



S.A. ENGINEERING COLLEGE, CHENNAI-77
(An Autonomous- Institute Level Research Centre- Affiliated to Anna University)
DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

INNOVATIVE TEACHING METHODS

Project-Based Learning (PBL)

Flipped Classroom

Gamification

Collaborative Learning

Hackathons and Coding Competitions

Peer-to-Peer Learning

Industry Collaboration and Internships

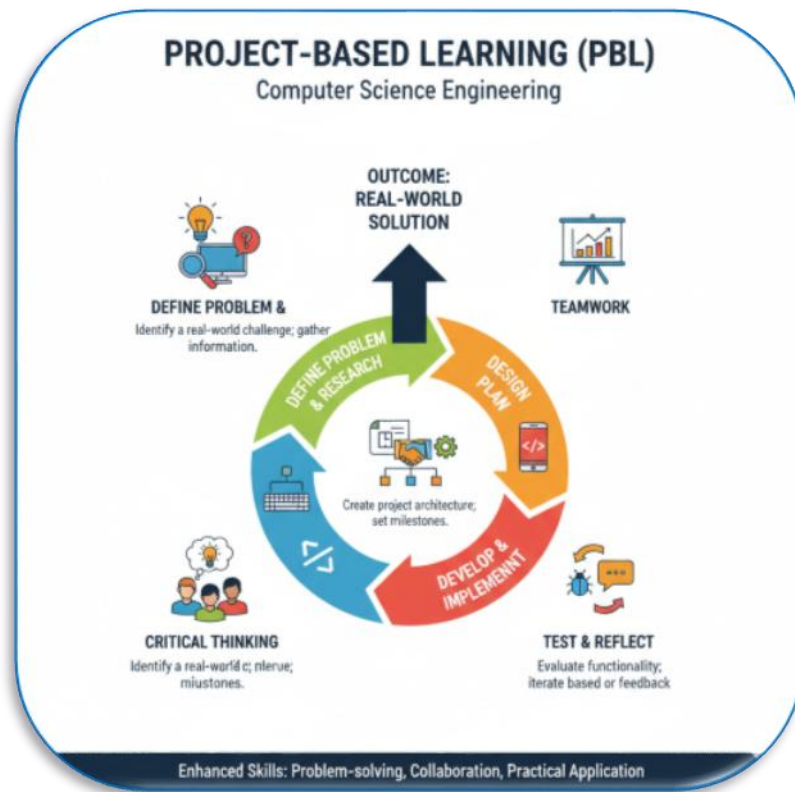
MOOCs and Online Courses

E-learning / Digital Learning methodologies

Pedagogical Innovation-Real World Exposure

Project-Based Learning (PBL)

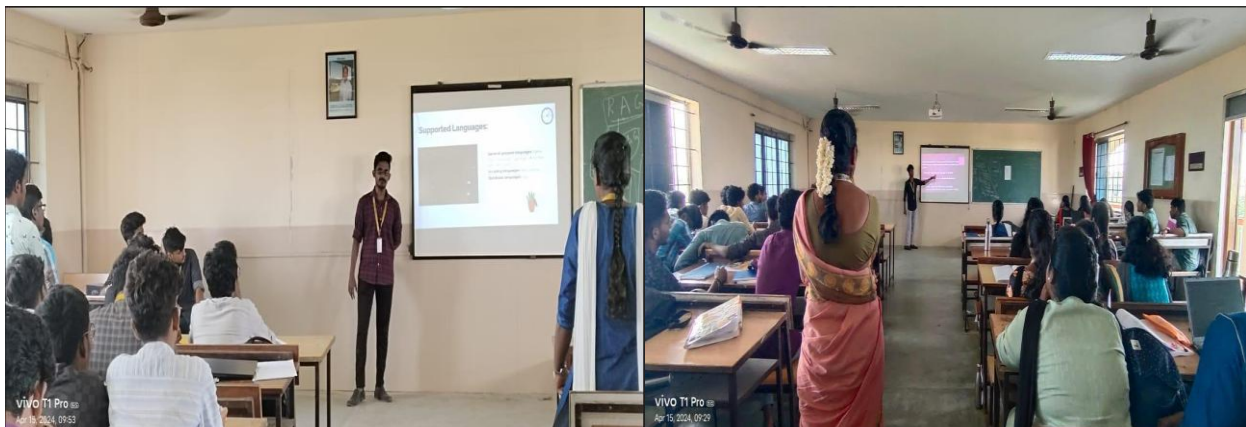
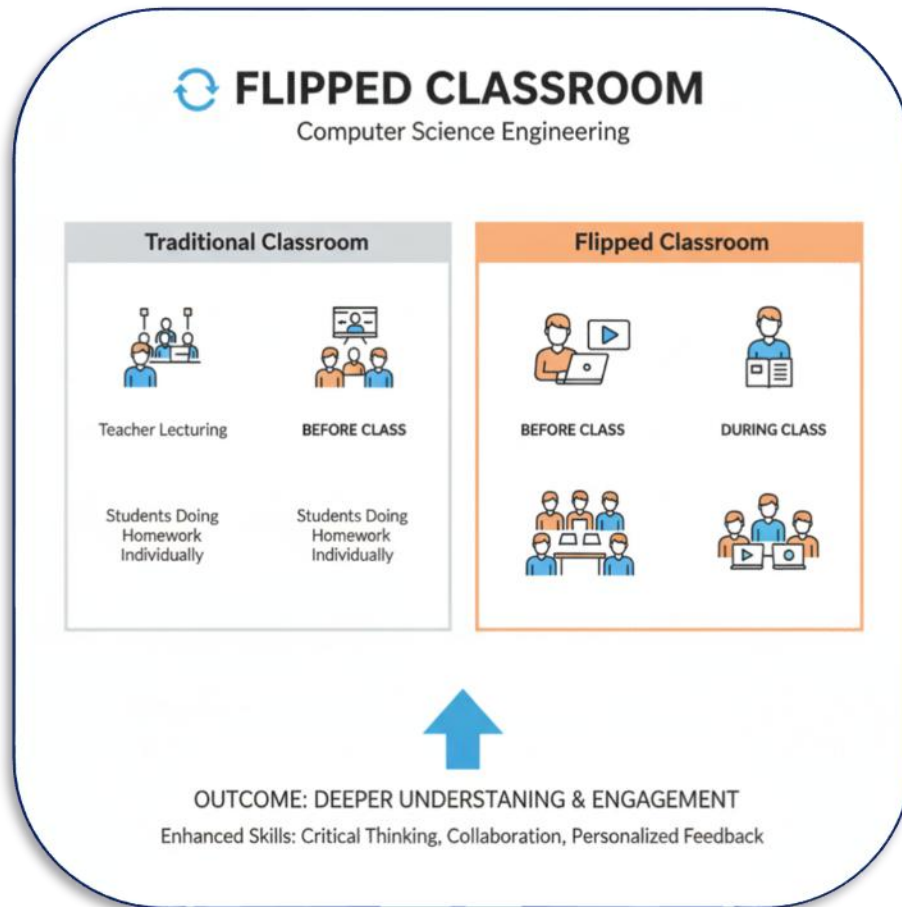
This diagram illustrates the cyclical and iterative nature of PBL, emphasizing student autonomy and real-world application.



