

HISTORY OF SCIENCE 100 – Great Scientists

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Course meets every Tuesday and Thursday,
6:30-7:45 at 4308 Social Sciences

Office Hours: Wednesdays 12-2
at 6202 Social Sciences

Final exam date: 7:25 PM, Thu. May 17th

COURSE OBJECTIVES

HSCI 100 is titled “Great Scientists.” It is a biographical survey of a certain few men and women whose work has come to be regarded as important in the development of what we now call science. Like most history classes, this one works on three levels at the same time. Over the course of the semester, you should:

- Gain a basic understanding of the lives and work of the scientists considered. These are the facts of the matter; the basic pieces of knowledge.
- Consider the relationship that each of these scientists had with their own particular cultures, and the larger question of how the accomplishments of “great scientists” are influenced by a scientist’s broader community. This is the broad, thematic question of the course: are great scientists “born that way,” or are they thrust into their roles by society?
- Begin to understand the historical perspective, and the tools that historians use to create narratives about the past.

ATTENDANCE POLICY

The attendance policy in simplest terms is this: attend every lecture. A great deal of the material for this course is presented in lecture, and the substitutes (borrowing others students’ notes, going over the material with me separately during my office hours, and so forth) aren’t nearly as effective.

That said, from time to time it may not be possible for you to attend class. Along with religious observances, sport or other extracurricular obligations, foreseeable absences like scheduled surgery, jury duty, and the like, or other known circumstances which might reasonably take precedence over section can usually be dealt with ***provided you notify me as soon as you are aware of them.*** Absences due to illness are sometimes unavoidable, but you are responsible for dealing with them in a mature and timely fashion.

E-MAIL POLICY

I make frequent use of the class e-mail list to distribute assignments, make announcements, and so on. You are responsible for checking your e-mail for

these messages, though I'll try to do so in a timely fashion, and in any event I won't send out assignments later than Monday evening of any week. **The automatic class e-mail list is updated every week according to your "preferred" e-mail address as defined by you in your my.wisc.edu settings; PLEASE make sure that this is set to an e-mail address you actually read!** I usually check e-mail several times a day; if I'll ever be out of contact for more than 24 hours, I'll give you advance notice and an alternate means of reaching me.

The address is: **mblavine@wisc.edu**. Careful of the spelling—there are some Wisconsin addresses that are just a letter off.

OFFICE HOURS

I will be holding office hours in my office, 6202 Social Sciences, on Wednesdays from noon to 2, or by appointment. If you would like consult with me but can't make it on Wednesday afternoon, feel free to e-mail me and set up a meeting; I'm on campus most days anyway. On occasion I may reschedule the time or place for a given week; if so, I'll send the change around on e-mail and post it on my door. Attendance at office hours won't be compulsory (except, possibly, to make up an absence from lecture under some circumstances), but it's always a good idea to drop by once or twice a semester. Most academics lead sheltered and lonely lives, and will appreciate your company.

THE WRITING CENTER

You will be writing one essay in this course, which accounts for a significant portion of your grade (see below). Many of the students in this class will have mastered the 5-page college essay by now, but others will not yet have fully hit their stride as writers. (First-years: this means you!) For the best that UW-Madison has to offer in writing instruction and consultation, I **strongly** recommend a visit to the Writing Center. They offer everything from drop-in hours (for emergency paper consultation) to regular weekly meetings, and they are excellent at what they do. You can contact them at: www.wisc.edu/writing; writing@wisc.edu; 263-1992; or in person at 6171 Helen C. White.

Naturally, you should feel free to solicit my help with the essay-craft aspect of this assignment, too.

ASSIGNMENTS

Midterm examination (25% of grade).

The midterm examination will consist of two parts: a short-answer identification section, and an essay portion. A list of essay topics will be pre-circulated as an aid to study, and the actual questions asked will be drawn from that list. **Both**

sections will draw heavily from material covered in lectures and discussion as well as the readings! The midterm will occur during the regular class period on **Tuesday, March 1**.

