Course Plan

Course Handout

Institute/School Name	Chitkara University Institute of Engineering & Technology		
Department Name	Department of Computer Science and Engineering		
Programme Name	B.E - Computer Science & Engineering		
Course Name	Front End Engineering-II	Session	July – Dec 2025
Course Code	24CSE0211	Semester/Batch	3rd /2024
L-T-P(Per Week)	0-0-6	Course Credits	3
Pre-requisite	Front End Engineering-I	NHEQF Level[1]	Level 5
Course Coordinator	Dr. Kiran Deep Singh	SDG Number[4]	4, 8, 9

1. Objectives of the Course

This course Front End Engineering-II is designed to provide students with comprehensive, hands-on experience in building responsive and dynamic web applications. Through a structured learning path that starts from web fundamentals and progresses to modern frameworks and deployment strategies, students will gain the technical expertise and creative confidence needed for real-world frontend development. The main objectives are:

- To develop proficiency in building web pages using core technologies such as HTML, CSS, and JavaScript. Students will learn to structure semantic content, style with responsiveness, and add interactivity, forming the foundation of all modern web applications.
- To design front-end GUIs by combining layout techniques, responsive design principles, and user experience (UX) best practices. Learners will integrate tools and APIs to create interfaces that are both user-friendly and accessible.
- To gain fluency with modern front-end frameworks and tools including React, Tailwind CSS, Remix, GraphQL, Webpack/Vite, and TypeScript. Students will learn how to choose and apply the appropriate technologies based on project needs, ensuring scalable and efficient solutions.
- To build secure web applications by understanding vulnerabilities like XSS and CSRF, and performance-enhancing strategies like Progressive Web Apps (PWAs) and Static Site Generators. Students will also explore Authentication Strategies, SSR, and component testing.
- Through project-based evaluations, learners will apply their knowledge in real-world scenarios by building complete frontend applications, integrating APIs, managing states, and deploying production-ready solutions.

2. Course Learning Outcomes (CLOs)

Student should be able to:

	CLOs	Program Outcomes (PO)	NHEQF Level Descriptor	No. of Lectures
CLO01	Analyse and construct well-structured HTML documents using CSS and responsive techniques.	PO3, PO4, PO11	Q1, Q2, Q3	**12**
CLO02	Create user-friendly, component-based UIs using utility-first frameworks like Tailwind CSS and styled APIs.	PO3, PO4	Q2, Q3	**14**
CLO03	Apply JavaScript to add interactivity, DOM manipulation, asynchronous data fetching, and client-side validations.	PO5, PO7, PO11	Q2, Q3, Q4	**14**
CLO04	Build and develop interactive SPAs using React components, JSX, state management, hooks, and routing mechanisms.	PO11, PO12	Q3, Q4, Q5	**18**
CLO05	Design and implement secure, high-performing applications with Remix, SSR, GraphQL, testing tools, and authentication strategies.	PO7, PO9	Q4, Q5	**16**
CLO06	Demonstrate front-end engineering skills through end-to-end project development, integration, and deployment.	PO5, PO10, PO11	Q3, Q4, Q5, Q6	**16**
Total Contact Hours				**90**

CLO-PO Mapping

CLO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	Type of Assessment's
CLO01			M	M						H	H		Formative
CLO02			M	M									Formative
CLO03					H		M				M		Formative
CLO04											H	L	Formative
CLO05							M		H				Formative
CLO06					M					M	H		Formative

H=High, M=Medium, L=Low

3. Recommended Books:

B01: 'Web Enabled Commercial Application Development using HTML, JavaScript, DHTML and PHP' by Ivan Bayross, 4th

Edition, BPB Publications.
B02: 'The Complete Reference HTML & XHTML' by Thomas Powell, 5th Edition, Tata McGraw-Hill Company Limited.
B03: 'HTML 4.0' by E. Stephen Mack, Janan Platt, Anaya Multimedia publication.
B04: 'Mastering HTML, CSS & JavaScript Web Publishing' by Laura Lemay, Rafe Coburn, Jennifer Kyrnin, 7th edition, SAMS publication.
B05: 'Learning web designing: A beginner's guide to HTML, CSS, JavaScript, and Web Graphics' by Niederst Robbins, 4th Edition, Oreilly Publication.

