

CEE 176G/276G

Sustainability Design Thinking

Course Syllabus

Overview

This interactive, online design studio introduces techniques for applying the Design Thinking methodology (pioneered at Stanford's d.School) to create design ideas that are compelling, impactful and realizable.

In this course, we will:

- apply contextual, functional and human-centered design thinking techniques to design projects that promote **sustainability** by holistically considering space, form, environment, energy, economics, human behavior, and health.
- also focus on **resilience** -- an important aspect of sustainability -- to consider how design ideas will be impacted (and, if designed thoughtfully, can help us continue to thrive) through disruptions, such as natural disasters or the global pandemic that we're experiencing today.

The course features a series of 4 design projects, exploring how Design Thinking can be applied and giving you an opportunity to practice it on diverse projects of different scales, including:

- products
- services
- places and spaces for living and working
- communities and urban environments

In each of these projects, you will work with a small design team to apply Designing Thinking by:

- **Empathizing** observing, listening, and interviewing to understand the needs
- **Defining** analyzing, diagnosing, and identifying the needs that your team will focus on
- **Ideating** generating, brainstorming, and refining potential design ideas
- **Prototyping** sketching, simulating, and modeling design ideas
- **Testing** observing users as they interact with your prototypes, gathering insights to refine your design ideas

Class Components

Class Sessions

The class will meet online for two scheduled class sessions per week. These class sessions will include a combination of discussions, case study presentations, interactive team exercises, and design studio working sessions.

Participation in these class sessions real-time is required. So, while much of the project work can be completed asynchronously, you must be available to attend these online sessions at the scheduled class times.

All class sessions will be recorded, so you can review them later as needed.

Design Projects

The class is organized into four modules -- each of which features a design project that will give you an opportunity to exercise and apply your design thinking skills.

Each design project will each require about 10 to 12 hours of individual or team design work outside of the class meetings. For each project, you'll work in a small team to develop and share a proposed design that:

- meets the needs your team identifies
- illustrates your team's strategy for approaching the problems and opportunities
- demonstrates your team's application of the design thinking process

Weekly Online Project Consulting and Problem-Solving Sessions

We'll also host weekly online Project Consulting and Problem-Solving sessions. The timing for these sessions will be determined based on the availability of students enrolled in the class. These sessions will also be recorded and available to view later if you cannot attend the live session.

Testing and Grading

The class will not have any exams. Your class grade will be determined by:

- your scores earned on each of the 4 design projects
- your participation in real-time and offline class discussions

<p>Designing Products that Promote Sustainability / Resilience in Everyday Use</p>	<ul style="list-style-type: none"> ● Course Introduction ● Design Thinking Process Overview <ul style="list-style-type: none"> ○ Empathize ○ Define ○ Ideate ○ Prototype ○ Test ● Product Development Case Study ● Design Thinking Tools - Empathizing ● Design Project Work <ul style="list-style-type: none"> ○ Team Formation ○ Empathizing & Interviewing
	<ul style="list-style-type: none"> ● Product Development Case Study ● Design Thinking Tools - Defining & Ideating ● Design Project Work <ul style="list-style-type: none"> ○ Defining a Point of View Statement ○ Choosing a Minimum Viable Product ○ Ideating - Expansion & Narrowing
	<ul style="list-style-type: none"> ● Design Thinking Tools - Prototyping & Testing ● Design Project Work <ul style="list-style-type: none"> ○ Creating a Functional Prototype ○ Developing a Test Plan
	<ul style="list-style-type: none"> ● Design Thinking Tools - Iteration & Refinement ● Design Project Work <ul style="list-style-type: none"> ○ Initial Testing ○ Analysis & Design Refinements ○ Additional Testing ○ Lessons Learned
	<p>Design Project Sharing & Evaluation</p>

