WHITE PAPER: BRINGING THE BIOMEDICAL ENGINEERING COMMUNITY TOGETHER TO DEVELOP ITS FUTURE WORKFORCE

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Executive Summary

In June 2023, the Biomedical Engineering Division of the American Society for Engineering Education hosted a special session titled "Bringing the Biomedical Engineering Community Together to Develop its Future Workforce." The session featured 5 panelists, representing government, industry, and academia, and breakout discussions with all attendees. Prompts were provided to guide the conversations. This white paper summarizes the special session and resulting discussions and presents recommendations for academic leadership, faculty, and curriculum.

Introduction to Workforce Development

The term "workforce development" is used across disciplines and organizational systems, both public and private, in the United States. Those in engineering academia may be most familiar with the term from the requirement of many government agencies to address workforce development in grant proposals. The broad usage of the term results in differing definitions; however, one definition aiming to unify the various stakeholders is proposed by Jacobs and Hawley (2009):

> *Workforce development is the co-ordination of public and private sector policies and programmes that provides individuals with the opportunity for a sustainable livelihood and helps organizations achieve exemplary goals, consistent with the societal context.* [1]

Several key features emerge from this definition:

- **Public and private sector:** Workforce development requires partnership of public and private sectors.
- **Policies and programs:** In higher education, much attention is often placed on the development of programs; however, this definition points out that workforce development more broadly encompasses policies that support the programs and stakeholders.
- **Individuals and organizations:** Successful workforce development has a mutually beneficial effect—individuals have access to careers that enable them to sustain their lives, and organizations get employees, enabling attainment of organizational goals. Together, individuals and organizations impact the larger society.

The Global Social Development Innovations Center at the University of North Carolina- Chapel Hill summarizes the breadth of workforce development to include life and work readiness skills, technical skills, entrepreneurial skills, employment support services, employers' demand for skills, and workplace experience [2]. Importantly, workforce development includes but expands beyond development of technical skills, which is often the primary focus of those in academia. Furthermore, workforce development emphasizes economic development, which distinguishes it from traditional education [1]. While higher education may focus on developing skills of an individual, successful workforce development seeks to achieve outcomes that impact society more broadly via economic growth [1].

Depending on the lens—the individual, an organization, or broader society—workforce development has important effects: increasing equity (addressing earnings gaps), promoting economic growth, sustaining global competitiveness, adapting to the future, and retaining employees [3, 4].

The U.S. Department of Commerce lists principles that guide their effective workforce investments [5]:

- *Are **employer led** to ensure skilled workers are connected to quality job opportunities.*

- *Are guided by **multiple community partners** such as educational institutions, labor unions, community-based organizations, and economic development organizations.*
- *Include **wrap-around services** to support the most vulnerable populations.*
- *Increase educational and workplace **diversity, equity, and inclusion**.*
- *Prioritize proven **earn and learn models** like Registered Apprenticeships.*
- *Lead to **stackable, industry-recognized credentials** and ensure that information about credentials is publicly accessible through the use of linked open data formats that support full transparency and interoperability.*
- ***Measure and evaluate outcomes** such as workers' employment and earnings. Ensure that data is transparent, actionable, and linked back to those executing programs.*
- *Build **sustainable systems and partnerships** that endure to serve employers and workers beyond the federal investment.*
- *Connect **workforce development to economic development**.*
- *Are **coordinated** across the federal government.*
- *Encourage the **use of other government and private funding**.*

Session Purpose

The field of bioengineering/biomedical engineering (BE/BME) has long debated how to define itself, what constitutes the "core competencies" of a biomedical engineer, and what skills undergraduates in biomedical engineering should develop [6, 7]. Although this topic still seems to be at the forefront of programs' minds, external factors are also changing the narrative. Specifically, technology is advancing at an increasing rate, greater pressures are being placed on higher education to change the ways in which it is meeting the needs of industry, and government funding agencies are expecting programs to address these needs. Hence, we chose to bring these challenges to the forefront of the BE/BME community in the context of workforce development.

