A. Introduction+background
    a. Experience in full stack: mysql admin, php, ruby on rails, front-end
        i. Started out on design side, moved more towards development
        ii. Interface/UI development strikes balance
    b. BS in scientific and technical communications
        i. Technical minor in CS
    c. 20 years of experience in industry
        i. Started working in Wisconsin in 1999
            1. agencies who wanted to add web capabilities and services
        ii. Moved to Seattle in 2008
            1. Worked for Zillow, University of Phoenix
        iii. Still primary work in industry
            1. Day job is at an early-days startup, still in stealth mode
            2. Building UI with many technologies we'll use in this class -- React, create-react-app, HTML, CSS
B. Welcome+overview
    a. Syllabus review
        i. Contact information
        ii. Office hours
        iii. Goals
        iv. Grading + assignments
    b. What will not be covered
        i. In-depth JS
        ii. Step-by-step building a web app
        iii. In-depth webpack + build pipeline
        iv. Implementing API
C. User experience (UX)
    a. having a deep understanding of users
        i. What they need
        ii. What are their goals
        iii. Why are they at the site?
        iv. What do they value
            1. sparkle? ease-of-use? lowest cost? Etc.
        v. What are their abilities/limitations
            1. technological
            2. physical/personal
    b. As developers, we need to use best practices to improve the quality of the user's interaction with and perceptions of product + related services
D. User experience honeycomb
    a. Peter Morville
        i. https://en.wikipedia.org/wiki/Peter_Morville
        ii. "Founding father of information architecture"
        iii. information architecture and user experience since 1994
    b. Honeycomb
        i. http://semanticstudios.com/user_experience_design/
        ii. 7 facets of user experience that mesh together
            1. Incorporates not only usability but other pieces
            2. Helps people identify their priorities when crafting a user experience

3. Supports a modular approach to UX design and development

c. 7 facets of user experience
   i. Useful
      1. Websites should be original and fulfill a need
      2. Useful != scholarly & serious!
      3. https://imgflip.com/memegenerator
         a. Gives me the ability to create and send image
         b. Useful to me
   ii. Usable
      1. Websites must be easy to use
      2. Goal should be to produce a UI that is effective, efficient, and satisfying
      3. If can make a meme in 30 seconds, it's highly usable!
   iii. Findable
      1. Content needs to be locatable
         a. Within the site -- can you navigate to it?
         b. From outside the site (from search, eg)
            i. Can Google find it?
         c. Can you get to useful content that you need?
      2. Increasing number of elements on screen == increased complexity
         a. 'find the needle in a haystack'
         b. user has to scan more potential options when searching for a specific item
         c. Hick-Hyman Law
            i. https://en.wikipedia.org/wiki/Hick's_law
            ii. item detection speeds are predicted by the number of alternatives; the higher the number of alternatives, the slower the detection speed
      3. Findability translates to $$$, especially on e-commerce sites
         a. If you don't give users an easy way of finding what they need, they'll either spend way too long on one thing, or they'll give up and go somewhere else
   iv. Desirable
      1. Image, identity, brand, and other design elements are used to evoke emotion and appreciation
         a. Bugatti
            i. https://www.bugatti.com
            ii. High end photography
            iii. Animation
            iv. No prices
            v. Emphasis and focus on history, experience, brand
         b. Kia
            i. https://www.kia.com/us/en/home
            ii. No frills
            iii. Utilitarian photography and animation
            iv. Prices on display
            v. Focus on price, features
      2. Bugatti's user experience is focused on
         a. how the car will make you feel as an owner

