UNIVERSITY OF PITTSBURGH

4th Annual First Year Engineering Experience (FYEE) Conference

Enhancing the Success of First-Year Engineering Students

Conference Program

Benedum Hall
Pittsburgh, PA

August 9 – 10, 2012

SWANSON SCHOOL OF ENGINEERING

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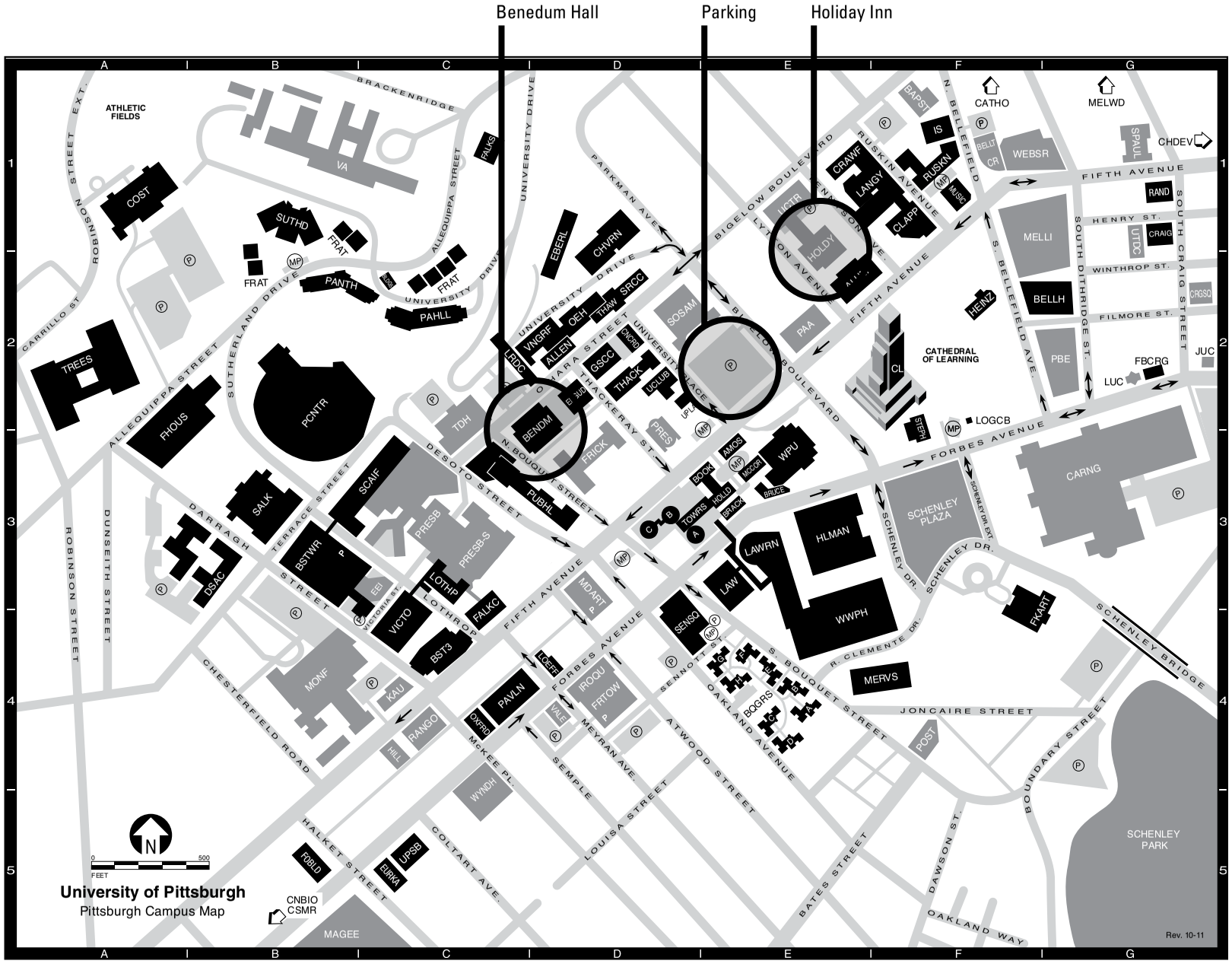
>> CAMPUS MAP


Benedum Hall
Parking
Holiday Inn
ATHLETIC FIELDS
BRACKENRIDGE
ROBINSON STREET EXT.
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ALLEQUIPPA STREET
SUTHERLAND DRIVE
UNIVERSITY DRIVE
PARKMAN AVE
BIGELOW BOULEVARD
FIFTH AVENUE
FORBES AVENUE
DESOTO STREET
TERRACE STREET
DARRAGH STREET
ROBINSON STREET
DUNSEITH STREET
CHESTERFIELD ROAD
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MEYRAN AVE
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LOUISA STREET
ATWOOD STREET
OAKLAND AVENUE
SENNOTT ST.
R. CLEMENTE DR.
S. BOUQUET STREET
JONCAIRE STREET
SCHENLEY DR.
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SCHENLEY BRIDGE
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DAWSON ST.
OAKLAND WAY
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McKEE PL.
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S. BELLEFIELD AVE.
SOUTH DITHRIDGE ST.
SOUTH CRAIG STREET
HENRY ST.
WINTHROP ST.
FILMORE ST.
CATHEDRAL OF LEARNING
SCHENLEY PLAZA
SCHENLEY PARK
CATHO
MELWD
CHDEV
LOGCB
TREES
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University of Pittsburgh
Pittsburgh Campus Map
Rev. 10-11

Allen Hall ..... ALLEN D2
Alumni Hall ..... ALUM E2
(Office of Admissions and Financial Aid, Office of Alumni Relations)
Amos Hall (residence hall) ..... AMOS E3
BAPST *(map abbreviation for First Baptist Church)*
• **Barco Law Building** ..... LAW E3
Bellefield Hall ..... BELLH G2
Bellefield Presbyterian Church ..... PRES D3
Bellefield Towers ..... BELLT F1
• **Benedum Hall** ..... BENDM D3
Thomas E. Starzl Biomedical Science Tower (Tower 1) and Biomedical Science Tower 2 ..... BSTWR B3
Biomedical Science Tower 3 ..... BST3 C4
The (University) Book Center ..... BOOK E3
Bouquet Gardens ..... BQGRS E4
(residence halls A–H)
Brackenridge Hall (residence hall, ... BRACK E3
Copy Cat, The Pitt Shop, Parking Office)
Bruce Hall (residence hall) ..... BRUCE E3
Building 5 ..... BLDG5 C2
• **Carnegie Library of Pittsburgh, Carnegie Museums of Pittsburgh** ..... CARNG G3
• **Cathedral of Learning** ..... CL F2
CATHO *(map abbreviation for Ryan Catholic Newman Center)*
Center for Bioengineering *off map* ..... CNBIO B5
Center for Sports Medicine and Rehabilitation *off map* ..... CSMR B5
Charles L. Cost Sports Center ..... COST A1
CHDEV *(map abbreviation for University Child Development Center)*
Chevron Science Center ..... CHVRN D1
Clapp Hall ..... CLAPP F1
Community of Reconciliation Building ..... CR F1
Concordia Club ..... CNCRD D2
Craig Hall ..... CRAIG G1
Craig Square ..... CRGSQ G2
Crawford Hall ..... CRAWF E1
Darragh Street Apartment Complex ..... DSAC A3
• **Eberly Hall** ..... EBERL D1
Engineering Auditorium ..... ENGUD D2
Eureka Building ..... EURKA C5
Eye and Ear Institute ..... EEI C3
Falk Medical Building ..... FALKC C3
Falk School ..... FALKS C1
First Baptist Church ..... BAPST F1
(United Campus Ministry)
Fitzgerald Field House ..... FHOUS A2
Forbes Craig Apartments ..... FBCRG G2
Forbes Oakland Building ..... FOBLD B5
Forbes Pavilion ..... PAVLN C4
(Forbes Hall [residence hall]; The Health Book Center; Department of Parking, Transportation, and Services)
Forbes Tower ..... FRTOW D4
Fraternity Housing Complex ..... FRAT B1, C2
• **Frick Fine Arts Building** ..... FKART F3
Gardner Steel Conference Center ..... GSCC D2
Heinz Memorial Chapel ..... HEINZ F2
Hill Building ..... HILL C4
• **Hillman Library** ..... HLMAN E3
Holiday Inn ..... HOLDY E1
Holland Hall (residence hall) ..... HOLLD E3
• **Information Sciences Building** ..... IS F1
Iroquois Building ..... IROQU D4
Jewish University Center ..... JUC G2
Kaufmann Medical Building ..... KAU C4
• **Langley Hall** ..... LANGY E1
LAW *(map abbreviation for Barco Law Building)*
Lawrence Hall ..... LAWRN E3
Learning Research and Development Center ..... LRDC C2
Litchfield Towers ..... TOWRS D3
(residence halls A, B, C)
Loeffler Building ..... LOEFF D4
Log Cabin ..... LOGCB F2
Lothrop Hall (residence hall) ..... LOTHP C3
Lutheran University Center ..... LUC G2
Magee-Womens Hospital ..... MAGEE B5
McCormick Hall (residence hall) ..... MCCOR E3
Medical Arts Building ..... MDART D3
(Student Health Service)
Mellon Institute ..... MELLI F1
(Pittsburgh Supercomputing Center)
Melwood Maintenance Building *off map* ..... MELWD G1
• **Mervis Hall** ..... MERVS F4
• **UPMC Montefiore** ..... MONF B4
• **Music Building** ..... MUSIC F1
• **Old Engineering Hall** ..... OEH D2
Oxford Building (3501 Forbes Avenue) ..... OXFRD C4
Panther Hall (residence hall) ..... PANTH B2
Parkvale Building ..... VALE D4
PAVLN *(map abbreviation for Forbes Pavilion)*
Pennsylvania Hall (residence hall) ..... PAHLL C2
The John M. and Gertrude E. Petersen Events Center ..... PCNTR B2
Pittsburgh Athletic Association ..... PAA E2
Pittsburgh Board of Education ..... PBE D3
Pittsburgh Science and Technology Academy ..... FRICK G2
Post Office (Oakland Branch) ..... POST F4
PRES *(map abbreviation for Bellefield Presbyterian Church)*
UPMC Presbyterian ..... PRESB C3
UPMC Presbyterian South Tower ..... PRESB-S C3
Public Health ..... PUBHL D3
(Crabtree and Parran Halls)
Rand Building ..... RAND G1
Rangos Research Center ..... RANGO C4
Ruskin Hall ..... RUSKN F1
Ryan Catholic Newman Center ..... CATHO F1
(The Oratory) *off map*
St. Paul Cathedral ..... SPAUL G1
Salk Hall ..... SALK B3
• **Scaife Hall** ..... SCAIF C3
Schenley Park G5
Schenley Plaza F3
Sennott Square ..... SENSQ D4
Soldiers and Sailors Memorial Hall ..... SOSAM D2
Space Research Coordination Center ..... SRCC D2
• **Stephen Foster Memorial** ..... STEPH F2
Sutherland Hall (residence hall) ..... SUTHD B1
• **Thackeray Hall** (registration) ..... THACK D2
Thaw Hall ..... THAW D2
• **Thomas Detre Hall of the Western Psychiatric Institute and Clinic** ..... TDH C2
TOWRS *(map abbreviation for Litchfield Towers)*
Trees Hall (athletic facilities) ..... TREES A2
University Center (UPMC) ..... UCTR E1
University Child Development Center *off map* ..... CHDEV G1
University Club ..... UCLUB D2
University Place Office Building ..... UPLAC D2
University Public Safety Building ..... UPSB C5
University Technology Development Center ..... UTDC G1
VA Pittsburgh Healthcare System—University Drive Division ..... VA B1
VALE *(map abbreviation for Parkvale Building)*
Van de Graaff Building ..... VNGRF D2
• **Victoria Building** ..... VICTO C4
Webster Hall ..... WEBSR F1
• **Wesley W. Posvar Hall** ..... WWPH E4
Western Psychiatric Institute and Clinic (see Thomas Detre Hall)
William Pitt Union ..... WPU E3
Wyndham Garden Hotel ..... WYNDH C5

Ⓟ Parking
Ⓗⓟ Handicap Parking
Ⓜⓟ Metered Parking
• Library in Building

LETTER FROM THE DEAN

Dear Engineering Colleagues,

On behalf of the University of Pittsburgh Swanson School of Engineering, welcome to FYEE 2012: Enhancing the Success of First-Year Engineering Students. The Swanson School is proud to host this event, and I hope you find the conference engaging and enlightening. I especially want to welcome our keynote speaker, Dr. Matthew Ohland, and I look forward to hearing his perspective on the first-year engineering experience.

