Capstone Design
CONFERENCE 2022

JUNE 6–8, 2022 ▶ DALLAS, TEXAS

Workshop Information

Workshop 1A: Monday June 6, 5:45pm – 7:15pm
ECSS 2.410

Title: Idea Generation: Utilizing design thinking and the creative problem-solving process to spur student-generated capstone projects with startup potential

Facilitators: Hadar Ziv, David Ochi – University of California Irvine

Abstract: UC Irvine's School of ICS – among many other universities – specializes in student Capstones (senior-design projects), in which project needs and requirements, as well as mentoring, come from local industry, charitable and non-profit organizations, and other stakeholders interested in supporting emerging talent and receiving a finished product – working software -- delivered in the end. These "client-based" projects have distinct advantages, including a clear "client" and the opportunity for students to gain valuable experience engaging with "real world" clients. Student-generated projects, however, offer the opportunity for student teams to truly take advantage of "owning" the project and frequently show greater commitment to the overall project success as a result of this ownership and pride. But how can we effectively help students generate feasible and viable projects of their own?

Below are some of the key goals of the workshop for participants:

• Participants in this session will learn about a few of the key methods used in developing ideas that have meaning to students.

• Participants will be led through a series of sample activities that will allow them to experience some of the activities for their students to find projects with meaning.

• Participants will have the opportunity to see how their learning outcomes are aligned with entrepreneurial programs on campus and develop an action plan to foster collaboration and cross-participation in these programs both during and after the capstone projects.

• Participants will learn how some capstone projects – particularly ones where the university and/or the students own the intellectual property – are natural fits for innovation and entrepreneurship programs and how to take advantage of these opportunities.

Title: The Systems Lens on Student Center Learning for the Capstone Design Curriculum

Facilitator: Shayne McConomy - Florida State University

Abstract: The goal of this workshop is to examine curriculum through a systems lens, and reconnect instructors with the student's college experience.

The Capstone course is where students apply the cumulative knowledge they amassed in years prior and learn to hone soft skills for future employment. However, it is easy to assume that all students arrive with the same baseline knowledge into the capstone course. Logically, the knowledge assumption makes sense; after all, there is typically a string of prerequisites associated with the start of the capstone curriculum. A systems lens on the curriculum can provide perspective on how prepared students come into the class. Understanding the diverse knowledge base and background of the students at the start will help the future success of the students and their projects.

Workshop 1C: Monday June 6, 5:45pm – 7:15pm
ECSS 2.415

Title: Capstone Design: The Role Playing Adventure Game

Facilitators: Elizabeth A. DeBartolo, David Schwartz - RIT

Abstract: Your team enters the conference room. In the center of the room is a table with six chairs around it. In the corner of the room, a coffee machine bubbles and hisses, and the smell of fresh coffee surrounds you. A middle-aged engineer is already seated in one of the chairs, flipping frantically through a lab notebook that's exploding with loose pages. You hear muttering… "I know I put that spec sheet in here somewhere…the team will be here any minute and I know they're going to ask me for it…maybe it's under last Thursday's notes…[looks up suddenly]…oh. Hello. You're here already? Come on in, have a seat!" What are you going to do?

From an instructor perspective, teaching a capstone class/project can feel like running a Pick Your Own Adventure game for your students, only with a lot more at stake. Rather than struggle with the challenges, let's embrace them! We are proposing a game framework in which students/players experience the trials and tribulations of a capstone project to practice overcoming challenges in a low-stakes environment.

This workshop will start with a quick play-through of a simplified version of the capstone game, along with a basic overview of different types of game mechanics that could be adapted to simulate elements of a capstone experience. Next, participants will break up into groups focused on different game features. We'll conclude by bringing the group back together to discuss next steps in building and testing the game(s). While we have our own perspectives on what learning outcomes the game(s) should have, this workshop will also serve as a customer discovery exercise to understand where other capstone instructors see this experience fitting into a capstone course.