4. Other readings and relevant websites:

SerialNo	Link of Journals, Magazines, websites and Research Papers
1.	https://developer.mozilla.org/en-US/docs/Web/HTML
2.	https://bennettfeely.com/flexplorer/
3.	https://onlinecourses.swayam2.ac.in/nou24_cs09/preview
4.	https://javascript.com/
5.	https://developer.mozilla.org/en-US/docs/Web/API/Document_Object_Model

5. Recommended Tools and Platforms

- Any Text Editor like Notepad++, Sublime, Visual Studio Code etc.

6. Course Plan: Theory+ Lab Plan

Theory Plan

Lecture	Topic	Detailed Contents
1-2	Recap basics of Information Technology	How does the internet work?, HTTP, Domain Name, What is hosting?, DNS and how it works?, Browsers and how they work?
3-4	Recap HTML and CSS	Learn the basics, Writing Semantic HTML, Forms and Validations, Accessibility, SEO Basics, CSS basics, Making Layouts, Responsive Design
5-6	Recap JavaScript	Basics: variables, loops, functions, conditionals, DOM manipulation: selecting and modifying elements, Using Fetch API and Ajax for asynchronous data fetch
7-8	MobileFirst Responsive Design	Build layouts that adapt to all screen sizes with a mobilefirst strategy.
9-10	DevTools & Debugging	Learn to use Chrome DevTools for inspecting, debugging, and analyzing frontend code.
11-12	Build Tools (Webpack / Vite)	Understand how bundlers like Vite/Webpack manage frontend assets and enable hot reloading.
13-14	Version Control Systems	GitHub-GitHub workflows for collaborative projects, Git: commits, branches, merge, and history
15-16	Package Managers	npm usage for managing project dependencies
17-18	React Basics & Lifecycle	React Lifecycle (Class vs Functional Components) Setting up with CLI tools
19-20		Creating functional and classbased components
21-22	React Rendering & Hooks	Rendering logic
23-24		JSX structure
25-26		Using builtin hooks like useState and useEffect
27-28	React Routing & State	Clientside routing using React Router
29-30		State management with props, context, and reducers
31-32	React Styling & API Integration	Styling using CSSinJS or Tailwind
33-34		Making API calls and rendering dynamic data
35-36	Testing & Remix Framework	Unit and component testing with tools like Jest/RTL
37-38		Using Remix for serverside rendering in React

39-40	Advanced Forms & Tailwind CSS	Building advanced forms using React & Remix
41-42		Styling with utilityfirst Tailwind CSS framework
43-44	Authentication Strategies	JWT, OAuth, SSO, Basic Auth
45-46		Session Auth explained with flows and examples
Project Based Evaluation – 1 (Lecture number 1-46)		
47-48	Web Security & Components	Secure frontend practices (XSS, CSRF)
49-50		Using Web Components for modular UI development
51-52	Type Checking & ServerSide Rendering	Using TypeScript or PropTypes in React
53-54		Serverside rendering (SSR) with frameworks
55-56	Authentication Strategies	JWT, OAuth, SSO, Basic Auth, Session Auth
57-58	Web Security Basics	Security related to Web Components, type Checkers, and SSR
59-60	GraphQL – Basics	Writing basic queries and fetching data with GraphQL
61-62	GraphQL – Advanced	Performing mutations, subscriptions, and schema design
63-64	GraphQL – Execution & Deployment	Validating queries,
65-66		executing on server
67-68		deploying GraphQL APIs
69-70	Pagination & Frontend Strategies	Implementing frontend pagination
71-72		Best practices in largescale frontend architecture
73-74	PWAs and Performance	Building Progressive Web Apps (PWAs)
75-76		Tools to measure and optimize frontend performance
Project Based Evaluation – 2 (Lecture number 1-76)		
77-78	Browser APIs	Using native APIs like Geolocation, Notifications, Storage, etc.
79-80	Static Site Generators	Introduction to Astro and generating static sites for speed and SEO
81-90	Project work	Apply all skills in a full project with deployment
Final Project Based Evaluation (Lecture number 1-90)		

7. Delivery/Instructional Resources Theory Plan:

Lect. No.	Topics	CLO	Book No, CH No, Page No	TLM	ALM	Web References	Audio-Video
1–6	Basics of IT, HTML, CSS, JS recap	CLO01, CLO02, CLO04	B01 Ch 1–3, 8; B03 Ch 1–3; B04 Ch 4–5, 17; B05 Ch 11, 19	Lecture, Hands-on, Discussion	Think-Pair-Share, Quiz, One Minute Paper	https://developer.mozilla.org/en-US/docs/Web https://developer.mozilla.org/en-US/docs/Web/HTML https://developer.mozilla.org/en-US/docs/Web/JavaScript/Guide	https://onlinecourses.swayam2.ac.in/nou20_cs05/preview https://nptel.ac.in/courses/106105084 https://www.youtube.com/watch?v=qoSksQ4s_hg

