



## HIS 265/SCI 265: History of Science Course Syllabus

# SAMPLE SYLLABUS

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### Required Readings

1. Bowler & Morus, *Making Modern Science: A Historical Survey*, UChicago Press, 2005 (ISBN: 978-0226068619)
2. Weekly selection of short primary and secondary source readings (accessed through course website)
3. Weekly lab manuals with background information (accessed through course website)

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### Course Catalog Description

Our modern world is built on a foundation of science and technology. How did we get here? This course investigates how human beings have used reason and experimentation to explain and manipulate the natural world from the ancient period to the present, focusing on the past five hundred years. We will locate the Scientific Revolution of the 1500s and 1600s and the modern physical and mathematical sciences that it inspired within an older, multi-cultural story of science history. We also will explore how science and technology have transformed politics, economies, and societies in world history. In a concurrent lab, students will have the opportunity to walk in the shoes of past scientists, reproducing pivotal experiments from history and experiencing key scientific discoveries first-hand. Meets for 3 lecture hours and 2 laboratory hours per week. Must be concurrently enrolled in lab. Students may receive credit for only one of the following courses: HIS 265 or SCI 265. Prerequisites: ENG 111, MTH 150 or MTH 240; or permission of the Associate Dean of the School of Liberal Arts. *This course fulfills the Core Distribution Humanities OR Natural Sciences and Mathematics requirement.*

### Course Objectives

Students will be provided the opportunity to pursue two essential goals. First, they should acquire a general knowledge of the events and developments that make up human history from the early cultures in Mesopotamia to the era of globalization. Within this historical narrative, students will observe the interaction between religion, economics, political ideology, and social structure in human civilizations. To better appreciate both universality and diversity in the human condition, students must compare and contrast the development of civilizations in the West to cultures in Asia, sub-Saharan Africa, and the Americas. Second, students will engage the historical process by which past events are given meaning and understood.

### **Course Curricular Context:**

The Core Distribution courses are core requirements for students in all majors. Students must complete ENG 111 or be admitted as an Honors students in order to enroll in any Core Distribution course. Therefore, students generally complete these courses in semesters 2, 3, and 4.

### **Global Objectives for all Core Distribution Humanities Courses (HIS 265):**

- To improve and develop college-level reading skills by reading closely, paraphrasing text and interpreting meaning.
- To improve and develop college-level writing skills by demonstrating coherent, clean and focused writing in formats appropriate to the discipline.
- To improve and develop college-level critical thinking skills by requiring students to identify the central issue/problem, key questions being asked, and the evidence that supports the conclusion.
- To demonstrate problem-solving and decision-making skills by integrating the learning from the course and applying it to a case or problem found in a real-world setting.
- To demonstrate awareness and understanding of global perspectives and/or diversity as it applies to the content of the course.
- To demonstrate an ability to locate, evaluate and ethically use relevant, reliable and appropriate sources of information in 200-level Core Distribution Humanities courses.

### **Global Objectives for all Core Distribution Natural Sciences and Mathematics Courses (SCI 265):**

- To improve and develop college-level reading skills by reading closely, paraphrasing text and interpreting meaning.
- To improve and develop college-level writing skills by demonstrating coherent, clean and focused writing in formats appropriate to the discipline.
- To improve and develop college-level critical thinking skills by requiring students to identify the central issue/problem, key questions being asked, and the evidence that supports the conclusion.
- To demonstrate an ability to analyze and organize data.
- To demonstrate problem-solving and decision-making skills by integrating the learning from the course and applying it to a case or problem found in a real-world setting.
- To demonstrate an ability to locate, evaluate and ethically use relevant, reliable and appropriate sources of information in 200-level Core Distribution Natural Sciences and Mathematics courses.

### **Additional Course Objectives for HIS/SCI 265: History of Science:**

By completing this course, students will be provided an opportunity ...

- To identify the differences between historical and scientific methods, and to recognize that conceptions and practices of science have changed over time.
- To learn how conceptual, material, and representational resources available to scientists have evolved and how these conditions framed their methods of investigation as well as the questions about the natural world that they prioritized or dismissed.
- To better understand that science occurs in context, identifying the people, institutions, and groups with authority in and access to science, as well as broader cultural, societal, and political influences on science.

