**Module 1**

**Topic 1: Course Introduction**

**Lecture 1: Introduction to the course: React Basics**

✅ **Introduction to React Basics**

* React is a JavaScript library used to build user interfaces for websites.
* This course introduces the basic structure and usage of React.js.

✅ **Understanding Components**

* User interfaces are made up of small, independent parts called components.
* Components can be reused and combined to create more complex structures.
* React helps organize and manage these components efficiently.

✅ **Why React is Popular**

* React makes it easy to build and manage UI components.
* It performs well and does not use too many browser resources.

✅ **Working with State**

* State refers to all the values that the app is using at a specific time.
* Managing state allows apps to update and respond to user actions.

✅ **Styling in React**

* You will learn how to add styles to your app and reuse them across components.

✅ **Handling Events**

* The app can respond to events like clicks or data entered by the user.

✅ **Navigation and Assets**

* You will learn how to create navigation between pages.
* You will also use assets like images and icons in your app.

✅ **Course Outcome: Portfolio Projects**

* You will complete projects to apply what you’ve learned.
* These projects will help you build a personal portfolio.

**Lecture 2: How is React used in the real world?**

✅ **React at Meta (Facebook.com)**

* Meta uses many experimental and new React features.
* Facebook.com served as a testing ground for unreleased features from the React team.
* Rewriting Facebook.com involved building on a modern and faster tech stack using React.

✅ **Role of the React Apps Team**

* The React Apps team at Meta builds new features for Facebook.com.
* The team experiments with advanced and upcoming features of React.

✅ **Popular Apps Built with React**

* React is used by many companies including Facebook, Instagram, Netflix, Airbnb, and The New York Times.
* Interactive websites often use React for building dynamic UIs.

✅ **Why Rewrite Facebook.com in React**

* The older site was outdated and had performance limitations.
* React offered better speed, responsiveness, and ease of development.
* The redesign aimed to create a modern look and improved user experience.

✅ **Scale and Collaboration**

* Around 40 engineers worked together on the Facebook.com rewrite.
* Collaboration with various product teams helped transition products to the new stack.
* It was a large, high-risk effort requiring strong proof of performance and reliability.

✅ **Proving the Value of React**

* Teams needed to be convinced that the new version was not only modern-looking but also faster and more efficient.
* The goal was to support product teams in delivering better web experiences.

✅ **React as an Open Source Project**

* React is open source and welcomes contributions from developers worldwide.
* Engineers inside and outside of Meta contribute to its development.
* This fosters a strong, active community that continuously maintains and improves React.

✅ **Community and Contribution**

* Developers can ask questions, suggest features, or contribute code.
* There's active engagement through documentation, forums, and updates.
* A React conference is held annually to share updates and connect developers.

✅ **Getting Involved with React**

* The React community offers many ways to participate and learn.
* Beginners are encouraged to explore official documentation.
* Connecting with the community enhances the development experience and opens contribution opportunities.

**Topic 2: React Components and Where They Live**

**Lecture 1:** **Why React?**

✅ **Introduction to React Usage in Tech Careers**

* React is widely used across the tech industry.
* Learning React is valuable for long-term career growth.

✅ **React vs Traditional Programming Concepts**

* most programming was object-oriented using inheritance.
* React uses **composition**, a different approach that may feel unfamiliar at first.
* With strong documentation and community support, the transition becomes easier.

✅ **Learning and Community Support**

* Numerous resources available: documentation, YouTube, and open-source projects.
* React has a large, active community that helps beginners and experienced developers alike.

✅ **Why Developers Choose React**

* Easy to learn and pick up.
* Offers high flexibility for creating custom UIs.
* Ideal for building modern, interactive web applications.

✅ **Integration with Other Libraries**

* React is just a **front-end library**, not a full-stack solution.
* It integrates well with tools like Redux and other third-party libraries.
* Perfect for developers who need flexibility in their tech stack.

✅ **Handling Complex UIs**

* React excels in building applications with many custom UI elements.
* Supports **component reusability** across different parts of an application.