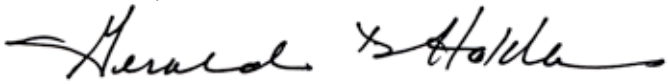
Simply put, the Swanson School's mission is "to produce highly qualified engineers and useful, creative research and technology," which would not be possible without our strong emphasis of the freshman engineering experience. Enhancing the academic and co-curricular experiences of our freshman students is a top priority and is the foundation of the quality undergraduate education we are committed to providing. From orientation week to the Freshman Seminar, our faculty and staff are dedicated to ensuring the success of our first-year students and helping them determine their goals as future engineers.

The success of our students during their freshman year translates throughout their undergraduate and graduate careers. Consider:

- Our first-year retention in engineering averages 88 percent, and is at 94 percent for those who start in engineering and remain at the University. Our graduation rate approaches 70 percent over six years.
- In just the past few years the Swanson School can claim:
  - 7 Whitaker Scholars
  - 6 Goldwater Scholars
  - 3 Fulbright Scholars
  - 2 Truman Scholars
  - 2 SMART Awards
  - 2 Boren Awards
  - 1 Rhodes Scholar
- The Mascaro Center for Sustainable Innovation offers two summer undergraduate research programs – the NSF IRES and the Undergraduate Research Program. This past year our student team lived in Brazil for four weeks and developed a sustainable, affordable bamboo frame system for use as a temporary shelter after natural disasters.
- Our co-op program, one of the first three to be established in the US, boasts a 60 percent student participation rate with nearly a 100 percent job placement rate upon graduation over the past three years.
- Micah Toll, a 2012 Mechanical Engineering and Materials Science graduate, was one of five finalists in *Entrepreneur* magazine's Young Entrepreneur of the Year Competition.
- Our undergraduate and graduate students played a significant role in the National Society for Black Engineers (NSBE) Conference held in Pittsburgh earlier this year, while bioengineering PhD candidate Soseena Wood was just named NSBE National Vice Chairperson.
- Joseph Rendemonti, a 2011 graduate with a *quadruple* major in bioengineering, chemistry, economics and psychology, was accepted to the Navy's elite Nuclear Propulsion Officer Candidate Program.
- The Swanson School is the top-ranked US school in percentage of doctoral degrees awarded to women in engineering, based on 2010-11 data released last month by ASEE. In the previous two annual reports, we were in second place.

In closing, I want to thank our fellow sponsors, the University of Notre Dame, the National Science Foundation, and the American Society for Engineering Education for their support. I also want to thank Dr. Dan Bundy, Director of our Freshman Engineering Program, for both his organization of this conference and the success of our freshmen. His dedication to our students was recognized this past February when he received the 2011 Professor of the Year Award from the American Society of Civil Engineers Pittsburgh Section. He, along with the other faculty and staff who work with our freshmen, both in and out of the classroom, are to be commended.

Sincerely,



Gerald D. Holder
US Steel of Engineering

>> CONFERENCE AT A GLANCE

THURSDAY, AUGUST 9

Noon – 5:00 p.m.	Registration – Third Floor of Benedum Hall
5:00 p.m. – 8:00 p.m.	Registration – University Club
1:00 p.m. – 2:45 p.m.	Workshops A and B– Benedum Hall Rooms 318 and 309
2:45 p.m. – 3:15 p.m.	Break – Third Floor of Benedum Hall
3:15 p.m. – 5:00 p.m.	Workshops C and D– Benedum Hall Rooms 318 and 309
5:00 p.m. – 5:30 p.m.	Tour of School Facilities
5:30 p.m. – 8:00 p.m.	Thursday Reception - at the University Club

FRIDAY, AUGUST 10

8:00 a.m. – 2:00 p.m.	Registration Open
7:00 a.m. – 8:00 a.m.	Welcoming Coffee/Tea and Juice
8:00 a.m. – 9:30 a.m.	Technical Sessions (F1)
9:30 a.m. – 10:00 a.m.	Break – Third Floor of Benedum Hall
10:00 a.m. – 11:30 a.m.	Technical Sessions (F2)
11:45 a.m. – Noon	Lunch Opening Talk – University Club
Noon – 1:30 p.m.	Lunch with Key Note Talk – University Club
1:30 p.m. – 2:30 p.m.	Technical Session (F3)
2:30 p.m. – 3:00 p.m.	Break – Third Floor of Benedum Hall
3:00 p.m. – 4:30 p.m.	Technical Sessions (F4)
4:30 p.m. – 5:00 p.m.	Conference Summary Session
5:30 p.m. – 11:00 p.m.	Bus Leaves for Dinner and Social Activities at PNC Park

WELCOME FROM THE GENERAL CO-CHAIRS

Enhancing the Success of First-Year Engineering Students
August 9 - 10, 2012
University of Pittsburgh

As a continuation of the Dialogue started at the University of Notre Dame and on behalf of the University of Pittsburgh, we welcome you to the First Year Engineering Experience. This 4th Annual First-Year Engineering Experience Conference is being held at The Swanson School of Engineering. The program committee welcomes you to Pittsburgh and hopes that you will find your time here enjoyable and valuable as you participate in the broad range of experiences that have been planned.

FYEE is a unique opportunity that allows attendees and presenters to discuss ideas, reflect on the topics and issues from the sessions, and chart new directions and collaborations. We hope to see many new faces at FYEE 2012, and that those who have attended previous conferences will join us for this one.

The FYEE program begins Thursday afternoon with a series of four workshops and a group discussion on topics related to the First Year, to set the tone for the proceedings. Invited facilitators from around the country will hold short workshops on important topics, during which the facilitator and attendees will have the opportunity to interact. The schedule is designed to allow attendees to participate in two workshops on Thursday afternoon. Following the workshops there will be a reception with light food and drinks where attendees will have the opportunity to meet, mingle and discuss the topics from the afternoon workshops.

Friday is a day of "Best practice" presentations, when selected attendees will present their work and show how it fits into the discussions from the previous days workshops. Friday will conclude with a summary session where the high points of the conference are summarized by teams of attendees. The conference concludes with a discussion of these talking points, and these presentations then become the starting workshops for the 2013 conference. For the attendees that decide to spend the night in Pittsburgh, Friday night is an evening of sharing and networking as presenters and attendees attend a social event at PNC Park the home of the Pittsburgh Pirates, to promote networking.

General Co- Chairs

Dan Budny, University of Pittsburgh
Ray Landis, CalState at LA
Kerry Meyers, University of Notre Dame
John Uhran, University of Notre Dame

CONFERENCE AFFILIATES AND SPONSORSHIPS

Conference sponsors and affiliates play an important role in supporting the FYEE conference. This support subsidizes the cost of the meal functions and special events. We appreciate these supporters and the part they play in making the 2012 FYEE conference an outstanding event.

The Annual First Year Engineering Experience Conference is supported by the University of Pittsburgh and Notre Dame University. The Swanson School of Engineering at the University of Pittsburgh is the host institution.

The conference also received start-up money from the National Science Foundation to help develop the mission of the conference.

In addition, the First Year Programs Division of the American Society for Engineering Education also supports the mission of this conference. Over 100 academic representatives are expected at this conference. Participants will include college deans, department chairpersons, and faculty in engineering and engineering technology, engineering student service staff and advisors, plus industry leaders from throughout the country. The majority of the attendees however, are engineering and engineering technology faculty.

University of Pittsburgh™

UNIVERSITY OF NOTRE DAME

National Science Foundation
WHERE DISCOVERIES BEGIN

AMERICAN SOCIETY FOR ENGINEERING EDUCATION (ASEE)

CONFERENCE HOST

The University of Pittsburgh

The University of Pittsburgh of the Commonwealth System of Higher Education is a nonsectarian, coeducational, state-related, public research university. Founded in a log cabin near the confluence of Pittsburgh's three rivers in 1787, it is the oldest institution of higher learning west of the Allegheny Mountains and has grown to international prominence.

The University of Pittsburgh is the most comprehensive educational complex in the tri-state area, enrolling about 34,000 students, and employing approximately 12,000 faculty members and staff. Pitt is a member of the prestigious Association of American Universities (AAU), an organization comprised of eminent North American research institutions.

As an international institution with strong local roots, Pitt fulfills a three-pronged mission of education, research, and public service. With its 132-acre main campus located in the Oakland section of Pittsburgh, it also serves western Pennsylvania with regional campuses in Bradford, Greensburg, Johnstown, and Titusville. Among the more than 90 academic, research, and administrative buildings and residence halls located at the main campus is the 42-story Cathedral of Learning, which is the second tallest academic building in the world.

The University of Pittsburgh Medical Center has achieved international prominence through pioneering efforts in human organ transplantation, including heart, liver, and kidney transplantation. The University's Schools of Health and Rehabilitation Sciences, Medicine, Pharmacy, and Public Health have all attained national and international recognition, as have the Swanson School of Engineering, the Katz Graduate School of Business, Graduate School of Social Work, the Graduate School of Public and International Affairs, and the School of Information Sciences. In addition, Pitt researchers have made substantial contributions to such diverse fields as anthropology, astronomy, computer science, bioengineering, psychology, and numerous other disciplines. Research activities are conducted at the University in its schools and in its 200 centers, institutes, laboratories, and clinics.

Numerous cultural and athletic events are sponsored by the University each year and are enjoyed by hundreds of thousands of area residents, including musical and theatrical presentations, as well as 18 athletic programs. As of 2008, the University had 29 libraries and special collections housing over 5 million volumes, 4.4 million pieces of microforms, nearly 25,000 subscriptions, and approximately 8,100 electronic journals, making the University Library System one of the leading facilities of its kind in the nation.

Swanson School of Engineering

Since 1846, the University of Pittsburgh's Swanson School of Engineering has been home to innovative processes and designs that have shaped our state, our country, and our world, both in the past and today.

The Swanson School continues its founding commitment to industrial, electrical, and mining engineering, the fields the world relies on for its energy and raw materials. The Swanson School also focuses on our health, our planet, and the ingenuity that keeps us competitive with recognized programs in bioengineering, sustainability, nanoscience and engineering, energy, manufacturing, and product innovation.

Our students explore the molecular world of nanoscience, and the multinational world market with programs based in South America, Europe, and Asia. The Swanson School of Engineering provides hands-on education in these areas, preparing engineering graduates through actual experience to enter exciting careers in advanced research and industry. Students find their place in the workforce through our established co-op program and working partnerships with engineering's top companies. Our faculty and staff represent countries around the world and are internationally recognized for providing excellent educational programs, for conducting cutting edge research, and for creating the partnerships that shape the industry.

