Global Trends: Strategic Analysis and Systems Thinking for Leadership
Fall 2017

ENGR 497 Section 2   Instructor: Darryl Farber
M-W 2:30-3:45 pm   112 Larson Institute
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Office Hours: Thursday & Friday 2-4 pm, by appt.
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The aim of the course is for students to develop their knowledge and skill at interpreting, integrating and synthesizing ideas about diverse political, economic, societal, and technical trends, discontinuities, and systems that will shape the future. Simply stated: How does one make sense of an increasingly complex world? A primary text for the course will be the recently released report, *Global Trends: Paradox of Progress* (2017), which governments, industry, and non-governmental organizations use for strategic foresight and planning. A central theme of the course is to learn how technological innovations change the way large-scale, complex, sociotechnical systems function – systems such as critical infrastructure: transportation, energy, communications, health, as well as the convergence among these systems – in relationship to economic competitiveness, environmental sustainability, national and global security, and societal well-being. The ability to understand the changing nature of these complex systems is also related to how technology is changing the systems of education, learning, and workforce development. The course will interest students from across disciplines, who seek to understand how global trends and particularly how changing technologies and sociotechnical systems will influence *your* future. For science and engineering students, the course will place your technical studies in a larger political, economic, societal, and technological systems context.

A systems and scenario analytic approach will be used to think through and integrate the diverse political, economic, societal, and technological factors that shape the future. The construction of alternative scenarios enables multiple stakeholders with different points of view to think through the consequences of action and interactions. The point of the analysis is not to predict the future, but rather to identify opportunities and risks that individuals and organizations may face so that they are better prepared to seize opportunities and to manage risks effectively. Strategic leadership *requires* an understanding of the trends that influence increasingly interconnected and interdependent systems of systems and that directly influence the quality of our lives. The course is an introduction to a holistic way of understanding the current state, and possible future states of the world and the human condition given differences in cultures, values, and beliefs.

Learning Outcomes

- Learn to recognize, analyze, and explain alternative interpretations of social and technological interactions. For example, is nuclear power sustainable and what are the implications for energy production, nuclear waste management, and nuclear weapons non-proliferation globally? Is agricultural biotechnology safe or is it an ecological and public health catastrophe in the making? Will new autonomous systems make life better

or worse perhaps by increasing unemployment in sectors of the economy previously thought immune from automation?

- Practice systems and integrative thinking and reasoning through the identification and description of causal relationships and feedbacks among political, economic, social, and technological dimensions of large-scale, complex sociotechnical systems.

- Learn scenario analysis and planning to develop an understanding of how a student's disciplinary knowledge may be understood in the context of "a big-picture" or "whole systems" perspective of global systems of systems.

- Practice critical reading and researching to distinguish credible sources of information from questionable sources and to practice constructing sound arguments using credible information as evidence to support one's line of reasoning.

- Practice critical thinking through the analysis and construction of alternative scenarios to the year 2035.

- Analyze and explain the ethical implications of alternative scenarios.

- Develop a proficiency in writing concise and insightful professional memos.

- Write an analysis of a strategic issue and communicate the findings verbally.

Texts

Burrows, Mathew. 2016. *Global Risks 2035*: *The Search for the New Normal*. Washington, D.C.: The Atlantic Council. (online)

De Weck, Olivier L, Daniel Roos, and Christopher L. Magee. 2011. *Engineering Systems: Meeting Human Needs in a Complex Technological World*. Cambridge, MA: The MIT Press.

Grove, Andrew, S. 1996. *Only the Paranoid Survive: How to Exploit the Crisis Points That Challenge Every Company*. New York: Doubleday Currency.

Meadows, Donella, H. 2008. *Thinking in Systems: A Primer*. White River Junction, Vermont: Chelsea Green Publishing.

National Intelligence Council. 2017. *Global Trends: Paradox of Progress*. Washington, D.C. (online)

Schwartz, Peter. 1996. *The Art of the Long View: Planning for the Future in an Uncertain World*. New York: John Wiley.

Shell. 2013. *New Lens Scenarios: A Shift in Perspective for a World in Transition*. The Hague, The Netherlands: Royal Dutch Shell, plc. (online)

Other Readings
Readings from noted contemporary authors and systems thinkers such as Thomas Friedman, John P. Holdren, and Anne-Marie Slaughter as well as classic authors such as Herbert Simon and Norbert Wiener in addition to reports from organizations such as the World Economic Forum will be posted to course website. Students will also use the University newspaper reading program to identify and read articles relevant to the class.