✅ **Code Reusability and Efficiency at Meta**

* Meta uses a shared library of core UI components across Facebook, Instagram, and Messenger.
* Fixing a bug in one component improves the entire system.
* Promotes efficiency and high code quality.

✅ **React vs Angular**

* **Angular**: Full-fledged framework with built-in routing, HTTP, etc.
* **React**: Flexible and lightweight, but needs third-party tools for full app development.
* React is better for custom UI needs; Angular is easier for creating single-page apps quickly.

✅ **Advice for Learning React**

* Start with simple projects—don’t aim for complexity at the beginning.
* Always follow best practices and consult the documentation.
* Focus on learning key concepts like **hooks** properly.

✅ **Long-Term Value of React**

* React will likely appear in many roles throughout a developer's career.
* Its large support network and ecosystem make it a strong skill to master.

**Lecture 2: React.js overview**

✅ **Understanding Single-Page Applications (SPAs)**

* SPAs load content dynamically without full page reloads.
* Unlike traditional websites, they don't reload common elements like headers and footers.
* React is a popular tool for building SPAs, providing better speed and user experience.
* SPAs are ideal for businesses needing fast, scalable, and interactive web apps.

✅ **React and Its Growing Popularity**

* React is developed by Meta and powers many top websites.
* Often, React apps update content without changing the URL, a common SPA trait.
* React offers flexibility, speed, and rich user interfaces.

✅ **React Basics: Component-Based Architecture**

* React apps are built using reusable **components**.
* Each component handles its own functionality and UI structure.
* Components are modular, allowing easy integration and maintenance.

✅ **Benefits of Using Components in React**

* Components can be reused and moved around the app as needed.
* Multiple developers can work on different components independently.
* Promotes clean, maintainable, and scalable code.

✅ **Components in UI Design**

* All user interfaces are created using a mix of **simple and complex components**.
* Example: An e-commerce checkout page may have
  + **Header** (logo, nav, cart)
  + **Payment Section** (form, validation, submit button)
  + **Sidebar** (order summary)
* Each section is a self-contained component with its own HTML, CSS, and JavaScript.

✅ **Not Just React — Component Use is Common**

* Component-based UI design exists outside React too.
* React simplifies and streamlines this design approach.

✅ **Rendering Components in React**

* Components are rendered efficiently to the **DOM (Document Object Model)**.
* React minimizes performance impact when updating components.

✅ **Traditional DOM Manipulation Challenges**

* Before React, developers had to manually manipulate the DOM.
* This made code messy and hard to maintain — known as **spaghetti code**.

✅ **React’s Virtual DOM Advantage**

* React uses a **virtual DOM** — a lightweight in-memory copy of the real DOM.
* Updates are first made in the virtual DOM, then selectively applied to the real DOM.
* This results in **faster rendering**, improved performance, and fewer browser resource issues.

**Lecture 3:** **Introduction to functional component**

✅ **Functional Components in React**

* React components are similar to JavaScript functions.
* They take inputs, perform actions, and return JSX (UI).
* Two types of components in React:
  + Functional Components (focus of this lesson)
  + Class Components (covered later)

✅ **Root Component and Rendering**

* Every React app must have one **Root Component**.
* Default root is the App component inside index.js.
* Components are rendered like self-closing HTML tags: <App />.

✅ **Component Composition**

* Root component can contain other custom components.
* Components represent different parts of the UI (e.g., header, sidebar).
* The App component is rendered inside a <div id="root"> in the HTML.

✅ **JSX – JavaScript XML**

* JSX is a **syntax extension** to JavaScript.
* Looks similar to HTML but can include JavaScript code.
* JSX enables dynamic content in components.

✅ **Creating a Functional Component (Example)**

* Create a new file named Heading.js.
* Use a capital letter for the component name: function Heading().
* Inside, declare a variable: const title = "This is some heading text";
* Return JSX:

return <h1>{title}</h1>;

* Curly braces {} are used to inject JavaScript variables inside JSX.

✅ **Capitalization Rules in React**

* Component names **must start with a capital letter**.
* Lowercase names are treated as built-in HTML tags by React.

