A. Introduction + background
    a. BS in scientific and technical communications
    b. College courses in scientific and technical communications dept.
    c. Started working for agencies who wanted to add web capabilities and services
    d. Transitioned to startups, primarily web development
    e. Experience in full stack: mysql admin, php, ruby on rails, front-end
    f. Started out on design side, moved more towards development
    g. Interface/UI development strikes balance
    h. Current position @ stealth startup
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/goals: why are they at the site?
        ii. What they value: sparkle, ease-of-use, lowest cost, etc.
        iii. Abilities/limitations: physical/personal and technological
    b. best practices → improve the quality of the user's interaction with and perceptions of product + related services
D. "User experience honeycomb"
    a. Peter Morville
        i. http://semanticstudios.com/user_experience_design/
        ii. information architecture and user experience since 1994
    b. Useful: Site content should be original and fulfill a need
        i. Useful != scholarly & serious!
        ii. https://imgflip.com/memegenerator
        iii. Gives me the ability to create and send image
        iv. Useful to me
    c. Usable: Site must be easy to use
        i. designing products to be effective, efficient, and satisfying
        ii. I can make a meme in 30 seconds
        iii. Usable!
        iv. Interacts with accessibility
            1. Usable for me on desktop
            2. Usable for person on phone?
            3. Usable for person with assistive technology?
    d. Desirable
        i. Image, identity, brand, and other design elements are used to evoke emotion and appreciation
            1. https://www.karmaautomotive.com/revero

        a. High end photography
        b. Animation
        c. No prices
        d. Focus on experience, brand
    2. https://www.kia.com/us/en/home
        a. No frills
        b. Focus on features
e. Findable: Content needs to be navigable and locatable onsite and offsite (from search, eg)
    i. Can you get to what you need? (useful content)
    ii. Increasing number of elements on screen == increased complexity
        1. 'find the needle in a haystack'
        2. user has to scan more potential options when searching for a specific item
        3. Hick-Hyman Law
            a. linear relationship between the number of options presented and subsequent choice reaction times
            b. item detection speeds are predicted by the number of alternatives; the higher the number of alternatives, the slower the detection speed
    iii. Findability == $$$, success of website (think e-commerce)
f. Accessible: web sites should be accessible to people with disabilities
    i. >10% of the population
    ii. Eg. Buildings -> elevators and ramps
    iii. Accessibility addresses discriminatory aspects related to equivalent user experience
        1. people with disabilities
            a. Visual challenges
            b. Lack of mobility
            c. Color blindness/contrast
        2. age-related impairments
            a. Visual challenges
            b. Tremors
    iv. people with disabilities
        1. can perceive, understand, navigate, and interact with websites and tools
        2. can contribute equally without barriers
    v. impact of disability is radically changed
        1. Web removes barriers to communication and interaction in the physical world
        2. UN Convention on the Rights of Persons with Disabilities
            a. access to information and communications technologies, including the Web, is a basic human right
        3. people with disabilities can perceive, understand, navigate, and interact with websites and tools & contribute equally
        4. badly designed sites can create barriers that exclude people from using the Web
    vi. Inclusive design/universal design/design for all = designing websites to be usable by everyone to the greatest extent possible, without need for adaptation
        1. Blind/visually challenged users or users with physical disabilities large focus, but not only focus
        2. Web crawlers = blind users
            a. Google = biggest blind user on web
            b. "Blind billionaire"
        3. Anyone whose main connection to web is mobile device

a. Low income segments of US
b. Major segments of Africa/Asia

4. People with temporary impairments/disabilities (eg broken arm)
5. People temporarily accessing sites away from regular environment (eg tradeshow kiosk)

vii. Laws

1. Americans with Disabilities Act (ADA)
    a. became law in 1990
    b. gives civil rights protections to individuals with disabilities
    c. guarantees equal opportunity for individuals with disabilities in public accommodations, employment, transportation, state and local government services, and telecommunications
2. Section 504/508 of the Rehabilitation Act of 1973
    a. http://www.section508.gov
    b. Congress amended Rehabilitation Act
    c. Section 508: requires Federal agencies to make electronic information accessible to people with disabilities (“equal or equivalent access”)
    d. Section 504: requires organizations that receive federal funding or grants to have accessible online content
3. https://www.w3.org/WAI/WCAG21/quickref/?versions=2.0

g. Credible: Users must trust and believe what you tell them

i. http://credibility.stanford.edu/guidelines/index.html
ii. Make it easy to verify the accuracy of the information on your site
    1. Eg 3rd party citations
iii. Show that there's a real organization behind your site
    1. Highlight the expertise in your organization
    2. Show that honest and trustworthy people stand behind your site
iv. Make it easy to contact site
v. Professional design
vi. Update your site's content often
vii. Avoid errors of all types, no matter how small they seem

h. Valuable: sites must deliver value to the origin site

i. advance the mission
ii. contribute to the bottom line and improve customer satisfaction