Project display by students

Flipped Classroom

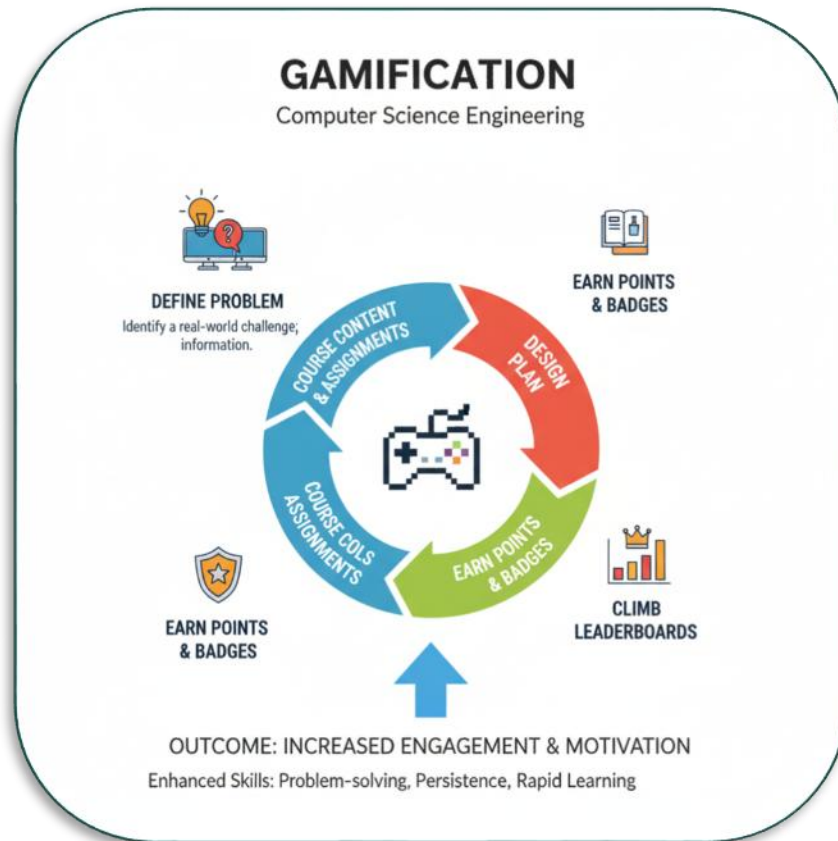
This diagram contrasts the traditional classroom model with the flipped model, highlighting the shift in where different learning activities occur.



Flipped classroom for CS1301A-Data Structure

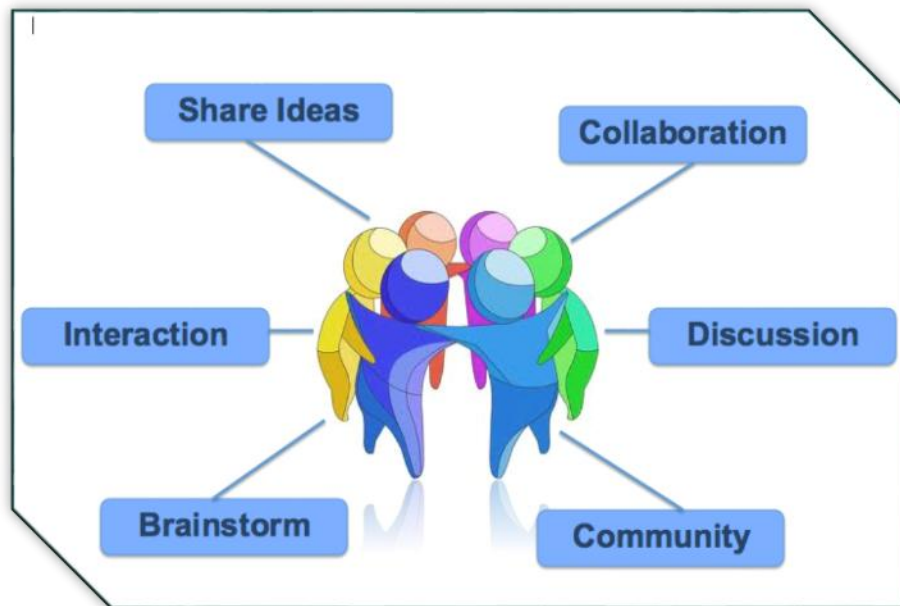
Gamification

This diagram illustrates how game elements are integrated into the learning process to drive engagement and reward progress.



