



B.E. IN CSE (DATA SCIENCE)

SCHEME OF TEACHING AND EVALUATION 2021
OUTCOME BASED EDUCATION (OBE) AND CHOICE BASED CREDIT SYSTEM (CBCS)
(2021 SCHEME: EFFECTIVE FROM THE ACADEMIC YEAR 2023 - 24)

V SEMESTER

Sl. No.	Course	Course Code	Course Title	Teaching Department (TD)	Question Paper Setting Board (PSB)	Teaching Hours / Week				Examination				Credits
						Theory Lecture	Tutorial	Practical / Drawing	Self -Study	Duration in hours	CIA Marks	SEE Marks	Total Marks	
						L	T	P	S					
1	IPCC	21AI51	Principles of Artificial Intelligence	AIML/DS	CSE	03	00	02	00	3	50	50	100	4
2	IPCC	21CS52	Data Communications and Networks	CSE Allied	CSE	03	00	02	00	3	50	50	100	4
3	PCC	21CS53	Automata Theory and Computability	CSE Allied	CSE	03	00	00	00	3	50	50	100	3
4	PCC	21CS54	Database Management Systems	CSE Allied	CSE	03	00	00	00	3	50	50	100	3
5	PCC (Lab)	21CSL55	Database Management Systems Laboratory	CSE Allied	CSE	00	00	02	00	3	50	50	100	1
6	PROJ	21DSMP56	Mini Project Work	DS	CSE	00	00	04	00	3	50	--	50	2
7	AEC	21IPR57	Research Methodology and Intellectual Property Rights	CSE Allied	CSE	01	00	00	00	1	50	50	100	1
8	HSMC	21ENV58	Environmental Studies	BSC	BSC	01	00	00	00	1	50	50	100	1
9	AEC	21CS59X	Ability Enhancement Course V	CSE Allied	CSE	00	00	02	00	2	50	50	100	1
10	Scheduled activities for III to VI semesters	21NS83	National Service Scheme (NSS)	NSS / PED / Yoga		00	00	02	00	Activities to be carried out by the student in the registered course				
		21PE83	Physical Education (PE) (Sports and Athletics)											
		21YO83	Yoga											
											450	400	850	20

ABILITY ENHANCEMENT COURSE – V

21CS591	MongoDB	21CS593	Game Development
21CS592	Mobile Application Development	21CS594	GitHub: AI-Powered Developer Platform

Note: **BSC:** Basic Science Course, **IPCC:** Integrated Professional Core Course, **PCC:** Professional Core Course, **INT** –Internship, **HSMC:** Humanity and Social Science & Management Courses, **AEC**–Ability Enhancement Courses. **UHV:** Universal Human Value Course, **MP:** Mini Project
L – Lecture, **T** – Tutorial, **P-** Practical/ Drawing, **S** – Self -Study Component, **CIA:** Continuous Internal Assessment, **SEE:** Semester End Examination, **TD-** Teaching Department, **PSB:** Paper Setting department.

Integrated Professional Core Course (IPCC): Refers to Professional Theory Core Course Integrated with Practical of the same course. Credit for IPCC can be 04 and its Teaching–Learning hours (L: T: P) can be considered as (3: 0: 2) or (2: 2: 2). The theory part of the IPCC shall be evaluated both by CIA and SEE. The practical part shall be evaluated by only CIA (no SEE). However, questions from the practical part of

Mini Project Work:

Mini Project is a hands-on course which will provide a platform to students to enhance their practical knowledge and skills by the development of small systems/applications. The mini-project requires the students to carry out interdisciplinary work either as an individual student or to a group having not more than FOUR students.

