

AccessEngineering Equal Access: Universal Design of Engineering Departments

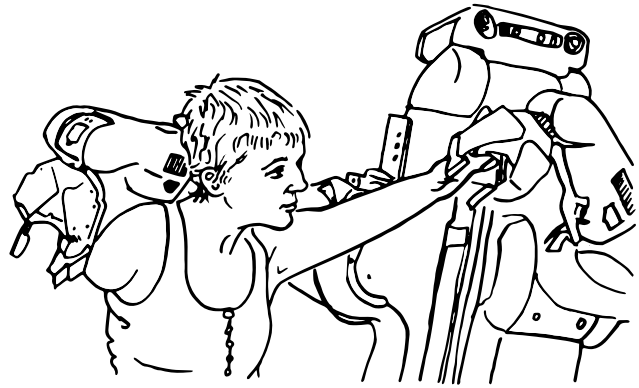
A checklist for making engineering departments welcoming and accessible to all students

The group of individuals pursuing engineering fields is becoming increasingly diverse with respect to gender, race, ethnicity, learning style, age, disability, and other characteristics. Engineering careers are potentially open to individuals with disabilities because of advancements in assistive technology that provide access to computers and facilitate common engineering tasks such as 3D-printing or Computer Numerical Control (CNC) machines for fabrication and manufacturing. However, the inaccessible design of facilities, software, curriculum, web pages, and distance learning courses continue to erect barriers.

When it comes to an engineering department, the ultimate goal is simply equal access. Everyone who qualifies to take courses within your department and anyone who is qualified to teach them should be able to do so.

Universal design (UD) can provide an approach for making your department accessible to all potential students and instructors. UD is “the design of products and environments to be usable by all people, to the greatest extent possible, without the need for adaptation or specialized design.”¹ It suggests that, rather than design your departmental offerings for the average user, design them for people with a broad range of abilities, disabilities, ages, reading levels, learning styles, native languages, cultures, and other characteristics. More information about applications of UD can be found in *Universal Design: Principles, Process, and Applications*.²

In applying UD, keep in mind that students, faculty, and staff in your department may have learning disabilities or visual, speech, hearing, and mobility impairments. Make sure everyone



- feels welcome,
- can get to facilities and maneuver within them,
- is able to fully benefit from resources and courses, and
- can make use of equipment and software.

Applying UD minimizes, but does not eliminate, the need for accommodations for students, faculty, and staff with disabilities. It is important to have a plan in place to respond to accommodation requests in a timely manner and to ensure that faculty and staff are prepared to work with colleagues and students who have disabilities.

Guidelines and Examples

AccessEngineering has drafted an Accessibility Checklist to guide faculty and administrators in making their engineering department more accessible. This content does not provide legal advice. Your disability support services office may also be able to assist you in increasing the accessibility of your department. Consult your campus legal counsel, campus ADA/504 compliance officer, or regional Office for Civil Rights (OCR) regarding relevant legal issues.



Planning, Policies, and Evaluation

Consider diversity issues as you plan and evaluate your facilities and programs.

- Are people with disabilities, racial and ethnic minorities, men and women, young and old students, and other groups represented on your staff, faculty, and student body?
- Are people with disabilities, racial and ethnic minorities, men and women, young and old students, and other groups included in departmental planning and review processes and advisory committees?
- Do you have policies and procedures that ensure access to facilities, printed materials, computers, and electronic resources for people with disabilities?
- Do policies and procedures require that accessibility be considered in the procurement process for software and other information technology?
- Do policies and procedures require that accessibility be considered when departmental software is created?
- Do you have a procedure to ensure a timely response to requests for disability-related accommodations? Is this content included in faculty and staff orientations and periodically in other meetings?
- Are disability-related access issues addressed in any external or internal evaluations of your courses or services?

Facility and Environment

Ensure physical access, comfort, and safety within an environment that is welcoming to visitors with a variety of abilities, racial and ethnic backgrounds, genders, and ages.

- Are there parking areas, pathways, and entrances to departmental buildings wheelchair-accessible?
- Are all levels of departmental facilities connected via wheelchair-accessible routes of travel? Are accessible routes of travel easy to find?
- Is adequate light available?
- Are there ample high-contrast, large-print directional and safety signs to and throughout departmental labs, administrative offices, classrooms, and other facilities? Is Braille signage available when appropriate?
- Do elevators have auditory, visual, and tactile signals and are elevator controls accessible from a seated position?
- Are wheelchair-accessible restrooms with well-marked signs available?
- Are parts of counters and desks in student service areas at a height accessible from a seated position?
- Are aisles kept wide and clear of obstructions?
- Are there quiet work or meeting areas where noise and other distractions are minimized and/or facilities rules in place (e.g., no cell phone use) that minimize noise?

Consult the ADA Checklist for Readily Achievable Barrier Removal³ for more suggestions.