✅ **Transpiling JSX**

* JSX is not valid JavaScript – it needs to be converted (transpiled).
* Transpiling means converting JSX into actual JavaScript + HTML.
* Tools like Babel handle this process in the background.

**Lecture 4:** **Creating React components**

✅ **Creating a New React App in VS Code**

* Open VS Code terminal in the desired folder.
* Run command: npx create-react-app .
  + The . means create the app in the current folder.
* Wait for the app to install (may take a few minutes).
* Start the development server with: npm start.
* App opens at: http://localhost:3000.

✅ **Understanding the Project Structure**

* Key folders/files created:
  + node\_modules: contains project dependencies.
  + public: static assets.
  + src: where development happens (focus here).
  + package.json: project configuration and dependencies.

✅ **Cleaning the Default App Component**

* Go to App.js.
* Remove the existing content inside the App function.
* Save the file – the page shows blank (expected).

✅ **Creating a New Functional Component**

* Inside App.js, define a new function:

function Header() {

return <h1>Hello World</h1>;

}

* This is a simple **functional component** returning JSX.

✅ **Rendering the Header Component**

* Inside the App function, render the Header component:

function App() {

return <Header />;

}

* Use self-closing tag syntax like HTML.
* Save changes (Ctrl + S / Cmd + S).
* "Hello World" appears in the browser.

✅ **Component Relationships**

* App is the **root component**.
* It renders the Header component.
* Both components currently exist in the same file.

✅ **Making Components Reusable**

* Next step: move Header to its own file.
* Allows reusing Header across the app.
* You'll learn to import/export components in upcoming lessons.

**Lecture 5:** **Transpiling JSX (Readings)**

✅ **What is JSX and Why It Needs Transpiling**

* JSX is a syntax extension for JavaScript used in React.
* Browsers **cannot understand JSX directly**.
* JSX must be **transpiled** (converted) into plain JavaScript before a browser can run it.

✅ **What is a Transpiler?**

* A **transpiler** converts code from one version or type to another.
* Example:
  + **ES6 Code**: const PI = 3.14 (modern JS)
  + **ES5 Equivalent**: var pi = 3.14 (older browser compatible)
* JSX → JavaScript (ES5/ES6) is the core task here

✅ **Babel – The Popular JSX Transpiler**

* **Babel** is a tool used to transpile JSX into JavaScript.
* Website: Babel Online REPL
* Choose “**Classic Runtime**” in settings to see React-style output.

✅ **Example 1: Transpiling a JSX Component**

JSX Code:

function Heading(props) {

return <h1>{props.title}</h1>;

}

Transpiled Output:

function Heading(props) {

return React.createElement("h1", null, props.title);

}

* React.createElement("h1", null, props.title)
  + "h1" → tag name
  + null → no attributes
  + props.title → content inside the tag

✅ **Example 2: Transpiling JSX Render Syntax**

JSX Render:

<Heading title="This is the heading text!" />

Transpiled Output:

React.createElement(Heading, {

title: "This is the heading text!"

});

* Heading → React component
* { title: "..." } → props passed to component

✅ **Why Transpiling Matters**

* Ensures **browser compatibility** across old and new browsers.
* Makes it possible to use **modern JavaScript features** today.
* Allows JSX to be used freely in React projects.

✅ **Minimum Code to Show Something on Screen**

To display content using a React component:

function App() {

return <h1>Hello</h1>;

}

Transpiles to:

function App() {

return React.createElement("h1", null, "Hello");

}

This is the **simplest working component** that renders something in React.

**Lecture 6: The React project structure**

✅**Default Folder Structure in a React App**

**1. Main Folders Created by create-react-app**

* **node\_modules/**:
  + Stores all installed npm packages.
  + Automatically generated when you run npm install.
* **public/**:
  + Holds static assets (e.g. favicon.ico, logo.png, manifest.json, robots.txt).
  + Contains the important index.html file – where the React app is injected into.
* **src/ (Source folder)**:
  + Main development area where all your components and logic live.
  + Key files:
    - index.js: Entry point – renders the root component.
    - App.js: Root component of the app.
    - App.css, index.css: CSS files for styling.
    - App.test.js, setupTests.js, reportWebVitals.js: Testing and performance tools.
    - logo.svg: Used in the default homepage.

