Continuing Education
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SOC-967: Scientific Revolution: 1500 - 1800

Independent Study Online Course Syllabus

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Course Description

This course involves an exploration of the key discoveries, theories, personalities, and impact of the Scientific Revolution in the Western World during the 16th through the 18th centuries, including the conflict between scientific advances and traditional religious and cultural views of the period. Comparisons with recent advances in science and technology will be examined.

Note: Required book must be acquired separately.

Required Texts and Course Materials

Book: Gribbin, John (2004). *The Scientists: A History of Science Told through the Lives of its Greatest Inventors*. Penguin Random House. ISBN: 9780812967883.
https://www.amazon.com/Scientists-History-Science-Greatest-Inventors/dp/0812967887

Documentary Film: *Galileo's Battle for the Heavens*, a Nova/Public Television film. A link for this film is included in Module 1 of the Canvas shell of this course and is free for viewing.

Canvas: This course will be delivered totally online. Canvas is a web-based learning management system (LMS) that provides students access to online resources, documents, videos, assignments, quizzes, forums, etc. Canvas is easy to learn and has a user-friendly interface.

Online Resources: Relevant online resources that support the course content and encourage further investigation will be available throughout the course assignments. Active hyperlinks are utilized throughout the course and will link to the appropriate information when clicked. These include videos, podcasts, worksheets, online activities, journal articles and other resources.

Course Dates

Self-paced; students may enroll at any time and take up to one year from the date of registration to complete assignments. Students may complete assignments in no less than three weeks for a 3-unit course (one week per unit).

National Standards Addressed in This Course

National Content / Common Core State Standards (CCSS) (www.corestandards.org)

The Common Core State Standards provide a consistent, clear understanding of what students are expected to learn, so teachers and parents know what they need to do to help them. The standards are designed to be robust and relevant to the real world, reflecting the knowledge and skills that our young people need for success in college and careers. With American students fully prepared for the future, our communities will be best positioned to compete successfully in the global economy.

Based on national history standards developed by NCHS (National Center for History in Schools at UCLA), this course will help prepare teachers to address the following:

History Standards for Grades 5-12, World History
Era 6: The Emergence of the First Global Age Standard 6A:

- The student understands major global trends from 1450 to 1770.
- Assess how the acceleration of scientific and technological innovations in this era affected social, economic, and cultural life in various parts of the world.
- Identify patterns of social and cultural continuity and various societies and analyze ways in which peoples maintained traditions and resisted external challenges in the context of a rapidly changing world.

Additional curriculum standards for social studies, addressed by this course, are described by the National Council for the Social Studies for grades 1-12 as found in Strand 8, “Science, Technology, and Society.”

Lower Grades: a) identify and describe examples in which science and technology have changed the lives of people. . . b) identify and describe examples in which science and technology have led to changes in the physical environment. . . c) describe instances in which values, beliefs, and attitudes have resulted from new scientific and technological knowledge.

Middle Grades: a) examine and describe the influence of culture on scientific and technological choices and advancement. . . b) show through specific examples how science and technology have changed people’s perceptions of the social and natural world. . . c) describe examples in which values, beliefs, and attitudes have been influenced by new scientific and technological knowledge, such as . . . conceptions of the universe. . .e) seek reasonable and ethical solutions to problems that arise when scientific advancements and social norms or values come into conflict.

High School: a) identify and describe both current and historical examples of the interaction and interdependence of science, technology, and society in a variety of cultural settings. b) make judgments about how science and technology have transformed the physical world and human society and our understanding of time, space, place, and human-environment interactions. c) analyze how science and technology influence the core values, beliefs, and attitudes of society, and how core values, beliefs, and attitudes of society shape scientific and technological change. e) recognize and interpret varied perspectives about human societies and the physical world using scientific knowledge, ethical standards, and technologies from diverse world cultures.

California History Standards
Students analyze the historical developments of the Scientific Revolution and its lasting effect on religious, political, and cultural institutions.
7.10.1: Discuss the roots of the Scientific Revolution (e.g. Greek rationalism; Jewish, Christian, and Muslim science; Renaissance humanism; new knowledge from global exploration).
7.10.2: Understand the significance of the new scientific theories (e.g. those of Copernicus, Galileo, Kepler, Newton) and the significance of new inventions (e.g. the telescope, microscope, thermometer, barometer).
7.10.3: Understand the scientific method advanced by Bacon and Descartes, the influence of new scientific rationalism on the growth of democratic ideas, and the coexistence of science with traditional religious beliefs.

