TUEE

Transforming Undergraduate Education in Engineering

Phase IV: Views of Faculty and Professional Societies

April 18-19, 2017 | Renaissance Washington, DC Downtown Hotel

NSF

ASEE
AMERICAN SOCIETY FOR ENGINEERING EDUCATION

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TUEE Transforming Undergraduate Education in Engineering
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Background and Purpose

Transforming Undergraduate Education in Engineering (TUEE) is a multi-phase initiative that seeks to identify the critical components of engineering curricula, pedagogy, and educational culture necessary to transform the education of engineers over the next decades of the 21st century. This initiative also seeks to create a shared vision on the future of engineering education by (a) bringing together diverse and varied members of the engineering community for catalytic workshops, (b) identifying the steps needed to achieve the shared vision outlined by the community, and (c) practicing continuous improvement and shared coordination amongst engineering education stakeholders to ensure these steps are being taken. The overarching goal of this project is to determine what aspects of current engineering education should be maintained and what areas should be changed in order to best meet anticipated challenges and opportunities.

Funded by the National Science Foundation (NSF) and led by the American Society for Engineering Education, the project is comprised of five distinct phases:

- Phase I: Synthesizing and Integrating Industry Perspectives
- Phase II: Insights from Tomorrow's Engineers
- Phase III: Voices on Women's Participation and Retention
- Phase IV: Views of Faculty and Professional Societies
- Phase V: Mobilizing the Community for Change

Statement of Expectations and Outcomes

The focus of TUEE Phase IV is on an invited group of individuals from professional societies, academia, industry, and federal agencies reviewing the findings of the first three phases of the initiative; discussing these findings in facilitated meetings; and recommending changes to curricula and pedagogy to better prepare graduates to meet industry expectations for today and in the future.

Framework for Workshop Conversations:

1. What role professional societies should play in influencing changes in curricular/pedagogy in academia.
2. What role professional societies can and should play in providing experiential learning opportunities.
3. How professional societies can assist in affecting curricular and pedagogical changes within the constraints of academic environments.

Workshop Agenda

Tuesday, April 18, 2017

8:00 AM	-	8:30 AM	**Breakfast**
8:30 AM	-	9:00 AM	**Welcome and Setting the Stage** *Norman Fortenberry,* Executive Director, American Society for Engineering Education *Don Millard,* Acting Division Director and Deputy Division Director of the Engineering Education and Centers Division, National Science Foundation *Ashok Agrawal***,** Managing Director, American Society for Engineering Education
9:00 AM	-	10:00 AM	**Session 1: Identifying Critical Competencies for Engineering Students** Review and discussion of results from the Delphi Process *Russ Korte,* Associate Professor, Colorado State University *Christine Grant*, Professor, North Carolina State University
10:00 AM	-	10:15 AM	**Break**
10:15AM	-	12:15 PM	**Session 2: Final Refinement of Competencies** What final modifications are needed from the results of the Delphi Process? Should any competencies or KSAs be given a higher priority in implementations? *John Krupczak* Professor, Hope College
12:15 PM	-	1:45 PM	**Lunch and Remarks from NSF** *Heather Watson*, Program Director, National Science Foundation
1:45 PM	-	3:15 PM	**Session 3: Assessment of Competencies** How do we know students have obtained the desired competencies? *John Krupczak* Professor, Hope College
3:15 PM	-	3:30 PM	**Break**
3:30 PM	-	5:00 PM	**Session 4: Curriculum Locations** Which competencies can and should be addressed through curricular and/or pedagogical changes? *Ingrid St. Omer,* Senior Instructor, Virginia Tech
5:30 PM	-	7:00 PM	**Dinner and Recap of Day 1 Discussion**

Wednesday, April 19, 2017

8:00AM	-	8:30AM	**Breakfast**
8:30AM	-	8:45AM	**Setting Expectations for Day 2** *Ashok Agrawal,* Managing Director, American Society for Engineering Education
8:45AM	-	10:15AM	**Session 5: Role of Professional Societies in Experiential Learning and Influencing Changes in Curriculum** What role can professional societies play in providing experiential learning opportunities? *Ingrid St. Omer,* Senior Instructor, Virginia Tech
8:15AM	-	10:30AM	**Break**
10:30AM	-	12:00PM	**Session 6: Improving Academic Environments** How can professional societies assist in affecting curricular and pedagogical changes within the constraints and mechanisms of academic environments? *Christine Grant* ,Professor, North Carolina State University
12:00PM	-	1:30PM	**Lunch and Closing Remarks** *Heather Watson,* Program Director, National Science Foundation *John Krupczak,* Professor, Hope College *Ashok Agrawal,* Managing Director, American Society for Engineering Education

Planning Committee

Ashok Agrawal

Ashok Agrawal is the managing director for professional services and director of external affairs at the American Society for Engineering Education. Agrawal holds a Doctorate in Management degree from the University of Maryland University College, an MS degree in Materials Science, an MS degree in Mining Engineering from the University of Kentucky, and a BS degree in Metallurgical Engineering from Nagpur University in India. Prior to assuming his present position, he was the vice president for Academic Affairs, dean of the Math, Science, Engineering, and Technology Division at St. Louis Community College at Florissant Valley. Over the last 35 years Agrawal has served as a faculty member and administrator of engineering science and engineering technology Associates and Baccalaureate programs and has many professional and academic positions. An ASEE Fellow, Dr. Agrawal is the recipient of 2012 James H. McGraw Award and 1996 Frederick J. Berger Award, and also the 2003 Governor's Award for Excellence in Teaching.

