SIPNA COLLEGE OF ENGINEERING & TECHNOLOGY, AMRAVATI

An Autonomous Institute Affiliated to

Sant Gadge Baba Amravati University, Amravati, Maharashtra (India)

(Approved by AICTE, New Delhi and Recognized by DTE, Maharashtra)

(Accredited with 'A+' Grade by NAAC)

Bachelor of Technology (B. Tech.)

Credit Distribution Structure (NEP)

Department of Artificial Intelligence (AI) and Data Science

B. Tech. Artificial Intelligence (AI) and Data Science with Multidisciplinary Minor

(Semester Pattern)

Effective from Academic Year 2024-25

Prepared By: Boards of Studies - Artificial Intelligence (AI) and Data Science

Approved By: Academic Council - Sipna COET, Amravati

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Index

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Dated:-

About the Department

The Department of Artificial Intelligence (AI) and Data Science is dedicated to exploring and applying cutting-edge principles in AI and data science. Within this department, students benefit from a strong focus on key areas like machine learning, natural language processing, and computer vision. These subjects teach students how to enable computers to learn, understand human language, and interpret visual information. Additionally, the curriculum covers data science techniques, including data mining and big data analytics, which are crucial for analyzing large datasets. These skills provide students with the tools to generate valuable insights and make informed decisions in various fields such as business, healthcare, finance, and Internet of Things (IoT) applications.

The department is established in 2024 with the intake capacity of the Undergraduate Course (B. Tech.) is 60. The department's emphasis on a modular learning approach reflects its commitment to integrating theoretical knowledge with practical applications in Artificial Intelligence (AI) and Data Science. This methodical approach ensures that students not only grasp foundational concepts but also gain hands-on experience in utilizing cutting-edge tools and techniques.

Through education and training programs, the department equips students with the skills needed to navigate and lead in this dynamic field, fostering collaborations with industry to bridge theory with real-world applications.

Institute Vision

- To provide quality professional education and conducive environment to students to emerge as a model proficient institute.

Institute Mission

- To create a scholarly and vibrant environment for professional excellence.
- To contribute to advancement of knowledge in basic and applied areas of Engineering and Technology.
- To be an institute of choice in the region by developing, managing and transferring contemporary technologies.
- To build mutually valuable terms with industry, society and alumni.

Department Vision

- To be a leading Program in Artificial Intelligence and Data Science education, fostering innovation and industry relevance to shape skilled and responsible professionals.

Approved in 3rd Academic Council Meeting
Dated:-

Department Mission

- To provide quality education in AI and Data Science through a learner-focused approach.
- To develop analytical thinking, innovation, and hands-on skills through experiential learning and interdisciplinary approaches.
- To integrate emerging technologies and practical skills for solving societal and real-world problems.
- To enhance collaboration with industry and academia while developing ethical, socially responsible, and future-ready lifelong learners.

Key Features of Curriculum

1. Provision for Open Electives (OE), Vocational and Skill Enhancement Courses (VSE), Ability Enhancement Courses (AE), Indian Knowledge System (IKS), Value Education Courses (VE), Basic Science (BS), Engineering Science (ES), Co-Curricular Courses (CC) in addition to program core courses.
2. Mandatory internship of one semester (Sixth Months)
3. Credits for Value education courses, Ability Enhancement Courses, Co-Curricular and Extra Curricular Activities.
4. Interdisciplinary and multidisciplinary education through single and double minors and open electives.
5. Provision for learning in online mode through Swayam / MOOCS / NPTEL etc. courses.
6. Provision for B.Tech. degree with Honors/ Minors.
7. Opportunity for learners to choose courses of their interest in all disciplines.
8. Provision of Field project.
9. Multiple entry and exit option after every year.

Programme Outcomes (POs): Engineering Graduates will be able to:

PO1: Engineering knowledge

Apply knowledge of mathematics, natural science, computing, engineering fundamentals and an engineering specialization as specified in WK1 to WK4 respectively to develop to the solution of complex engineering problems.

Approved in 3rd Academic Council Meeting Dated:-

PO2: Problem analysis

Identify, formulate, review research literature and analyze complex engineering problems reaching substantiated conclusions with consideration for sustainable development (WK1 to WK4).

PO3: Design/development of solutions

Design creative solutions for complex engineering problems and design/develop systems/components/processes to meet identified needs with consideration for the public health and safety, whole-life cost, net zero carbon, culture, society and environment as required. (WK5).

