Welcome to The Making of Modern Science! Considered as a professional activity, science and technology are relatively recent products of Western European culture. In this course, we will examine developments since the mid-seventeenth century that have brought about a dramatic change in the way we understand the world and our place in it. How can we best explain why the thing we call science began when and where it did? What forces formed it, and how - in turn - has it become a powerful agent in shaping modern life? Tackling these questions is a major historical challenge, one that will take us from the familiar and the local to the furthest extent of distant empires. We will not find all the answers. But we will learn a lot about the connections between commerce, manufacture, exploration, and war, changing conceptions of man’s place in nature, and our ability to control the world around us. And, in the process, we will come to a new understanding of the relationship between science, technology and society.

This course is suitable for undergraduates in any field. No previous knowledge is required: historical background will be provided, and key scientific concepts explained, by the lectures and readings.

Learning Objectives:

By the end of this course you should:

- understand why and how science has become such a powerful component of modern culture;
- be able to outline some key changes in human understanding of the natural world since the 17th century: how these were set in motion, why they mattered and what were their consequences;
- appreciate science as a contingent activity, as profoundly shaped by its context as it is effective in controlling and manipulating the material world;
- know that history (of science) can serve a range of goals, depending on the questions it seeks to answer and the audiences it is intended to address.
This course will also help you develop transferable skills in:

- analyzing and criticizing written argument (readings);
- evaluating and synthesizing information derived from a range of sources (reading, lectures, and informal discussions);
- constructing and defending written and verbal arguments (your contributions in the classroom, and your written work)

You will also gain experience in:

- planning and executing small-scale projects (historical exercises, short essay writing);
- working with others (participation in classroom exercises);
- interpreting historical sources (reading the primary literature)

**Assessment:**

- 20%: Attendance and participation, including any informal writing, homework exercises, and other discussion activities.
- 30%: equally allocated to three historical exercises, due in your 202 L@UW Dropbox by 7 pm on the following days: **Wednesday, February 15; Monday, March 6; Wednesday, April 5**
- 15%: Completion of a short written quiz (multiple choice) on each of 6 topics (as listed in this syllabus; 2.5% per quiz; 10 questions per quiz). These tests will take place at the start of the **first lecture of topics 2 through 6 and the final review lecture**.
- 15%: mid-semester test, to be held in class on **Wednesday, April 12 2017**. This 1-hour test will require you to answer 4 out of 6 short answer questions.
- 20%: Take-home essay (1000 words), due in your 202 L@UW Dropbox by **7pm on Tuesday, May 9 2017**. Late papers will not be accepted.

All formal writings should be at least 1.5 spaced and supplied as word files (not PDFs). See “Introductory Study Materials” on Learn@UW for details on policies concerning late papers, plagiarism, learning accommodations, and academic performance.

**Course Textbook:**

No textbook is required for this course. But if you would like to have an independent framework for the material we’ll be studying, I suggest:

Course Schedule:

*Introduction*: where you will learn what the course entails, and how to complete it successfully.

1. (1/18/17) Introduction: What is modern science and where did it begin?
   
   **Required Reading**: None

**TOPIC 1: Natural Philosophy and the Birth of Experiment**: in which we will see how new ways of thinking about and interacting with the world introduced during the Scientific Revolution improved human ability to control, predict and manipulate natural phenomena.

   

3. (1/25/17) Uniting the Heavens and the Earth: Galileo, experiment and the new science of motion
   

4. (1/31/17) Experiment and Mechanical Philosophy: Descartes and the Clockwork Universe
   

5. (2/1/17) Newton: the paradigm of paradigms
   

**TOPIC 2: Teaching, Learning and Doing Science**: in which we trace the institutionalization of science and the emergence of the scientist as professional expert from the Enlightenment to the 20th century.

   

   
   **Required Reading**: Antoine Lavoisier, “Preface” to *Elements of Chemistry* transl. Robert Kerr (Edinburgh, 1790), xiii-xxxvii (at: [https://web.lemoyne.edu/giunta/ea/LAVPREFann.HTML](https://web.lemoyne.edu/giunta/ea/LAVPREFann.HTML)).
8. **(2/13/17) The Rise of the Research University**


9. **(2/15/17) Laboratory Science**


10. **(2/20/17) Popular Science**


**TOPIC 3: Science, Religion and the State:** in which we explore the changing relationship between science and religion from the early 19th century onwards, including the controversy over Darwinian evolution and the appropriation of science as a tool of the modern state

11. **(2/22/17) Science as Taxonomy**


12. **(2/27/17) Lyell and the Age of the Earth**


16. **(3/13/17) Genetics and Genetic Medicine**

*Required Reading:* Dan Kevles, “From Eugenics to Genetic Manipulation,” in *Companion to

**TOPIC 4: Science and Empire: in which we learn how 19th century imperialism changed science as well as political geography**

17. (3/15/17) Telegraphy and Empire


*PLEASE NOTE: NO CLASSES DURING SPRING BREAK, MARCH 18-26*

18. (3/27/17) The Global Quinine Trade

*Required Reading:* [http://www.lib.cam.ac.uk/deptserv/rcs/cinchona.html](http://www.lib.cam.ac.uk/deptserv/rcs/cinchona.html)


**TOPIC 5: Science and War: in which we use 20th century examples to examine the powerful effect of war on the development of science, technology and industry**


22. (4/10/17) Cold War Science


**MID-SEMESTER TEST**

23. (4/12/17) Mid-Semester Test covering Topics 1-5
TOPIC 6: Science and Industry, Health and Environment: beginning with the Industrial Revolution, we track the rise of major industries and emerging 20th and 21st century concerns including climate change and genetically modified organisms

    Required Reading: Carsten Reinhardt and Anthony S. Travis, Heinrich Caro and the Creation of Modern Chemical Industry (Dordrecht, 2000), Excerpts from Chapter 8, “The Industrial Research Laboratory,” pp. 219-32 and 251-56.

25. (4/19/17) Science and Industry II: the Case of Penicillin
    Required Reading: Robert Bud, Penicillin: Triumph and Tragedy (Oxford, 2007), Excerpts from Chapter 2, TBD.


27. (4/26/17) Agriculture and the Environment

28. (5/1/17) Climate Change and Green Energy
    Required Reading: Naomi Oreskes and Erik Conway, Merchants of Doubt (London, 2010), Chapter 6 “The Denial of Global Warming.”

Review: in which we draw out the major themes and developments discussed during the course

29. (5/3/17) Course Review and Essay Clinic