Continuing Education Student Learning Outcomes (CE-SLO)

CE-SLO 1	Demonstrate proficient written communication by articulating a clear focus, synthesizing arguments, and utilizing standard formats in order to inform and persuade others, and present information applicable to targeted use.
CE-SLO 2	Demonstrate comprehension of content-specific knowledge and the ability to apply it in theoretical, personal, professional, or societal contexts.
CE-SLO 3	Reflect on their personal and professional growth and provide evidence of how such reflection is utilized to manage personal and professional improvement.
CE-SLO 4	Apply critical thinking competencies by generating probing questions, recognizing underlying assumptions, interpreting and evaluating relevant information, and applying their understandings to the professional setting.
CE-SLO 5	Reflect on values that inspire high standards of professional and ethical behavior as they pursue excellence in applying new learning to their chosen field.
CE-SLO 6	Identify information needed in order to fully understand a topic or task, organize that information, identify the best sources of information for a given enquiry, locate and critically evaluate sources, and accurately and effectively share that information.

Course Student Learning Outcomes (C-SLO)

Student Learning Outcomes for This Course By the end of this course student will be able to:		**National Standards Addressed***	**CE-SLO Addressed****
C-SLO 1	Describe the religious/cultural environment within which the growth of science developed in Europe in the 16th and 17th centuries.	NCHS Era 6 NCSS Strand 8 CA Hist 7.10.1	CE 2,4,6
C-SLO 2	Understand the importance of key individuals and inventions to the Scientific Revolution of the period.	NCSS Strand 8 CA Hist 7.10.2	CE 2,4,6

C-SLO 3	Explain key theories developed by thinkers and researchers during the Scientific Revolution.	NCHS Era 6	CE 2,4,6
C-SLO 4	Define the nature of conflicts that arose between the new scientific theories and the Roman Catholic Church, and the reasons for resistance to change.	NCSS Strand 8 CA Hist 7.10.3	CE 2,4
C-SLO 5	Grasp the implications of changes in core values and worldviews as a result of scientific observation and experimentation.	NCSS Strand 8 CA Hist 7.10.2	CE 2,4,5
C-SLO 6	Trace the development of the "scientific method."	CA Hist 7.10.3	CE 2
C-SLO 7	Analyze the growth and expansion of scientific thinking as a result of early discoveries and its impact on Western Civilization.	NCHS Era 6 NCSS Strand 8	CE 2,4,6
C-SLO 8	Analyze the relationship between scientific discoveries of the era and changes in technology and society, including the Age of Discovery and Colonization.	NCHS Era 6 NCSS Strand 8	CE 2,4,6
C-SLO 9	Demonstrate awareness of ethical considerations in science.	NCSS Strand 8	CE 5
C-SLO 10	Demonstrate ability to take material from this course and develop a meaningful lesson for students.		CE 1,5,6

* Please refer to the section on **National Standards Addressed in This Course**
** Please refer to the section on **Continuing Education Student Learning Outcomes**

Topics, Assignments, and Point Values

Module Title	Module Assignments and Activities	Points Possible
Home Page	• Welcome Video • Course Syllabus • Policies and Procedures • Introduce Yourself Forum	5 pts
Module 1 Ancient Tradition and Revolution: The Greeks, Galileo, and the Catholic Church	• Watch *Galileo's Battle for the Heavens* • 1.1 Respond to prompts about film • 1.2 The old Greek scientific views	50 pts 10 pts
Module 2: John Gribbin, *The Scientists:* Charting Scientific Advances	• Read Gribbin, *The Scientists* • 2.1 Prepare chart of scientific achievements • 2.2 Forum: Select a scientist from the Gribbin book	50 pts 5 pts
Module 3: Biographical Report, Scientific Method, and Internet Webliography	• 3.1 Biographical report • 3.2 Annotated Webliography • 3.3 Report on the Scientific Method • 3.4 Forum: Using the Scientific Method	25 pts 15 pts 15 pts 5 pts