Kahoot Quiz on IT1501A-Computer Networks

Collaborative Learning








Lab based learning for CS1606A-Security laboratory

Hackathons and Coding Competitions



HACKATHONS AND CODING COMPETITIONS

ROLE OF HACKATHONS & CODING COMPETITIONS IN EDUCATION

-  **Practical Learning Beyond Classrooms**
Students apply theoretical knowledge to real-world problems
-  **Innovation & Creativity**
Students brainstorm, design, and build solutions under time pressure
-  **Collaboration & Teamwork**
Builds communication, leadership, and group problem-solving skills
-  **Skill Development**
Sharpens technical skills (programming, UI/UX, AI, data science)
-  **Industry Exposure & Employability**
Often supported by tech companies
→ networking opportunities

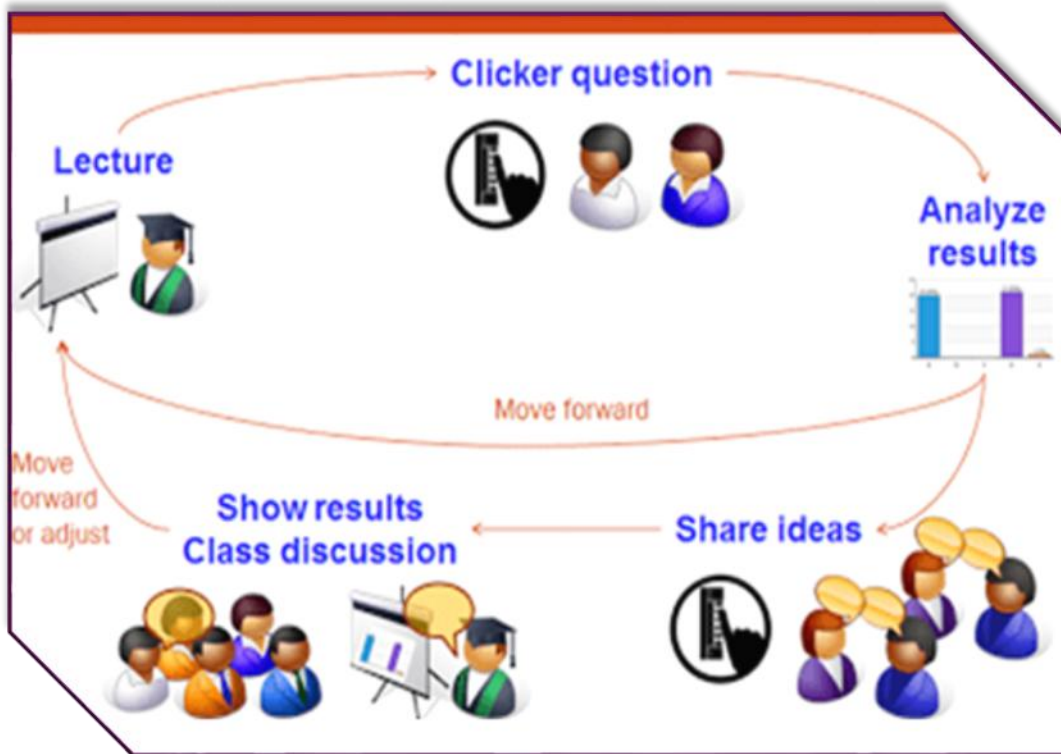
IMPACT ON STUDENT EDUCATION

- ✓ Bridges the gap between academia & industry
- ✓ Improves student engagement & motivation
- ✓ Boosts confidence in problem-solving under pressure
- ✓ Fosters entrepreneurial mindset & startup culture
- ✓ Encourages self-learning and continuous upskilling



Students won in Hackathon

PEER-TO-PEER LEARNING



- Increased collaboration and communication skills.
- Enhanced learning through teaching and group discussions.
- Students gain different perspectives and methods of understanding.
- Builds a supportive learning environment.

INDUSTRY COLLABORATIONS AND INTERNSHIPS



SAEC has collaborated with the industries like wipro, Kendryl etc towards the faculty training. Industrial experts handle sessions to the SAEC faculty for the courses listed below in the table.

Academic year	Duration	Title of training	No of Faculty attended
2022-2023	1 month	Artificial Intelligence	1
2023-2024		.NET Full Stack	3
2024-2025		Programming using Java	2
		Data Science with Python	2

Industrial collaborated training for faculty

S.No	Name of the Faculty	Name of the Internship/ Training Collaboration	Name of the Company & Place	Duration	Outcomes of Internship/ Training Collaboration
1	Ms.R.Shobana	Programming using Java	Infosys Springboard	2.7.24 to 26.7.24	Training Students in Java certification in Infosys Springboard.

