Accessibility (A11y) & Universal Design
• Understand
  • Principles of universal design
  • Application of universal design to technology and to accessibility
  • CSU Accessible Technology Initiative
  • Accessibility best practices

• Be able to
  • Conduct a four-point accessibility evaluation
What is Accessibility and Universal Design?

ACCESSIBILITY
Accessibility ensures everyone can perceive, understand, engage, navigate, and interact with technology regardless of device, software, or product without barriers.

UNIVERSAL DESIGN
The design that is simple, useful and accommodates a wide range of individual preferences and abilities.

EVERYONE!
Accessibility is not about disability; it’s actually about **ability**. It’s about making it easy for **everyone** to:

- Acquire the **same** information
- Engage in the **same** interactions
- Enjoy the **same** services
Understanding Accessibility, 2 of 2

VISION
Low vision, blind, colorblind, etc.
- Screen readers
- Braille display
- High contrast settings
- Magnifiers

HEARING
Deaf, hard of hearing, noisy environment
- Sign language
- Captions/Subtitles
- Transcripts

MOBILITY
Muscular dystrophy, arthritis, injury, etc.
- Keyboard only
- Speech to text

COGNITIVE
Learning disability, dyslexia, ADHD, etc.
- Digital content layout
- Information organization

LEARNING
Learning styles, preferences, etc.
- Visual learners
- English as a Second Language (ESL)
- Accents
What is Assistive Technology?

Assistive Technology (AT) are “products, equipment, and systems that enhance learning, working, and daily living for persons with disabilities.”

- Screen Readers
- Magnification Software
- Speech Recognition
- Trackball Mouse
- Keyboard
- ZoomText
- Braille
- Captions/Subtitles
- Captioned Telephone
- Video Relay Services
What are Screen Readers

Screen readers are a form of assistive technology (AT) software that enables access to a computer, and all the things a computer does, by attempting to identify and interpret what is being displayed on the computer screen using text-to-speech. Screen readers can only access and process live text.

- Provides access to someone who is visually impaired, mobility or has a learning disability to access text on the screen.
- Offers same level of independence and privacy as anyone else.
Types of screen readers

Screen reader program for Microsoft Windows that allows blind and visually impaired users to read the screen either with a text-to-speech output or by a refreshable Braille display. [NVDA screen reader](https://nvaccess.org/) can be downloaded free of charge by anyone.

Provides auditory descriptions of each onscreen element using gestures, a keyboard, or a braille display.

Adds spoken, audible, and vibration feedback to your device.

Screen magnifier for Microsoft Windows that allows you to see and hear everything on the computer.
Designing for Accessibility with POUR

Accessibility incorporates principles to guide the designing and development process of digital content accessible. The POUR principles support foundational considerations for accessibility.

Image courtesy of Accessible Educational Materials
POUR = Perceivable

Can a person’s brain perceive the content regardless of the senses they use? Can a person access content despite being blind, low vision, deaf, deafblind, dyslexia, or...

- Alternative Text for non-text content in variety of formats (Braille, speech, symbols or simpler language)
- Captioning or Transcripts for time-based media
- Content presented in different way (simpler layout) without losing info or structure
- Easier for user to see and hear content (separating background and foreground)
POUR = Operable

Can you access and navigate regardless of the device the user is using?

• JAWS, NVDA, No Mouse, or...

• Functionality using just a keyboard (no mouse) for physical or motor limitations

• Enough time to read or use content

• Can be navigated to find content and know where one is on the screen

• Doesn’t cause seizures i.e. GIF or flickering media
POUR = Understandable

Can the content be understood as easily as possible through simple language and contextual information?

- Text content is readable and understandable (language, reading level, unusual words)
- Use plain language
- Web pages operate in predictable way
- Input assistance – users can avoid or correct mistakes
POUR = Robust

Can the content be accessed regardless of the users operating system, browser, browser window?

• Google Chrome vs, Firefox, vs iPhone vs Windows OS, Android, or...