7–12	Responsive Design, DevTools, Build Tools	CLO03, CLO04, CLO06	B05 Ch 16, 18	Lecture, Demo	Group Quiz, Think-Pair-Share	https://developer.mozilla.org/en-US/docs/Web/CSS/CSS_Flexible_Box_Layout https://developer.chrome.com/docs/devtools/ https://vitejs.dev/	https://www.youtube.com/watch?v=fYq5PXgSsbE https://www.youtube.com/watch?v=IZGNcSuwBZs
13–18	Version Control, npm, React Basics	CLO06	B05: Ch 19 –(p. 459–483)	Hands-on, Discussion	Peer Activity, Quiz	https://docs.github.com/en https://docs.npmjs.com/ https://reactjs.org/docs/getting-started.html	https://www.youtube.com/watch?v=RGOj5yH7evk https://onlinecourses.swayam2.ac.in/aic20_sp11/unit?unit=4&lesson=7
19–26	React Rendering, Hooks, Routing, State	CLO06	B05: Ch 19 (p. 459–483)B05: Ch 20 – (p. 485–502)B05: Ch 21 – (p. 503–528	Lecture + Practice	Focused Listing, Brainstorm	https://reactjs.org/docs/hooks-intro.html https://reactrouter.com/en/main	https://www.youtube.com/watch?v=O6P86uwfdR0
27–34	Styling & API Integration, Testing, Remix	CLO06	B05: Ch 22 – B05: Ch 23 –	Live Demo, Project Work	Peer Review, Quiz	https://tailwindcss.com/ https://remix.run/docs https://jestjs.io/docs/getting-started	https://www.youtube.com/watch?v=VViJkBT0YMg
35–42	Forms, Tailwind Advanced, Auth Strategies	CLO06	B04: Ch 16 – (p. 443–470) B05: Ch 24 B05: Ch 25 – B04: Ch 17 – (p. 471–489) B05: Ch 25 –	Lecture + Hands-on	Role Play, Design Challenge	https://reactjs.org/docs/forms.html https://tailwindui.com/ https://jwt.io/introduction	https://www.youtube.com/watch?v=7Q17ubqLfaM
43–52	Web Security, Web Components, Type Checking, SSR	CLO06	B01: Ch 10 –(p. 160–190) B04: Ch 12 – (p. 313–365)	Lecture + Hands-on	Case-Based Learning	https://owasp.org/www-project-top-ten/ https://developer.mozilla.org/en-US/docs/Web/Web_Components	https://www.youtube.com/watch?v=bc1zfQfW4S8
53–60	GraphQL – Basics to Deployment	CLO06	B05: Ch 26 B05: Ch 27 B05: Ch 28	Lecture + Demo	Problem Solving	https://graphql.org/learn/ https://www.apollographql.com/docs/	https://www.youtube.com/watch?v=ed8SzALpx1Q
61–68	Advanced GraphQL & Final Evaluation II	CLO06	B05: Ch 29	Project-Based	Presentation	Same as above	Same as above
69–76	Pagination, Frontend Architecture, PWAs, Performance	CLO06	B05: Ch 29	Discussion, Hands-on	Quiz, Think-Pair-Share	https://web.dev/progressive-web-apps/ https://web.dev/measure/	https://www.youtube.com/watch?v=cmGr0RszHc8
77–80	Browser APIs & Static Site Generators (Astro)	CLO06	B05: Ch 29	Lecture + Demo	Quiz	https://docs.astro.build/ https://developer.mozilla.org/en-US/docs/Web/API	https://www.youtube.com/watch?v=9gU5hEF0hmk
81–90	Project Work & Final Evaluation	CLO06	-	Hands-on Project	Peer Evaluation	Project Tools (GitHub, Vercel,	https://www.youtube.com/watch?v=nhBVL41-_Cw

						Netlify)	

Lab Plan:

