

EGN 4944: Interdisciplinary Capstone Design Project II (IDCD II)

Instructor: Dr. Alexandra Strong

Phone:

Office Hours:

Office:

Catalog Description

A senior-level capstone design experience for interdisciplinary engineering students. This culminating design experience is concluded in IDCD II, which will focus on prototyping, testing, iterating, examining the global and local implications of your project, and manufacturing a final product. Students will work on a team of their peers to continue a client-based project that began in Interdisciplinary Capstone Design Project I.

NOTE: This is also a Global Learning Discipline-Specific course that counts towards the Global Learning graduation requirement.

Course Description

The final year, capstone design experience is the culminating design experience within your undergraduate engineering experience. The purpose of this capstone course is to provide you with an opportunity to (1) integrate the knowledge you have learned in previous engineering and non-engineering courses, (2) work with a diverse group of your peers on an interdisciplinary, client-based engineering project, (3) practice your professional skills (i.e., teamwork, communication, reflection), and (4) refine your abilities to approach engineering challenges from a systematic, human-centered perspective. IDCD II is the second semester of a two-semester capstone that seeks to prepare you to be a leader and exemplary collaborator in multidisciplinary engineering work environments and to support you with your post-graduation planning.

Course Objectives

Through the activities within this course, you will improve your abilities to:

1. Apply a systematic engineering design approach to develop solutions to a client-based design problem, prototype and test solutions, iterate on a design problem, and manufacturing a final solution [LO #1]
2. Conduct rapid, low risk prototyping as a method for learning more about a solution. [LO #2]
3. Integrate the disciplinary knowledge and techniques (from multiple disciplines) necessary to complete a project [LO #3]
4. Collaborate, reflect, and identify specific areas (e.g., time management, communication, cooperation, technical contribution, etc.) in which they and their group members can improve for future collaborations [LO #4]
5. Communicate technical information clearly and concisely within written assignments, reports, and class presentations [LO #5]
6. Critically reflect on their work as an engineer by examining the ethical issues that may arise during the design process [LO #6]

Global Learning Course Objectives

As part of these objectives, you will connect your engineering design work with your development as global learners and citizens through the following objectives. Through the activities within this course, you will:

1. Identify and analyze the connections between your final interdisciplinary project solution and global markets and cultures [GLO #1 – Global Awareness]
2. Identify perspectives not commonly “at the table” and to articulate the potential short and long-term impacts of their project solution on multiple stakeholder groups locally, nationally, and/or globally [GLO #2 – Global Perspective]

3. Collaborate on interdisciplinary design teams to develop solutions that address interdisciplinary and complex local, global, and/or international engineering problems [GLO #3 – Global Engagement]

Course Organization

Course Materials. There are no required textbooks. Most course materials will be posted to Canvas. Online course materials (pre-reading before class) will be based on engineering design, interdisciplinary engineering, and systems engineering research, including but not limited to:

- Tim Brown's – [Designers – Think Big!](#)
- Tom Chi's – [Fast Solutions for a Brighter Future](#)

Evaluation. This class will provide you with many opportunities to engage with the topics and skills that are central to this course. Assignments will be predominantly collaborative work but will also include individual assignments. Your course grade will be a weighted sum of the assignments.

The course is broken down into the following areas:

- **65% Project Deliverables, including**
 - **10% Team Experience Design Assignments [LO #1-3, GLO #3]** These assignments will seek to help you and your team design your team experience and reflect on your progress throughout the semester.
 - **25% Design Report Submissions [LO #1-3, 5; GLO #3]** – Your team will submit components of your final design report throughout the semester for feedback.
 - **5% Interdisciplinary and Global Learning Components** – Given that you will be working on multidisciplinary design teams with students from other senior design courses, you will be asked to incorporate two sections of the report that articulate the interdisciplinary and global nature of your design project.
 - *Integration and Critical Awareness Statement [LO #3, 5, & 6]*
 - *Global Market and Impact Statement [LO #5, GLO #1 & 2]*
 - **20% Final Showcase Presentation [LO #1-3, 5, GLO #3]** – Your team will present a poster and any prototypes to faculty and practicing engineers from a variety of disciplines. In anticipation of that presentation, you will get practice and feedback through in-class activities and presentations.
- **15% Project and Individual Online Portfolio [LO #3-5, GLO #3]** This semester you will update your Professional Preparedness Portfolio to include your individual contribution to the project. In addition, you will work collaboratively with your team to create an online portfolio that summarizes your team's design process and your final design solution.
- **10% Designer Development Assignments (DDAs) [LO #1-2, 6, GLO #1-2]**
- **10% Participation and Professionalism [LO #4, GLO #3]** (including class participation and participation as a contributing member of project teams)

The grading scale for the course is included below.

Letter	Range (%)	Letter	Range (%)	Letter	Range (%)
A	Above 93	B-	80 - 83	D+	67 - 70
A-	90 - 92	C+	77 - 79	D	64 - 66
B+	87 - 89	C	74 - 76	D-	61 - 63
B	84 - 86	C-	71 - 73	F	< 61

Major Assignments

Project Deliverables. This course is grounded on a year-long, interdisciplinary, client-based project experience. As such, the project deliverables have been designed to scaffold your experience, provide formative feedback throughout the project, and provide you and your team opportunities to take ownership over your design project and process. As part of the project experience, you and your team will explore the interdisciplinary and global nature of your project through in-class activities. The project will culminate in a final design report and a presentation at FIU's Senior Design Showcase.

Project Portfolio. Last semester, you created a professional preparedness portfolio to articulate connections among your activities, experiences, engineering education, and global education at FIU as well as to demonstrate how you are prepared for your professional goals post-graduation. This semester you will expand on your entry for your IDCD project. In addition, you will work collaboratively with your teammates to create an online portfolio for your project that highlights (1) your team's design process, (2) your final design solution, and (3) the interdisciplinary nature of the process and solution.

Designer Development Assignments. These individual assignments will both support your development as a global, interdisciplinary designer as well as engage you in critical reflection around your project topic. You will complete these assignments prior to class sessions, and we will engage collaboratively in class around the assignment.

Course Expectations and Policies

As your instructor, my role is to create learning experiences that will support your development as a designer and leader. These learning experiences are based on my view of this class as a learning community, where we all actively participate and support each other's learning within this course.

In my role as an instructor, I will be expected to:

- Arrive to class prepared (with an agenda for that day's class session and the graded assignments)
- Support you in the various activities and assignments by
 - Communicating expectations clearly,
 - Providing timely feedback at regular intervals, and
 - Being available for assistance virtually.
- Show respect for you by
 - Treating fairly and consistently, and
 - Accepting feedback with an open-mind and adjusting the course and schedule as appropriate

As members of this learning community and students in this course, I will expect you to:

- **Attend class sessions:** Given the team- and projects-focused nature of this course, we will ask you to consider the impact of your absence on your teammates, your projects, and your learning. However, if you are sick, please get well, and do not come to class. Please let me and your teammates know about your illness via email as soon as possible, and we will help you catch up on things you missed. If you have a different reason for missing class, contact us as early as possible.
- **Arrive to class on time and be prepared by**
 - **Submitting all assignments on time:** Assignments should be submitted on Canvas and brought to class when specified in the assignment description. Assignments submitted more than 10 minutes after the deadline will be considered late assignments. Late assignments will receive a grade deduction.

- **Bringing necessary reading, assignments, supplies, drafts, etc. to class**
- **Participate in class by**
 - Asking questions and engaging in small group and class discussions,
 - Refraining from using cellphones and web browsers for reasons unrelated to the course, and
 - Completing in-class activities with enthusiasm and a commitment to learning
- **Accept and provide constructive feedback:** Feedback is a critical part of the learning process and the course design process. I strongly encourage providing constructive feedback about our course and will seek to provide you with constructive feedback about your development both in our remote learning environment and on assignments.
- **Inform me of any necessary accessibility needs or accommodations:** Any student who feels a need for accommodation based on the impact of a documented disability should contact me privately to discuss specific needs. Students who have questions or may need an accommodation should reach out to the Disability Resource Center.