### **Course Grading**

In this course, lecture and lab grades are combined.

Engagement	10%
Assignments	30%
Papers	30%
Midterm Exam	10%
Final Exam	20%

## **Course Requirements**

1. **Engagement:** A robust community of learners requires the contributions of all members of the community. Students who are not actively engaged in the classroom discussions and activities either as active speakers or active listeners will be both missing learning opportunities and may lose engagement points. This grade will be calculated at the culmination of the course and will reflect the degree of sustained engagement in the course. Components of this grade will include but are not limited to: attendance, on-time arrival, attending office hours, offering questions and comments during class discussions. Actions which will result in the loss of points include but are not limited to: excessive absences, tardiness, and disengagement with class in the form, inappropriate technology usage, talking and sleeping.
2. **Assignments:** Assignments come in multiple forms including quizzes, homework, and in-class activities. Lab assignments will include weekly lab comprehension activities. In lecture, students will complete short, unannounced readings quizzes. These assignments may not be made up for credit, but the lowest two assignment grades will be dropped at the end of the semester.
3. **Field Trip:** As part of the co-curricular experience in this course, we will be visiting the Museums of Science and Culture at Harvard University on Sunday, November 3 (morning + afternoon with travel time). In particular, we will tour the Museum of Natural History, the Peabody Museum of Archaeology and Ethnology, and the Collection of Historical Scientific Instruments. Please save this date in your calendar; all students are required to attend and will complete a graded assignment at the museums. If for some reason you are unable to attend, you will be able to complete an alternative assignment so long as you can provide appropriate documentation for the absence.
4. **Papers:** Two papers will be assigned over the semester. One will deal with the history of lab techniques and one will deal with broader themes in the history of science. Papers should be submitted both online through MyCourses and in hardcopy form (printed, stapled with a cover page).
5. **Midterm Exam:** The midterm, which will take place in lecture class, will evaluate students' understanding of essential material covered to date in both lecture and lab. It will include a mixture of multiple choice, matching, and true/false questions from course readings, lectures, lab activities, and discussions.
6. **Final Exam:** The cumulative final exam will evaluate mastery of the course content and progression on course learning goals. Like the midterm, the final will include material from both lecture and lab. It will include multiple choice, matching, and true/false questions, as well as short answer essays drawing upon course readings, lectures, lab activities, and discussions.

## Course Outline

This overview of lecture topics, readings, labs, and major assignments is subject to change. Please refer to the course website for a daily, detailed, and up-to-date list of readings and assignments. Students are responsible for consulting the course website prior to each class meeting to prepare the day's assignments. Please note that all primary source readings are short readings or excerpts from longer works. B&M = Bowler & Morus textbook.

Students should attend only their designated lab section. Lab section dates and topics are color-coded below as follows:

Lab Section #1 - Tuesdays

Lab Section #2 - Thursdays

Lecture Date	Topic	Readings and Major Assignments	Lab Date & Topic
<b>UNIT I</b>	<b>Welcome to History of Science</b>		
Sept 4	A: Introduction and Overview B: Paradigm Shifts and Science History		Sept 5: <b>Online for Both Lab Sections</b> – Lab Safety and Rules
Sept 6	Black Box Activity	Thomas Kuhn, <i>The Structure of Scientific Revolutions</i> (excerpt)	
<b>UNIT II</b>	<b>Ancient Origins</b>		
Sept 9	Aristotelian Worldview	"Aristotle," <i>Stanford Encyclopedia of Philosophy</i> Aristotle, <i>Physics</i> , 4 <sup>th</sup> cent. BCE	Sept 10 – Lab Section #1 Ptolemy's Shape of Earth
Sept 11	Classical Cosmology	Grant, What the Middle Ages Inherited from Aristotle Crowe, "Celestial Motions" Ptolemy, <i>Almagest</i> , ca. 150	Sept 12 – Lab Section #2 Ptolemy's Shape of Earth
Sept 13	Ancient Astronomy	"Ptolemy and the Ptolemaic System" "Eratosthenes of Cyrene" Ptolemy, <i>Almagest</i> , ca. 150	
<b>UNIT III</b>	<b>Medieval Origins</b>		
Sept 16	Traditions of Learning in the Medieval University	"Influence of Arabic and Islamic Philosophy on the Latin West," <i>Stanford Encyclopedia of Philosophy</i>	Sept 17 – Lab Section #1 Vesalius & Anatomy