Support Services

Make sure support staff are prepared to work with all students, faculty, and staff.

- Do staff members know how to respond to requests for disability-related accommodations such as sign language interpreters?
- Are staff members familiar with the availability and use of Telecommunications Relay Services, assistive technology, and alternate document formats?
- Are staff members aware of issues related to communicating with students of different races, ethnicities, ages, and students who have disabilities? (See the Communication Hints on page five of this publication.)
- Are department websites accessible?

Consult *Equal Access: Universal Design of Student Services*⁴ for more suggestions for making services accessible to all students.



Information Resources

Ensure that departmental publications and websites welcome a diverse group and that information is accessible to everyone.

- Are accessibility issues incorporated into mainstream web design and other technology training for students and staff?
- Do pictures in departmental publications and on websites include people with diverse characteristics with respect to race, gender, age, and disability?
- In key publications, does the department include a statement about its commitment to universal access and procedures for requesting disability-related accommodations? Ideally, use the institution's diversity statement.
- Are all printed publications available in an accessible format on the department's website and also available (immediately or in a timely manner) in alternate formats such as Braille and electronic text?
- Do departmental web pages adhere to accessibility guidelines or standards adopted by your institution or your department? See, for example, the W3C's Web Content Accessibility Guidelines.⁵ For information about designing accessible websites, consult the *World Wide Access: Accessible Web Design* video and publication.⁶
- Are faculty members aware of issues related to communicating with students of different races, ethnicities, and ages and students who have disabilities? (See the Communication Hints on page five of this publication.)
- Are faculty members familiar with and do they employ instructional strategies that maximize the learning of all students? (See *Equal Access: Universal Design of Instruction*⁷ for a checklist of instructional strategies.)
- Do instructors promote the use of flexible methods of assessment for students with diverse abilities and learning styles?
- Is universal and accessible design incorporated into the curriculum of appropriate courses (e.g., requiring software or class projects designed by students be accessible to people with disabilities)?

Engineering Courses and Faculty

Ensure that faculty members deliver courses that are accessible to all students and that accommodations are provided in a timely manner.

- Do video presentations used in courses have captions? Audio descriptions? Do podcasts have transcripts?
- Do faculty members know how to respond to requests for disability-related accommodations such as sign language interpreters?

Computers, Software, and Assistive Technology

Make technology in computing facilities accessible to everyone.

- Is an adjustable-height table available for each type of computer workstation?
- Is screen enlargement software available for users with low vision? Is a large monitor available so that a larger amount of screen can be viewed while magnified?
- Is text-to-speech software available to those with print-related disabilities?
- Is a trackball available for those who have difficulty controlling a mouse?
- Is a wrist rest and forearm rest available for those who require support while typing?
- Can controls on computers, printers, scanners, and other information technology be reached from a seated position (e.g., easy access to power switches on computers and surge protectors)?

For more information about making a computer lab accessible, consult *Equal Access: Computer Labs*.⁸ For information about assistive technology, consult DO-IT's technology and universal design videos and publications.⁹



Engineering Labs

Ensure that engineering labs are accessible to everyone.

- Are aisles wide and clear of obstructions for wheelchair users as well as people with mobility or visual impairments?
- Have you addressed safety procedures for students with disabilities (e.g., instructions in print and visual lab warning signals for students with hearing impairments)?
- Can controls on lab equipment be reached from a seated position?
- Is equipment marked with large-print and/or Braille labels?
- Do you provide non-slip mats, beaker and object clamps/stands, beakers and equipment with handles, and/or surgical gloves to handle slippery items?
- Do you have strategies for dividing the labor in a way that ensures all students in a group, including students with disabilities, actively participate in hands-on learning activities?
- Are there policies or procedures for accommodating students who receive extra time on assignments?

For more information about making an engineering lab accessible, consult the Checklist for *Making Engineering Labs Accessible to Students with Disabilities*.¹⁰



Checklist Updates

This checklist was adapted with permission from the checklists within the publications *Equal Access: Universal Design of Computer Labs*¹¹ and *Equal Access: Universal Design of Student Services*.⁵ These checklists are being refined and field-tested at postsecondary institutions nationwide. To increase the usefulness of these documents, send suggestions to doit@uw.edu.

Additional Resources

For more information about applications of universal design consult *The Center for Universal Design in Education* website,¹² or the book *Universal Design in Higher Education: From Principles to Practice, Second Edition* published by Harvard Education Press. To learn more and order online, visit the DO-IT website.¹³

Getting Started

Looking at all of these suggestions may seem overwhelming. The great thing about universal design, however, is it can be applied incrementally. For example, a department might begin by assigning an existing diversity committee or creating a new task force to explore ways of making the department more welcoming and accessible to everyone. Members of the advisory group could go through the checklist provided in this publication and cross off items not applicable in their department, note as “done” those that have already been implemented, and label with a recommended deadline date for those they feel should be addressed by the department. Then, using the online version of this publication, they could order the items by date and add additional notes as appropriate. Presenting the timeline to the department decision-maker on diversity issues could be the next step. Once approval is secured, assigning staff and, when needed, securing budget funds could move the project along.

