

Dr. Don Salisbury

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***Global Science,
Technology, & Society***
Spring 2010

Fulfills Non-Lab Science Requirement

Only Required Course for GSTS Minor

SCOPE & CONTENT

Generally, this course will address, in a global context, insights emerging from the physical and natural sciences, humanities, and social sciences. It will explore the societal and historical forces that shape, and are shaped by, science and technology. Attention will be given to issues surrounding ethical and policy questions derived from multicultural and international approaches to how science is practiced and technology implemented. Inquiry will be directed toward how science and technology advance, decline, and reappear as cultures encounter and influence each other. Ideas will be illustrated using specific historical and contemporary examples. Readings and lectures will also address theories of technology, philosophies of science, the dynamics of knowledge development, and interactions of literature with technology and science.

Specifically, each instructor will address different issues pertaining to science, technology, and society. **Professor Nuckols'** 1st unit lectures will delve into the insights emanating from literature that pertain to what some label the "Rationalism of the Enlightenment." His 2nd unit initiates a conversation on topics coming from the philosophy of science. A sample of such questions includes: What are the aims of science? How do scientists justify their claims? How do the historical and cultural settings in which scientific work occurs affect the content and quality of such work? Professor Nuckols' 3rd unit addresses the philosophy of technology. This last unit will introduce some of the background ethical concepts necessary for assessing questions of technology and values, survey different ways of looking at technology, and discuss the various ways that humans have evaluated technology (and how our assessments may have failed us).

Professor Daeley will address three related topics. The first topic is a brief introduction to the Islamic scientific tradition both on its own terms and in relation to European science of the medieval period and the Renaissance. The second topic is a similarly brief

introduction to science and technology in China roughly during the same time period as our introduction to Islamic science. The third topic is centered on the Macartney Expedition, a British diplomatic mission to China in 1792-94 whose primary purpose was to establish favorable trade relations but whose outcome so decisively changed Europe's image of China that it "prepared the way for the armed confrontations of the next [19th] century" (Peyrefitte). All three topics will give as much attention as possible to the cultural contexts of science and technology, to the common elements of science in whatever culture it appears, and to the complex interactions of different cultures as they pursue scientific and technological goals.

The primary focus throughout **Professor Salisbury's** units will be on understanding the nature of scientific change. He will demonstrate through three case studies that this change can only be properly understood when one takes into account not only the scientific, but also the cultural, economic, political, and even artistic context in which discoveries are spawned. He begins in Unit 1 with the beginnings of modern science in Italy in the 16th and 17th century. Galileo's discoveries must be evaluated in the context of the dominant Aristotelean worldview. Similarly in Unit 2 he will show that Einstein was indeed a bright young man, but more was at play than a single intellect in bringing about the revolution that is associated with his name. Finally, in the third unit he will look more closely at the role of the state in Germany in promoting and exploiting scientific and technical knowledge, focusing on state-sponsored war research during World War I, and then the errant science that served as a cover for genocide during the Nazi era.

All course lectures will be held from 1:30 to 2:50 MWF in Room 201 in the Administration Building. Discussion classes (small groups) will be held in SH 315 (Daeley), Hopkins B1 (Nuckols), and Hopkins B3 (Salisbury). **The student is expected to bring to class the readings for that day; and all reading assignments should be completed for the class for which they are assigned.**

TEXTS. You must have the listed edition of these books.

The Time Machine by H.G. Wells
ISBN 10:0-141-43997-1
Penguin Classics

Dr. Jekyll and Mr. Hyde by Robert Louis Stevenson
ISBN 978-0-451-52895-7
Signet Classic, A Division of Penguin Group

Technology and Values, ed. by Craig Hanks
ISBN 978-1-4051-4901-3
Wiley-Blackwell

Lost History: The Enduring Legacy of Muslim Scientists, Thinkers, and Artists by Michael Hamilton Morgan.
National Geographic: 2007
ISBN 9781426202803

The Genius of China by Robert Temple
Inner Traditions: 2007
ISBN 9781594772177

OTHER READINGS. Students will be expected to access some readings in various electronic versions. Hard copies of other readings may occasionally be distributed in class—material that the professor unexpectedly uncovers and feels appropriate for the course. Matters related to this course frequently show up in the news, for example.

EXAMS and GRADING POLICY. The exams will include questions of varying format: short answer, identification, and brief discussion. Most of the focus of the exams will be on a student's ability to understand the material, rather than solely his or her ability to memorize information, though important facts must be mastered to do well on the exams. In an effort to prepare the student for course exams and discussion periods, the professors will provide, as class handouts and/or posted material, some topics to be considered in order to better understand lectures and assigned readings. Approximately one week before each exam—corresponding with the small group discussions—the professors will provide test preparation material.