Christine Grant

Christine Grant is a full professor of Chemical and Biomolecular Engineering. As the Associate Dean of Faculty Advancement in the College of Engineering, she implements innovative initiatives supporting COE faculty, leads College RPT processes and crafts initiatives for STEM broadening participation. One of less than ten African¬American women full CHE professors in the nation, she received CHE degrees from Brown (Sc.B., 1984) and Georgia Tech (M.S., 1986; Ph.D. 1989). She's received the: AAAS Mentor Award, NSF Presidential Award for Excellence in Science, Math and Engineering Mentoring (PAESMEM), American Institute of Chemical Engineers Minority Affairs Committee Pioneers of Diversity Award. She is a Life Member of the Society of Women Engineers and AIChE and an AIChE Fellow. A co-editor of "Success Strategies from Women in STEM: A Portable Mentor"; she's done STEM policy work as a Visiting Senior Scholar at AAAS, an Expert in NSF's Engineering Directorate, and a Boeing Senior Fellow of the National Academy of Engineering.

Russell Korte

Russ Korte is an Associate Professor of Organizational Learning, Performance, and Change at Colorado State University. Dr. Korte studies the socio-cultural systems in organizations and their effects on learning and performance in school and the workplace. This work focuses on engineering students, faculty, practicing engineers, medical students, and teachers. Prior to Colorado, Korte was at the University of Illinois at Urbana-Champaign where he helped redesign the first year engineering program as a Fellow with the Illinois Foundry for Innovation in Engineering Education and was a member of the Academy for Excellence in Engineering Education—a faculty development program at the University of Illinois. Earlier, he was a research assistant for the Center for the Advancement of Engineering Education at the University of Washington. Additional research interests include theory, philosophy, social science, workplace learning and performance, socialization, professional education, and organization studies.

John Krupczak

John Krupczak holds a Ph.D. in Mechanical Engineering and has served as an engineering faculty member for nineteen years. He teaches courses on engineering fundamentals as well as engineering and STEM literacy for non-engineers. Dr. Krupczak is an active member of the American Society for Engineering Education (ASEE) and has served as Chair of the Liberal Education Division and was founding chair of the Technological and Engineering Literacy Division. He has been a Senior Fellow of the Center for the Advancement of the Scholarship of Engineering Education (CASEE) of the National Academy of Engineering. From 2013-2016 he was a Program Director in the Division of Undergraduate Education at the National Science Foundation.

Ingrid St. Omer

Dr. Ingrid St. Omer is currently a faculty member at Virginia Tech in the department of Engineering Education. She was previously a member of the University of Kentucky Department of Electrical & Computer Engineering and the founding Co-Principal Investigator for the ten-institution Kentucky – West Virginia Alliance for Minority Participation. Prior to earning her doctorate, she worked in industry at Rosemount Inc., attaining the rank of Senior Engineer and Engineering Supervisor. Upon completion of her Ph.D. at the University of Missouri-Columbia (MU), she served as a Visiting Assistant Professor in the MU Department of Electrical Engineering, a Research Associate and President's Postdoctoral Fellow at the University of Minnesota, and as an Assistant Professor and Director of the Advanced Microelectronics Laboratory at Northern Arizona University. Dr. St. Omer has been an active member of IEEE, MRS, and ASEE. She has also held several leadership positions at the national level.

Workshop Attendees

Kashy Aminian

Professor of Petroleum & Natural Gas Engineering at West Virginia University, has over 35 years of distinguished service in both industry and academia. He holds a Ph.D. from University of Michigan. He has an extensive publication record in the areas of unconventional natural gas development and reservoir modeling. He serves on Society of Petroleum Engineers (SPE) Education and Accreditation Committee and has served on the Engineering Accreditation Commission.

Dr. Paul J. Benkeser

Dr. Paul J. Benkeser received the B.S. degree in Electrical Engineering from Purdue University in 1981 and the M.S. and Ph.D. degrees in Electrical Engineering from the University of Illinois in 1983 and 1985 respectively. His current position is Professor and Senior Associate Chair in the Wallace H. Coulter Department of Biomedical Engineering at Georgia Tech and Emory University. Dr. Benkeser is an American Institute of Medical and Biological Engineering (AIMBE) Fellow, a member of the Biomedical Engineering Society (BMES), a member of the American Society for Engineering Education (ASEE) and a senior member of the Institute for Electrical and Electronics Engineers (IEEE). Dr. Benkeser has over 15 years of experience as an ABET program evaluator and team chair. He currently represents the BMES on the ABET Board of Delegates.

John Blake

John Blake is a Professor of Engineering Technology at Austin Peay State University in Clarksville, TN. He received his B.S., M.S., and Ph.D. in Mechanical Engineering from Northwestern University, and is a registered Professional Engineer in the State of Tennessee. He has taught in both engineering and engineering technology (B.S. level) programs and served as chair of the Engineering Technology Department at APSU.

Patsy Brackin

Patsy Brackin is a professor in mechanical engineering at Rose-Hulman Institute of Technology where she also serves as Director of Engineering Design. Her B.S. and M.S. are from the University of Tennessee, and her Ph.D. is from Georgia Institute of Technology. She has significant industrial experience and is a licensed professional engineer. She has been involved in several areas of ABET accreditation - she has served as her departmental ABET coordinator, a member of ASME's Committee on Engineering Accreditation, program evaluator, team chair, and is a current member of the Executive Committee of the EAC where she also chairs the Criteria Committee.

Peggy Brouse

Dr. Peggy Brouse has over forty years of practical and academic experience in Systems Engineering. She is an associate professor in the Systems Engineering and Operations Research department at George Mason University. and the Director of the Cyber Security Engineering program. She designed the Mason undergraduate and graduate program in Systems Engineering over 20 years ago. Before Mason, Dr. Brouse worked as a Program Director at the MITRE Corporation where she managed projects for NIH, USDA and the US Navy. At the U.S. Army Computer Systems Command, she was a Systems Analyst, and Programmer for the Army Civilian Payroll System (STARCIPS). Dr. Brouse is a member of the IEEE and INCOSE. Within INCOSE, she served as the director of the Academic Forum. Degrees earned include a BS in Computer Science from the American University; MBA from Marymount University; and a Ph.D. in Information Technology and Engineering from George Mason University.