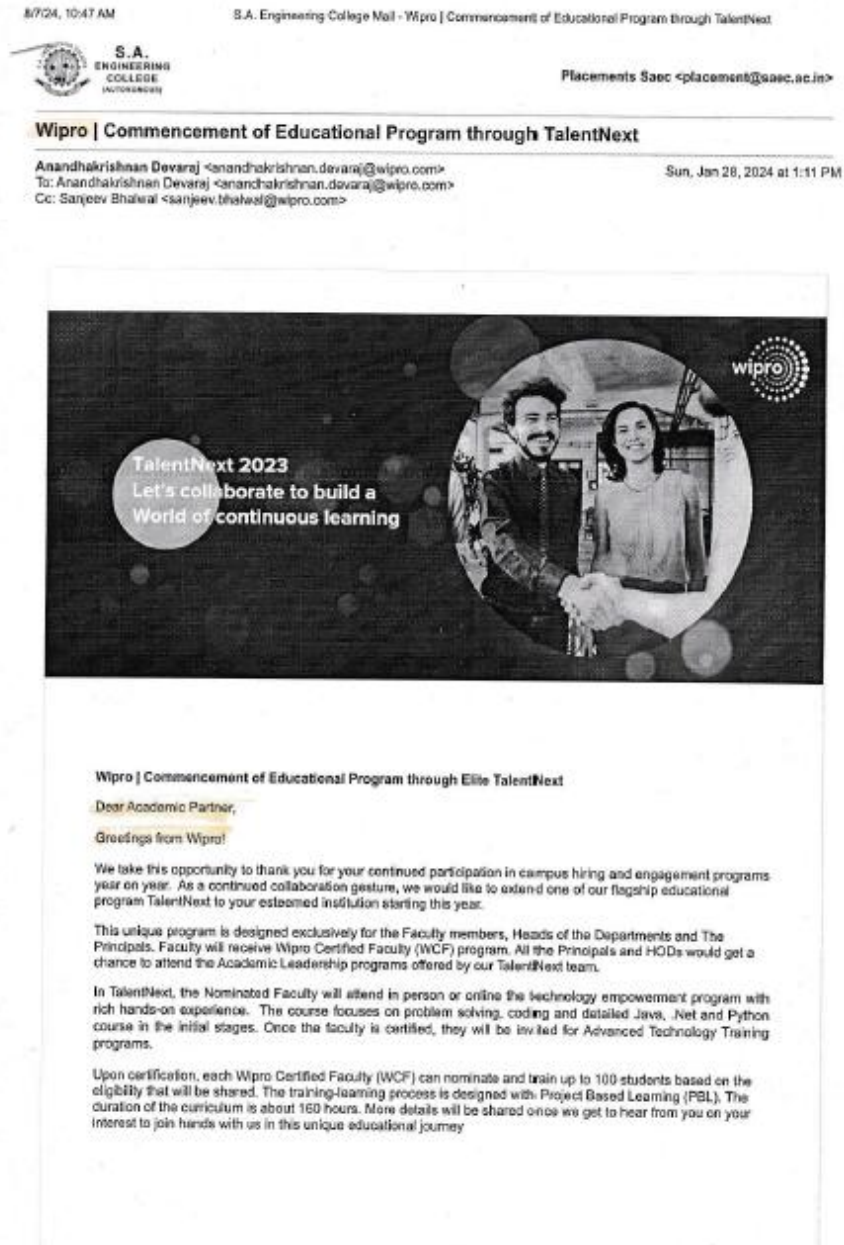
2	Ms.R.Shobana	.NET Full Stack	Wipro Certified Faculty Program (Wipro talentnext)	19.2.2024 to 8.3.24	Training Students in .NET certification in Wipro talentnext.
3	Ms.R.Shobana	Data Science with Python	Wipro Certified Faculty Program (Wipro talentnext)	11.11.24 to 29.11.24	Students will be trained once allocated
4	Ms.S.Gayathri	Programming using Java	Infosys Springboard	2.7.24 to 26.7.24	Training Students in Java certification in Infosys Springboard
5	Ms.S.Gayathri	.NET Full Stack	Wipro Certified Faculty Program (Wipro talentnext)	19.2.24 to 8.3.24	Training Students in .NET certification in Wipro talentnext.
6	Ms.S.Gayathri	Artificial Intelligence	Infosys Springboard	11.11.22 to 17.11.22	Training Students in AI certification in Infosys Springboard
7	Ms.M.Revathi	Data Science with Python	Wipro Certified Faculty Program (Wipro talentnext)	11.11.24 to 29.11.24	Students will be trained once allocated
8	Dr.R.Geetha	Operating System & Information Security	Defsecone	28.01.25 to 04.02.25	<ul style="list-style-type: none"> -Enhanced knowledge of OS security mechanisms and vulnerability assessment. -Hands-on experience with security tools and incident response strategies. -Exposure to industry best practices in cybersecurity. -Improved ability to integrate security concepts into teaching and research.
9	Dr.D.Hemanand	Operating System & Information Security		28.01.25 to 04.02.25	
10	Dr.D.Chitra Devi	Operating System & Information Security		28.01.25 to 04.02.25	
11	Dr.S.Sivakumar	Operating System & Information		28.01.25 to 04.02.25	

		Security			
12	Mr.C.Balakrishna	Operating System & Information Security		28.01.25 to 04.02.25	
13	Mrs.K.B.Aruna	Operating System & Information Security		28.01.25 to 04.02.25	
14	Mrs.M.Kavitha	Operating System & Information Security		28.01.25 to 04.02.25	
15	Mrs.S.Arumai Shiney	UI/UX	VEI Technologies	02.09.24 to 09.09.24	<ul style="list-style-type: none"> -Improved understanding of user experience principles and design methodologies. -Hands-on exposure to industry-standard UI/UX tools such as Figma, Adobe XD, and Sketch. -Capability to implement user-centric design strategies in academic projects. -Strengthened ability to mentor students in UI/UX-related courses.
16	Mrs.L.Dharani	UI/UX		02.09.24 to 09.09.24	
17	Mr.A.Mani	Full Stack Development/ ServeSide/ Back End	Beeja Academy	20.01.25 to 25.01.25	<ul style="list-style-type: none"> -Practical exposure to full-stack development frameworks (e.g., MERN, MEAN). -Improved skills in backend technologies like Node.js, Express.js, and databases.
18	Mrs.V.Saraswathi	Full Stack Development/ ServeSide/ Back End		20.01.25 to 25.01.25	

19	Mr.V.Muthukumaraswamy	Full Stack Development/ ServeSide/Back End		20.01.25 to 25.01.25	-Understanding deployment strategies and cloud integration. -Ability to guide students in real-world application development.
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Faculty Training Provided by Industries

The sample of MoU are shown below.



