

Sharing Exemplary Admissions Practices that Promote Diversity in Engineering Panel Discussion

Dr. Elizabeth Cady, National Academy of Engineering

Dr. Elizabeth T. Cady is a Senior Program Officer at the National Academy of Engineering (NAE). She has worked on a variety of projects that examine and enhance systems for the formal, informal, and life-long education of engineers and improving diversity and inclusion in engineering. She is leading a project that will recognize and share innovative practices that improve diversity in undergraduate engineering education and also staffs a consensus study examining the capacity of K-12 teachers to teach engineering. She is also staffing the Roundtable on Linking Academic Engineering Research and Defense Basic Science. She also co-edited a resource collection translating research on women in science and engineering into practical tips for faculty members and worked on LinkEngineering, an online toolkit to support PreK-12 engineering education, and the Online Ethics Center, a website that supports ethics education and science and engineering. She earned M.S. and Ph.D. degrees in Cognitive and Human Factors Psychology from Kansas State University and a B.A. in psychobiology and political science from Wheaton College in Massachusetts.

Dr. Beth M Holloway, Purdue University at West Lafayette (COE)

Beth Holloway is the Assistant Dean for Diversity and Engagement and the Leah H. Jamieson Director of the Women in Engineering Program (WIEP) in the College of Engineering at Purdue University. She is the current PIC IV Chair of the ASEE Board of Directors. Holloway received B.S. and M.S. degrees in Mechanical Engineering and a Ph.D. in Engineering Education, all from Purdue University.

Dr. Theresa A. Maldonado P.E., University of California System

Dr. Theresa A. Maldonado is currently serving as Director of the Division of Engineering Education and Centers (EEC) in the Directorate for Engineering. She began her term at NSF in January 2011. Prior to joining NSF, Dr. Maldonado served as Assoc. Vice Chancellor for Research of the Texas A&M University System, which is comprised of 11 universities, seven state agencies, and a health science center. At the same time, she served as the founding director of the Texas A&M Energy Institute. She is also Professor of Electrical and Computer Engineering at Texas A&M University in College Station.

Dr. Maldonado has had connections to NSF throughout her career. She is the immediate past chair of the NSF Committee on Equal Opportunities in Science and Engineering (CEOSE). From 1999 to 2001 she served as Program Director of Engineering Research Centers in the NSF Directorate for Engineering. Dr. Maldonado earned the Ph.D., M.S.E.E., and B.E.E. with Highest Honors degrees in electrical engineering, all from the Georgia Institute of Technology, and she is a registered Professional Engineer in Texas. She was inducted into the Inaugural Council of Outstanding Young Engineering Alumni at Georgia Tech in 1995. She was recognized by a number of awards throughout her academic career including a 1991 NSF Presidential Young Investigator Award. She is a Senior Member of IEEE and member of OSA, SPIE, AAAS, ASEE, and Sigma Xi.

Dr. Beth A Myers, University of Colorado Boulder

Beth A. Myers is an Assistant Vice Provost at the University of Colorado Boulder and Assessment and Evaluation Lead for the ASPIRE Engineering Research Center. Her goal is to facilitate the continuous improvement of the educational experiences of all students and guide policy and practice changes that ensure equity within higher education. Her interests and research expertise are in quantitative and qualitative analytics related to equity in education. She holds a BA in biochemistry, ME in engineering management and PhD in civil engineering.

Dr. Andrew B. Williams, The Citadel School of Engineering

Andrew B. Williams, Ph.D. is the Dean of Engineering and the Louis S. LeTellier Chair at The Citadel School of Engineering. Dr. Williams is an alumni of the National Academy of Engineering Frontiers in Engineering Symposium and the National GEM Consortium Ph.D. in Engineering Program. He received both his Ph.D. in Electrical Engineering with an emphasis in AI and his BSEE from the University of Kansas.

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With support from the National Science Foundation, the National Academy of Engineering (NAE) is engaging the engineering education community in a collaborative process that highlights and shares effective admissions practices that improve diversity in engineering education. In 2019, the NAE issued a call for nominations of policies or programs that are targeted to students from underrepresented populations among incoming first-year full-time students, incoming transfer students (from community colleges or other institutions), and/or veterans or other students over the age of 25 who are entering engineering. The project defines underrepresented populations broadly, including men of color, all women, individuals with disabilities, and individuals from other underrepresented or marginalized populations (e.g., first-generation students, LGBTQI individuals, students from low socioeconomic status backgrounds, students for whom English is a second language, veterans). A committee of experts named 8 of the nominated programs as exemplary; those programs were announced on the NAE website.¹

