COMSATS University Islamabad
Department of Computer Science
Course Syllabus

Course Information

Course Code: **CSC337** | Course Title: **Advanced Web Technologies**
Credit Hours: **3 (2,1)** | Lecture Hours/Week: **2**
Lab Hours/Week: **3** | Pre-Requisites: **CSC336 – Web Technologies**

Catalogue Description:

This course is aimed to give students the opportunity to learn current web technologies and programming techniques. Topics include: Technological Race; Concepts of JSON; MEAN Stack; MongoDB; Node.JS; Client Connector & Mongoose; Express JS Framework; REST API; Angular; MEAN Stack Application Development; React JS; and MERN Stack Application Development.

Text and Reference Books

Textbooks:

1. Beginning Node.js, Express & MongoDB Development, Lim, G., Amazon, 2019.
2. REST API Development with Node.js: Manage and Understand the Full Capabilities of Successful REST Development, Doglio, F., APress, 2018.
3. Pro Angular 9: Build Powerful and Dynamic Web Apps, Freeman, A., APress, 2020.
4. React and Libraries: Your Complete Guide to the React Ecosystem, Elrom, E., APress, 2021

Reference Books:

1. Node.js Notes for Professionals, Free Internet Source, 2020.
2. Web Development with Node and Express, Ethan Brown,O'Reilly Publishing, 2019.
3. Building Modern Web Applications Using Angular, Kasagoni, S. K., Packt Inc, 2017.
4. Full-Stack React, TypeScript, and Node: Build cloud-ready web applications using React 17 with Hooks and GraphQL, Choi, D., Amazon Kindle Edition, 2020.

Week wise Plan:

Lecture #	CDF Unit #	Topics Covered	Reading Material
1.	1	Course Roadmap, Importance of the Course, Full Stack Development Concepts, and Technological Race.	Ref. Material
2.	1	JSON: Structure, Data Types & Conversion, and Technological Advancements from XML to JSON.	Ref. Material
3.	2	Node.JS: Architectures & Core Features, and Modules.	Greg : Ch1,2
4.	2	Node Architecture: Event loop, Callback, and Event Emitters; NPM Repository & Commands.	Greg : Ch 3,4
5.	2	Implementation of HTTP Server; and Use of URL Module.	Greg : Ch 5
6.	2	Node.JS File System (FS): Access using Files & Streams.	Greg : Ch 6,7
7.	3	MongoDB, Database Creation, Collections, Schemas, and its Access with Aggregate Functions.	Greg : Ch 8,9
8.	3	Implementation of MongoDB Client Connector with Node.JS (Mongo Client).	Greg : Ch 10
9.	3	Mongoose Connector Schemas, Models & its CRUD Operations.	Greg : Ch 11

10.	4	Express Framework Concepts: Middleware, Routing, and Routers.	Fernando : Ch1
11.	4	Application Architecture in Express.JS: Adding Routes, Router & Middleware.	Fernando : Ch1
12.	4	Application Development using View Generators, and Adding Bootstrap.	Fernando : Ch1
13.	5	REST Architecture Principals: Statelessness, Idempotent, Method Selection, Resource, and URI Identifications.	Fernando : Ch2
14.	5	Designing REST API using Case Study.	Fernando : Ch2
15.	5	Implementing REST API using Case Study.	Fernando : Ch3
16.	5	REST API Security: Handling Cors, Xss, DDoS; Overview of Authentication & Authorization, and Implementation of Session Handling in REST.	Fernando : Ch4
17.	**Mid Term Exam**		
18.			
19.	5	Authentication with Passport: Basic Auth, Passport Local Strategy, and Third-Party Authentication.	Fernando: Ch4
20.	5	Implementing JSON Web Tokens in REST.	Fernando :Ch5
21.	6	TypeScript Language Constructs: Classes, Inheritance, and Interfaces.	Adam : Ch1,2
22.	6	Introduction to Angular, and Making Sample Application using Angular Framework.	Adam : Ch3
23.	6	Implementation of Decorators, Modules, Components, and Data Binding in Angular.	Adam : Ch4,5,6
24.	6	Implementation of Templating, Directives, Pipes and Dependency Injections in Angular.	Adam : Ch: 7,8,10
25.	6	Implementation of Services, Routing, and Observable in Angular.	Adam : Ch: 9,11,12
26.	6	Creating Complete MEANSTACK Application with REST.	Ref. Material
27.	7	ReactJS Concepts: Components, Virtual DoM, LifeCycle Hooks, and Props & States.	Elad : Ch 1,2
28.	7	React Language: JSX; Sample Application Creation; Adding Components & Routing in React.JS.	Elad :Ch 3,4
29.	7	React Controlled & Uncontrolled Forms, and Hooks.	Elad : Ch 5,6,7,
30.	7	REST API Calling using Fetch & Axio in React.JS.	Elad : Ch 8,9,10
31.	7	Using Redux with React, and Applying Thunk in Application.	Elad : Ch 9,10,11,12,13
32.	7	Unit Testing in React, Complete MERN Stack Application Implementation.	Elad : Ch16
Final Term Exam			