MOU signed with WIPRO



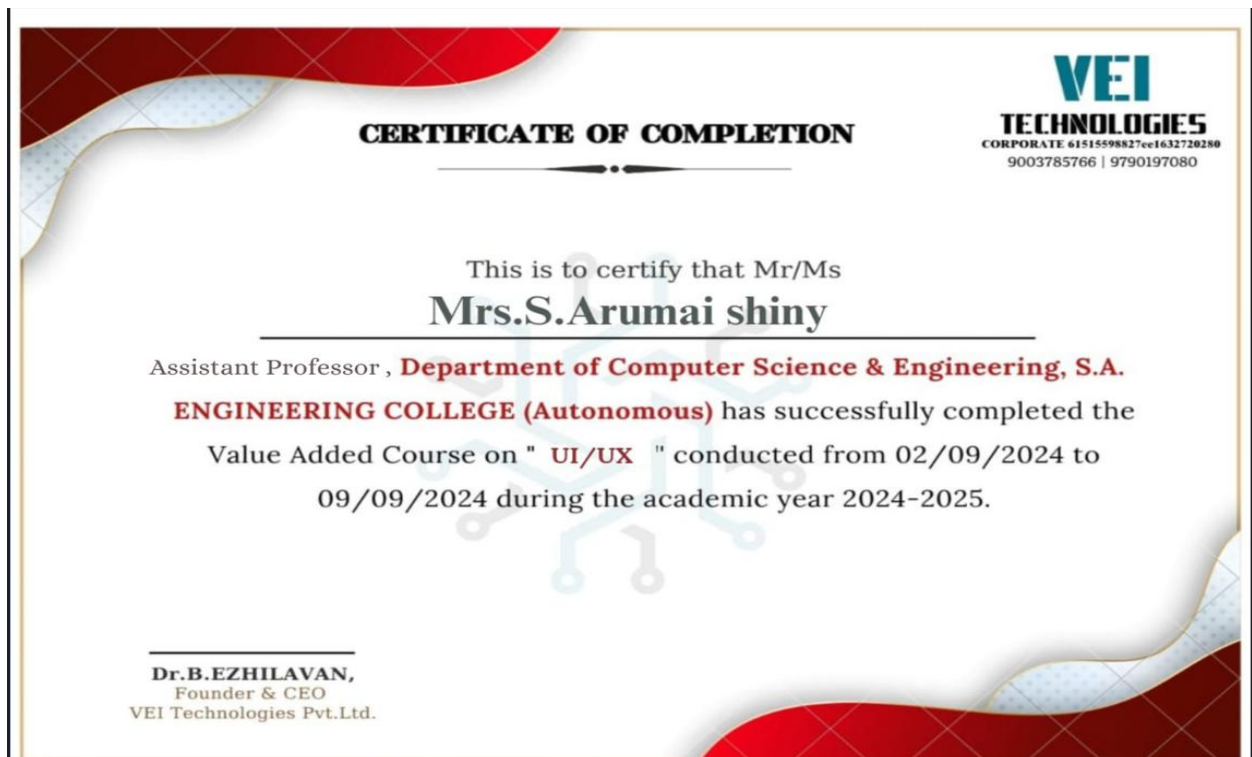
Wipro talent Next certificate to faculty for “Data science with Python”



Wipro talent Next certificate to faculty for “Java Full Stack”



Industrial training by Beeja Academy for faculty in the course “Full stack development (server side/ Back end)”



Industrial training by VEI Technologies for faculty in the course “Full stack development (server side/ Back end)”



Industrial training by Defsecone for faculty in the course “Operating system and information security”

Benefits from student side:



Student done course through CISCO network academy



Student done course through AWS academy(cloud)



Student done course through WIPRO



Student done course through Mathwork

MOOCs and Online Courses



When faculty members receive **MOOC (e.g., Coursera, edX), NPTEL, or industrial certifications**, the link with **innovative teaching** comes in terms of how those certifications are **applied in the classroom**.

Here's how they match:

1. **Knowledge & Skill Upgrade**

→ Innovative Teaching

- MOOC / NPTEL / Industry training ensures the faculty stays updated with the latest domain knowledge, tools, and methods.
- Faculty can bring real-world case studies, industry practices, and cutting-edge tools into their teaching.
- Example: A faculty completing an NPTEL course on *Deep Learning* may integrate live coding demos, AI project-based learning, or flipped classroom activities.

2. **Curriculum Enrichment**

- Certifications help faculty update course content with latest advancements.
- Introducing new electives, value-added courses, and workshops.
- Example: Faculty with a certification in *Data Analytics* can include hands-on data labs using Python/R, making teaching more experiential.

3. **Student Engagement**

- Faculty use innovative teaching techniques like:
 - Flipped Classroom (students watch MOOC videos, class time for problem-solving).

- Simulation tools learned in certification → applied in class.
- Industry-aligned mini-projects inspired from industrial certifications.

MOOC courses by faculty:



Course by faculty regarding curriculum



Certificate no: UC-9d66f8d-06c1-4ba-8993-477a9c30764
Certificate url: ude.my/UC-9d66f8d-06c1-4ba-8993-477a9c30764
Reference Number: 0004

CERTIFICATE OF COMPLETION

React Certification for IT Freshers (with HTML5, CSS3, Js)

Instructors **Amaresh Chinnakotla**

Shobana

Date **May 2, 2022**
Length **20 total hours**

Course by faculty regarding courses



Elite
NPTEL ONLINE CERTIFICATION
(Funded by the MoE, Govt. of India)

This certificate is awarded to
SHOBANA R
for successfully completing the course

Accreditation and Outcome Based Learning

with a consolidated score of **84** %

Online Assignments	21.17/25	Proctored Exam	63/75
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Total number of candidates certified in this course: **1675**

Aug-Oct 2024
(8 week course)

Indian Institute of Technology Kharagpur

Roll No: NPTEL24GE66S1056313191

To verify the certificate 

No. of credits recommended: 2 or 3

Course by faculty regarding Outcome Based Education



Course by faculty regarding Universal Human Values



Course by faculty regarding courses

MOOC courses by students:



Elite
NPTEL Online Certification
(Funded by the MoE, Govt. of India)

This certificate is awarded to
V K SWETHA
for successfully completing the course

The Joy of Computing using Python
with a consolidated score of **90** %

Online Assignments	24.56/25	Proctored Exam	65.25/75
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Total number of candidates certified in this course: **10672**

Devendra Jalihal
Prof. Devendra Jalihal
Chairperson,
Centre for Outreach and Digital Education, IITM

Jan-Apr 2023
(12 week course)

Prof. Andrew Thangaraj
Prof. Andrew Thangaraj
NPTEL, Coordinator
IIT Madras

Indian Institute of Technology Madras

swayam
FREE ONLINE EDUCATION
Unleash your inner genius

Roll No: NPTEL23CS20573340572 To validate the certificate  No. of credits recommended: 3 or 4

Course through nptel



Infosys
Navigate your next

||| COURSE COMPLETION CERTIFICATE |||

The certificate is awarded to
Maalolan G M
for successfully completing the course
Software Engineering
on September 4, 2024

Infosys | Springboard
Congratulations! You make us proud!