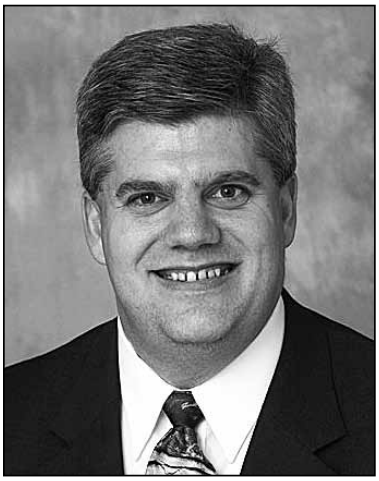
The mission of the Swanson School of Engineering is to produce highly qualified engineers and useful creative research and technology through academic excellence. The faculty and staff at the University of Pittsburgh Swanson School of Engineering are recognized for providing excellent educational programs, for conducting leading edge research, and for creating innovative industrial partnerships.

KEYNOTE ADDRESS

Friday, August 10, 1:00 p.m. – 1:20 p.m.
University Club
Sponsored by NSF

Key Note Discussion

Institutions have various ways of engaging first-year engineering students, including entry into formal First-Year Engineering programs, matriculation directly to specific engineering disciplines, and pathways that introduce students to engineering after completing general education requirements. The choices institutions make regarding how students first engage with engineering have consequences. Findings from the Multiple-Institution Database for Investigating Engineering Longitudinal Development (MIDFIELD) will be used to compare and contrast the impact of various approaches. Dr. Matthew Ohland, who has taught exclusively first-year engineering students for 12 years and has had a significant role in curriculum design and coordination at both Clemson and Purdue, will help frame these findings as evidence supporting the achievement of certain outcomes as well as recommendations for policy and practice.



Matthew W. Ohland - Purdue University Matthew W. Ohland is Professor of Engineering Education at Purdue University and has been elected a Fellow of the American Society for Engineering Education. His research on the longitudinal study of engineering students, team assignment, peer evaluation, and active and collaborative teaching methods has been supported by over $11.6 million from the National Science Foundation and the Sloan Foundation. With his research colleagues, he has received the William Elgin Wickenden Award for the Best Paper in the Journal of Engineering Education in 2008 and 2011. Dr. Ohland holds or has held leadership roles in ASEE's Educational Research and Methods division, the IEEE Education Society, and Tau Beta Pi, the national engineering honor society.

CONFERENCE AMENITIES

Meals and Social Events

Thursday

Reception and Tours
5:30 p.m.–8:00 p.m.

The Thursday night reception will take place inside the newly remodeled University Club. Join us for light finger food and refreshments while you network with your fellow conference attendees.

Benedum Hall of Engineering is in the middle of a major building transformation. Starting at 5:00 p.m. and going into the reception we will offer individual tours of the facility including our new state of the art computer assisted teaching classrooms.

- Tour our technology classrooms
- Tour the RFID Technology lab
- Tour the Nano Research lab
- Tour the Student Organization space and the Formula Race Car lab
- Tour the new research labs on the second floor, show the Lab Space and the Collaborative nature of modern engineering curricula

The reception is designed to allow attendees to meet fellow faculty and have the time to network and discuss engineering education topics in an open forum. The evening will have designed activities to encourage people to meet, learn about each other and explore related Engineering Education Topics. Come prepared to share ideas and make new friends.

After the reception you can enjoy time out with friends at one of the many fine restaurants within walking distance of the University. A map with a list of local restaurants can be provided, or just explore on your own.

Friday

Welcome Coffee and Juice
7:00 a.m.–8:00 a.m. – Third Floor of Benedum Hall

A light breakfast of coffee, juice and rolls will be provided in the Third Floor Common Area. Be sure to wear your name tag. Should you prefer, the hotel also has a very good restaurant that provides a more complete breakfast at a reasonable price.

Lunch

11:45 a.m. - 1:30 p.m. – University Club

Lunch will be at the University Club and include an opening and closing keynote presentation.

Activity – PNC Park

5:30 p.m. - 11:00 p.m.

The Friday social will be located at PNC Park, home of the Pittsburgh Pirates. The Pirates will be hosting the Padres, and everyone will receive a free Pirates jersey. The game ticket will be loaded with enough money so you can buy a dinner of your choice. Don't lose the ticket!! Join your fellow conference attendees for a meal to discuss the days activities. Then stick around and enjoy the game. Please note on your registration if you will be staying for dinner.

Refreshment Breaks – Third Floor of Benedum Hall

Morning and afternoon breaks – Thursday and Friday

We will be featuring refreshments during the morning and afternoon breaks on Thursday and Friday. Breaks will include coffee/tea, soft drinks, water and snacks.

FYEE Registration Conference Desk

Registration will be open during these times:

Thursday

Noon – 5:00 p.m. – Third Floor Benedum Hall
5:00 p.m. – 8:00 p.m. – University Club

Friday

8:00 a.m. – 2:00 p.m. – Third Floor Benedum Hall

Hospitality Table – Near Conference Registration

If you are looking for a certain kind of a restaurant, shop, golf course, or health club, stop by the hospitality table close to the registration area. Maps and brochures of area attractions will be available.

FYEE Message Center – Near Conference Registration

The conference will maintain a message board by the registration area. Messages received for conferees will be posted there. In an emergency, we will make every effort to locate you.

GUEST PROGRAM AND ABOUT PITTSBURGH

We realize that some people may bring a guest with them that will not be attending the conference. Pittsburgh provides bustling metropolitan activity, but without the big city hassles. The city's neighborhoods provide affordable housing with minimal commuting time. An excellent public transit system makes getting around easy. More information on the city can be found at www.pitt.edu/pittsburgh.

One of the many activities to do is visit the museums in the area. The Carnegie Museums of Art and Natural History are just steps from Pitt's campus, as is Phipps Conservatory and Botanical Gardens, and the Soldiers & Sailors Memorial Hall & Museum. Across the Allegheny River, you'll find the interactive exhibits of the Carnegie Science Center and Highmark SportsWorks, the pop art explosion of The Andy Warhol Museum, and the installation art of the Mattress Factory. Animal lovers can delight in the National Aviary or Pittsburgh Zoo and PPG Aquarium, while history buffs can visit Pittsburgh's past at the Senator John Heinz Pittsburgh Regional History Museum.

Finally no visit to the University campus would be complete without a tour of the University Nationality Rooms. The Nationality Rooms are located on the first and third floors of the University of Pittsburgh's Cathedral of Learning. The rooms were designed to represent the culture of various ethnic groups that settled in Allegheny County and are supported by these cultural groups and governments. Tours are conducted year round. The public is invited to experience their ethnic identity and ancestral roots. The rooms are also in use as University classrooms.

You can also enjoy a lunch or dinner at one of the many fine restaurants within walking distance of the University.

On Friday night the conference has planned a post-conference social activity at PNC Park, where the Pirates will host the San Diego Padres. If you are bringing a guest to the conference and would like to purchase a ticket for your guest just email the conference committee. The ticket price of $35.00 includes a $10 food voucher that can be used throughout the ballpark, and a Pirates jersey.

CONFERENCE TOPIC AREAS

Listed below is the topic Areas from the Call for Papers. Below each topic is a list of the papers in the various sessions that fall into these tracks.

Engineering Education Research

- T1A Workshop A - First-Year Engineering Program Workshop
- F1B Assessment Issues in the Freshman Year

Introduction to Engineering Courses

- F1C Approaches to the Freshmen Engineering Experience
- F2A Enhancing Success of Freshman Engineering Students
- F2B Introduction to the Engineering Disciplines
- F2C Experiencing Engineering Design During the Freshman Year
- F4A Service Learning Experiences in the First Year
- F4C Teaching the First Engineering Courses

K-12

- T2B Workshop D - High School Students Expectations of Engineering
- F4B Connecting K-12 Programs to the University

Living and Learning Communities

- F1A Value Added by Living Learning Communities

Service Learning

- T1B Workshop B - Service-Learning in Engineering, Technology and Computing
- F4A Service Learning Experiences in the First Year

Student Development Models

- T2A Workshop C - Student development: An alternative to “sink or swim”
- F1C Approaches to the Freshmen Engineering Experience
- F2A Enhancing Success of Freshman Engineering Students
- F3A Mini Workshop - Shaping a First-Year Course; Applying Quality Concepts to Swim Lessons
- F4B Connecting K-12 Programs to the University

Teaching the First Engineering Courses

- F1C Approaches to the Freshmen Engineering Experience
- F2A Enhancing Success of Freshman Engineering Students
- F2B Introduction to the Engineering Disciplines
- F2C Experiencing Engineering Design During the Freshman Year
- F4A Service Learning Experiences in the First Year
- F4C Teaching the First Engineering Courses

Understand OurStudents

- F1C Approaches to the Freshmen Engineering Experience
- F2A Enhancing Success of Freshman Engineering Students

REVIEWERS

The FYEE 2012 Program Committee wishes to thank the following 70 individuals for acting as abstract/paper reviewers. The program committee asked these individuals to help control the quality of the presentations at this year's conference by reviewing the submissions for FYEE 2012. Their outstanding effort has helped maintain the high standard that has become the reputation of each FYEE conference.

Name	Institution
Jim Collofello	Arizona State University
Carolyn Skurla	Baylor University
Raymond Landis	California State University, Los Angeles
Chris Hendrickson	Carnegie Mellon University
Lawrence Cartwright	Carnegie Mellon University
James Thompson	Carnegie Mellon University
Jeanne VanBriesen	Carnegie Mellon University
David Dzombak	Carnegie Mellon University
James Garrett	Carnegie Mellon University
Irving Oppenheim	Carrnegie Mellon University
Natalie Van Tyne	Colorado School of Mines
James Wong	Colorado School of Mines
Kay Godel-Gengenbach	Colorado School of Mines
Thomas Siller	Colorado State University
Gearold Johnson	Colorado State University
Christina Paguyo	Colorado State University
Eban Bean	East Carolina University
Ed Howard	East Carolina University
Rick Williams	East Carolina University
Sara Atwood	Elizabethtown College
Ramakrishnan Sundaram	Gannon University
Wendy Reffeor	Grand Valley State University
Christopher Pung	Grand Valley State University
Sung-Hwan Joo	Grand Valley State University
David Gray	Messiah College
Sandra Soto-Cabán	Muskingum University
Priscilla Nelson	New Jersey Institute of Technology
N. M. Ravindra	New Jersey Institute of Technology
Denis Blackmore	New Jersey Institute of Technology
Judith Redling	New Jersey Institute of Technology
David Lubliner	New Jersey Institute of Technology
Lisa Axe	New Jersey Institute of Technology
John Estell	Ohio Northern University
Christine North	Ohio Northern University

Kenneth Reid	Ohio Northern University
Debra Gallagher	Ohio Northern University
Heidi Diefes-Dux	Purdue University
Farshid Marbouti	Purdue University
William Oakes	Purdue University
Matt Ohland	Purdue University
Tracy Volz	Rice University
Ann Saterbak	Rice University
Tara Sulewski	The Pennsylvania State University
Liz Kisenwether	The Pennsylvania State University
Melissa Marshall	The Pennsylvania State University
Andrew Lau	The Pennsylvania State University
Denise Thorsen	University of Alaska Fairbanks
Lori Sowa	University of Alaska Southeast
Kellie Schneider	University of Arkansas
C. Richard Cassady	University of Arkansas
Heath Schluterman	University of Arkansas
Kathryne Van Tyne	University of Chicago
John Uhran	University of Notre Dame
Leo McWilliams	University of Notre Dame
Craig Lent	University of Notre Dame
Victoria Goodrich	University of Notre Dame
Jay Brockman	University of Notre Dame
Kerry Meyers	University of Notre Dame
Jaclyn Nord	University of Notre Dame
Dan Budny	University of Pittsburgh
Charles Pierce	University of South Carolina
Maria Hasenhuttl	University of Texas at Dallas
Simeon Ntafos	University of Texas at Dallas
Holly Matusovich	Virginia Polytechnic Institute and State University
Tamara Knott	Virginia Polytechnic Institute and State University
Robin Hensel	West Virginia University
Lizzie Santiago	West Virginia University
Mark Cambron	Western Kentucky University
Nathan Klingbeil	Wright State University
Tony Bourne	Wright State University

SESSION CHAIRS

The conference committee would like to thank the people that have agreed to act as session chairs at the 2012 First Year Engineering Experience Conference. Session chairs play an important role in ensuring the conference runs smoothly and that the technical presentations are a valuable experience for both speakers and attendees.