Module Title	Module Assignments and Activities	Points Possible
Module 4: The Enlightenment, Non-Western Science, and Current Science-Faith Relations	• 4.1 Influence of scientific thinking on the Enlightenment • 4.2 1Report on non-Western scientific discovery • 4.3 Essay on Science and Religious Faith • 4.4 Current scientific advances compared • 4.5 Forum: Reasons for the Scientific Revolution	15 pts 15 pts 10 pts 15 pts 5 pts
Module 5: Importance of studying the History of Science, and Preparing and Teaching a Lesson	• 5.1 Preparing and teaching a lesson • 5.2 Report on the value of studying science history • 5.3 Course evaluation and application	50 pts 10 pts 5 pts
Course Wrap-up – Grading and Evaluation	• Final Reflection Forum • Course Evaluation • Course Completion Checklist • Grade Request / Transcript Request	
	TOTAL POINTS	**305 points**

Grading Policies, Rubrics, and Requirements for Assignments

Grading Policies

- Assignments will be graded per criteria presented in the course rubrics.
- A = 90-100% and B = 80-89%, (anything below 80% will not receive credit.)
- The discernment between an A or a B letter grade is at the discretion of the instructor based on the quality of work submitted (see course rubrics).
- Coursework falling below a B grade will be returned with further instructions.
- All assignments must be completed to receive a grade and are expected to reflect the quality that teacher-training institutions require of professional educators. If completed assignments do not meet this standard, students will be notified with further instructions from the instructor.

Grading Rubrics

Grade	Percent	Description	Rubric
A	90-100%	Excellent	Meets all course / assignment requirements with significant evidence of subject mastery and demonstration of excellent graduate level professional development scholarship.
B	80-89%	Very Good	Adequately meets criteria for all course/assignment requirements - demonstrates subject competency with very good graduate level professional development scholarship.
NC	Below 80%	Unacceptable	Does not meet the minimum criteria for all course/assignment requirements and demonstrated little, if any, evidence of acceptable graduate level professional development scholarship.

Writing Requirements

- **Superior:** Writing is clear, succinct, and reflects graduate level expectations. Clearly addresses all parts of the writing task. Maintains a consistent point of view and organizational structure. Includes relevant facts, details, and explanations.
- **Standard:** Writing is acceptable with very few mistakes in grammar and spelling. Addresses most parts of the writing task. Maintains a mostly consistent point of view and organizational structure. Includes mostly relevant facts, details, and explanations.
- **Sub-standard:** Writing contains noticeable mistakes in grammar and spelling. Does not address all parts of the writing task. Lacks a consistent point of view and organizational structure. May include marginally relevant facts, details, and explanations.

Lesson Plan Requirements

- **Superior:** Instructional goals and objectives clearly stated. Instructional strategies appropriate for learning outcome(s). Method for assessing student learning and evaluating instruction is clearly delineated and authentic. All materials necessary for student and teacher to complete lesson clearly listed.
- **Standard:** Instructional goals and objectives are stated but are not easy to understand. Some instructional strategies are appropriate for learning outcome(s). Method for assessing student learning and evaluating instruction is present. Most materials necessary for student and teacher to complete lesson are listed.
- **Sub-standard:** Instructional goals and objectives are not stated. Learners cannot tell what is expected of them. Instructional strategies are missing or strategies used are inappropriate. Method for assessing student learning and evaluating instruction is missing. Materials necessary for student and teacher to complete lesson are missing.

Instructor/Student Contact Information

Throughout the course participants will be communicating with the instructor and their classmates on a regular basis using asynchronous discussion forums. Students are provided with instructor contact information in the event they want to make email or phone contact. In addition, students are encouraged to email or phone the instructor at any time. Students will also receive feedback on the required assignments as they are submitted.

Forums

Participation is an important expectation of this course and all online courses. Online discussions promote reflection and analysis while allowing students to appreciate and evaluate positions that others express. While students may not be engaging with the same students throughout this course, they will be expected to offer comments, questions, and replies to the discussion question whenever possible. The faculty role in the discussion forum is that of an observer and facilitator.