Thirumala Archi
Thirumala Archi
Executive Vice President and Global Head
Education, Training & Assessment (ETA)
Infosys Limited

Issued on: Wednesday, September 4, 2024
To verify, scan the QR code at <https://verify.springboard.com>

Course through Infosys springboard

Student Learning Assessment
ALL INDIA COUNCIL FOR TECHNICAL EDUCATION, NEW DELHI

DIXITHA R (SLAS789653)
3rd Year
COMPUTER SCIENCE AND ENGINEERING
S.A. ENGINEERING COLLEGE (1-15813371)

Date : 16-11-2022
Type : Self-Assessment

Overall Rating
★★★★☆

★★★★★ Excellent | ★★★★☆ Very Good | ★★★☆☆ Good

Artificial Intelligence ★★★★★ * Outstanding innovative professional. * You can be a great engineer to go with acting skills.	Cloud Computing ★★★★★ * You can be among the engineers who can do all the tasks effortlessly. * You can be an exceptional and a great engineer.
Theory Of Computation ★★★★★ * Your Core skills are extra ordinary * Your sound, knowledgeable skills and out-of-box thinking can be precious for your circle.	Web Technology ★★★★★ * You can be exceptional in engineering automations. * You are desperate to learn and experience with hand-on-hand at latest technologies.
Artificial Intelligence/ Machine Learning ★★★★★ * You acquire the peak of understanding the utmost complex design and implementation issues at every s * You can be a highly proficient and a worthy engineer.	Cyber Security ★★★★★ * Innovative and good technical skills. * You can be an excellent all-rounder engineer.

General Knowledge Aptitude ★★★★★ * You can be an innovative engineer artist who can improvise and confront new situations. * Blend of technical and practical skills.	Integrity Aptitude ★★★★★ * Acquires a great personality and good work ethics. * You always have great ideas and provide relevant, valuable input-outputs.
Mental Aptitude ★★★★★ * You are a very intelligent and innovative personality. * You have a sense of responsibility.	Physical Aptitude ★★★★★ * You have ability to fulfil all the commitments. * You have ability to identify relevant and appraisable components of effective management.
Social Aptitude ★★★★★ * You have creative thought process. * You are good at analyzing problems.	Spiritual Aptitude ★★★★★ * You put your heart and soul to complete every task given to you with the best engineering practices * You focus on building morals and setting an example on how to become a professional engineer useful

Student Learning Assessment on different subjects through AICTE-Parakh

5. Pedagogical Innovation in Teaching & Learning

Pedagogical innovation refers to the creative use of teaching strategies, tools, and activities that move beyond traditional lectures to improve student engagement, understanding, and skill development.

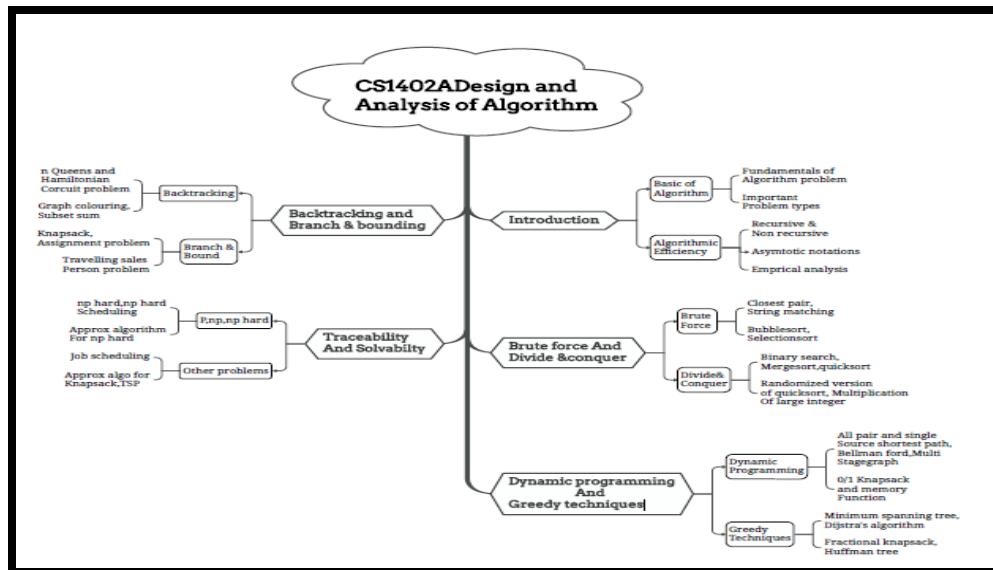
◆ Key Innovative Methods

- **Outcome-Based Education (OBE) Knowledge** → Ensures learning outcomes are clearly defined and achieved.
- **Activity-Based Learning** → Students learn by doing rather than memorizing.
- **Web-Design-Based Learning** → Integrates technology and creativity into problem-solving.
- **Seminars & Presentations** → Improves communication, critical thinking, and knowledge sharing.
- **Concept Maps** → Visual representation of ideas helps organize and connect concepts.
- **Cheat Sheets & Quick Guides** → Summarize core concepts for faster revision.
- **Quizzes & Crossword Puzzles** → Encourage active recall in an engaging way.
- **Lab-Based Learning** → Hands-on experiments bridge theory and practice.