• Maximize compatibility with current and future technologies
• Add metadata to make content easier to find and use
• Perform an accessibility check
• Perform basic assistive technology testing
Universal Design Principles

1. **Equitable use.** The design is useful and marketable to people with diverse abilities. For example, a website that is designed to be accessible to everyone, including people who are blind and use screen reader technology, employs this principle.

2. **Flexibility in Use.** The design accommodates a wide range of individual preferences and abilities. An example is a museum that allows visitors to choose to read or listen to the description of the contents of a display case.

3. **Simple and intuitive.** Use of the design is easy to understand, regardless of the user’s experience, knowledge, language skills, or current concentration level. Science lab equipment with clear and intuitive control buttons is an example of an application of this principle.

4. **Perceptible information.** The design communicates necessary information effectively to the user, regardless of ambient conditions or the user's sensory abilities. An example of this principle is captioned television programming projected in a noisy sports bar.

5. **Tolerance for error.** The design minimizes hazards and the adverse consequences of accidental or unintended actions. An example of a product applying this principle is software applications that provide guidance when the user makes an inappropriate selection.

6. **Low physical effort.** The design can be used efficiently, comfortably, and with a minimum of fatigue. Doors that open automatically for people with a wide variety of physical characteristics demonstrate the application of this principle.

7. **Size and space for approach and use.** Appropriate size and space is provided for approach, reach, manipulation, and use regardless of the user's body size, posture, or mobility. A flexible work area designed for use by employees who are left- or right-handed and have a variety of other physical characteristics and abilities is an example of applying this principle.

*Universal Design: Process, Principles, and Applications (UW)*
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.
Universal Design
Universal Design for ALL
Universal Design for Learning (UDL) applies the principles of Universal Design in the education context, with the goal of minimizing barriers and maximizing learning for all students.

**Universal Design for Learning**

A research-based set of principles to guide the design of learning environments that are accessible and effective for all.

**Expression**
- Providing several ways to demonstrate learning

**Representation**
- Presenting the same instruction in multiple ways

**Engagement**
- Extending a variety of opportunities for connection and interaction
- Giving all learners equal opportunities to learn including:
  - Vision
  - Learning
  - Mobility
  - Hearing
  - Talk

**Every Learner is Unique**

Learning Opportunities for All
Universal Design for LEARNING, 2 of 2

AFFECTIVE NETWORKS: THE WHY OF LEARNING

ENGAGEMENT: Look for different ways to motivate and inspire students
Example: Interactive skill-building exercises

RECOGNITION NETWORKS: THE WHAT OF LEARNING

REPRESENTATION: Present information and content in different ways
Example: Captions and transcripts to accompany audiovisual materials

STRATEGIC NETWORKS: THE HOW OF LEARNING

ACTION & EXPRESSION: Provide multiple ways for students to interact with material and express their knowledge
Example: Tests that include different question types such as long answer and multiple choice

Visit CAST UDL Guidelines
Universal Design Example
Is Captioning Universal Design?
Captioning Videos

Per federal and state law, and CSU policy, instructional media (e.g., videos, captured lectures, recorded presentations) must have captions. This includes instructional media used in classrooms, posted on websites or shared in Canvas.

- All students who are enrolled in a course must be able to access the content in the course.

- **Faculty:** Funding is available to help faculty generate captions and transcripts for instructional media. Materials should be submitted **at least six weeks** in advance of their use in instruction.

- **Staff:** For CSUN staff who do not provide classroom material, there is a cost through chargeback. For information on the chargeback, email [ncod@csun.edu](mailto:ncod@csun.edu).

[csun.edu/captioning](http://csun.edu/captioning)
Mobile Universal Design

• Siri, Genie, etc.
• Dictation
• Predictive text
• Vibrating/flashing alerts
• Safari Reader
• Screen Reader
• Font size
• Color Contrast

iOS - Voiceover

Android - Talkback

Universal Design Center
csun.edu/udc
It is the policy of the CSU to make information technology resources and services accessible to all CSU students, faculty, staff and the general public regardless of disability.
Need for Accessibility

- 20% of the U.S. population has at least one disability (U.S. Census Bureau: Disability [2010])
- 11% of college students report a disability (U.S. Department of Education, National Center for Education Statistics. [2016])
- Nearly 1 in 5 people have disability in the U.S. (U.S. Census Bureau Reports [2010])
Accessibility, it’s the _____ thing to do!