b. how it will make you part of a grand tradition
c. Maximizing desirability

3. Kia's user experience is focused on
    a. getting you to buy a car

v. Accessible

1. web sites should be accessible to people with extra challenges/impediments to using them
2. By making it possible for people with extra challenges to perceive, understand, navigate, and interact with websites and tools, we empower them to contribute and participate equally/without barriers in an important aspect of society
    a. Communicating and participating via the web can remove barriers to communication and interaction in the physical world
    b. Conversely, badly designed sites can create barriers that exclude people from using the web and participating in society
    c. 2006: UN adopts Convention on the Rights of Persons with Disabilities
        i. Defined a broad categorization of persons with disabilities
        ii. reaffirms that all persons with all types of disabilities must enjoy all human rights and fundamental freedoms.
        iii. Defined access to information and communications technologies, including the Web, as a basic human right
3. Inclusive design/universal design/design for all = designing websites to be usable by everyone to the greatest extent possible, without need for adaptation
4. Physical challenges
    a. Estimated that users with physical challenges make up >10% of the population
    b. Accessibility addresses discriminatory aspects related to equivalent user experience
        i. Just like when we build new buildings and install elevators and ramps to accommodate users who would find stairs challenging
    c. Types of physical challenges
        i. Blindness/poor eyesight
            1. Web crawlers = blind users
            2. Google = biggest blind user on web, "Blind billionaire"
            3. Accessibility can translate directly to more business!
        ii. Color blindness/contrast
        iii. Lack of mobility
        iv. Age-related impairments
            1. tremors/lack of fine motor control
            2. Memory impairments (findability)
        v. People with temporary impairments/disabilities (eg broken arm)
5. Technology/other challenges
    a. Lack of access to high-powered computers
    b. Lack of access to broadband internet connectivity
        i. Low income segments of US
        ii. Major segments of Africa/Asia
    c. People temporarily accessing sites away from regular environment
        i. tradeshow kiosk w/touchpad or on ipad
6. Laws to support accessibility

a. Section 504/508 of the Rehabilitation Act of 1973
    i. http://www.section508.gov
    ii. prohibits discrimination on the basis of disability in
        1. programs conducted by US federal agencies
        2. programs receiving US federal financial assistance
        3. federal employment
        4. the employment practices of federal contractors
    iii. First disability civil rights law in the US
    iv. Paved the way for the Americans With Disabilities Act
    v. Section 508
        1. requires Federal agencies to make electronic information accessible to people with disabilities ("equal or equivalent access")
    vi. Section 504
        1. requires organizations that receive federal funding or grants to have accessible online content
b. Americans with Disabilities Act (ADA)
    i. became law in 1990
    ii. prohibits discrimination and guarantees that people with disabilities have the same opportunities as everyone else to participate in the mainstream of American life
    iii. gives civil rights protections to individuals with disabilities
    iv. guarantees equal opportunity for individuals with disabilities in public accommodations, employment, transportation, state and local government services, and telecommunications

7. As developers, we should strive to bring equal access to the web and the greater internet to ALL potential users
    a. It's the right thing to do
    b. Not doing so could potentially be against the law
    c. It's just good business!

vi. Credible
1. Users must trust and believe what you tell them
2. http://credibility.stanford.edu/guidelines/index.html
    a. Make it easy to verify the accuracy of the information on your site
    b. Show that there's a real organization behind your site
    c. Highlight the expertise in your organization
    d. Show that honest and trustworthy people stand behind your site
    e. Make it easy to contact site
    f. Professional design
    g. Update your site's content often
    h. Avoid errors of all types, no matter how small they seem

vii. Valuable
1. Our sites should not only deliver value to the user, but also to the company on whose behalf we build them!
2. By using all the other good principles of user experience, the website should
    a. advance the mission of the company, foundation, organization, etc.
    b. contribute to the bottom line and improve customer satisfaction

