Science of Modern Technology and Public Policy,  APHY S100, ENAS S100, PHYS S100

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Seminar that examines the science behind selected major advances in modern technology. The focus is on the scientific basis of each advance, as well as the technology's resulting impact on society. Student groups present case studies, with topics developed by the participants in collaboration with the instructor. Intended for non-science majors.

Yale solar plant – treated in the course

We address major questions in presentations given by the instructor, students and guest lecturers: what is the science base of the technological advance, what lead up to the technology development, and how does the advance affect society and public policy. The goal is to understand how we have gotten to where we are, and thereby provide insight into the future. The format will be a seminar with case studies. Topics will be developed by the participants with the instructor and with guest lecturers.

Possible topics include
nanotechnology; advanced materials; aircraft; space flight; nuclear power, weapons, medical uses; optical systems for communication and medical diagnostics; transistors; self-driving cars, clean energy and Yale initiatives; renewable energy technologies, and applications in the developing world, new technology for satellite imaging and Global Positioning systems; large-scale immunization; DNA made-to-order; clean public water technology; and lighting – from tungsten filaments to LEDs.

Hands-on demonstrations by the instructor in class and by student groups, and field trips within Yale and New Haven will be undertaken.

Each week will treat a different major topic. The first week will be presented fully by the instructor. Subsequent weeks will have student and faculty presentations. Each student will also prepare a final paper on his or her topic. There is no final exam. WE PLAN TO HAVE A MIDTERM EXAM.

Texts:
A Century of Innovation: Twenty engineering achievements that transformed our lives, George Constable and Bob Somerville, published by the National Research Council.

Physics for Future Presidents, by Richard A. Muller; used for group presentations only
The instructor will have copies of both books to loan.

We will also make extensive use of web resources, and posted lecture notes from the instructor and guest lecturers.
Yale subjects covered in the course:

(clockwise) – Yale’s New Colleges, then under construction – their sustainability design is a key feature; Kroon Hall - home of the Yale School of Forestry and Environmental Studies - the most energy efficient building on campus; the Yale Power plant, a major contributor to Yale carbon reduction plans, and the large solar photovoltaic facility on Yale's new West campus our greenest renewable power source. These are covered in the course. Yale’s extensive sustainability and preservation efforts are an important current topic, and one in which Yale has leadership.

Discussion of the Yale Carbon-charge project, and the Yale-owned wind farm in Maine will also be included, for both renewable energy and carbon-reduction issues.
III. Format and Procedures:
The course will meet twice per week in seminar format mainly with lectures and discussions led by
the instructor. There may be a few guest lectures during the term and field trips to nearby locations
(power plant, wind turbines, geothermal operation). In addition there will be an optional homework
section held at a time to be determined. These sections are intended to provide time to work with
classmates on the homework problems and to ask the TF for help.

Note: Please turn off all electronic devices before class begins. Laptops may be used only for
note taking and only with permission of the instructor.

IV. Expectations
Knowledge of high school math, chemistry, and physics is assumed/required. This course is not
overly quantitative in nature, but you will be expected to make value judgements and form opinions
related to many of the topics discussed.

V. Course Requirements:
1. Class attendance and participation policy: Class attendance is important, and you will benefit
from group discussions. Full attendance is expected.

2. Course readings:
   Required texts: listed above, on page 1

   Lecture notes will usually be available on the Canvas website (canvas.yale.edu) before class
   and/or paper copies will be available at the beginning of class. Other readings will be posted.

3. Problem Sets: There will be problem sets assigned throughout the term. All problem sets will be
posted on the canvas server (and solutions can be submitted in hard copy form (hand-written neatly
or typed, please!) or via canvas.

4. Group Project/Presentation and Final Paper: Before the middle of the term students will be
divided into teams to complete a presentation to the class on a topic related to a technology-related
issue of your choice. Topics will need approval by the instructor.

Each student will also submit an individual paper at the end of the term. The topic can be
related to, and extend, the Group topic, or can differ, with permission of the instructor.
Grading Procedures:
(a) Problem sets............................................(25%)

(b) Group presentation ………………………(25%)

(c) Final report (due in last class)……………. (25%)
   6-8 pages, 1-1/2 spaced, plus references and figures

(d) Midterm ...........................................................(25%)

Policy for late homework: Homework will be collected at the beginning of class on the date it is due. Failure to turn in homework at this time will result in deduction of points. Same day = 10% deduction, next day = 50% deduction. Homework will not be accepted more than 1 day late unless permission is obtained from the instructor.

VII. Academic Integrity
You are encouraged to study together and to work on problem sets together; however, this permissible cooperation should never involve one student having possession of a copy of all or part of work done by someone else. When working in a collaborative environment, always make sure that you understand the work that you are submitting for a problem set. You may NOT copy and paste answers to homework problems from the web.

VIII. Accommodations for students with disabilities and Tutoring
In compliance with the Yale University policy and equal access laws, the instructor is available to discuss appropriate academic accommodations that may be required for student with disabilities. Requests for academic accommodations are to be made during the first week, except for unusual circumstances, so arrangements can be made. Students are encouraged to register with Student Disability Services to verify their eligibility for appropriate accommodations.

Tutoring may be available on science topics and also for writing advice, at announced times in the CTL located in the Sterling Library.