



## Mern Stack Web Development

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“Great web design without functionality is like a sports car with no engine.”

~Paul Cookson

## About Coding Ninjas

At Coding Ninjas, our mission is to continuously innovate the best ways to train the next generation of developers and transform how tech education is delivered. Training is designed and provided by professional developers turned educators who have experience working at bigwigs like Facebook, Amazon, Google etc. and are Stanford, IIT, IIIT alumni.

Coding Ninjas teaches 15+ Programming courses in Foundation, Advanced, Data & Development such as Machine Learning, Data Science, Web Development and more.

## Doubt Support

We have developed a very scalable solution using which we are able to solve 4000+ doubts every single day with the help of 700+ Teaching Assistants (TAs) on the platform itself with an average rating of 4.8 out of 5.

## Placement Stats

100,000<sup>+</sup>

Students taught so far

78%<sup>+</sup>

Percentage placement

85%<sup>+</sup>

CN Alums Working in Unicorns

9.3L<sup>+</sup> Average Salary

Number of placement partners and average salary of students

100<sup>+</sup>

Students recieved International job offers



# Ankush Singla

Co-Founder & Instructor

Ankush holds a Bachelor's degree in Computer Science from India's most premier institute- IIT Delhi and a Master's degree in Computer Science from Stanford University.

He is a coding enthusiast and has worked with bigwigs like Amazon and Facebook in the past.



### Quick TAs & Student Experience Team Support

Dedicated TAs and Student experience team to make sure that your doubts get resolved quickly.



### Want A Break? Pause Your Course

Take a short break when you need it. Pause your course for upto 60 days. Resume when you are ready



### Get An Industry Recognised Certificate

Get awarded with an industry recognised certificate after you complete your programming course



### Be A Part Of The Learning Community

Slack groups to meet your batchmates. Learn from your peers about resources, doubts and more!

# Programme Overview

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## ○ Course Overview

Become a full stack web developer using the best tools and technologies out there - MERN. By the end of this course you will gain the mastery over nodejs, reactjs and advanced HTML & CSS which will enable you to create effective and responsive web applications for all intents and purposes.

## ○ Features

16

Months

6<sup>+</sup>

Projects

140<sup>+</sup>

Hours of video  
content

400<sup>+</sup>

Problems

## WHY Mern Stack web development?

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- MERN Stack web development can make the development entire process smooth
- Learn the best practices of converting data to a graphical interface, through the use of HTML, CSS, and JavaScript.
- Learn the basics of adding server-side logic to any web application using Node.js.
- MERN stack can make faster development of smaller applications.

# Course Outcome

## ○ Introduction To Programming

Learn the basics of the most popular programming languages (C++ /Java / Python) and become an expert in the core fundamentals of programming.

## ○ Data Structures And Algorithms

Data structures and algorithms is all about organising the information and finding the most efficient approach to solve a problem. Learning these concepts will in turn help you to improve your problem-solving skills and solve any real-world problems using technology.

## ○ Front end Web Development

Learn the best practices of converting data to a graphical interface, through the use of HTML, CSS, and JavaScript.

## ○ Backend web development with Node.js

Learn the basics of adding server-side logic to any web application using Node.js

## ○ Advanced Frontend with React.js

Learn the best practices of converting data to a graphical interface, through the use of HTML, CSS, and JavaScript. Build amazing user interfaces or UI components using React library

