

SCIENCE & SOCIETY

From the Age of Newton to the Age of Darwin



Joseph Wright, An Experiment on a Bird in the Air-Pump (1768)

HIS 281; SPRING TERM 1, 2021
Mon, Wed, Fri: 10:00-11:50 am (CST)

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Office Hours:
Thur, 2-4pm (Webex)
& by appointment

This course examines the rise of modern science from the transformative period of Isaac Newton and the scientific revolution to the time of Charles Darwin (c. 1650-1880). During this key period, science not only emerged as the most authoritative form of knowledge, but also began to exert a powerful influence on the fabric of western society and its imperial projects around the globe. Over the course of the semester, we will explore how revolutionary developments in the physical, biological and human sciences were connected to profound changes in the social, political, and economic world, such as the emergence of the Enlightenment, the industrial revolution, new forms of imperialism and statecraft, religious debates, and the growing emphasis on racial and sexual difference.

The course readings focus on the historical factors that have shaped how scientific knowledge was constructed; how and why it gained assent; and how different groups have employed this knowledge to serve particular ends. Our goal, therefore, is not simply to understand how science has shaped society, but also to probe how social and ideological factors have structured the world of science itself, conditioning the kind of knowledge it produces. As we shall see, even fields like mathematics or the “hard” physical sciences cannot be fully understood without an appreciation of the social context surrounding them.

Given the vast scope of our topic, the course follows a case-study approach that explores three key facets of modern science: experimentation, measurement/quantification, and classification. Each unit of the course, therefore, represents a unique “story” about how a particular set of knowledge-making practices were shaped by social and historical forces, and in turn, how the scientific advancements they produced transformed important aspects of the world around them. By tracing the rise of experimentation, for example, the readings and documents illuminate how the new culture of experimental philosophy was tied to political crises of the seventeenth century, the creation of new social spaces and audiences for the Enlightenment of the eighteenth century, and the industrial world of the nineteenth century. I have tried to choose readings that will cover a diverse spectrum of scientific fields, geographic regions, social groups, and historical debates. That said, I’m sure there will be a number of topics (or fields of science) that students are interested in that do not appear in our main course readings. So I will be offering additional reading guides, and posting optional readings throughout the term, to make it easier for students to pursue these interests if they have the time/inclination.

While our subject matter for the semester is the interplay between science and society in the making of our modern world, all of our courses at Grinnell also focus on developing particular academic skills that transcend the topic at hand. This term, I would like to focus our attention on writing—becoming more reflective about how we approach writing, what we value in compelling prose, and experimenting with techniques to hone our skills as writers. Accordingly, we are going to focus on a series of three short essays (one for each unit), with students having the opportunity to revise any paper and resubmit it for a new grade. We have been fortunate enough to have four writing mentors assigned to our course this term. Each student will be assigned a writing mentor, who can serve as a resource as they develop ideas, work on outlines and drafts, or wrestle with particular aspects of the writing process. The writing mentors will also be leading a series of 4-5 short workshops over the course of the term, which will focus on key areas of writing to help you hone your skills in preparation for the essay assignments, or in terms of revising papers that have been graded & returned. Participation in these workshops will be a graded component of your larger participation grade for the course (as explained below).

I realize that everyone is facing a lot of challenges this year: from the pandemic to the distressing cycle of events dominating the news to the condensed time frame of the courses (7.5 weeks). It can be all too easy to become disconnected from an online course, losing interest or focus, or perhaps falling behind in terms of readings or assignments. I would just urge you not to feel that these are things you have to tackle on your own. Please reach out to me so that we can talk about the difficulties you are facing, and develop some strategies or plans to address them. I really want to work with each of you to make sure this is a successful and rewarding term.

COURSE AT A GLANCE

COURSE MATERIAL: All of the course material will be available in digital form in the “course readings” section of our blackboard site.

ONLINE SESSIONS: Students are assigned to one of two discussion sections, that will meet for 50 minutes each Monday, Wednesday, and Friday of the term (all online sessions and office hours will take place in my webex room:

Section 1 (meeting 10-10:50am, Central Standard Time)Section 2 (meeting 11-11:50am, Central Standard Time)

COURSE ASSIGNMENTS & GRADES:

- **Three Short Essays**, roughly 2-4 pages in length, with the option to revise and resubmit any for a new grade. (60% of total grade)
- Participation in a series of **writing workshops & exercises**, that will take place throughout the semester, led by the writing mentors. (10% of total grade)
- **Class Participation**, which includes not only our online discussion sessions but also assigned activities/exercises that will be scattered throughout the term (such as discussion board prompts or journaling). (30% of total grade).