Session Overview

To address the topic of biomedical engineering workforce development, the Biomedical Engineering Division of the American Society for Engineering Education (ASEE) hosted a 90-minute special session on June 27, 2023, at the ASEE Annual Conference in Baltimore, Maryland. The goals of this session were as follows:

- Bring together the bio/biomedical engineering (BE/BME) community
- Foster a higher-level dialogue than what can be accomplished through typical ASEE technical sessions
- Examine the meaning of "workforce development" and propose how BE/BME education must change to meet workforce needs
- NOT to repeat the (important and well-intentioned, but separate) conversation about what skills we should teach BE/BME students

Five panelists, representing government, medical devices industry, and academia, were invited to the session (biographies are provided at the end of this document):

- Jeannie Epps, Ph.D., Terumo Medical Corporation
- Dave Gutekunst, Ph.D., NIH NIBIB
- Aftin Ross, Ph.D., FDA Center for Devices and Radiological Health
- James Warnock, Ph.D., University of Georgia
- Youseph Yazdi, Ph.D., M.B.A., Johns Hopkins University

Following a brief introduction to workforce development delivered by Dr. Sarah I. Rooney, each panelist was invited to respond to questions. After panelists' remarks, they disbursed to round tables with session

attendees to engage in further dialogue with additional prompts. Each table had a designated notetaker. All attendees were encouraged to sign in. A list of notetakers and attendees who signed in is provided at the end of this document. The session was moderated by Dr. Sarah I. Rooney and Dr. Aileen Huang-Saad. The remainder of this document summarizes the discussions and contributions of the panelists and attendees, as documented by the notetakers. This white paper is not a consensus document and does not necessarily represent endorsement by all attendees.

Panelist Responses

Panelists were asked three different prompts:

- Describe your vision/prediction of the future BE/BME workforce.
- Who is currently defining and leading workforce development? Who should be?
- Public-private collaboration is a factor that influences the success of workforce development programs. What do you see as the barriers to these collaborations? What can/should universities do to address these barriers?

In their responses, the panelists emphasized the importance of various stakeholders and perspectives. For example, Dr. Yazdi suggested that all engineers should have foundational training and develop perspective-taking in four areas: clinical, commercial, technical/design, and organization/strategy. Dr. Epps noted that students need to learn how to identify and articulate their unique skills and strengths, which can benefit from exposure to the myriad job roles available to a biomedical engineer. Dr. Ross agreed that we must foster leadership opportunities and help students build resilience. Furthermore, Dr. Ross suggested that we must center student and employee wellness and diversity, equity, and inclusion efforts. Building upon this perspective, Dr. Warnock noted the importance of listening to the students and employers. Employers can provide input on technical and professional skills that are valued in the workforce. He remarked that both what we teach (e.g., engineering standards and guidance documents, as suggested by Dr. Epps) and how we teach matters, and that students should be aware of technology's impact. Dr. Epps suggested that the undergraduate BE/BME curriculum intends to prepare students for the first five years out of college, after which it is the employer's responsibility to provide further training. She challenged educators to be creative with the curriculum to fit both technical and professional skill development.

All panelists agreed that workforce development efforts depend on all partners: industry, government, and academia. For example, government agencies continue to incorporate education and training into research grants. Dr. Warnock added that accreditation (e.g., ABET) can serve as a catalyst. Despite the importance of collaboration among organizations, our panelists noted challenges:

- Timelines from government funding sources (Gutekunst)
- Conflicting or competing priorities (Epps)
- Faculty mindset and often limited industry involvement (Warnock)
- Limited engagement of academic research labs with industry (Ross)
- Technology transfer from academia to industry (Yazdi)

Table Discussions

Attendees and panelists were distributed among eleven tables. Each table engaged in three rounds of discussions. The panelists were asked to rotate tables after the second discussion round. Summaries of the three sets of discussions from the eleven tables are provided.

