THE OHIO STATE UNIVERSITY
JOHN GLENN COLLEGE OF PUBLIC AFFAIRS

THE OHIO STATE UNIVERSITY
BATTELLE CENTER FOR SCIENCE, ENGINEERING, AND PUBLIC POLICY

PUBAFRS 8620: Innovating for Sustainable Energy Systems: (A Multi-disciplinary Graduate Problem-solving Course)
Syllabus

Part of the John Glenn College of Public Affairs and College of Engineering's Joint *Science and Engineering in the Public Interest* program

INSTRUCTORS:

Lead Instructor:
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Day of Week [3-hr window] **Location: tbd** **4 credits**

Course Description

Graduate students in any discipline or college are welcome in this graduate multi-disciplinary applications course because complex problem-solving requires interdisciplinary approaches. This course also serves as the capstone for OSU's Energy Graduate Interdisciplinary Specialization (GIS), *Data-dRIVen sustainable Energy Systems [DRIVES]*; priority is given to GIS students' participation.

The course provides students with the design tools and a framework to understand complex problems and develop within weeks *minimal viable products* or solutions that address energy-sector needs. Through an intense process of stakeholder interviews and continuous feedback, students acquire experience in systematic innovation, refining problem-statements, engaging customers and stakeholders, navigating public and private sector organizations, budgeting, and management issues.

Students gain additional experience in: the broader context surrounding the problem and sponsor, applied critical thinking, creativity, collaboration, communication, and cultural competence. Working in multi-disciplinary teams, students develop and apply policy, business, and engineering skills to address real-world, contemporary problems that are articulated by our external partners. Teams invest significant time: working outside the classroom; interacting weekly with sponsors, customers, and stakeholders; preparing written status-reports; and presenting weekly to the teaching team, sponsors, mentors, peers, and guests for critiques which emulate briefings to management or investors. Students acquire not only tools and leadership skills but an innovation mindset and exposure to a vast array of careers in the public and private sectors.

This course does not substitute for the Glenn College capstone requirement.

Student Learning Objectives

The class is an intense professional experience and relies heavily on out-of-classroom work. See Requirements section below for a typical week's work. This course is designed to provide students with hands-on experience in understanding and working with energy-related federal, state, and local public sector agencies, companies, or nonprofits on real, current problems. In so doing, the students help organizations better address their missions and emerging threats, challenges, and opportunities. The course provides students with human-centered design and Lean Innovation tools to problem-solve in weeks' time, rather than months or years.

Our goal, within the constraints of a classroom and a limited amount of time, is to provide a framework for testing students' hypotheses and product design, while creating all of the pressures and demands of the real world in early-stage innovation. The intent is for urgency and good-enough decision-making to become ingrained. The class design gives students the experience of how to work and collaborate on a team, handle uncertain and chaotic environments, and turn a creative idea into a solution for a real-world complex problem that is challenging a government or nonprofit agency. Students will learn how to interview government and private sector customers and stakeholders (customer discovery), practice evidence-based innovation (customer validation and agile development), use a business model tool to brainstorm, and get out of the classroom to see whether anyone other than the student would want or use the solution.

At the conclusion of this course, students will possess a deep understanding of complex problems in the energy sector. Specifically, students will demonstrate:

1. An understanding of the public sector and its dynamics
2. The ability to analyze, synthesize, think critically, solve problems and make decisions
3. A profound understanding of the assigned sponsor's needs, problem, and workflow, and an ability to clarify the problem-statement
4. The ability to participate in and contribute to the energy policy process
5. Rapid iteration or agile development of products or solutions that are technically feasible, desirable, and viable in a economic and organizational sense.
6. An understanding of all relevant customers, stakeholders, deployment issues, costs, resources, and ultimate value of the minimum viable solution.
7. The ability to interact effectively with public policy and administration professionals from a broad range of sectors, using professional competencies common to the field
8. A facility with complex problem-solving methodology and lean innovation tools, valuable throughout a professional career.

Course Requirements

Rigorous class preparation includes <u>students investing consistently some amount of time on an almost daily basis</u>, like professionals would. A handout will detail the suggested time-budget for a typical week in order to keep the workload reasonable and in-line with the number of course credit-hours. Typical tasks include:

1. Watching assigned videos online in full and completing any required readings or online knowledge-checks listed in the course Navigator (a separate resource document)
2. Testing hypotheses about the problem and potential solutions by speaking to several customers or stakeholders.
3. Attending one 30-minute *mandatory* office hour slot to review findings and identify obstacles

4. Preparing a weekly presentation for Friday's class with updates on the solution design and development and other topics described in the course Navigator (a separate resource document).
5. Posting a team blog summarizing the week's hypothesis-testing and progress in order to update the sponsors and instructors.
6. Attending ALL classes, presenting the week's team presentation, providing critical peer-feedback to another assigned team, and formulating hypotheses for the coming week.