Workshop 1D: Monday June 6, 5:45pm – 7:15pm
ECSS 2.102

Title: Harnessing The Three Intelligences Methodology to Guide Student Ownership, Collaboration and Delivery in Capstone

Facilitators: B. Kris Jaeger-Helton - Northeastern University; John K Estell - Ohio Northern University; Susannah Howe - Smith College

Abstract: The "Three Intelligences Methodology" (3I) approach is an inductive learning approach developed and used at Northeastern University in the Industrial Engineering Capstone Program to guide and support student ownership, collaboration, and delivery in project-based settings through grouping visual and abstract data into common attribute classifications. The 3I technique involves a sequence of individual, collaborative, and collective intelligences that are ultimately integrated into a final team deliverable/plan. This method will be modeled in this workshop with the participants initially in the role of student and capstone team member. Accordingly, the facilitator of this method will do the following across the 3 categories below:

- Individual Intelligence: First, involve participants by having them respond to questions individually to ensure personal ownership for a group-owned task or problem to be solved.

- Collaborative Intelligence: Next, foster collaboration within teams to (a) reinforce common ideas and (b) highlight the need for and value of diverse input.

- Collective Intelligence: Finally, supplement collaborative results by capitalizing on the knowledge of experienced faculty or experts to ensure quality delivery of a final product.

The 3I method has been used successfully in capstone design classes to lay the groundwork for the initial client interaction and to outline the final capstone presentation. It has also been used in first-year courses for creating a foundation for project research, data collection, knowledge gathering, and for consulting experts. Valuable insights have been gained from each offering of a 3I exercise!

The goal of this workshop is to actively engage participants in the 3I method so they can experience the approach and its potential in their capstone design courses and beyond. The workshop offers a framework for exercises that facilitate complex planning while systematically benefiting from the input of many sources.

Workshop 2A: Tuesday June 7, 9:00am – 10:30am
ECSS 2.410

Title: Geometric based Topological Optimization and Analysis for engineering based Capstone Projects

Facilitators: Erik W. Larson, Darius Fadanelli - Altair

Abstract: This hands-on workshop introduces users to Altair's Conceptual Design tool called Inspire. Inspire allows all levels of students to perform Conceptual Design and Analysis on their projects. Inspire's ultra-modern user interface, backed by industry verified solver technology, allows for anyone to easily and quickly perform advanced static analysis and topological optimization and create lightweight yet structurally reliable designs. By the completion of the workshop, attendees will see the full capabilities of Inspire and how it can fit into a capstone project, allowing students to create an optimized and structurally sound design. Attendees will be provided with flash drive containing a temporary license, information on how to get a Free license of the software and free eBook of Inspire.

Workshop 2B: Tuesday June 7, 9:00am – 10:30am
ECSS 2.412

Title: Capstone and Experiential Learning Trends: Unpacking The Annual Benchmark Survey

Facilitators: David Comisford – EduSourced; Allyson Gibson, BYU

Abstract: So often when talking with a school we are asked: what are other schools doing in their capstones? Do they charge fees? Do they have multidisciplinary programs? Are there dedicated staff to support faculty? This session will help share that information and provide broad benchmarking data and anecdotes from across capstone programs. Year over year shifts will be highlighted.

Workshop 3A: Tuesday June 7, 10:45am – 12:15pm
ECSS 2.415

Title: Attracting Corporate Partnerships That Last

Facilitators: Mark Easley – Texas Instruments

Abstract: In this workshop, participants will learn how to find and retain industry partners using the existing networks available at the college and department levels. Tips will be shared on what strategies and methods are effective to motivate your industry contacts and showcase the value of participation within the capstone program.

