

Web Technologies (INBPA0316E) Exam Topics

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Topics marked with “☒” are basic, while those marked with “☐” are advanced. At least 60% percent of the exam questions will cover the basic topics. Thus, if you would like to pass with a pass (2) grade, it is enough to learn the basic topics only.

1 World Wide Web

- ☒ Basic concepts: resource, representation, content negotiation, dereferencing a URI, user agent
- ☐ The three types of standards by origin: de facto standards, de jure standards, voluntary consensus standards
- ☐ Organizations responsible for web standards: IANA; IETF, the RFC series; W3C; WHATWG

2 Unicode

- ☒ What is Unicode?
- ☒ Basic concepts: codespace, code point, Basic Multilingual Plane (BMP)
- ☒ Character encodings: UTF-8, UTF-16, UTF-32
- ☒ Expressing Unicode characters in CSS, XML, HTML, and JSON

3 An Introduction to XML

- ☒ What are markup languages?
- ☒ What is XML?
- ☒ Comparison of XML and HTML
- ☒ Document-centric and data-centric XML

4 XML 1.0

- ☒ XML documents, well-formedness

- Structure of XML documents: elements and attributes, character data, whitespace characters
- Special characters: the `&` and `<` characters
- Markup constructs: start-tags, end-tags, empty-element tags, character references, entity references, comments, XML declaration, document type declaration
- Document type definition, validity
- Element type declarations: empty elements, element content
- Predefined entities: `amp`, `lt`, `gt`, `apos`, `quot`
- Associating CSS stylesheets with XML documents

5 Media Types

- What are media types?
- Structure of media types: top-level type, subtype, parameters
- Major top-level types: `application`, `audio`, `font`, `image`, `multipart`, `text`, `video`

6 URI

- What is a URI?
- URI characters, percent-encoding
- URI syntax: the scheme, host, port, path, query, and fragment identifier components
- Meaning of the fragment identifier
- URI-reference, relative reference, base URI
- URI comparison
- Relative reference resolution

7 HTTP Fundamentals

- The `http` and `https` URI schemes
- Message abstraction: control data, header section, content
- Major header fields: `Content-Type`, `Content-Length`, `User-Agent`
- Major HTTP methods: `GET`, `HEAD`, `POST`, `PUT`, `DELETE`
- Status codes, classes of status codes
- Redirection, the `Location` header field
- Major content negotiation header fields: `Accept`, `Accept-Language`
- HTTP/1.1 message format

8 Sending Form Data over HTTP

- What is a form?

- Forms and form fields
- HTTP methods for sending form data: GET and POST
- Formats for sending form data: `application/x-www-form-urlencoded`, `multipart/form-data`

9 Advanced Features of HTTP

- Origin of a resource, same-origin resources, same-origin policy
- Site of a resource, same-site resources
- What are HTTP cookies? Practical uses, the `Set-Cookie` and the `Cookie` header fields, cookie attributes (`Expires`, `Max-Age`, `Domain`), persistent cookies, third-party cookies
- Web tracking: information on which web tracking can be based on, the `Referer` header field, protection against tracking

10 HTML

- What is HTML?
- The building blocks of HTML documents: text, elements and attributes, document type declaration (DOCTYPE), comments
- Void and non-void elements
- Global attributes: `id`, `class`, `lang`, `style`, custom data attributes
- Document metadata elements: the `base`, `link`, `meta`, `noscript`, `script`, `title`, `style`, and `title` elements
- Concrete syntaxes: the HTML syntax and the XML syntax, and their differences
- Special features of the HTML syntax: unquoted attribute value syntax, boolean attributes, optional tags
- What is DOM?
- Emmet abbreviations for generating HTML code

11 Web Accessibility

- What is web accessibility?
- Major types of disabilities that can affect computer literacy
- Why is web accessibility for the benefit of all?
- What is WCAG?
- Common accessibility features in browsers
- How to create accessible web pages?

12 CSS

- What is CSS?

- The development of CSS, CSS levels
- The CSS box model
- Syntactic elements: characters, comments, declaration blocks, style rules
- Properties, shorthand properties
- Values: numbers, percentages, lengths, colors
- Selectors: type selector, universal selector, attribute selectors (only [att] and [att=val]), class selector, ID selector, pseudo-classes (:link, :visited, :hover, :active, :lang(C), :is(), :not(), and structural pseudo-classes), pseudo-elements (::after, ::before, ::first-letter, ::first-line)
- Selectors: combinators (descendant combinator, child combinator, next-sibling combinator)
- Selectors: specificity, calculating the specificity
- Stylesheet origins: user agent, user, author
- Important declarations (!important)
- The cascade
- Rule ordering
- Inheritance
- Nesting of style rules
- Determining box sizes in CSS: the box-sizing, width, height, min-width, min-height, max-width, and max-height properties

13 CSS Preprocessors

- What is Node.js?
- What is a CSS Preprocessor?
- Common features of CSS preprocessors
- Sass: the SCSS syntax, main features (variables, nesting, mixins, @extend)

14 Responsive Web Design

- What is Responsive Web Design?
- Page layouts: static/fixed width, fluid/liquid, adaptive, responsive
- CSS pixels and physical pixels
- Reference pixel
- Viewport
- The absolute and relative length units of CSS, viewport units
- Media queries: media queries in CSS and HTML, syntax, evaluation, media types, media features (only width, height, and orientation), combining media features (not, and, or), the min- and max- prefixes (min-width, max-width, min-height, max-height)
- The visual and layout viewports, the viewport meta tag
- Mobile-first and desktop-first design
- Fluid grids: flexbox layout, grid layout

15 Images in CSS and HTML

- Major image formats: JPEG, PNG, SVG
- Major image formats: WebP, AVIF
- The `` HTML element: the `alt` attribute; the `height/width` attributes, their importance, image layout shift
- Responsive images: the `<picture>` and the `<source>` elements, the `srcset` and the `sizes` attributes

16 Web Browsers

- The structure and components of a web browser
- Steps of rendering a web page, the critical rendering path
- Resource loading in web browsers (blocking vs non-blocking)
- Major rendering engines
- Major desktop and mobile browsers
- Error handling in HTML
- Error handling in CSS
- Rendering modes of web browsers: quirks mode, standards mode

17 JSON

- What is JSON? Relationship to ECMAScript
- Comparison of JSON and XML
- Primitive types: strings, numbers, booleans, null
- Structured types: arrays, objects
- Converting XML to JSON, and vice versa (see the examples on pages 21 and 22 of the presentation about JSON)

18 Reading Code

- Students must be able to read and understand XML, DTD, HTML, CSS, and JSON code.
- Students must be familiar with the HTML elements and CSS properties used in the computer labs over the semester.