



2014 Capstone Conference Workshop Line-up

MONDAY, June 2nd 6:00 – 7:30 p.m. (with box dinner)

1. I Didn't Sign Up for This: Dealing with Difficult Students and Problem Teams
2. Framework for Engineering Design Learning and Assessment
3. Biomimicry = Engineering + Biology: Tools for Capstone Design
4. Using Requirements for Project Health Monitoring

TUESDAY, June 3rd 9:00 – 10:30 a.m.

1. Rapid Design of Embedded Systems with NI myRIO
--- OR ---
2. Tours/Local Activities

TUESDAY, June 3rd 11:00 – 12:30 a.m.

1. Student-Affordable Hardware and Design Tools for Capstone Projects
2. Using CATME to Assign Students to Capstone Teams
--- OR ---
3. Tours/Local Activities

TUESDAY, June 3rd 6:00 – 7:30 p.m. (with box dinner)

1. Coaching the Client: Collaborating with Sponsors to Maximize Student Learning
2. Formation and Deployment of a Capstone Course 'Blue Collar' Industrial Advisory Board
3. Task Planning - A Management Toolbox for Team Projects

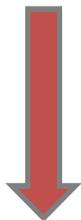
WEDNESDAY, June 4th 9 – 10:30 a.m. (Parallel to Panel Sessions)

Pathways to Innovation Program

WEDNESDAY, June 4th 11:00 – 12:30 a.m. (Parallel to Panel Sessions)

Case Studies in Use of Standards with Capstone Projects: A Multidisciplinary Approach

Workshop Descriptions below!





MONDAY EVENING WORKSHOP DESCRIPTIONS *(Select One)*

“I Didn’t Sign Up for this”: Dealing with Difficult Students and Problem Teams

Keith Stanfill (stanfill@ufl.edu)

Angela Lindner (alind@eng.ufl.edu)

Shari Robinson (sar1966@ufl.edu)

Capstone project mentors work on a more intimate professional basis with students than their colleagues who teach traditional lecture-based courses. It is not uncommon for mentors to get involved resolving team conflicts, counseling team leaders in handling nonproductive team members, and performing damage control on dysfunctional teams. These situations can have nothing to do with the sophistication and thoroughness of students’ technical training—i.e. team member immaturity, “bad apple” personality types, stress level, physical health, and mental health. This interactive workshop session will use role playing and facilitated discussion to explore coaching strategies for difficult project team situations. Workshop leaders include a Counseling and Wellness Center psychologist, an associate dean for student affairs in a large college of engineering, and a veteran capstone design instructor.

Framework for Engineering Design Learning and Assessment

Denny Davis (davis@wsu.edu)

Peter Rogers (rogers.693@osu.edu)

The goal of this workshop is to lay groundwork for a major proposal to fund the development of versatile assessments for engineering design learning and performance across undergraduate engineering programs. Desired outcomes include (1) set of design learning and performance outcomes for undergraduate engineering students (through all four years), (2) draft framework that identifies critical abilities necessary for design learning and performance (throughout entire curriculum), (3) proposal concept that can be developed into a versatile valid assessment for design learning and performance, (4) identified leadership for preparation of proposals for funding, (5) identified research collaborators, and (5) plan to prepare the proposal for submission.

Biomimicry = Engineering + Biology: Tools for Capstone Design

Darrell Kleinke (kleinked@udmercy.edu)

The application of biomimicry has led to many recent breakthroughs in engineering design, such as robotics inspired by rodents and cameras inspired by beetles. In this workshop, participants will study practical examples of biomimicry and explore techniques of varying difficulty. First, a simple tool, random association, will be utilized as a way to introduce students to biomimicry. Second, a moderately difficult tool, the Ask Nature taxonomy, will be illustrated as a vehicle for understanding applicable biological phenomena. Finally, an advanced tool, “bio-TRIZ”, will be examined for use by determined student innovators.

Using Requirements for Project Health Monitoring

Shradda Joshi (shraddj@g.clemson.edu)

Beshoy Morkos (bmorkos@fit.edu)

Joshua Summers (jsummer@clemson.edu)

The workshop illustrates how to systematically use requirements as a tool for monitoring project health throughout the entire design process. Requirements play a critical role in engineering design projects and much time is spent eliciting and documenting them. However, while requirements are frequently used to evaluate solution concepts, there are many other venues in the design process where these can add value. By the end of the workshop attendees will be able to measure ‘completeness’ and ‘specificity’ of requirements as well as better use these to monitor project health at all stages in the design process.



TUESDAY MORNING WORKSHOP DESCRIPTIONS

(You may choose to attend local tours OR morning workshops – see schedule for details.)

Rapid Design of Embedded Systems with NI myRIO

Mark Walters (mark.walters@ni.com)

Margaret Barrett (margaret.barrett@ni.com)

This hands-on workshop seeks to familiarize educators and students with embedded technology to complete real-world design projects in one semester or less. NI myRIO is an embedded hardware device designed for developing real, complex engineering systems more quickly using a dual-core ARM® Cortex™-A9 real-time processing and customize I/O with a Xilinx FPGA. In this seminar attendees physically setup an NI myRIO, write an embedded program in LabVIEW, and then visualize the results. The exercises are examples of how to leverage graphical programming for stand alone, deterministic systems. For more information on NI myRIO, visit: ni.com/myrio.