Many of us likely have a profound sense of responsibility but are overwhelmed by having to learn it all (and then teach it all) with the workloads we have.

- ***How do we as educators stay up to date on ever-changing and future technologies?***

- ***How do we train tomorrow's workforce using yesterday's knowledge?***
- ***What does it mean to teach an adaptive learner or to cultivate an adaptive curriculum?***

Many participants agreed that staying up to date in the field is a significant challenge, which is made even more difficult for those whose workloads are primarily teaching with little or no time set aside for engaging in current topics. Some teaching-focused faculty felt that the responsibility fell primarily on them to keep the curriculum fresh and current. Because programs may have only a handful of teaching track faculty, the demand feels heavy and underappreciated by some. Furthermore, some participants questioned what technology and information we should be staying current with. With advances in medical devices, procedures, and basic science (in addition to advances in engineering education and changes within industry), it is difficult to know where to begin or what to focus on. Finally, some participants, particularly those who teach core (not design) courses, who are in newer programs, or who have campuses located in regions that are less rich with biomedical employers, experience fewer opportunities to interact with industry partners. Several recommendations for academic leadership, faculty, and the curriculum/students to stay up to date emerged from these discussions.

Recommendations- Administration/Academic Leadership

- Review the incentives/rewards and evaluation processes in the department and institution. Specifically, what incentives exist for faculty to update their courses with new applications instead of continuing to teach the same version of a course year after year? Are faculty evaluated on whether they stay up to date with workforce needs? Is this included in faculty career development?
- Review faulty workloads. Are faculty (especially those who are primarily teaching) able to devote time to staying up to date with new tools, applications, and literature?
- Provide legitimate opportunities for faculty to gain industry experience through "internships" or sabbaticals at a company. This possibility relies upon the support of both the academic institution and the partnering company, and it may not be feasible based on many factors, such as 9- vs. 12-month contracts, NDAs, etc. Seek to reduce these barriers to participation.
- Hire a diverse group of faculty who can stay up to date with different topics. Hire Professors of Practice (titles may vary)—individuals who have workforce experience and can bring that knowledge and the applications to the classroom.
- Invest in space, tools, and resources.
- Deliberately create networks that allow direct communication pathways to clinicians and industry representatives. Capstone/design courses and industry advisory boards can help but consider other avenues as well.
- Identify people (faculty, employers) at the cutting edge to report back to the broader faculty.
- Maintain your alumni network. Alumni may be valuable sources for
    - Faculty "internships" or sabbaticals at companies
    - Technical and professional development of current students (could be via panels)
    - Providing perspective on current/relevant activities in the field
    - Jobs

Recommendations- Faculty

- Few things can substitute for direct experience. A faculty "internship" or a sabbatical with industry, if possible, would allow faculty to bring back broader experiences to the classroom. To find these experiences, try the following:
    - Ensure that faculty LinkedIn sites are updated. Connect with students and alumni to build a network and job paths for other students.
    - Conduct cold calls based on connections from LinkedIn.
    - Reach out to companies at their outreach office.

    - Consider remote job opportunities, which have increased due to shifts in response to Covid.
    - Consider a shorter duration (multiple weeks) industry immersion experience as a starting point if a longer duration is not feasible.
- Students can help instructors stay up to date by sharing their interests and completing assignments related to new applications of course content.
- Designate time to stay up to date with tools and literature, including current events/news.
- Participate in both education (e.g., ASEE) and discipline-focused professional meetings.
- Engage with clinicians.
- Take advantage of and attend company-led certifications and meetings.
- Evaluate the level of depth to which you need to understand new applications—sometimes, just being aware (versus knowing how to use) is sufficient.
- Maintain a diverse network and ongoing dialogue: colleagues within and outside the institution, alumni, clinicians, industry, and students.

