# React Testing with Jest - Complete Syllabus (Beginner to Master)

## ✅ Objective

To master testing in React using Jest and React Testing Library (RTL) through a structured and progressive learning plan.

## 🔰 PHASE 1: Foundation (Absolute Basics)

**Goal:** Understand the basics of testing and Jest.

### Topics to Cover:

1. ✅ What is testing and why do we test?
2. ✅ Types of testing: Unit, Integration, E2E, etc.
3. ✅ Setting up React Testing Library and Jest
4. ✅ Your first test case: Testing a Button click
5. ✅ Understanding render(), screen, and fireEvent
6. ✅ Role of describe, test, it, expect

## ⚙️ PHASE 2: Core Concepts (Practice & Patterns)

**Goal:** Learn to test user interactions and DOM elements.

### Topics:

1. ✅ Testing input fields and form submission
2. ✅ Using beforeEach, afterEach
3. ✅ Mocking functions (jest.fn())
4. ✅ Querying elements with:
   * getByRole, getByText, getByPlaceholderText, etc.
   * queryBy, findBy, and how they differ
5. ✅ Assertions with expect()

## 🚦 PHASE 3: Testing Logic & Props

**Goal:** Test logic, props, and mocked behaviors.

### Topics:

1. ✅ Testing props and dynamic rendering
2. ✅ Conditional rendering (e.g., show/hide components)
3. ✅ Testing API calls (mocking fetch/axios)
4. ✅ Mocking child components
5. ✅ Snapshot testing (optional but good to know)

## ⚡ PHASE 4: Advanced React Testing

**Goal:** Handle complex features and state.

### Topics:

1. ✅ Testing Context API
2. ✅ Testing Redux (slices and connected components)
3. ✅ Testing custom hooks
4. ✅ Usage of act()
5. ✅ Coverage and Snapshot Testing
   * Using --coverage
   * Understanding coverage reports
   * Snapshot testing pros/cons
6. ✅ Debugging Tests
   * debug(), logTestingPlaygroundURL()
   * Handling flaky tests
7. ✅ Mock Service Worker (MSW)
   * Setting up MSW
   * Writing handlers
   * Integration with RTL

**Practice:**

* Mocked dashboard with API data

## 🔴 PHASE 5: Mastery and CI Integration

**Goal:** Production-ready testing and pipelines.

### Topics:

1. ✅ Test-Driven Development (TDD)
   * Red-Green-Refactor cycle
   * TDD in React
2. ✅ CI/CD Integration
   * GitHub Actions
   * GitLab CI / Jenkins setup
   * npm test integration
3. ✅ Best Practices & Anti-Patterns
   * What/what not to test
   * Avoiding implementation detail testing
   * Maintainable tests

## 🧪 BONUS: Real Project Practice

**Goal:** Apply everything in a real-world project.

### Project Ideas:

* To-do App
* Weather App (Context + Routing)
* E-commerce Page (Product + Cart)

### What to Test:

* Rendering
* User Interactions
* State & APIs
* Loaders & Errors
* Custom hooks

Usage of act