

Disability and Accessibility in Engineering Higher Education

Approximately one in five U.S. undergraduates have a disability but disabled individuals still remain largely underrepresented in engineering disciplines. This discrepancy in representation reflects larger issues of marginalization in STEM fields and higher education at large. Current support structures for disabled people remain ineffective, as accessing necessary resources requires navigating physical, cultural, and bureaucratic barriers. **This document shares resources for supporting disabled engineering students inside and outside of the classroom, through digital accessibility practices, and within your home division.**

A Note on Language...

There are two main “schools of thought” for how to talk about disability and the disabled community, using identity-first language or person-first language (refer to [Okundaye, 2021](#)). Throughout this document, we rotate between using both to respect the choice of each individual’s preferences (who are apart of the disability community).

- **Person-First Language:** Language that puts the person before their diagnosis (e.g., student or person with a disability)
- **Identity-First Language:** Language that leads with the person’s diagnosis (e.g., disabled student or person)

Support Resources

In the Classroom

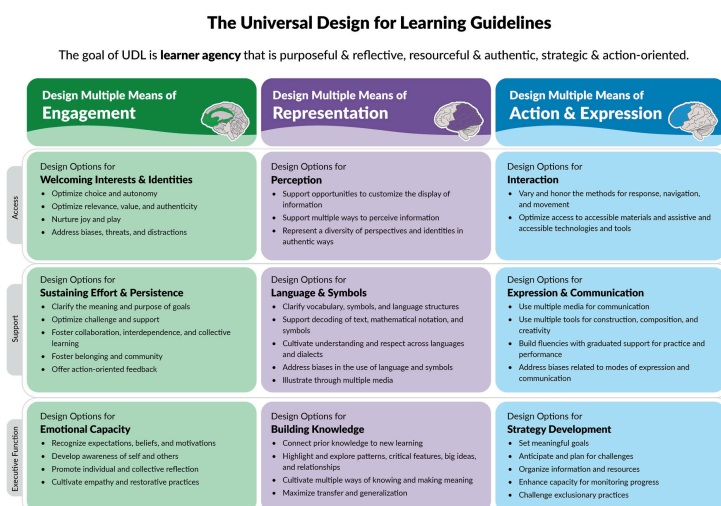
Universal Design for Learning (UDL) Framework: The [UDL framework](#) is a tool used to improve teaching and learning for all students.

- The guidelines offer concrete suggestions for equitable course improvement to ensure that all students can access and participate in the learning process.

Accommodations and Classroom Accessibility

Accommodations:

- Mentioning on the first day of class the importance of accommodations
- Invite your university’s DRC to present to students on the first day of class
- Getting to know your DRC, the available accommodations, and how to implement the accommodations



General Classroom Accessibility:

- Creating an optional survey around accessibility needs and/or suggestions for improvement in your course to understand accessibility needs to be distributed at the beginning of and midway through the semester

Outside of the Classroom

In Research

NSF Facilitation Awards for Scientists and Engineers with Disabilities (FASSED)

- **Purpose:** [FASSED](#)'s purpose is to reduce or remove barriers to participation in research and training by persons with physical disabilities by providing special equipment and assistance under awards made by NSF. Funds may be requested to purchase special equipment, modify equipment, or provide services required specifically for the work to be undertaken.
- **Who qualifies:** PIs, other senior personnel, and graduate and undergraduate students with disabilities
- Can be made as a supplemental funding request to existing NSF awards or apart of an upcoming proposal

Highlighting Disability-Centered Scholarship in Engineering (and STEM) Education

- Beardmore & Bielefeldt (2023): Work in Progress: Culture of Productivity – Multipositional Impacts on STEM Graduate Students
- Cech (2023): Engineering ableism: The exclusion and devaluation of engineering students and professionals with physical disabilities and chronic and mental illness
- Crabtree et al. (2023): Strategies for change: thriving as an individual with a disability in STEMM
- Figard et al. (2023): "It is So Exhausting to Constantly Have to Explain to People": Exploring the Effects of Faculty Interactions on Disabled Students
- Maul & Figard (2024): Interrogating the State of Disability Data Collection and Reporting
- McCall et al. (2020): Exploring student disability and professional identity: Navigating sociocultural expectations in US undergraduate civil engineering programs
- Reinholz & Ridgway (2021): Access needs: Centering students and disrupting ableist norms in STEM
- Weatherton et al. (2017): Barriers to persistence for engineering students with disabilities

Advocacy and Support

Learning Disability Language

- Disability language guide: [NCDI Language Guide](#)
- Understanding the differences in person-first versus identity-first language ([Andrews et al., 2019](#); [Gernsbacher, 2017](#))

Authentic Allyship and Advocacy: Reading Everyday Activism Network's "[How to be Anti-Ableist and Promote Disability Inclusion](#)"

Knowledge Sharing: Sharing about accessibility resources (e.g., [UDL](#) guidelines) at a faculty meeting

Web/Digital Accessibility

WebAIM: Web Accessibility In Mind ([WebAIM](#)) empowers individuals and organizations to create and deliver accessible content by providing knowledge, technical skills, tools, organizational leadership strategies, and vision.