The primary responsibilities of session chairs are to:

- Help develop a title for the session that describes the focus of each paper.
- Contact the authors in the session to make sure they know which author will be presenting and how to pronounce their names.
- Introduce the session and make any FYEE announcements that are needed.
- Manage time during the session – hold each presentation to its time limit.
- Briefly introduce each speaker and paper.
- Manage audience questions, and ensure that presentations occur within their predefined time slots.
- Manage the end-of-session discussion period.

Session	Name	Institution
T1A	Kerry Meyers, Director Freshman Program	Youngstown State University
T1B	William Oakes, Director EPICS Program	Purdue University
T2A	Raymond B. Landis, Dean Emeritus of Engineering	California State University, Los Angeles
T2B	John Uhran, Retired Associate Dean of Engineering	University of Notre Dame
F1A	J. Bruce Elliott-Litchfield, Assistant Dean	University of Illinois at Urbana-Champaign
F1B	Teri Reed-Rhoads, Assistant Dean of Undergraduate Education	Purdue University
F1C	Simeon Ntafos, Associate Dean	University of Texas at Dallas
F2A	Nathan W. Klingbeil, Senior Associate Dean	Wright State University
F2B	Andy Lau, Director of Freshman Seminars	Pennsylvania State University
F2C	Jim Collofello, Associate Dean	Arizona State University
F3A	David A. Gray	Messiah College
F4A	Dan Budny, Director of the Freshman Programs	University of Pittsburgh
F4B	John Uhran, Retired Associate Dean of Engineering	University of Notre Dame
F4C	Kellie Schneider, Freshman Engineering Victoria Goodrich, Director First-Year Engineering Program	University of Arkansas University of Notre Dame

SESSION AND PRESENTATION CODES

Technical Session Coding: A three-character designator is used to identify each technical session, as in DTN, where:

D is a letter that designates the day of the session:

T designates Thursday sessions and papers.
F designates Friday sessions and papers.

T is a number that designates the time slot for the session. (See the program for exact session starting and ending times.) Technical session time slots are numbered consecutively throughout each day.

N is a letter that designates the parallel session within any time slot.

A is the first parallel session.
C is the third parallel session.

SESSION AND PRESENTATION TIMING

Technical sessions are 90 minutes long. Special sessions are allocated the entire time with the format determined by the nature of the session. All of the paper sessions within the same time slot will maintain the same starting time for papers as shown in the table below. This is to enable "session hopping," where papers of interest are in different sessions but are not presented at the same time.

If there is a "no-show" author in a session, the moderator will conduct an open forum on the session's theme between the presenters and the audience during this empty time slot. Papers MUST be presented at their scheduled time. No papers will be rescheduled.

Each technical paper session will consist of four (4) 15-minute segments. Each paper will be allotted 15 minutes for the presentation and questions. The moderator will use part of each of the 15-minute segments for introductions and instructions. The final 30 minutes of each session are for a group discussion. The design of the FYEE conference is to promote discussion and interaction. Thus, the sessions are not just people presenting material but also a place for people to share their insights on an issue. The discussion should be based on the theme of each session. The presentations should present ideas that the group can then discuss. Come to the session prepared to provide your insight.

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Paper times for sessions are shown in the table below. H designates session starting hour of the session: mm designates the session starting minutes. (For example, if the session starts at 3:30 p.m., then H=3 and mm=30.) The starting time of each paper is indicated by H:mm + X where X denotes the number of minutes to add to the session starting time. (For example, in a 90-minute session that begins at 3:30 p.m., the fourth paper, as shown in the second column, begins at H:mm + 45 so that H=3, mm=30 and X=45; the starting time is 4:15 p.m.)

SESSIONS	1 hour 30 mins	EXAMPLE 1	EXAMPLE 2
Session begins:	H:00	8:00	3:00
First paper	H:00	8:00	3:00
Second paper	H:15	8:15	3:15
Third paper	H:30	8:30	3:30
Fourth paper	H:45	8:45	3:45
General Discussion	H + 1:00	9:00	4:00

A few specific items for presenters:

The time allotted for both full and extended abstract papers at FYEE is 15 minutes for your talk, plus questions. You should rehearse your presentation to ensure that it will fit within these time limits.

The final 30 minutes of each session are for a group discussion. The design of the FYEE conference is to promote discussion and interaction. Thus, the sessions are not just people presenting material but also a place for people to share their insights on an issue. The discussion should be based on the theme of each session. The presentations should present ideas that the group can then discuss. Come to the session prepared to provide your insight.

Each of the session rooms will have both an overhead projector and an LCD projector connected to a computer. If you are planning to use PowerPoint, please bring two copies of your presentation on different media (e.g., a CD plus a memory stick) so that you have a back-up copy, just in case. You also could post a copy on your personal web site so that you can download it, if necessary.

Please be at your session room 15 minutes prior to the scheduled starting time. This will allow time to meet the session chair and other speakers, discuss session procedures, and preload all of the electronic presentations onto the computer in the session room.

>> THURSDAY WORKSHOPS

The conference will begin with four highly interactive workshop sessions – each topic area featured was selected for their timeliness and value. The workshops will provide concentrated professional development and the range of topics offers opportunities for everyone from new faculty members to the most experienced educators to expand their skills and knowledge.

Session 1: Thursday, 1:00 p.m. – 2:45 p.m.

Workshop 1-A •Room: 318 Benedum Hall

First-Year Engineering Programs

Matt Ohland, Purdue University
Kerry Meyers, University of Pittsburgh and University of Notre Dame
Holly Matusovich, Virginia Polytechnic Institute and State University

This workshop will present the elements of multiple successful but different First-Year Engineering programs including:

- program structures/program types
- content areas (computer programming, design, discipline specific projects, technical communication)
- administration and logistics (teaching, grading, etc.)
- advising

Workshop participants will be asked to share the aspects of First-Year Engineering programs that have been particularly successful (or unsuccessful) at their institutions. Finally, participants will have the opportunity to draft and present a First-Year Engineering Program Structure that would be possible at their institution.

Workshop 1-B •Room: 309 Benedum Hall

Service-Learning in Engineering, Technology and Computing

William Oakes, Purdue University
Dan Budny, University of Pittsburgh

Goal of the workshop is to guide participants through the process of how to integrate service-learning into their own courses. Service learning is a rapidly growing pedagogy in higher education and within engineering, technology and computing. Service-learning provides a learning environment that is very well-matched with ABET. Students can learn strong technical skills while developing teamwork, communication and leadership skills. The community and human context of service-learning provides rich learning experiences for contemporary social, global and ethical issues. Service-learning also provides the kind of curricular efficiency necessary to meet the attributes called for in the National Academy's Engineer of 2020. Evidence suggests that service-learning also has the potential to increase participation among underrepresented populations within engineering, technology and computing. This interactive workshop will provide an introduction to service-learning and allow participants to explore how it could be integrated into their own courses and curricula. Resources, partnerships and potential barriers will be discussed to provide strategies for successful implementation at the participants' own institutions.

Session 2: Thursday, 3:15 p.m. – 5:00 p.m.

Workshop 2-A •Room: 318 Benedum Hall

Student development: An alternative to "sink or swim"

Raymond B. Landis, California State University, Los Angeles

"Sink or Swim." For decades that policy has determined the success or failure of America's first-year engineering students. The general paradigm has been to put up a difficult challenge and "weed out" those students that don't measure up. Fortunately, engineering education in the United States is undergoing a revolution. We are in the process of a shift from the "sink or swim" paradigm to one of "student development." Engineering colleges all across the nation are revising their freshman year curricula with the primary goal of enhancing student success.

Basic concepts of "student development" defined as facilitating the growth, change, and development of first-year engineering students in areas that will enhance their success in engineering study will be discussed. Approaches for building first-year engineering students into a supportive community and for strengthening students' commitment to engineering will be described. Specific attitudes and behaviors that need to be changed will be delineated and pedagogical approaches for changing those attitudes and behaviors will be presented.

Topics for discussion are:

- Building students in an Intro to Engineering course into a supportive, learning community
- Strengthening the commitment of first-year engineering students through an Intro to Engineering course
- Facilitating change in the attitudes of students in an Introduction to Engineering course to those appropriate to success in math/science/engineering coursework
- Facilitating change in the behaviors of students in an Intro to Engineering course to those appropriate to success in math/science/engineering coursework
- Involving first-year engineering students in co-curricular activities

Workshop 2-B •Room: 309 Benedum Hall

High School Students Expectations of Engineering

Moderator: **John J. Uhran**, Jr. University of Notre Dame

Panelists: **Margaret Pinnell**, Dayton University

Ben Brubaker, PLTW Instructor, Reilly High School, South Bend IN

Matthew Modlin, PLTW Instructor, Reilly High School, South Bend, IN

Mary Ellen Scott, Director of Pre-Engineering, St. Joseph Academy, Cleveland, OH

HS and College students

What are High School students expectations of engineering and what do they see as necessary to move forward in the discipline. To help increase the interest of engineering within the K-12 student population we must first understand what these students are thinking. Thus, this session will include input from students within the University and students in High School. In addition various individuals involved with K-12 education will be present to provide their input. Two panels are planned for this session: one of High School and College students and the other of those involved in both teaching and studying high school students going into an engineering program.