Lect. No.	Topics	CLO	TLM	ALM	Web References	Audio-Video
1–6	Basics of IT, HTML, CSS, JS recap	CLO01, CLO02, CLO04	Lecture, Hands-on, Discussion	Think-Pair-Share, Quiz, One Minute Paper	https://developer.mozilla.org/en-US/docs/Web https://developer.mozilla.org/en-US/docs/Web/HTML https://developer.mozilla.org/en-US/docs/Web/JavaScript/Guide	https://onlinecourses.swayam2.ac.in/nou20_cs05/preview https://nptel.ac.in/courses/106105084 https://www.youtube.com/watch?v=qoSksQ4s_hg
7–12	Responsive Design, DevTools, Build Tools	CLO03, CLO04, CLO06	Lecture, Demo	Group Quiz, Think-Pair-Share	https://developer.mozilla.org/en-US/docs/Web/CSS/CSS_Flexible_Box_Layout https://developer.chrome.com/docs/devtools/ https://vitejs.dev/	https://www.youtube.com/watch?v=fYq5PXgSsbE https://www.youtube.com/watch?v=IZGNcSuwBZs
13–18	Version Control, npm, React Basics	CLO06	Hands-on, Discussion	Peer Activity, Quiz	https://docs.github.com/en https://docs.npmjs.com/ https://reactjs.org/docs/getting-started.html	https://www.youtube.com/watch?v=RGOj5yH7evk https://onlinecourses.swayam2.ac.in/aic20_sp11/unit?unit=4&lesson=7
19–26	React Rendering, Hooks, Routing, State	CLO06	Lecture + Practice	Focused Listing, Brainstorm	https://reactjs.org/docs/hooks-intro.html https://reactrouter.com/en/main	https://www.youtube.com/watch?v=O6P86uwfdR0
27–34	Styling & API Integration, Testing, Remix	CLO06	Live Demo, Project Work	Peer Review, Quiz	https://tailwindcss.com/ https://remix.run/docs https://jestjs.io/docs/getting-started	https://www.youtube.com/watch?v=VViJkBT0YMg
35–42	Forms, Tailwind Advanced, Auth Strategies	CLO06	Lecture + Hands-on	Role Play, Design Challenge	https://reactjs.org/docs/forms.html https://tailwindui.com/ https://jwt.io/introduction	https://www.youtube.com/watch?v=7Q17ubqLfaM
43–52	Web Security, Web Components, Type Checking, SSR	CLO06	Lecture + Hands-on	Case-Based Learning	https://owasp.org/www-project-top-ten/ https://developer.mozilla.org/en-US/docs/Web/Web_Components	https://www.youtube.com/watch?v=bc1zfQfW4S8
53–60	GraphQL – Basics to Deployment	CLO06	Lecture + Demo	Problem Solving	https://graphql.org/learn/ https://www.apollographql.co	https://www.youtube.com/watch?v=ed8SzALpx1Q

					m/docs/	
61–68	Advanced GraphQL & Final Evaluation II	CLO06	Project-Based	Presentation	Same as above	Same as above
69–76	Pagination, Frontend Architecture, PWAs, Performance	CLO06	Discussion, Hands-on	Quiz, Think-Pair-Share	https://web.dev/progressive-web-apps/ https://web.dev/measure/	https://www.youtube.com/watch?v=cmGr0RszHc8
77–80	Browser APIs & Static Site Generators (Astro)	CLO06	Lecture + Demo	Quiz	https://docs.astro.build/ https://developer.mozilla.org/en-US/docs/Web/API	https://www.youtube.com/watch?v=9gU5hEF0hmk
81–90	Project Work & Final Evaluation	CLO06	Hands-on Project	Peer Evaluation	Project Tools (GitHub, Vercel, Netlify)	https://www.youtube.com/watch?v=nhBVL41-_Cw

8. Remedial Classes[1]

After every Continuous Evaluation, different types of learners will be identified and special discussions will be planned and scheduled accordingly.

Action Plan for different types of learners:

Learner Type-I	Learner Type- II	Learner Type- III
Remedial Classes, Doubt Sessions, Guided Tutorials	Workshop, Doubt Session	Coding Competitions, Project

9. Self-Learning[2]

Assignments to promote self-learning, survey of contents from multiple sources.

