B.Tech. - Computer Science- Artificial Intelligence and Machine Learning

Program Details

Faculty	Engineering and Technology (FET)
School	School of Computer Science and Technology (SCST)
Department	Computer Science
Program	B.Tech., Computer Science-Artificial Intelligence & Machine Learning
Director of School	Dr. Sanjay Pande M.B.
Head of Department	Dr. Asha K

1.	**Title of the Award**	B.Tech. in Computer Science-Artificial Intelligence & Machine Learning
2.	**Modes of Study**	Full Time
3.	**Awarding Institution /Body**	GM University
4.	**Joint Award**	Not Applicable
5.	**Teaching Institution**	Faculty of Engineering and Technology, GM University
6.	**Date of Program Specifications**	Nov -2023
7.	**Date of Course Approval by the Academic Council of GMU**	---
8.	**Next Review Date:**	---
9.	**Program Approving Regulating Body and Date of Approval**	---
10.	**Program Accredited Body and Date of Accreditation**	---
11.	**Grade Awarded by the Accreditation Body**	---
12.	**Program Accreditation Validity**	---
13.	**Program Benchmark**	N/A

14.	The Bachelor's program in Computer Science and B.Tech.- CS - Artificial Intelligence and Machine Learning Systems (B.Tech. Computer Science and B.Tech.- CS - Artificial Intelligence and Machine Learning Systems) offers a comprehensive and innovative education for students aspiring to excel in the dynamic field of computer science, software engineering, and the strategic integration of technology into business operations. This program is meticulously designed to provide students with a robust foundation in both theoretical principles and practical applications of computer science, fostering a deep understanding of creative problem-solving, software design, and advanced technologies in the computer science and B.Tech.- CS - Artificial Intelligence and Machine Learning Systems industry.
	Over the course of four years, students engage in a well-structured curriculum that seamlessly integrates core engineering principles with specialized courses in computer science and B.Tech.- CS - Artificial Intelligence and Machine Learning Systems. The program adopts a hands-on approach, incorporating software projects, system design, and internships to enable students to apply theoretical knowledge to real-world challenges in computer science and B.Tech.- CS - Artificial Intelligence and Machine Learning Systems.
	Key areas of study include programming principles, algorithms, data structures, artificial intelligence, machine learning, software development methodologies, computer networks, and the strategic implementation of technology in business environments. Students gain proficiency in using cutting-edge programming languages, development tools, and simulation software, preparing them for the challenges of the contemporary computer science and B.Tech.- CS - Artificial Intelligence and Machine Learning Systems industry.
	The B.Tech. Computer Science and B.Tech.- CS - Artificial Intelligence and Machine Learning Systems program aim to equip graduates for diverse career opportunities across various sectors, with a particular focus on leveraging technology to enhance business processes. Potential career paths encompass roles in technology companies, business enterprises, consulting firms, research and development, and entrepreneurship within the computer science and B.Tech.- CS - Artificial Intelligence and Machine Learning Systems domain.
	The interdisciplinary nature of computer science and B.Tech.- CS - Artificial Intelligence and Machine Learning Systems opens avenues to explore diverse applications, enabling

	graduates to contribute to advancements in technology, software solutions, and the development of efficient B.Tech.- CS - Artificial Intelligence and Machine Learning Systems. Continuous learning and staying abreast of the latest industry trends are crucial for graduates to thrive in the rapidly evolving field of computer science and B.Tech.- CS - Artificial Intelligence and Machine Learning Systems. The program spans eight semesters, providing a holistic education that prepares students for a successful and impactful career in the dynamic realm of computer science and B.Tech.- CS - Artificial Intelligence and Machine Learning Systems innovation.
15.	**Program Educational Objectives (PEOs)** **PEO-1: Knowledge and Technical Skills** The Bachelor's program in Computer Science and B.Tech.- CS - Artificial Intelligence and Machine Learning Systems aims to provide graduates with a robust foundation in computer science and engineering principles, encompassing algorithms, data structures, artificial intelligence, and machine learning. Upon completion, graduates will possess the knowledge and technical skills necessary to analyze, design, implement, and optimize software systems and intelligent solutions. They will be well-equipped to address real-world challenges, particularly in the strategic integration of technology into business processes, fostering efficiency and innovation. **PEO-2: Professional Competence and Leadership** To instill technical competencies, practical skills, and leadership abilities in graduates, preparing them for success in the dynamic field of computer science and B.Tech.- CS - Artificial Intelligence and Machine Learning Systems. Graduates will excel in roles within technology companies, business enterprises, consulting firms, research and development, and entrepreneurial ventures within the computer science and B.Tech.- CS - Artificial Intelligence and Machine Learning Systems domain. They will be capable of assuming both technical and leadership positions, contributing to advancements in technology and innovation, with a specific focus on leveraging technology for strategic business success. **PEO-3: Holistic Development and Adaptability** The program aims to nurture critical thinking, creativity, innovation, collaboration, effective communication, information literacy, flexibility, adaptability, leadership, responsibility, and social and cross-cultural interaction skills. Graduates will demonstrate the ability to adapt to evolving professional environments, ensuring they contribute