✅ **Root-Level Files**

* **.gitignore**:
  + Lists files/folders to exclude from version control (e.g., node\_modules/).
* **README.md**:
  + Documentation for project – useful for GitHub.
* **package.json**:
  + Holds project metadata and dependency list.
  + Defines npm scripts (e.g., start, build).
* **package-lock.json**:
  + Stores exact versions of installed dependencies for reproducibility.

✅ **Key Concepts and Best Practices**

* **JSX and Babel**:
  + JSX must be transpiled (via Babel) into plain JavaScript using React.createElement.
* **Index.html**:
  + React components are injected into the <div id="root"> inside this file.
* **Customizing Folder Structure**:
  + Add components/, assets/, utils/ directories inside src/ as needed.
* **Planning Structure**:
  + Helps maintainability, scalability, and team collaboration.
* **Deleting Unused Files**:
  + You can safely delete some default files (like logo.svg, test files) if not needed, but remove all references in code too.

**Lecture 7:** **Customizing the project**

✅ **Project Structure & Planning**

* **Goal**: Build a typography-focused layout for a coding blog (no images).
* **Sections**: Nav, Promo, Blog post intros (Intro1, Intro2, Intro3), Footer.
* **Setup Command**:

npm init react-app customizing-example

* **Organize Code**: Add a components folder in src/.

**🧩 Component Breakdown**

* **Nav.js**: Main navigation menu with Home, Articles, About, Contact.
* **Promo.js**: Promotional section with main heading and subheading.
* **Intro1.js**: First blog post preview.
* **Intro2.js**: Second blog post preview.
* **Intro3.js**: Third blog post preview.
* **Footer.js**: Footer with simple copyright.

✅ **Final Folder Structure**

src/

components/

Nav.js

Promo.js

Intro1.js

Intro2.js

Intro3.js

Footer.js

App.js

index.js

index.css

...

**💬 Important JSX Notes**

* **className**: Used instead of class in JSX due to JavaScript syntax rules.
* **Component Duplication**: Used Intro1/2/3.js for simplicity; reusable components come later.
* **Props Not Used Yet**: Will be introduced in upcoming lessons.
* **No <a> tags**: Internal links will later be handled using React Router (not raw <a> tags).

**Lecture 8: Importing components**

✅ **Component-Based Architecture in React**

* React apps are built using **self-contained, reusable components**.
* Each component is like a building block used to create powerful UIs.
* Splitting apps into components makes code **organized and manageable**.

✅ **Understanding Modules in JavaScript**

* A **module** is a standalone unit of code that can be reused.
* JavaScript files act as modules.
* Modules allow you to **add, remove, or replace** parts of your code easily.

✅ **Components vs Modules**

* A **component** is usually a small UI piece (e.g., a button).
* A **module** can contain one or more components.
* Components focus on **UI**, while modules focus on **functionality grouping**.

✅ **Exporting and Importing in JavaScript**

* Use the **export** keyword to make code available to other files.
* Use the **import** keyword to use exported code in another file.

**Types of Exports:**

* Default Export: Used when function name matches file name.
* Named Export: Used when function name differs from file name.

✅ **Importing React Components**

* Use the import keyword followed by component name.
* Use from to specify the file location.
* Syntax:

import Header from './Header';

✅ **Structuring React Components**

* Create a folder named \*\*components\*\* to store all component files.
* Helps in grouping and managing similar files together.
* Example:
  + Header.js for top section
  + Main.js for payment section
  + Sidebar.js for sidebar section

✅ **Using Components in Root File (App.js)**

* Each component is **imported and returned** in App.js.
* This forms the main structure of your application page.

**Topic 3:** **Component Use and Styling**

**Lecture 1:** **Principles of components: Props**

✅ **Introduction to Props in React**

* Functional components in React are like JavaScript functions.
* React uses **props** (short for *properties*) to **pass data between components**.
* Props make components **dynamic and reusable**.