1. The mini-project work will carry only the CIA component and will not have SEE component.
2. The mini project needs to be mandatorily done as Interdisciplinary work.
3. The Circuit branches (CSE/ISE/CSE-DS/CSE-CY/AI-DS/AI-ML) need to do the mini-project with non-circuit branches (ME/RA/ECE).
4. The circuit branches cannot do the mini-project with another Circuit branch, i.e. CSE with ISE/CSE-DS/CSE-CY/AI-DS/AI-ML.
5. The Start-up companies and LLPs may be involved in carrying out the Mini-project work.
6. The evaluation of the mini-project work will be done by two faculty members one faculty member from parent stream and another faculty member from the inter-disciplinary stream

BoS SPECIFIED NPTEL COURSES

(APPLICABLE ONLY TO THE STUDENTS WHO FAIL IN A COURSE MORE THAN FOUR TIMES)

Course Code	Course Name	Alternative NPTEL Courses*
21CS53	Automata Theory and Computability	Theory of Computation / Introduction to Automata Languages and Computation (12 Weeks)
21CS54	Database Management System	Introduction to Database Systems (12 Weeks)

***Subjected to change depending on the courses offered by the NPTEL.**

Note:

- The student has to provide the evidences for registering to the course, assignment submission, attending the examination and the certificate provided by NPTEL indicating the clearance of the Course by the candidate.
- Only on submitting the valid documents, the student will be awarded with the credits mentioned against the course(s)

Innovation/ Entrepreneurship/ Societal Internship: Students who missed the internship due to the Supplementary Semester have to complete the mandatory 4-week internship during the intervening period of the FIFTH and SIXTH semesters. The students need to satisfy all the requirements of the internship parameters. The evaluation of the Innovation/ Entrepreneurship/ Societal Internship will be done in the SIXTH semesters and the grades will be included in the SIXTH semester Grade card. In case, if the student fails to meet the internship requirements, they will be awarded with ‘F’ grade and will have to re-register and complete the same whenever offered.



B.E. IN CSE (DATA SCIENCE)

SCHEME OF TEACHING AND EVALUATION 2021
OUTCOME BASED EDUCATION (OBE) AND CHOICE BASED CREDIT SYSTEM (CBCS)
(2021 SCHEME: EFFECTIVE FROM THE ACADEMIC YEAR 2023 - 24)

VI SEMESTER

Sl. No.	Course	Course Code	Course Title	Teaching Department (TD)	Question Paper Setting Board (PSB)	Teaching Hours / Week				Examination				Credits
						Theory Lecture	Tutorial	Practical / Drawing	Self -Study	Duration in hours	CIA Marks	SEE Marks	Total Marks	
						L	T	P	S					
1	HSMC	21CS61	Software Engineering and Project Management	CSE Allied	CSE	03	00	00	00	3	50	50	100	3
2	IPCC	21DS62	Data Science and Applications	DS	CSE	03	00	02	00	3	50	50	100	4
3	PCC	21AI63	Machine Learning	AIML/ DS	CSE	03	00	00	00	3	50	50	100	3
4	PEC	21CS64X/ 21IS64X	Professional Elective Course I	CSE Allied	CSE	03	00	00	00	3	50	50	100	3
5	PEC	21CS65X/ 21IS65X	Professional Elective Course II	CSE Allied	CSE	03	00	00	00	3	50	50	100	3
6	PCC (Lab)	21AIL66	Machine Learning Laboratory	AIML/ DS	CSE	00	00	02	00	3	50	50	100	1
7	PROJ	21DSP67	Project Work Phase I	DS	CSE	00	00	04	00	---	50	---	50	2
8	INT		Innovation/ Entrepreneurship/ Societal Internship			Completed during the intervening period of IV and V Semester				100	---	100	3	
9	Scheduled activities for III to VI semesters	21NS83	National Service Scheme (NSS)	NSS / PED / Yoga		Completed during the intervening period of III and VI Semester				50	---	50	0	
		21PE83	Physical Education (PE) (Sports and Athletics)											
		21YO83	Yoga											
											500	300	800	22

PROFESSIONAL ELECTIVE COURSE I

21IS641	Information Storage Management	21CS643	Social Network Analysis
21IS642	Industrial IoT and Analytics	21IS644	Drone Technology and Applications

PROFESSIONAL ELECTIVE COURSE II

21CS651	Block Chain and Applications	21IS653	Cryptography and Network Security
21IS652	Computer Vision	21CS654	Software Architecture and Design Patterns

Note: **BSC:** Basic Science Course, **IPCC:** Integrated Professional Core Course, **PCC:** Professional Core Course, **INT** –Internship, **HSMC:** Humanity and Social Science & Management Courses, **PEC**–Professional Elective Course. **OEC:** Open Elective Course

L – Lecture, **T** – Tutorial, **P**- Practical/ Drawing, **S** – Self -Study Component, **CIA:** Continuous Internal Assessment, **SEE:** Semester End Examination, **TD-** Teaching Department, **PSB:** Paper Setting department.