Recommendations- Curriculum & Student Learning

- The curriculum should balance classical and cutting-edge content. Students must know the technical basics, but deep knowledge may not be the goal of an undergraduate biomedical engineering degree.
- Students must be made aware that things will change, and they need to be given opportunities to learn how to handle change. Instilling an entrepreneurial mindset may aid in this endeavor.
- Students need to be trained in how to find, access, evaluate, and implement new knowledge. Teaching skills may be prioritized over teaching facts. “The what (that is being learned) isn’t as important as the how (it is being learned).”
- Strategies that could be adopted to bring in new applications to the classroom or train students in developing their skills include the following:
    - Create assignments centered around new technologies and current events. For example, students open the class with a short presentation or work collaboratively on a short report about a current topic.
    - Provide students places to start, such as the FDA, current events related to BME in the news, Qmed, etc.
    - Use Wikipedia as a tool for students to start their searches and try to find errors to correct
    - Bring in guest speakers from industry
    - Use Professors of Practice
    - Use student self-reflection exercises, such as “What do I know vs. What don’t I know” or “What skills did I not have vs. Have now”
    - Include a statement on the syllabus

In addition to skill development (“what” you know), successful workforce development programs create a network (“who” you know) for their participants, “efficiently connecting workers with jobs and employers with workers.” [8]

- ***What does it mean to have a “strong” network?***
- ***How do we strengthen our networks?***

Participants noted that a “strong” network means having broad and diverse connections. The individuals comprising a strong network represent different stakeholder groups and sectors (e.g., industry, academia, government, clinical, etc.) and hold various experiences and perspectives. The value of this network is always knowing that there is someone to ask questions, both big and small. Participants also identified challenges to building a strong network. They recognized that geography (the employer landscape in a region as well as the proximity of other elite institutions) can impact the ease with which an academic

institution can grow its network. Participants have also observed students struggling to reach beyond their immediate social bubbles. Participants acknowledged the importance of recognizing that students have different backgrounds. Students need training in and opportunities to develop their networks; strategies to help students are compiled separately from more general strategies below.

Recommendations- Alumni Engagement

Engaging alumni was a common theme suggested by participants to strengthen networks; however, questions remain about the best ways to effectively involve alumni. Some suggested that one goal is to have alumni directly interact with the students, and panels, though useful for other purposes, do not achieve this goal. It was suggested that having someone within the department (versus a central university office) engage with alumni would create a more personal relationship. Administrators may consider who in their department is well-suited for this role and ensure that this person has workload devoted to maintaining alumni relations. Part of this role may include collecting data on where alumni are placed after graduation, if not already collected elsewhere. Participants suggested various ways to engage with program alumni, both in-person and virtually:

- Hosting events every few months
- Mentorship programs
- Capstone (project sponsors, inviting to final presentations)
- Social events (breakfasts, weekend events, sports events)
- Maintain a shared spreadsheet where recent graduates can opt in with information such as where they did an internship, what did they do during the summer in undergrad, contact information, etc. This spreadsheet lets current students see the path that recent grads took to get their jobs.
- Create a checklist of ways for alumni to get involved and then contact them as opportunities arise

Recommendations- Building a Broad Network

- Invite one another (industry/others and academics) into each other's spaces for mutually beneficial learning.
- Take advantage of and create virtual events and meetings. For example, USPTO is fully online. Much of the FDA is remote. Online opportunities reduce costs (no travel). Breakout rooms can be used for "speed networking."
- Stop thinking of "industry" as a single bucket. Skillsets and roles can vary significantly.
- Identify the value proposition and goal of the partnership. Build empathy and reflect upon what you can offer rather than making it transactional.
- Ensure that your network contains diverse connections from various fields. Consider different (perhaps peripheral) disciplines, professional schools, affinity groups, and clinical programs that could contribute to your network.
- Work on building your positive reputation.
- Be able to succinctly (4 sentences or less) state what you need.
- Leverage what you have (location, alumni, co-ops, etc.).
- Don't limit yourself to only local connections. Think internationally as well.
- Adopt a collaborative teaching model between academic instructional faculty and industry.
- Implement—and use—advisory boards.