Grades will be dependent upon *Participation* (19%) and *Exams* (81%). The Participation grade will be based upon class attendance and active involvement in class discussions, as well as on some short written work for the small group sessions. There will be three scheduled exams during the semester. In addition, there will be an **optional** *Cumulative Final Exam* administered during final exam week. Every student must take all three semester exams, but each student also has the option of taking the *Cumulative Final Exam* for purposes of replacing a prior exam score, or for taking the place of an exam that the student missed. This last option assumes that the student has missed an exam for an acceptable reason, a reason determined to be legitimate by the professors. If the professors rule that the student has missed an exam for a legitimate reason, then the missed exam will count as the dropped score and the student will be permitted to take the *Comprehensive Final* in order to replace the zero. **However, if the student misses an exam for an unacceptable reason, an automatic grade of zero will be recorded for that exam, with no opportunity to take the *Comprehensive Final Exam* to replace the zero.** Barring a missed exam without an acceptable reason, this leaves the student with three scored exams, weighted 27% each. **The student should note that there are NO Make-Up Exams administered in this course for ANY REASON!** Examples of acceptable reasons for missing an exam and earning the right to replace it with the comprehensive final exam include absence for college-approved activities (choir tour, athletic events, MUN), documented contagious or serious illness, or documented legal

obligations. **Unless an emergency makes it impossible, the student MUST notify Professor Nuckols ahead of the exam that he or she is unable to take it as scheduled.**

In summary:

Class Participation:	19%
Three Recorded Exam Scores @ 27% each =	81%
	100%

The dates for the exams are on the course syllabus. The grades will be computed by using your three highest test grades along with your Participation grade.

Use of the 1:30-2:50 Class Period. Careful reading of the “Topics & Reading Assignments” portion of the syllabus will make it clear that approximately two-thirds of the classes will be lectures (with some discussion/Q&A). All lectures will be held in Administration 201. The remaining classes will be three sets of small group discussions. There will be three approximately equal groups defined for each set of discussions, each with its own instructor and classroom. Each student will attend each professor’s small group once for each unit. For instance, Student X will attend Professor Daeley’s small group on Monday, Salisbury’s on Wednesday, and Nuckols’ on Friday. Students Y and Z, however, will rotate among the small group sections in a different order, i.e. Professor Nuckols’ group on Monday, Daeley’s on Wednesday, and Salisbury’s on Friday. These sessions will allow more focused discussions, questions, and some review, and they may cover certain material in more depth. These smaller classes will enable students to more fully exhibit their understanding of course material, generating an enhanced opportunity to score well on the *Participation* grade, which is weighted as 19% of the course grade. There will be at least some written assignments as part of the small group work; this, too, counts as part of the *Participation* grade.

ATTENDANCE. Regular attendance is expected at all scheduled class meetings (both lecture and discussions) and will be recorded at the beginning of each meeting. It is your responsibility to ensure that your attendance is accurately recorded. If you miss class, or know you are going to miss a future class, do not offer the instructors an explanation or excuse; we trust you have a good reason. However, if you must be away from class for an extended period (more than three consecutive classes), please inform us well in advance.

1-4 Missed Classes: No Penalty

After four absences, five points will be deducted from the student’s Final Grade for **EACH** missed class.

Note: The first four absences are in a sense “free,” i.e. there is no grade reduction for them, though they may cause you to do less well on an exam. “Spend” your “free” absences however you need to, e.g., school field trips, school team trips, job interviews, funerals, recovering from an illness, etc. Course rules do not distinguish between “excused” and “unexcused” absences except in determining whether you can take the comprehensive final in place of a missed exam. In that particular case, your reason for missing the exam must be “acceptable.” For other absences above four, the reason does

not matter; the number does. If you miss four classes in the first five weeks of the term because you would rather do something else than come to class, and then you become ill, you are in the penalty zone not for being ill but for already having “spent” your penalty-free absences. Please note that you are not required to spend four absences just because you have them. It is in your best interest not to miss any classes, though that is not always possible. You may inquire about your number of recorded absences at any time during the course. There will be no alteration of our attendance records at the end of the course.

TAPE RECORDINGS OF LECTURES. Tape recordings of lectures will not be provided, nor are students permitted to tape lectures.

