Spring 2011 Courses

THE UNIVERSE
Christopher F. Chyba, Gregory S. Novak, Anatoly Spitkovsky  AST 203
This specially designed course targets the frontier of modern astrophysics. Subjects include the planets of our solar system, the birth, life, and death of stars; the search for extrasolar planets and extraterrestrial life; the zoo of galaxies from dwarfs to giants, from starbursts to quasars; dark matter and the large-scale structure of the universe; Einstein's special and general theory of relativity, black holes, neutron stars, and big bang cosmology. This course is designed for the non-science major and has no prerequisites past high school algebra and geometry. High school physics would be useful.

POLICY SEMINAR
Harold A. Feiveson  WWS 402
In policy seminars students work in groups first formulating the general problem, then engaging in individual research on subtopics, and finally presenting their inferences for discussion and debate and producing a collective policy report.

TOPICS IN POLICY ANALYSIS (HALF-TERM) – THE FUTURE OF NUCLEAR ENERGY
Alex Glaser  WWS 594Q
Course explores current debates about nuclear energy and reviews the basic science and technology and current uses of nuclear energy, with particular emphasis on the economic aspects and arrangements to prevent its use for weapons purposes. Policy proposals to facilitate the safe and rapid global expansion of nuclear energy are analyzed.

SCIENCE AND TECHNOLOGY OF NUCLEAR ENERGY: FISSION AND FUSION
Alex Glaser and Robert J. Goldston  AST 309/MAE 309/PHY 309
Concern about climate change is creating the potential for a renaissance of nuclear fission power. The international ITER fusion experiment is being built to demonstrate the scientific and technological feasibility of fusion. This course will introduce the science and technology of fission and fusion. We will also cover societal risks, such as nuclear weapons proliferation, and societal benefits, such as reduced CO2 emissions.

ENERGY ENGINEERING, ECONOMICS, AND POLICY
Alexander Glaser  MSE 527
The purpose of this course is to explore in-depth several important energy topics that integrate engineering, economics and policy. This course is designed for doctoral students in the natural sciences, engineering, and social sciences that have been exposed to a wide-range of energy topics, perhaps as part of an IGERT program, and are interested in further investigating some of those topics. After reviewing key elements of economic and policy analysis, the course covers the engineering, economics and policy of the electric power grid, integrated energy assessment, and energy security.
FRESHMAN SEMINAR -- WHEN COWS GO CRAZY: THE INEXTRICABLE LINKS BETWEEN HUMAN AND ANIMAL HEALTH
Laura H. Kahn  FRS 124

FRESHMAN SEMINAR -- LIFE IN A NUCLEAR ARMED WORLD
Zia Mian  FRS 142

TOPICS IN POLICY ANALYSIS (HALF-TERM) -- ENERGY, ENVIRONMENT AND DEVELOPMENT
M.V. Ramana  WWS 594P
An interdisciplinary introduction to debates about energy, environment, and development. Some of the questions to be addressed are: Should one posit quantitative or qualitative limits to economic growth? What kinds of social change might be desirable or necessary to achieve a sustainable future? What role does energy play in improving the well-being of the poor and how does one ensure that this function is "optimized"? What are the roles for technology and consumption reduction in climate mitigation? How can we reduce pollution, environmental degradation, and human hardship due to the use of bio-fuels in cooking?

TOPICS OF POLICY ANALYSIS (HALF-TERM) -- INTRO. TO SCIENCE, TECHNOLOGY AND ENVIRONMENTAL POLICY
Frank von Hippel and Denise L. Mauzerall  WWS 594S
Designed to improve students' skill, confidence and judgment in use of science in policy applications. Using case studies, real-world examples, and in-class exercises, in the areas of atmospheric and energy policy, the emphasis is on preparing both non-scientists and scientists to use, understand, and critique science in environmental policy applications. Exercises are scaled to the student's background.

TOPICS IN INTERNATIONAL RELATIONS – PROTECTION AGAINST WEAPONS OF MASS DESTRUCTION
Frank von Hippel  WWS 556D
Since the collapse of the Soviet Union, the only significant security threats to the U.S. and its allies have been from nuclear, biological and chemical weapons. Historically, the US focus has oscillated between protection via nonproliferation and disarmament agreements, and via civil and missile defense. The course assesses the threats, both approaches to protection, and linkages made between policies on WMD and perceptions of "conventional" military threats.