

KOENIG SOLUTIONS • COURSE OUTLINE

# Modern Web Application Development with React and Node-RED

Learn to build full-stack web applications using HTML, CSS, JavaScript, React and Node-RED, from UI design to secure APIs and databases.

**8 Days**

DURATION

**28**

MODULES

**74**

TOPICS

**7**

HANDS-ON ACTIVITIES

## COURSE OVERVIEW

This course begins with HTML, CSS, responsive design and Git version control before moving into JavaScript fundamentals and DOM manipulation. It then covers React, including components, state, event handling, forms, routing and API calls. The course continues into backend development with Node.js and Node-RED, covering RESTful APIs, SQL and NoSQL database integration, authentication, web security and data validation. It concludes with a final project that combines a React frontend with a Node-RED backend into a product management application.

## WHO THIS COURSE IS FOR

Frontend Developers

Backend Developers

Full Stack Developers

Web Developers

## LEARNING OBJECTIVES

- Structure web pages using semantic HTML and accessible forms
- Style layouts with CSS including the box model and flexbox
- Apply responsive design using media queries and Bootstrap
- Manage source code with Git branches and commits
- Manipulate the DOM and handle events with JavaScript
- Build React components that manage state and props
- Implement routing and API calls in React applications
- Develop RESTful APIs with Node-RED connected to MySQL and MongoDB

# 28 Modules, 74 Topics

## DAY 1 HTML, CSS & Responsive Web Design

01

120 minutes

### HTML Basics & Structure

#### TOPICS

- HTML Elements (Headings, Paragraphs, Lists, Links, Tables)
- Forms & Input Fields (Text, Checkbox, Radio, File Upload)
- Semantic HTML & Accessibility

02

105 minutes

### CSS Fundamentals

#### TOPICS

Selectors, Properties, Values · Box Model, Flexbox · CSS Units (px, em, rem, %, vw, vh) · Color and Font Properties

03

90 minutes

### Responsive Web Design

#### TOPICS

Media Queries for Different Screen Sizes · Mobile-First Design Approach · CSS Frameworks (Bootstrap)

04

90 minutes

Hands-on Exercise

### Version Control with Git

#### TOPICS

- Initializing a Git repository
- Basic Git commands (add, commit, push, pull, clone)
- Working with branches & merging

## DAY 2 JavaScript Basics & DOM Manipulation

01

120 minutes

### JavaScript Basics

#### TOPICS

- Variables & Data Types (String, Number, Boolean, Array, Object)
- Functions (Regular, Expression Functions, Arrow Functions)
- Loops & Conditionals

**02**

105 minutes

## DOM Manipulation

### TOPICS

- Selecting Elements (getElementById, querySelector)
- Updating Elements Dynamically
- Creating & Removing Elements

**03**

90 minutes

Hands-on Exercise

## Event Handling

### TOPICS

Click, Change, Submit Events · Event Delegation & Propagation · Preventing Default Behavior

**DAY 3**

## React Fundamentals

**01**

120 minutes

## Introduction to React & Setup

### TOPICS

What is React? Why use it? · Installing React with Vite · JSX & Virtual DOM

**02**

45 minutes

## React Components & Props

### TOPICS

Functional Components · Props & Reusability

**03**

60 minutes

## State Management in React

### TOPICS

useState Hook for Managing Component State · Handling User Input with useState

**04**

90 minutes

## React Event Handling

### TOPICS

- Handling Click, Change, Submit Events in React
- Passing Functions as Props

**05**

60 minutes

Hands-on Exercise

## Lists & Conditional Rendering

### TOPICS

Mapping over Lists · Conditional Rendering with Ternary Operator

**DAY 4**

## Advanced React - Forms, Routing, and API Calls

**01**

120 minutes

## Forms in React

### TOPICS

Form handling with useRef hook · Handling Form Submission & Validation

**02**

105 minutes

## React Router

### TOPICS

- Setting Up Routes
- Dynamic Route Parameters
- Protected Routes & Authentication-Based Navigation