## Companies Hiring



## Placement after the course



Abhishek Jha



Sudhanshu Kumar



Rubleen Kaur



Sidharth Pantula



# Course Offerings

## Basic

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Front-End Web  
Development

Back-End Web Development  
with Node.js

Advanced frontend with  
React.js

8

Months

80<sup>+</sup>

Hours

6<sup>+</sup>

Projects

60<sup>+</sup>

Assignments

## Standard

Introduction  
to Programming

Data structures and  
algorithms

Front-End Web  
Development

Back-End Web Development  
with Node.js

Advanced frontend with  
React.js

14<sup>+</sup>

Months

140<sup>+</sup>

Hours

6<sup>+</sup>

Projects

10<sup>+</sup>

Assignments

300<sup>+</sup>

Problems

# Detailed Curriculum

## Introduction to Programming

Topics	Sub-topics	Details
Basics of Programming	Flowcharts	Introduction to flowcharts, Decision making using flowcharts, Loops, Example problems
	Variables and Data types	First program, Variables and data types, Taking input, How data is stored in memory, Arithmetic Operators
	Conditional statements	Introduction to If else, Relational and logical operators, Nested conditionals
Loops and Functions	While loops	While loops, Flow of execution of statements in while loop, Example problems using while loop
	Patterns	Introduction to patterns, Basic Patterns, Square Patterns, Triangular Patterns, Character Patterns, Reverse Triangle, Inverted patterns, Isosceles triangles
	For loops	For loops, Break and Continue, increment - decrement operators
	Functions	Introduction to functions, Working of function calling, Variables and its scope, Pass by value
Arrays	Introduction to arrays	Introduction to arrays, How arrays are stored in memory, Passing arrays to functions
	Searching and Sorting	Understanding Binary Search, Selection sort, Bubble sort, Insertion sort, Merging two sorted arrays
Strings and 2D Arrays	Strings	Introduction to strings, storage of strings and their inbuilt functions
	2D Arrays	2D arrays, Storage of 2D arrays, Example problems using 2D Arrays

# Introduction to Data Structures

Topics	Sub-topics	Details
Problem Solving Techniques	Recursion	Introduction to recursion, Principle of mathematical induction, Fibonacci numbers, Recursion using arrays, Recursion using strings, Recursion using 2D arrays
	Time and space complexity	Order complexity analysis, Theoretical complexity analysis, Time complexity analysis of searching and recursive algorithms, Theoretical space complexity, Space complexity analysis of merge sort
	Backtracking	Introduction to backtracking, Problems based on backtracking: Rat in the maze, Word search, and N-Queens
Object-oriented programming	Basics of OOP	Introduction to oops, Creating objects, Getters, and setters, Constructors and related concepts, Inbuilt constructor and destructor, Example classes
	Advance concepts of OOP	Static members, Function overloading and related concepts, Abstraction, Encapsulation, Inheritance, Polymorphism, Virtual functions, Abstract classes, Exception handling
Linear Data Structures	Linked lists	Introduction to linked list, Inserting node in linked list, Deleting node from linked list, Midpoint of linked list, Merge two sorted linked lists, merge sort of a linked list, Reversing a linked list
	Stacks and Queues	Introduction to stacks, Stack using arrays, Dynamic Stack class, Stack using linked list, Inbuilt stack, Queue using arrays, Dynamic queue class, Queue using linked list, Inbuilt queue
Trees	Generic Trees	Introduction to Trees, Making a tree node class, Taking a tree as input and printing, Tree traversals, Destructor for tree node class
	Binary Trees	Introduction to Binary Trees, Taking a binary tree as input and printing, Binary Tree traversals, Diameter of binary tree
	Binary Search Trees	Introduction to Binary Search Trees, Searching a node in BST, BST class, Inserting and Deleting nodes in BST, Types of balanced BSTs
Advanced Data Structures	Priority Queues	Introduction to Priority Queues, Ways to implement priority queues, Introduction to heaps, Introduction to Complete Binary Trees and its implementation, Insert and Delete operations in heaps, Implementing priority queues, Heap sort, Inbuilt Priority Queue

Topics	Sub-topics	Details
Dynamic Programming	Hashmaps	Introduction to Hashmaps, Inbuilt Hashmap, Hash functions, Collision handling, Insert and Delete operation implementation in hashmap, Load factor, Rehashing
	Tries	Introduction to Tries, Making a Trie Node class, Insert, Search and Remove operation implementation in Tries, Types of Tries, Huffman Coding
	Graphs	Introduction to Graphs, Graph Terminology, Graph implementation, Graph Traversals (DFS and BFS), Weighted and Directed Graphs, Minimum Spanning Trees, Cycle Detection in Graphs, Kruskal's algorithm, Prim's Algorithm, Dijkstra's algorithm
	Introduction to Dynamic Programming	Introduction to Memoization, Introduction to Dynamic Programming, Fibonacci numbers using recursion, memoization and dynamic programming
	Applications of Dynamic	Longest Common Subsequence (LCS) using recursion, memoization and dynamic programming, Edit distance using recursion, memoization and dynamic programming, Knapsack problem using recursion, memoization and dynamic programming

