Next Gen Employability Program

Curriculum Outlines

Student Curriculum Outline

This document summarizes the detailed content related information for the training track of Student Development Program. Please note that it is indicative and is subject to some changes based on the recommendations from all stakeholders.

Cohort-: Building Modern Web Applications with MERN Stack

Phase 1

- Deep Tech hands-on course content: 70 hours
- Soft Skills: 20 hours

Phase 2

- Industry Expert Talk: 10 hours
- AICTE - EY GDS Internship: 40 hours

The course is designed for engineering/science students aspiring good career in the field of Full Stack Web Development.

Course Objective:

- Understand the architecture and components of the MERN stack
- The objective of this course is to provide participants with comprehensive knowledge and hands-on experience in full stack development with MERN Stack and deploying the developed website onto the cloud.
- By the end of the course, participants will be able to design, develop, deploy, and manage full stack applications with MERN Stack

Course Learning Outcomes:

- Understand the concepts and principles of full stack development, MERN Stack.
- Install and configure tools for MERN stack development.
- Gain proficiency in front-end development using HTML, CSS, and JavaScript frameworks.
- Setting up and working with MongoDB databases, including data modeling and querying.
- Creating robust server-side applications using Node.js and Express.js for handling user requests and data manipulation.
- Building dynamic and responsive user interfaces using React.js components and managing application state.
- Implement security and authentication mechanisms in full stack applications.

Course Content Duration Distribution:

Theory/Practical	Duration
Theoretical discussion	15 hours approx.
Practical/hands-on	55 hours approx.
Employability Skills	20 hours
Industry Expert Talk	10 hours
AICTE - EY GDS Internship	40 hours
Total Duration	140 hours

Assessment Rubric

S. No.	Assessment Component	Evaluation Parameters	Maximum Marks
1	Mid-Term	VIA LMS	20
2	End-Term	VIA LMS	40

Course Outline:

Building Modern Web Applications with MERN Stack			
Module	**Units**	**Content Topic**	
Introduction to MERN Stack Development Tools and Technologies	**Getting started with MERN Stack Development**	Introduction to Full Stack Development, Components	2
		Use Case of Full Stack Development	
		Full Stack Developer	
		Internet, URL Web Page, Web Browser, Web Server, Web sites	
		Client Server Architecture Purpose & Characteristics	
		MERN Stack Introduction	
		MERN Stack Architecture	
Front-End Development Tools, Technologies and Frameworks	**HTML 5 Fundamentals**	Introduction	5
		Use case of HTML	
		Structure of HTML document	
		HTML Tags and Attributes	
		Practical - Hands-on HTML Structure and Basic Tags with Attributes	
		HTML 5 Features	
		Practicals - Hands-on HTML5 features (Multimedia, Semantic Elements, Canvas Elements, etc)	
		Practice - Coding Practice on Online Platforms	
	CSS Essentials and Layout Techniques	Introduction	6
		Use Case of CSS	
		CSS Selector	
		Types of CSS	

		Practical - Hands-on CSS basics, Selectors, and types	
		CSS Box model	
		Practical - Hands-on Box Model	
		Advanced CSS - Grids & Flex	
		Practical - Hands-on Grids & Flex	
		Practice - Coding Practice on Online Platforms	
	JavaScript and DOM Manipulation	Introduction	7
		Use case of JavaScript	
		JavaScript Variables, Data Types, Operators, Control Statements, Array, Functions, Hoisting and Event Handling.	
		ES6 Introduction and Details	
		Practical - Hands-on JS Basics, Functions, Control Statements, and Event Handling	
		DOM Manipulation	
		Practice - Coding Practice on Online Platforms	
	BootStrap Framework	Introduction to BootStrap	2
		Use Case of BootStrap	
		BootStrap Container	
		Overview of BootStrap	
		BootStrap Components	
		Advanced BootStrap Components	
		Practical - Hands-on Basic bootstrap, Contailer, and components	
		Responsive Column & Images	
		BootStrap5 Utilities	
		Practical - Hands-on Utilities, Columns & Images	
		Practice - Coding Practice on Online Platforms	
	React Fundamentals	ReactJS Introduction	12
		Use case of React	
		React Architecture	
		JSX	
		DOM Vs. Virtual DOM	
		React Components & Life Cycle	
		React Router	
		Component Interacting	
		Practical - Hands-on React Basics, Components, Life Cycle and Router	
		Handling Events and Forms	
		Practical - Hands-on Events and Forms	
		Hooks	
		Practical - Hands-on Hooks	
		Practice - Coding Practice on Online Platforms	