S.A ENGINEERING COLLEGE, CHENNAI -77
DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING
Course Code:CS1302A
Course Name: Software Engineering
Academic Year: 2024-2025

Course Outcomes for Assessment in this Assignment	
CO1	<p>Case Study1: Choosing the Right Software Development Life Cycle Model</p> <p>Background: A software development company, TechSolutions Inc., specializes in creating custom enterprise software solutions for various industries. They recently secured a contract to develop a comprehensive customer relationship management (CRM) system for a large retail chain.</p> <p>Challenge: The project involves complex requirements including integration with existing systems, real-time data analytics, and scalability to accommodate future growth. TechSolutions Inc. needs to select an appropriate software development life cycle (SDLC) model that ensures efficient project management and successful delivery.</p>
CO1	<p>Case Study2: Agile Software Development in XYZ Tech Solutions</p> <p>Background: XYZ Tech Solutions is a software development company specializing in creating mobile applications for various clients. Recently, they undertook a project to develop a new mobile banking app for a leading financial institution.</p> <p>Challenge: The project required XYZ Tech Solutions to deliver a secure, user-friendly mobile banking app within a tight deadline. Key challenges included integrating with existing banking systems, ensuring compliance with regulatory standards, and providing a seamless user experience across different devices and platforms.</p>

Case study assignment



Concept map

S.A. Engineering College, Chennai-77.


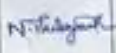


Department of CSE

Activity Based Learning Methods

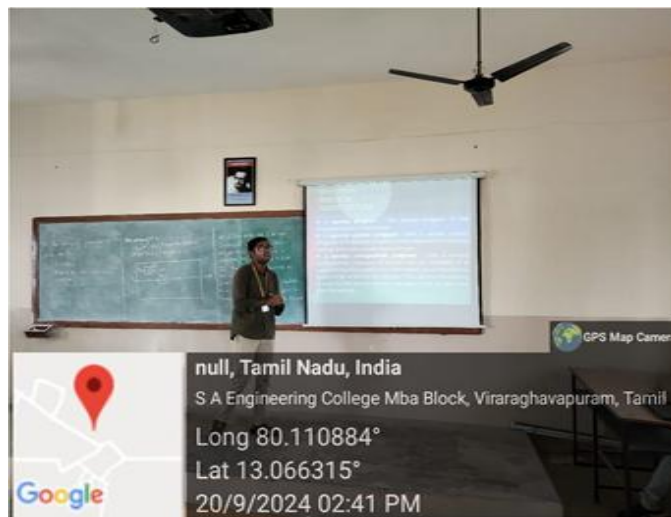
Academic Year/Sem: 2024-25/EVEN

Date: 20.12.24

Class: III Year / VI Sem

Sl No	Course Code/Title	Name of the Activity	Relevant Cos	Relevant POs	Faculty Incharge	Signature
1	CS 1601A / Internet Programming	1. Concept map 2. Assignment 3. Quiz 4. Seminar 5. Website design	Co1-Co5	PO1, PO2 PO3, PO4 PS01, PS02 PS03	Ms.C.Lakshmi Priya Ms.V.Saraswathi Mr.S.Muthukumarasamy	
2	CS1603A / Artificial Intelligence	1. Concept Map 2. Assignment 3. Quiz 4. Seminar 5. Debate 6. Case study 7. Chatbot	Co1-Co5	PO1, PO2 PO3, PS01, PS02	Dr.R.Geetha Dr.M.Anuradha Dr.N.Thilagavathi	
3	CS 1602A/ Compiler Design(Lab integrated)	1. Concept Map 2. Assignment 3. Quiz 4. Seminar 5. Case study [Problem based Learning] 6. Coursera	Co1-Co6	PO1, PO2 PO3, PO5, PS01, PS02	Ms.S.N.Ananthi Ms.J.Sangeetha Ms.O.Vasanthakumar	 

Activity based learning consolidation sample



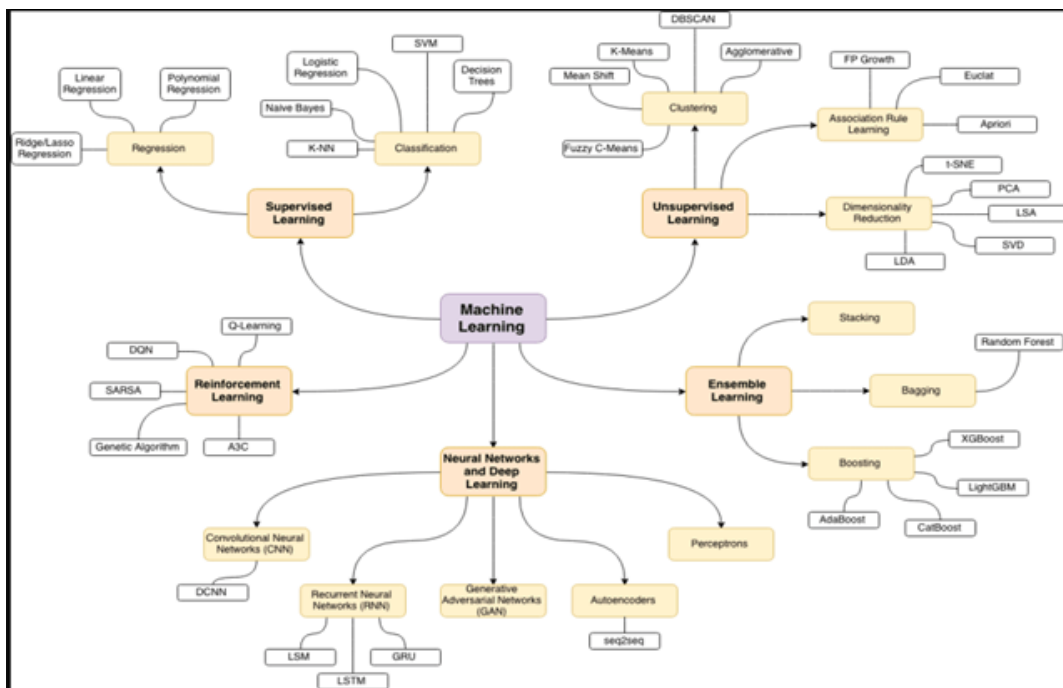
Student Seminar on CS1701-Machine learning and CS1708A-C# and .Net