**Right:**
- Aligns with University Mission or Vision
- Increase usability for all people
- Attracts students to university

**Legal:**
- Equal access due to laws such as ADA, Section 508
- Department of Justice scrutiny
- Risk of litigation

**Smart:**
- Sustainable
- Large number of population has disability (19% of US population)
- “If they can use my products, they can buy them.” – Steve Jobs
- Creating a welcoming environment
- Support’s a person’s success and persistence in activity retention
Create with Accessibility in Mind

Best Practices

Tools to design accessible content creation workflow...

Making digital content accessible for everyone

- Alternative Text
  - Images
  - Shapes

- Video/Audio
  - Captions/transcripts

- Navigation/Links
  - Link requirements

- Structure
  - Headings
  - Lists, etc.

- Color
  - Color contrast
  - Meaning without color

- User Interface
  - Keyboard accessibility
Organize content with headings, subheadings, images, videos, and footer are important for usability and accessibility.
Example 1: Reading long, dense text documents can be a daunting task for learners

As part of our commitment to excellence through diversity and inclusion, California State University, Northridge (CSUN) strives to ensure that campus communication and information technology is accessible to everyone. The California State University system statement on accessibility is articulated in California State University - Executive Order 1111, in accordance with both federal and state laws including the Americans with Disabilities Act of 1990 (ADA) and Section 508 of the U.S. Rehabilitation Act.

Need assistance or have a question not answered here? Please contact the Universal Design Center (UDC) at UDC@csun.edu or, during business hours (Monday through Friday, 8am to 5pm Pacific time), at (818) 677-5898.

In this context, “accessibility” means that people with disabilities have access — to facilities, to information and to technology.

“Universal design” takes this concept one step further, to ensure that everyone can perceive, understand, engage, navigate and interact regardless of ability or preference.

The UDC supports the campus community in their efforts to make it possible for individuals to learn, communicate, and share via information and communication technology. One way we do this is by assisting the campus community to ensure their information and communication technology is interoperable, usable and accessible, so that individual learning and processing styles and/or physical characteristics are not barriers to access.

The role of the UDC is to help CSUN implement business practices which enable the campus to meet policy standards under the Accessible Technology Initiative Coded Memoranda.

What does this mean to me?

Everyone has a part in creating accessible and usable information. The responsibility of creating and maintaining accessible content falls to the entire campus community.

Example 2: Well-structured documents help students organize and process texts

Universal Design Center (Heading 1)

Accessibility Statement (Heading 2)

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Need help? (Heading 3)

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What is Accessibility? What is Universal Design? (Heading 2)

In this context, “accessibility” means that people with disabilities have access — to facilities, to information and to technology. “Universal design” takes this concept one step further, to ensure that everyone can perceive, understand, engage, navigate and interact regardless of ability or preference.

Universal Design Center Mission (Heading 2)

The UDC supports the campus community in their efforts to make it possible for individuals to learn, communicate, and share via information and communication technology. One way we do this is by assisting the campus community to ensure their information and communication technology is interoperable, usable and accessible, so that individual learning and processing styles and/or physical characteristics are not barriers to access.

The role of the UDC is to help CSUN implement business practices which enable the campus to meet policy standards under the Accessible Technology Initiative Coded Memoranda.

Shared Campus Responsibility (Heading 3)

Everyone has a part in creating accessible and usable information. The responsibility of creating and maintaining accessible content falls to the entire campus community.
Heading Styles, 2 of 2

- Use Heading Styles in a logical sequence
- Heading Styles (Heading 1 through Heading 6)
  - Heading 1: Document Title or a major section
  - Heading 2: Major subsection titles
  - Heading 3: Further subsection titles, and so forth
- Using heading styles means you can also quickly build a **table of contents**, reorganize your document, and reformat its design without having to manually change each heading's text.