Short essay assignment (25% of grade).

You will write a brief (1200-word) historical essay on one of several assigned topics. The materials for this will come from course readings and lectures and **will not require outside research**. This will be a take-home assignment, handed out on **Tuesday, April 10** and due nine days later in class on **Thursday, April 19**. More information about this assignment will be given in class.

Final examination (35% of grade).

The final examination will take place on **Thursday, May 17 at 7:25 PM**. The exam period is three hours long, and you will be permitted to use all this time to complete the exam. Most students should be able to complete it in less than three hours, though. Like the midterm, the final will consist of short-answer identifications, and essay questions on pre-circulated topics.

Quizzes and participation in class discussion (15% of grade).

There will be some time in each week set aside for open discussion of course materials. This is an important part of developing your understanding of the material, and in helping you to gain a perspective on the different ways that historical facts can be interpreted. Your participation in these discussions helps your fellow students too, and is a required part of the class!

In some weeks there will be a short quiz, intended only as a reading check. If you have familiarized yourself with the reading (even if you have not fully understood every aspect of it yet) you will have no difficulty with the quizzes.

PLAGIARISM AND ACADEMIC HONESTY

If you have not already committed them to memory, familiarize yourself with the UW's standards for academic honesty. They are available at these websites:

<http://www.wisc.edu/students/conduct01.htm> (general policy)

<http://www.wisc.edu/students/Plagiarism.pdf> (plagiarism defined)

PLEASE PAY CLOSE ATTENTION: failure to observe the university's academic honesty policies, or any of the rules below, will have dire consequences for your grade. A common penalty for careless or intentional violations is a zero grade for the assignment, which in this course is tantamount to failure of the class.

For the short essay assignment:

- Unless you secure permission from me in advance, you may not use sources other than course texts, the course reader, lecture notes, or class discussion in writing your papers.
- Any method of citation commonly used in the humanities is acceptable. Most students prefer the MLA or Chicago styles, about which you'll be given more information later.
- There is no rule obligating you to cite general factual information given to you verbally in lecture or discussion sections (although it is not improper to do so). However, **no paper will be considered acceptable that is based exclusively on such sources.** In other words, your paper must demonstrate familiarity with the relevant text sources available to you, and you must acknowledge by citation your debt to them. Put still another way, there is no such thing as a no-citation paper in this class.
- For the record, you must cite a source
 - every time you quote it directly, no matter how brief the quote;
 - every time you use or refer to its ideas;
 - every time you summarize or paraphrase factual information it contains;
 - every time you use a **specific** fact that is not common knowledge to the average reader, and
 - at least the first time you refer to it by its title or author's name.When in doubt, err on the side of caution. You can hardly go wrong by having too many citations, but you **must not have too few.**
- Group study, including *preparation* for essays, is permitted and encouraged. It is fine to share your class and section notes with anyone and everyone. You may debate the relative merit of theses and make suggestions on how another student's argument might be improved. You must, however, *stop* collaborating when it comes to the *production* of the paper: outlines, organization, thesis elaboration, and the actual writing itself.

For all parts of the course:

Needless to say, any of the more exotic ways of violating one's scholarly conscience (turning in work written by someone else, submitting a paper that has already been used in a different class, misrepresenting the circumstances of an appeal for an extension, peeking over someone's shoulder during an exam or quiz, and so on) are treated in the same dire fashion as plagiarism.

REQUIRED TEXTS. In addition to the course reader, which contains the balance of the reading assignments for this class, there are four required textbooks:

- David C. Lindberg, *The Beginnings of Western Science* (1992).
- Steven Shapin, *The Scientific Revolution* (2003).
- Rachel Carson, *Silent Spring* (first published 1962; any edition is acceptable for this course).
- James Watson, *The Double Helix: A Personal Account of the Discovery of the Structure of DNA* (first published 1968; any edition is acceptable for this course).