SESSION F1A: VALUE ADDED BY LIVING-LEARNING COMMUNITIES

Chair: J. Bruce Elliott-Litchfield, Assistant Dean, University of Illinois at Urbana-Champaign

Time: Friday, August 10, 2012, 8:00 a.m. - 9:30 a.m. Benedum Hall 318

SESSION F1B: ASSESSMENT ISSUES IN THE FRESHMAN YEAR

Chair: Teri Reed-Rhoads, Assistant Dean of Undergraduate Education, Purdue University

Time: Friday, August 10, 2012, 8:00 a.m. - 9:30 a.m. Benedum Hall 309

SESSION F1C: APPROACHES TO THE FRESHMEN ENGINEERING EXPERIENCE

Chair: Simeon Ntafos, Associate Dean, University of Texas at Dallas

Time: Friday, August 10, 2012, 8:00 a.m. - 9:30 a.m. Benedum Hall

SESSION F2A: ENHANCING SUCCESS OF FRESHMAN ENGINEERING STUDENTS

Chair: Nathan W. Klingbeil, Senior Associate Dean, Wright State University

Time: Friday, August 10, 2012, 10:00 a.m. - 11:45 a.m. Benedum Hall 318

SESSION F2B: INTRODUCTION TO THE ENGINEERING DISCIPLINES

Chair: Andy Lau, Director of Freshman Seminars, Pennsylvania State University

Time: Friday, August 10, 2012, 10:00 a.m. - 11:45 a.m. Benedum Hall 309

SESSION F2C: EXPERIENCING ENGINEERING DESIGN DURING THE FRESHMAN YEAR

Chair: Jim Collofello, Associate Dean, Arizona State University

Time: Friday, August 10, 2012, 10:00 a.m. - 11:45 a.m. Benedum Hall

SESSION F3A: MINI WORKSHOP - SHAPING A FIRST-YEAR COURSE; APPLYING QUALITY CONCEPTS TO SWIM LESSONS

Chair: David A. Gray, Messiah College

Time: Friday, August 10, 2012, 1:30 p.m. – 2:30 p.m. Benedum Hall 318

SESSION F4A: SERVICE LEARNING EXPERIENCES IN THE FIRST-YEAR

Chair: Dan Budny, Director of the Freshman Programs, University of Pittsburgh

Time: Friday, August 10, 2012, 3:00 p.m. – 4:30 p.m. Benedum Hall 318

SESSION F4B: CONNECTING K-12 PROGRAMS TO THE UNIVERSITY

Chair: John Uhran, Retired Associate Dean of Engineering, University of Notre Dame

Time: Friday, August 10, 2012, 3:00 p.m. – 4:30 p.m. Benedum Hall 309

SESSION F4C: TEACHING THE FIRST ENGINEERING COURSES

Chair: Kellie Schneider, Freshman Engineering and Victoria Goodrich, Director First-Year Engineering Program, University of Arkansas and University of Notre Dame

Time: Friday, August 10, 2012, 3:00 p.m. – 4:30 p.m. Benedum Hall

"Best of the World" Pittsburgh: We've Got Energy

There's something for everyone to discover about Pittsburgh, ranked as a "best of the world, must-see destination" by National Geographic *Traveler*.

An "extreme metropolitan makeover" has infused the region with new energy, making it a choice live-work-play destination. Energy itself, above and below ground, is fueling the excitement about Pittsburgh.

Here, in one of the most innovative and greenest places anywhere, we're collaborating – like nowhere else – across academia, government and industry to answer the world's energy challenges and advance America's own energy security.

There's energy – and lots more – to discover in Pittsburgh. By foot, boat, bike and more, explore all that's "best of the world" here.

PITTSBURGH BEST of THE WORLD

PITTSBURGH: CENTER OF AMERICAN ENERGY

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>> 2013 CALL FOR PAPERS

FIRST YEAR ENGINEERING EXPERIENCE (FYEE) CONFERENCE

Enhancing the Success of First-Year Engineering Students

Early August 2013

University of Pittsburgh

We encourage everyone to consider attending the fifth in the series of Workshop/Conferences on First-year Engineering Education that will be held at the University of Pittsburgh's Swanson School of Engineering in early August 2013. The purpose of this meeting is to continue the dialogue on first-year engineering programs as a bridge between the end of high school and sophomore year. Of interest are the student experiences, success, failure, or adjustments in the first-level courses whether they occur in the first year during the traditional freshman experience or the second year when typically the majority of first-level engineering courses are taught.

We hope to engage the participants in a number of working sessions that will enable us to begin to understand how we might make engineering a more viable option as a field of study and career opportunity than it currently seems. You can either select an area of Engineering Education, Engineering Technology Education or other related area. The topic areas allow attendees to develop a network of people with common interests:

- Various approaches and strategies to teaching engineering courses appropriate for today's student
- Advances in Engineering Education Research as it applies to today's student
- Impact of K-12 education on our students
- The role of advising in the first year and how it impacts the students
- Effective uses of peer mentoring and/or student organizations
- Discuss the current technologies including social networks and their impact/use for today's student
- Discuss the various student development models and professional development of the student
- Diversity in engineering
- The value of Living and Learning Communities
- Integration of both business principles and the liberal arts to the curriculum
- Service learning in the freshman year and beyond
- Other topics that address issues in education

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We hope participants can begin to understand how to solve the drop in enrollments in engineering schools across the country by providing:

- A number of highly interactive special presentations - each topic area featured selected for its timeliness and value with respect to the theme of the conference;
- Various blocks of time devoted to paper presentations by selected conference attendees;
- A series of summary sessions to allow for interaction by participants and facilitators on the topics presented; and
- Social activities designed to promote attendee networking.

Co-sponsors of the conference are the Swanson School of Engineering at the University of Pittsburgh, the College of Engineering at the University of Notre Dame, and the National Science Foundation.

For details on the conference schedule, workshops and registration information, visit: http://fyee.org/

Questions can be referred to Dr. Daniel Budny, University of Pittsburgh at budny@pitt.edu

>> FRIDAY SESSIONS

Room	Benedum Hall Room 318	Benedum Hall Room 309	Benedum Hall Room 320
7:00 a.m. - 8:00 a.m.	**Good Morning Breakfast Refreshment** – Third Floor Benedum Hall *Sponsored by Swanson School of Engineering*		
8:00 a.m. - 9:30 a.m.	**Session F1A** Living Learning Communities	**Session F1B** Assessment Issues in the Freshman Year	**Session F1C** Approaches to the Freshmen Engineering Experience
9:30 a.m - 10:00 a.m	**Morning Break** – Third Floor of Benedum Hall		
10:00 a.m - 11:30 a.m	**Session F2A** Enhancing Success of Freshman Engineering Students	**Session F2B** Introduction to the Engineering Disciplines	**Session F2C** Experiencing Engineering Design During the Freshman Year
11:45 a.m - Noon	Role of Engineering Education Within Undergraduate-Focused Institutions and Graduate-Focused Institutions **Eric T. Baumgartner** – Dean of the T. J. Smull College of Engineering at Ohio Northern University *Location: University Club*		
Noon - 1:15 p.m.	**Key Note Luncheon** **Matthew W. Ohland** - Purdue University *Location: University Club* *Sponsored by NSF*		
1:30 p.m. - 2:30 p.m.	**Session F3A** **Mini Workshop** - Shaping a First-Year Course; Applying Quality Concepts to Swim Lessons **David A. Gray,** Messiah College		
2:30 p.m. - 3:00 p.m.	**Afternoon Break** – Third Floor of Benedum Hall		
3:00 p.m. - 4:30 p.m.	**Session F4A** Service Learning Experiences in the First-Year	**Session F4B** Connecting K-12 Programs to the University	**Session F4C** Teaching the First Engineering Courses
4:30 p.m. - 5:00 p.m.	**Conference Summary Session** – Hand Out Baseball Game Tickets		
5:30 p.m. - 9:30 p.m.	**Baseball Game at PNC Park**		

> > NOTES

SESSION F1A: VALUE ADDED BY LIVING LEARNING COMMUNITIES

Chair: J. Bruce Elliott-Litchfield, Assistant Dean, University of Illinois at Urbana-Champaign

Time: Friday, August 10, 2012, 8:00 a.m. - 9:30 a.m. Benedum Hall 318

REVIEW OF THE UNIVERSITY OF PITTSBURGH RESIDENT HALL SYSTEM

Dan Budny and Deena Kelly

The presentation will summarize the University of Pittsburgh Resident Hall System, including the Living Learning communities, the Faculty Associate Program, and the results of these programs on our students.

EXTENDED ABSTRACT - DISADVANTAGES OF ENGINEERING LIVING LEARNING COMMUNITIES

Sara A. Atwood

The benefits of living learning communities are well documented, and living learning communities are increasingly incorporated into the first year experience for engineering students in an effort to increase retention and performance. However, the disadvantages of living learning communities in engineering have not been similarly explored. We propose two primary disadvantages: 1) increased anxiety faced when leaving the major when it is appropriate, and 2) increased proximity and encouragement to work together on assignments, leading to a lack of individual responsibility for learning which may tempt more students to engage in academic dishonesty. This work-in-progress has four aims: 1) to start a discussion about these and other potential disadvantages of engineering living learning communities at other institutions, 2) to get feedback on survey questions and study designs to elucidate these disadvantages, 3) to hypothesize how strong and weak students may respond differently to these disadvantages, and 4) to brainstorm and gather solutions to mitigate these disadvantages.

EXTENDED ABSTRACT - ACHIEVING HIGHER RETENTION RATES THROUGH AN ENGINEERING LEARNING COMMUNITY AT A TRADITIONAL LIBERAL ARTS UNIVERSITY

Sandra Soto-Cabán

Two years ago, a learning community was developed in the Physics and Engineering Department at Muskingum University, a traditional liberal arts institution. The goal was to build a sense of community and belonging among freshmen engineering students, provide appropriate advising to enhance the likelihood of student academic success in the field, and improve the retention rate of the program. The learning community is comprised of the freshman design course and the First-Year Seminar course. First-Year Seminar provides students with a common academic experience during their first semester at the University. The course was modified for the engineering learning community to focus on learning skills and problem solving skills necessary for science and engineering students.

Students in this learning community have a faculty advisor from the Physics and Engineering Department. Amongst other things, the faculty advisor helps students selecting courses, making academic decisions, and locating and utilizing campus resources. This paper outlines the implementation of the learning community, the role of the faculty advisor, and a comparison of the retention rates in the last four years. Preliminary results show that retention rates improved during the years in which students participated in the learning community.

EXTENDED ABSTRACT – IMPROVING STUDENT ENGAGEMENT IN ENGINEERING

Lisa Axe, Judith Redling, Priscilla Nelson, David Lubliner, N. M. Ravindra and Denis Blackmore

In fall 2011, the Newark College of Engineering (NCE) in collaboration with the College of Science and Liberal Arts (CSLA) began implementing two initiatives focused on the first-year experience. Community Connections, NJIT's learning community program, was initiated through curricular-based cohorts in an effort to improve student engagement. Academic advisors and peer mentors play a critical role in these communities through co-teaching a first-year seminar, mentoring students, and tracking student progress in all courses. The second initiative currently in progress is implementation of the NSF ENGAGE project. NCE is among 30 schools selected to participate in this project, which is focused on improving retention of undergraduate engineering students using three research-based strategies. NCE and CSLA are supporting and leveraging these synergistic initiatives through monthly meetings in which instructors share experiences, course content, innovative teaching approaches, and overall best practices. Course material and strategies are shared through a community Moodle site.

SESSION F1B: ASSESSMENT ISSUES IN THE FRESHMAN YEAR

Chair: Teri Reed-Rhoads, Assistant Dean of Undergraduate Education, Purdue University

Time: Friday, August 10, 2012, 8:00 a.m. - 9:30 a.m. Benedum Hall 309

EXTENDED ABSTRACT-ATTRITION AND UNIVERSITY RETENTION

Lizzie Y. Santiago and Robin Hensel

Engineering attrition is a concern for first-year engineering programs and engineering colleges. The stress related to making the transition from high school to college has been suggested as one reason for the high attrition rate. Not only is there a disruption to student-family relationships, but students need to learn how to manage their time and resources, as well as to meet deadlines without the guidance and close supervision of parents and relatives. Many first-year engineering programs provide extensive academic and social support to help students make the transition and succeed academically. While necessary, are these programs sufficient to keep students in an engineering program? Are students who leave engineering academically successful in their non-engineering field of study? This study was designed not only to address why students transfer out of engineering, but to determine if those students who leave engineering are able to succeed in their new discipline and graduate from the university. All "engineering" students at this large land grant university in the mid-Atlantic region, both "calculus-ready and not calculus-ready," must complete a common "first-year experience" before moving to a discipline major. Students who are not calculus-ready at

entry usually take 1.5 to 2 years to complete the required courses, depending on their initial math placement. The authors studied 527 students who transferred out of engineering during their first or second year of that general engineering program. The students were mostly men who changed majors between January 2007 and December 2010. An exit questionnaire administered at the time of the transfer was utilized to determine their exit grade point average (GPA) and the reason for the switch. Furthermore, university databases were utilized to determine if those students were able to graduate from, or are still pursuing a degree at, the university. The number of students who withdrew from the university, were suspended, or never returned to the university was also assessed, as was the percent of students who left engineering, but were later readmitted into the program. Analysis of exit surveys provided insight into the academic characteristics of those first year students who transferred out of engineering, reasons why they left, and the degree to which these students persisted to degree completion in another major at the university. Results indicate that factors different from academic difficulty are leading to the change of discipline among general engineering students. Students who are in good standing academically are leaving engineering because they lack interest in the subject. Additional explanations are considered and presented, as well as the implications for potential intervention programs to address increasing student interest as well as academic success in engineering. The percentage of students who leave engineering and who also leave the university is a source of concern for both engineering and university administrators. Influencing factors for leaving both engineering and the university are explored and presented.