Student-Affordable Hardware and Design Tools for Capstone Projects

John Schneider (schneidj@eecs.wsu.edu)

In multiple studies it has been shown that outcomes in electrical and computer engineering lab-based courses are enhanced when the students own the equipment on which the labs are performed. Such ownership provides the students with around-the-clock access to equipment and fosters unconstrained exploration beyond the assigned work (with the added benefit of easing the departmental burden of providing both space and equipment). This workshop will highlight several of the ways products from Digilent Inc. have been used in a wide range of capstone design projects, including a controller for a quad-copter. Applications include analog electronics, embedded systems (microcontrollers), field programmable gate arrays (FPGAs), wireless devices, and various sensors and actuators.

Using CATME to Assign Students to Capstone Teams

Richard Layton (layton@rose-hulman.edu) Misty Loughry (moughry@georgiasouthern.edu)

Matthew Ohland (ohland@purdue.edu)

The CATME system provides free, web-based tools for helping faculty effectively manage student teams. These tools were reviewed favorably at the 2010 Capstone Conference, but participants expressed the need to make team assignments that account for student project preferences. That feature has since been added to the CATME system. The goals of this workshop are to introduce the new feature, reacquaint the audience with the other system tools, and show how the tools can be used together for effective management and training of student teams. Attendees with wireless-network-capable laptop computers will be able to interact with the system in real-time. The workshop leaders have collaborated for many years as part of NSF-sponsored grants to develop and disseminate the CATME system. The system works well for faculty who use teams in any course, including courses at all levels in the engineering curriculum.



TUESDAY EVENING WORKSHOP DESCRIPTIONS *(Select One)*

Coaching the Client: Collaborating with Sponsors to Maximize Student Learning

Chuck Pezeshki (pezeshki@wsu.edu)

Steven Beyerlein (sbeyer@uidaho.edu)

The client is often an underused ally in achieving capstone course goals. With proper coaching, clients can positively impact a multitude of capstone project issues, both social and technical. Without coaching, client actions can exacerbate common social and technical problems. It is incumbent on capstone faculty to cultivate positive relationships with their clients, increasing the likelihood of positive project and professional development outcomes. As part of this workshop, faculty will explore a number of scenarios related to faculty and client actions before project start-up and continuing through the capstone experience. A number of resources developed by the facilitators will be used to scaffold workshop activities. Each of the workshop leaders have more than 15 years of experience working with external capstone course sponsors that have generated more than \$1.5M of project funding for their respective programs.

Formation and Deployment of a Capstone Course 'Blue Collar' Industrial Advisory Board

Gregory Kremer, Ohio University (kremer@ohio.edu)

Terry Russell, Russell Consulting, Co-chair ME Industrial advisory board (trussell61@embarqmail.com)

Russ Tipton, Liebert Precision Cooling, Co-chair ME Industrial advisory board (russ.tipton@emerson.com)

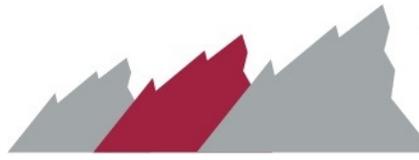
Participants in this workshop will have an opportunity to work on advancing the capstone design experience in their own programs through implementation or enhancement of a 'blue-collar' advisory board (a hands-on board that gets involved with direct mentoring of student projects). The workshop is based on 14 years of experience with capstone design, with the past 6 focused on "Designing to Make a Difference", a Year-Long Community-Based Capstone Experience in the Mechanical Engineering Program at Ohio University. This workshop highlights desirable outcomes supported by the "blue-collar" advisory board to date, explores how to recruit/orient members, outlines the evolution of the current tollgate management structure, and suggests productive ways to engage members in course assessment as well as program assessment.

Task Planning - A Management Toolbox for Team Projects

Margaret Heil (heil@ncsu.edu)

Robert Fornaro (fornaro@ncsu.edu)

This workshop provides a script for facilitating a formal one-hour project management session that helps groups of students leverage team strengths and identify team deficits that threaten accomplishment of project goals. Participants will receive materials and engage in small group activities that develop proficiency in (1) facilitating student discussions so that design tradeoffs are explored and project planning is emphasized, (2) reinforcing positive communication and leadership styles exhibited by students during small group meetings so that all team members gain ownership of project responsibilities, (4) modeling approaches to conflict resolution, and (5) mentoring students to visualize as well as articulate realistic project scope statements.



WEDNESDAY WORKSHOP DESCRIPTIONS *(no sign-up required)*

Pathways to Innovation Program

Phil Weilerstein (pweilerstein@nciia.org) Liz Nilsen (lnilsen@nciia.org)

Participants will engage in an experiential workshop designed to inform and support the development of a preliminary framework for integrating entrepreneurship in the capstone experience. This will begin with collaboration in generating of goals for acquisition and demonstration entrepreneurial skills within capstone project work. It will culminate in a group exercise to develop program models for achieving these goals. The workshop will build on the experience of current partners in the NSF-funded Pathways to Innovation program. Twelve institutions are participating in the 2013-2014 cohort and an additional 20 – 25 schools are being recruited for 2014-15 cohort. Interested participants will have the opportunity to learn about how their program can become part of this undergraduate engineering curriculum change initiative.

Case Studies in Use of Standards with Capstone Projects: A Multidisciplinary Approach

Susan Tatiner (s.tatiner@ieee.org)

The goal of this workshop is to show how using industrial standards in capstone projects can make them more relevant to students and future employers. Standards education promotes the importance of standards in meeting technical, economic, environmental, and societal challenges. The workshop will utilize a case study approach that captures technology, economics, and political issues addressed by industry standards. At the same time, the case studies will illustrate how standards offer strong technical and critical thinking components.