Workshop 4A: Tuesday June 7, 5:15pm – 6:45pm
ECSS 2.410

Title: Translating Projects Into Startups: Activities to bridge capstone projects with innovation and entrepreneurship

Facilitators: Hadar Ziv, David Ochi - University of California Irvine

Abstract: With hundreds to thousands of students on a campus partaking in capstone courses as well as similar numbers taking advantage of innovation and entrepreneurship programs and competitions, it's not particularly shocking that more integration does not take place between these programs. With the large variety of sources for capstone projects, the coordination of students, competition rules, participant requirements, intellectual property issues, and a host of other nuances and challenges makes translating and coordinating between these programs seem non-trivial.

Below are a few of the key goals of the workshop for participants:

- Participants in this session will learn about a few of the key methods used in developing coordination between capstone projects and entrepreneurial programming.

- Participants will be led through a series of activities that will allow them to be introspective about their own programming and how they can apply these practices in their own institutions.

- Participants will have the opportunity to see how their learning outcomes are aligned with entrepreneurial programs on campus and develop an action plan to foster collaboration and cross-participation in these programs.

- Participants will learn how some capstone projects – particularly ones where the university and/or the students own the intellectual property – are natural fits for innovation and entrepreneurship programs and how to take advantage of these opportunities.

Workshop 4B: Tuesday June 7, 5:15pm – 6:45pm
ECSS 2.412

Title: How to use Canvas LMS to streamline project assignments and peer evaluations

Facilitator: Bonnie C. Roberts - Colorado State University

Abstract: Workshop Goals:

- Teach capstone instructors how to use Canvas to survey students on project preferences.

- Teach capstone instructors how to use Excel to assign students to a project based on preferences.

- Teach capstone instructors how to use Canvas for student peer evaluations.

- Teach capstone instructors how to use Excel to identify "areas of concern" based on peer evaluations.

Title: Cultivating Character Development in Capstone Design

Facilitators: Olga Pierrakos, Jesse B Pappas, Adetoun Yeaman, Jessica Koehler - Wake Forest University

Abstract: This workshop aims to engage the capstone design engineering education community in examining the role that capstone design can play in supporting character education and character development of engineering students. Capstone provides a fertile ground and a unique opportunity for students to habituate important character strengths and virtues such as creativity, teamwork, empathy, curiosity, resilience, intellectual humility, critical thinking, honesty, authenticity, leadership, etc. Such character strengths support students' individual personal development and their professional development as engineers. In this workshop, we will: (1) share knowledge about character education stemming from disciplinary traditions of philosophy and psychology, (2) showcase an engineering senior capstone design course sequence in which character strengths and virtues were infused, (3) describe lessons learned and student insights, and (4) engage all participants in knowledge sharing activities to facilitate course design to support character education. Our hope at the end of the workshop is the co-creation of a collection of best practices for character infused engineering capstone design learning experiences and building a community of practice within the capstone design community to facilitate shared learning and knowledge generation and exchange of resources relevant to character and ethics in the capstone context.

Workshop 4D: Tuesday June 7, 5:15pm – 6:45pm
ECSS 2.102

Title: The Transfer from Capstone to Work: Insights and Implications

Facilitators: Julie Dyke Ford – New Mexico Tech; Susannah Howe – Smith College; Daria Kotys-Schwartz – University of Colorado; Robin Ott - Virginia Tech; Marie Paretti – Virginia Tech

Abstract: Capstone to Work (C2W) is an NSF funded study of engineering students' transition from capstone design to initial employment after graduation. Participants were recruited from two recent graduating years across for institutions in the U.S. Data includes weekly surveys from these new engineers' first 12 weeks of work followed by interviews at 3, 6, and 12 months of work. The workshop will provide an overview of the capstone courses at each of the participating institutions and review findings from the C2W project. The findings described the work activities the new engineers engaged in during their first year, the challenges they experienced, and the strategies they used to address those challenges. The findings presented will focus on areas where their capstone courses did and did not prepare them for work, highlight key transferable skills, identify areas for enhancement, and note potentially unbridgeable differences. The workshop will include interactive sessions with the study's interactive data dashboard, and take home materials including course handouts and slides decks designed to help participants bring the findings from the C2W project directly to their students.