✅ **JavaScript Object Refresher**

* A JavaScript object stores related data in **key-value pairs**.
* You access object values using **dot notation**.
* React's **props** work similarly—props are essentially objects.

✅ **What Are Props?**

* Props are **arguments passed to components** using JSX syntax.
* Used like **HTML attributes** in the parent component.
* Accessed inside the component using the props object and dot notation.
* Syntax:

<App title="Welcome!" /> // Parent Component

function App(props) {

return <h1>{props.title}</h1>; // Child Component

}

✅ **Props Accept Different Data Types**

* Props can hold:
  + Strings and numbers
  + Arrays and objects
  + Functions
* This allows **high flexibility and reusability**.

✅ **Component Hierarchy and Data Flow**

* React follows a **parent-child structure**.
* **Parent component** sends props → **Child component** receives.
* One parent can send the same data to **multiple child components**.
* Data flow is **one-directional** (from parent to child only).

✅ **Limitations of Props**

* **Cannot send data from child to parent** using props.
* Props should be **read-only** inside the component.
* React components should behave like **pure functions**:
  + Same inputs (props) should always produce the same output.
  + Components should **never modify their own props**.

**Lecture 2: Using props in components**

✅ **Understanding Props in React**

* Props in React are like **function parameters** in JavaScript.
* They allow **data to be passed** from one component to another.

✅ **JSX is Just Syntactic Sugar**

* JSX is a **nicer way to write** complex JavaScript.
* Browsers don’t understand JSX directly — it must be **transpiled** to plain JavaScript.
* Use the online tool [**babeljs.io**](https://babeljs.io/) to see the **converted JavaScript code**.

✅ **Transpiling JSX to JavaScript**

* Example JSX:

function App() {

return <h1>Hello there</h1>

}

* Transpiled output:

function App() {

return React.createElement("h1", null, "Hello there");

}

✅ **How React.createElement Works**

* React.createElement takes **three arguments**:
  1. **Type of element** (e.g., "h1", "div")
  2. **Props object** (e.g., {} or null)
  3. **Children** (content inside the element)

✅ **Nested JSX Translates to Nested createElement**

* JSX:

return (

<div>

<h1>Hello there</h1>

</div>

)

* Transpiled JavaScript:

return React.createElement(

"div",

null,

React.createElement("h1", null, "Hello there")

);

* **JSX nesting = Nested createElement calls**

✅ **The Second Argument: Props Object**

* null can be replaced with {} to show an empty props object.
* Example:

React.createElement("h1", {}, "Hello there")

* This props object is how you send data from a parent to child component.

✅ **React.createElement Syntax Overview**

React.createElement(

type, // Element type (e.g., "div", MyComponent)

[props], // Optional props object

[...children] // Inner content or nested elements

)

✅ **The Third Argument: Children**

* This is the **inner content** of the component or element.
* Enables **nesting of elements** just like HTML.
* Makes JSX structure **readable and organized**.

**Lecture 3:** **Introducing JSX**

✅ **What Makes JSX Special?**

* JSX is **expressive** – lets you write HTML directly inside JavaScript.
* It resembles **HTML/XML** but works inside JS code.

✅ **Mixing JavaScript, HTML, and CSS in JSX**

* JSX allows **mixing static HTML and dynamic values** using curly braces {}.
* You can pass data dynamically via **props**.
* Curly braces = place for **any JavaScript expression**.

✅ **Creating Components with JSX**

* Components are **JavaScript functions** that return JSX.
* Example: A Nav component can return:

<nav>

<ul>

<li>{dynamicItem}</li>

</ul>

</nav>

✅ **JSX Return Statement Rules**

* JSX must be wrapped in a **single parent element** (e.g., <div>).
* Use <> </> (React **Fragments**) to avoid extra DOM elements.
* For multi-line returns, **wrap JSX in parentheses ()**.