A virtual workshop was held in May, 2021. In addition to presentations from the exemplary programs, the workshop covered topics of the higher education admissions system, admissions for transfer and 3+2 programs, research on admissions, and the benefits and consequences of using artificial intelligence and data science tools in recruiting, admissions, and retention. Breakout sessions covered questions about the system of state, institutional, and engineering school policies and how they interact to affect admissions; future research needs, and considerations about how new technologies fit into the system. The workshop agenda is designed to encourage new collaborations and networking among speakers and attendees. A workshop proceedings will be published in early 2022 and will include narratives from the workshop conversations, descriptions of the exemplary admissions programs, and suggestions for future research on best practices in admissions policies, ways to measure success in engineering education beyond grades, the predictive validity of criteria used to admit students to undergraduate engineering programs, and ways to improve the system so that students from all backgrounds are recruited to, admitted into, and retained throughout an engineering education.

This panel discussion will include an overview of the information presented in the workshop proceedings as well as new policies or practices that have emerged in the months since the workshop. Panelists will give a short overview of their own takeaways from the workshop. The moderator will ask questions about what policies and practices the panelists have considered implementing in their own institutions, what barriers they have encountered, and how they overcame those barriers. Audience members will also be encouraged to ask questions of their own and think about how they can implement ideas from the panel and proceedings into their own work.

PANELISTS:

Beth M. Holloway, Purdue University

Dr. Holloway has been the Director of the Women in Engineering Program since 2001. 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. She received the 2012 IBM Faculty Advisor Award, the 2012 national Society of Women Engineers (SWE) Outstanding Faculty Advisor Award, the 2013 Purdue University Helen B. Schleman Gold Medallion Award, the 2014 Women in Engineering ProActive Network (WEPAN) Distinguished Service Award, and the 2015 ASEE William E Wickenden Award for the best paper

¹ More information about the workshop, committee, and exemplary programs is available here: <https://www.nae.edu/203352/Sharing-Admissions-Practices-That-Promote-Diversity-in-Engineering>.

published in the Journal of Engineering Education during 2014. She was elected fellow of the American Society for Engineering Education (ASEE) in 2017. Under her leadership, the Purdue Women in Engineering Program received the 2013 WEPAN Women in Engineering Program Award and the 2014 ABET Claire L. Felbinger Award for Diversity. Dr. Holloway is a past Chair of the Women in Engineering Division of the American Society for Engineering Education (ASEE). She served on the ASEE Diversity Committee from 2010 – 2012 and currently serves on the ASEE Committee on K-12 Engineering. Dr. Holloway has also been President of WEPAN (www.wepan.org) in 2006- 2007, served on WEPAN's Board of Directors from 2005 – 2008, and was the co-chair of the 2003 WEPAN National Conference. She currently serves as the advisor to the Purdue SWE Chapter and Phi Sigma Rho Sorority. Prior to joining Purdue, Dr. Holloway was a research and development engineering group leader at Cummins, Inc., where she was a recognized corporate engine lubrication system expert, with specialties in piston cooling nozzle and lubrication pump performance. Dr. Holloway received both B.S. and M.S. degrees in Mechanical Engineering and a Ph.D. in Engineering Education, all from Purdue University.

Theresa A. Maldonado, University of California Office of the President

Dr. Theresa A. Maldonado was appointed Vice President for Research & Innovation in March 2020. Before coming to UC, she served as Dean and Riter Professor of Engineering at The University of Texas at El Paso (UTEP) in July 2017. She also holds a tenured appointment as Professor in the Department of Electrical & Computer Engineering. Dr. Maldonado's academic career spans 29 years, including at four other universities: The University of Texas – Rio Grande Valley, Texas A&M University, Texas A&M Health Science Center, and The University of Texas at Arlington, with nearly 20 years in various research strategic and administrative roles. She also served as Associate Vice Chancellor for Research at the Texas A&M University System and as founding director of the Texas A&M Energy Institute. Dr. Maldonado has extensive experience at the federal level in advancing engineering research, education, and commercialization initiatives. From Jan. 2011 to Oct. 2014, she served as a division director in the Engineering Directorate at the National Science Foundation (NSF). She was responsible for a \$135M budget in support of interdisciplinary research centers, research translation, innovations in engineering education, special initiatives in support of military veterans, broadening participation in engineering, and workforce development programs. Her initial appointment at NSF was in 1999 to 2001, when she served as a program director in the Engineering Research Centers program and represented the Engineering Directorate on several NSF-wide committees. Before entering academia, Dr. Maldonado was a member of technical staff at AT&T Bell Laboratories for 5 1/2 years working on optical fiber components and systems. Dr. Maldonado earned the Ph.D., M.S.E.E., and B.E.E. with Highest Honors degrees in Electrical Engineering, all from the Georgia Institute of Technology. Dr. Maldonado is a registered Professional Engineer in Texas.