Christopher Carr

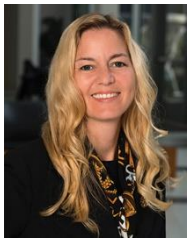
Christopher Carr is the Director, Collegiate and Professional Programs at the National Society of Black Engineers (NSBE). He is the World Headquarters representative for the 232 NSBE collegiate chapters and 63 professional chapters around the world at conferences, workshops, panels, and webinars. Christopher mainly works in the area of STEM education and policy, with a particular passion for access to opportunity, diversity in STEM, and education retention. Christopher holds a Bachelor degree from William Jewell College, a Master of Public Policy from Pepperdine University, and he is currently working on his Doctorate in Education (Interdisciplinary Leadership) at Creighton University.

Christopher M. Cuica

Chris Ciuca is the Director of Pre-Professional Education at SAE International. He oversees the strategic direction of SAE's programmatic offerings at the K-16 level, including the *National Science Board Award* winning *A World In Motion* and Collegiate Design Series Programing. Chris leads numerous initiatives designed to increase STEM engagement and achievement at the PreK-16 level. Chris serves in advisory roles for National Science Foundation, National Academy of Engineering and other private and publically funded STEM projects, is a published author on various educational strategies and techniques for delivering classroom-based instruction and has served as an expert on multiple STEM panels and through other media outlets. As a former classroom teacher, Chris strives to bring his classroom experience into all efforts designed to deliver high-quality integrated STEM instruction. Chris holds a BA in Environmental Science and Education and a Masters of Education in Curriculum Design and Instruction.

Burton Dicht

Burton Dicht joined IEEE in 2011 and serves as the Director of Student and Academic Education Programs, where he oversees IEEE's pre-university and university education programs as well as the IEEE Eta Kappa Nu (IEEE-HKN), the honor society of IEEE. This involves creating resources for pre-university and university educators, university students and managing IEEE's engineering education accreditation efforts. Mr. Dicht began his career as an engineer in 1982 and held positions as a lead engineer for Northrop Grumman and Rockwell Space Transportation Systems Division. Mr. Dicht is a member of IEEE, AIAA and is an ASME Fellow. Mr. Dicht received his B.S. in Mechanical Engineering from Temple University and an M.A. in History from California State University, Northridge. Mr. Dicht is an Exhibit Explainer for the Intrepid Museum in NYC, a 1st Lt and Aerospace Education Officer for Civil Air Patrol and a Board Member of the National Space Society.



Liza Wilson Durant

Dr. Liza Wilson Durant is Associate Professor and Acting Chair of the Sid and Reva Dewberry Department of Civil, Environmental and Infrastructure Engineering at George Mason University. Dr. Durant is an environmental engineer with expertise in fate, transport and bioremediation of contaminants in the environment. She received her BS from Cornell University, and her MS and PhD in environmental engineering from Stanford University and the Johns Hopkins University respectively. Prior to joining Mason, she served as a consultant and was twice awarded an American Association for the Advancement of Science, Environmental Science and Engineering Fellowship. During her tenure as an AAAS Fellow, she served as science advisor to the US EPA and in the Immediate Office of the Assistant Administrator of the Office of Research and Development. At Mason, she has served as the faculty advisor for the student chapters of the ASCE, DBIA, Engineers for International Development and SAME.

Patricia Fox

Patricia Fox is a Clinical Assistant Professor in the Department of Technology Leadership and Communication in the Purdue School of Engineering and Technology at Indiana University Purdue University Indianapolis (IUPUI). Pat has been a member of the faculty in the School for over 35 years. She spent a number of those years in administration, working as the Associate Dean and Assistant Dean. Pat also served as Associate Chair for two departments. Pat teaches leadership and sustainability courses, including a study abroad course about sustainable practices in businesses and industries in Germany and France. She has held numerous leadership roles in the American Society for Engineering Education (ASEE) including four terms on the ASEE Board of Directors. She currently is serving as the Chair of Engineering Technology Council (ETC) for the second time. Pat received the ASEE Frederick J. Berger Award in 2003, ASEE James H. McGraw Award in 2008, and ASEE Fellow in 2007. Her research interests include sustainability and study abroad education.

Terrence L. Freeman

Terrence L. Freeman is a Professor of Mechanical Engineering and Engineering Science Coordinator at St. Louis Community College. He graduated with mechanical engineering degrees from RPI (B.S.) and MIT (M.S.). His Ph.D. from the University of Missouri focused on Educational Leadership and Policy. Throughout his career he has taught and mentored students along STEM pathways K-20 encouraging them to make a difference in their communities. He has served as a host parent for over a dozen international students from Latin America and the Caribbean. He is a lifetime member of the National Society of Black Engineers and was named Missouri Professor of the Year by the Carnegie Foundation and Council for Support and Advancement of Education in 2013. In 2014 he was selected as the Stellar Performer in Education by the St. Louis American Foundation and received a Lifetime Achievement Award for his commitment to diversity from MOKAN in 2015.