Recommendations- Developing Students' Networks

- Remember, and explain to students, that networking is a skill that can be learned through practice.
- Use advising intentionally. Talk about networking during advising meetings and connect students with recent graduates.
- Create course assignments that encourage networking, such as scheduling 5 meetings via LinkedIn.

- Encourage students to show up to and participate in campus events, such as career fairs, for exposure to professional interactions.
- Help students reflect upon their own value, so they can articulate their strengths.
- Facilitate internal bonding (e.g., icebreakers in classes, team bonds in capstone) that will extend to external bonds in the future.
- Train students to think strategically about their networks early in their careers.
- Expose students to a variety of job roles. Identify if there is a mismatch between students' interests and where they go post-graduation.

Wrap-Up

- ***What is keeping us from making changes in our BE/BME departments to address workforce development needs?***
- ***What are the next questions we need to address for BE/BME workforce development?***

Participants identified several barriers to change. Many of these barriers would benefit from the support of academic leadership.

- **Faculty workloads and incentives to change:** Some faculty are resistant to change, often because of their demanding workloads and lack of incentives. Generally, faculty are more comfortable with small, as opposed to big, changes. Some participants perceive that academic leadership does not appreciate the time and energy required to address these issues, revise their courses, or engage in professional development; therefore, devoted time is not built into the faculty workload. For those faculty whose primary workload does not align with the needs (e.g., faculty who have primary workloads in research and therefore are rewarded for their research impact), there may be disincentives. Promotion and tenure guidelines must recognize these efforts for change to occur. Accreditation and external boards may serve as additional incentives to change.
- **Faculty knowledge:** Many faculty have never been in industry. There may be misalignment of faculty expertise and the intended program outcomes. There may be a lack of training resources (or lack of knowledge of how to find the resources) that faculty can use to develop new skills, or they do not know where to start or who to talk to.
- **Breadth of the field:** The breadth of biomedical engineering leads to a lack of consensus on what is fundamental to our field. A program cannot be all things for all people, but it is unclear where this line lies.
- **Rigidity of the curriculum:** Many programs feel confined by all the courses that are "necessary" in the BE/BME curriculum and struggle to balance requirements with flexibility. Personalizing the undergraduate curriculum is challenging.
- **Unclear or differing priorities:** Priorities of academia and partnering entities (e.g., industry) may differ.
- **Academic research:** Historically, programs have been designed to prepare students for graduate school, and some faculty maintain this mindset. Faculty research and the funding they obtain does not always align with industry needs. Skills that research faculty want may differ than desired industry skills, which leads to a disconnect in graduate student training and a potential deemphasis on skills such as budgeting, time management, and working with people.
- **Realizing that change is needed:** Some programs may not have implemented a structured continuous improvement system that would allow them to collect and evaluate feedback and implement changes as necessary. They may not realize that changes are necessary. For a successful system, faculty must be willing to hear the feedback and make changes.
- **Slowness:** Change in academia can often be cumbersome and slow.

Remaining Questions

This session served as an initial discussion into workforce development. Attendees proposed many unresolved questions:

- How can we leverage existing connections to better network with industry?
- How do we create bandwidth to do this?
- How do we incentivize faculty time for professional development and adaptation or revision of courses?
- Do we need to create new metrics to exert appropriate pressure on institutions?
- How can we as institutions be prepared for all possible aspects of BE/BME (biotech, biopharma, biomed, bioeng, etc.)? A program cannot do it all. Where do we draw the line in what an undergraduate BE/BME degree is?
- Is there a trend for a school to focus on one part or parts of BME?
- What are topics, skills, and content could a Master's degree provide that cannot fit within an undergrad BE/BME degree?
- Do we need to train students and/or faculty in AI or ChatGPT?
- Do our senior design projects align with the jobs that our students get? Are they developing the intended skills and not just what they're interested in?
- What are the grant mechanisms for professional development or bridge-building with industry partners?
- How do we prepare industry hires to teach effectively?
- How do we retain industry hires if they get competing offers?