ACADEMIC INTEGRITY POLICY. This course will adhere to the Austin College Academic Integrity Policies. Group studying is accepted and even encouraged. But all students are required to do their own work on exams and other assignments. By enrolling in this course, each student has agreed to abide by the Academic Integrity principles found in the most recent version of ENVIRONMENT or in other official college publications. All sources in the preparation of papers must be appropriately acknowledged. **(See attached for Academic Integrity General Definitions, Procedures, Penalties, and Faculty Responsibility.)**

STUDENTS WITH DISABILITIES. Austin College seeks to provide reasonable accommodations for all individuals with disabilities. Austin College will comply with all applicable federal, state, and local laws, regulations and guidelines, specifically Section 504 of the Rehabilitation Act of 1973 and the Americans with Disabilities Act (ADA), with respect to providing appropriate academic adjustments to afford equal educational opportunity. **It is the responsibility of the student to register with and provide verification of academic accommodation needs to the Director of Academic Skills Center as soon as possible. This verification/documentation must be handed to the student’s professors. The student also must contact the faculty member in a timely manner (at least one week before exam date) for reasonable academic accommodations. For further information regarding learning disability issues or to register for assistance, please contact the office at 903-813-2454 or visit the Academic Skills Center.**

CLASS ETIQUETTE & CONDUCT

- A. Do not bring tape recorders to class. Keep cell phones turned off and out of sight during class. Do not “text” during class. If you have an emergency situation, speak with one of the professors ahead of class for permission to keep your cell phone visible.
- B. Come to class on time: that is, be in your seat ready to start class no later than 1:30. Persistent lateness might affect your Participation grade. If, however, you on some occasion are going to be late, come to class anyway (and come in quietly). It is better to be in class for 30 minutes than not at all.
- C. Do not leave the classroom during lectures/discussions.
- D. Complete reading assignments before their discussion in class.

- E. Respect the rights of others by refraining from talking (unless recognized by the instructors) while class is in session. Do not read during class any material not under discussion in that class session.
- F. Get permission from one of the professors before bringing visitors to class.
- G. Do not eat during class. Beverages are permitted.
- H. Sit near the classroom door and be as quiet as possible in leaving, if it is necessary on some occasion for you to leave class early.

TOPICS & READING ASSIGNMENTS

UNIT I

Feb. 1 Monday

Preliminaries

Introductory Presentations: Professors of Physics, English, and Economics briefly discuss their role, discipline, and practice as it pertains to the course.

PART ONE: ISLAMIC SCIENCE (Carol Daeley)

Feb. 3 Wednesday

Topic: BAGHDAD, CORDOBA, CAIRO

Reading: *Lost History* Introduction and Epilogue, Chapter 2

Feb. 5 Friday

Topic: HINDU NUMERALS, ASTROLABES, OBSERVATORIES,
AND A WANDERING ENGLISH SCHOLAR

Reading: *Lost History* Chapters 3 and 4

Feb. 8 Monday

Topic: THE ILLS FLESH IS HEIR TO

Reading: *Lost History* Chapter 6

PART TWO: GALILEO (Don Salisbury)

Feb. 10 Wednesday

Topic: NAKED-EYE ASTRONOMY AND THE PTOLEMAIC UNIVERSE

Reading: Thomas Kuhn, "The Ancient Two-Sphere Universe" and "The Problem of the Planets," *The Copernican Revolution*, pp. 1-76

Feb. 12 Friday

Topic: THE GALILEAN REVOLUTION IN CONTEXT

Reading: Noel Swerdlow, "Galileo's discoveries with the telescope and their evidence for the Copernican theory," *The Cambridge Companion to Galileo*, pp. 244-270

Feb. 15 Monday

Topic: GALILEO AND THE CHURCH

Reading: Galileo Galilei and Stilman Drake, "Introduction: Third Part" and "Letter to the Grand Duchess Christina" in *Discoveries and Opinions of Galileo*, pp. 145-216

PART THREE: LITERATURE'S USE OF SCIENCE: (Dan Nuckols)

Feb. 17 Wednesday

Topic: LITERATURE'S REACTION: THE GOTHIC AND ROMANTICISM

Reading: *Dr. Jekyll and Mr. Hyde* by Robert Louis Stevenson

Feb. 19 Friday

Topic: SCIENCE AND THE UNCONSCIOUS

Reading: *Dr. Jekyll and Mr. Hyde* (continued)
The Time Machine by H.G. Wells

Feb. 22 Monday

Topic: MODELING THE FUTURE

Reading: *The Time Machine* (continued)

PART FOUR: SMALL GROUP MEETINGS AND UNIT I EXAM

Feb. 24 Wednesday

Small Group Discussion (SH 315, Hopkins B1, or Hopkins B3)

Feb. 26 Friday

Small Group Discussion (students attend a different session)

Mar. 1 Monday

Small Group Discussion (students attend a different session)

Mar. 3 Wednesday

EXAM I (AD 201)

UNIT II

PART ONE: CHINESE SCIENCE (Carol Daeley)