PO4: Conduct investigations of complex problems

Conduct investigations of complex engineering problems using research-based knowledge including design of experiments, modelling, analysis; interpretation of data to provide valid conclusions. (WK8).

PO5: Modern tool usage

Create, select and apply appropriate techniques, resources and modern engineering & IT tools, including prediction and modelling recognizing their limitations to solve complex engineering problems. (WK2 and WK6).

PO6: The engineer and World

Analyze and evaluate societal and environmental aspects while solving complex engineering problems for its impact on sustainability with reference to economy, health, safety, legal framework, culture and environment. (WK1, WK5, and WK7).

PO7: Ethics

Apply ethical principles and commit to professional ethics, human values, diversity and inclusion; adhere to national & international laws. (WK9).

PO8: Individual and Collaborative Teamwork:

Function effectively as an individual, and as a member or leader in diverse/multi-disciplinary teams.

PO 09: Communication

Communicate effectively and inclusively within the engineering community and society at large, such as being able to comprehend and write effective reports and design documentation, make effective presentations considering cultural, language, and learning differences.

Approved in 3rd Academic Council Meeting
Dated:-

PO10: Project management and finance

Apply knowledge and understanding of engineering management principles and economic decision-making and apply these to one's own work, as a member and leader in a team, and to manage projects and in multidisciplinary environments.

PO11: Life-long learning

Recognize the need for, and have the preparation and ability for i) independent and life-long learning ii) adaptability to new and emerging technologies and iii) critical thinking in the broadest context of technological change (WK8).

Program Educational Objectives (PEOs):

PEO1:

To prepare globally competent graduates having strong fundamentals, domain knowledge, updated with modern technology to provide the effective solutions for engineering problems.

PEO2:

To prepare the graduates to work as a committed professional with strong professional ethics and values, sense of responsibilities, understanding of legal, safety, health, societal, cultural and environmental issues.

PEO3:

To prepare committed and motivated graduates with research attitude, lifelong learning, investigative approach, and multidisciplinary thinking.

PEO4:

To prepare the graduates with managerial and communication skills to work effectively as individual as well as in teams.

Program Specific Outcomes (PSO's):

Engineering Graduates will be able to:

PSO1:

Acquire a foundation in artificial intelligence, machine learning, and data science techniques.

PSO2:

Design, develop, and implement solutions to real-world problems using Artificial Intelligence & Data Science algorithms.

Approved in 3rd Academic Council Meeting
Dated:-

PSO3:

Demonstrate skills in applying data analysis, statistical modeling, and visualization tools to extract insights from various datasets.

PSO4:

Integrate ethical principles and interdisciplinary knowledge to create AI driven systems that responsibly address societal, environmental, and industrial needs.

General Course Structure and Scheme

A. Definition of Credit

1 Hr. Lecture (L) per week	1 Credit
1 Hr. Tutorial (T) per week	1 Credit
2 Hours Practical (P) per week	1 Credit

B. Total Credits for the completion of B.Tech. in Artificial Intelligence (AI) and Data Science:

The total number of credits proposed for the four-year B.Tech. in Artificial Intelligence (AI) and Data Science with one Multidisciplinary minor (Compulsory) degree is **172** as per the structure given below**:**

Students can opt for any of the following as per the rules and regulations given by the institute:

1. B. Tech. Artificial Intelligence (AI) and Data Science with Multidisciplinary Minor = Total 172 Credits
2. B. Tech. Artificial Intelligence (AI) and Data Science with Multidisciplinary Minor and Honors Specialization = Total 190 Credits
3. B. Tech. Artificial Intelligence (AI) and Data Science with Multidisciplinary Minor and Honors with Research = Total 190 Credits
4. B. Tech. Artificial Intelligence (AI) and Data Science with Multidisciplinary Minor and additional specialization Minor (Double Minors) = Total 190 Credits.