**Headings** are styles to give a document structure by category or topic.

**Without headings**, a person using assistive technology like a screen reader **cannot** navigate by sections, subsections, or scan section titles to understand the document structure.
Heading Styles compatible with other programs

Microsoft Word

Website

Canvas

Google Docs

InDesign

```html
<h1> Main Heading </h1>
<h2> Sub Heading </h2>
<h3> Sub sub heading </h3>
<h2> Sub Heading </h2>
<h3> Sub sub heading </h3>
<h3> Sub sub heading </h3>
```

Header 2 -> This is the Title
Header 3 -> This is the sub title
Header 4 -> This is a category
Paragraph -> This is the body of the content
Table of Contents

Headings structure will automatically populate a table of contents and provide accessible for screen readers rely on headings structure to navigate a page quickly.

• Or Custom Table of Contents
• Ensure the ‘Tab leader’ option is ‘…….’
• To change which styles appear, select ‘Options’
• Number each style in the order in the Table of Contents
• Select ‘Ok’ twice
Visual Challenge

What’s the best way to make images accessible to everyone?

Universal Design Center

normal vision  
low vision  
color blindness  
blind or deaf-blind

Children leaving school before completing their Primary Education
In the Sub-Saharan, 11.07 million children leave school before completing their primary education. In South and West Asia, that number reaches 13.54 million.
Alternative or Alt Text

- A written description of images and/or objects that can be read by a blind or low vision using screen reader technology.

- Screen readers and other assistive technologies can’t convert images into words/texts.

- Captions are universal and accessible for everyone.

- “Image of…”, “photo of…” is not needed.

- Recommend brief descriptive text within 8 to 80 characters long.

- Best practices for accessible images

Tiny turtle eating a ripe strawberry.
How to Describe Images?

A stair chase leading up to an entryway is painted yellow with bold black text that reads museums are now.

A hand reaches out of a computer screen giving the hand gesture for stop. The screen reads ‘access denied!’

On the left is the book cover for Haben The Deafblind Woman Who Conquered Harvard Law, and on the right is the quote: “In the Tigrinya language of Eritrea and Ethiopia, Haben means ‘pride.’”

Michelle Obama claps and Barack waves.

Student holds a diploma hardcover up in the air during CSUN commencement. Caption text “and together, as Matadors, we will move mountains.”

More examples of How to Describe Images

- Document Learning Tools: Describing images
- How to Describe Images (Art, Chemistry, Diagrams, Flow Charts, Formatting & Layout, Graphs, Maps, Mathematics, Page Layout, Tables, Text-only images)
- Periodic Table of the Elements
- UDC Best Practices for Describing Images
How to add Alt Text in various software applications?

**Office 2016**
- Insert image
- Right-click on the image and select “Format Picture”

**Office 365**
- Right-click on the image and select “Edit Alt Text”

**Google Docs**
- Right-click on the image and select “Alt Text”

**Canvas**
- Insert an alternative text by clicking Embed Image
- Write the alternative text in the Alt Text field

**Web-One**
- Upload image
- Write the alt text in HTML Alt field

**InDesign**
- Right-click on the image
- Select Object Export Options
- Alt Text tab | Choose Custom from the Alt Text Source | enter alt description

There are more Alt Text field available Email Marketing, Facebook, Instagram, etc.
Descriptive Hyperlinks, 1 of 2

Not Accessible – vague and redundant

CSUN News
Woman of the Year for the 18th Senate District
California State University, Northridge President Dianne F. Harrison has been named Woman of the Year for the state's 18th Senate District by Sen. Robert Hertberg. Read more