S.No	Topics	CLO	ALM	References/MOOCS
1	HTML structure, tags, forms, semantic elements, and accessibility. Students learn about the Document Object Model (DOM) and inclusive design using keyboard navigation.	CLO01- CLO05	Leading Question, Test Questions	Coursera- HTML, CSS, and Javascript for Web Developers https://www.coursera.org/learn/html-css-javascript-for-web-developers https://reactjs.org/docs/getting-started.html](https://reactjs.org/docs/getting-started.html
2	Basic styling, Flexbox, responsive design, Tailwind CSS, and animations. Focuses on visual aesthetics, accessibility, and performance-optimized layouts.	CLO02- CLO06	Leading Question, Test Questions, Brain Storming	Coursera- Responsive Website Development and Design Specialization https://www.coursera.org/specializations/website-development https://frontendmasters.com/courses/api-design/
3	Fundamentals, DOM manipulation, React basics, hooks, and routing. Advanced topics include APIs, authentication, GraphQL, PWAs, SSR, and security practices.	CLO01, CLO02	Leading Question, Test Questions, Brain Storming	https://dequeuniversity.com/curriculum/web-accessibility

10. Delivery Details of Content Beyond Syllabus[3]

Content beyond syllabus covered (if any) should be delivered to all students that would be planned, and schedule notified accordingly.

[1] Refer to Annexure
[2] Refer to Annexure
[3] Refer to Annexure

S.No	Advanced Topics, Additional Reading, Research papers	CLO	POs	ALM	References/MOOCS
1	Introduction to React – Understanding the basics of React, its virtual DOM concept, JSX, and component model	CLO06	PO7, PO10, PO11	Think Pair Share, Brain Storming	https://legacy.reactjs.org/tutorial/tutorial.html https://www.coursera.org/learn/front-end-react](https://www.coursera.org/learn/front-end-react
2	Performance Optimization in React – Lazy loading, memoization, code splitting, and rendering optimization	CLO06	PO7, PO9, PO11	Case Study, Peer Teaching	https://reactjs.org/docs/optimizing-performance.html https://www.coursera.org/learn/advanced-react
3	GraphQL vs REST APIs – Comparative understanding, use cases, real-world implementation challenges	CLO06	PO5, PO10	Panel Discussion, Research Review	https://www.howtographql.com/](https://www.howtographql.com/ https://www.udemy.com/course/graphql-with-react-course/
4	Web Accessibility semantic HTML, keyboard navigation for inclusive design	CLO01, CLO02	PO3, PO4, PO11	Interactive Demo, Role Play	https://webaim.org/intro/](https://webaim.org/intro/ https://www.coursera.org/learn/web-accessibility](https://www.coursera.org/learn/web-accessibility

11. Evaluation Scheme & Components:

Assessment Type	Evaluation Component	Type of Component[4]	No. of Assessments	% Weightage of Component	Max. Marks	Mode of Assessment	CLO
Formative	Component 1	Project-based Evaluation 1	01*	30%	30	Viva Voce, PPT Presentation, File work	CLO01- CLO02
Formative		Project-based Evaluation 2	01*	30%	30	Viva Voce, PPT Presentation, File work	CLO01- CLO04
Summative	Component 2	Final Project-based Evaluation	01**	40%	40	**Project**, Viva Voce, PPT Presentation, File work	CLO01- CLO06
	Total		**100%**				

* Students will have to appear in all the Project-based evaluations.
* Makeup Examination will compensate for either Project-based Evaluation 1 or Project-based Evaluation 2 (Only for genuine cases, based on the Dean's approval).
** As per Academic Guidelines, a minimum 75% attendance is required to become eligible for appearing in the Final Project-based Evaluation.
** No makeup exam will be taken for Final Project-based Evaluation

Syllabus of the Course:

Subject : Front End Engineering -II			
S.No.	**Topic (s)**	**No. of Lectures**	**Weightage %**
1	Basic foundation to HTML, CSS, JS, Tools, Git	16	18%
2	Core React with basics of Components, Hooks, Routing, Styling	24	27%
3	Advanced React & Security using Remix, Testing, Auth, SSR	21	23%
4	Modern Architectures & Deployment using GraphQL, PWAs, Astro and Final Project	29	32%

12. Academic Integrity Policy:

Education at Chitkara University builds on the principle that excellence requires freedom where Honesty and integrity are its prerequisites. Academic honesty in the advancement of knowledge requires that all students and Faculty respect the integrity of one another's work and recognize the importance of acknowledging and safeguarding intellectual property. Any breach of the same will be tantamount to severe academic penalties.