E. What makes a site usable?

a. No “right” answers for web/user experience design
    i. No “average user”
    ii. Every person uses web differently
    iii. All web users are unique
    iv. There’s no magic equation we can plug variables into to derive the perfect UI
b. So how do we know what usable means?
    i. In terms of user experience, a useable site
        1. Has a good integrated design that fills a need (“useful”)
        2. Is carefully thought out
        3. Well executed
        4. Has been tested!
c. Some concepts that we can implement to make a site usable (connected to the facets of the honeycomb we talked about)
    i. Availability and Accessibility (useful, usable, findable, credible)
        1. No broken links
            a. Goes back to credibility -- if you have a broken link that lands your user in a limbo, you’re causing irritation and also causing them to question your competence!
        2. Helpful error/404 pages
            a. Increase credibility by showing expertise/helpfulness even in error state
            b. Help your user get back to the familiar or find their way out
            c. Navigation
            d. Search box
            e. Example: http://google.com/foo
                i. Is this helpful? Does it give you a feeling of confidence and set you back on your way?
                ii. No navigation
                iii. No search
            f. Example: https://www.apple.com/foo
                i. Search box
                ii. Navigation still available
                iii. Link directly to site map
        3. Mobile availability
            a. make sure site can handle different screen sizes and slow connections
            b. Mobile website or native app -- either way, you’re meeting your user where they are and signaling that you’ve considered their needs
    ii. Conventionality (usable, findable)
        1. Users don’t want to think
        2. Don’t Make Me Think https://www.amazon.com/Dont-Make-Think-Revisited-Usability/dp/0321965515/ref=pd_lpo_sbs_14_t_0?_encoding=UTF8&psc=1&refRID=PXRTM59H7VCHWQ0A4J7F
        3. Users scan for what they’re looking for, they don’t read
        4. Look to norms & standards to reinforce what they know from other sites
            a. Example newspaper sites
                i. https://www.nytimes.com/
                ii. https://chicago.suntimes.com/
                iii. https://www.washingtonpost.com/

iv. All look very similar, people become trained as to what “a newspaper site” looks like and can find information/features more quickly
1. Masthead/main nav
2. Subscribe button
3. Footer navigation

5. Certain web design conventions users have become familiar with:
   a. main navigation is at the top (or left)
   b. logo at the top left (or top center)
   c. logo is clickable to the homepage
   d. links change color/appearance on hover
   e. links change color/appearance on visit
   f. “You are here” indicator in navigation
   g. Footer has “site map” links
   h. Shopping cart icon on ecommerce site
6. take advantage of knowing what types of web experiences user is familiar with & follow users’ expectations
   a. understand what they expect from navigation, text structure, search placement etc
   b. don’t force them to relearn how to use a website on your site!
   c. When you put elements where users expect, they feel confident
      i. gain user trust
      ii. prove your credibility
7. Discoverability = degree of ease user can find all the elements and features of a new system when they first encounter it
8. Conventionality aids in discoverability!

iii. Consistency (findable)
1. being consistent can have a positive impact on usability and UX
2. create a consistent experience across your entire website to keep visitors oriented & grounded
   a. better sense of orientation = the more trust they can develop towards the site (credibility)
   b. Consistency can be employed in
      i. Background images/colors
      ii. color palette
      iii. Typefaces
      iv. tone of writing
      v. Similar structure/page layout for similar content
         1. using templates & components makes it easier for visitors to understand what type of information they're likely to find on a given page

iv. Navigability (findability)
1. intuitive navigation
2. Ideally user should not have to think hard about where to click next
3. Ideal goal is effortless movement from point to point, page to page
4. Navigation is not just a feature, it IS the website
5. Test for good navigation

a. If landing on a deep-linked page of the site (eg from search), can your user answer these questions:
    i. What site is this?
    ii. What page am I on?
    iii. What are the major sections of the site?
    iv. What are my options at this level?
    v. Where am I in the overall site?
    vi. How can I search?
b. Example: https://www.overstock.com/Home-Garden/41-Wide-Electric-Fireplace-Mantle-in-White/9477653/product.html?refccid=YQUVN3IXRLR2QT2DLKCLG3EQ2U&searchidx=13&kwds=&rfmt=type%3AMantel