Important Dates for CSUN Commencement 2019
For graduating seniors, CSUN GradFest 2019 will take place from 9 a.m. to 6 p.m., March 13 and 14, at the CSUN Campus Store Complex. The event gives students the opportunity to make their final preparations for graduation, including renting caps and gowns, information on ceremony schedules, reserving guest tickets, purchasing souvenirs and taking graduation portraits. Read more

Blinky the Friendly Hen: 40th Anniversary Exhibition
Comprised of a Relic Chamber, a Blinky Theatre, Blinky book editions (1979-2019), chapel, gift shop, stained glass, and historical artifacts, this fourth retrospective exhibition celebrates historical and contemporary works relating to four decades of the Blinky phenomenon. Read more

Accessible – descriptive and unique

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Comprised of a Relic Chamber, a Blinky Theatre, Blinky book editions (1979-2019), chapel, gift shop, stained glass, and historical artifacts, this fourth retrospective exhibition celebrates historical and contemporary works relating to four decades of the Blinky phenomenon.

Full URL text https://www.csun.edu/universal-design-center
(raw URL may not make sense to screen reader users or others, so make the link text descriptive i.e. Universal Design Center)
When creating hyperlinks, make sure the text associated with the link is understandable out of context.

• Avoid this: You may find this tutorial here.

• Do this: You may find this tutorial on creating accessible Word document on our website.

For Printing

• If the document is likely to be printed, include the full URL. If the URL is long, consider creating a shorten URL (tinyurl.com or bitly.com or other URL services)

You may find this tutorial on creating accessible Word document on our website (www.csun.edu/udc/word)

• Do not use click here or here or read more or continue or email me.

• Do not use different link text to refer to the same resource.

• Do not to use the same link text to refer to different resources.

• Be unique for unique destinations.

• Best practice is to bold or underline links.

• Do not use color links as the only method to convey important information.

• Tab order should read from the upper left to the lower right, and make sense to both sighted and visually impaired users.
Color Contrast

**HUMANITY & TECHNOLOGY**

*Where we extract the bandwidth of information we make every day continuously reaching new heights.*

**GLOBAL BANDWIDTH PER SECOND**

- **100 TERABYTES** (250,000,000,000,000 bits per second)

**DATA TRANSFERED PER MONTH**

- **200 EXABYTES** (250,000,000,000,000,000,000 bits per month)

The global bandwidth is said to exceed 1000 Tbps by 2030 and data transferred will reach vast scale much sooner than that.

**LIBRARY OF CONGRESS**

- **TEXT, AUDIO, VIDEO**

**DIGITAL DATA STORED GLOBALY**

- **20 PETABYTES** (20,480,000,000,000 bits)

**HUMAN SPEECH IN DATA FORM (2003)**

- **42 ZETTABYTES** (45,097,156,608 TBS)

Digital data stored increased by almost 18% in a few years. We can only imagine the amount of data in the world by the year 2003.

**TOTAL DATA STORABLE IN HUMAN**

- **170 YOTTABYTES** (186,916,977,000,000,000,000,000 bits)

*The approximate cost of a zettabyte right now is $150 Trillion (198 zettabytes) and would require data centers the size of Texas to house the information.*

**SOURCES**

- arstechnica, May 1st 2012
- blog.loc.gov, April 25th, 2012
- The c.wisconsin.edu, Nov 5, 2003
- Businessweek.com, Dec 1, 2011

**CONVERSION TABLE**

<table>
<thead>
<tr>
<th>1 GIBIYTE</th>
<th>1 TEKIBYTE</th>
<th>1 PETIBYTE</th>
<th>1 ZETTIBYTE</th>
<th>1 YOTTABYTE</th>
</tr>
</thead>
<tbody>
<tr>
<td>1,024 MB</td>
<td>1,024 GIBIYTE</td>
<td>1,024 TEBIYTE</td>
<td>1,024 ZETTIbyte</td>
<td>1,024 YOTTIBYTE</td>
</tr>
<tr>
<td>1,024 GIBIYTE</td>
<td>1,024 TEKIBYTE</td>
<td>1,024 PETIBYTE</td>
<td>1,024 ZETTIbyte</td>
<td></td>
</tr>
<tr>
<td>1,024 PETIBYTE</td>
<td>1,024 ZETTIbyte</td>
<td>1,024 YOTTIBYTE</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**SCALE MODEL WITH MASS**