Back-End Development and Integration	**Working with Node JS**	Introduction of Node JS	11
		Use case of Node JS	
		Node.js Environment Setup & Runtime Environment	
		REPL in Terminal	
		Practical - Hands-on Simple Node App	
		Node Js Architecture	
		Node.js Package Manager (NPM)	
		Creating Web Server	
		Modules in Node JS - Creating modules - HTTP Module	
		Local, In-built & Third-party modules	
		Installing Third party packages using npm	
		File Systems - Methods, File Operations, & Information	
		Practical - Hands-on Modules, packages and file system	
		Node.js Events -Event driven programming , Event Emitter	
		Callbacks - Blocking & Non-Blocking codes	
		Practical - Hands-on Events, and Callbacks	
		Practice - Coding Practice on Online Platforms	
	Working with Express JS	Introduction	10
		Use case of Express JS	
		Express JS Architecture	
		Installing Express JS - Understanding the File Structure & package.json	
		Understanding the nodemon & watch mode	
		Practical - Hands-on Express JS Basics and First Project	
		Routing in Express.js - App.method(path, handler)	
		Middleware in Express.js	
		HTTP Methods	
		URL Building	
		Templating Engines with Express.js	
		Error Handling	
		Practical - Hands-on Routing, Methods, Files and Error Handling Techniques	
		CRUD Operations	
		Practical - Hands-on CRUD Operations	
		Practice - Coding Practice on Online Platforms	
	MongoDB Fundamentals	Introduction	8
		Use case of Databases	
		SQL & NoSQL Fundamentals	
		Use case of MongoDB	
		MongoDB Architecture	

		Installation and Setup	
		Commands / Crud Operations in MongoDB	
		MongoDB Operators	
		Practical - Hands-on MongoDB Basics and Operators	
		Integration of MongoDB and Node JS	
		MongoDB module	
		Practical - Hands-on Modules, Queries, and basic project work	
		Practice - Coding Practice on Online Platforms	
Code Repository & Web Hosting	**Version Control using Git**	What is Version Control and why is it important?	4
		Understanding Git and GitHub	
		Setting up a GitHub account and installing Git	
		Git basics (init, clone, add, commit, push, pull)	
		Working with branches	
		Merging and resolving conflicts	
		Git workflow and best practices	
		Practical - Hands-on Git basics and Advance Functionalites	
	Web Hosting & Cloud Technologies	Introduction to Web Hosting and Cloud Computing	3
		Use case of Cloud Computing	
		Cloud Service Providers	
		Setting up a Render Cloud Account	
		Creating an account with a cloud service provider	
		Understanding the GItHub and Render Connectivity	
		Practical - Hands-on experiments of integratation of Git and Cloud	
		Cloud Storage	
		Introduction to cloud storage services	
		Uploading website files to cloud storage	
		Practical - Hands-on experiments of uploading static and dynamic web application	

Note: The module durations mentioned above are approximate and can be adjusted based on the learning pace and specific requirements of the participants.

Software Requirements:

Most of the tools used for this course are either open source or free of cost to use

S.No.	Software	Downloadable Link
1	Visual Studio Code (VS Code)	https://code.visualstudio.com/download

2	Node JS	https://nodejs.org/en
3	React JS	https://react.dev/
4	Express JS	https://expressjs.com/
5	MongoDB	https://www.mongodb.com/try/download/community
6	Git	https://www.git-scm.com/downloads
7	GitHub	https://github.com/

Hardware Requirements:

1. Computer /laptop with 1:1 student to computer ratio
2. Dedicated Classroom / Lab for the session
3. High Speed Internet Access with 150 MBPS Speed
4. Computers/Desktop with required configuration for students - 8 GB RAM, Min i3 12th Gen Processor, 256 GB SSD / 512 GB HDD
5. Projector or Large Display Screen
6. Audio - Speakers & Microphone for Trainers
7. Whiteboards and Markers
8. Podium, Trainer Table & Chair
9. Power Outlets and Charging Points