The [Disability Resource Center](#) collaborates with students, faculty, staff, and community members to create diverse learning environments that are usable, equitable, inclusive, and sustainable. The DRC provides FIU students with disabilities the necessary support to successfully complete their education and participate in activities available to all students. If you have a diagnosed disability and plan to utilize academic accommodations, please contact the Center at 305-348-3532 or visit them at the Graham Center GC 190.

- **Show respect for your peers, your instructor, and the academic community. This includes**
 - **Submitting original work and cite your sources appropriately:** Engineers and designers work collaboratively to solve complex problems. As such, this course is designed to engage you and your peers in team projects. You will collaborate on all phases of the project. Nevertheless, there will be assignments in which we require individual work only. Those assignments will be clearly noted as such. **Plagiarism, false claims of performance, and Unauthorized collaboration will be damaging to the community we are building in this course and are unacceptable in this or any other course you take at Florida International University.** Therefore, any aspects of the submission (including images in a presentation) that may have been borrowed from a previous work or another individual must be clearly cited (i.e., identified and referenced with information about the author, title of the work, and where and when it appeared).
 - **Demonstrating integrity and academic honesty at all times:** Florida International University is a community dedicated to generating and imparting knowledge through excellent teaching and research, the rigorous and respectful exchange of ideas, and community service. All students should respect the right of others to have an equitable opportunity to learn and honestly to demonstrate the quality of their learning. Therefore, all students are expected to adhere to a standard of academic conduct, which demonstrates respect for themselves, their fellow students, and the educational mission of the University. All students are deemed by the University to understand that if they are found responsible for academic misconduct, they will be subject to the Academic Misconduct procedures and sanctions, as outlined in the Student Handbook.

NOTE: This syllabus is subject to change based on student progress and feedback.

EGN 4944 - Course Schedule

WEEK	EGN 4944
1	Welcome Back!
	<p><i>Session Topics/Plans:</i> Senior Design Showcase Poster Development [LO #1, 5, GLO #3] Begin updating Collaboration Plan</p>
2	<p>Project Portfolio Discussion</p> <p><i>Session Topics/Plans:</i></p> <ul style="list-style-type: none"> • Project Check-In #1 • Project Portfolio Introduction <p>What's Due This Week?</p> <p>Jan 19th - Team Experience Design – Collaboration Plan Updates [LO #4, GLO #1]</p>
3	<p>Prototyping & Provisional Commitment</p> <p><i>Session Topics/Plans:</i></p> <ul style="list-style-type: none"> • Project Check-In #2 • Prototyping – What and How to Prototype <p>What's Due This Week?</p> <ul style="list-style-type: none"> - Jan. 25th - Designer Development Assignment (DDA) #1: Exploring High Fidelity, Low Fidelity, and Rapid Prototyping [LO #2, 6] - Jan. 28th - Design Report Outline and Section Descriptions – Prototyping, Manufacturing, Evaluation, and Iteration [LO #1, 4-5; GLO #3]
4	<p>Project Work Time!</p> <p><i>Session Topics/Plans:</i></p> <ul style="list-style-type: none"> • Project Work Time
5	<p>Test Plan Development and Stakeholder Engagement with Prototyping</p> <p><i>Session Topics/Plans:</i></p> <ul style="list-style-type: none"> • Project Check-In #3 <p>What's Due This Week?</p> <ul style="list-style-type: none"> - Feb. 9th - DDA #2 – User Testing Drafts! [LO #1, 6] - Feb. 11th – Thesis Review by Mentors – Prototyping, Manufacturing, Evaluation, and Iteration [LO #1-3, 5; GLO #3]
6	<p>Project Work Time</p> <p><i>Session Topics/Plans:</i></p> <ul style="list-style-type: none"> • Project Work Time
7	<p>Who is NOT at the Table?</p> <p><i>Session Topics/Plans:</i></p> <ul style="list-style-type: none"> • Short and Long-Term Potential Impacts of the Design on Stakeholder Groups <p>What's Due This Week?</p> <p>Feb. 23rd - DDA #3 – Who is NOT at the Table [LO #6, GLO #2] – Systems analysis of potential impacts on different stakeholder groups</p>
8	<p>Project Progress Presentations</p> <p><i>Session Topics/Plans:</i></p>