- **1 PETAMETER** 14 MEGAGRAMS
- **1 ZETTAMETER** 14 YOTTAGRAMS

**A COMPUTER ON EVERY DESK IN EVERY HOME**

*— Bill Gates*

We are dealing with data at an exponential rate. We are saturated with information and our capacity grows and our memory computer and mobile devices are almost every day than the last. The Smiths believe that by 2030, the whole world will be connected to data. We are closer but surely moving towards a world overflowing with data.
Meaning without Color

Fill Out the form below to register now

All field in red are required information

Contact Information

First Name: 

Last Name: 

City: 

Submit Query
Provide descriptions if using color to convey meaning

Example 1: Inaccessible color highlights in red
May 11-17, 2019

Example 1: Accessible with a description
May 11-17, 2019* (final exams)

Example 2: Inaccessible table

<table>
<thead>
<tr>
<th>Assignments (overdue in red)</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Introduction</td>
<td></td>
</tr>
<tr>
<td>Chapter 1</td>
<td></td>
</tr>
</tbody>
</table>

Example 2: Accessible table

<table>
<thead>
<tr>
<th>Assignments</th>
<th>Overdue</th>
</tr>
</thead>
<tbody>
<tr>
<td>Introduction</td>
<td>Yes</td>
</tr>
<tr>
<td>Chapter 1</td>
<td>No</td>
</tr>
</tbody>
</table>

Example 3: Inaccessible color shape

Color identical may not be recognized by colorblind users

Example 3: Accessible color and number
People who have low vision or colorblind could encounter some difficulty distinguishing text color from a background color if the contrast is insufficient contrast ratio 1.5:1.

This example has a great color contrast ratio of 8.7:1. The contrast is sufficient for those who have color deficiencies.

- Download Colour Contrast Analyser onto your computer (PC/Mac) to ensure accessible contrast or use an online contrast checker from WebAIM.

- WCAG Level AA requires a contrast ratio of at least 4.5:1 for regular sized text (12 or 14 pt. font) and 3:1 for large text (18 pt. font).

- Coblis Color Blindness Simulator
Keyboard Navigation or Touch

• Users should be able to get to content without using a mouse
  • Keyboard
  • Hearing
  • Touch

• Users should be able to access content on different screens (phone, tablet, etc.)
Four-point Accessibility Evaluation

**FONT**
Is the font styling easy to read?

**COLOR**
Is the font color easy to read?

**TAB**
Can a user “tab” through the functions?

**ENLARGE**
Can a user make the font bigger? (ctrl +)
The accessibility checker will identify certain accessibility issues:

- Headings that are not in logical order
- Images with no alt text
- Tables have the header box checked
- Tables that have merged cells or with empty cells
- Large numbers of repeated blank characters (spacebars, tabs, enters)
Accessibility... as sweet as pie

• Make accessibility into part of the culture by baking it
• Make it part of the everyday work of everyone on campus
• Pie is sweet and enjoyable
• Accessibility is a good thing and make’s people lives a little sweeter

Analogy courtesy of Lainey Feingold of LF Legal and Sue Boyd of Microsoft in their Beyond Compliance Presentation at CSUN 2018
Accessible Content Ingredients

- Headings
- Image descriptions
- Link descriptions
- Fonts
- Lists
- Columns
- Tables
- Spacing

- Forms
- Color contrast
- Video captions
- Audio transcripts
- Accessibility Checker
- So forth...
Accessibility is a Journey

You can’t build an accessible content overnight. It’s making progress one step at a time. One small moment of victory propelling you forward to the next. Accessibility is a constant journey, not an end destination.
How can we help you make a difference?

Universal Design Center Offers

- Online, self-paced training
- In-person training each semester
- Consultations
- Tools and Services

Universal Design means design for everyone