Kenneth J. Fridley

Kenneth J. Fridley is the Senior Associate Dean for the College of Engineering at The University of Alabama. Prior to his current appointment, Fridley served as Professor and Head of the Department of Civil, Construction and Environmental Engineering at the University of Alabama. Dr. Fridley has been recognized as a dedicated educator throughout his career and has received several awards for his teaching efforts, including the ExCEEd (Excellence in Civil Engineering Education) Leadership Award in 2010. At the University of Alabama, Fridley has led efforts to establish several new programs including new undergraduate degree programs in construction engineering, architectural engineering and environmental engineering, a departmental Scholars program allowing highly qualified students an accelerated program to earn their MSCE in addition to their BS degree, the interdisciplinary "Cube" promoting innovation in engineering, and the cross-disciplinary MSCE/MBA and MSCE/JD dual-degree programs.

Linda Serra Hagedorn

Linda Serra Hagedorn is Associate Dean of Undergraduate Programs, International Programs, Student Services, and Diversity in the College of Human Sciences and Professor in the School of Education at Iowa State University. She is a prominent researcher in the area of community college student success and international education with over 200 publications and presentations. Several of her projects and publications are related to community college students in STEM and their success post-transfer. Internationally she has worked with universities in Vietnam and Indonesia on curriculum development. Currently she is funded by the U.S. Department of State and the U.S. Embassy in Beijing to be the American Director of the American Cultural Center at Xinlian College of Henan Normal University. Additionally, she worked with Harbin University of Science and Technology (Harbin, China) to establish a joint engineering program at Iowa State University.

Scott Hamilton

Scott Hamilton is currently the coordinator for the Civil Engineering program at York College of Pennsylvania, a program launched in the fall of 2016. Previously he served for over 26 years in positions of increasing responsibility and complexity as an Army Corps of Engineers officer including assignments in the US, Germany, Korea and Afghanistan, where he led a multi-national team of academic and military specialists charged with building and developing a 4-year military academy in Afghanistan. He also served on the faculty and as a Group Director in the Department of Civil & Mechanical Engineering, US Military Academy, West Point. In 2015 he was elected a Fellow of ASCE. Scott received his BS in Civil Engineering from the US Military Academy. He also earned MS degrees in Civil Engineering and Engineering Management, as well as his PhD in Civil Engineering from Stanford University. He is a registered Professional Engineer.

Carl O. Hilgarth

Carl O. Hilgarth, M.S., is current division chair of the ASEE Technological and Engineering Literacy/Philosophy of Engineering division. He is Professor Emeritus and former chair of engineering technologies at Shawnee State University, Portsmouth OH. He is a Fellow and past president of the American Society for Engineering Management and Associate Fellow of the American Institute of Aeronautics and Astronautics. Mr. Hilgarth had a 26-year career is in academia instructing courses in industrial management, financial management, computer technology and environmental technology and seminar courses in the university's general education program. Prior to academia, Mr. Hilgarth was employed as an engineer in the aerospace industry in ground and flight test, facilities management, and quality assurance. He has contributed papers on management, laboratory and flight test facilities, and ethics. In education, he has been a consultant to the Ohio Board of Higher Education and Department of Education as a curriculum developer.

Beth Holloway

Dr. Beth Holloway is the Director of the Women in Engineering Program (WIEP) and the Assistant Dean for Undergraduate Education in the College of Engineering at Purdue University. WIEP develops and administers research-based comprehensive activities and programs to recruit and retain women in engineering from Kindergarten through graduate school. As Assistant Dean, she is responsible for the College's scholarship strategy, retention of undergraduate students, and undergraduate student data. Her research areas include differential retention issues for students across engineering disciplines; engineering admissions practices; and women and leadership, particularly in male dominated careers. Holloway was president of the Women in Engineering ProActive Network (WEPAN) in 2006-07 and served on WEPAN's Board of Directors from 2005 – 2008. Holloway received B.S. and M.S. degrees in Mechanical Engineering and a Ph.D. in Engineering Education, all from Purdue University. She is also an Assistant Professor of Mechanical Engineering, by courtesy.

Allison Hostetler

I am a 2007 Graduate from the University of Pittsburgh – Johnstown, and a 2010 Graduate from Indiana University of Pennsylvania. I have been with SAE International for the past 7 years. For the first 4 years I worked in the Pre-Professional Development in the Collegiate Design Series (CDS). CDS specializes in hands on engineering design competitions that connect students to industry. For 2 years I worked within SAE International's Member & Sections Division as the Local Activities Specialist, working primarily with SAE Sections and SAE Collegiate Chapters. Currently, I am the University Program Manager for AutoDrive Challenge™, an autonomous student vehicle engineering competition within the Pre-Professional Development Department at SAE International.

Mary Kasarda

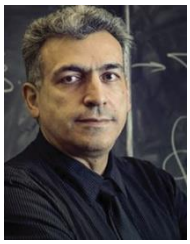
Mary Kasarda is an associate professor in the Department of Mechanical Engineering at Virginia Tech. She is an Associate Director of the VT Smart Infrastructure Laboratory. She received her BS, MS, and PhD in Mechanical Engineering from the University of Virginia. She has five years of professional engineering experience, including analytical and field work with Du Pont and Ingersoll Rand. Her research areas are in vibration-related topics such as system health monitoring, smart building applications, and magnetic bearings and also in engineering education. She has over 10 years of ABET accreditation experience as an ASME program evaluator, team chair and EAC Commissioner, and she currently serves as a delegate on the ABET Board of Delegates. She is active in efforts to support U.S. Military Veteran success in higher education. She is a recipient of an NSF CAREER award and a Fellow of the American Society of Mechanical Engineers (ASME).