By the semester's end:

- Individual students deliver a draft innovation strategy document
- Each team conducts an estimated 100 customer/stakeholder interviews.
- Each team delivers a video, presentation, and written innovation strategy document concerning the solution developed to meet the sponsor's needs.
- Individual students deliver a brief, ungraded, written personal reflection at the class' conclusion.

Course Schedule Overview

Week	Date	Student Team's Presentation Focus	Instructors' Focus
1		Team Discovery (developed during class)	Orientation and On-boarding
2		Sponsor and Problem Discovery DUE: Brief Written Status Report	Systematic Innovation Method; Interviewing Skills Workshop
3		Beneficiary Discovery: Dauntless DUE: Brief Written Status Report	Public Sector Budget Process & Energy Sector Dynamics; Team Survival Skills Workshop
4		Beneficiary Discovery: Amity DUE: Brief Written Status Report	Innovation's Desirability I
5		Innovation's Desirability: Dauntless DUE: Brief Written Status Report	Innovation's Desirability II: Ideation & Information Synthesis Workshop
6		Innovation's Desirability: Amity DUE: Brief Written Status Report	Innovation's Feasibility I
7		Innovation's Feasibility: Dauntless DUE: Brief Written Status Report	Innovation's Feasibility II: Prototyping & Iterative Design Workshop
8		Innovation's Feasibility: Amity DUE: Brief Written Status Report **DUE: DRAFT Innovation Strategy Report**	Innovation's Viability I
9		Guest Panel on Innovation (no presentations) DUE: Brief Written Status Report	Innovation's Viability II: Assessing Unintended Consequences Workshop
10		**SPRING BREAK—NO CLASS**	**Optional: It's a good time to interview or make field visits!**
11		Innovation's Viability: Dauntless DUE: Brief Written Status Report	Story-telling & Gaining Buy-in and Support Workshop
12		Innovation's Viability: Amity DUE: Brief Written Status Report	Video Tips
13		Draft Video, Presentation Storyboard, and Written Innovation Strategy Report DUE: Brief Written Status Report	Presentation Tips
14		Close-to-Final Video, Presentation, and Written Innovation Strategy Report DUE: Brief Written Status Report	
15		**DUE: FINAL Video, Oral Presentation, and Written Innovation Strategy Report**	
16		**DUE: Submit evaluation of team members and required Reflections paper**	

ALL WORK LISTED IN THE *COURSE NAVIGATOR / GUIDE, provided separately and posted to Carmen,* SHOULD BE ACCOMPLISHED *BEFORE* THAT WEEK'S FRIDAY CLASS. Teams are expected to enter the classroom prepared – see Course Requirements on pages 2-3.

Student Assessment

This course is interdisciplinary and team-based, therefore 60% of a student's final grade will come from the team's performance. Students' teammates will also help assess individual contributions. Detailed grading rubrics will be posted to Carmen. The grading policy appears on page 7.

20% Individual's Engagement reflected in:

- **Attendance and response to Knowledge-Check** in Class and at Office Hours, reflecting perseverance and commitment to team. You are required to attend every class.
- **Teammates' evaluation** of individual's contributions, reflecting trustworthiness and collaboration skills
- **Quality of feedback on other teams' presentations**, demonstrating active listening and attentiveness (de-brief assignments may be made day of class)

20% Individual's Draft Innovation Strategy Report:

The draft will address all elements of the *Heilmeier Catechism* with the problem sponsor as the intended audience. Its narrative length, when typed single-spaced, should not exceed 7 pages, not counting appendices and figures. This deliverable fulfills GIS students' individual capstone requirement and midterm assessment. Students may collaboratively gather information and inputs for the draft report, but they must independently complete the written assignment.

30% Team's Weekly Performance evident in:

- **Number of interviews, quality of questions, and quality of interview notes**, demonstrating hypothesis-formulation and -testing and applied critical thinking.
- **Presentation quality**, demonstrating critical thinking, communication skills, learning, and creativity.
- **Written status reports and Blog quality**, demonstrating information-synthesis, critical thinking, and communication skills.
- **Effort to 'get out of the building' or off campus for customer discovery or validation,** demonstrating customer-focus and curiosity about context.