Professional Elective Course (PEC): A professional elective (PEC) course is intended to enhance the depth and breadth of educational experience in the Engineering and Technology curriculum. Multidisciplinary courses that are added supplement the latest trend and advanced technology in the selected stream of engineering. Each group will provide an option to select one course. The minimum number of students’ strengths for offering professional electives is 10. However, this conditional shall not be applicable to cases where the admission to the program is less than 10.

Open Elective Courses (OEC): Students belonging to a particular stream of Engineering and Technology are not entitled to the open electives offered by their parent Department. However, they can opt for an elective offered by other Departments, provided they satisfy the prerequisite condition if any. Registration to open electives shall be documented under the guidance of the Program Coordinator/ Advisor/Mentor.

Selection of an Open Elective shall not be allowed if,

- i. The candidate has studied the same course during the previous semesters of the program.
- ii. The syllabus content of open electives is similar to that of the Departmental core courses or Professional Elective courses.
- iii. A similar course, under any category, is prescribed in the higher semesters of the program.
- iv. In case, if any department is interested in offering courses from streams such as Law, Business (MBA), Medicine, Arts, Commerce etc. need to get the necessary approval from the respective Board of Studies and the Academic Council.

The minimum numbers of students’ strength for offering Open Elective Course is 10. However, this condition shall not be applicable to class where the admission to the program is less than 10.

Non-Credit Mandatory Courses (NMC):**National Service Scheme/Physical Education (Sport and Athletics)/ Yoga:**

- 1) Securing 40% or more in CIA, 40% or more marks in SEE and 40% or more in the sum total of CIA + SEE leads to successful completion of the registered course.
- 2) In case, students fail to secure 40 % marks in SEE, they have to appear for SEE during the subsequent examinations and obtain the minimum requirement.
- 3) In case, any student fails to register for NSS, PE or Yoga/fails to secure the minimum requirements as mentioned in (B).1, they shall be awarded with NP Grade. In such a case, the student has to fulfill the course requirements during subsequent semester/s.
- 4) Successful completion of the course shall be indicated with a PP Grade in the grade card.
- 5) These courses shall not be considered for vertical progression as well as for the calculation of SGPA and CGPA, but completion of the courses shall be mandatory for the award of degree.

BoS SPECIFIED NPTEL COURSES
(APPLICABLE ONLY TO THE STUDENTS WHO FAIL IN A COURSE MORE THAN FOUR TIMES)

Course Code	Course Name	Alternative NPTEL Courses*
21AI63	Machine Learning	Introduction to Machine Learning / Fundamentals of Artificial Intelligence (12 Weeks)

***Subjected to change depending on the courses offered by the NPTEL.**

Note:

- The student has to provide the evidences for registering to the course, assignment submission, attending the examination and the certificate provided by NPTEL indicating the clearance of the Course by the candidate.
- Only on submitting the valid documents, the student will be awarded with the credits mentioned against the course(s)



SAHYADRI
COLLEGE OF ENGINEERING & MANAGEMENT
An Autonomous Institution
MANGALURU

B.E. IN CSE (DATA SCIENCE)

SCHEME OF TEACHING AND EVALUATION 2021
OUTCOME BASED EDUCATION (OBE) AND CHOICE BASED CREDIT SYSTEM (CBCS)
(2021 SCHEME: EFFECTIVE FROM THE ACADEMIC YEAR 2024 - 25)

