

A. Course Handout (Version 1.0)

Institute/School Name	Chitkara University Institute of Engineering and Technology		
Department Name	Department of Computer Science & Engineering		
Programme Name	Bachelor of Engineering (B.E.), Computer Science & Engineering		
Course Name	Back End Engineering	Session	2024-2025
Course Code	22CS026	Semester/Batch	5 th /2022
L-T-P (Per Week)	0-0-8	Course Credits	04
Course Coordinator	Dr. Damandeep		

CLO01	Implement the concept of Web Stack using Nodejs and JSON
CLO02	Examine how to Handle the server-side Application using EJS.
CLO03	Apply acquired knowledge and skills through practical projects and case studies, simulating real-world scenarios to reinforce learning and problem-solving abilities.
CLO04	Gain hands-on experience with deploying backend applications to various environments (e.g., cloud platforms, virtual machines) and understanding basic DevOps principles.

1. Objectives of the Course

The scope of the course is to Gain a comprehensive understanding of backend development concepts, including server-side languages, databases, APIs, and server management.

- Students will master one or more programming, such as Javascript and Node.js, focusing on their application in server-side operations.
- Develop skills in designing and implementing databases.
- Learn how to design, build, and test RESTful APIs to facilitate communication between front-end and back-end systems.

2. Course Learning Outcomes

After completion of the course, a student should be able to:

	Course Learning Outcome	*POs	**CL	***KC	Sessions
CLO01	Implement the concept of Web Stack using Nodejs and JSON	PO1, PO2, PO3, PO5, PO9	K2	Factual Procedural	20
CLO02	Examine how to Handle the server-side Application using JSP Servlet	PO1, PO2, PO3, PO9, PO11	K2	Conceptual Procedural	12
CLO03	Apply acquired knowledge and skills through practical projects and case studies, simulating real-world scenarios to reinforce learning and problem-solving abilities	PO1, PO2, PO3, PO5	K3	Conceptual Procedural Metacognitive	12
CLO04	Gain hands-on experience with deploying backend applications to various environments (e.g., cloud platforms, virtual machines) and understanding basic DevOps principles.	PO3, PO4, PO5, PO9 PO11	K4	Conceptual Procedural Metacognitive	14
Total Contact Hours					T= 58

Revised Bloom's Taxonomy Terminology

* PO's available at (shorturl.at/cryzF)

**Cognitive Level =CL

***Knowledge Categories = KC

Course Learning Outcomes	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CLO01	H	H	M		H				H			
CLO02	H	H	H		H				H	M		
CLO03	M	H	H		H							
CLO04			H	M	H						H	

H=High, M=Medium, L=Low

3. ERISE Grid Mapping

Feature Enablement	Level (1-5, 5 being highest)
Entrepreneurship	1
Research	3
Innovation	2
Skills	5
Employability	4

4. Recommended Books:

Text Books:

B01 Beginning Node.js, Express & MongoDB Development, Greg Lim, 2nd edition, sept. 2020.

B02 Full Stack Javascript: Learn Backbone.Js Node.Js and Mongoddb, Azat Mardon, 2nd edition, Apress, Jan.2019.

B03 Aws The Ultimate Step-by-Step Guide From Beginners to Advanced, Dabha Ltd., Oct. 2020.

B04 C. J. Date, A. Kannan and S. Swamynathan, *An Introduction to Database Systems*, Pearson Education, Eighth Edition, 2009.

B05 SQL in a Nutshell, 4th Edition by Kevin Kline, Regina O. Obe, Leo S. Hsu Released June 2022
Publisher(s):O'Reilly Media, Inc. ISBN: 9781492088868.

Reference Books:

B05: SQL in a Nutshell, 4th Edition by Kevin Kline, Regina O. Obe, Leo S. Hsu Released June 2022
Publisher(s): O'Reilly Media, Inc. ISBN: 9781492088868.