CLASS TOPICS AND READING ASSIGNMENTS. Please note that all readings are to be done *before* the relevant lecture.

January 23 and 25:

Introductions and logistics. The Pre-Socratics. Where did Western science come from? What was different about Greece in the seventh century BCE? Was there anything particularly enduring about their natural philosophy? What does “natural philosophy” mean, exactly?

- Lindberg, *Beginnings of Western Science* (1992), Chapters 1 (“Science and Its Origins”) and 2 (“The Greeks and the Cosmos”)

January 30 and February 1:

Natural philosophers in tension: Plato and Aristotle. Summary and analysis of two sharply divergent natural philosophies, with a look ahead to the recapitulation of their debate in the late medieval and early Renaissance period.

- Lindberg, Chapters 3 (“Aristotle’s Philosophy of Nature”) and 4 (“Hellenistic Natural Philosophy”)
- Plato: selections from *Timaeus* and *Republic* (Book VII, the “Allegory of the Cave” et al)
- G.E.R. Lloyd, *Aristotle: The Growth and Structure of His Thought* (1968), Chapters 7 (“The physics of the heavenly region”) and 8 (“The physics of the sublunar region”)
- Lindberg, Chapter 5 (“The Mathematical Sciences in Antiquity”)

February 6 and 8:

Islamic science in microcosm: Avicenna and Averroes. The darkness of the “Dark Ages” in Christian Europe and Asia may have been overrated, but for several centuries on either side of the first millennium, Persia, North Africa, and Moorish Spain were the real centers of “Western” scholarship. Were Ibn Rushd (Averroes) and Ibn Sina (Avicenna), two of the most prolific and influential Islamic authors, merely keeping Greek scholarship alive, or did they make their own

distinct contributions? Were their reasons for doing so different than their European counterparts?

- Lindberg, Chapters 8 ("Science in Islam") and 10 ("The Recovery and Assimilation of Greek and Islamic Science")
- T.E. Huff, *The Rise of Early Modern Science: Islam, China, and the West*, 237-286

February 13:

Galen. A brief chronological step backwards to consider the anatomist whose theories of the human body dominated the next twelve centuries. What accounts for this degree of influence?

- Owsei Temkin, "Greek Medicine as Science and Craft", *Isis* 44 (1953), 213-225

February 15 and 20:

Was *De Revolutionibus* really revolutionary? Copernicus. Copernicus' heliocentrism explored in detail, along with a discussion of astronomical practice in the sixteenth century. Where did he get his ideas? What set him apart from other Renaissance astronomers? What were the circumstances of their reception? Was he a revolutionary, a reactionary, or simply an astronomer in search of better predictions? Did he believe in what he was saying? And what about the Church?

- Steven Shapin, *The Scientific Revolution* (2003), Chapter 1 ("What was known?")
- Nicholas Copernicus, *De Revolutionibus...*, selections.

February 22 and 27:

Methods in tension: Francis Bacon and Rene Descartes. A side-by-side exploration of two fundamentally differing views of what the scientific enterprise should be.

- Shapin, Chapter 2 ("How Was It Known?")
- Descartes, *Discourse on the Method...*, selections: Part I, Introduction; Part IV, Chapters 5-8 (Elements and quantities, matter, laws of nature, sun and stars) and 13-14 (on light)
- Francis Bacon, *The New Atlantis* (in its entirety)

MARCH 1 – MIDTERM EXAMINATION

March 6 and 8:

A scientist in tension with himself: The canonical Newton, and the hidden Newton. First, a review of Newton's contributions to physics, mathematics, and the philosophy of science. Then, how they fit into his larger understanding of the universe.

- READING ASSIGNMENT TO BE ANNOUNCED

March 13 and 15:

Other members of the Royal Society. A continuation of our exploration of Newton's *milieu*, with an emphasis on how he influenced, and was influenced by, his contemporaries.