GRADING RELIABILITY OF TEACHING ASSISTANTS NEW TO ASSESSMENT OF REALISTIC OPEN-ENDED PROBLEMS

Farshid Marbouti and Heidi A. Diefes-Dux

Many first-year engineering courses enroll a large number of students. Open-ended problems are common in engineering courses. When implementing realistic open-ended problems in large educational settings with multiple instructors (or teaching assistants), it is a challenge to design valid and reliable assessment tools that can be consistently used to grade students' responses. The purpose of this study is to evaluate the reliability with which teaching assistants (TAs) who are new to assessing student work on realistic open-ended problems use a valid generic four-dimension rubric that is supported by problem-specific guides and designed to assess student work on mathematical modeling problems. The new TAs reliably used the rubrics seven items to score student work across all dimensions. From the analysis of the TA written feedback on the student responses that were scored differently by the TA and expert, three themes emerged: 1) TAs did not identify errors present in student responses, 2) TAs misunderstood the rubric items, 3) TAs correctly identified errors in student responses but scored the items incorrectly. These three issues can be addressed through modifications to the TA training and the problem-specific guides.

USE OF PASS/FAIL GRADING TO INCREASE FIRST YEAR RETENTION

Tom Siller and Christina Paguyo

Like many colleges of engineering we have been concerned about the retention of our first-year students. At CSU we recently implemented an experimental project that allowed first semester engineering students the option to take all of the courses using grading that was based on satisfactory or unsatisfactory (S/U) being the only options. This was optional and during the first year of the project we had approximately one-third of the students choose this option. In the second year we

had approximately 50% of the students choose this option. We completed a comparison between the project participants and the students who chose to not participate. A simple comparison of composite grade point averages (GPAs) for the two groups indicated that nonparticipants had higher GPAs at the end of the first semester than participants (using grades before the conversion to the S/U system.) This was consistent with a comparison of high school records; since the participants were self-selected, the data indicated slightly lower high school performances in terms of grades and standardized test scores for participants. The positive effect measured was in the retention data, where participants were retained both in the university and in the college at higher rates than the nonparticipants.

THE VALUE OF INTERVIEWS IN THE LONGITUDINAL ASSESSMENT OF A COURSE

Tamara Knott and Holly Matusovich

Qualitative assessments, such as interviews and focus groups, are an important part of developing and improving classroom learning experiences for students. Often these tools are implemented at the end of a course for immediate feedback. We argue that a longitudinal approach in the use of interviews is necessary to fully capture the impacts of a course because students need time to reflect on their learning. Through an on-going project, we are investigating the question, "How can a series of interviews over time be used in longitudinal assessment to benefit the development and improvement of first year engineering courses?" Situated in a self-regulated learning (SRL) conceptual framework proposed by Pintrich, we focus on preliminary results from a qualitative longitudinal assessment of students' experiences in a large, first year engineering course. Data include a series of interviews collected annually with the same participants over a three year period. Results suggest three key themes. First, it is challenging for students to reflect on the course and what they have learned while still enrolled. Second, as students are called on to use skills they realize how much they have learned. Finally, two years removed from the course students reflected positively on the course for providing learning experiences that subsequent courses have not afforded. The implications of this work are a need for researchers and practitioners alike to consider longer-term qualitative assessments as they design and develop courses.

SESSION F1C: APPROACHES TO THE FRESHMEN ENGINEERING EXPERIENCE

Chair: Simeon Ntafos, Associate Dean, University of Texas at Dallas

Time: Friday, August 10, 2012, 8:00 a.m. - 9:30 a.m. Benedum Hall

DEVELOPMENT OF A NEW FRESHMAN ENGINEERING POLICY

Carolyn Skurla

Historically, any student admitted to our university could declare an engineering major and enroll in lower division engineering courses. A 2.25 grade point average in lower division STEM courses attempted at our university was required for admission into upper division engineering courses. However, with a 110% increase in enrollment in freshman engineering courses from the 2001-2002 to the 2010-2011 academic year, we need an enrollment management policy that moves identification of at-risk students from the end of the 4th semester to the end of the 2nd semester. Initial multivariate regression analysis of data on students who attempted freshman engineering courses during this

time failed to identify predictors of success from data available at the conclusion of the 2nd semester. Before spring 2011 semester began, a pilot risk-factor analysis, based upon empirical evidence, was performed on one section of the 2nd semester freshman engineering course. All students identified as at-risk ultimately failed the course despite multiple outreach attempts and twice-weekly tutoring sessions. Risk-factor analysis was applied to the 1,600 students who enrolled in freshman engineering courses between 2001-2002 through 2010-2011 to enable the crafting of a new engineering admission policy, which will be effective in the 2013-2014 academic year.

A HOLISTIC APPROACH TO THE FRESHMEN ENGINEERING EXPERIENCE

Jim Collofello

All engineering schools must strive to evolve a new paradigm for undergraduate education that recognizes the evolution of the skills and learning styles of its incoming students and prepares them to tackle society's grand challenges of the future, while at the same time increases the probability of their success in their chosen engineering program. Most researchers and experts in the field agree on some basic tenants of retention, which include developing community amongst freshmen, creating connections for freshmen through meaningful interactions with returning students and faculty, engaging freshmen in active learning environments, helping freshmen understand and internalize the vision and mission of the school, and assisting freshmen to develop a personal identity as an Engineer [1,2,3]. This paper describes a holistic approach to the freshmen year developed over the last few years which includes and integrates an engineering camp, new freshmen courses, a career exploration event, undergraduate teaching assistants, an engineering residential community and intensive advising.

EXTENDED ABSTRACT – CREATING A FIRST-YEAR ENGINEERING PROGRAM WITH ONE FACULTY MEMBER: INTEGRATING COMMUNITY ENGINEERS AND PARTNER UNIVERSITIES TO CREATE A ROBUST FRESHMAN EXPERIENCE

Lori Sowa and Denise Thorsen

In an effort to increase the number of engineering graduates within Alaska, a one-year Pre-Engineering program was created at the University of Alaska Southeast, an open-enrollment liberal arts college. The program was created by hiring one engineering faculty member to teach freshman engineering courses and to advise pre-engineering students. The challenges faced by creating this "satellite" first year engineering program are much the same as those faced by community college pre-engineering programs, including meeting curricular needs for multiple independent engineering programs, creating a robust introduction to the field with limited faculty, and encouraging student transfer and engineering degree completion. Partnerships with the local engineering community and engineering degree-granting Universities through a freshman engineering seminar course and collaborative, blended distance/onsite course offerings are used to augment the curriculum. Initial response from students has been promising, with high retention and subsequent transfer rates among pre-engineering students (85.7% of students completing the Pre-Engineering certificate program transferred into a baccalaureate engineering program, n=7). The methods employed at UAS could be a model for other community college-University partnerships to enhance transfer and degree attainment rates.

A NEW FRESHMAN EXPERIENCE CLASS IN THE JONSSON SCHOOL

Simeon Ntafos and Maria Hasenhuttl

ECS 1200 – Introduction to Engineering and Computer Science is a new freshman experience class that was introduced as a degree requirement for all undergraduate majors in the School of Engineering and Computer Science and delivered for the first time in Fall 2011 (total enrollment of 667 in fall 2011, 59 in spring 2012). A main goal of the class is to improve freshman retention rates and graduation rates down the line. Several "best practices" were incorporated in the class including a section for students participating in a Living Learning Community, block scheduling (a section with students sharing at least two classes), star-instructors, Peer-Led Team Learning support, peer mentors. In this paper we report on the effectiveness of ECS 1200 using data collected during the 2011-12 academic year and projecting retention through pre-registration data for fall 2012. We discuss the relative effectives of the "best practices" that were employed and lessons learned. We also contrast ECS 1200 with UNIV 1010, a university wide freshman experience class (a graduation requirement for FTIC freshmen starting in fall 2011).

SESSION F2A: ENHANCING SUCCESS OF FRESHMAN ENGINEERING STUDENTS

Chair: Nathan W. Klingbeil, Senior Associate Dean, Wright State University

Time: Friday, August 10, 2012, 10:00 a.m. - 11:45 a.m. Benedum Hall 318

EPINEPHRINE, EMOTION, AND MEMORY

David A. Gray

This paper discusses deliberate actions chosen to promote emotional response with the intent to enhance student memory of things I have wanted them to remember. The purpose of this discussion is to foster interchange among us of successful things of this nature that we have done. The actions listed here include humor (Anna Russell's "Psychiatric Folk Song"), practicing graduation, yelling at the top of my lungs (it is fun to watch the levitation), safety pins, singing songs a cappella (what is a septuagenarian doing singing to us), stories (ones I cannot tell without emotion). Here is one quote from a student portfolio suggesting something is working. "I had a class MWF at 9:00 and everyone fell asleep, but then I realized I came to your class at 8:00 on Tuesday, and everyone stayed awake."

MULTIPLE PERSPECTIVES: KEY TO A NEW INTRODUCTORY ENGINEERING COURSE

Thomas J. Siller and Gearold R. Johnson

Concepts such as the Grand Challenges for Engineering in the 21st Century present the potential for a major shift in engineering education. Colorado State University developed a new first-year engineering course based on the concept of the grand challenges. We developed an approach to frame the in-class discussions called the divergent-convergent approach. This method encourages students to think broadly about the technical and non-technical issues society faces–diverging from a narrow disciplinary mentality. Then the class presentations and discussions converge towards technical discussions illustrating elementary engineering concepts. At this point, bringing the students back to readdress the major non-technical challenges completes the cycle. One of our main goals is to focus

students to critically analyze topics from multiple perspectives. The National Academy of Engineering's Grand Challenges provide an opportunity to make major changes in engineering education. To affect this change, faculty need to consider new pedagogies that fit the breadth of the types of projects engineers of the 21st century will face.

EXTENDED ABSTRACT-PRELIMINARY ASSESSMENT OF AN INTERCOLLEGIATE FRESHMAN ENGINEERING PROJECT ON CONTRASTING AUTOMATIC BLOOD PRESSURE MEASUREMENT METHODS

Lunal Khuon and Kevin Buckley

We describe a new intercollegiate freshman mini-project course, discuss its objectives, identify outcomes, report on results of an initial assessment, and discuss our plans to conduct additional assessment. The mini-project, titled "Automatic Blood Pressure Measurement," employs two novel educational approaches. First, we introduce freshman students to engineering design/development by contrasting several blood pressure measurement approaches implemented on different digital processors. This fosters innovation in design by providing students with a direct experience in investigating trade-offs between different approaches. Second, we use an intercollegiate team of faculty, from Biology, Nursing, Chemical Engineering, and Electrical and Computer Engineering departments, to present this course. This provides an opportunity for freshman students to gain insights directly from the experts in their respective fields and inherently demonstrates the multidisciplinary nature of engineering.

