AccessEngineering

Equal Access: Universal Design of Engineering Labs

A checklist for making engineering labs welcoming, accessible, and usable

As increasing numbers of people with disabilities pursue educational opportunities in engineering, accessibility of engineering teaching and research labs is critical. The ultimate goal is simply equal access. Hands-on learning in lab courses is an important component of an engineering degree. Everyone who needs to use your departments' labs should be able to do so comfortably.

Universal Design

To make your departments' labs accessible, employ principles of universal design (UD). UD means that rather than designing your facilities and services for the average user, they are designed for people with a broad range of abilities, disabilities, ages, reading levels, learning styles, native languages, cultures, and other characteristics. Keep in mind that individuals using a lab may have learning disabilities or visual, speech, hearing, and mobility impairments. Preparing your space and curriculum to be accessible to all will minimize the need for special accommodations. Make sure everyone

- feels welcome,
- can get to the facility and maneuver within it,
- is able to communicate effectively with support staff,
- is able to access printed materials and electronic resources, and
- can make use of equipment and software.

Guidelines and Examples

The following questions can guide you in making a lab universally accessible.

Planning and Policies

Consider diversity issues as you plan and evaluate your departments' labs.

— 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 in numbers proportional to those of the whole campus or community?

— Are people with disabilities, racial and ethnic minorities, men and women, young and old students, and other groups represented in lab planning and review processes and advisory committees in numbers proportional to those of the whole campus or community?

— Do policies and procedures require that accessibility be considered in the procurement process for software and other information technology?

— When students work in groups, are groups formed and the division of labor determined in a manner that considers students' strengths and abilities?

Physical Environments

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 the building that are wheelchair-accessible and clearly defined?

— Are all levels of the facility connected via an accessible route of travel?

— Do elevators have auditory, visual, and tactile signals and are elevator controls accessible from a seated position?

— Are there ample high-contrast, large-print directional and safety signs to and throughout the lab? Is Braille signage available when appropriate?

— Are wheelchair-accessible and child-friendly restrooms with well-marked signs available in or near the lab?
— Are aisles wide and clear of obstructions for wheelchair users who have mobility or visual impairments?
— Can background noise from equipment or tools be turned off or minimized during instruction?
— Are there clear lines of sight to demonstrations or presentations?

Lab Staff

Make sure staff are prepared to work with all students.

— Are staff members familiar with assistive technology, alternate document formats, and how to respond to requests for disability-related accommodations?
— Are staff members aware of issues related to communicating with students with different characteristics regarding race and ethnicity, age, and disability? (See the Communication Hints at the end of this publication.)
— Do staff members have ready access to a list of on- and off-campus resources for students with disabilities?
— Can staff members explain how to use tools in a variety of ways?

Information Resources

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

— On syllabi and other publications, do you include a statement about your commitment to universal access and procedures for requesting disability-related accommodations?
— Are all printed software and hardware documentation and other publications available (immediately or in a timely manner) in alternate formats such as Braille, large print, and electronic text?
— Are printed materials within easy reach from a variety of heights and without furniture or equipment blocking access?
— Do electronic resources, including web pages, adhere to accessibility guidelines or standards? For information about making your website accessible to everyone, consult World Wide Access: Accessible Web Design video and publication at *www.uw.edu/doit/videos/index.php?vid=35*.
— Do videos used in the lab have captions? Audio descriptions?
— Are accessibility issues incorporated into mainstream web design and other technology training for students and staff?

Equipment and Technology

— Is an adjustable-height table available for each type of workstation in the lab? Can the height be adjusted from a seated position?
— Can controls on equipment, computers, printers, scanners, and other information technology be reached from a seated position?
— Are adequate work areas available for both right- and left-handed users?
— Do you have low-cost equipment that can increase accessibility? This might include
  - a trackball, wrist rests, and forearm rests;
  - keyboards with large-print or braille labels, or home-row key indicators;
  - software to enlarge screen images (that may be available in the operating system), along with a large monitor with a flexible positioning arm;
  - equipment labeled with tactile braille;
  - non-slip mats;
  - magnifying devices and extra lighting;
  - plastic cylinders and beakers;
  - step stools; and
  - tactile image creation tools.

— Have you considered adding additional software and equipment? This might include
  - text-to-speech, word prediction, and speech input software;
  - scanner and optical character recognition (OCR) software;
  - talking equipment, including tape measures, thermometers, calculators, and multimeters that vocalize readings;
  - hearing protection; and
  - one-handed keyboards or "keyboard layout" software.
— Have you addressed safety procedures for students with hearing impairments (e.g., instructions in print and visual lab warning signals), visual impairments (e.g., large print signage), and mobility impairments (e.g., fire extinguisher that can be reached from a seated position)?

Instructional Strategies

— 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?
— Can a student use more accessible systems (such as computer numerical control [CNC] equipment or 3D printers), work in groups, or receive assistance from a teaching assistant when standard equipment is inaccessible?
— How can a student who is unable to access a piece of equipment participate and/or contribute to the task?

Checklist Updates
The most current version of this publication can be found at *www.uw.edu/doit/equal-access-universal-design-engineering-labs*. Any suggestions should be sent to *doit@uw.edu*.

Additional Resources

For further guidelines and suggestions on how to create accessible labs consult the *ADA Checklist for Readily Achievable Barrier Removal* at *www.usdoj.gov/crt/ada/checkweb.htm*.

For more information about accessible science equipment, consult the publication at *www.uw.edu/doit/accessible-science-equipment*.

For more information about assistive technology, consult the videos and publications at *www.uw.edu/doit/technology-and-universal-design*.

For more information on accessible student services, visit *The Student Services Conference Room* at *www.uw.edu/doit/programs/accesscollege/student-services-conference-room/overview*. This includes a collection of documents, videos, and checklists to help make career services, distance learning, computer labs, recruitment and admissions, registration, housing and residential life, financial aid, libraries, tutoring and learning centers, and student organizations accessible. *The Student Services Conference Room* also hosts a searchable Knowledge Base of questions and answers, case studies, and promising practices.

For more information about applications of UD consult *www.uw.edu/doit/resources/popular-resource-collections/applications-universal-design* or The Center for Universal Design in Education at *www.uw.edu/doit/programs/center-universal-design-education/overview*.

To clarify legal issues, consult your campus legal counsel or ADA/504 compliance officer or call your regional Office for Civil Rights (OCR).

Communication Hints

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.

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.

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