< 60$ |
|---|---|---|---|---|

The University describes the levels of attainment for A, B, C, and D grades as excellent, good, average, and barely passing, respectively (`https://www.reg.uci.edu/services/transcripts/notations.html`). For F, I, and IP grades, I will follow the standards set by the University (`https://www.reg.uci.edu/faculty-staff/gradingpolicy-facstaff.html`).

## 7 How to Succeed in this Course

My advice for succeeding in this course is as follows. Do the weekly readings; watch the weekly lecture videos; complete the participation quizzes that accompany the readings; attend weekly discussions; and come to my student hours or the TA's student hours whenever you have any questions or confusions. If you do all these things, then you will almost certainly do very well in the course!

## 8 How to Act in Synchronous Discussions

I strongly encourage you to always be *considerate* and *respectful*. You will often be broken up into small groups to discuss various question regarding the readings. When discussing in these small groups, consider whether others have had an opportunity to speak and actively ask for one another's thoughts on discussion topics.

When you happen to disagree with others, do so very respectfully. We will be covering complex historical and philosophical issues that no one is expected to fully understand right away. Substantive disagreement—along with uncertainty and confusion—are to be expected and welcomed.

## 9 Student Hours and Getting Help

The TA and I will hold **student hours** over Zoom at various times during the week. You are enthusiastically encouraged to come to these virtual student hours and ask any questions you may have about lectures, quizzes, upcoming exams, or the course.

Please do not hesitate to reach out to me at any time if you have any difficulties, concerns, or questions regarding the course or your performance. To do so, you can email me, visit me during my student hours, or make an appointment with me. If you are concerned with academic matters that are not specific to this course, please consider contacting the Learning and Academic Resource Center (`http://www.larc.uci.edu/`).

## 10 How to Contact the Instructor or TAs

Contacting either the instructor or TAs in a course can be intimidating. So, below is a template and some tips for how to best and to do this.

First, a few preliminaries. The best way to contact the instructor or TAs for this course will be via email. The emails can be found on the syllabus. It is best to expect 48 hours to elapse for a reply. This is important: it means you should not expect to email the instructor or TA the night before an exam or assignment and get a reply in time!

Importantly, before you contact the instructor or TA, do check the syllabus and course site to see if you cannot easily answer the question for yourself. If you still have a question after having checked the syllabus and/or the relevant portions of the course site, include in your email that you checked the syllabus and/or course site for the answer. Your instructor and TA will appreciate this and know that they can trust you not to be asking frivolous questions.

This might seem simple, but be polite and considerate. That is, in your message it is good to acknowledge that the other person is more than a machine for answering your questions! For example, a friendly greeting like, "I hope this finds you well," can go a long way in building rapport.

Finally, try to be clear and concise in your questions. The clearer your questions, the more effectively the instructor or TA can be in helping you. For example, "I don't understand quiz 3" is far too vague. What, specifically, does the student not understand? Instead, a question like, "In question 2 of participation quiz 3, I am unclear if the question is asking us to describe X or to describe Y?" is much more likely to get a helpful answer!

Here is a template to help you in writing your emails.

```
Dear Instructor Mohseni,
I hope this finds you well.
I am writing to you to ask a question regarding X.
(I have checked the course Canvas site and did not find the answer
to this particular question.)
My question is:  ...
Sincerely,
Nima
```

## 11 Academic Integrity

I trust you to be adults. This means you will uphold your responsibilities to adhere to the UCI Academic Integrity Policy. The policy is detailed here: `https://aisc.uci.edu/students/academic-integrity/index.php`. If you have any questions or uncertainty about the policy, please meet with me to discuss the policy to make sure you understand it clearly and completely.

## 12 Disabilities

If you have a disability for which you may be requesting an accommodation, you are encouraged to contact both myself and the Disability Services Center (`http://www.disability.uci.edu/`). The Disability Services Center will verify your disability and help determine appropriate accommodations for this course. If you have any questions or concerns about disability accommodations, please dont hesitate to speak with me; I am very happy to help out!