VII SEMESTER

Sl. No.	Course	Course Code	Course Title	Teaching Department (TD)	Question Paper Setting Board (PSB)	Teaching Hours / Week				Examination			Credits	
						Theory Lecture	Tutorial	Practical / Drawing	Self -Study	Duration in hours	CIA Marks	SEE Marks		Total Marks
						L	T	P	S					
1	IPCC	21DS71	Natural Language Processing and Applications	DS	CSE	03	00	02	00	3	50	50	100	4
2	PCC	21DS72	Data Visualization using Python	DS	CSE	03	00	00	00	3	50	50	100	3
3	PEC	21CS73X/ 21DS73X	Professional Elective Course III	CSE Allied	CSE	03	00	00	00	3	50	50	100	3
4	OEC	21IS74X	Open Elective Course I	ISE	CSE	03	00	00	00	3	50	50	100	3
5	PCCL	21DSL75	Data Visualization Laboratory	DS	CSE	00	00	02	00	3	50	50	100	1
6	PROJ	21DSP76	Project Work Phase- II	DS	CSE	00	00	16	00	3	100	100	200	8
											350	350	700	22

PROFESSIONAL ELECTIVE COURSE III

21CS731	Robotic Process Automation	21DS733	Advanced Artificial Intelligence
21DS732	Cloud Security and Privacy	21CS734	Deep Learning

OPEN ELECTIVE COURSE

21IS741	Information Management System	21IS743	Data Warehouse and Data Mining
21IS742	Introduction to Cloud Computing	21IS744	Introduction to Software Testing

Note: PCC: Professional Core Course, PEC–Professional Elective Course. OEC: Open Elective Course, PROJ: Project Work

L – Lecture, T – Tutorial, P- Practical/ Drawing, S – Self -Study Component, CIA: Continuous Internal Assessment, SEE: Semester End Examination, TD- Teaching Department, PSB: Paper Setting department.

Professional Elective Course (PEC): A professional elective (PEC) course is intended to enhance the depth and breadth of educational experience in the Engineering and Technology curriculum. Multidisciplinary courses that are added supplement the latest trend and advanced technology in the selected stream of engineering. Each group will provide an option to select one course. The minimum number of students' strengths for offering professional electives is 10. However, this conditional shall not be applicable to cases where the admission to the program is less than 10.

Open Elective Courses (OEC): Students belonging to a particular stream of Engineering and Technology are not entitled to the open electives offered by their parent Department. However, they can opt for an elective offered by other Departments, provided they satisfy the prerequisite condition if any. Registration to open electives shall be documented under the guidance of the Program Coordinator/ Advisor/Mentor.

Selection of an Open Elective shall not be allowed if,

- i. The candidate has studied the same course during the previous semesters of the program.
- ii. The syllabus content of open electives is similar to that of the Departmental core courses or Professional Elective courses.
- iii. A similar course, under any category, is prescribed in the higher semesters of the program.

In case, if any department is interested in offering courses from streams such as Law, Business (MBA), Medicine, Arts, Commerce etc. need to get the necessary approval from the respective Board of Studies and the Academic Council.

The minimum numbers of student's strength for offering Open Elective Course is 10. However, this condition shall not be applicable to class where the admission to the program is less than 10.

Project Work:

The objective of the Project Work is to

- i. Encourage independent learning and the innovative attitude of the students
- ii. Develop interactive attitude, communication skills, Organization, Time Management and Presentation Skills.
- iii. Impart Flexibility and Adaptability
- iv. Inspire Team working
- v. Expand Intellectual capacity, credibility, judgement and intuition
- vi. Adhere to Punctuality, setting and meeting deadlines
- vii. Install responsibilities to oneself and others
- viii. Train students to present the topic of Project work without any fear, face the audience confidently, enhance communication skills, involve in group discussions to present and exchange ideas.

The CIA and SEE evaluation procedure for the Project work will be as provided by the Board of Studies in line with SCEM Academic Statute 2021 and approved by the Academic Council of SCEM.

