Syllabus
Introduction to the Human Context of Science and Technology
HCST 100 & HCST 100H
FALL 2007
Rev. 3 IN WORK

Changes in color

HCST 100 (3 credits) MW 1:00pm- 2:15pm PUP 105
HCST 100H (4 credits) MW 1:00pm- 2:15pm PUP 105 + W 2:30 pm- 3:30 pm PUP 203 Discussion
This course carries Arts/Humanities GEP credit.

Description

This course explores the human context of science and technology. It asks such questions as: how is science done? What role does imaginative intention play in technological invention? What values do science and technology represent? How do our human cultures express themselves in science and technology, and, *vice versa*, how do science and technology create cultures within which we must live? Importantly, it asks, what are the ethical implications of advances in scientific and technical fields?

The course will open with a reading of C.P. Snow's classic statement of the problem posed by the separation of humanistic from scientific and technical learning and the attendant division into "two cultures." It will then consider case studies of important scientific discoveries and technological innovations that raise serious issues in various realms of human activity and thought. These case studies will be presented by various expert members of the UMBC faculty, drawn from many different departments and divisions across the arts, humanities, sciences, and engineering.

Students will be introduced to the material through reading, lecture, video, role playing, discussion and other techniques. Students with scientific and technical proficiency and interests will learn some of the humanistic contexts and implications that surround science and technology. Students with a more artistic or humanistic inclination will find science and technology de-mystified, and shown to be intelligible human products. In short, we aim to bridge the "two cultures" by personal example and collegial exposition, demonstrating the interdisciplinary dialog that connects UMBC scholars from diverse fields.

The course may be taken alone, or as part of an undergraduate Certificate in the Human Context of Science and Technology. Details on the HCST Program may be found at: www.umbc.edu/hcst

Instructors

Instructors for the HCST 100 Core: Dr. Joseph N. Tatarewicz (Department of History and

Director, HCST Program) and Dr. G. Rickey Welch (Department of Biological Sciences and Research Professor in the Human Context of Science and Technology)

Instructors for Case Studies: Dr. Ted Foster (Engineering); Dr. Sandra Herbert (History); Dr. Joel Liebman (Chemistry); Dr. Ian George (Joint Center for Astrophysics); Dr. Jeffrey Halverson (Joint Center for Earth Systems Technology); Dr. Thomas Robinson (Evolutionary Psychology); Dr. Lynn Sparling (Physics); Dr. Laszlo Takacs (Physics); Dr. Joseph N. Tatarewicz (History); Dr. G. Ricky Welch (Biological Sciences and HCST).

Library Resources: Mr. Drew Alfgren, Albin O. Kuhn Library Reference (x 53608)

Text Books

Books Available for purchase at the UMBC Bookstore:

Harry Collins and Trevor Pinch, *The Golem at Large: What You Should Know about Technology*.
Harry Collins and Trevor Pinch, *The Golem: What You Should Know about Science.* (Recommended)
Linda Lear, *Lost Woods: The Discovered Writing of Rachel Carson.*
C.P. Snow, *The Two Cultures.*
Aldous Huxley, *Brave New World.* (Honors)

Other required readings are posted on the Blackboard Site, "Course Documents" section or are accessible through the "External Links" section.

Assignments

Students will be required to write 6 short papers. Details may be found on the course Blackboard site, "Assignments", and the due dates are indicated in the schedule below. These are designed to begin with shorter and easier assignments, working up to longer and more complex work. There are no exams. The UMBC Writing Center offers assistance in a variety of ways, including walk-in. More information can be found at:
http://www.umbc.edu/lrc/writing_center.htm

Attendance

Attendance, which is mandatory, will be observed at the beginning of each class period. Punctuality is expected, and to be marked as present students must be in the classroom when roll is called. Unexcused absences in excess of three during the course of the semester will lower the student's final grade.