Tanya Kunberger

Dr. Tanya Kunberger is a founding faculty member and Associate Professor in the U. A. Whitaker College of Engineering at Florida Gulf Coast University. Dr. Kunberger is a member of the American Society of Civil Engineers (ASCE) and serves on the society's Committee on Education, Committee on Faculty Development, and Committee on Scholarships, as well as being extensively involved with ASCE's ExCEEd Teaching Workshop. Additionally, she is active in ASEE (serving as a regional officer for several years) and serves on the board of directors for the United States Universities Council on Geotechnical Education and Research. A recipient of multiple teaching awards, Dr. Kunberger also serves as the PI for an NSF S-STEM grant and a grant focused on improving introductory STEM courses through teacher training. Dr. Tanya Kunberger is a licensed Professional Engineer in the state of Florida.

Suzanne Marzano

Ms. Marzano began her career in Ann Arbor Michigan at Pfizer Global Research and Development, where she was responsible for the design and development of molecular diagnostic assays to assess the toxicity of compounds automation of diagnostic laboratory assays. Ms. Marzano joined SME in 2015 and has taken on numerous roles and responsibilities including the lead interface with the advanced manufacturing research community, accreditation committee, technical networks and communities. Through targeted programming and initiatives, Suzy is responsible for promoting awareness and engagement among industry and academic professionals regarding best practices and leading technology trends in manufacturing. Prior to SME she worked for the College of Healthcare Information Management Executives for almost 10 years in in a Professional Development and Education capacity. She led the development and implementation of an accreditation program for Healthcare IT executives. She led the development and management of e-learning initiatives, in-person conferences, courses, and workshops.



Mani Mina

Mani Mina is a faculty in Electrical and Computer Engineering and Industrial Design with extensive breadth of teaching and industrial experience. He has designed and implemented over 30 classes in engineering and technological literacy. He has national and international collaborations in the area of Engineering Education. As one of the leaders of American Society for Engineering Education, he is known for his unique approach in Deweyan inquiry-based Engineering Education. This has been implemented in his work in Technological and Engineering Literacy, role of Design in Engineering Education, Interdisciplinary, multidisciplinary and Transdisciplinary classes. His technical interests lie in fiber based magneto-optic switches, high speed measurement systems, electromagnetics, and other physical layer technologies. He is a member of the Board of Governors of IEEE Education Society, and is Associate Editor of IEEE Transactions (Magnetism and Education)

Ivan Mutis

Dr. Ivan Mutis serves as Assistant Professor in the Department of Civil, Architectural, and Environmental Engineering at Illinois Institute of Technology. With a focus on the use of information technologies in construction management practices, Dr. Mutis strives to elevate the scientific understanding of the social nature of construction projects and the properties and behaviors that technologies and the social fabric possess within Construction Engineering Management (CEM). Dr. Mutis' research related to Education in CEM have been recognized by NSF, with his latest NSF award being a project that uses Unmanned Aerial Vehicles to help envision the next generation of learning technologies and advance how the diversity of student population learns in technology-rich environments. Active in the professional community, Dr. Mutis was elected Chair of the Education Committee (2014-2017), an administrative committee of the American Society of Civil Engineers' Technical Council on Computing and Information Technology.

Leslie Nolen

Leslie Nolen has nearly 20 years of association management experience, most recently as director of educational activities for the American Society of Civil Engineers (ASCE). She directs all aspects of ASCE's efforts related to higher education of civil engineers, including accreditation activities, workshops and conferences for faculty, and development of the Civil Engineering Body of Knowledge. Prior to joining the educational activities department, she served as director of grassroots advocacy for ASCE, developing and producing programs to engage ASCE members with their elected officials at all levels of government. She also served in similar positions at the Automotive Aftermarket Industry Association (now the Auto Care Association) and the International Downtown Association.

Gregory S. Parnell

Dr. Gregory S. Parnell is a Research Professor, Department of Industrial Engineering, University of Arkansas and is Director, M.S. in Operations Management program. His research focuses on decision and risk analysis. He is editor of *Trade-off Analytics: Creating and Exploring the System Tradespace* (2017), lead editor of *Decision Making for Systems Engineering and Management,* (2nd Ed, 2011), and lead author of the *Handbook of Decision Analysis* (2013). He is a fellow of the International Committee for Systems Engineering, the Institute for Operations Research/Management Science, and the Military Operations Research Society. His received the Frank P. Ramsey Medal (2014) for distinguished contributions to the field of decision analysis, the MORS Wanner (2013) and Thomas (2002) Awards. He previously taught at West Point, the U.S. Air Force Academy, the Virginia Commonwealth University, and the Air Force Institute of Technology. He has a PhD from Stanford University and is a retired Air Force Colonel.

Stephen M. Phillips

Stephen M. Phillips earned the BS in electrical engineering from Cornell University and the MS and PhD from Stanford University all in electrical engineering. He previously served as a faculty member at Case Western Reserve University and was director of the Center for Automation and Intelligent System Research. In 2002, he joined the electrical engineering faculty of Arizona State University and was subsequently appointed department chair. Since 2005 he has led the School of Electrical, Computer and Energy Engineering as its first director. He was elected president of the Electrical and Computer Engineering Department Heads Association and served on its board of directors. He is a registered professional engineer, is a program evaluator for ABET and serves on its board of delegates. His teaching and research interests include modeling and implementation of control systems and microsystems, teaching methods to improve student learning and web-delivered engineering education and its assessment.

Teri Reed

Teri Reed serves as Assistant Vice President for Economic Development in the Office of Research and a professor in the Department of Chemical and Environmental Engineering in the College of Engineering and Applied Science at the University of Cincinnati. She received her B.S. in petroleum engineering from the University of Oklahoma and spent seven years in the petroleum industry, during which time she earned her MBA. She subsequently received her Ph.D. in industrial engineering from Arizona State University. She is the 2016–2017 President of the Women in Engineering ProActive Network (WEPAN). She is also a member, board member and Fellow of the American Society for Engineering Education, and a member of the Institute of Electronics and Electrical Engineers. An advocate for research-informed approaches to engineering education and administration, her research interests include statistics education, concept inventory development, assessment and evaluation of learning and programs, recruitment, retention, diversity, and equity.

