HTS 2084

Syllabus

OXFORD, SUMMER 2014

Technology and Society

This course will introduce the students to the factors that enter into taking decisions under conditions of risk in the domain of science and technology. The approach is based on in-depth case studies of major decisions that have affected the course of history and cost human life in both civilian and military domains. The aim is to alert students to the combination of technological with political, institutional and cultural traditions and values that are built into such decisions. The stress on non-technological factors will encourage them to think more broadly about how technology affects the course of world events, and to think more deeply about the kind of values that may inform the decisions they are likely to take in their professional lives.

Part I of the course deals with the fateful decision to launch the Space Shuttle *Challenger* in January 1986. The course will first describe the technological circumstances that led to the emergence of a plume at a lower joint on one of the Shuttle's two solid-fuel boosters. The history of the design of this joint will then be traced, with special emphasis on the gradual redefinition of *acceptable risk* by engineers at the contractor (Morton Thiokol) and at NASA. The circumstances on the evening before the launch will be described and the negotiations between the engineers and project managers in the two organizations over whether it was safe to launch at temperatures below 40°F on the pad will be studied carefully. The pressures on NASA to launch will be placed in an historical context. The source materials will be the official report on the *Challenger* accident and the detailed analysis of it by Diane Vaughan in her *The Challenger Launch Decision.*

The analysis of the *Challenger* accident will be followed by a brief analysis of the destruction of the Space Shuttle *Columbia* due to the damage to the lower wing caused by a piece of foam breaking away at launch and dislodging ceramic tiles which served as a heat-shield.

Part II. The second case study concerns the decision to drop the atomic bombs on Hiroshima and Nagasaki and, briefly, the subsequent development of the H-bomb. The scientific history of the bomb will be briefly described and the scientific, engineering and industrial challenges of the production of fission weapons will be discussed in some depth. The deliberations of the Target Committee, chaired by J. Robert Oppenheimer, will then be discussed using declassified documents as a primary source, and President Truman's decision to actually use the weapons will then be analyzed in detail.

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SELECTION OF BOOKS USED:
Diane Vaughan, *The Challenger Launch Decision. Risk, Technology and Deviance at NASA* (University of Chicago Press, 1996)

Peter Goodchild, *J. Robert Oppenheimer: Shatterer of Worlds* (Mifflin, 1981).

Thomas Hughes, *American Genesis. A History of the American Genius for Invention* (Penguin Books 1989) on the Manhattan Project.

J. Samuel Walker, *Prompt and Utter Destruction. Truman and the Use of Atomic Bombs Against Japan* (University of North Carolina Press, 2004)

Many published articles and on-line primary source documents.

An award-winning documentary film, *The Day after Trinity* will be shown.

BOOKS TO BUY: There are NO books to buy. All required study material will be made available in Oxford at a cost of about £10

THIS COURSE MEETS THE SOCIAL SCIENCE REQUIREMENT (CORE AREA E)
Students will demonstrate the ability to describe the social, political, and economic forces that influence social behavior. By studying how scientists and engineers take crucial technical decisions under conditions of uncertainty, they will learn to weigh the multiple factors that shape technological choice, and gain a critical awareness of the trade-offs required in everyday decision-making by practitioners in the field. Students will demonstrate that they have met Area E outcomes by successfully passing three examinations counting respectively 30%, 30% and 40% towards the final grade.

DETAILED LEARNING OUTCOMES: At the end of this course students should
a) be familiar with some of the critical technical problems that beset the Space Shuttle and of the science, technology and politics of the Manhattan project;
b) be familiar with the arguments for and against dropping the first atomic bombs on Japan
c) understand and be able to illustrate the difficulties of taking life-threatening science and engineering-related decisions under conditions of uncertainty
d) recognize the importance of values in taking such decisions.

START TIME OF THE EXAMINATIONS: Examinations will start promptly on time. Late arrivals will be tolerated up to a maximum of ten minutes after the start of the exam. Students who arrive more than 10 minutes late will be deemed to have failed the exam (0%): a second exam covering the same material will NOT be arranged.

ATTENDANCE POLICY: Attendance in class is obligatory. The register will be taken every day. Two absences without good reason are permitted. After that, absence from class without good reason is punished by the loss of 5% each time there is a no-show.

ACCOMMODATING DIABILITIES: If you have or acquire any sort of condition that may require special arrangements please let the teacher know at the start of the session.

ACADEMIC CONDUCT: All students are expected to conduct themselves in accordance with the policies of the Georgia Tech Honor Code with respect to conduct and academic honesty. Anyone engaging in acts that violate these policies, such as plagiarism or cheating, will be severely penalized.

John Krige
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