<p>Designing Services that Provide for Individual / Personal Needs in Sustainable / Resilient Ways</p>	<ul style="list-style-type: none"> ● Designing Services <ul style="list-style-type: none"> ○ Functional Requirements ○ User Requirements ○ System Requirements ● How Can Services Promote <ul style="list-style-type: none"> ○ Sustainability ○ Resilience ● Applying Design Thinking to Service Design ● Design Case Study - Physical Services ● Design Project Work <ul style="list-style-type: none"> ○ Team Formation ○ Empathizing & Interviewing
	<ul style="list-style-type: none"> ● Design Case Study - Online Services ● Designing Incentive Systems <ul style="list-style-type: none"> ○ Behavioral Economics ○ Creating Action & Commitment ● Design Thinking Tools - Defining & Ideating ● Design Project Work <ul style="list-style-type: none"> ○ Choosing a Need to Focus On ○ Defining the Essential Features ○ Ideating - Expansion & Narrowing
	<ul style="list-style-type: none"> ● Moving from Idea to Implementation <ul style="list-style-type: none"> ○ Competitive Analysis & Positioning ○ Identifying Supply Chains ○ Quantifying the Impact & Return ● Design Thinking Tools - Prototyping & Testing ● Design Project Work <ul style="list-style-type: none"> ○ Prototyping <ul style="list-style-type: none"> ■ Storyboards & Flow ■ Quick Digital Prototypes ■ Simulating Interfaces ○ Developing a Test Plan <ul style="list-style-type: none"> ■ User Experience ■ Functionality
	<ul style="list-style-type: none"> ● Design Thinking Tools - Iteration & Refinement ● Design Project Work <ul style="list-style-type: none"> ○ Initial Testing ○ Analysis & Design Refinements ○ Additional Testing ○ Lessons Learned
	<p>Design Project Sharing & Evaluation</p>

<p>Designing Places that Support Sustainability / Resilience for Living and Working</p>	<ul style="list-style-type: none"> ● Designing Places & Spaces <ul style="list-style-type: none"> ○ Functional Requirements ○ User Requirements ○ Visioning ● How Can Spaces Promote <ul style="list-style-type: none"> ○ Sustainability ○ Resilience ● Applying Design Thinking to Space Design <ul style="list-style-type: none"> ○ Empathizing ○ Defining ○ Ideating ○ Prototyping ○ Testing ● Design Case Study - Living Spaces ● Design Project Work <ul style="list-style-type: none"> ○ Team Formation ○ Empathizing & Interviewing
	<ul style="list-style-type: none"> ● Design Case Study - Working Spaces ● Design Thinking Tools - Defining & Ideating ● Design Project Work <ul style="list-style-type: none"> ○ Choosing a Need to Focus On ○ Defining the Essential Features ○ Ideating - Expansion & Narrowing
	<ul style="list-style-type: none"> ● Design Thinking Tools - Prototyping & Testing ● Design Project Work <ul style="list-style-type: none"> ○ Creating a Prototype / Model <ul style="list-style-type: none"> ■ Sketches ■ Physical Models ■ Digital Models ○ Developing a Test Plan <ul style="list-style-type: none"> ■ User Experience ■ Functionality
	<ul style="list-style-type: none"> ● Design Thinking Tools - Iteration & Refinement ● Design Project Work <ul style="list-style-type: none"> ○ Initial Testing ○ Analysis & Design Refinements ○ Additional Testing ○ Lessons Learned
	<p>Design Project Sharing & Evaluation</p>

<p>Designing Communities that Provide Societal Needs in Ways that Maximize Sustainability and Resilience</p>	<ul style="list-style-type: none"> ● Identifying Systems in Urban Environments <ul style="list-style-type: none"> ○ Energy / Water ○ Transportation ○ Economic/ Education / Cultural ○ Interdependence ● Design Goals for Urban Systems <ul style="list-style-type: none"> ○ User Goals / Requirements ○ Societal Goals / Requirements ○ Functional & Operational ○ Sustainability & Resilience ● Urban System Components & Interfaces ● Applying Design Thinking to System Design ● Case Study - Sustainable Communities ● Design Project Work <ul style="list-style-type: none"> ○ Team Formation ○ Empathizing & Interviewing
	<ul style="list-style-type: none"> ● Case Study - Regional Planning ● Designing Incentives for Urban Systems <ul style="list-style-type: none"> ○ Personal vs. Societal Goals ○ Motivating Action & Commitment ● Design Thinking Tools - Defining & Ideating ● Design Project Work <ul style="list-style-type: none"> ○ Choosing a Need to Focus On ○ Defining Essential System Features ○ Ideating - Expansion & Narrowing
	<ul style="list-style-type: none"> ● Planning for Implementation & Adoption ● Quantifying the Impact & Benefits ● Design Thinking Tools - Prototyping & Testing ● Design Project Work <ul style="list-style-type: none"> ○ Prototyping a Concept ○ Developing a Test Plan <ul style="list-style-type: none"> ■ Acceptability ■ Functionality ■ Efficacy
	<ul style="list-style-type: none"> ● Design Thinking Tools - Iteration & Refinement ● Design Project Work <ul style="list-style-type: none"> ○ Initial Testing ○ Analysis & Concept Refinements ○ Additional Testing ○ Lessons Learned
	<p>Design Project Sharing & Evaluation</p>