6. How to optimize navigation
    a. Some of these may sound familiar from the part about conventionality and consistency!
    b. primary navigation simple & near the top of the page
    c. Include navigation in footer
    d. Breadcrumbs
        i. Example: https://www.overstock.com/Home-Garden/41-Wide-Electric-Fireplace-Mantle-in-White/9477653/product.html?refccid=YQUVN3IXRLR2QT2DLKCLG3EQ2U&searchidx=13&kwds=&rfmt=type%3AMantel
    e. Keyword search box near the top of page
    f. Include very clear links within page content
    g. Make it obvious what's clickable!
    h. Name of page matched what the user clicked

v. Understandability
1. Your site and content are obvious and self-explanatory
2. Remember: don't make users think! (or read)
3. get rid of question marks ie the decisions users need to make consciously
4. Understand user's mental model and how they would expect content to be structured
5. User should immediately understand about site:
    a. What is site for?
    b. What does the site have for me?
    c. What can I do here?
    d. Why should I be here and not somewhere else?
6. Make use of hierarchy
    a. every HTML document/page has an "outline," which is how search engines and screen readers view the page content
    b. The stronger the hierarchy + semantic markup, the easier it is for search engines, screen readers, and other machines to identify the different parts of your website.
7. Make use of design principles (we'll talk about in next week's class)
    a. Logically related content should be visually related/co-located
    b. Make use of content nesting

c. Clearly define areas of functionality/content (header, footer, main navigation, etc.)
d. Focus user attention
    i. More important = more prominent
    ii. Human eyes recognize edges, patterns and motions
    iii. Capture the user's eye and lead the user with elements that stand out
        1. Bold color
        2. Bold text
        3. Animation/motion
    iv. Example: https://reactjs.org/ -- get started!

F. What makes a site accessible?
    a. https://www.w3.org/standards/webdesign/accessibility
    b. https://www.w3.org/WAI/WCAG21/quickref/?versions=2.0
    c. https://developers.google.com/web/fundamentals/accessibility/
    d. Ways to develop that will yield a lot of improvements in accessibility
        i. Page titles
            1. Good title = important for orientation
            2. help people know where they are and move between pages open in their browser
            3. The first thing screen readers say is page title
            4. Should be unique & adequately distinguish the page between windows/tabs
            5. Should briefly describe the content of the page
            6. "front-load" with the important and unique identifying information first.
                a. Poor: Acme Web Solutions, Inc. | About Us
                b. Good: About Us | Acme Web Solutions, Inc.
        ii. Image alt (alternative) text
            1. used by users who cannot see the images
            2. `<img alt="this is an image of a kitten" src="kitten.jpg" />`
            3. Every image should include alt text in their HTML markup
                a. If the image conveys information for interacting with or understanding the page content, then it needs alt text
                b. If the image is purely decorative, should have null alt text (alt="")
            4. Avoid including images of text (for example, if you find yourself including images of headers/text in specific fonts)
                a. Webfonts have come a long ways
                b. Wherever possible, include actual text, which is resizeable and searchable
        iii. Multimedia
            1. Provide captions and other alternatives for multimedia
            2. Give users the functionality to pause, stop, or change audio volume
            3. If including background audio, be sure it is low volume or can be turned off (distracting)
            4. Be mindful of video content with strobing effects, flashing lights, or quick cuts which can cause seizures
        iv. Headings
            1. Headings are the primary way of giving our content hierarchy and a logical structure