Language-specific Topics	Sub-topics	Details
Python	Tuples/Dictionaries/Sets Programming	Tuples, Tuple functions, variable length input & output, Dictionary intro, adding & removing data in dictionary, sets, functions in sets
Python	Lists	Introduction to lists, How lists are stored in memory, Passing lists to functions 2D lists, Storage of 2D lists, Example problems using 2D lists
C++	STL	Introduction to STL, Arrays functions in STL, Vectors, 2D vectors, Pairs, Example problems.
C++	Pointers & Dynamic Allocation	Introduction to Pointers, Pointer arithmetic, Double pointers, Address typecasting, Pass by reference, Dynamic memory allocation, Macros, Global Variables, Inline and Default Arguments, Constant Variables.



# Frontend Module

Topics	Sub-topics	Details
Getting started with Basics	History of Web	Understanding how and who built the web
	Client server architecture	General architecture used by websites
	What happens when you visit a website	Learning what happens behind the scenes while opening a website
Introduction to HTML	HTML structure	How to create the structure of a web page
	Tags in HTML	Learning about various tags in HTML like <a>, <ul> etc
More on HTML	More tags	Practice creating HTML with more tags
	Block v/s Inline elements	Understand the difference between inline and block HTML elements
	Table	Learn to create tables in HTML
Forms	Form	How to create the structure of a web page
	Form fields	What is an HTML form
Intro to CSS	CSS Introduction	What is CSS and how to use it in HTML
	Blog page	Building and styling the blog project

Topics	Sub-topics	Details
Styling with CSS	CSS units	Learning about various CSS units used to style HTML elements
	CSS box model	Understanding the CSS box model
Starting with Resume project	Starting the project	Start building the Resume project by creating the HTML structure
Flex	Intro to Flex	Introducing SASS, setting up SASS for our project
	Flex properties	Explaining 1:1, 1:M and M:M DB relations
	Using flex in Resume	Utilising flex to style the Resume project
Responsive designs	Media queries	Learning storage in SQL databases
Completing Resume	Pseudo elements	What are pseudo elements and where to use them
	Finishing up	Finish building the Resume project
Animations and 3D space	Animation properties	Basics of CSS animation and how to animate HTML elements using animate.css
Bootstrap	Frontend frameworks	What are frontend frameworks and how to use one
	Grid system	Learning about grid system of bootstrap
	Bootstrap components	Using various other bootstrap elements like Navbar, Jumbotron etc
Major Project	Assignment	Build a music player project with your newly gained skill set

Topics	Sub-topics	Details
Getting started with JavaScript	Intro and History of JS (ECMA)	What is JS and history of JS
	First JavaScript Code Various IDEs available	Various IDEs available.
Fundamentals of JS	Variables, Data Types	Learning the basics of the language
	Operators & Conditional Statements	Working with operators and conditional statements
Loops, Arrays, Function & Objects	loops	Working with various loops
	Functions expressions v/s Function declaration.	Difference between a function expression and declaration
	Arrays and its usage and Intro to Objects	What are arrays and using array functions like splice, slice, etc. Introduction to objects in JS.
	Execution Context, Hoisting, Call Stack	Learning the internal working of the language.
Working of JS	Scope	Understanding scope in JS
	Closures	What are closures and its application
	JS Runtime Environment	Introduction to JRE and its components.
	Arrow, IIFE, Pure/ Impure	Different types of functions
Functions in JS	Callback Functions	What are Callback functions, and when they are used
	Higher Order Functions	What are Higher Order Functions and its application

Topics	Sub-topics	Details
Functions in JS	Map, reduce, and filter	Working of map() reduce() and filter() functions
OOP in JS	Object, Constructor Function	Understanding creation and access of objects, 'this' keyword, Constructor function, and its usage
	Prototype	Understanding Prototype and its chain in objects and Array
	Destructuring	Learning Object and Array destructuring
ES6 Classes	Class in JS	Understanding classes and its usage
	Encapsulation, Inheritance	What is Encapsulation and Inheritance
	Built-In classes in JS, JSON, Shallow, and Deep copy	Learning built-in JS classes, introduction to JSON and Copy in JS
DOM Manipulation	API, DOM	What is DOM, and how to access it?
	DOM Selectors	Different types of selectors
	Event Listeners and Event Propagation	Creating and removing Events and different event listeners available
Mini-Project: Quiz Game	Assignment	Project setup, Displaying question and correct option
	Shuffle Options, Using JSON	Working for the completion of Project
JS ASYNCHRONOUS	Callback, Promises	What are promises and callbacks in Javascript, Why to use
	Async Await	What are Async-Await in Javascript, Why that is important.
Modules in js	What are modules?	Introduction to Modules.
	Import/Export	Named and default Import/Export