THE WRIGHT STATE MODEL FOR ENGINEERING MATHEMATICS EDUCATION: A LONGITUDINAL STUDY OF PROGRAM IMPACTS

Nathan Klingbeil and Tony Bourne

This paper summarizes an NSF-funded initiative at Wright State University to address the nationwide problem of math-related attrition in engineering. The approach involves the development of EGR 101 - a first-year engineering course replacing traditional math prerequisites for core sophomore engineering courses - along with a more just-in-time structuring of the required calculus sequence. Since its inception in fall 2004, the impact of the Wright State model on student retention, motivation and success has been widely reported. This paper includes previously unpublished results of a longitudinal study of program impacts at Wright State University, from student performance in math and engineering to ultimate graduation rates. Results show that the program has substantially mitigated the effect of incoming math preparation on student success in engineering across the entire range of incoming ACT math scores, which has more than doubled the average graduation rate of enrolled students. Moreover, it has done so without watering down the caliber of graduates, who have actually enjoyed a slight (but statistically significant) increase in graduation GPA. Finally, the approach has been shown to have the greatest impact on members of underrepresented groups, for many of whom the traditional engineering curriculum is simply not accessible.

SESSION F2B: INTRODUCTION TO THE ENGINEERING DISCIPLINES

Chair: Andy Lau, Director of Freshman Seminars, Pennsylvania State University

Time: Friday, August 10, 2012, 10:00 a.m. - 11:45 a.m. Benedum Hall 309

ENGINEERING EFFECTS: STRATEGIES AND SUCCESSES IN INTRODUCTION TO CIVIL ENGINEERING

Charles E. Pierce, Juan M. Caicedo and Joseph R.V. Flora

This paper describes the development, implementation, and assessment of engineering Environments for Fostering Effective Critical Thinking (EFFECTs) that serve as the core instructional materials in an Introduction to Civil Engineering course at the University of South Carolina. In this course, the goals are to i) expose first-year students to the disciplines of civil engineering, including environmental, geotechnical, structural, transportation, and water resources engineering; ii) provide opportunities for students to acquire fundamental knowledge in civil engineering, while gaining skills for success in a challenging academic environment; and iii) encourage students to recognize and develop critical thinking skills that will serve as the foundation for growth in engineering judgment. Based on a five-year review of this course, these three goals are being achieved in large part because of the educational strategies built into EFFECTs. This pedagogical approach integrates active learning techniques, reflective writing, and iterative engineering design into a framework centered on a driving question that relates to a real engineering context or problem. Student satisfaction and perception of learning earn consistently high ratings; hands-on activities and in-class interaction are two of the contributing factors. Most importantly, the course has had a measureable impact on sophomore retention.

IMMERSIVE GROUP PROJECTS FOR FIRST-YEAR CIVIL AND ENVIRONMENTAL ENGINEERING STUDENTS

Lawrence G. Cartwright, David A. Dzombak, James H. Garrett, Jr., Chris T. Hendrickson, Irving J. Oppenheim, James M. Thompson and Jeanne M. VanBriesen

The engineering curriculum at Carnegie Mellon University features substantive first-year courses taught within each department, and requires students to take two such courses before declaring their major. The course in Civil and Environmental Engineering treats three specialization areas, and engages students with immersive, hands-on, group projects in each area. The projects fulfill multiple educational objectives: students apply engineering science material conveyed in lectures and homework exercises; groups face numerous engineering design decisions involving trade-offs; students experience the dynamics of group work; and, groups must communicate through written reports and oral presentations. Each project involves hands-on activities conveying the questions of engineering interest in tangible terms. The environmental project addresses the reaeration of a body of water, modeled by the appropriate first-order differential equation. The construction planning project requires assembling an object with components from competing suppliers with different unit costs, modeled by Gantt charting and/or by deterministic queuing. The structures project features a truss design requiring trade-offs between strength and constructability, evaluated by its failure probability, and tested by the weight of the instructor. At the conclusion of each project the class observes the range of solutions presented by the different groups, at which juncture the instructors provide an overview.

EXTENDED ABSTRACT - ENHANCING SUCCESS OF ENGINEERING STUDENTS THROUGH A FIRST YEAR PROJECT BASED COURSE

W. David Harding, Samuel Bogan Daniels and Cheryl Q Li

Engineers must develop the ability to work productively in teams, to manage projects, and to communicate effectively within and outside of an organization. Many engineering students lack the organizational skills needed for academic success. Similar organizational skills, although more advanced, are required for managing engineering projects. The course Project Planning and Development seeks to develop these necessary skills while also promoting higher retention rates and increase student motivation, and beginning the transition to professional practice. Given the demands of adjusting to engineering study, students benefit greatly by beginning to learn these professional skills early in their engineering study and a key component of realizing this transition to engineering practice is the focus on project planning. Results of two previous studies relating to student learning outcomes are summarized here. The proposed work will involve assessing impacts of project planning skills on performance in upper level engineering courses and more broadly on student success. Student success will be assessed based on three sources of data. This will include focus groups of junior level students, a general measure of student success based on performance in coursework and progress toward degree, and end of course assessment of achievement of student learning outcomes.

EXTENDED ABSTRACT – ENGINEERS MAKE LIFE BETTER

Andrew Lau, Melissa Marshall, Liz Kisenwether and Tara Sulewski

Engineers have an ethical responsibility to contribute to the betterment of life. Engineers make life better is a more important and accurate message about engineering than the misconception that you have to excel at and love math and science. Students must learn and appreciate what leads to a good fulfilling life, and then incorporate those attributes into their work. Several initiatives are underway in the College of Engineering. One is the Engineering Ambassadors–sophomore and higher engineering students that through communication and leadership skills inspire pre-college and first-year students to challenge conventional ideas about science and engineering. Another is via design projects in Introduction to Engineering Design, a course that most first-year students must take. A third is a new one-credit first-year seminar, Sustainable State. This course leads students through an exploration of sustainability in four areas: transportation, waste, food and energy, and three dimensions: behavior, technology and projects on campus.

SESSION F2C: EXPERIENCING ENGINEERING DESIGN DURING THE FRESHMAN YEAR

Chair: Jim Collofello, Associate Dean, Arizona State University

Time: Friday, August 10, 2012, 10:00 a.m. - 11:45 a.m. Benedum Hall

USING THE ASME STUDENT DESIGN COMPETITION AS THE CULMINATING DESIGN AND BUILD EXPERIENCE IN A FRESHMAN LEVEL CAD/CAM COURSE

Wendy Reffeor, Sung-Hwan Joo and Christopher Pung

The culminating project in a freshman level CAD/CAM course introduces students to electromechanical and/or pneumo-mechanical systems and drivetrains. In addition, it provides a third opportunity for students to explore the design process and to complete a design and build project. Student groups participated in the ASME Student Design Competition, Energy Relay, to fulfill this requirement. Adherence to the formal design process was enforced and monitored through intermediate project submissions. The objective of learning the design process as well as completing a design and build project was achieved. As the assigned task was to design alternate energy powered cars, some teams did not take the opportunity to develop their skills in working with electromechanical systems seriously. Overall, using the ASME Student Design Competition as a basis for the freshman design experience was a success and will be repeated in future years based on the suitability of the design problem posed.

ASSESSING DESIGN CAPABILITIES FOLLOWING A CLIENT-BASED FRESHMAN DESIGN COURSE

Ann Saterbak and Tracy Volz

Authentic, client-based projects form the foundation of a one-semester freshman design course at Rice University. First-year students learn the engineering design process and use it to solve meaningful problems drawn from local hospitals, local community partners, and international communities. Learning outcomes for Introduction to Engineering Design (ENGI 120) are that students design a product that meets user-defined needs and realistic constraints; communicate effectively through written reports and oral/visual presentations; and work effectively on multidisciplinary teams. Assessment of students' knowledge of the design process was measured by asking students to critique the strengths and weaknesses of a Gantt chart. Statistically significant increases are seen for topics related to needs assessment, design context review, analysis and decision-making, time allotments, and the overall layout of the design process. No changes were seen in the topics of idea generation, building and testing, and documentation. Improvements to the course aimed at achieving student learning outcomes are described.

INTRODUCING THE ENGINEERING DESIGN PROCESS TO FIRST YEAR ENGINEERING STUDENTS

Eban Bean, Ed Howard and Rick Williams

In response to fourth-year students not applying the engineering design process as expected during capstone courses, a new course was developed to introduce the engineering design process to first year engineering students that does not rely on students having an understanding of engineering concepts. Introduction to Engineering Design is a required course that was initially offered in the

spring semester of 2012 (seven sections; 140 total students) and is designed to introduce students to the engineering design process. Course sections were divided into semester long teams of three or four students. Teams were presented with four project statements during the course, which required an engineered solution, with each project designed to emphasize different step(s) in the design process. After completing each project, students provided peer reviews and completed surveys on various aspects of the project. Additional assessment was obtained at the end of the course using a team work assessment tool, a student self-assessment of their mastery of the course objectives, and direct assessment of the final project presentation. While all survey and assessment results indicate that the objectives of the course were effectively met, the feedback will be used to make improvements to future offerings of the course.

THE FRESHMEN EXPERIENCE AT WESTERN KENTUCKY UNIVERSITY

Mark Cambron

This paper describes the freshmen experience at Western Kentucky University for electrical engineering students. Students take three engineering classes in addition to math, science, and general education classes. Three engineering classes are offered to electrical engineering students during their freshmen year. Pathways into the program are presented. Suggested curriculums are given depending on math placement. The first course described is a University Experience seminar focused on introduction to the engineering profession and university survival skills. The second course is traditional course in Digital Logic. The final course teaches design through robotics. Students must design and build an autonomous robot. During this design experience, the students solder components, fabricate a frame, and program a BASIC Stamp microcontroller.

SESSION F3A: MINI WORKSHOP - SHAPING A FIRST-YEAR COURSE; APPLYING QUALITY CONCEPTS TO SWIM LESSONS

Chair: David A. Gray, Messiah College

Time: Friday, August 10, 2012, 1:30 p.m. – 2:30 p.m. Benedum Hall 318

MINI WORKSHOP - SHAPING A FIRST-YEAR COURSE; APPLYING QUALITY CONCEPTS TO SWIM LESSONS

David A. Gray

Concepts from quality literature apply in many ways to shape and improve a First-Year Experience course. Process, process improvement, control charts, the hidden factory all may help to teach students to swim, not sink. Education psychology suggests taking into account student characteristics. We therefore consider the psychosocial characteristic of self-concept (self-efficacy). These issues come into play, 1) many think they know everything they need to succeed in college, 2) many, in fact have heard things (information) they must do but have never had anybody put the parts together in a functioning concept, and 3) Instructors must provide a new approach, or students will turn them off. The new approach taken here will be one highly based on quality concepts. The core concept is the hidden factory, the process is learning, the metric is grades interpreted in the language of control charts.