	effectively to the dynamic and challenging field of computer science and B.Tech.- CS - Artificial Intelligence and Machine Learning Systems. The interdisciplinary nature of the program prepares graduates for diverse career trajectories, fostering holistic development and lifelong learning.
	The overarching goal of the B.Tech. In Computer Science and B.Tech.- CS - Artificial Intelligence and Machine Learning Systems is to produce graduates who are well-prepared to meet the challenges of the dynamic computer science and B.Tech.- CS - Artificial Intelligence and Machine Learning Systems industry, contribute to technological advancements, and make a positive impact on strategic business processes and society.
16.	**Program Outcomes (POs) (Graduate Attributes)**
	PO-1: Engineering knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
	PO-2: Problem analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
	PO-3: Design/development of solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
	PO-4: Conduct investigations of complex problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
	PO-5: Modern tool usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.
	PO-6: The engineer and society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.
	PO-7: Environment and sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
	PO-8: Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

	PO-9: Individual and team work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings. **PO-10:** Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions. **PO-11:** Project management and finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments. **PO-12:** Lifelong learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.
17.	**Program Specific Outcomes (PSOs):** **PSO-1: Analyze and Address B.Tech.- CS - Artificial Intelligence and Machine Learning Systems Challenges** Graduates will demonstrate the ability to analyze complex computational requirements specific to B.Tech.- CS - Artificial Intelligence and Machine Learning Systems, identify challenges, and articulate problems with necessary specifications. Leveraging their understanding of computer science principles within the B.Tech.- CS - Artificial Intelligence and Machine Learning Systems context, graduates will deliver innovative solutions, addressing issues related to software development, algorithm design, and computational applications in the B.Tech.- CS - Artificial Intelligence and Machine Learning Systems domain. **PSO-2: Apply B.Tech.- CS - Artificial Intelligence and Machine Learning Systems Concepts in System Development** Graduates will be equipped to envision, model, design, implement, and test software systems and computational solutions in the context of B.Tech.- CS - Artificial Intelligence and Machine Learning Systems. They will demonstrate proficiency in addressing technical challenges within the field of computer science and B.Tech.- CS - Artificial Intelligence and Machine Learning Systems, utilizing their knowledge of algorithms, data structures, and software development methodologies to create efficient, reliable, and innovative applications tailored to business needs.

PSO-3: Conduct and Lead Experimental Validation in B.Tech.- CS - Artificial Intelligence and Machine Learning Systems

After completing the program, graduates will showcase the capability to strategize, coordinate, and execute experiments for the validation and verification of B.Tech.- CS - Artificial Intelligence and Machine Learning Systems and solutions. They will adeptly use laboratory techniques and software tools for designing and simulating computational processes, emphasizing the importance of addressing challenges specific to B.Tech.- CS - Artificial Intelligence and Machine Learning Systems. Graduates will be prepared to assume leadership roles in research projects, effectively managing teams and resources in the context of computer science and B.Tech.- CS - Artificial Intelligence and Machine Learning Systems.