Topics	Sub-topics	Details
jQuery	Intro to jQuery	What is jQuery and what is the need for it
	Event handling in jQuery	Handling various JS events with jQuery and exploring the library
Git	Intro to Git	What is git and why it's helpful
	Branches	Exploring branches in Git. How to create branches.
	Git workflow	Understanding push, commits, pull requests and using git for teams and individual

## Backend Module

Topics	Sub-topics	Details
Getting Started With NodeJS	What is NodeJS	Understanding Runtime environments and its role, why NodeJS is popular
	How NodeJS works	Eventloop , Libuv
	Creating server	Creating server using HTTP , returning HTML Content.
Modules in NodeJS	Types of Modules	List of Core modules in NodeJS.
	FileSystem , Path Modules	CRUD operations using File System , Parsing and Joining Path using path module
	npm, nvm , nodemon	Using npm init , using nvm for version management , Using nodemon
Exploring More Modules	Nodemailer	Sending emails in NodeJS.
	Events in NodeJS	How events works, Creating custom events

Topics	Sub-topics	Details
Getting Started with Express	Testing APIs	Installing Postman and testing Post request.
	Understanding Express.js	Installing and creating server using Express.js.
	Understanding middleware	Understanding app.use, order of middlewares
	Types of requests	How to handle a specific request types and send responses
Model-View-Controller - I	Understanding MVC	Understanding Model , View and Controller
	View engines	Understanding EJS - View engine.
	Creating Layouts	Creating layout files and embedding products into layout.
Model-View-Controller - II	Working with Forms	Creating a form view to post new data and controller to receive data
	Validation Middleware	SRP Violation
	Express validator	Installing Express validator, creating validator middleware
File Upload, Session and Cookies	File Uploading	Using Multer, storage configuration.
	Understanding Sessions	Creating session on login, storing & retriving data in session, express-session
	Understanding Cookies	Cookie vs session, creating cookie, storing data in cookie, deleting cookie
Getting started with API	Understanding REST APIs	Why REST, how it works , applications of REST.
	Setting up routes	Understanding and setting up routes
	Query params	Reading Router params , filter Products using query params

Topics	Sub-topics	Details
Securing APIs	Basic Authentication	Authentication Vs Authorization
	Understanding JWT	How JWT works and How to use in REST APIs.
Adding More features to E-Com App	Using Swagger	Swagger Implementation for NodeJS APIs, Testing Swagger
	CORS	what is CORS, Calling APIs from JS App.
Handling Errors	Creating Loggers Middleware	Creating middleware to log requests in files, and applying it at the controller and route level
	Custom error handling middleware	Customising error handling middleware
Getting Started with Databases	Types of Databases	SQL vs NOSql
	Documents and Collections	Creating collections and documents
	CRUD in MongoDB	Create, retrieve, update and delete document
MongoDB with NodeJS - I	Understanding Repository Patterns	Understanding Repository pattern and its advantages
	Hash Passwords	Using hash to store passwords
MongoDB with NodeJS - II	Understanding Index	What is an index and its advantages, type of index, creating an index
	MongoDB Operators	Comparison, Logical, projection and aggregation operators
Working with Mongoose - I	Understanding Mongoose	What is ORM, connecting using Mongoose.
	Creating schemas	Creating various schemas
Working with Mongoose - II	Validations in Mongoose	Implementing Validation in mongoose
	References and relationships	Understanding relationships with examples, Multiple references
Socket Programming	Setting up server using Socket.io	What is Socket Programming and its application, How it works, Storing chats in Databases
Task Runners in NodeJS	Grunt	Setup gruntfile, minifying JS and CSS using grunt

Topics	Sub-topics	Details
Deployment	Gulp	Setup gulp, file transformation and image optimization using Gulp
	AWS EC2	What is deployment and its need, Understanding EC2
	Creating Databases	Setting Up mongoDB on AWS and creating Databases.
	Deploying NodeJS on AWS	Building NodeJS files and deploying NodeJS on AWS.