BoS SPECIFIED NPTEL COURSES

(APPLICABLE ONLY TO THE STUDENTS WHO FAIL IN A COURSE MORE THAN FOUR TIMES)

Course Code	Course Name	Alternative NPTEL Courses*
21DS72	Data Visualization using Python	Data Analytics with Python (12 Weeks)

***Subjected to change depending on the courses offered by the NPTEL.**

Note:

- The student has to provide the evidences for registering to the course, assignment submission, attending the examination and the certificate provided by NPTEL indicating the clearance of the Course by the candidate.
- Only on submitting the valid documents, the student will be awarded with the credits mentioned against the course(s)



SAHYADRI
COLLEGE OF ENGINEERING & MANAGEMENT
An Autonomous Institution
MANGALURU

B.E. IN CSE (DATA SCIENCE)

SCHEME OF TEACHING AND EVALUATION 2021
OUTCOME BASED EDUCATION (OBE) AND CHOICE BASED CREDIT SYSTEM (CBCS)
(2021 SCHEME: EFFECTIVE FROM THE ACADEMIC YEAR 2024 – 25)

VIII SEMESTER

Sl. No.	Course	Course Code	Course Title	Teaching Department (TD)	Question Paper Setting Board (PSB)	Teaching Hours / Week				Examination			Credits	
						Theory Lecture	Tutorial	Practical / Drawing	Self -Study	Duration in hours	CIA Marks	SEE Marks		Total Marks
						L	T	P	S					
1	SEM	21DSS81	Technical Seminar	DS	CSE	One Contact hour per Week for interactions between the faculty and students				---	100	---	100	1
2	INT	21INT	Research Internship/ Industrial Internship/ Rural Internship	DS	CSE	Two Contact hours per week for interactions between Students and faculty members				3	100	100	200	15
									200	100	300	16		

Note: INT: Internship, PCC: Professional Core Course, PEC–Professional Elective Course. OEC: Open Elective Course

L – Lecture, T – Tutorial, P- Practical/ Drawing, S – Self -Study Component, CIA: Continuous Internal Assessment, SEE: Semester End Examination, TD- Teaching Department, PSB: Paper Setting department.

Technical Seminar: In order to make the student aware of the technological and research application in various domains of the society, a comprehensive presentation need to be provided with all the supporting evidences for the claims in the presentation.

- The objective of the Technical Seminar is to inculcate self-learning, present the seminar topic confidently, enhance communication skill, involve in group discussion for exchange of ideas.
- Each student, under the guidance of a Faculty, shall choose a topic, preferably a recent topic in their interested specializations.
- The student has to
 - i. Carry out a detailed Literature survey, systematically organize the content
 - ii. Prepare the report as per their own intuition, without cut-paste activities.
 - iii. Use tools for writing equations, drawings etc. and gain proficiency of the tools used.
 - iv. Present the topics effectively through appropriate digital media.
 - v. Answer the queries posed and involve in healthy debates/discussions
 - vi. Submit a report in an error-free and professional way
 - vii. Present the findings of the seminar in the reputed Conferences/Journals for possible publications.

The evaluation procedure for the Technical Seminar will be as provided by the Board of Studies and approved by the Academic Council of SCEM.

21INT82 Research Internship/Industry Internship/Rural Internship

- **Research Internship:** This is intended to offer the flavor of current research happening in the Research fields. It helps students to get familiarize with the field and imparts the skill required for carrying out research.
- **Industry Internship:** An extended period of work experience undertaken by the students to supplement their degree for professional development. It also helps them learn to overcome unexpected obstacles and successfully navigate the organizations, perspectives and cultures. Dealing with contingencies helps the students recognize, appreciate and adapt to the organizational realities by tempering their knowledge with practical constraints.
- **Rural Internship:** A long term goal, as proposed under the AICTE rural internship programme, shall be counted as rural internship activity.
- The student may take up Interdisciplinary Research Internship or Industry Internship.
- The Faculty Mentor need to monitor the student's internship progress and interact with them to guide them for the successful completion of the internship requirements
- The students are permitted to carry out internship anywhere in India or Abroad. However, the institute will not bear any expenses incurred with respect to the internship.