March 5 Friday

Topic: STARS AND NUMBERS IN CHINA

Reading: *The Genius of China* 7-13, Part 2, and Part 6

March 8 Monday

Topic: HEALING AND KILLING

Reading: *The Genius of China* Parts 1, 5, and 11

March 10 Wednesday

Topic: TECHNOLOGICAL INNOVATION

Reading: *The Genius of China* Parts 3, 4, and 9

SPRING BREAK BEGINS MARCH 12 AT NOON**PART TWO: EINSTEIN** (Don Salisbury)

March 22 Monday

Topic: PHYSICS AT THE CLOSE OF THE 19TH CENTURY:
FOUNDATIONS OF THE EINSTEINIAN REVOLUTION

Reading: Electronic handout

March 24 Wednesday

Topic: EINSTEIN'S MIRACULOUS YEAR OF 1905

Reading: Electronic handout

March 26 Friday

Topic: THE DYNAMICS OF SCIENTIFIC KNOWLEDGE
DEVELOPMENT

Reading: Electronic handout

PART THREE: PHILOSOPHY OF SCIENCE (Dan Nuckols)

March 29 Monday

Topic: THE PHILOSOPHY OF SCIENCE: WHAT IS IT?Reading: Dewey, "Science and Society," *Technology and Values* p, 199
Class handout

March 31 Wednesday

Topic: THE BIRTH OF THE SOCIAL SCIENCES

Reading: Class handout

April 2 Friday

Topic: EXISTENTIAL AND PHENOMENOLOGICAL
CONSIDERATIONS

Reading: Heidegger, "The Question Concerning Technology,"
Technology and Values p. 99
Ortega y Gasset, "Man the Technician," *Technology and Values* p.
114

PART FOUR: SMALL GROUP MEETINGS AND UNIT II EXAM

April 5 Monday

Small Group Discussion (same procedure as Unit I)

April 7 Wednesday

Small Group Discussion

April 9 Friday

Small Group Discussion

April 12 Monday

EXAM II (AD 201)

UNIT III

PART ONE: CHINA AND THE WEST IN THE 19TH CENTURY (Carol Daeley)

April 14 Wednesday

Topic: THE MACARTNEY EXPEDITION

Reading: Electronic handout from Peyrefitte, *The Collision of Two
Civilizations*

April 16 Friday

Topic: TECHNOLOGIES

Reading: Review Unit II assignments from *The Genius of China*

April 19 Monday

Topic: AFTERMATH OF THE MACARTNEY EXPEDITION

Reading: Electronic handout from Peyrefitte, *The Collision of Two Civilizations*

PART TWO: SCIENCE AND THE STATE (Don Salisbury)

April 21 Wednesday

Topic: THE DAWN OF BIG SCIENCE: THE GERMAN KAISER WILHELM SOCIETY

Reading: Electronic handout

April 23 Friday

Topic: SCIENCE AND WAR: FRITZ HABER AND THE DEVELOPMENT OF POISON GAS WARFARE

Reading: Electronic handout

April 26 Monday

Topic: EUGENICS AND RACIAL POLITICS IN NAZI GERMANY

Reading: Electronic handout

PART THREE: PHILOSOPHY OF TECHNOLOGY (Dan Nuckols)

April 28 Wednesday

Topic: PHILOSOPHY OF TECHNOLOGY: WHAT IS IT?

Reading: Jonas, "Toward a Philosophy of Technology, *Technology and Values* p. 11

Drengson, "Four Philosophies of Technology, *Technology and Values* p. 26

Shrader-Frechette, "Technology and Ethics," *Technology and Values* p. 60

April 30 Friday

Topic: IS TECHNOLOGY AUTONOMOUS?

Reading: Ellul, "The Autonomy of Technology," *Technology and Values* p. 67
 Winner, "Artifice and Order," *Technology and Values* p. 76
 Pitt, "The Autonomy of Technology," *Technology and Values* p. 87

May 3 Monday

Topic: VALUES, BIOTECHNOLOGIES, AND FEMINIST CONSIDERATIONS

Reading: Haraway, "A Cyborg Manifesto," *Technology and Values* p. 225
 Michelfelder, "Technological Ethics in a Different Voice," *Technology and Values* p. 247
 Callahan, "How Splendid Technologies Can Go Wrong," *Technology and Values* p. 299
 Purdy, "Genetics and Reproductive Risk," *Technology and Values* p. 304
 Kass, "Preventing a Brave New World," *Technology and Values* p. 311

PART FOUR: SMALL GROUP MEETINGS, UNIT III EXAM, AND FINAL EXAM

May 5 Wednesday

Small Group Discussion

May 7 Friday

Small Group Discussion

May 10 Monday

Small Group Discussion

May 14 Friday

Final Exam 12:00-2:00 (AD 201)