Karl W. Reid

Dr. Karl W. Reid was named executive director of the National Society of Black Engineers (NSBE) on June 2, 2014. He came to NSBE from the United Negro College Fund (UNCF), where he oversaw new program development, research and capacity building for the organization's 37 HBCUs. Before his service at UNCF, he served as Executive Director of Engineering Outreach Programs in the School of Engineering at his alma mater MIT, and Associate Dean of Undergraduate Education and Director of the Office of Minority Education. While working at MIT, Dr. Reid earned his Doctor of Education degree at Harvard University. His dissertation explored the interrelationship of race, identity and academic achievement. Dr. Reid earned his undergraduate and master's degrees in materials science and engineering from MIT. Immediately after graduating from MIT, Dr. Reid worked in the computer industry for 12 years, in product management, marketing, sales and consulting.

Rachelle Reisberg

Rachelle Reisberg is Assistant Dean for Engineering Enrollment and Retention as well as Director of Women in Engineering at Northeastern University in Boston, MA. She was PI on the Pathways research grant titled "Self-Efficacy and Retention of Women in Undergraduate Engineering" funded by NSF's Gender in Science and Engineering program. Rachelle's degrees are in Electrical Engineering from Rice University. After graduating, she joined IBM in Austin, Texas. She spent a number of years with IBM in various locations including San Jose, Palo Alto, and Cambridge. After IBM, she spent several years at Hanover Insurance in Worcester, MA. She was promoted to Vice President, Information Systems after the company merged with Allmerica Financial. After leaving Allmerica, Rachelle began a high tech start-up company specializing in speech recognition software and training. She was President of this company for five years prior to joining Northeastern University in 2001.

Dan Sayre

A publishing professional for more than 30 years, Dan Sayre graduated from Yale University with a BA in History, earning Distinction in the major. Since 2005, he held both editorial and marketing roles in Wiley's engineering education team in its Knowledge and Learning division. He is currently Executive Marketing Manager for Engineering and Computer Science. He was previously Vice President and Publisher of Island Press in Washington, DC and is a past President of Washington Book Publishers. Prior to that, Dan was an Engineering editor in Wiley's Professional and Trade Division, where he began his career. He is currently Chair of the Corporate Member Council of ASEE, serves on the Board of Directors of ASEE as First Vice President, and is also an advisor to the ASEE Student Division.

Darlene Schuster

Darlene Schuster is the director of technical entities of AIChE and oversees, as the Executive Director, the operations of the industry-technology efforts in energy (Center for Energy Initiatives), water, biological engineering (Society for Biological Engineering), regenerative engineering (The Regenerative Engineering Society), and entrepreneurship. Schuster previously was a science policy fellow for the American Chemical Society and she held the Clare Boothe Luce Chair of Chemical Engineering at Bucknell University. As a professor, Schuster integrated design methodology and systems analysis into the undergraduate courses she taught on chemical kinetics, reactor design, process control, statistics, transport phenomena, and incorporated societal ethics with engineering design, and coordinated the team taught multidisciplinary freshman engineering course. Her career in academia followed a variety of engineering positions in industry, including being an engineer, senior engineer and research engineer with Gulf Oil Research and Development, which was subsequently acquired by Chevron Oil Field Research Company.

Bartlett M. Sheinberg

Mr. Sheinberg serves as Center Director, West Houston Center for Science and Engineering, Houston Community College Northwest. He has held various senior administrative positions at HCC including Director of Governmental Relations, and Assistant to the Chancellor. His research interests include materials science and educational policy issues in lower division science and engineering. He has provided consulting services and given numerous speeches and presentations over the past thirty years in areas including lasers, robotics, artificial intelligence, telecommunications, and education/workforce related issues. Mr. Sheinberg has Bachelor's Degrees from the University of Texas and University of Houston and a Master's Degree from the University of Texas Graduate School of Biomedical Sciences (Houston) and serves on numerous regional, state and national educational and community advisory and steering committees and panels. He is married to Beth Finefield and they reside in Kingwood, TX.

Tom I-P. Shih

Tom I-P. Shih is The J. William Uhrig and Anastasia Vournas Head and Professor of the School of Aeronautics and Astronautics at Purdue University. Previously, he was Professor and Head of the Dept. of Aerospace Engineering at Iowa State University (2003-09). Also, he has served as a faculty member at Michigan State University (1998-2003), Carnegie Mellon University (1988-98), and the University of Florida (1983-88) and was a mechanical engineer at NASA Lewis (now Glenn) Research (1981-82). He started his undergraduate education at West Virginia University, but completed his BS at the National Cheng Kung University in Taiwan. His MS and PhD are from The University of Michigan in Ann Arbor. He is a Fellow of ASME and AIAA. Currently, he chairs AIAA's Academic Affairs Committee.

Christopher Smith

Christopher Smith currently serves as the Vice President of Scholarships, University Relations, and Research at the National Action Council for Minorities in Engineering, Inc. (NACME). He is responsible for the management and direction of all NACME scholarship programs and scholarship management services. Christopher oversees the NACME Scholars Program, where NACME partners with 50 colleges and universities across the country to support over 1,300 underrepresented minority engineering students annually. He also oversees the administration of the Alfred P. Sloan Minority Ph.D. Program and the Sloan Indigenous Graduate Partnership. Both programs are focused on increasing the number of underrepresented minority students who earn STEM graduate degrees in the United States. Previously, he served as NACME's Director of Research and Program Evaluation. Prior to joining NACME, he worked as the Program Director of Evaluation Services at The After-School Corporation (TASC). In 2015, he received his doctorate from Fordham University in Applied Developmental Psychology.