30% Team's Final Video, Presentation, and Written Innovation Strategy Report

Instructional Method

Flipped Classroom: Unlike a traditional classroom where the instructor presents lecture material, our lectures are online. Watching the assigned lectures is part of students' weekly homework. Their information is essential for completing students' weekly interviews and presenting the insights that the teaching team expects in the team's presentation for that week. We expect students to watch the assigned lectures for the upcoming week before class and we will use time in class to discuss questions about the lecture material and to provide supplemental material. Students need to come prepared with questions or comments about the material for in-class discussion. We will cold-call students to answer questions about the online lecture material.

Experiential Learning: Students will be spending a significant amount of time between lectures outside the class talking to customers or stakeholders. Each week, student teams will conduct an average of eight (8) interviews focused on a specific part of the Mission Model Canvas. This class is a simulation of what startups and innovation is like in the real world: chaos, uncertainty, stringent deadlines, more work than time, conflicting input, etc.

Inverted Lecture Hall: Sitting in the back of the classroom are experienced instructors and professionals who have built and/or funded startups, as well as seasoned public agency professionals with significant experience in the field. We will not be lecturing in the traditional sense, but instead critiquing each team's progress. While the comments may be specific to each team, the insights are almost always applicable to all teams. Students are advised to pay close attention.

Peer-to-Peer Culture: While other teams are presenting the results of their weekly 'experiments,' the rest of the class is expected to attentively listen, engage, and react to what they see and hear. Sharing insights, experience, and contacts with each other is a key way that this unique 'laboratory' achieves results. ***Taking written notes during Class, Office Hours, and other Feedback sessions is highly encouraged.***

Class Culture: Startups communicate in a dramatically different style from the university, government, or large company cultures that students may be familiar with. At times it can feel brusque and impersonal, but in reality, it is focused on creating immediate action in time- and resource-constrained environments. We have limited time and we will push, challenge, and question students in the hope that they will learn quickly. We will be direct, open, and tough, just like the real world. This approach is all part of students' learning to challenge themselves quickly and objectively, and to appreciate that as innovators one needs to learn and evolve faster than perhaps ever imagined possible. This class pushes many people past their comfort zones. Students will be receiving candid critiques in front of peers on a weekly basis. The pace and the uncertainty pick up as the class proceeds. As part of the process, we also expect students to question us, challenge our points of view if disagree, and engage in a real dialogue with the teaching team.

Policy

Deadline Extensions. Extensions will be granted for family emergencies, religious observances, or unanticipated/unavoidable work-related contingencies, provided the instructors receive such requests by telephone or e-mail before the applicable deadline. Extensions will automatically be granted in the case of *force majeure* events including natural disasters or other Acts of God. However, in such cases, we will attempt to collaborate online using video conferencing or other tools.

Academic Misconduct. The Ohio State University and the Committee on Academic Misconduct (COAM) expect that all students have read and understand the University's *Code of Student Conduct* and that all students will complete all academic and scholarly assignments with fairness and honesty. **Failure to follow the rules and guidelines established in the University's *Code of Student Conduct* may constitute "Academic Misconduct."** Sanctions for the misconduct could include a failing grade in this course and suspension or dismissal from the University. In the Ohio State University's *Code of Student Conduct*, Section 3335-23-04 defines academic misconduct as: "Any activity that tends to compromise the academic integrity of the University, or subvert the educational process." Examples of academic misconduct include (but are not limited to) plagiarism, collusion (unauthorized collaboration), copying the work of another student, and possessing unauthorized

materials during an examination. Ignorance of the University's *Code of Student Conduct* is never considered an "excuse" for academic misconduct. **If you have any questions about the above policy or what constitutes academic misconduct in this course, please contact the teaching team.**

OSU and The Glenn College value Diversity. The Glenn College is committed to nurturing a diverse and inclusive environment for our students, faculty, staff, and guests that celebrates the fundamental value and dignity of everyone by recognizing differences and supporting individuality. We are dedicated to creating a safe environment which promotes civil discourse and acknowledges and embraces diverse perspectives on issues and challenges that affect our community.