ASSIGNMENT	DATE	PERCENTAGE OF TOTAL GRADE
Short Essay #1	Feb 16	20%
Short Essay #2	Mar 2	20%
Short Essay #3	Mar 16/23	20%
Writing Workshops	***	10%
Class Participation	***	30%

More detailed information about the assignments, expectations, and course policies can be found towards the end of this syllabus (after the class schedule).

CLASS SCHEDULE & READINGS

I create a discussion guide for each class session, which lays out the major issues for the day, contextualizes the material, and gives specific questions to help guide your reading, note-taking, and preparation for class discussion. The guide will be posted alongside the readings on blackboard, so please make sure to read it *before* you begin the assigned readings.

SECTION I
The Culture of Experimentation

Week 1

Mon (Feb. 1st): **Rethinking the Story of Science**

Reading Due: *Mechanical Marvels/Clockwork Dreams* (BBC Documentary film, 2013)

Optional: *Connections: An Alternative View of Change* (BBC Documentary series, 1978)
<https://archive.org/details/ConnectionsByJamesBurke/>

Steven Johnson, *Wonderland: How Play Made the Modern World*, ch. 2 (on the intertwined history of music, automata, and computing)

Wed (Feb. 3rd): **The Scientific Revolution: An Intellectual or Social Movement?**

Reading Due: Steven Shapin, *The Scientific Revolution*, introduction & ch. 2.

Fri (Feb. 5th): **Experimental Science as Utopia and Dystopia**

Reading Due: Francis Bacon, “The New Atlantis” (1627), selections.

Jonathan Swift, *Gulliver’s Travels into Several Remote Nations of the World* (1726), selections.

Week 2

Mon (Feb. 8th): **The Politics of the New Science**

Reading Due: Steven Shapin and Simon Schaffer, *Leviathan and the Air-Pump: Hobbes, Boyle and the Experimental Life*, selections.

Thomas Sprat, *History of the Royal Society* (1667), selections.

Wed (Feb. 10th): **The Milieu of Enlightenment Science**

Reading Due: Steven Johnson, *The Invention of Air: A Story of Science, Faith, Revolution, and The Birth of America*, pt. 1.

Fri (Feb. 12th): **Paradigms & Revolutions**

Reading Due: Johnson, *The Invention of Air*, pt 2.

Week 3

- Mon (Feb. 15th): **New Audiences for Science**
 Reading Due: *Skim* Paul Elliott, “Scientific Culture and the Home in Georgian Society.”
 Maria Edgeworth, *Harry & Lucy Concluded* (1825), selections.
Optional: Margaret Jacob and Larry Stewart, “Popular Audiences and Public Experiments,”

First Short Essay Due 7pm, Tuesday, February 16th

- Wed (Feb. 17th): **Enlightenment and Industrialization**
 Reading Due: Joel Mokyr, *The Gifts of Athena: Historical Origins of the Knowledge Economy*, selections.
 Benjamin Franklin, *Proposal for Promoting Useful Knowledge* (1743).
 Fri (Feb. 19th): **Transformative Spaces & Practices**
 Reading Due: Bruno Latour, “Give Me a Laboratory and I Will Raise the World.”

SECTION II

Quantification: The Science & Politics of Measurement

Week 4

- Mon (Feb 22nd): **Mathematizing Nature**
 Reading Due: Clifford D. Conner, *A People’s History of Science: Miners, Midwives and “Low Mechanics”*, ch. 5.
 Wed (Feb 24th): **Family Affairs: Women in Science & the Trades**
 Reading Due: Londa Schienbinger, *The Mind Has No Sex? Women in the Origins of Modern Science* (1989).
 Elizabeth Yale, “[Astronomy’s Evolving Gender Dynamics](#)” *The Atlantic* (2016).
 Fri (Feb 26th): **The Expanding World of Numbers**
 Reading Due: Theodore Porter, “Making Things Quantitative,” *Science in Context* 7 (1994).
 Select one chapter from *The Quantifying Spirit in the 18th Century*, eds Frangsmyr, Heilbron, & Rider (1990).

Second Short Essay Due 7pm, Tuesday, March 2nd

Week 5

Mon (Mar 1st): **The Measure of Enlightenment**

Reading Due: Ken Alder, "A Revolution to Measure: The Political Economy of the Metric System in France."

Second Short Essay Due 7pm, Tuesday, March 2nd

Wed (Mar 3rd): **The Power of Numbers: Making the World Legible**

Reading Due: James C. Scott, *Seeing Like a State: How Certain Schemes to Improve the Human Condition Have Failed* (1998).