E. What makes a site usable?

a. Note: ideally, principles should be implemented by UX designer

i. Often, designers have print background, little/no web design experience
ii. As developer, you will find yourself advising on design!

b. No “average user”

i. Every person uses web differently
ii. All web users are unique
iii. No right answers for web design
iv. So how do we know what usable means?
v. Good integrated design that fills a need (“useful”)
    1. Carefully thought out
    2. Well executed
    3. Tested!
    4. Example: “I hate videos!”

            a. I hate 4 minute videos where the actual content I wanted is at 3:30
            b. I appreciate videos that show me how to do something or are full of content from 0:01
            c. Well executed!
c. Users don't want to think
    i. https://www.amazon.com/Dont-Make-Think-Revisited-Usability/dp/0321965515/ref=pd_lpo_sbs_14_t_0?_encoding=UTF8&psc=1&refRID=PXRTM59H7VCHWQ0A4J7F
    ii. Users scan, not read → wireframes
d. Availability and Accessibility (useful, usable, findable, credible)
    i. No broken links
    ii. Helpful error/404 pages
        1. Increase credibility by showing expertise/helpfulness even in error state
        2. Help your user get back to the familiar or find their way out
            a. Navigation
            b. Search box
    iii. Mobile responsiveness
        1. make sure site can handle different screen sizes and slow connections
        2. Throttling
        3. Chrome dev tools example
e. Conventionality (usable, findable)
    i. Look to norms & standards
    ii. Eg. our newspaper sites
        1. All look very similar, people become trained as to what "a newspaper site" looks like
    iii. Certain web design conventions users have become familiar with
        1. main navigation be at the top (or left)
        2. logo at the top left (or center)
        3. logo is clickable to the homepage
        4. links change color/appearance on hover
        5. Links change color/appearance on visit
        6. "You are here" indicator
        7. Footer has "site map" links
        8. Shopping cart icon on ecommerce site
    iv. take advantage of knowing what types of web experiences user is familiar with
        1. Follow users' expectations
            a. understand what they expect from navigation, text structure, search placement etc
        2. When you put elements where users expect, they feel confident
            a. gain user trust
            b. prove your credibility
    v. Discoverability = degree of ease user can find all the elements and features of a new system when they first encounter it
        1. Conventionality aids in discoverability!
f. Consistency (findable)
    i. being consistent can have a positive impact on usability and UX
    ii. create a consistent experience across your entire website
        1. keep visitors oriented & grounded

        a. better sense of orientation = the more trust they can develop towards the site (credibility)
    2. Backgrounds, color palette, typefaces, tone of writing
    3. Similar structure for similar content
        a. Templates & components!
        b. make it easier for visitors to understand what type of information they're likely to find on a given page

g. Navigability (findability)
    i. intuitive navigation
        1. Ideally user should not have to think hard about where to click next
        2. Pain-free moving from point to point
        3. Navigation is not just a feature, it IS the website
    ii. Test for good navigation
        1. If landing on a deep-linked page of the site (eg from search), can your user answer these questions:
            a. What site is this?
            b. What page am I on?
            c. What are the major sections of the site?
            d. What are my options at this level?
            e. Where am I in the overall site?
            f. How can I search?
    iii. optimizing navigation
        1. primary navigation simple & near the top of the page
        2. Include navigation in footer
        3. breadcrumbs
        4. Keyword search box near the top of page
        5. Include very clear links within page content
        6. Make it obvious what's clickable!
            a. Link? Button?
        7. Name of page matched what the user clicked

h. Understandability
    i. obvious and self-explanatory
        1. Don't make users think! (or read)
        2. get rid of question marks -> the decisions users need to make consciously
        3. Understand user's mental model and how they would expect content to be structured
        4. 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?
    ii. Clear hierarchy
        1. Every HTML document has an "outline," which is how search engines and screen readers view the hierarchy of the content on the page
        2. Outline helps adapt the way they present information to the users according to the structure of the document
        3. Stronger hierarchy + semantic markup, the easier it is for search engines, screen readers, and other machines to identify the different parts of your website.