Approved in 3rd Academic Council Meeting
Dated:-

C. Semester Wise Credit Distribution Structure for Four Year UG Program with One Multidisciplinary Minor.

Courses		No of Credits /Semester								Total Credits	% Credit Allotment
		1	2	3	4	5	6	7	8		
Basic Science Course	BSC/ESC	7	7	3						17	9.88
Engineering Science Course		7	9							16	9.30
Programme Core Course (PCC)	Program Courses		2	12	13	12	8	11		58	33.72
Programme Elective Course (PEC)						4	8	7		19	11.04
Multidisciplinary Minor (MD M)	Multidisciplinary Courses			3	3	3	3		2	14	8.13
Open Elective (OE) Other than a particular program				2	2	2				6	3.48
Vocational and Skill Enhancement Course (VSEC)	Skill Courses	2	1		2		2			7	4.06
Ability Enhancement Course (AEC -01, AEC-02)	Humanities Social Science and Management (HSSM)	2					1			3	6.97
Entrepreneurship /Economics/ Management Courses				2	2					4	
Indian Knowledge System (IKS)			2							2	
Value Education Course (VEC)		3								3	
Research Methodology	Experiential Learning Courses								4	4	12.20
Comm. Engg. Project (CEP)/Field Project (FP)						1				1	
Project								4		4	
Internship/ OJT									12	12	
Co-curricular Courses (CC)	Liberal Learning Courses	1	1							2	1.16
Total Credits		**22**	**22**	**22**	**22**	**22**	**22**	**22**	**18**	**172**	100%

Approved in 3rd Academic Council Meeting
Dated:-

1. Vocational and Skill Enhancement Courses (VSEC)

VSEC Courses include hands-on training corresponding to the Major and/or Minor Subject. Vocational courses include skills based advanced laboratory practical of Major. The following courses are offered as Vocational and skill Enhancement courses by the department of Artificial Intelligence (AI) and Data Science.

Sr. No.	Course Title	Semester	Credits
1	Web Technology Lab (Technical Deptt. Specific)	I	1
2	Design Thinking	I	1
3	Basics of Python Lab (Technical Deptt. Specific)	II	1
4	Big Data Analytics	IV	2
5	IoT and Embedded Computing	VI	2
Total Credits			**07**

2. Humanities & Social Sciences Courses [HSSMC]

The following courses are offered as Humanities & Social Science Courses by department of Artificial Intelligence (AI) and Data Science.

Sr. No.	Category	Course Title	Semester	Credits
1	Ability Enhancement Course (AEC-I)	Professional Communication	I	2
2	Value Education Course (VEC-I)	Environmental Studies	I	1
3	Value Education Course (VEC-II)	Values and Ethics	I	2
4	Indian Knowledge System (IKS)	Indian Knowledge System	II	2
5	Humanities & Social Sciences Courses	MIS (Management Information System)	III	2
6	Humanities & Social Sciences Courses	Entrepreneurship Development	IV	2
7	Ability Enhancement Course (AEC-II)	Modern Indian Language	VI	1
Total Credits				**12**

Approved in 3rd Academic Council Meeting
Dated:-

3. Multidisciplinary Minor Courses: 14 Credits

i. Compulsory Multidisciplinary Minor Courses are offered from the different disciplines of the Engineering.
ii. Students once registered for the selected Course of Multidisciplinary Minors (MDM) in 3rd semester need to complete all credits assigned from 3rd to 8th semester for the specific selected MDM course only.

Sr. No.	Course Category	Semester	Credits
1	Multidisciplinary Minor-I	III	3
2	Multidisciplinary Minor-II	IV	3
3	Multidisciplinary Minor-III	V	3
4	Multidisciplinary Minor-IV	VI	3
5	Multidisciplinary Minor-V	VIII	2
		Total Credits: 14	

For the detailed syllabus of the Multi-Disciplinary Minor (MDM) courses click here.

4. Open Elective Courses: 06 Credits

The open elective subjects offered from the faculty other than Engineering and Technology.

Sr. No.	Course Category	Semester	Credits
1	Open Elective-I	III	2
2	Open Elective -II	IV	2
3	Open Elective -III	V	2
		Total Credits: 06	

For the detailed syllabus of the Open Electives courses click here.

5. Honors/ Double Minors Degree Programs: 18 Credits

A student shall be eligible for the award of B.Tech. degree with Honors / Double Minors if he/she earns 18 credits in addition to the 172 credits of regular B.Tech. Programme within 4 years duration. It is not mandatory for any student to opt for the Honors /Double Minors Programme.

Approved in 3rd Academic Council Meeting
Dated:-

Sr. No.	Course Category	Semester	Credits
1	Honors/ Double Minors-I	III	4
2	Honors/ Double Minors -II	IV	4
3	Honors/ Double Minors -III	V	4
4	Honors/ Double Minors -IV	VI	4
5	Honors/ Double Minors -V	VII	2
		Total Credits: 14	

- **For Honors/Double Minors degree programmes refer syllabus and scheme click here.**
- **The guidelines related to the Honors/ Double Minor Certification are provided as separate document: Rules and Regulations of Honors and Minors**

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