Grading and Assignments
Professional memos	45%	(Three memos with optional fourth)
Working Paper	20%	
Final Strategic Analysis	25%	
Participation	10%	

Grades are based on the Penn State grading system, see
http://senate.psu.edu/policies-and-rules-for-undergraduate-students/47-00-48-00-and-49-00-grades/#47-20

Absence Policy Students are expected to attend class. Of course things happen that are beyond ones control just email ASAP. If you are sick and you think you have the flu, DO NOT COME TO CLASS. However, many things are within ones control, such as scheduling job interviews or scheduling vacations. Obviously, attendance influences participation. If you need to be absent, please let me know ahead of class if possible.

Late Assignments Late papers will be downgraded one half letter grade each day late. For example, if the paper received a "B", if it was handed the day after it was due, then the paper would be graded a "B-". "The best is the enemy of the good."

Extra Credit From time to time during the semester, there will be the opportunity to attend an outside lecture or presentations related to the issues we are discussing in class. I will post some of these opportunities on CMS. There may be some that you think are relevant, let the class know and go attend. If you do attend such a lecture write a 1 page memo, essentially a summary of the main points and what you learned. The memo must be handed in within 1 week after the presentation and uploaded to extra-credit box on Angel.

Electronic Etiquette Please be mindful of your use of electronic devices in class.

FLU PROCEEDURES
In compliance with Pennsylvania Department of Health and Centers for Disease Control recommendations, students should NOT attend class or any public gatherings while ill with influenza. Students with flu symptoms will be asked to leave campus if possible and to return home during recovery. The illness and self-isolation period will usually be about a week. It is

very important that individuals avoid spreading the flu to others. Most students should be able to complete a successful semester despite a flu-induced absence. Faculty will provide students who are absent because of illness with a reasonable opportunity to make up missed work. Ordinarily, it is inappropriate to substitute for the missed assignment the weighting of a semester's work that does not include the missed assignment or exam. Completion of all assignments and exams assures the greatest chance for students to develop heightened understanding and content mastery that is unavailable through the weighting process. The opportunity to complete all assignments and exams supports the university's desire to enable students to make responsible situational decisions, including the decision to avoid spreading a contagious virus to other students, staff, and faculty, without endangering their academic work. Students with the flu do not need to provide a physician's certification of illness. However, ill students should inform their teachers (but not through personal contact in which there is a risk of exposing others to the virus) as soon as possible that they are absent because of the flu. Likewise students should contact their instructors as quickly as possible to arrange to make up missed assignments or exams

ACADEMIC INTEGRITY
Academic integrity is the pursuit of scholarly activity in an open, honest and responsible manner. Academic integrity is a basic guiding principle for all academic activity at The Pennsylvania State University, and all members of the University community are expected to act in accordance with this principle. Consistent with this expectation, the University's Code of Conduct states that all students should act with personal integrity, respect other students' dignity, rights and property, and help create and maintain an environment in which all can succeed through the fruits of their efforts.

Academic integrity includes a commitment by all members of the University community not to engage in or tolerate acts of falsification, misrepresentation or deception. Such acts of dishonesty violate the fundamental ethical principles of the University community and compromise the worth of work completed by others.

DISABILITY STATEMENT
Penn State welcomes students with disabilities into the University's educational programs. Every Penn State campus has an office for students with disabilities. Student Disability Resources (SDR) website provides contact information for every Penn State campus. For further information, please visit Student Disability Resources website.
In order to receive consideration for reasonable accommodations, you must contact the appropriate disability services office at the campus where you are officially enrolled, participate in an intake interview, and provide documentation: See documentation guidelines. If the documentation supports your request for reasonable accommodations, your campus disability services office will provide you with an accommodation letter. Please share this letter with your instructors and discuss the accommodations with them as early as possible. You must follow this process for every semester that you request accommodations.

COUNSELING AND PSYCHOLOGICAL SERVICES STATEMENT
Many students at Penn State face personal challenges or have psychological needs that may interfere with interfere with their academic progress, social development, or emotional wellbeing. The university offers a variety of confidential services to help you through difficult times, including individual and group counseling, crisis intervention, consultations, online chats, and mental health screenings. These services are provided by staff who welcome all students and embrace a philosophy respectful of clients' cultural and religious backgrounds, and sensitive to differences in race, ability, gender identity and sexual orientation.

STATEMENT OF NONDISCRIMINATION
The Pennsylvania State University is committed to the policy that all persons shall have equal access to programs, facilities, admission, and employment without regard to personal characteristics not related to ability, performance, or qualifications as determined by University policy or by state of federal authorities. The Pennsylvania State University does not discriminate against any person because of age, ancestry, color, disability or handicap, national origin, race, religious creed, sex, sexual orientation, or veteran status.