ENST 282 Ecological Innovation & Entrepreneurship
Instructor: Dave Tilley (dtilley@umd.edu)
Office: ANS 1421; General Hours: MWF 11-12, other times are available. email to schedule meeting
Location: ANS 0422
Time: MTWHF 9:30-12:00
Canvas: elms.umd.edu

Course Description
The course combines Design Thinking, which uses an iterative cycle of developing customer empathy, learning ecological technology, appreciating environmental stewardship, brainstorming, rapid prototyping, testing user experience, and redesign, with Lean Startup, which uses customer discovery, encourages quick product development, reduces start-up costs, tests ideas quickly, and employs designed experiments, in a multidisciplinary academic setting to design, build, test and market novel technologies that enhance the environmental needs of humans.
Students will learn in an active environment that requires working creatively, collaboratively, diligently, and precisely to create a business model and tangible prototype for a new commercial product.
Prerequisites: None

Learning Outcomes
1. Demonstrate knowledge on the functioning and role of designed eco-technologies in supporting human well-being.
2. Be able to employ interviewing as a main tenet of Customer Discovery to uncover customer empathy and to discover the value of a commercial product or service.
3. Know how to apply the ecological design thinking process.
4. Understand the key elements needed for environmental entrepreneurship.
5. Apply Lean Startup process to develop a viable and scalable business model.
6. Demonstrate an ability to work collaboratively to employ design thinking and lean startup to develop innovative eco-based products or services for a startup business or non-profit enterprise.

Format
The course engages students in an interdisciplinary, active learning experience while aiming to produce a tangible, ecologically designed commercial product or service. The course was developed as part of a UMD Academy for Innovation and Entrepreneurship "Fearless Ideas" award given to Dr. Tilley.
The course will introduce students to key concepts of ecology, design and business startup. This is accomplished through Blended Learning, which provides students with presentations, videos, readings, in-class activities, campus site visits, and interviewing strangers. This experiential philosophy aims is to achieve a deeper learning that enhances long-term recall and professional development.

A major component of the course is to learn the Lean Startup method, which is a new approach to developing a viable and scalable business model for an innovative product. Students will "**get out of the building**" to interview potential customers to develop empathy for their pains, gains and jobs, in an effort to determine the value proposition for the designed product/service. Students will learn **storytelling** as a tool for branding and developing a business pitch for investors. Students will use design thinking, which includes customer feedback, to develop minimum viable products.

Another major component of the course is to understand how ecological technologies work and provide benefits to the public and the environment. This will serve as a basis for designing an ecologically-based product or service that has commercial appeal.

Learning Materials
- **TEXTBOOK RECOMMENDED**: Value Proposition Design by Alex Osterwalder, Yves Pigneur, Greg Bernarda, Alan Smith. Published by Wiley.
- **SKETCH BOOK REQUIRED**: Sketch Diary (NO LINES)
- Access to OpenAI's ChatGPT-4 or later version: you will need to setup an account.
- Other materials will be made available on elms.

Major Assignments
- **Oral Updates, Discussion, & Feedback**: Students will report on their progress toward developing their innovative idea, which will include reporting on interviews, prototyping and testing. Students will be given rubrics to follow. The intention is to keep these as informal discussions whereby the instructor and classmates can provide dynamic and constructive feedback. Students are expected to provide feedback to each other during the discussion.
- **Pitches**: Students will prepare 2 digital presentations (Powerpoint or Slides) and give each to class during a Live session. Formats and rubrics will be provided for each pitch.
- **Review of Environmental Technology Evolution**: Students will present an oral, synoptic review of an eco-technology of their choosing.
- **Low Resolution Prototype**: Students will develop simple physical prototypes that will allow them to test their innovations with the public.
- **Reflection Paper**: Students will write a short paper that reflects upon their learning as they progressed through the key stages of the course.
- **Final Exam**: Students will be tested on their understanding of eco-technologies, Design Thinking and Lean Startup.