Harrie Stevens

Professor of Glass Science and an Engineering @ Alfred University for 25 years Assistant/Associate Dean for Sponsored Programs , ten years Process an Engineering Manager, Corning Incorporated, ten years ABET Program Evaluator, Eac Commissioner, ETAC Commissioner, Board of Directors twenty-five years

Yvette Pearson Weatherton

Dr. Yvette Pearson Weatherton has over 20 years of experience in higher education. She is currently Associate Dean for Accreditation and Assessment in the George R. Brown School of Engineering at Rice University, and prior to that, was a Program Director in the Division of Undergraduate Education (DUE) at the National Science Foundation (NSF). Her research, professional service, and outreach efforts are largely focused on broadening participation of underrepresented minorities, people with disabilities, and women in engineering education and practice. Dr. Pearson Weatherton holds a B.S. in Civil Engineering and M.S. in Chemistry from Southern University and A&M College and a Ph.D. in Engineering and Applied Science from the University of New Orleans. She is a Program Evaluator (PEV) for the Engineering Accreditation Commission (EAC) of ABET, a registered Professional Engineer in Louisiana, and a Fellow of the American Society of Civil Engineers (ASCE).

Steve Yalisove

Steve Yalisove obtained a PhD in Materials Science and Engineering at the University of Pennsylvania in 1986. After a post doc at Bell Laboratories, he joined the Michigan faculty in 1989. He is currently the Associate Director of the Materials Laboratory at the Center for Ultrafast Optical Sciences at the University of Michigan. Yalisove' s current research focuses on understanding the relationships between atomic structure and materials properties at surfaces and interfaces in a wide variety of material systems. He has made important contributions to the fields of surface science, thin film growth, evolution of thin film morphology, and most recently, the interaction of high intensity femtosecond laser pulses and materials. Ultrafast laser/material interaction is being studied in his group to understand the fundamental mechanisms which drive ablation, surface morphology, and collateral damage via advanced temporal and structural characterization methods. He is also very interested in revolutionizing engineering education.

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Results from TUEE Phase II

Table 1. Students' perception of KSA's importance for the engineering profession and quality of education received in each area

Knowledge, Skills and Abilities (KSAs)[1]	A. Importance for the engineering profession								B. Quality of education[4]			
	Very Important*		Moderately Important		Unimportant **		Not sure					
	Personal perception[2]	Conveyed by Institution[3]	Personal perception[2]	Conveyed by Institution[3]	Personal perception[2]	Conveyed by Institution[3]	Personal perception[2]	Conveyed by Institution[3]	VG-G	F	P-VP	NS
KSA 1: Good communication skills	100%	82%	0%	16%	0%	2%	0%	0%	44%	43%	13%	1%
KSA 2: Hard sciences and engineering science fundamentals	90%	96%	8%	3%	2%	1%	0%	0%	46%	46%	7%	1%
KSA 3: Ability to identify, formulate, and solve engineering problems	99%	94%	1%	6%	0%	1%	0%	0%	48%	40%	12%	0%
KSA 4: Systems integration	79%	44%	12%	40%	1%	9%	8%	8%	10%	38%	39%	13%
KSA 5: Curiosity and persistent desire for continuous learning	96%	58%	4%	29%	0%	12%	0%	1%	35%	39%	25%	1%
KSA 6: Self-drive and motivation	99%	62%	1%	27%	1%	11%	0%	0%	32%	38%	30%	1%
KSA 7: Cultural awareness in the broad sense (nationality, ethnicity, linguistic, gender, sexual orientation)	68%	41%	24%	37%	6%	19%	2%	2%	29%	33%	30%	9%
KSA 8: Economics and business acumen	71%	36%	28%	42%	1%	19%	0%	2%	10%	48%	39%	4%
KSA 9: High ethical standards, integrity, and global, social, intellectual, and technological responsibility	99%	86%	1%	9%	0%	5%	0%	0%	46%	40%	12%	1%
KSA 10: Critical thinking	98%	91%	2%	9%	0%	0%	0%	0%	43%	44%	12%	1%
KSA 11: Willingness to take calculated risk	76%	37%	20%	40%	3%	17%	1%	7%	12%	42%	37%	9%
KSA 12: Ability to prioritize efficiently	95%	70%	5%	25%	0%	4%	0%	1%	32%	51%	16%	1%

Note. N=141
[1] KSAs are ordered by priority as initially defined by industry representatives at the TUEE Phase I Workshop, see report at http://www.asee.org/TUEE_PhaseI_WorkshopReport.pdf
[2] Level of importance as perceived by students.
[3] Level of importance communicated to students through orientation, advising, classes and other activities at their institutions.
[4] Quality of curricular and extra-curricular activities to help develop each area.
VG-G = very good/good; F = fair; P-VP = poor/very poor; NS = Not Sure
*Combines Extremely Important and Important. **Combines Relatively Unimportant and Completely Unimportant

Table 1. Students' perception of KSA's importance for the engineering profession and quality of education received in each area (continued)

Note. N=141
[1] KSAs are ordered by priority as initially defined by industry representatives at the TUEE Phase I Workshop, see report at http://www.asee.org/TUEE_PhaseI_WorkshopReport.pdf
[2] Level of importance as perceived by students.
[3] Level of importance communicated to students through orientation, advising, classes and other activities at their institutions.
[4] Quality of curricular and extra-curricular activities to help develop each area.
VG-G = very good/good; F = fair; P-VP = poor/very poor; NS = Not Sure
*Combines Extremely Important and Important. **Combines Relatively Unimportant and Completely Unimportant

Table 1. Students' perception of KSA's importance for the engineering profession and quality of education received in each area (continued)