These Program Specific Outcomes are tailored to ensure that graduates are not only well-versed in the theoretical aspects of computer science and engineering but also possess the practical skills and leadership qualities required to make meaningful contributions in the specialized field of computer science and B.Tech.- CS - Artificial Intelligence and Machine Learning Systems. The outcomes emphasize the application of computer science principles in addressing real-world challenges and the development of innovative solutions in the realm of B.Tech.- CS - Artificial Intelligence and Machine Learning Systems.

Programme Structure

18. **Definition of Credit**:

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

Sl.No.	Program -Category	Credits
1.	Program-Core courses, elective Courses, open electives	130
2.	Technical Competency	10 (SDTCD)
3.	Life Skills	3(CASP)
4.	Innovation and Entrepreneurial Skills	3(CIPI)

5.		Environmental Awareness and Community Services	3(SA)
6.		Athletics, Sports, Yoga, Gymnasium	3(SA)
7.		Cultural & Literary Activities	3(SA)
8.		Co-Curricular Activities (Seminar/Conference/Exhibition/Technical Competition)	2(SA&SP)
9.		Placement Training	3(CASP)
		Total	**130+30=160**

18. Courses and Credits:

Semester-1			
S. No.	**Course Code**	**Course Title**	**Credits**
1.	UE24CS1101	Foundational Mathematics for Computer Science	3
2.	UE24CS1102	Analog & Digital Fundamentals	3
3.	UE24CS1103	Advanced Materials Integration in Computing Technology	3
4.	UE24CS1104	Problem Solving through C Programming	3
5.	UE24CS1105	Web Designing & Programming	3
6.	UE24CS1106	Project Based Learning / mini project on Web Designing	2
7.	SDTCD	Technical Competency	0
8.	CASP	Life Skills	0
9.	CIBI	Innovation and Entrepreneurial Skills	0
10.	SA	Environmental Awareness and Community Services	0
11.	SA	Athletics, Sports, Yoga, Gymnasium	0
12.	SA	Cultural & Literary Activities	0
13.	SASP	Co-Curricular Activities (Seminar/Conference/Exhibition/Technical Competition)	0
14.	CASP	Placement Training	0
Total			**17**

Semester-2			
S. No.	Course Code	Course Title	Credits
1.	UE24CS1201	Applied Mathematics for Computer Science	3
2.	UE24CS1202	Applied Physics for CSE	3
3.	UE24CS1203	Data Structures & Applications	3
4.	UE24CS1204	Python Programming	3
5.	UE24CS1205	Fundamentals of Computer Networks	3
6.	UE24CS1206	Fundamentals of DBMS	3
7.	UE24CS1207	Project Based Learning / mini project	2
8.	SDTCD	Technical Competency	2
9.	CASP	Life Skills	1
10.	CIBI	Innovation and Entrepreneurial Skills	0
11.	SA	Environmental Awareness and Community Services	1
12.	SA	Athletics, Sports, Yoga, Gymnasium	0
13.	SA	Cultural & Literary Activities	0
14.	SASP	Co-Curricular Activities (Seminar/Conference/Exhibition/Technical Competition)	0
15.	CASP	Placement Training	0
Total			24

Semester-3			
S. No.	Course Code	Course Title	Credits
1.	UE24CS2301	Algorithm Design and Complexity Analysis	4
2.	UE24CS2302	Internet of Things	3
3.	UE24CS2303	Object Oriented Programming	3
4.	UE24CS2304	Computer Organization and Architecture	3
5.	UE24CS2305	Operating System Concepts	3
6.	UE24CS2306	Project Based Learning / mini project	2
7.	SDTCD	Technical Competency	2
8.	CASP	Life Skills	1
9.	CIBI	Innovation and Entrepreneurial Skills	0
10.	SA	Environmental Awareness and Community Services	1
11.	SA	Athletics, Sports, Yoga, Gymnasium	1
12.	SA	Cultural & Literary Activities	0
13.	SASP	Co-Curricular Activities (Seminar/Conference/Exhibition/Technical Competition)	0
14.	CASP	Placement Training	1
Total			24