Course Modules and Key Topics
1. **Inspiration and Course Overview**
   - Overview of design thinking and its fundamentals.
   - Campus tour of eco-technologies for inspiration.
   - Research on existing eco-technologies ("prior art").
   - Generating ideas for eco-technological innovations.
2. **Design Thinking: Empathizing**
   - Activities focused on empathy mapping.

- o Interviewing techniques for customer discovery.
- o Creation of customer profiles based on findings.

3. **Design Thinking: Defining Problems**
   - o Analyzing data from interviews.
   - o Ranking customer "jobs," "pains," and "gains."
   - o Detailed unpacking of interview insights.

4. **Design Thinking: Ideation**
   - o Emphasizing a brainstorming mindset.
   - o Various brainstorming tactics and strategies.
   - o Selection of ideas and headline creation.

5. **Design Thinking: Prototyping**
   - o Introduction to Minimum Viable Product (MVP) concepts.
   - o Exploration of prototyping principles and techniques.
   - o Rapid prototyping practices.

6. **Design Thinking: Testing Prototypes**
   - o Conducting tests with real users.
   - o Observing user interactions and taking notes.
   - o Identifying improvements and iterative testing steps.
   - o Reflection on the overall design thinking process.

7. **Eco-Design Thinking Project**
   - o Hands-on project applying the design thinking process.
   - o Includes stages of empathy, problem definition, ideation, prototyping, and testing.
   - o Reflection and identification of areas for process re-entry.

8. **Lean Startup Principles**
   - o Introduction to the Business Model Canvas.
   - o Exploration of customer segments, value propositions, and customer relationships.
   - o Revenue models, key activities, resources, and cost structure.

9. **Storytelling, Branding, and Pitching**
   - o Techniques for storytelling and branding.
   - o Pitching strategies and business plan summaries.
   - o Analysis of market size.

10. **Establishing the Business (if time permits)**
    - o Overview of business formation and incorporation.
    - o Discussion on Benefit Corporations.
    - o Proposal writing for funding.
    - o Setting milestones and tracking success metrics.

Grading Component	Points
Oral Update, Discussion, Feedback (~weekly, 5 @ 20 pts each)	100
Pitch Your Innovation	150
Contribution to the Learning of Others	200

Grading Component	Points
Low Resolution Prototype	100
Practice Pitch Your Business	50
Pitch Your Business (Final)	150
Reflection Paper	100
Final Exam	150
Total Points Available	**1000**

Letter Grade Breakdown:
- **A+ / A / A**-: 970+ / 930 / 900
- **B+ / B / B**-: 870 / 830 / 800
- **C+ / C / C**-: 770 / 730 / 700
- **D**: 650
- **F**: <650

All assessment scores will be posted on the course ELMS page. For grade reviews or questions about scoring, please email the instructor to schedule a meeting.

Class Policies:
Get Out of the Building: **This class is an experience**. Students are expected to embrace the process by getting out of the building to meet and interview people they have never met. Approximately 50% of one's final grade is dependent on customer interviews.

Missed classes: **Missing class should be avoided**. When you miss class, you fail in your duty to contribute to the learning of your classmates. Therefore, if you miss a class you must explain to the instructor in an email your plan for how you will make up your responsibility to contribute to the learning of your classmates. With prior arrangements, the instructor may elect to provide notes to students who cannot attend for acceptable reasons. Otherwise, students are responsible for obtaining class notes and assignments.

Missed exams or presentations: Only in cases deemed acceptable by the instructor, will missed exams or presentations be offered again as make-up. Missing an exam or presentation without a University Accepted excuse will **result in a grade of zero** on that assignment.

Artificial Intelligence: This **course embraces the power that Artificial Intelligence like ChatGPT** can give individuals. Used properly it can advance your learning, productivity and skills. You are expected to use Artificial Intelligence like ChatGPT in this course for specific assignments. You are welcomed to use it for any task, as long as you acknowledge how it assisted you. You are expected to use it transparently, responsibly, and ethically. Do not plagiarize, spread misinformation, or manipulate data. Respect privacy and intellectual property.

Mobile phone use: Unless there is an explicit reason given to use your mobile phone in class, **students are restricted from using their phones**, except for extreme emergencies. Improper use of your phone will result in you being asked to leave the classroom.