Student Outcomes (SOs)

S.#	Description
1	Apply knowledge of computing fundamentals, knowledge of a computing specialization, and mathematics, science, and domain knowledge appropriate for the computing specialization to the abstraction and conceptualization of computing models from defined problems and requirements
2	Identify, formulate, research literature, and solve *complex* computing problems reaching substantiated conclusions using fundamental principles of mathematics, computing sciences, and relevant domain disciplines
3	Design and evaluate solutions for *complex* computing problems, and design and evaluate systems, components, or processes that meet specified needs with appropriate consideration for public health and safety, cultural, societal, and environmental considerations
4	Create, select, adapt and apply appropriate techniques, resources, and modern computing tools to *complex* computing activities, with an understanding of the limitations
5	Function effectively as an individual and as a member or leader in diverse teams and in multi-disciplinary settings.

Course Learning Outcomes (CLO)

Sr.#	Unit #	Course Learning Outcomes	Blooms Taxonomy Learning Level	SO
CLO's for Theory				
CLO-1	1	Describe advance concepts and technologies for developing web applications.	*Understanding*	1
CLO-2	2-4	Design web applications using advance technologies.	*Creating*	2-4
CLO-3	5	Design REST API based web server for web application.	*Creating*	2-4
CLO-4	6-7	Apply MEAN Stack & MERN technologies for developing a web application.	*Applying*	2-4
CLO's for Lab				
CLO-5	5	Develop REST API based web server for web applications.	*Creating*	2-4
CLO-6	6-7	Develop dynamic clients using modern development technologies.	*Creating*	2-5

CLO Assessment Mechanism

Assessment Tools	CLO-1	CLO-2	CLO-3	CLO-4	CLO-5	CL0-6
Quizzes	Quiz 1	Quiz 2	Quiz 3	Quiz 4	-	-
Assignments	-	Assignment 1 & 2	Assignment 3	Assignment 4	Lab Assignments	Lab Assignments
Midterm Exam	Midterm Exam	Midterm Exam	Midterm Exam	-	-	-
Final Term Exam	Final Term Exam				-	-

Project	-	-	-	-	-	Lab Project

Policy & Procedures

- **Attendance Policy:** Every student must attend 80% of the lectures as well as laboratory in this course. The students falling short of required percentage of attendance of lectures/laboratory work, is not allowed to appear in the terminal examination.

- **Course Assessment:**

	Quizzes	Assignments	Mid Term Exam	Terminal Exam	Total
Theory (T)	15	10	25	50	100
Lab (L)	-	25	25	50	100
Final Marks (T+L)	**(T/100) *67 + (L/100) *33**				

- **Grading Policy:** The minimum passing marks for each course is 50% (In case of LAB; in addition to theory, student is also required to obtain 50% marks in the lab to pass the course). The correspondence between letter grades, credit points, and percentage marks at CUI is as follows:

Grade	**A**	**A-**	**B+**	**B**	**B-**	**C+**	**C**	**C-**	**D+**	**D**	**F**
Marks	>= 85	80 - 84	75 - 79	71 - 74	68 – 70	64 – 67	61 - 63	58 - 60	54 - 57	50-53	< 50
Cr. Point	3.67-4.00	3.34-3.66	3.01-3.33	2.67-3.00	2.34-2.66	2.01-2.33	1.67-2.00	1.31-1.66	1.01-1.30	0.10-1.00	0.00

- **Missing Exam:** No makeup exam will be given for final exam under any circumstance. When a student misses the mid-term exam for a legitimate reason (such as medical emergencies), his grade for this exam will be determined based on the Department policy. Further, the student must provide an official excuse within one week of the missed exam.

- **Academic Integrity:** All CUI policies regarding ethics apply to this course. The students are advised to discuss their grievances/problems with their counsellors or course instructor in a respectful manner.

- **Plagiarism Policy:** Plagiarism, copying and any other dishonest behaviour is prohibited by the rules and regulations of CUI. Violators will face serious consequences.