Conclusion

At the conclusion of the session, attendees were encouraged to continue and evolve the conversation outside the conference; broaden the conversation participants; identify and address the barriers unique to their program; and report on their future progress. This white paper is intended to serve as a catalyst for the conversation and a foundation to identify next steps. Meaningful change will require the coordination of faculty and academic leadership, working in partnership with industry and government representatives.

Panelist Biographies

Jeannie Epps, Ph.D., Terumo Medical Corporation

Dr. Jeannie (Stephens) Epps is Director of Applied Technology & Evaluation at Terumo Medical Corporation, where she focuses on early-stage concept feasibility and innovative product development. Prior to Terumo, Dr. Epps was an Assistant Professor and Director of Clinical & Corporate Relations in the Department of Biomedical Engineering at the University of Delaware. She was a recipient of the UD Excellence in Undergraduate Advising and Mentoring Award. Dr. Epps also worked previously at Synthes and at NIST.

Dave Gutekunst, Ph.D., NIH NIBIB

Dr. Dave Gutekunst joined the National Institutes of Health (NIH) National Institute of Biomedical Imaging and Bioengineering (NIBIB) in June 2022 as a Program Director in the Division of Interdisciplinary Training, following an AAAS Science & Technology Policy Fellowship at the National Center for Medical Rehabilitation Research. Prior to joining NIH, Dr. Gutekunst was an assistant professor in the Department of Physical Therapy and Athletic Training at Saint Louis University.

Aftin Ross, Ph.D., FDA Center for Devices and Radiological Health

Dr. Aftin Ross is the Senior Special Advisor for Emerging Initiatives at the FDA Center for Devices and Radiological Health (CDRH). In this role, she provides leadership for and coordinates on a range of emerging public health issues including medical device cybersecurity, respiratory protective devices, personal protective equipment, and incident response. She collaborates nationally and internationally with scientists, other external stakeholders, and government officials on a range of regulatory and scientific issues.

James Warnock, Ph.D., University of Georgia

Dr. James Warnock is the founding chair of University of Georgia's School of Chemical, Materials and Biomedical Engineering. In addition, he currently serves as interim director of the Engineering Education Transformations Institute. Dr. Warnock is the Co-Director for Education and Workforce Development for the NSF Engineering Research Center for Cell Manufacturing Technologies. He also serves as adjunct director for ABET, where he supports the organization's professional-development programming.

Youseph Yazdi, Ph.D., M.B.A., Johns Hopkins University

Dr. Youseph Yazdi is the Director of the Johns Hopkins Center for Bioengineering Innovation and Design, which focuses on the design and development of solutions to health challenges in developed and developing regions of the world. Prior to his arrival at Johns Hopkins, Dr. Yazdi was Corporate Director in Johnson & Johnson's Corporate Office of Science and Technology. Dr. Yazdi is a Fellow of the American Institute for Medical and Biological Engineering.

Moderators

First Name	Last Name	Title/affiliation
Aileen	Huang-Saad	Associate Professor, Roux Institute, Northeastern University
Sarah	Rooney	Associate Professor, University of Delaware

Notetakers

First Name	Last Name	Title/affiliation
Casey	Ankeny	Associate Professor of Instruction, Northwestern University
Judy	Cezeaux	Dean of Engineering and Applied Sciences, Arkansas Tech University
Rachel	Childers	Associate Professor of Practice, The Ohio State University
Jen	Choi	Associate Professor of Teaching, UC Davis
LeAnn	Dourte Segan	Practice Associate Professor, University of Pennsylvania
Richard	Goldberg	Teaching Associate Professor, University of North Carolina at Chapel Hill
Annie	Hedman	Instructional Assistant Professor, Texas A&M University
Brian	Helmke	Associate Professor, University of Virginia
Sharon	Miller	Clinical Associate Professor, IUPUI
Tanya	Nocera	Associate Professor of Practice, The Ohio State University
Renata	Ramos	Teaching Professor, Rice University
Joseph	Towles	Associate Professor, Swarthmore College