Fri (Mar 5th): **Nineteenth-Century Statistics**

Reading Due: Ian Hacking, "Biopower and the Avalanche of Printed Numbers."
Charles Babbage, "On Tables of the Constants of Nature and Art," (1832).



Week 6

Mon (Mar 8th): **Ordering the World**

Reading Due: Peter Dear, "A Place for Everything" in his *The Intelligibility of Nature: How Science Makes Sense of the World*

Robert Darton, "Philosophers Trim the Tree of Knowledge: The Epistemological Strategy of the *Encyclopedie*."

Wed (Mar 10th): **Classification and the Scientific Method**

Reading Due: Karl Pearson, *The Grammar of Science* (1892), selections.

Luke Howard, "Essay on the Modification of Clouds" (1803).

Fri (Mar 12th): **Collecting and Appropriating Knowledge**

Reading Due: Kathleen S. Murphy, "Translating the Vernacular: Indigenous and African Knowledge in the Eighteenth-century British Atlantic," *Atlantic Studies* 8, no. 1 (2011): 29-48.

Sam Kean, "[Historians Expose Early Scientists' Debt to the Slave Trade](#)," *Science Magazine* (April 4, 2019).

Week 7

Mon (Mar 15th): **Classifying People**

Reading Due: Elizabeth Ewen & Stuart Ewen, *Typecasting: On the Arts and Sciences of Human Inequality* (2006), selections.

Option 1: Third Short Essay Due 7pm, Tuesday, March 16th

Wed (Mar 17th): **Racialized Science, Technology & Medicine**

Reading Due: Lundy Braun, *Breathing Race into the Machine: The Surprising Career of the Spirometer from Plantation to Genetics* (2014), pt. 1.

Fri (Mar 19th): **Science, Social Darwinism, and Physical Fitness**

Reading Due: Braun, *Breathing Race into the Machine*, pt. 2

Option 2: Third Short Essay Due 7pm, Tuesday, March 23rd

COURSE POLICIES & REQUIREMENTSCLASS ATTENDANCE

Please email me if a medical, personal, or technological issue prevents you from attending class. Under these circumstances, I allow students to make up such absences by emailing me a response to the readings that addresses one of the discussion questions for that day, which I then count towards their participation grade. Students may do this 3 times over the course of the semester (although exceptions may be made for students facing special circumstances).

Note: Please reach out to me at the beginning of the term if you are facing particular technological challenges (or issues with time zones) that make attending our online class sessions problematic so that we can work out appropriate accommodations.

Writing Workshops: In addition to our class sessions, there will be a series of 4-5 writing workshops scheduled over the course of the term that are a required component of the class (i.e. all students need to attend and participate. More information on these workshops is provided below.

Information about your assigned discussion section and time (along with log-in information) is posted on blackboard (in the “online meeting” tab)

CLASS PARTICIPATION (30% of Total Grade)

Given the nature of the course—which revolves around discussion rather than lecture—it is crucial that students come to each discussion session fully prepared to engage the readings/topics at hand. This involves not only completing the assigned readings prior to class, but also taking the appropriate time to address discussion questions, to organize your notes accordingly, and to *identify specific examples and passages you want to highlight in class*. While I like to let conversations

evolve naturally, with students choosing to “jump in” at their own pace, there may well be times when I call on students to ensure that everyone is participating, and that the conversation is not confined to a narrow circle.

I also plan to utilize other asynchronous activities or exercises that will allow students to engage the material, and develop their ideas, beyond class discussion. This might take the form of a discussion board activity (either before class discussion, or after it), or I might ask you to do a short reflective exercise (along the lines of “journaling” or “commonplacing” as Europeans from the time period we are studying would have done). These short exercises will be part of your overall participation grade.

Since class participation accounts for 30% of your total grade, I take this evaluation seriously. I will record a participation grade for each class session—and for most exercises/activities—and will make these available to you on a daily basis so that you can track how you are doing in this aspect of the course. I will send an email at the beginning of the term explaining the logistics of this process (i.e. how students can access their participation grades). Please come see me early in the semester if you have concerns about participation, or if the discussion format is one you struggle with at times, so that we can discuss these issues.

Note: All of our class sessions and writing workshops will be recorded in Webex, but they will be kept confidential and not used for any purpose other than evaluating participation grades.