Beth A. Myers, University of Colorado Boulder

Dr. Beth A. Myers serves as the Assistant Vice Provost for Student Success Initiatives at the University of Colorado Boulder where she provides strategic visioning, leadership and oversight of student success. Her portfolio includes oversight of campus-wide programs such as Undergraduate Enrichment Programs, Top Scholarship Office, the Writing Center, International Student Academic Success, and Student Success Analytics. She also coordinates tutoring, math placement, mid-term course alerts, CU-101, retention/re-enrollment campaigns, and various student data and assessment processes for campus. She interfaces with a wide array of campus partners including the Office of Data Analytics, Office of Information Technology, Enrollment Management, Student Affairs and all academic units. Beth also acts as the Financial Futures Retention workstream sponsor supporting and enhancing the mission of CU Boulder through strategic financial alignment. Dr. Myers is leading a cross-functional team that employs student data analytics to increase retention and graduation rates using predictive analytics in conjunction with other data sources. She is helping guide multiple projects that will make student data more accessible to campus allowing data-informed decision-making and building processes and workflows to action on data insights. She provides expertise on assessing the effectiveness of student success initiatives, academic

advising and student learning outcomes. Beth has worked for the University of Colorado in various capacities since 1999, including as Director of Analytics, Assessment and Accreditation as well as Director of Access and Recruiting for the College of Engineering and Applied Science. She also held a Research Associate position performing program evaluation and assessment for the Integrated Teaching and Learning, Engineering Plus and Engineering GoldShirt Programs. She was a strategic member of the team that created novel diversifying programs (BOLD and GoldShirt), policies and practices in the College of Engineering and Applied Science. She earned a BA in biochemistry, ME in engineering management, and PhD in civil engineering all from the University of Colorado. She also holds a Master Black Belt in Six Sigma and values quality science and continuous improvement. Her goal is to facilitate the continuous improvement of the educational experiences of all students and guide policy and practice changes that ensure equity within higher education. Her interests and research expertise are in quantitative and qualitative analytics related to equity in education. When she isn't working she enjoys spending time with her family.

Andrew B. Williams, The Citadel

Andrew B. Williams, Ph.D., M.B.A., is the Dean of Engineering and the Louis S. LeTellier Chair for The Citadel School of Engineering at the Military College of South Carolina in Charleston, SC. He was formally the Associate Dean for Diversity, Equity, and Inclusion at the University of Kansas and the Charles E. and Mary Jane Spahr Professor in Electrical Engineering and Computer Science. He was a Professor and the John P. Raynor, S.J., Distinguished Chair of Electrical & Computer Engineering at Marquette University (2012-2016). Dr. Williams directs the Humanoid Engineering & Intelligent Robotics (HEIR) Lab. He joined Marquette University in 2012 after serving as Department Chair in Computer and Information Sciences at Spelman College in Atlanta, GA and as a Research Affiliate at Georgia Institute of Technology in the Human-Automation Systems Lab. He began his successful academic career as an Assistant Professor at the University of Iowa College of Engineering. He earned a Ph.D. in Electrical Engineering with an emphasis in AI from the University of Kansas in 1999, M.S. in Electrical & Computer Engineering from Marquette University in 1995, and B.S. in Electrical Engineering from University of Kansas in 1988. He received his Master of Business Administration from Rockhurst University and an executive education certificate in Fostering Inclusion and Diversity from the Yale School of Management in 2019. Dr. Williams is the former Senior Engineering Diversity Manager at Apple Inc. under Steve Jobs. He authored the book, *Out of the Box: Building Robots, Transforming Lives*.

PANEL MODERATOR:

Elizabeth T. Cady, National Academy of Engineering

Dr. Elizabeth T. Cady is a Senior Program Officer at the National Academy of Engineering (NAE). She has worked on a variety of projects that examine and enhance systems for the formal, informal, and lifelong education of engineers and improving diversity and inclusion in engineering. She leads a project that will recognize and share innovative practices that improve diversity in undergraduate engineering education and the Department of Defense-funded Roundtable on Linking Defense Basic Research to Leading Academia Research and Engineering Communities; she also staffed a recently-completed consensus study examining the capacity of K-12 teachers to teach engineering. She also co-edited a resource collection translating research on women in science and engineering into practical tips for faculty members and worked on LinkEngineering, an online toolkit to support PreK-12 engineering education, and the Online Ethics Center, a website that supports ethics education and science and engineering. Cady earned M.S. and Ph.D. degrees in Cognitive and Human Factors Psychology from Kansas State University and a B.A. in psychobiology and political science from Wheaton College in Massachusetts.