SESSION F4A: SERVICE LEARNING EXPERIENCES IN THE FIRST-YEAR

Chair: Dan Budny, Director of the Freshman Programs, University of Pittsburgh

Time: Friday, August 10, 2012, 3:00 p.m. – 4:30 p.m. Benedum Hall 318

SERVICE LEARNING FROM START TO FINISH: BUILDING A FIRST-YEAR PLAYGROUND DESIGN IN SOUTH AFRICA

Natalie Van Tyne, Kay Godel-Gengenbach, James Wong and Kathryne Van Tyne

The "humanitarian engineering" programs at a public engineering-oriented institution provide its graduates with a variety of readily applicable career skills, including the ability to work effectively in a global community. Our project involved the design and on-site construction of a playground at a school for disabled students in South Africa, involving a first year design team and a joint first- and third-year construction team. The project's major goals were aiding in the development of increased student mobility, ease of construction and maintenance, ease of student access, low material and labor cost, safety in use, and the creation of a sequence of play units that would work together seamlessly. Constraints included a one-week time frame to build the equipment on site, a highly compacted bare soil surface, limited access to power tools, and a $2,000 budget. Local acceptance is essential to viability, which was realized as students recognized the difference between actual and perceived needs, incorporated local materials and ideas to foster ownership, collaborated continually with school staff and sponsors, and demonstrated flexibility in both scheduling and implementation to its greatest advantage.

INTRODUCING ENGINEERING INTO THE DOMINICAN REPUBLIC CLASSROOM: TEACHER WORKSHOPS

Kenneth Reid, Debra Gallagher and Christine North

The IEEE Teacher In Service Program (TISP) enables teachers to effectively introduce engineering into the K-12 environment. The program consists of training for engineers to hold in-service workshops for teachers who then take hands-on engineering projects into their classroom. Teachers are provided with lesson plans (available in English and Spanish), tied to educational standards in the United States, all accessible on the website tryengineering.org. Each activity is designed to be inexpensive (often less than $10 for a classroom). This program has been successfully implemented throughout the United States for over ten years. Additionally, workshops have been implemented in other countries, including Malaysia, South Africa and Chile. The IEEE teamed with electrical engineering and engineering education faculty and students from Ohio Northern University to implement the TISP activities in a series of schools in impoverished regions in the Dominican Republic. This project allows the team to visit five schools and directly impact over 2000 students. The team will offer the initial workshops in May 2012, then visit the teachers to interview and conduct focus groups to assess the effectiveness of the workshops. A final assessment plan will be developed that will assist in assessment of other international offerings. This work-in-progress should be of interest to anyone working with international engineering education, especially within impoverished or developing countries.

DESIGNING FOR POVERTY ALLEVIATION: A FIRST-YEAR ENGINEERING CAPSTONE PROJECT

John K. Estell and Kenneth J. Reid

The engineering curriculum at Ohio Northern University includes a first-year introduction to engineering course sequence culminating in a semester-long design project. The focus of the project involves the design of a poverty alleviation device to address a specific need of the population of an impoverished country. The project requires multidisciplinary student teams to follow the engineering design process, prepare a formal written response to a Request for Proposals, provide regular verbal and written status reports, give an elevator pitch as part of an entrepreneurial competition, develop and test a prototype of their design, and report their results in both oral and written formats. The poverty alleviation requirement has allowed students to directly experience many of the learning outcomes specified in the ABET EAC criteria, including understanding engineering in a global and societal context, along with criteria typically found in a senior-level capstone course such as the ability to function in teams and to communicate effectively. Quantitative and qualitative assessment of the project showed that students felt the experience positively related to societal and realistic constraints.

ENGAGE, EMPOWER, AND EDUCATE THROUGH SERVICE LEARNING EXPERIENCES IN THE FIRST-YEAR SEMINAR COURSE IN ENGINEERING

Ramakrishnan Sundaram

This paper discusses the use of service learning activities to strengthen the student learning experiences in the critical entry-level course, First-Year Seminar course in Engineering, for undergraduate engineering majors. The First-Year Seminar in Engineering at our institution is offered once each year during the fall term. The redesign of this course was necessitated by the (1) disparate nature of the content from session to session (2) lack of continuity across sessions, and (3) absence of a common thread to bind the content of the course. For the incoming engineering student to receive both the holistic University experience and develop the ability to learn and retain fundamental engineering principles and practices, the course incorporated community-based engineering projects as the core theme. The students formed teams, and maintained team-based blogs to document their progress on the engineering project. Rubrics were developed to assess the performance of the students in the engineering projects.

SESSION F4B: CONNECTING K-12 PROGRAMS TO THE UNIVERSITY

Chair: John Uhran, Retired Associate Dean of Engineering, University of Notre Dame

Time: Friday, August 10, 2012, 3:00 p.m. – 4:30 p.m. Benedum Hall 309

THE IMPACT OF STEM ENRICHMENT OPPORTUNITIES ON SECONDARY SCHOOL STUDENTS

Benjamin R. Campbell and Robert W. Nickl

Attracting and retaining talented students is a central issue in freshman engineering education and can be impacted by experiences prior to college. We argue that Governor's Schools, which are statewide summer enrichment programs to engage talented middle school or high school students in a focused college-style curriculum, are useful models from which important insights about college and

career choices can be gleaned. This paper focuses on the Pennsylvania Governor's School for the Sciences (PGSS), a Science, Technology, Engineering, and Mathematics (STEM) enrichment program that graduated nearly 2,400 students over a 27-year period. We review the history and structure of PGSS and provide evidence of its similarity to a freshman engineering curriculum. We demonstrate the measurability of PGSS's impact by presenting outcomes from a recent alumni survey. Results illustrate the effectiveness of PGSS to inspire enthusiasm for STEM, and reveal program components that correlate with high retention in STEM majors through college. Finally, we argue for the value of PGSS and similar programs as venues for career exploration and recruitment into STEM fields.

STEM 2 STEM: TYING AN INCREASE IN ENGINEERING WITHIN K-12 TO THE REVISED EDUCATIONAL STANDARDS

Debra Gallagher

The STEM acronym has been circulating for quite some time in the K-12 educational community. While math, science and technology have been a regular part of the curriculum, Engineering has not. State and national standards are available for math, science, and technology, but while no K-12 standards are available for Engineering, the concepts addressed in the Engineering lesson plans clearly align with math, science and technology standards. Ohio Northern University is in its second year of workshops designed to introduce hands-on engineering concepts into the classrooms primarily within grades 5-10. The series of workshops involves a detailed introduction to the Common Core Standards for Mathematics and the Revised Science Standards in the state of Ohio. Hands-on activities designed to address these standards are introduced to the teachers along with success stories. Lesson plans are from the IEEE-sponsored tryengineering.org web site, TED.com and Engineering Go For it, eGRI.com The first year of the program recently culminated with a symposium, where teachers demonstrated the successes from their classrooms. This paper will describe the results of the assessment from our first cohort of teachers and describe the implementation of the program for those institutions interested in building upon these efforts.

THE TRANSFORMATION OF A COLLEGE OF ENGINEERING AND APPLIED SCIENCE SUMMER BRIDGE PROGRAM TO A STEM SUMMER BRIDGE PROGRAM FOR HISTORICALLY UNDERREPRESENTED ETHNIC STUDENTS

Kenneth Simonson and Carol Tonge-Mack

This paper will examine the Emerging Ethnic Engineers Program (E3) at the University of Cincinnati College and Engineering and Applied Science and its impact the success of underrepresented ethnic engineers (Africa American, Hispanic/Latino, and American Indian) students who enter and graduate from the college. The program's freshman to sophomore rate is 88% compared to <50% nationally, and the graduation rate is 58% compared to 39% nationally. The 58% graduation rate is equal to that of majority students in the college. There has been a national effort for the past thirty-plus years to increase the number of historically under-represented ethnic students who enroll and graduate from engineering. Programs commonly referred to as minority-engineering programs have been in the forefront of developing strategies to recruit and graduate these students. A summer bridge program is common component of a significant number of these programs. This paper will examine the bridge program and its role in the success of the E3 program, its expansion in 2009 to include ethnic STEM students from the college of Arts & Sciences leading to current discussions around transforming it from a CEAS program to a campus-wide STEM bridge program.

CREATING MODELS IN PATHWAYS TO ENGINEERING EDUCATION

Kamyar Khashayar and Artin Davidian

This paper describes the models for preparing the underprepared and underrepresented college students into Engineering Transfer Pathway and how it could be used as a model by other community colleges.

SESSION F4C: TEACHING THE FIRST ENGINEERING COURSES

Chair: Kellie Schneider, Freshman Engineering and Victoria Goodrich, Director First-Year Engineering Program, University of Arkansas and University of Notre Dame

Time: Friday, August 10, 2012, 3:00 p.m. – 4:30 p.m. Benedum Hall

PROJECT-BASED ORIENTATION COURSE FOR EE FRESHMEN: A MOTIVATIONAL INTRODUCTION TO ENGINEERING

Oscar N. Garcia

In 2003 the National Science Foundation funded a preliminary one-year study to consider the feasibility of a project-oriented Electrical Engineering curriculum in the newly created College of Engineering at the University of North Texas. At the end of this study, a proposal for such a curriculum in a nascent Department of Electrical Engineering was submitted, was funded, and ran for four years. The curriculum, strongly influenced by the first cognition and project-oriented course, has been operational and accredited by the Accreditation Board for Engineering and Technology. The course has evolved significantly in bi-annual offerings. This is a brief account of the original course goals and their changing implementation over the years.

IMPLEMENTING AN ENGINEERING APPLICATIONS OF MATHEMATICS COURSE AT THE UNIVERSITY OF ARKANSAS

Kellie Schneider, Heath Schluterman and C. Richard Cassady

One of the primary factors associated with retention of first-year engineering students is their performance in their first math class. Due to recent changes in math placement guidelines coupled with unprecedented growth in the College of Engineering, many students in the Freshman Engineering Program at the University of Arkansas begin their course of study one math class behind Calculus I. An Engineering Applications of Mathematics course has been developed, accepted by the Department of Mathematical Sciences as a prerequisite for the Calculus I course, and offered to a total of 271 students. In addition, the number of students entering the program two math classes behind Calculus I has increased significantly as well. Therefore, a pilot course that will prepare these students for Calculus I their second semester has been developed.

TEACHING MATLAB IN FIRST-YEAR ENGINEERING: A GUI TOOL DIRECTED APPROACH

Craig S. Lent, Jay Brockman, Victoria Goodrich and Kerry Meyers

We describe an approach to teaching MATLAB that focuses on student-written computational models with a graphical user interface (GUI). The curriculum teaches the basics of programming but emphasizes getting as soon as possible to GUI tool development. Students learn a straightforward process for constructing a computational model of a physical system, and then attaching it to a GUI.

EXTENDED ABSTRACT – DEVELOPMENT OF AN INTERACTIVE, SELF-DIRECTED LEARNING TOOL FOR FIRST-YEAR PROGRAMMING

Victoria Goodrich, Jaclyn Nord, Kerry Meyers, Leo McWilliams and Jay Brockman

In this work, we present the "Docens Learning Tool," an automated study tool developed for use in the MATLAB environment to provide numerous practice problems with real-time evaluation. This learning tool provides students with an opportunity to read a problem description, write and debug a code segment, and submit the program for evaluation. Docens Tool was created completely within the MATLAB environment, the programming environment taught in the first-year engineering course. This work focuses largely on the features of the Docens "Learning" Tool, including future expansions to other instructional tool development. In addition, we will review the initial launch of the tool in the spring 2012 semester of the first-year engineering course at the University of Notre Dame. This class contains approximately 400 students across all engineering disciplines with a wide variety of programming backgrounds. In short, students were provided with the tool as a study aid several weeks before a live, timed programming exam in the course. Participation was voluntary, and it was not tied to student grades in any way.

>> AUTHOR INDEX

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P

R

S

T

U

V

W

University of Pittsburgh

Swanson School of Engineering
Benedum Hall
3700 O'Hara Street
Pittsburgh, PA 15261