E-Resources:

- <https://library.chitkara.edu.in/subscribed-books.php>

5. Other readings and relevant websites:

Serial No	Link of Journals, Magazines, websites and Research Papers
1.	https://byjus.com/gate/difference-between-sql-and-nosql/
2.	https://www.youtube.com/watch?v=SBY-YIHRTZO
3.	https://www.w3schools.com/nodejs/
4.	https://nodejs.dev/learn
5.	https://youtu.be/c2M-rlkkT5o?feature=shared
6.	https://www.youtube.com/watch?v=Z3SYDTMP3ME

6. Recommended Tools and Platforms

Code Quotient, SQL, NO-SQL, MongoDB

7. Course Plan:

Lecture Number	Topics	Textbook
1-3	Introduction to Client Server Architecture, Understanding Server and how request is handled at the server	B01-Chpater-1
4-7	Understanding Nodejs, advantages and disadvantages with respect to the available languages Install nodeJS and create a nodejs server.	B01-Chapter-1
8-10	handling request, creating endpoints, Modules, npm, import modules	B02-Chapter-2
11-13	Handling static pages with file stream, Handling exceptions.	B02-Chapter-3
14-16	Frameworks, Different frameworks of NodeJs. Introduction to express, Serve static files	B01-Chapter-6
17-18	Routing (Routing methods, Route paths, Route parameters, Route Handlers), Response Methods.	B01-Chapter-7 B01-Chapter-8
19-21	Middleware: Middleware lifecycle, Application-level middleware, Router-level middleware, Error-handling middleware and Third-party middleware.	B02-Chapter-6
22-24	How request travels in express, Blocking vs non-blocking code - Body parser	B01-Chapter-10
CE-1 Syllabus (Lecture number 1-24)		
25-26	Introduction to Multer, Disk Storage handling.	B02-Chapter-14
27-28	Client state management: Client state management using session module, Different ways of managing session	B02-Chapter-15
29-30	Authentication, Authorization, and Handling Exceptions during authentication and authorization.	B01-Chapter-10
31-33	JSON web token, Authentication using JSON, Authentication using JSON using Web Tokens	B01-Chapter-11
34-35	Rendering, Client-side rendering, Server-side rendering, Comparison between CSR and SSR	B02-Chapter-12
36-38	Template Engines, How to use the EJS template in your Node.js application, Create the EJS Partial	B01-Chapter-17
39-42	Pass Data to Views and Partial, and Live the application with EJS.	B02-Chapter-18
43-46	Practical (Modify the EJS template to handle arrays of data. Use looping constructs (for, for Each) in the template to iterate over the array data and merge it into the template for dynamic rendering.)	B01-Chapter-17
CE-2(Lecture number 25-46)		

47-49	Create reusable EJS partials for common UI components such as header, footer, and sidebar. Then, merge these partials into the main EJS template to construct the complete UI dynamically.	B01-Chapter-18
50-54	Introduction to databases, SQL and No SQL Databases.	B04-Chapter-1
55-58	Connecting MongoDB with NodeJS application	B05-Chapter-1
ETE Syllabus (Lecture number 1-58)		