✅ **Styling JSX Elements**

* Use className instead of class (since class is a **JavaScript keyword**).
* className follows **camelCase** syntax.  
  Example:

<div className="container mainContent">Hello</div>

✅ **Why JSX is Easy to Work With**

* JSX looks like HTML but supports **JavaScript flexibility**.
* Helps you create **interactive, styled components** with less effort.

✅ **Conclusion**

* JSX = HTML + JavaScript + styling in one place.
* You now understand how JSX allows you to:
  + Write **HTML structure**
  + Insert **dynamic data**
  + Apply **CSS styles**
  + Follow specific **syntax rules**

**Lecture 4:** **Props and children (Reading)**

✅ **Props and Children in React**  
Understanding how JSX components can receive and render nested elements using props.children.

✅ **What is props.children?**

* It is a special prop automatically passed to every React component.
* It represents whatever is placed between the opening and closing tags of a component.
* Makes components flexible and reusable for various content.

✅ **Real-life Analogy**

* A bag can carry apples or pears; it doesn’t change based on the content.
* Similarly, a component can wrap different child components without changing itself.
* The bag doesn’t care what’s inside—just like props.children.

✅ **Component Example Overview**

Apples Component:

<Apples color="yellow" number="5" />

Pears Component:

<Pears friend="Peter" />

Bag Component using props.children:

function Bag(props) {

return <div style={...}>{props.children}</div>;

}

✅ **Using props.children in JSX**

* You can pass children by placing them between component tags:

<Bag>

<Apples color="yellow" number="5" />

</Bag>

* You can also pass it as a named prop (less common):

<Bag children={<Apples color="yellow" number="5" />} />

✅ **Nesting JSX Elements**

* JSX allows nesting multiple elements:

<Trunk>

<Bag>

<Apples />

<Pears />

</Bag>

</Trunk>

* The Bag component uses props.children to render both Apples and Pears.

✅ **Benefits of Using props.children**

* Makes components more flexible and easier to reuse.
* Enables components to wrap any kind of content, like text or JSX elements.
* Helps in creating layout wrappers, like cards, sections, or containers.

✅ **Important Rules and Considerations**

* Use props.children when a component needs to wrap other components.
* It allows consistent layout or styling while keeping the content dynamic.

✅ **Component Modularity**

* Don’t over-split your layout into tiny components—it becomes harder to manage.
* Don’t keep everything in one big component either—it becomes messy.
* Find a balance by creating components for meaningful sections like header, footer, etc.

✅ **Conclusion**

* Wrapping one component inside another is made possible by props.children.
* It helps you write cleaner and more organized React components.
* This concept supports reusable, modular design in React applications.

**Lecture 5:** **Styling JSX Elements (Reading)**

✅ **Styling JSX Elements**

* JSX allows combining JavaScript, HTML, and CSS.
* You can style JSX in multiple ways for both visual and functional results.

✅ **1. External CSS Styling with className**

* Add a <link> tag in index.html to include a CSS file.
* Use className (not class) in JSX to refer to CSS classes.

**Example:**

function Promo(props) {

return (

<div className="promo-section">

<h1>{props.heading}</h1>

<h2>{props.promoSubHeading}</h2>

</div>

);

}

**CSS:**

.promo-section {

font-weight: bold;

line-height: 20px;

}

✅ **2. Inline Styling in JSX**

* Styles are defined directly in JSX using a JavaScript object.
* Syntax: style={{ property: "value" }}
* CSS properties are camelCased, and values are strings.

**Example:**

<h1 style={{ color: "tomato", fontSize: "40px", fontWeight: "bold" }}>

{props.heading}

</h1>

✅ **3. Saving Inline Styles in a Variable**

* Define a styles object and reuse it in JSX.
* This keeps styles close to the component but may affect maintainability.

**Example:**

function Promo(props) {

const styles = {

color: "tomato",

fontSize: "40px"

};

return (

<div className="promo-section">

<h1 style={styles}>{props.heading}</h1>

<h2>{props.promoSubHeading}</h2>

</div>

);

}

✅ **Important Notes**

* Use inline styles for quick, component-scoped styling.
* Use external CSS or CSS modules for reusable, maintainable styles.
* Avoid mixing too many styling methods in one component.