	<ul style="list-style-type: none"> • 10-minute progress presentation in class <p>What's Due This Week?</p> <p>Mar 2nd - Progress Presentation for Class [LO #1-3, 5; GLO #3]</p>
9	<p>Community Feedback – Project Portfolio</p> <p>Session/Plans:</p> <ul style="list-style-type: none"> - Focused feedback on state of Online Project Portfolio (specifically Design Process) - Discussion of Integration and Critical Awareness Statement <p>What's Due This Week?</p> <ul style="list-style-type: none"> - Mar 9th - Project Portfolio – Initial Draft of Design Process, Outline of Other Sections [LO #3, 5 & 6, GLO #3] - Mar 11th – Outline and Section Descriptions of Final Report [LO #1-3, 5; GLO #3]
10	<p>Global Market Research and Cultural Awareness</p> <p>Session Topics/Plans:</p> <ul style="list-style-type: none"> - Discussion of Global Market and Impact Statement - Systems Mapping of Global Markets for Project <p>What's Due This Week?</p> <ul style="list-style-type: none"> - Mar 16th - DDA #4 – Exploration of the Global Markets for Project – Based on readings, podcasts, and videos, create a systems diagram of the global markets and the needs and constraints of different markets. [LO #3, 5 & 6, GLO #1] - Mar 18th – Team Experience Design – Peer and Self Assessments [LO #4, GLO #3]
11	<p>Individual Contribution Section - Community Feedback</p> <p>Session Topics/Plans:</p> <ul style="list-style-type: none"> - Project Check-In #4 - Review Individual Contribution Sections <p>What's Due This Week?</p> <p>Mar 23rd - Project Portfolio – Individual Contribution Section Draft [LO #3 & 5]</p>
12	<p>Prep to Submit Draft Final Report</p> <p>Session Topics/Plans:</p> <ul style="list-style-type: none"> - Discussion of Final Report Sections <p>What's Due This Week?</p> <ul style="list-style-type: none"> - Mar 30th – Draft of Global Market and Impact Statement as well as Integration and Critical Awareness Statement [LO #3, 5, & 6, GLO #1 & 2] - Apr 1st – Thesis Review by Mentors – Final Report [LO #1-3, 5; GLO #3]
13	<p>Practice Poster Session</p> <p>Session Topics/Plans:</p> <p>Practice Poster Session</p> <p>What's Due This Week?</p> <p>Apr 6th - Draft of Showcase Poster [LO #1-3, 5, GLO #3]</p>
14	<p>Project Work Time</p> <p>Session Plans/Topics:</p> <ul style="list-style-type: none"> - Project Work Time

	<p>What's Due This Week?</p> <p>April 12th – Showcase Video [LO #1-3, 5, GLO #3] April 19th – Team Experience Design - Final Peer and Self-Assessment [LO #4, GLO #3]</p> <p style="background-color: #cccccc;">Senior Project Showcase [LO #1-3, 5, GLO #3]</p>
	<p>What's During Finals Week?</p> <p>Final Thesis Due Including Statements - [LO #1-3, 5, 6; GLO #1-3] Online Project Portfolio Due [LO #3, 5 & 6, GLO #3] Individual Contribution for Professional Preparedness Portfolio [LO #3 & 5]</p>

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