Sept 18	Aristotle in the Medieval University	Gregory IX, Command to Expurgate Aristotle's Nature Books, 1231 Condemnations of 1277
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Sept 19 – Lab Section #2  
Vesalius & Anatomy

**UNIT IV Scientific Revolution: Beginnings, 16<sup>th</sup>-17<sup>th</sup> Centuries**

Sept 20	Vesalius and the Scientific Renaissance	Park, "The Criminal and the Saintly Body" Vesalius, <i>The Fabric of the Human Body</i> , 1543
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Sept 23	Copernicus and the Scientific Renaissance	B&M, 23-33 Copernicus, <i>On the Revolutions</i> , 1543
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Sept 24 – Lab Section #1  
Spanish Empire Mapmaking

Sept 25	Early Modern "Big Science"	B&M, 319-329
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Sept 26 – Lab Section #2  
Spanish Empire Mapmaking

Sept 27	The Galileo Affair	B&M, 341-347 Cardinal Bellarmine to Foscarini, 1615 Galileo, <i>Dialogue on the Two Chief World Systems</i> , 1632
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**UNIT V Scientific Revolution: Empiricism and Universal Laws, 17<sup>th</sup>-18<sup>th</sup> Centuries**

Sept 30	Bacon and Empiricism	Deborah Harkness, Chapter 6, from <i>The Jewell House</i>
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Oct 1 – Lab Section #1  
Galileo's Inclined Plane

Oct 2	Cultures of Experimentation: Galileo vs. Boyle	B&M, 33-45 Galileo, <i>Dialogue on the Two Chief World Systems</i> , 1632 Boyle, "New Experiments," 1668
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Oct 3 – Lab Section #2  
Galileo's Inclined Plane

Oct 4	Paper Workshop Day	
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Oct 7	Descartes and Mechanical Philosophy	Fontenelle, <i>Conversations</i> , 1686
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Oct 8 – Lab Section #1  
Periodic Table Lab

Oct 9	Newtonianism	B&M, 46-52 & 350-354 Newton, "The System of the World," 1685
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Oct 10 – Lab Section #2  
Periodic Table Lab

## UNIT XI Order and Classify: Enlightenment Science, 18<sup>th</sup> Century

Oct 11 Nature and the Enlightenment B&M, 367-373  
Linnaeus, "Observations on the  
Vegetable Kingdom," 1735  
**Paper #1 Due**

Oct 14 COLUMBUS DAY – NO CLASS

Oct 15 – Lab Section #1  
Conservation of Mass &  
Energy

Oct 16 Chemical Revolution and Industrialism B&M, 55-77  
Lavoisier, et al., *Method of Chemical  
Nomenclature*, 1787

Oct 17 – Lab Section #2  
Conservation of Mass &  
Energy

Oct 18 Midterm Examination **MIDTERM EXAMINATION**

## UNIT VII Origins of Evolutionary Biology and Genetics, 19<sup>th</sup>-20<sup>th</sup> Centuries

Oct 21 Precursors to Darwin B&M, 103-143  
Lamarck, *Zoological Philosophy*, 1809  
Lyell, *Principles of Geology*, 1833

Oct 22 – Lab Section #1  
Genetics and Evolution  
Simulation

Oct 23 The Darwinian Revolution B&M, 143-162 & 354-360  
Wallace, "On the Tendencies of  
Varieties," 1858  
Letter from Darwin to Lyell, 1858