Note. N=141
[1] KSAs are ordered by priority as initially defined by industry representatives at the TUEE Phase I Workshop, see report at http://www.asee.org/TUEE_PhaseI_WorkshopReport.pdf
[2] Level of importance as perceived by students.
[3] Level of importance communicated to students through orientation, advising, classes and other activities at their institutions.
[4] Quality of curricular and extra-curricular activities to help develop each area.
VG-G = very good/good; F = fair; P-VP = poor/very poor; NS = Not Sure
*Combines Extremely Important and Important. **Combines Relatively Unimportant and Completely Unimportant

Table 2. Industry vs. Students: Perceptions of the importance of high priority* KSAs for the engineering profession**

*These high priority KSAs were initially selected by industry representatives at the TUEE Phase I Workshop, see report at http://www.asee.org/TUEE_PhaseI_WorkshopReport.pdf

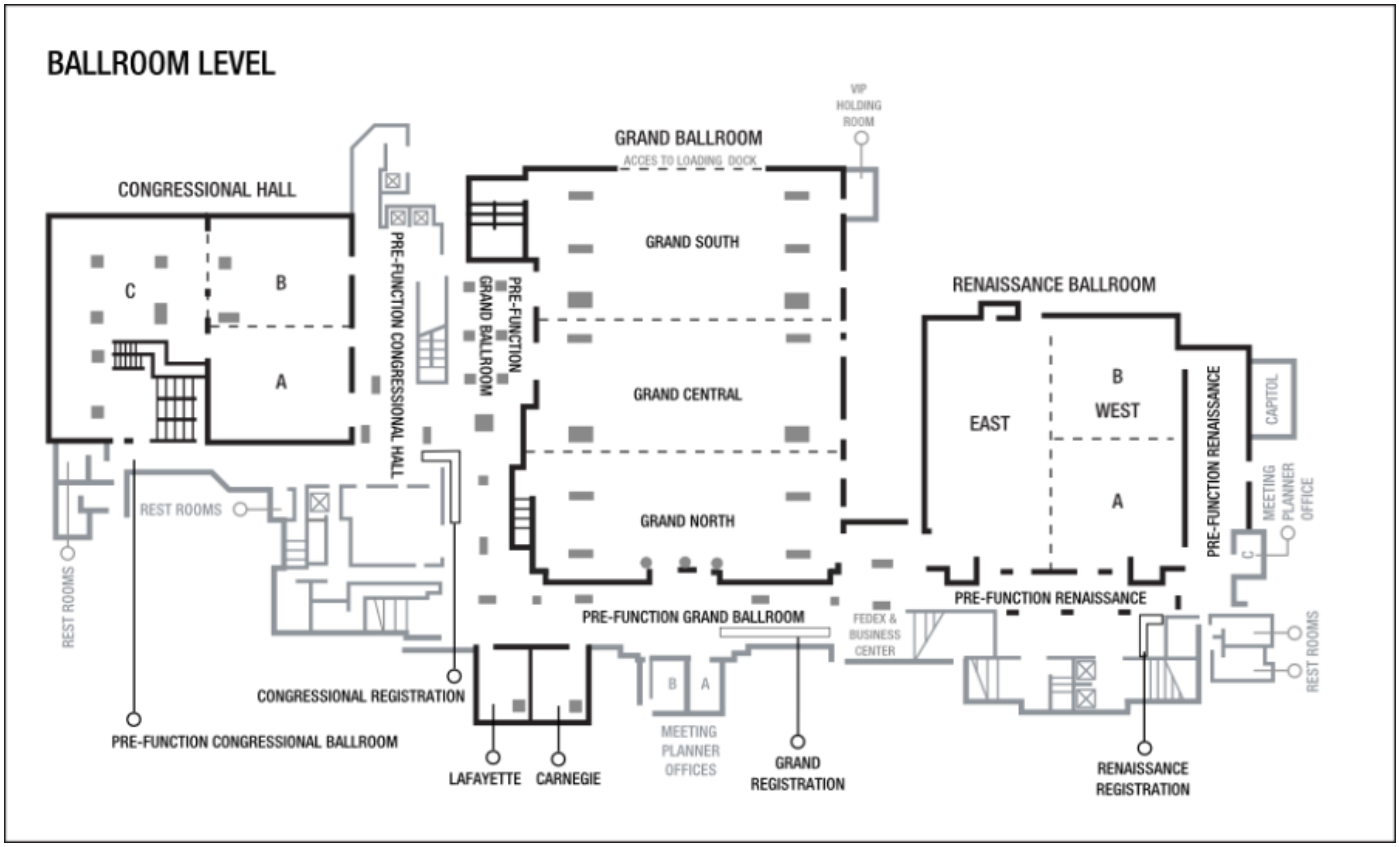
**Percentage totals may exceed 100% due to rounding

[1] 8% of Students responded with 'Not Sure'

[2] 2% of Students responded with 'Not Sure'

Venue floor plan

Meeting room located on the Ballroom level in the Congressional Hall AB



Notes

The **American Society for Engineering Education** is a global society of individual, institutional, and corporate members founded in 1893. We are committed to furthering education in engineering and engineering technology by promoting excellence in instruction, research, public service, professional practice, and societal awareness.

ASEE seeks to more fully engage with high school students, parents, teachers, engineering faculty and business leaders to enhance the engineering workforce of the nation.

ASEE is the only professional society addressing opportunities and challenges spanning all engineering disciplines, working across the breath of academic education, research, and public service.

- We support engineering education at the institutional level by linking engineering faculty and staff to their peers in other disciplines to create enhanced student learning and discovery.
- We support engineering education across institutions, by identifying opportunities to share proven and promising practices.
- We support engineering education locally, regionally, and nationally, by forging and reinforcing connection between academic engineering and business, industry, and government.

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