## React Module

Topics	Sub-topics	Details
Introduction to React	What is React?	Features of React
	SPAs vs. MPAs	Difference between Single page and Multi page applications
	How React works?	How Virtual DOM and Babel are working under the hood?
	Creating First React Element	VS Code Basics, What is JSX?
Learning JSX	React Components	Functional Component, React Fragments, React dev tools,
	JSX Expressions	Rendering Javascript inside JSX (Variables, data types, functions)
	Rendering Arrays and Objects	How to render list of items from an array (using map function) and objects rendering in React
	Conditional Rendering	Conditional rendering using Ternary, AND and OR operators

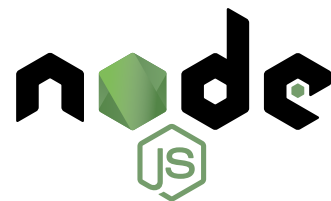


Topics	Sub-topics	Details
Score-Keeper App	Event Handling	How to handle events in JSX?
	Forms in JSX	How to take input and display form data in JSX?
	Accessing Input Values	Using refs to access React elements
Create-React-App	CDNs and Webpack	Drawbacks of CDNs, Using Module Bundler in React Project
	Tools Installation	Installing required tools for creating a React Project
	Folder Structure	Understanding the folder and files structure
	Import/Export	How to import and export components in files?
React Components - I	Class Based Components	How to create class based components?
	Movie-App Project	Creating and adding functionalities to Movie App
	State in React	Adding state to components
React Components - II	Props	What are props, passing data through props from one component to another, Default props

Topics	Sub-topics	Details
Styling in React	Drawbacks of global scope of styling file (CSS)	Understanding CSS Scope to avoid colashes in classNames
	Limiting the scope of styling using inLine styling	Creating inline styles for the elements, styling objects in the component.
	Styled Components	Writing styled components to limit the scope of styling
	Dynamic Styling	Styling Application based on a condition using styled-components
	CSS Modules	Modern styling techniques used by developers
Component Lifecycle Methods	Component Lifecycle	Different Phases of Component lifecycle like mounting, umounting, etc.
	Mounting Phase	Lifecycle methods involved during execution and their order
	Side Effects	How and where to perform side effects
	Updating Phase	Methods involved in the updating phase
	Un-mounting Phase	Performing clean-ups during un-mounting
React Hooks	Error-handling	Creating Error-Boundary
	Use Effect, use State and other	What are hooks, why do we use them and various React hooks out there

Topics	Sub-topics	Details
Firebase 9	Introduction to Firebase	Understanding what is firebase and how it actually works
	Firebase Setup	Setting up firebase and adding it to the project
	CRUD with Firebase	Learning how to create, read, update and delete data from firebase
	Querying Data	Querying data from firebase
React Router v6	Routing	Building navigation and showing different pages for different routes.
Context API	Context API	Passing Arguments to the component tree without passing props at every level.
Redux in React	What is Redux?	Why Redux is used? What is the Data Flow?
	Store, Action, Reducers	Fundamental Principles of Redux, applying them practically
	Thunk Middleware	Allows you to write action creators that return a function instead of an action.
Redux Toolkit	Redux Toolkit	Set of tools that helps simplify Redux development

# Tools and Techniques



# Projects

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## Music Player

Build and style a music player like Spotify/Youtube Music using HTML, CSS and JS.



## Stock Market Analysis

A project which allows users to add different stocks to their portfolio and get real-time data on their stocks using API, which automatically updates after a few sec.



## Easily

A job portal based on MVC architecture, enabling recruiters to post and manage job listings, while also providing a user-friendly platform for job seekers to discover and apply for suitable roles.



## Postaway

A social media application based on REST API with a user-friendly interface to register and authenticate users, create a post, and to like and comment on that post.



## ChatterUp

A real-time chatting application powered by the Socket.io library.



## iPod

Build a clone of iPod nano 5th gen



## PhotoFolio

An online photo album app that allows users to upload, organise, and share their digital photos.




## BusyBuy

A web-based application that allows users to browse and purchase products online





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