**03**

90 minutes

Hands-on Exercise

## API Calls in React

### TOPICS

Fetching Data using Fetch API & Axios · Handling Loading, Success & Error States

**DAY 5**

## Introduction to Backend with Node.js & Node-RED

**01**

120 minutes

## Introduction to Web Servers & Backend Development

### TOPICS

What is a Web Server? · Overview of Backend Development

**02**

105 minutes

## Server-Side Languages: Node.js & Node-RED

### TOPICS

- What is Node.js? (Introduction & Use Cases)
- Introduction to Node-RED & Flow-Based Development
- Installing & Running Node-RED

**03**

90 minutes

Hands-on Exercise

## Creating RESTful APIs with Node-RED

### TOPICS

Creating an HTTP Endpoint · Handling GET & POST Requests · Testing APIs using Postman

**DAY 6**

## Database Integration (SQL & NoSQL) with Node-RED

**01**

120 minutes

### Database Integration (MySQL & MongoDB)

#### TOPICS

SQL vs. NoSQL: When to Use Which? · Setting Up MySQL & MongoDB with Node-RED

**02**

105 minutes

### Performing CRUD Operations in Databases

#### TOPICS

Creating Tables & Collections · Storing, Retrieving & Deleting Data

**03**

90 minutes

Hands-on Exercise

## RESTful APIs & Web Services in Node-RED

### TOPICS

Connecting REST APIs with MySQL & MongoDB · Retrieving Data & Sending JSON Responses

**DAY 7**

## Security, Authentication & Data Validation

**01**

120 minutes

### Authentication & Authorization

#### TOPICS

User Authentication with JWT (Login, Signup) · Role-Based Access Control (Admin vs. User)

**02**

105 minutes

### Web Security Basics

#### TOPICS

Understanding HTTPS, CORS & CSRF · Preventing SQL Injection in APIs · Encrypting Passwords & User Data

**03**

45 minutes

## Session Management & Cookies

### TOPICS

Storing Sessions in Local Storage & Cookies ·  
Implementing Logout Functionality

**04**

90 minutes

Hands-on Exercise

## Data Validation & Sanitization

### TOPICS

Validating API Input Data · Preventing Malicious  
Input Attacks

**DAY 8**

## Final Project - Product Management App

Goal: Build a fully functional Product Management App

**01**

120 minutes &amp; 105 minutes

## Frontend (React)

### TOPICS

- **User Authentication:** Signup/Login with JWT
- **Product Management:** Add, Edit, Delete, View Products
- **State Management:** Context API for Global State
- **Routing & Navigation:** React Router with Protected Pages
- **Forms & API Calls:** Handling user input, submitting to backend

**02**

90 minutes

## Backend (Node-RED)

### TOPICS

- User Authentication APIs
- CRUD APIs for Product Management
- **Database Integration:** MySQL / MongoDB for storing products
- Logging & Error Handling

**03**

90 minutes

## Security & Validation Enhancements

### TOPICS

Secure API Endpoints with JWT Authentication · Validate and Sanitize API Input Data

## Practise What You Learn

| #  | MODULE                                  | ACTIVITY                                                                           |
|----|-----------------------------------------|------------------------------------------------------------------------------------|
| 04 | Version Control with Git                | Build a responsive product listing page with forms and CSS styling                 |
| 03 | Event Handling                          | Create an interactive product form with JavaScript validation and DOM manipulation |
| 05 | Lists & Conditional Rendering           | Build a product listing page using React components and state                      |
| 03 | API Calls in React                      | Create a product form with validation and navigation using React Router            |
| 03 | Creating RESTful APIs with Node-RED     | Build a simple REST API with Node-RED and test it using Postman                    |
| 03 | RESTful APIs & Web Services in Node-RED | Store product details in MySQL and MongoDB and fetch them using APIs               |
| 04 | Data Validation & Sanitization          | Implement secure user authentication and validate API inputs in Node-RED           |

## WHAT IS INCLUDED

## Everything You Need to Succeed

- Koenig course material for every module
- Delivery by certified instructors and subject matter experts
- Hands-on exercises throughout the course
- Course completion certificate from Koenig

## Who We Are

Established in 1993, Koenig Solutions is a globally recognised training provider with 35+ technology partnerships, 5,000+ training programmes and a network of certified instructors and subject matter experts, supporting individuals and enterprise teams worldwide.

## Learn the Way That Suits You

Classroom Training

Live Online Classes (ILO)

Fly-Me-A-Trainer (FMAT)

Flexi (Self-Paced)

1-on-1 Training

### Ready to Get Started?

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