Oct 24 – Lab Section #2  
Genetics and Evolution  
Simulation

Oct 25 Formation of Modern Biology B&M, 157-205

## UNIT VIII The Anthropological Human and Racial Thinking, 19<sup>th</sup> Century

Oct 28 Phrenology, Craniometry, and Social Difference B&M, 415-422  
Morton, *Crania Americana*, 1839  
"Phrenology - Its Principles and  
Proofs," 1876  
Lombroso, *The Born Criminal*, 1911

Oct 29 – Lab Section #1  
Phrenology Simulation

Oct 30 Anthropology and Empire B&M, 422-431

Oct 31 – Lab Section #2  
Phrenology Simulation

## Unit IX Public Health and the Social Body, 19<sup>th</sup>-20<sup>th</sup> Centuries

Nov 1 Epidemics: Tuberculosis, Cholera, and the Spanish Flu CDC, *Pandemic Influenza Storybook*

Nov 4 Epidemiology and the Germ Theory of Disease B&M, 439-455  
Riis, *How the Other Half Lives*, 1890

Nov 6 Eugenics B&M, 431-435  
“Eugenics Education Society – Records and Program,” 1908-1914  
Eugenics Education Society, Family Records, 1913-1914  
Salaman, “Legalising Eugenic Sterilization,” 1930

Nov 5 – Lab Section #1  
John Snow’s Epidemiology

Nov 7 – Lab Section #2  
John Snow’s Epidemiology

## Topic X Quantum Physics and Relativity, 20<sup>th</sup> Century

Nov 8 From Electromagnetism to the Atomic Model B&M, 253-260  
Marie Curie, *On the Discovery of Radium*, 1921

Nov 11 Einstein and Relativity B&M, 260-265  
Einstein, “What is the Theory of Relativity?” 1919

Nov 13 Quantum Mechanics B&M, 265-270  
Kleppner & Jackiw, “One Hundred Years of Quantum Physics”

Nov 12 – Lab Section #1  
Double-Slit Experiment & Quantum Theory

Nov 14 – Lab Section #2  
Double-Slit Experiment & Quantum Theory

## Topic XI Science, Inhumanity, and the World Wars, 20<sup>th</sup> Century

Nov 15 World War I: Chemistry and Total War B&M, 463-468  
L.F. Haber, *The Poisonous Cloud*

Nov 18 World War II: Eugenics and Total War Law for the Prevention of Offspring with Hereditary Diseases, 1933  
Nuremberg Laws of 1935  
Hiemer, *The Poodle-Pug-Dachshund-Pinscher*, 1940

Nov 19 – Lab Section #1  
Detecting Radiation

## XII Big Science in the Nuclear Age, 20<sup>th</sup> Century

Nov 20	Manhattan Project	B&M, 471-479 Einstein, Letter to President Roosevelt, 1939 Franck Report, 1945
Nov 22	Big Science and the Cold War	B&M, 479-483 <i>Life Magazine</i> , "Crisis in Education," 1958
Nov 25	Space Race and Popular Culture	B&M, 277-297 CBS News, "Special Report on Sputnik 1," 1957 <b>Paper #2 Due</b>
Nov 27	THANKSGIVING – NO CLASS	
Nov 29	THANKSGIVING – NO CLASS	

Nov 21 – Lab Section #2  
Detecting Radiation

## XIII Life Decoded: DNA and Big Biology, 20<sup>th</sup>-21<sup>st</sup> Centuries

Dec 2	Discovery of DNA	B&M, 205-211 & 493-499 Correspondence between Watson & Crick and Pauling, 1953 Klug, "Rosalind Franklin and the Discovery of the Structure of DNA," 1968
Dec 4	Big Biology	U.S. Congress, <i>Mapping Our Genes— Genome Projects: How Big? How Fast?</i> 1988
Dec 6	Final Exam Review	

Dec 3 – Lab Section #1  
Watson & Crick Data and  
Models Simulation

Dec 5 – Lab Section #2  
Watson & Crick Data and  
Models Simulation

**FINAL EXAMINATION: WEDNESDAY, DECEMBER 11, 10:30 AM – 12:30 PM**