

GSC 2010 History of Modern Science

SPRING SEMESTER 2016

Tuesday 2:15pm-5:00pm

Professor: Italo Simonelli (e-mail: isimonelli@mcdaniel.edu)

Text: Making Modern Science, by P.J. Bowler and I.R. Morus.

Description: This course studies the development of modern science from the seventeenth century to present, predominantly in Europe and the United States. In addition to exploring some of the major conceptual achievements of modern science, the course also explores how science has affected and has been affected by political, social, and cultural developments. Key questions include: What is science? How has science been practiced and by whom has it been practiced? How are discoveries made and accepted? What is the nature of scientific progress? What is the impact of science on society? What is the impact of society on science? Topics will be drawn from the history of physics, chemistry, biology, psychology, and medicine.

General information and policies

- Students are expected to attend class regularly and on time. Normal rules of politeness will prevail in class. In particular, cell phones must be turned completely off, and stored out of sight during class.
- The format of the class is discussion based, and lectures will be kept to a minimum. Students are expected to read the assigned material before each class meeting, prepare questions and comments, and actively participate in class discussion.
- Homework is an integral part of this course and will be assigned each class period. There will be two kinds of homework:
 - (a) Required reading, which will be assigned at the end of each meeting. Occasionally students will be divided into groups and different reading assignments will be given.
 - (b) Short weekly written response assignments, which must be submitted at the beginning of each meeting. The assignments will be based on discussion questions given out prior to each reading assignment.

Assessment of Student Learning: Students will be graded on (i) homework, (ii) a short paper (Paper 1) based on the life and contribution of a scientist (about 4-5 pages), (iii) a final paper (Paper 2) based on a relevant scientific issue/topic (about 8-10 pages), and (iv) a final presentation. Directions and suggestions regarding papers 1-2 will be given in class.

Office hours: Office hours will be announced at the end of the first week of the semester.

Grading: The final grade will be calculated as follows:

Class participation	25%
Weekly written assignments	25%
Paper 1	15%
Paper 2	25%
Final Presentation	10%

Academic Honesty: It is the responsibility of each student to understand the College's policies regarding academic honesty and to uphold these standards. In accordance with the McDaniel College Honor Code students are expected to sign an honor pledge on all work, indicating

I have neither given nor received unauthorized aid on this piece of work, nor have I knowingly tolerated any violation of the Honor Code.

The above information is tentative and subject to change.

Calendar: (subject to change)

Week 1 Tuesday, February 2

What is science? When do we start? The understanding of the world prior to the the 17-th century. Introduction to the scientific revolution.

Week 2 Tuesday, February 9

The Scientific Revolution, Bowler/Morus, pp. 23-53

Robert Boyles landmark book of 1660, *New Experiments Physico-Mechanicall, Touching the Spring of the Air and Its Effects*, with the first experiments on rarified air by John B. West, *Journal of Applied Physiology* Published 1 January 2005 Vol. 98 no. 1, 31-39

<http://jap.physiology.org/content/98/1/31>

(Full book available at <http://quod.lib.umich.edu/e/eebo/A29007.0001.001?view=toc>)

Additional background: *The organization of Science*, Bowler/Morus, pp. 319-340.

Week 3 Tuesday, February 16

Voltaire, *Lettres Philosophiques*, 1778, Letter XIV: *On Descartes and Sir Isaac Newton*; Letter XV: *On Attraction*; Letter XVI: *On Sir Isaac Newton's Optics*; Letter XVII: *On Infinites in Geometry, and Sir Isaac Newton's Chronology*; Letter XXIV: *On The Royal Society and Other Academies*
<https://legacy.fordham.edu/halsall/mod/1778voltaire-lettres.asp>

Newton's Principia, Introduction

<http://www.archive.org/stream/newtonspmathema00newtrich#page/n0/mode/2up>

Week 4 Tuesday, February 23

The Chemical Revolution, Bowler/Morus, pp. 55-78

Antoine Laurent Lavoisier (1743-1794), *Preface by the Author from Elements of Chemistry*, translation by Robert Kerr (Edinburgh, 1790), pp. xiii-xxxvii, from Dover facsimile edition (1965).

<https://web.lemoyne.edu/giunta/ea/LAVPREFann.HTML>

Week 5 Tuesday, March 1

The age of the earth, Bowler/Morus pp. 103-127, pp. 341-365

Week 6 Tuesday, March 8

The Darwinian revolution, Bowler/Morus pp. 129-164, pp. 341-365

Struggle for Existence, Chapter 3 in *On the Origin of Species by Means of Natural Selection*, Darwin Charles, <http://biodiversitylibrary.org/item/135954#page/11/mode/1up>

Week 7 Tuesday, March 29

The new biology, Bowler/Morus pp. 165-188

Theory of the Cells, in *Microscopical researches into the accordance in the structure and growth of animals and plants*, T. Schwann 1847, https://books.google.com/books?id=m9kHAAAAIAAJ&printsec=frontcover&source=gbs_ge_summary_r&cad=0#v=onepage&q&f=false

Genetics, Bowler/Morus pp. 189-212

Week 8 Tuesday, April 7

The emergence of human science, Bowler/Morus pp. 299-316

Science and medicine, Bowler/Morus pp. 439-462

The origin and development of psychoanalysis, Sigmund Freud <https://dspace.mit.edu/bitstream/handle/1721.1/65347/sts-003-spring-2008/contents/readings/freud.pdf>

Week 9 Tuesday, April 14

Ecology and Environmentalism, Bowler/Morus pp. 213-235

Continental Drift, Bowler/Morus pp. 237-252

Week 10 Tuesday, April 21

Twentieth-Century physics, Bowler/Morus pp. 253-276

The rise of nuclear fear, Spencer Weart

Week 11 Tuesday, April 28

Science and war, Bowler/Morus pp. 463-486

The decision to build the bomb and the Manhattan Project, in *Brighter than a thousand suns*, by R. Jungk

Copenhagen by M. Frayn

Week 12 Tuesday, May 3

Science, Security, and the Cold War: The Case of E. U. Condon, Jessica Wang http://www.jstor.org/stable/234506?seq=1#page_scan_tab_contents

Continuity and Change in the Politics of European Scientific Collaboration, Olof Hallonsten <http://www.jcer.net/index.php/jcer/article/viewFile/366/349>

Big Science and Big Politics in the United States: Reflections on the Death of the SSC and the. Life of the Human Genome Project, Daniel J. Kevles http://econ.williams.edu/files/www.jstor_.org_stable_pdfplus_27757780.pdf

Week 13 Tuesday, May 10

Current Controversies: Nuclear Power and Fossil Fuels, Climate Change

Week 14 Tuesday, May 17

Final Exam