2. screen readers navigate by jumping from header to header, section to section
3. Using headings to promote semantic html (we'll learn this term in a couple of weeks) makes content findable
    a. Every page has a heading
    b. All pages should have at least one heading
    c. Mark up all conceptual section heading as headings -- if it looks like it could serve as a heading, it should be marked up that way!
    d. start page hierarchy with an "h1" tag, highest possible html header

v. Color contrast and other visual accommodations
1. https://www.w3.org/TR/low-vision-needs/
2. High contrast
    a. some people with visual impairments need high contrast (dark text + light background or bright text + dark background)
    b. Includes older people who lose contrast sensitivity
3. Low luminance
    a. some people with reading disabilities such as dyslexia need low luminance
    b. bright colors (high luminance) not readable and painful
4. browsers should allow changing color of text and background
5. web pages need to work when people change colors
6. Don't use color as only way of showing/highlighting info or contrast
    a. Example: colored links w/no underline

vi. Text resize
1. Some users need to enlarge web content to read
2. Most browsers allow users to change text size through settings, text zoom, page zoom
3. Pages can be unusable when the text size is changed
    a. Text overlapping
    b. Text cut off
    c. Horizontal scrolling (some visual/cognitive disabilities make finding/understanding content difficult if they need to scroll horizontally)
    d. Ensure that changing text size allows users to comfortably view text

vii. Touch access
1. Provide large touch target like buttons so that people with motor challenges can activate easily
2. Minimum recommended target 48px x 48px touch area

viii. Keyboard access
1. Many users cannot use a mouse & rely on the keyboard to interact with the Web
    a. blind people
    b. sighted people with mobility impairments
    c. Users of assistive technologies that rely on keyboard commands eg voice input
2. Accessible websites enable keyboard access to all content and functionality
    a. Links
    b. Forms
    c. media controls
3. keyboard focus when element is active should be visible and apparent
4. Users who cannot use the mouse should be able to tab through elements

5. Tabbing should follow a logical order through the page elements
    a. default tab order = order of position of native elements

ix. WAI-ARIA

1. Web Accessibility Initiative - Accessible Rich Internet Applications suite
2. defines a way to make Web content and Web applications more accessible to people with disabilities
3. defining new ways for assistive technology to interactive with ajax, javascript, etc.
4. Examples:
    a. drag-and-drop functionality that is not available to users who use a keyboard only and cannot use a mouse
    b. Content that changes after the page is loaded that cannot be detected by users who are blind
5. WAI-ARIA can define how information about functionality can be provided to assistive technology
6. provides a framework for adding attributes to identify features
7. Designed to fill the gap between standard HTML tags and the desktop-style controls found in dynamic web applications
8. should always prefer using the correct semantic HTML element over using ARIA
9. ARIA example: https://developer.mozilla.org/en-US/docs/Web/Accessibility/An_overview_of_accessible_web_applications_and_widgets
10. https://developer.mozilla.org/en-US/docs/Web/Accessibility/ARIA

G. Tools

a. Validators

i. Why validate?

1. Using standards-compliant HTML increases the likelihood that all web browsers and assistive technologies will correctly handle your content.
2. If your code contains errors or tags that are not part of the HTML specification, screen readers and other assistive technologies might fail when trying to render the content for users.
3. Even pages that seem to look OK visually in a web browser might have unseen problems for assistive technology users.
4. Validating mark-up can help in your debugging efforts if your web page exhibits unexpected problems.
5. Valid mark-up provides a better cross-browser, cross-platform, experience and gives you maximum control over how your page is displayed.
6. Valid mark-up will help with future compatibility as it will have the best chance of being backward-compatible with new technologies.
7. Properly formed HTML renders faster than HTML with errors. This means less load on servers and client browsers.
8. A site that validates using proper HTML is a sign of professionalism (credibility!)

ii. HTML: https://validator.w3.org/

iii. CSS: https://jigsaw.w3.org/css-validator

b. Cynthiasays.com

i. Accessibility guidelines scanner

c. Text browsers

i. http://lynx.browser.org

d. Screen readers

i. software programs that allow blind or visually impaired users to read text on a computer screen with a speech synthesizer or braille display
ii. https://www.afb.org/blindness-and-low-vision/using-technology/assistive-technology-products/screen-readers
iii. Voiceover for Mac - command-f5