4. Logically related = visually related
5. Nesting
6. Clearly defined areas of functionality/content

iii. Focus user attention
1. Clear visual hierarchy
a. More important = more prominent
2. users recognize edges, patterns and motions
3. Draw the eye and lead the user with elements that stand out
a. Bold color
b. Bold text
c. Animation/motion
4. 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. Page titles
i. Good title = important for orientation
1. help people know where they are and move between pages open in their browser
ii. The first thing screen readers say is page title
iii. Should be unique & adequately distinguish the page between windows/tabs
iv. Should briefly describe the content of the page
1. “front-load” with the important and unique identifying information first.
2. Poor: Acme Web Solutions, Inc. | About Us
3. Good: About Us | Acme Web Solutions, Inc.
e. Image alt text
i. used by people who do not see the image
ii. Every image should include alt in the markup
1. If conveys information for interacting with or understanding the page content, then it needs alternative text.
2. If just decorative, should have null alt (alt="")
iii. Images of text are resizable, replaced with actual text
1. avoid where possible!
2. Will help with searchability too.
f. Multimedia
i. Captions and other alternatives for multimedia
ii. Users can pause, stop, or change audio volume
iii. Background audio is low or can be turned off (distracting)
iv. Content does not cause seizures (flashing/blinking)
g. Headings
i. Hierarchy + logical page structure!
1. Eg screen readers navigate by jumping from header to header, section to section
2. Semantic html makes content findable
ii. The page has a heading
iii. pages should have at least one heading
iv. Mark up all conceptual section heading as headings
v. start page with an "h1"
h. Color contrast

    i. High contrast
        1. some people with visual impairments need high contrast (dark text + light background or bright text + dark background)
        2. Includes older people who lose contrast sensitivity
    ii. Low luminance
        1. some people with reading disabilities such as dyslexia need low luminance
        2. bright colors (high luminance) not readable
    iii. browsers should allow changing color of text and background
    iv. web pages need to work when people change colors
    v. Don't use color as only way of showing/highlighting info or contrast
        1. Eg colored links w/no underline
i. Text resize
    i. Some users need to enlarge web content to read
    ii. Most browsers allow users to change text size through settings, text zoom, page zoom
    iii. Pages can be unusable when the text size is changed
        1. Text overlapping
        2. Text cu t off
        3. Horizontal scrolling (some disabilities make horizontal scrolling impossible)
    iv. Ensure that changing text size allows users to comfortably view text
j. Touch access
    i. Large touch target so that people with motor challenges can activate easily
    ii. Min recommended 48px x 48px touch area
k. Keyboard access
    i. Many users cannot use a mouse & rely on the keyboard to interact with the Web
        1. blind people
        2. sighted people with mobility impairments
        3. Users of assistive technologies that rely on keyboard commands eg voice input
    ii. Accessible websites enable keyboard access to all content and functionality
        1. Links
        2. Forms
        3. media controls
    iii. keyboard focus
        1. Should be visible
        2. Users who cannot use the mouse should be able to tab through elements
        3. Should follow a logical order through the page elements when tabbing
        4. default tab order = order of DOM position of native elements
        5. Tabindex
            a. ability to modify the tab order
            b. Set tabindex on element
            c. Tabindex = 0, make an element tabbable
            d. Tabindex = -1, remove ability to tab to element
            e. Tabindex > 0 = lets element cut in line ahead of natural order
                i. Avoid whenever possible!
                ii. restrict tabindex to custom interactive elements user might provide input to
                    1. buttons, tabs, dropdowns, and text fields
l. WAI-ARIA
    i. Web Accessibility Initiative - Accessible Rich Internet Applications suite

ii. defines a way to make Web content and Web applications more accessible to people with disabilities
iii. defining new ways for assistive technology to interactive with ajax, javascript, etc.
iv. Examples:
1. drag-and-drop functionality that is not available to users who use a keyboard only and cannot use a mouse
2. Content that changes after the page is loaded that cannot be detected by users who are blind
v. WAI-ARIA can define how information about functionality can be provided to assistive technology
1. provides a framework for adding attributes to identify features
2. Designed to fill the gap between standard HTML tags and the desktop-style controls found in dynamic web applications
3. should always prefer using the correct semantic HTML element over using ARIA
vi. 3 different types of attributes
1. Roles: describe widgets that aren't otherwise available in HTML 4 and below, such as sliders, menu bars, tabs, and dialogs
2. Properties: describe characteristics of these widgets, eg if they are draggable
3. States: describe the current interaction state of an element (busy, disabled, selected, or hidden)
vii. ARIA example: https://developer.mozilla.org/en-US/docs/Web/Accessibility/An_overview_of_accessible_web_applications_and_widgets
viii. https://developer.mozilla.org/en-US/docs/Web/Accessibility/ARIA

G. Tools
a. Validators
i. Why validate?
1. debugging tool (cross browser consistency)
2. Future proofing (not relying on quirks)
3. Maintainability (adhering to agreed standards)
4. Good habits
ii. HTML: https://validator.w3.org/
1. HTML document is valid if it syntactically conforms to DTD (document type definition) for a version of HTML
a. Order allowed, what elements can be children of which, etc.
2. Cannot validate how HTML will be rendered (cross browser consistency)
iii. CSS: https://jigsaw.w3.org/css-validator
b. Cynthiasays.com
i. Accessibility guidelines scanner
1. Section 508
2. WCAG (web content accessibility guidelines)
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