Three Short Papers (60% of Total Grade)

There are no exams in this class. Instead, you will be required to write three concise essays (2-4 pages in length) that demonstrate your grasp of the material and your ability to develop sophisticated historical arguments about the core issues we explore. Each individual essay will be worth 20% of your total grade; and you have the option to revise and resubmit any piece for a new grade. Students interested in being able to revise and resubmit their third essay will need to submit their paper by March 16th, whereas students who are not interested in revisions can opt to turn their final essay in the following week (i.e March 23rd).

You will be able to choose from multiple prompts, which will be posted under the “Assignment” tab on Blackboard, along with additional guidelines about writing and revising pieces. Each student will submit their essays as an MS Word or Adobe Pdf file electronically through the drop-box function located in the Assignment section.

Late assignments

Late assignments will receive a deduction of 2 points per day. Exceptions may be made for special medical or personal issues. But please note that no work can be accepted after 5pm on Wednesday, March 24th (i.e. the last day of the term) unless you have received approval to take an “incomplete.”

Writing Mentors & Workshops (10% of Total Grade)

In the first week of the term, I will divide our class into four groups, with each group assigned to one of the four student writing mentors. These mentors will contact you directly, and post important information in the “Writing Mentors” section of blackboard, so that you understand

the range of ways they may be able to assist you, and their process for scheduling appointments and the like. Our four writing mentors this term are:

I will be working with the writing mentors to design a series of 4 or 5 workshops that will focus on a particular issue/skill set I want you to master. These workshops will be small (the writing mentor + 3-4 students) and will involve analyzing examples, discussing them, and engaging in concrete exercises. The goal of the workshops is to move beyond the general & abstract—i.e. what makes a good thesis?—and instead to have a focused and concrete discussion about the mechanics of crafting a strong thesis in practice. So to continue with this example, the workshop might revolve around a group discussion and analysis of two student essays that struggled to develop an effective thesis (I have a collection of papers from past semesters of HIS 281, where students have given permission for me to use their essays for such instructional purposes, with their names removed). And so, the workshop might revolve around a discussion about why, exactly, each thesis is unsatisfying, and how they might have been improved. There might also be a follow-up exercise, due a day or two later, in which you would craft your own, improved, version of one of the paper's thesis statements, emailing it to the writing mentor and myself.

The writing mentors will work with their groups to set up 50 minute time blocks when all parties can meet for a particular workshop. We realize that everyone has complex, and often shifting schedules, so instead of having one time slot for the entire term, we will schedule these workshops on an ad-hoc basis. We should be able to do this since the numbers are so small (i.e. finding a 50 minute block that 3-4 people can make should be feasible). The writing workshops will be recorded, and I will watch the sessions to assign participation grades, along with evaluating any writing exercises that accompany the workshops. All told, this evaluation will constitute 10% of the overall course grade.

Grading Scale

I employ the following numeric grade scale: A+ (97-100), A (93-96), A- (90-92), B+ (87-89), B (83-86), B- (80-82), C+ (77-79), C (70-76), D (60-69), F (below 60).

OTHER COLLEGE POLICIES

Religious Observance Policy

The following statement on religious observation policies comes from the Academic Handbook:

Grinnell College acknowledges and embraces the religious diversity of its faculty, students and staff. Faculty and students share responsibility to support members of our community who observe religious holidays. Students will provide faculty members with reasonable notice of the dates of religious holidays on which they will be absent, and this notice would be expected to occur no later than the third week of the term. Faculty members will make reasonable efforts to accommodate students who need to be absent from examinations or class due to religious observance. Students are responsible for completing any part of the course work, including examinations, they have missed due to religious observance, and faculty members are responsible for giving them the opportunity to do so. (Approved by the Faculty, September 21, 2009)

There is a more descriptive list of the holy days available on our website
<http://www.grinnell.edu/about/offices-services/crssj/calendars>

Writing Lab

You are welcome to take any of your assignments to the writing lab this semester. For those unfamiliar with the writing lab, this is the short description provided by its director:

Grinnell's Writing, Reading, and Speaking Center supports students working on papers, projects, presentations, and applications. Schedule a session with one of the Center's professional instructors and get feedback as you interpret readings, talk through your ideas, analyze evidence, develop and organize arguments, craft introductions and conclusions, rewrite sentences and paragraphs, or plan presentations. Center instructors do not proofread papers, but they can show you how to edit your own work effectively. Make an appointment online: <http://mywco.com/grinnell>

Disability Resources

I will make every effort to work with students to implement accommodations that are presented to me through the College process (as outlined in the Student Handbook and the Office of Accessibility and Disability Services). To learn more about this process, and the rights and responsibilities of students in this area, please consult: <https://www.grinnell.edu/about/offices-services/accessibility-disability/students>