Academic Integrity

"By enrolling in this course, each student assumes the responsibilities of an active participant in UMBC's scholarly community in which everyone's academic work and behavior are held to the highest standards of honesty. Cheating, fabrication, plagiarism, and helping others to commit these acts are all forms of academic dishonesty, and they are wrong. Academic misconduct could result in disciplinary action that may include, but is not limited to, suspension or dismissal." To read the full Student Academic Conduct Policy, consult the "Resources for Students" section of the UMBC Academic Integrity Web Site:
(http://www.umbc.edu/integrity/students.html)

In their papers for the course students are expected to provide citations (footnotes) for all statements paraphrased from other authors and to enclose verbatim passages in quotation marks. All writing should conform to the UMBC Department of History Style Sheet, which provides instructions and examples for citing printed works as well as material from internet sites and other media.
(http://www.umbc.edu/history/students/style.html)

Schedule of Classes

Topic I: Science, Technology, and Culture

Wed 8/29 Introduction by Profs. Tatarewicz & Welch: The Human Context of Science and Technology

Mon 9/03 Labor Day Holiday

Wed 9/05 Introduction: C.P. Snow's *The Two Cultures*
Reading: C.P. Snow, *The Two Cultures* (entire book).

Mon 9/10 Discussion led by Prof. Welch of Snow's *The Two Cultures*

Wed 9/12 Lecture & Discussion by Prof. Tatarewicz, Beyond the Two Cultures—the "Science Wars"

First Assignment: A one page paper (250 words) on Snow's essay. Due in Blackboard Assignments Manager on Monday September 17. Details can be found under "Assignments" on the course Blackboard Site.

Topic II: Humans and Nature

II-a: Nature Shaping Humans: the controversial science of evolution

Mon 9/17 Discovering Evolution: Charles Darwin's work on the Galápagos Islands
Lecture by Profs. Tatarewicz and Welch
Reading: Erasmus Darwin, *Temple of Nature*; Charles Darwin, *Geology and Natural History*; William Wordsworth, Selected Poems (Blackboard).

Wed 9/19 Film on Darwin, the evidence he gathered, and the theory he proposed
Reading: William Coleman, "Transformation," from *Biology in the Nineteenth Century* (Blackboard)
Discussion led by Prof. Welch

Wed 9/26 The Legacy of Charles Darwin 150 Years Later
Lecture by Prof. Sandra Herbert
Reading: "Galapagos at Risk" (Blackboard); web sites for the Galapagos National Park, the Charles Darwin Research Station, and the Galapagos Conservancy (Blackboard, External Links)

Mon 9/24 Concluding Discussion by Profs. Welch & Tatarewicz)

Second Assignment: 750-word Essay, Due in Blackboard Assignments Manager *Wednesday, October 3*. Details can be found under "Assignments" on the course Blackboard Site.

II-b: Humans Shaping Nature: the controversial science of climate change

Mon 10/1 Humans Shaping the Globe: The Science and Politics of Global Warming
Lecture by Profs. Tatarewicz and Lynn Sparling (Physics)
Reading: Spencer R. Weart, *The Discovery of Global Warming*: Please read the sub-pages, "Summary of the History of Climate Science" and "Developments After 1988"; IPCC (Intergovernmental Panel on Climate Change), *Climate Change 2001* (Blackboard, External Links): Please browse this report, reading the "Summary for Policymakers."

Wed 10/3 Humans Shaping the Globe: Hurricanes and the Purported Link to Global Warming.
Lecture by Prof. Jeff Halverson (Geography and Environmental Systems)
Reading: See Blackboard, External Links.

II-c: Humans Shaping Nature: chemical pesticides from World War II to Silent Spring.

Mon 10/8 "Rachel Carson: From Biology to Ecology: The Bio-Ethics of the Post-War Period." Lecture by Prof. Tatarewicz for Linda Lear
Reading: Lear, *Lost Woods*, especially Chapters 3, 7, 9, 14, 26, 28, 30.

Wed. 10/10 PBS Video "Rachel Carson's Silent Spring", Discussion by Prof. Welch

Third Assignment: 750-word Essay Due in Blackboard Assignments Manager Mon. Oct. 15. Details can be found under "Assignments" on the course Blackboard Site.

Topic III: The Architecture of Matter

III-a: What is the world made of and how do we know it? The bizarre realm of the quantum.