Communication Hints

Treat people with disabilities with the same respect and consideration with which you treat others. Here are some helpful hints when it comes to delivering a presentation, hosting an exhibit, and otherwise relating to people with disabilities.

General

- Ask a person with a disability if that person needs help before providing assistance.
- Talk directly to the person with a disability, not through their companion or interpreter.
- Refer to a person's disability only if it is relevant to the conversation.
- Avoid derogatory slang or negative descriptions of a person's disability. For example, "a person who uses a wheelchair" is more appropriate than "a person confined to a wheelchair." A wheelchair is not confining—it's liberating!
- Provide information in alternate means (e.g., written, spoken, diagrams).
- Do not interact with a person's guide dog or service dog unless you have received permission to do so.
- Do not be afraid to use common terms and phrases, like "see you later" or "let's go for a walk" around people with disabilities.
- Do not touch mobility devices or assistive technology without the owner's consent.
- Do not assume physical contact, like handshakes, high-fives, or hugs are okay.
- Understand that not everyone uses eye contact.

Blind or Low Vision

- Be descriptive. Say, "The computer is about three feet to your left," rather than "The computer is over there."
- Speak all of the projected content when presenting and describe the content of charts, graphs, and pictures.
- When guiding people with visual impairments, offer them your arm rather than grabbing or pushing them.

Learning Disabilities

- Offer directions or instructions both orally and in writing. If asked, read instructions to individuals who have specific learning disabilities.

Mobility Impairments

- Consider carrying on a long conversation with an individual who has a mobility impairment from a seated position.

Speech Impairments

- Listen carefully. Repeat what you think you understand and then ask the person with a speech impairment to clarify or repeat the portion that you did not understand.

Deaf or Hard of Hearing

- Face people with hearing impairments, and avoid covering your mouth, so they can see your lips. Avoid talking while chewing gum or eating.
- Speak clearly at a normal volume. Speak louder only if requested.
- Repeat questions from audience members.
- Use paper and pencil, or type things out on your cell phone, if the person who is deaf does not read lips or if more accurate communication is needed.
- When using an interpreter, speak directly to the person who is deaf; when an interpreter voices what a person who is deaf signs, look at the person who is deaf, not the interpreter.

Psychiatric Impairments

- Provide information in clear, calm, respectful tones.
- Allow opportunities for addressing specific questions.



Cited Web Resources

1. www.ncsu.edu/ncsu/design/cud/about_ud/udprinciples.htm
2. www.uw.edu/doit/universal-design-process-principles-and-applications
3. www.ada.gov/checkweb.htm
4. www.washington.edu/doit/Brochures/Academics/equal_access_ss.html
5. www.w3.org/TR/WCAG20/
6. www.uw.edu/doit/videos/index.php?vid=35
7. www.uw.edu/doit/equal-access-universal-design-instruction
8. www.uw.edu/doit/videos/index.php?vid=12
9. www.uw.edu/doit/technology-and-universal-design
10. www.uw.edu/doit/checklist-making-engineering-labs-accessible-students-disabilities
11. www.uw.edu/doit/equal-access-universal-design-computer-labs
12. www.uw.edu/doit/programs/center-universal-design-education/overview
13. www.uw.edu/doit/universal-design-higher-education-principles-practice-1
14. www.uw.edu/accesscomputing/get-informed/publications/brochures/equal-access-universal-design-computing-departments

About AccessEngineering

The College of Engineering and DO-IT (Disabilities, Opportunities, Internetworking and Technology) at the University of Washington lead the *AccessEngineering* project for the purpose of increasing the participation of people with disabilities education and careers in engineering and improve engineering fields with their perspectives and expertise. The *AccessEngineering* Faculty Leadership Team includes representatives from Auburn University, Georgia Tech, Ohio State University, and the Rochester Institute of Technology. Collaborators represent education, industry, government, and professional organizations nationwide.

For further information, to be placed on the mailing list, request materials in an alternate format, or to make comments or suggestions about DO-IT publications or web pages, contact:

University of Washington

Box 354842

Seattle, WA 98195-4842

doit@uw.edu

www.uw.edu/doit/programs/accessengineering/overview

206-685-DOIT (3648) (voice / TTY)

888-972-DOIT (3648) (toll free voice / TTY)

509-328-9331 (voice / TTY) Spokane

206-221-4171 (fax)

Dr. Sheryl Burgstahler, Principal Investigator

Drs. Maya Cakmak and Kat Steele, Co-PIs

Dr. Brianna Blaser, Project Coordinator

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