8. Delivery/Instructional Resources

Lecture No.	Topics	Web References	Audio-Video
1-3	Introduction to Client Server Architecture, Understanding Server and how request is handled at the server	https://intellipaat.com/blog/what-is-client-server-architecture/	https://youtu.be/bWKbdPAovFA?si=Y15YhCw8DmcZYhO5
4-7	Understanding Nodejs, advantages and disadvantages with respect to the available languages, Install nodeJS and create a nodejs server.	https://www.geeksforgeeks.org/node-js-introduction/	https://youtu.be/zFRuGk52X-c?si=3DuzU8CNKLwDWXuR
8-10	handling requests, creating endpoints, Modules, npm, import modules	https://docs.npmjs.com/creating-node-js-modules	https://youtu.be/FSRo41TaHFU?si=ZeSwfQcBd98_AaLn
11-13	Handling static pages with file stream, Handling exceptions.	https://www.geeksforgeeks.org/explain-error-handling-in-express-js-using-an-example/	https://youtu.be/64LJhT6Ybo?si=gXKYn5-zo4SnpzYB
14-16	Frameworks, Different frameworks of NodeJs. Introduction to express, Serve static files	https://www.geeksforgeeks.org/node-js-frameworks/	https://youtu.be/2ojkb44XObc?si=sOu5EAPoUhEHhLqa
17-18	Routing (Routing methods, Route paths, Route parameters, Route Handlers), Response Methods.	https://developer.mozilla.org/en-US/docs/Learn/Server-side/Express_Nodejs/routes	https://youtu.be/0Hu27Poloyw?si=-yyf4Kc5JvTz65i2
19-21	Middleware: Middleware lifecycle, Application-level middleware, Router-level middleware, Error-handling middleware and Third-party middleware.	https://expressjs.com/en/guide/using-middleware.html	https://youtu.be/n2c0mf1sza4?si=50R2b0Rgf8DlpgkR
22-24	How request travels in express, Blocking vs non-blocking code - Body parser	https://nodejs.org/en/learn/asynchronous-work/overview-of-blocking-vs-non-blocking	https://youtu.be/BVMjyLPAROI?si=Rlhm-6qEqEaAq-hh
25-26	Introduction to Multer, Disk Storage Handling.	https://www.geekster.in/articles/introduction-to-multer/	https://youtu.be/i8yxx6V9UdM?si=nuLyW2EdordwM3sl
27-28	Client state management: Client state management using session module, Different ways of managing session	https://www.geeksforgeeks.org/session-management-using-	https://youtu.be/oYGhoHW7zql?si=9b-X-wPgjl-ZxhA6

		express-session-module-in-node-js/	
29-30	Authentication, Authorization, and Handling Exceptions during authentication and authorization.	https://dev.to/mhmdlotfy96/authentication-and-authorization-using-jwt-in-node-js-with-express-5bo6	https://youtu.be/TDe7DRYK8vU?si=q9SkMKsbVJ83S2QT
31-33	JSON web token, Authentication using JSON, Authentication using JSON using Web Tokens	https://www.geeksforgeeks.org/json-web-token-jwt/	https://youtu.be/cGmzBNH2wUo?si=j3q6YdgYB1MULcGJ
34-35	Rendering, Client-side rendering, Server-side rendering, Comparison between CSR and SSR	https://www.freecodecamp.org/news/server-side-rendering-javascript/	https://youtu.be/YkxrbxoqHDw?si=6H6e1lu325IfCiSE
36-38	Template Engines, How to use the EJS template in your Node.js application, Create the EJS Partial	https://www.digitalocean.com/community/tutorials/how-to-use-ejs-to-template-your-node-application	https://youtu.be/yy9cbu_e3Xg?si=1g1HiX585GyFzgMZ
39-42	Pass Data to Views and Partial, and Live the application with EJS.	https://www.geeksforgeeks.org/passing-data-to-ejs-templates/	https://youtu.be/IYVKbAn5Od0?si=s5alt2Tvfcpivks0
43-46	Practical (Modify the EJS template to handle arrays of data. Use looping constructs (for, for Each) in the template to iterate over the array data and merge it into the template for dynamic rendering.)	https://www.geeksforgeeks.org/how-to-use-array-of-objects-in-ejs-template-engine/	https://youtu.be/F5DVJmhqNvc?si=9a77j9F3uZlmaAj1a
47-49	Create reusable EJS partials for common UI components such as header, footer, and sidebar. Then, merge these partials into the main EJS template to construct the complete UI dynamically.	https://www.topcoder.com/thrive/articles/using-ejs-template-engine-with-express-js	https://youtu.be/vGUYI9SEMak?si=8jwd79N652ikGETi
50-54	Introduction to databases, SQL and No SQL Databases.	https://www.mongodb.com/resources/basics/databases/nosql-explained/nosql-vs-sql	https://youtu.be/jh14LIMHyds?si=iEGS_2g2hD2FKOkw
55-58	Connecting MongoDB with NodeJS application	https://www.mongodb.com/docs/drivers/node/current/quick-start/connect-to-mongodb/	https://youtu.be/ACUXjXtG8J4?si=xx308cTOJ8Z60r-d

