DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

Innovative Teaching and Learning

The field of Computer Science and Engineering (CSE) is rapidly evolving, requiring modern, technology-driven, and student-centered education. Innovative Teaching and Learning (ITL) integrates methods like flipped classrooms, blended learning, project based learning and peer mentoring to enhance engagement and problem-solving skills. By fostering critical thinking, collaboration, and adaptability, ITL prepares CSE students for real-world challenges in software development and other emerging technologies. This approach transforms learning into an interactive, practical, and industry-relevant experience.

The innovative teaching learning methods followed by the faculty members are listed below

- **Blended Learning:** It refers to a learning approach that combines traditional face-to-face classroom teaching with online learning. In this model, students gain theoretical knowledge and domain-specific skills through online certification courses, complemented by in-class discussions, hands-on sessions, and faculty guidance. This hybrid format ensures flexibility, deeper understanding, and practical application of concepts, bridging the gap between academic learning and industry needs.

- **Flipped Class:** The faculty provide the materials to the students prior to the class. The students practice working before it is discussed in class. The teacher plays the role of the facilitator and helps the students to understand any complex concepts through small group discussions.
- **Project Based Learning:** Students are encouraged to undertake mini projects during their studies, allowing them to actively explore real-world problems and gain deeper insights. Faculty members provide guidance at various stages, offering timely inputs to support project development.
- **Lab taken to class:** Faculty members are encouraged to use Interactive Display Panel(IDP) to demonstrate practical concepts, installations, and implementations directly in the classroom, ensuring effective learning.
- **Peer Learning:** Students are encouraged to discuss on the given problems among themself and guide each other to derive the solutions that leads to better understanding and problem-solving abilities.
- **Peer Mentoring:** A student who is already familiar with the concepts will act as a mentor, supporting other students in analyzing and understanding concepts. Peer mentoring fosters mutual learning, skill development, and personal growth by creating a collaborative environment for knowledge sharing.
- **Collaborative Learning:** Students work as a team to explore problem-solving methodologies and deepen their understanding through active discussions. Cross-departmental collaboration is encouraged, enabling students to integrate diverse perspectives, collectively solve problems, and develop prototypes effectively.
- **Experiential Learning:** Students engage in experiential learning by solving real-world industry problems from Samsung PRISM, Wisework, Hyperverge and Roche under faculty guidance.

This hands-on approach enhances critical thinking, problem-solving, and industry readiness through practical application and reflection.

- **Lecture:** Faculty members explain concepts, principles, problem-solving approaches, and applications of the subject, fostering student interest and sparking creativity in applying the knowledge to real-world scenarios.
- **Group Discussion:** Faculty members organize and facilitate group discussions, encouraging students to express their views on various topics. This approach enhances communication, technical presentation skills, and critical thinking, fostering a collaborative learning environment.

The table below showcases sample implementations of pedagogical initiatives conducted in the respective courses.

S.NO	Methodology	Course aligned	Remarks
1	Blended Learning	• U18CSP7703 - Project Phase I • VAC-Emerging Domains, Disruptive Technologies	For Phase I projects, certificate courses are curated using Coursera's course builder to equip students with the relevant domain and technology knowledge required to address their problem statements. These courses provide expose to first year students to emerging technologies and future ready domains that integrates industry insights, cohort based learning and augmented learning through coursera courses. It provides insights into the application of technology in emerging domains. The sessions were conducted with 60% led by industry experts and 40% by internal faculty. It encourages students to participate in hackathons, and work on projects. The assessment is carried out through a private authoring course on Coursera.
2	Project Based Learning	• U18CSE0314 - 3D Modelling and Game Design • U18ITE0323 - Cloud Application Development	Teams of students are encouraged to analyze and implement their ideas to a given problem, promoting a deeper understanding of concepts through hands-on experience.
3	Peer Mentoring	• U18INI3600-Engineering Clinic III (Design Sprints)	This event aimed to empower second year students by equipping them with practical skills in design thinking, problem-solving, and innovative solution development, focusing on software and hardware themes aligned

			with the UN's Sustainable Development Goals (SDGs). Students who participated in the International Immersion Program at Taylor's University shared their experiences and served as peer mentors.
4	Collaborative Learning	• U18CSP7703 - Project Phase I • U18CSP8701 – Project Phase II	Students work in teams and are guided to explore problem-solving methodologies, enhancing their understanding through discussions. Collaborative teams comprising students from different departments are encouraged to solve problems and develop prototypes/products together.
5	Experiential Learning	• Samsung PRISM, Wisework, Roche	Students are encouraged to collaborate in groups to address industry-related problems, with guidance from both industry professionals and faculty mentors.
6	Flipped Classroom	U18CSE0016- Advanced Metaverse Technologies	Learning materials were shared via a blog covering both foundational and advanced concepts. Students read the blog materials before class, gaining a basic understanding of the topic. During class, the instructor facilitated deeper engagement through discussions, addressing questions, and hosting group activities.
7	Lab Taken to class	U18CSI6201- Internet and Web Programming	Demonstration on lab exercises shown to students using interactive Display Panel (IDP). For this the required software like JDK, Netbeans, etc., installed. This helps students to understand the programming concepts effectively in the classroom.
8	Peer Learning	U18CSI5203 – NOSQL Databases	Peer learning on NoSQL databases involved students collaboratively exploring MongoDB Compass and MongoDB Atlas. Through group discussions and hands-on activities, students shared knowledge and insights, enhancing their understanding of NoSQL concepts and tools by learning from each other’s experiences.