- Shapin, Chapter 3 ("What Was The Knowledge For?")

March 20:

James Joule. In addition to being a central figure in the evolving science of energy, Joule was notable for his differences from the generation of physicists who had gone before: socially, epistemologically, and educationally. How did this affect his work? How can we tell?

- Heinz Otto Sibum, "Reworking the mechanical value of heat: instruments of precision and gestures of accuracy in early Victorian England," in *Studies in History and Philosophy of Science*, 26 (1994), 73-106

March 22, 27 and 29:

Charles Darwin. A biographical approach to Charles Darwin. What were the pressing questions of his day? What led him to his conclusions, and why did he wait so long to publish them in *The Origin of the Species*? When he did, what was the reaction?

- Selections from Charles Darwin, *On the Origin of the Species...* as collected in Thomas F. Glick and David Kohn, eds., *On Evolution*, p. 156 ("Introduction") through p. 194 (up to but not including "Divergence of Characters")

SPRING RECESS – NO CLASSES APRIL 3 OR 5

April 10 and 12:

Sigmund Freud. The same approach as with Darwin, and the same fundamental questions: what unanswered questions about human behavior was Freud addressing, and what influence did his environment have on how he went about answering them?

- Sigmund Freud, "Recommendations to Physicians Practicing Psychoanalysis," "On Beginning the Treatment," and "Obsessive Actions and Religious Practices," in Peter Gay, ed., *The Freud Reader*, 356-378 and 429-436.
- H.W. Chase, "Freud's Theories of the Unconscious," *Popular Science Monthly* 78 (1911): 355-363.

APRIL 10 – MIDTERM ESSAY TOPICS HANDED OUT

April 17 and 19:

Marie Curie. Remembered now as a discoverer of radioactive elements, and as a “martyr to her science”, Curie was not the only woman working in radiochemistry in the early days of the field. We will consider the role that her sex played in her career, and also in her treatment at the hands of historians since.

- READING ASSIGNMENT TO BE ANNOUNCED

APRIL 19 – MIDTERM ESSAYS DUE IN CLASS

April 24 and 26:

A scientist in tension with the public: Einstein. From the public’s perspective, Einstein was more than just a physicist—he was a socialist, a Zionist, a pacifist, an enemy, a Jew, a secular humanist, a hero, a grandfather, and a scoundrel, depending on the angle at which he was viewed. In light of his scientific achievements, does any of that matter? Should the history of science be concerned with scientists’ public lives?

- Alan J. Friedman and Carol Donley, *Einstein as Myth and Muse* (1985), 154-194.
- David Cassidy, *Einstein and Our World* (1995), Chapters 6 and 7 (Einstein and the broader culture).

May 1 and 3:

Rachel Carson. Carson’s skill as a biologist has always been highly regarded, but her place in the history of science has had much more to do with her advocacy on behalf of a particular public policy than with any particular contribution she made at the lab bench. Is science always political, or only when scientists make it so?

- Rachel Carson, *Silent Spring* (1962) (in its entirety).

May 8 and 10:

Scientists and histories in tension: Rosalind Franklin and James Watson.

For nearly fifty years, Francis Crick and James Watson were regarded as having deciphered the structure of DNA, to the exclusion of the many other scientists and technicians, including Rosalind Franklin, who helped make the discovery possible. This story was reinforced by Watson’s own bestselling memoir of the subject, *The Double Helix*. Recently, Franklin—by many accounts treated as poorly in life by Watson as she was in his book—has been the subject of renewed attention for her work on DNA, and for the way in which her role was minimized by the other actors in the drama. We will consider how scientists shape their own stories, how the stories that historians tell can change over time, and revisit the place of women in the scientific workplace.

- James Watson, *The Double Helix* (1968), in its entirety.
- **IN-CLASS VIDEO:** “NOVA: The Secret of Photo 51” (2003)