Attendees

First Name	Last Name	Title/affiliation
Sabia	Abidi	Assistant Teaching Professor
Amy	Adkins	Assistant teaching professor
Kemi	Akintewe	University of South Florida
Katie	Bieryla	Associate Professor Biomedical & Mechanical Engineering, University of Portland
Caroline	Blassick	PhD Candidate, Department of BME, Boston University
Colleen	Bringman	Associate Professor of Instruction
Michael	Browne	Clinical Assistant Professor/ University of Illinois Chicago
Elizabeth	Bucholz	Associate professor of the practice
Travis	Carrell	Instructional Assistant Professor
Lianne	Cartee	Teaching Prof. Joint dept of BME NC State and UNC
Silvia	Ceballos	Teaching Professor
Mitchel	Colebank	Postdoctoral Researcher, Biomedical Engineering, UC Irvine
Christian	Rivera	Assistant Professor of Instructor/ UTD
Amber	Doiron	Assistant professor
Mostafa	Elsaadany	Teaching Assistant Professor
Ethan	Geheb	Doctoral Student
Bilal	Ghosn	Lecturer in Bioengineering at Rice University
Lauren	Heckelman	Lecturer, Columbia University
Steve	Higbee	Clinical Associate Professor of BME / IUPUI
Jacquelynn	Horsey	University of Arkansas

Cassandra	Jamison	Assistant Professor, Rowan University
David	Jamison	Associate Dean for Undergraduate Affairs
Mary	Jia	Undergraduate
Julie	Karand	Assistant Professor, Univ of Delaware
Kavon	Karrobi	Lecturer/BME
Antarjot	Kaur	Student
Cameron	Kim	Assistant professor of the practice
Christine	King	Associate Professor of Teaching, Biomedical Engineering, UC Irvine
Kwame	Kutten	Lecturer, Johns Hopkins
Angela	Lai	Assistant Teaching Professor
Jen	Leight	Professional practice associate Prof, Ohio State
Elizabeth	Logsdon	Senior Lecturer, Director of Undergraduate Studies, Biomedical Engineering, Johns Hopkins University
James	Long	Rice University
May	Mansy	Instructional Assistant Professor
Elizabeth	Mays	Lecturer III, University of Michigan
Rob	McKee	Assistant Professor of Teaching, UC Riverside
Lisa	Milkowski	Teaching professor
Linsey	Moyer	ADUS for BME
Robin	Najar	McGraw Hill
Maysam	Nezafati	Lecturer, GA Tech
Charles	Patrick	Professor & Director of UG/Texas A&M University
Charles (C.W.)	Peak	Instructional Associate Professor, Texas A&M University
Anika	Pirkey	Teaching Assistant Professor/West Virginia University
John	Puccinelli	Teaching Assoc. Prof., UW-Madison, BME
Grayson	Rice	Graduate Student, Duke University
Michael	Rizk	Assistant Professor of the Practice
Rachael	Schmedlen	Teaching Professor, Director of Academic Programs, University of Michigan
Rebecca	Scott	Assistant Professor at the University of Oklahoma
Sally	Shady	Associate Chair UG studies/ Stevens Institute of Technology
Levi	Thompson	Dean, University of Delaware
Karissa	Tilbury	Assistant Prof
Binh	Tran	Marian University
Tracy	Truzansky	STEM Consultant- Training, Facilitation, Program Design
Ross	Venook	Senior Lecturer, Stanford University
Zhinan	Wang	Clinical assistant prof.
Kelsey	Watts	Postdoc, University of Virginia
Lisa	Weeks	Lecturer, University of Maine
Melissa	Wrobel	Lecturer, University of Michigan

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