This Document is approved by:

Designation	**Name**	**Signature**
Course Coordinator	Dr. Kiran Deep Singh	
Head-Academic Delivery	Dr. Mrinal Paliwal	
Dean	Dr. Rishu Chhabra	
Date(DD/MM/YYYY)	26/06/2025	

Annexure

1. **Pre- requisite**
   Mention The Pre-requisite skill set or course/s if it is expected to be studies before this course, otherwise write "not applicable".

2. **NHEQF levels**

The NHEQF levels represent a series of sequential stages expressed in terms of a range of learning outcomes against which typical qualifications are positioned/located. NHEQF level 4.5 represents learning outcomes appropriate to the first year (first two semesters) of the undergraduate programme of study, while Level 8 represents learning outcomes appropriate to the doctoral-level programme of study.
Table 1: Higher education qualifications at different levels on the NHEQF

NHEQF level	**Examples of higher education qualifications located within each level**
Level 4.5	Undergraduate Certificate. Programme duration: First year (first two semesters) of theundergraduate programme, followed by an exit 4-credit skills-enhancement course(s).
Level 5	Undergraduate Diploma. Programme duration: First two years (first four semesters) of the undergraduate programme, followed by an exit 4-credit skills-enhancement course(s) lasting two months.
Level 5.5	Bachelor's Degree. Programme duration: First three years (Six semesters) of the four-yearundergraduate programme.
Level 6	Bachelor's Degree (Honours/ Honours with Research). Programme duration: Four years(eight semesters).
Level 6	Post-Graduate Diploma. Programme duration: One year (two semesters) for those whoexit after successful completion of the first year (two semesters) of the 2-year master's programme.
Level 6.5	Master's degree. (e.g. M.A., M.Com., M.Sc., etc.) Programme duration: Two years (four semesters) after obtaining a 3- year Bachelor's degree (e.g. B.A., B.Sc., B.Com.etc.).
Level 6.5	Master's degree. (e.g. M.A., M.Com., M.Sc., etc.) Programme duration: One year (two semesters) after obtaining a 4 -year Bachelor's degree (Honours/ Honours with Research) (e.g. B.A., B.Sc., B.Com. etc.).

Level 7	Master's degree.(e.g. M.E./M.Tech. etc.) Programme duration: Two years (four semesters) after obtaining a 4-year Bachelor's degree. (e.g. B.E./B.Tech. etc.)
Level 8	Doctoral Degree

3. NHEQF level descriptors

Each NHEQF level is structured based on the defined learning outcomes which lead to the expected graduate attributes/profile. The level descriptors reflect the expected outcomes of learning that should be achieved and demonstrated by graduates of a specific programme of study leading to a qualification at a specific NHEQF level.

Click Learning outcomes descriptors for qualification for all levels on the NHEQF

4. Course Outcomes

The number of Course Outcomes is recommended to be 4-5 for courses that do not contain practical component and 6 for those courses with a practical component. Flexibility can be sought by the post-graduate courses in this regard.

5. Theory/lab Plan

The following are the guidelines to be followed while creating plans

- Each session may be planned for a duration of 45/50mins (irrespective of the double hour or single hour scheduled in timetable).
- Every session must incorporate at least one active learning method which may or may not be part of the assessments.
- Put BoS Approved Syllabus in the topics. Deviations (if any) from BoS approved syllabus must be brought to the notice of BoS chairman & Dean Academics, After approval, revised handout should be submitted.
- The Topics elaborated in the Theory/Lab plan must match those in the course execution plan.

6. Teaching Learning Methods

The following are some of the Teaching & Learning methods that can be incorporated in session wise teaching learning plan.

- **Teacher-centered Learning Methods:**
  i. Lecture
  ii. Discussion
  iii. Demonstration method using a simulation or a tool
  iv. Reviewing
  v. Questioning

- **Learner-centered teaching & Learning methods:**
  i. **Active learning**, in which students solve problems, answer questions, formulate questions of their own, discuss, explain, debate, or brainstorm during class;
  ii. **Cooperative learning**, in which students work in teams on problems and projects under conditions that assure both positive interdependence and individual accountability; and
  iii. **Inductive teaching and learning**, in which students are first presented with challenges (questions or problems) and learn the course material in the context of addressing the challenges.
  iv. **Inductive methods** include inquiry-based learning, case based instruction, problem-based learning, project-based learning, discovery learning, and just-in-time teaching. It is important to integrate authentic, reflective and collaborative learning experiences when designing for student-centered learning.

7. **Active Learning Methods**

The following are some of the Active Learning Methods that can be incorporated in session wise teaching learning plan.