Debate on HV1401A-Universal Human Values

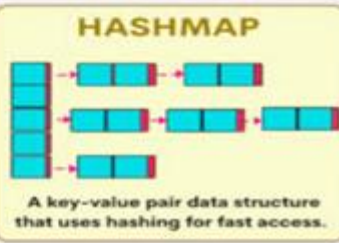
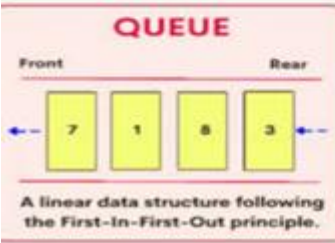
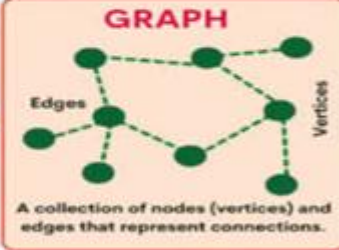
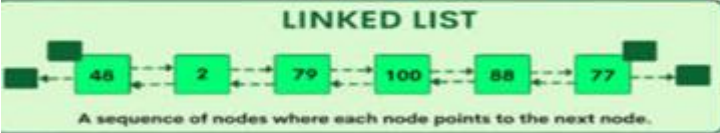
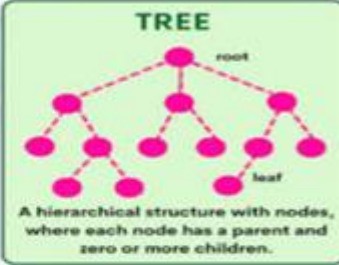
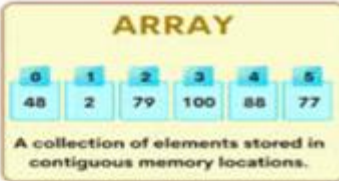
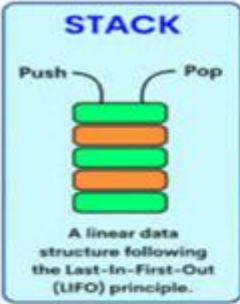


Lab based learning for CS1606A-Security laboratory



Concept Map Mode for CS1701 – Machine Learning

DATA STRUCTURES CHEATSHEET



Cheat sheet by student CS1302-Data Structures

MOOC/NPTEL/INDUSTRY CERTIFICATIONS AND INNOVATIVE TEACHING PRACTICES

This table clearly shows: **Certification** → **Innovative Teaching Method** → **Student Outcome**.

It directly maps to **NAAC “Innovative Teaching and Learning”** evidence.

Type of Certification	Example Area	How Faculty Apply It (Innovative Teaching Practice)	Impact on Students / Outcome
MOOC (Coursera, edX, Udemy, etc.)	Data Science, AI, Cloud Computing, Cyber Security	Use flipped classroom: students watch MOOC videos, faculty conducts discussions and problem-solving in class	Better concept clarity, active learning, and independent learning skills
NPTEL Certification	Machine Learning, Control Systems, Communication	Integration of case studies and real-life engineering problems from NPTEL modules into teaching	Improved application-oriented learning and industry relevance
Industry Certification	AWS, Cisco, Siemens, SAP, Microsoft	Faculty introduce simulation-based labs and hands-on workshops using tools from certifications	Students gain practical skills and become job-ready
MOOC + NPTEL Combined	Emerging Technologies (IoT, Block chain, Cybersecurity)	Design of mini-projects and hackathons aligned with course content	Students build innovation mind set, teamwork, and problem-solving skills
Industrial Training / FDP	AI in Healthcare, Robotics, Smart Manufacturing	Faculty develop value-added courses and interdisciplinary projects for students	Exposure to real-world applications, improved employability
Certification in Pedagogy/EdTech Tools	Moodle, Google Classroom, AR/VR tools	Use of blended learning platforms, online quizzes, interactive simulations	Enhanced student engagement and continuous assessment opportunities

- **Outcome:**

- Access to a vast range of global learning resources.
- Flexibility to learn specific topics at a student's pace.
- Knowledge acquisition from top universities and industry professionals

YOUTUBE VIDEO LECTURE AS AN INNOVATIVE TEACHING METHOD



INNOVATIVE TEACHING METHODS

Techniques and practices that enhance learning and engagement



E-LEARNING / DIGITAL LEARNING

Use of digital tools and resources to facilitate learning



YOUTUBE VIDEO LECTURES

Online videos used to deliver educational content

Outcome

The outcome of YouTube video lectures is better learning performance, stronger independent study habits, and improved digital competency — provided they are used effectively alongside traditional or interactive methods.

PEDAGOGICAL INNOVATION-REAL WORLD EXPOSURE

Teaching methodology where faculty connect students with the outside world through industry, community, and professional engagement.



Examples:

- **Guest lectures** by industry experts
- **Industrial visits** & field trips
- Collaborative projects with companies
- Faculty participation in research/consultancy with external agencies
- **Industry-driven internships & certifications**

Impact on Students:

- Bridges gap between theory and practice
- Enhances practical problem-solving & employability skills
- Builds industry-ready mind set
- Provides networking opportunities
- Encourages lifelong learning & adaptability

Outcome:

Students become professionally competent, socially aware, and innovation-driven graduates with strong connections to real-world practices.