OSU supports your Well-being As a student you may experience a range of issues that can cause barriers to learning, such as strained relationships, increased anxiety, alcohol/drug use, feeling down, difficulty concentrating and/or lack of motivation. These health concerns or stressful events may lead to diminished academic performance or reduce a student's ability to participate in daily activities. The Ohio State University offers services to assist you with addressing these and other concerns you may be experiencing. If you or someone you know is suffering from any of the aforementioned conditions, you can learn more about the broad range of confidential mental health services available on campus via the Office of Student Life Counseling and Consultation Services (CCS) by visiting https://ccs.osu.edu/ or calling 614-292-5766. **CCS is located on the 4th Floor of the Younkin Success Center and 10th Floor of Lincoln Tower.** You can reach an on-call counselor when CCS is closed at 614-292-5766 and 24-hour emergency help is also available through the 24/7 National Suicide Prevention Hotline at 1-800-273-TALK or at https://suicidepreventionlifeline.org/. **Also, the OSU Student Advocacy Center is a resource to help students navigate OSU and to resolve issues that they encounter at OSU – visit http://advocacy.osu.edu/.**

OSU values Accessibility. The University strives to make all learning experiences as accessible as possible. If you anticipate or experience academic barriers based on your disability (including mental health, chronic or temporary medical conditions), please let me know immediately so that we can privately discuss options. To establish reasonable accommodations, I may request that you register with Student Life Disability Services. After registration, discuss with me as soon as possible your accommodations so that they may be implemented in a timely fashion. **SLDS contact information:** slds@osu.edu; 614-292-3307; slds.osu.edu; 098 Baker Hall, 113 W. 12th Avenue.

Required Texts

IDEO, *The Field Guide to Human-Centered Design*, 1st edition 2015
http://www.designkit.org/resources/1?utm_medium=ApproachPage&utm_source=www.ideo.org&utm_campaign=FGButton

Osterwalder and Pigneur, [VPD] *Value Proposition Design – How to Create Products and Services Customers Want*
Paperback: 320 pages
Publisher: Wiley; 1st edition (October 20, 2014)
ISBN-13: 978-1118968055

Constable & Rimalovski, *Talking to Humans – Success Starts With Understanding Your Customers*
https://www.talkingtohumans.com/download.html
or Paperback: 88 pages
Publisher: Giff Constable (September 23, 2014)

ISBN-13: 978-0990800927

Students can access textbook information via the Barnes & Noble (B&N) bookstore website: https://ohiostate.bncollege.com as well as from their BuckeyeLink Student Center. This information is disseminated by B&N to all area bookstores. You may buy from a store of your choice and/or shop for books (always use ISBN# for searches) online.

Appendix 1 - Explanation of Grading Policy

Grade	GPA & %	Criteria
A	4.0 (93-100)	Brilliant and original work; nearly publishable. Commendably clear and thoroughly analytical; comprehensively supported by, and systematically substantiated with, voluminous empirical evidence.
A-	3.67 (90-92.9)	Excellent work; powerful analysis with distinctive, well- structured argument; critical and full awareness of the literature alongside masterful use of empirical evidence to support and substantiate the arguments presented.
B+	3.33 (87-89.9)	Very good; fine analysis with a coherent argument, most of the most important points are developed in a structured discussion; well-substantiated with clear and firm command of supporting empirical evidence.
B	3.0 (83-86.9)	Good; sound analytical skill shown from identification and understanding of the core intellectual problem accompanied by a clear discussion of the subject substantiated with some (albeit insufficient) empirical evidence.
B-	2.67 (80-82.9)	Satisfactory; basic analytical skills apparent from identification of the intellectual problem and an insufficiently developed discussion of the same. Poorly structured argument with inadequate empirical evidence.
C+	2.33 (77-79.9)	Average; little analysis and an insufficiently developed argument. S*ome,* albeit cursory knowledge of the main intellectual problem; *some* key empirical points may have been identified and touched on, basic, but are anemically developed. No detailed familiarity with the literature evident.
C	2.0 (73-76.9)	Below average. weak analysis and an incoherent argument, bare evidence of ability to identify intellectual problem, little use of empirical evidence and minimal knowledge of the relevant literature.
C-	1.7 (70-72.9)	Below average, very weak analysis and an incoherent argument, and little use of empirical evidence and minimum to little knowledge of the relevant literature.
D+	1.3 (67-69.9)	Unsatisfactory, absence of argument, analysis; and little reference to, much less knowledge of, the relevant literature.
D	1.0 (60-66.9)	Unsatisfactory, absence of argument, analysis; and little or much less knowledge of, the relevant literature.
E	0.0 (0-59)	Totally unsatisfactory, absence of argument, analysis; and little if any reference to, much less knowledge of, the relevant literature.