- One Minute Paper
- Group Discussion
- Student-Created PPT, Charts, Matrices, Flowcharts, Models
- The Fish Bowl
- Debate
- Video Synthesis
- Quiz/Test Questions
- Brain Storming Sessions
- Case Study
- Shadowing
- Leading Question
- Puzzle, Enigma, Contradiction
- Statement-Opinion-Summary
- Think / Pair / Share
- Peer Review
- Just in Time Teaching
- Statement-Opinion-Summary
- Peer Survey
- Focused Listing
- Role-Playing
- Student Field Work with Reflection
- Infusing Humor into Class Sessions
- Inviting Effective Guest Speakers

8. Remedial Classes

After every Sessional Test, identify weak learners, provide supplement course handout. Student list and Impact Observed report should be submitted to Dean through proper channel.

9. Self Learning

Plan 10% of topics in self-learning mode with discussions, ALM's and Assessment happing in the class.

10. Content Beyond Syllabus

Plan Advanced Topics, Experiments, Additional Reading, Research papers in self-learning mode with ALM's and Assessment happing in the regular class or lab. Usually caters advanced learners. Identify Advanced learners. For Extra classes, schedule should be notified accordingly.

11. Assessment Type

1. Assessment broadly can be classified into the following types:

a. **Diagnostic assessments**: Diagnostic assessments are intended to help teachers identify what students know and can do in different domains to support their students' learning. These help teachers determine strengths of students in various areas to better address their specific needs.
b. **Formative assessments**: Formative assessment refers to a wide variety of methods that teachers use to conduct in-process evaluations of student comprehension, learning needs, and academic progress during a lesson, unit, or a course. Formative assessments help teachers identify concepts that students are struggling to understand, skills they are having difficulty acquiring, or learning standards they have not yet achieved so that adjustments can be made to lessons, instructional techniques, and academic support.
c. **Summative assessments**: Summative assessment is an assessment administered at the end of an instructional unit in a course. These assessments are intended to evaluate student learning by comparing performance to a standard or benchmark.
d. **Ipsative assessments**: Ipsative assessment involves comparisons between past and current work to identify a learner's growth over time, rather than progress toward an external set of criteria. Therefore, Ipsative assessment is an internal or self-referenced assessment.
e. **Norm-referenced assessments**: Norm-referenced tests report whether test takers performed better or worse than a hypothetical average student, which is determined by comparing scores against the performance results of a statistically selected group of test takers, typically of the same age or grade level, who have already taken the exam.
f. **Criterion-referenced assessments**: Criterion-Reference tests measure the performance of test takers against the criteria covered in the curriculum.
g. **Peer-to-Peer randomised Assessments**: Peers will be able to provide assessment in this case
h. **Industry Validation of Effectiveness**: In the Vocation Education, Industry validation of effectiveness of training is particularly important.
i. **Self-assessments**: To evaluate how much the learner has grasped by self-learning.

2. Other Assessment Methods: Conducting an assessment takes time, thought, attention, planning, and often collaboration. Each assessment tool, whether a short survey or detailed rubric, will be useful only insofar as it both addresses the outcomes well and is feasible to use.

a**. Rubrics**: For assessing qualitative student work such as essays, projects, reports, or presentations. Rubrics serve well to clearly denote the specific expectations for an assignment, for collecting data for assessment of student learning outcomes. and for student performance. Rubrics can be used for grading, for providing feedback to students, and for informing and encouraging students to think about their own learning.
b. **Portfolios and E-Portfolio**: Portfolios can provide a window into the process of student learning across a semester-long project that can be assessed (usually by using a rubric).
c. **Curriculum Mapping**: A good curriculum map can serve to focus assessment, and the improvements that follow, where it will be most useful, informative, or effective.
d. **Structured Interviews**: While time-consuming, structured interviews are useful when specific questions need to be asked. It also leaves room for unplanned topics or ideas to emerge.
e. **Student Experience Surveys**: Student experience in research universities (SERU), including administration of on-line census SERU Undergraduate and Graduate Surveys, can yield important information about student perceptions and experiences.

12. Evaluation Component & Types

As per LMs we need to figure it out whether it is component 1, 2 or 3. In Types of Evaluation Component, we need to specify what type of evaluation we are performing like Continuous Evaluation or Sessional Test or End Term Examination.

13. No. of Assessments and Weightage of Components

Department will give guideline for number of assessments, mandatory or optional and weightage.