9. Action plan for different types of learners

Slow Learners	Average Learners	Fast Learners
<ul style="list-style-type: none"> Remedial Classes on Saturdays Encouragement for improvement using Peer Tutoring Use of Audio and Visual Materials Use of Real-Life Examples 	<ul style="list-style-type: none"> Workshops Formative Exercises used to highlight concepts and notions E-notes and E-exercises to read ahead of the pedagogic material. 	<ul style="list-style-type: none"> Engaging students to hold the hands of slow learners by creating a Peer Tutoring Group Design solutions for complex problems Design solutions for complex problems Presentation on topics beyond those covered in CHO

10. Evaluation Scheme & Components:

Evaluation Component	Type of Component	No. of Assessments	Weightage of Component	Mode of Assessment
Component1	Formative Assessment	4*	20%	offline
Component 2	Continuous Evaluation (CE)	02**	30%	Offline
Component 3	End Term Examinations (Project Viva)	01**	50%	offline
Total		100%		

* Average of best 3 Formative Assessments will be counted for final assessment.

** Student needs to appear for both continuous evaluations and average will be counted for final assessment.

**As per Academic Guidelines, a minimum of 75% attendance is required to appear for the End Term Examination.

11. Syllabus of the Course:

Subject: Back End Engineering (22CS026)

S. No.	Topic (s)	No. of Sessions	Weightage %
1	Introduction to Client Server Architecture, Understanding Server and how request is handled at the server, Understanding Nodejs, advantages and disadvantages with respect to the available languages, install Nodejs and create a NodeJS server. Handling request, creating endpoints, Modules, npm, import modules. Handling static pages with file stream, Handling exceptions. Frameworks, Different frameworks of NodeJS. Introduction to express, Serve static files Routing (Routing methods, Route paths, Route parameters, Route Handlers), Response Methods. Middleware: Middleware lifecycle, Application-level middleware, Router-level middleware, Error-handling middleware and Third-party middleware. How request	24	40%

	travels in express, Blocking vs non-blocking code - Body parser.		
ST-1 (Covering 40% syllabus)			
2	Introduction to Multer, Disk Storage Handling. Client state management: Client state management using session module, Different ways of managing session. Authentication, Authorization, and Handling Exceptions during authentication and authorization, JSON web token, Authentication using JSON, Authentication using JSON using Web Tokens, JSON web token, Authentication using JSON, Authentication using JSON using Web Tokens, Rendering, Client-side rendering, Server-side rendering, Comparison between CSR and SSR, Template Engines, How to use the EJS template in your Node.js application, Create the EJS Partial, Pass Data to Views and Partial, and Live the application with EJS, Modify the EJS template to handle arrays of data. Use looping constructs (for, for Each) in the template to iterate over the array data and merge it into the template for dynamic rendering.	21	40%
ST-2 (Covering 40% syllabus)			
3	Create reusable EJS partials for common UI components such as header, footer, and sidebar. Then, merge these partials into the main EJS template to construct the complete UI dynamically, Introduction to databases, SQL and No SQL Databases, Connecting MongoDB with NodeJS application.	13	20%
End Term Examination (Covering 100% syllabus)			

This Document is approved by:

Designation	Name	Signature
Course Coordinator	Dr. Damandeep	
Head-Academic Delivery	Dr. Susheela Hooda	
Dean	Dr. Rupali Gill	
Dean Academics	Dr. Monit Kapoor	
Date	10.07.2024	