Coursework Hours

Based on the Carnegie Unit standard, a unit of graduate credit measures academic credit based on the number of hours the student is engaged in learning. This includes all time spent on the course: reading the textbook, watching videos, listening to audio lessons, researching topics, writing papers, creating projects, developing lesson plans, posting to discussion boards, etc. Coursework offered for FPU Continuing Education graduate credit adheres to 45 hours per semester unit for the 900-level courses. Therefore, a student will spend approximately 135 hours on a typical 3-unit course.

Services for Students with Disabilities

Students with disabilities are eligible for reasonable accommodations in their academic work in all classes. In order to receive assistance, the student with a disability must provide the Academic Support Center with documentation, which describes the specific disability. The documentation must be from a qualified professional in the area of the disability (i.e. psychologist, physician or educational diagnostician). Once documentation is on file, arrangements for reasonable accommodations can be made. For more information and for downloadable forms, please go to https://www.fresno.edu/departments/disability-access-education.

Plagiarism and Academic Honesty

All people participating in the educational process at Fresno Pacific University are expected to pursue honesty and integrity in all aspects of their academic work. Academic dishonesty, including plagiarism, will be handled per the procedures set forth in the Fresno Pacific University Catalogue and Handbook - https://handbook.fresno.edu/graduate/academic-policies

Technology Requirements

To successfully complete the course requirements, course participants will need Internet access, can send and receive email, know how to manage simple files in a word processing program, and have a basic understanding of the Internet. Please remember that the instructor is not able to offer technical support. If you need technical support, please contact your Internet Service Provider.

Getting Help with Canvas: If you need help with Canvas, please contact the FPU Help Desk by phone: (559) 453-3410 or email: helpdesk@fresno.edu. Help is available Mon-Fri 8:00 am to 7:00 pm.

Final Course Grade and Transcripts

When all work for the course has been completed, students will need to logon to the Continuing Education website (https://ce.fresno.edu/my-account) and "Request Final Grade". Once the instructor receives the requests and submits the grade online, students may log back in to view their Final Grade Report or order transcripts online. Please allow at least two weeks for the final grade to be posted. For more information, see the Continuing Education Policies and Procedures at https://ce.fresno.edu/ce-policies-and-procedures.

University Policies and Procedures

Students are responsible for becoming familiar with the information presented in the Academic Catalog and for knowing and observing all policies and procedures related to their participation in the university community. A summary of university policies may be found on the university website at https://www.fresno.edu/departments/registrars-office/academic-catalogs.

Fresno Pacific University Student Learning Outcomes (FPU-SLO)

FPU-SLO 1	**Oral Communication:** Students will *exhibit* clear, engaging, and confident oral communication – in both individual and group settings – and will critically *evaluate* content and delivery components.

FPU-SLO 2	**Written Communication:** Students will *demonstrate* proficient written communication by *articulating* a clear focus, *synthesizing* arguments, and utilizing standard formats in order to *inform* and *persuade* others.
FPU-SLO 3	**Content Knowledge:** Students will *demonstrate* comprehension of content-specific knowledge and the ability to apply it in theoretical, personal, professional, or societal contexts.
FPU-SLO 4	**Reflection**: Students will *reflect* on their personal and professional growth and *provide evidence* of how such reflection is utilized to manage personal and vocational improvement.
FPU-SLO 5	**Critical Thinking:** Students will *apply* critical thinking competencies by *generating* probing questions, *recognizing* underlying assumptions, *interpreting* and *evaluating* relevant information, and *applying* their understandings to new situations.
FPU-SLO 6	**Moral Reasoning:** Students will *identify* and *apply* moral reasoning and ethical decision-making skills, and *articulate* the norms and principles underlying a Christian worldview.
FPU-SLO 7	**Service**: Students will *demonstrate* service and reconciliation as a way of leadership.
FPU-SLO 8	**Cultural and Global Perspective:** Students will *identify* personal, cultural, and global perspectives and will employ these perspectives to *evaluate* complex systems.
FPU-SLO 9	**Quantitative Reasoning**: Students will accurately *compute* calculations and symbolic operations and *explain* their use in a field of study.
FPU-SLO 10	**Information Literacy:** Students will *identify* information needed in order to fully understand a topic or task, *explain* how that information is organized, *identify* the best sources of information for a given enquiry, *locate* and critically *evaluate* sources, and accurately and effectively *share* that information.