Adobe Accessibility Tools: [Adobe](#) has hundreds of accessibility capabilities, like Speech to Text in Premiere Pro, Text to Image generation in Adobe Firefly, and the PDF Accessibility Auto-tag API in Acrobat.

WCAG 2.2: Web Content Accessibility Guidelines 2.2 ([WCAG 2.2](#)) explains how to make web content more accessible for people with disabilities.

Microsoft Accessibility Tools: [Microsoft](#) has embedded accessibility tools in PowerPoint, Word, Teams, Office 365, and more.

Home Division

Conference Accessibility

Understanding Needs: Creating a short, optional survey and distributing it to your division's members around conference accessibility and how it could be improved

Presentation and Workshop Format:

- **Consider:** "How do our division's workshops and presentations compare to the [UDL framework](#)?"
- Leveraging tools, like in Microsoft PowerPoint, to provide live captioning
- Providing guidelines for accessible visual presentations (e.g., font and color usage, minimum image sizes)
 - **Example resources:** from [Do-IT](#), [Microsoft](#), [JMU](#), [W3C](#), [University of Colorado](#), [Gov.Wales](#)

Resources Mentioned

Resource Name	Link to Resource
Universal Design for Learning Framework	udlguidelines.cast.org
NSF Facilitation Award for Scientists and Engineers with Disabilities	nsf.gov/resources.nsf.gov/files/nsf24_1.pdf
Highlighting Disability Scholarship	<ul style="list-style-type: none">● Beardmore & Bielefeldt (2023): peer.asee.org/work-in-progress-culture-of-productivity-multipositional-impacts-on-stem-graduate-students&ved=2ahUKewjH_M-Q29mIAxVg4ckDHY8XBkwQFnoECAoQAQ&usq=AOvVaw224WISWUSAEMPIpDjnepMf● Cech (2023): onlinelibrary.wiley.com/doi/pdf/10.1002/jee.20522● Crabtree et al. (2023): academic.oup.com/femspd/article/doi/10.1093/femspd/ftac045/6855226● Figard et al. (2023): peer.asee.org/it-is-so-exhausting-to-constantly-have-to-explain-to-people-exploring-the-effects-of-faculty-interactions-on-disabled-students.pdf&ved=2ahUKewim8ozj3NmIAxV_4MkDHWkMDfIQFnoECBYQAQ&usq=AOvVaw2jPXuC_XNCQEHQ_0icTjFN● Maul & Figard (2024): nemo.asee.org/public/conferences/344/papers/41321/view&ved=2ahUKewjdtgPA_3dmlAxVN38kDHUdYluwQFnoECBgQAQ&usq=AOvVaw0xdxcHjRlITHJVBVtqbheG● McCall et al. (2020): tandfonline.com/doi/pdf/10.1080/22054952.2020.1720434● Reinholz & Ridgway (2021): lifescied.org/doi/pdf/10.1187/cbe.21-01-0017● Weatherton et al. (2017): researchgate.net/profile/Renae-Mayes/publication/325077312_Barriers_to_Persistence_for_Engineering_Students_with_Disabilities/links/640a09a32a87ea006a918176/Barriers-to-Persistence-for-Engineering-Students-with-Disabilities.pdf
NCDJ Language Guide	ncdj.org/style-guide/
On Disability Language	<ul style="list-style-type: none">● Andrews et al., 2019: news.vanderbilt.edu/files/Andrews.Forber-Pratt.Mona_Lund_Pilarski.Balter-2019-RP-Say2.pdf● Gernsbacher, 2017: acamh.onlinelibrary.wiley.com/doi/pdf/10.1111/jcpp.12706● Okundaye, 2021: massadvocates.org/news/ask-a-self-advocate-the-pros-and-cons-of-person-first-and-identity-first-language
Everyday Activism Network's "How to be Anti-Ableist and Promote Disability Inclusion"	everydayactivismnetwork.org/archive/how-to-be-anti-ableist
WebAIM	webaim.org/about/
Adobe Accessibility Tools	adobe.com/trust/accessibility.html
WCAG 2.2	w3.org/WAI/standards-guidelines/wcag/
Microsoft Accessibility Tools	microsoft.com/en-us/accessibility/accessible-technology-products

Resource Name	Link to Resource
Guidelines for Accessible Presentations	<ul style="list-style-type: none"> ● DO-IT: washington.edu/doit/how-can-you-make-your-presentation-accessible ● Microsoft: support.microsoft.com/en-us/office/make-your-powerpoint-presentations-accessible-to-people-with-disabilities-6f7772b2-2f33-4bd2-8ca7-dae3b2b3ef25#bkmk_slideswin ● JMU: jmu.edu/accessibility/files/presentation-best-practices.pdf ● W3C: w3.org/WAI/teach-advocate/accessible-presentations/ ● University of Colorado: colorado.edu/digital-accessibility/resources/understanding-powerpoint-accessibility ● Wales.Gov: gov.wales/how-create-accessible-powerpoint-presentations