Lectures and Discussion by Prof. Joel Liebman (Chemistry):
Reading for Topic IV: Liebman, "Notes on Nodes;" Bronowski, "Knowledge or Certainty"; Tim Allen, *I'm not really here.* (Blackboard, Course Documents)

Mon 10/15 Introduction by Prof. Tatarewicz: the strange story of the quantum.

Wed 10/17 Particles and Waves: What's Where? The Uncertainty Principle, Lectures by Prof. Liebman

Mon 10/22 Size and Scale of Reality; Chemical and Nuclear Energy

Wed 10/24 Summary Discussion by Profs. Tatarewicz & Welch

III-b: How can we do anything with something so weird?

Lectures and Discussion by Prof. Laszlo Takacs (Physics)

Mon 10/29 Engineering the architecture of matter--nanotechnology
Lecture by Prof. Takacs
Reading: Blackboard
Wed 10/31 (continued)

Fourth Assignment: Due in Blackboard Assignments Manager Mon. Nov. 1. Details can be found under "Assignments" on the course Blackboard Site.

Topic IV: Exploring the Universe with Science & Technology

Topic IV-a: Exploring the universe from afar

Mon 11/05 Discovering the Universe: Telescopes and Light
Lecture by Prof. Ian George
Reading: Joseph N. Tatarewicz, *Observatories* (Collier's Encyclopedia); Tatarewicz, *Astronomy and Astrophysics* (Collier's Encyclopedia); concentrate on the 20th Century portions of these readings, both in the Documents section of Blackboard

Wed 11/07 Discovering the Universe: Telescopes in Person
Field Trip to UMBC Observatory. Meet at the First Floor Elevators, New Physics Building;NOTE: students are also invited to the monthly public viewing, 7:30 p.m., Thursday, November 1.

Topic IV-b: Exploring the universe from a closer, and more dangerous vantage

Mon 11/12 Exploring the Universe: History of the Space Shuttle and the Hubble Space Telescope. Lecture and discussion by Prof. Tatarewicz

Reading: Collins & Pinch, "The Naked Launch: Assigning Blame for the Challenger Explosion"; Challenger & Columbia Accident Reports (read the *Introductions* to each report and browse the chapters, available via Blackboard, External Links).

Wed 11/14 Hazards of Exploration: Challenger and Columbia Accidents
Comparison of the Two Accidents by Prof. Tatarewicz
Challenger Launch Decision by Prof. Foster

Mon 11/19 Managing the Risks of Exploration: Challenger Launch Decision and the Columbia mission mis-steps.
"Two Accidents Rooted in History and Culture" by Prof. Tatarewicz

Wed 11/21 Coda – NASA's Return to Flight, Retiring the Shuttle, and the Bush Space Vision
Discussion led by Profs. Foster & Tatarewicz
Reading: Tatarewicz, "The Bush Vision for Space Exploration and U.S. Space Policy" (Blackboard, Course Documents)

Thanksgiving Holiday Thursday November 22

Fifth Assignment: Due in Blackboard Assignments Manager Mon. Nov. 26. Details can be found under "Assignments" on the course Blackboard Site.

Topic V: Humans and their Cultures

Mon 11/26 Humanity and the Culture of Technology.
Introduction by Prof. Welch
Reading: Postman, *Technopoly: the Surrender of Culture to Technology.*
(Selections on Blackboard, entire book available at bookstore)

Wed 11/28 Humanity and the Culture of Technology
Discussion of Postman led by Prof. Welch

Mon 12/3 Humans and their Mental World: Evolutionary Psychology
Lecture: Prof. Robinson
Reading: Reading: DeKay and Buss, "Human Nature, Individual Differences, and the Importance of Context: Perspectives on Evolutionary Psychology;" Kenrick, "Evolutionary Psychology, Cognitive Science, and Dynamical Systems: Building an Integrative Paradigm." (Blackboard, Course Documents)

Wed 12/5 Film: *The Nature of Human Nature*
Discussion led by Prof. Robinson

Mon 12/10 Concluding Thoughts: the Human Context of Science & Technology
Discussion led by Profs. Tatarewicz & Welch

Sixth Assignment: Due in Blackboard Assignments Manager Wednesday, December 12. Details can be found under "Assignments" on the course Blackboard Site.

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