## 13 Course Schedule

The following is a tentative schedule of topics, reading, assignments, and their due dates. Note that while discussions will be canceled when they fall on recognized holidays, readings or video lectures that fall on holidays will typically be posted on the course Canvas site on the day after the given holiday.

I reserve the right to change this at any point, but the most up-to-date schedule will always be on the course Canvas site.

(Note that MMS denotes the course text, Bowler & Morus' "Making Modern Science.")

**Week 0: Introduction: Science, Society, and History**

(10/2) Introduction & course overview

**Week 1: The Scientific Revolution**

(10/5) Basics, terminology, and the origins of the history of science
& MMS Chapter 1: The Scientific Revolution
(*Due by midnight:* Syllabus quiz)

(10/7) Galilei, Galileo (1632) Day Two, Dialogue concerning the two chief world systems

(10/9) Discussion (*Due before discussion:* Reading quiz)

**Week 2: The Chemical Revolution**

(10/12) INDIGENOUS PEOPLE'S DAY

(10/14) Scerri, Eric (2019) "The periodic system: An overview"
(*Due by midnight:* Text Analysis Assignment 1)

(10/16) Discussion (*Due before discussion:* Reading quiz)

**Week 3: The Age of the Earth and Continental Drift**

(10/19) MMS Chapter 5: The Age of the Earth

(10/21) MMS Chapter 10: Continential Drift
(*Due by midnight:* Text Analysis Assignment 2)

(10/23) Discussion (*Due before discussion:* Reading quiz)

**Week 4: Ecology and Environmentalism**

(10/26) MMS Chapter 9: Ecology and Environmentalism

(10/28) Elton (1966) "The animal community"
(*Due by midnight:* Text Analysis Assignment 3)

(10/30) Discussion (*Due before discussion:* Reading quiz)

**Week 5: Midterm and The New Synthesis in Biology**

(11/2) **Midterm** (*Available at* 9 am; *Due by* 11:59 pm (PT))

(11/4) MMS Chapter 8: Geentics; Sturtevant (1965) "History of genetics"

(11/6) Discussion (*Due before discussion:* Reading quiz)

**Week 6: The Birth of Scientific Statistics**

(11/9) John Arbuthnot (1710) "An argument for Divine Providence, taken from the constant regularity observed in the births of both sexes"

(11/11) VETERAN'S DAY

(11/13) Discussion (*Due before discussion:* Reading quiz)

**Week 7: Making Modern Statistics**

(11/16) R.A. Fisher (1935). "The Design of Experiments" (alternatively, Neyman, J. (1977). "Frequentist probability and frequentist statistics")

(11/18) Thomas Bayes (1763) "An Essay towards solving a Problem in the Doctrine of Chances"
(*Due by midnight:* Text Analysis Assignment 4)

(11/20) Discussion (*Due before discussion:* Reading quiz)

**Week 8: The Replication Crisis in the Social and Biomedical Sciences**

(11/23) Ioannidis (2005) "Why Most Published Research Findings Are False"

(11/25) Discussion (*Due before discussion:* Reading quiz)

(11/27) THANKS GIVING BEAK

**Week 9: The Replication Crisis Continued**

(11/30) Prinz, Schlange, and Asadullah (2011) "Believe it or not: how much can we rely on published data on potential drug targets?"

(12/2) Simmons, Nelson, and Simonsohn (2011) "False-Positive Psychology"
(*Due by midnight:* Text Analysis Assignment 5)

(12/4) Discussion (*Due before discussion:* Reading quiz)

**Week 10: Re-Making Modern Science**

(12/7) Ioannidis (2014) "How to Make More Published Research True"

(12/9) Nosek et al (2012) "Scientific Utopia"

(12/11) Discussion (*Due before discussion:* Reading quiz)

**Finals Week**

(12/18) **Final exam** (*Available at* 9 am; *Due by* 11:59 pm (PT))