Semester-4			
S. No.	Course Code	Course Title	Credits
1.	UE24CS2401	Machine Learning	3
2.	UE24CS2402	Data Mining & Data Warehousing	3
3.	UE24CS2403	Discrete Structures for Computing	2
4.	UE24CS2404	Advanced DBMS and PL/Sql	3
5.	UE24CS2405	Automata Theory and Computations	3
6.	UE24CS2406	Project Based Learning / mini project on building a Machine Learning Model	2
7.	SDTCD	Technical Competency	2
8.	CASP	Life Skills	1
9.	CIBI	Innovation and Entrepreneurial Skills	1
10.	SA	Environmental Awareness and Community Services	1
11.	SA	Athletics, Sports, Yoga, Gymnasium	1
12.	SA	Cultural & Literary Activities	1
13.	SASP	Co-Curricular Activities (Seminar/Conference/Exhibition/Technical Competition)	0
14.	CASP	Placement Training	1
Total			24

Semester-5			
S. No.	Course Code	Course Title	Credits
1.	UE24CS3501	Advanced Machine Learning	3
2.	UE24CS3502	Cloud Computing and its Applications	3
3.	UE24CS3503	Text Analytics and NLP	3
4.	UE24CS3504	Generative AI	3
5.	UE24AI3505	Project Based Learning / mini project	3
6.	UE24CS35XX	**Professional Elective - 1**	3
7.	SDTCD	Technical Competency	2
8.	CASP	Life Skills	0
9.	CIBI	Innovation and Entrepreneurial Skills	0
10.	SA	Environmental Awareness and Community Services	0
11.	SA	Athletics, Sports, Yoga, Gymnasium	1
12.	SA	Cultural & Literary Activities	0
13.	SASP	Co-Curricular Activities (Seminar/Conference/Exhibition/Technical Competition)	0
14.	CASP	Placement Training	1
Total			22

Semester-6			
S. No.	Course Code	Course Title	Credits
1.	UE24AI3601	Human-centered artificial Intelligence	3
2.	UE24CS3602	Optimization Techniques in AI	3
3.	UE24CS3603	Blockchain Technology	3
4.	UE24CS3604	Project Based Learning / mini project on Block Chain	3
5.	UE24CS36XX	Professional Elective - 2	3
6.	SDTCD	Technical Competency	2
7.	CASP	Life Skills	0
8.	CIBI	Innovation and Entrepreneurial Skills	1
9.	SA	Environmental Awareness and Community Services	0
10.	SA	Athletics, Sports, Yoga, Gymnasium	0
11.	SA	Cultural & Literary Activities	1
12.	SASP	Co-Curricular Activities (Seminar/Conference/Exhibition/Technical Competition)	0
13.	CASP	Placement Training	0
Total			19

Semester-7			
S. No.	Course Code	Course Title	Credits
1.	UE24CS4701	Intellectual Property Rights	3
2.	UE24CS4702	Industry Internship	4
3.	UE24CS4703	Project − 1	4
4.	UE24CS47XX	Open Elective -1	3
5.	SDTCD	Technical Competency	0
6.	CASP	Life Skills	0
7.	CIBI	Innovation and Entrepreneurial Skills	0
8.	SA	Environmental Awareness and Community Services	0
9.	SA	Athletics, Sports, Yoga, Gymnasium	0
10.	SA	Cultural & Literary Activities	1
11.	SASP	Co-Curricular Activities (Seminar/Conference/Exhibition/Technical Competition)	1
12.	CASP	Placement Training	0
Total			16

S. No.	Course Code	Course Title	Credits
		Semester-8	
1.	UE24CS4801	Engineering Project Management	3
2.	UE24CS4802	Project - 2	3
3.	SDTCD	Technical Competency	6
4.	CASP	Life Skills	0
5.	CIBI	Innovation and Entrepreneurial Skills	0
6.	SA	Environmental Awareness and Community Services	1
7.	SA	Athletics, Sports, Yoga, Gymnasium	0
8.	SA	Cultural & Literary Activities	0
9.	SASP	Co-Curricular Activities (Seminar/Conference/Exhibition/TechnicalCompetition)	1
10.	CASP	Placement Training	0
Total			**14**

19	**Program Delivery and Program Attainment**
	The program comprises several courses, each delivered according to the specifications outlined in the course documents. At the conclusion of each course, both course attainments and program attainments are computed. These attainments undergo analysis during Course Assessment Board and Program Assessment Board meetings, leading to recommendations for enhancements in subsequent offerings.
20	Teaching and Learning Methods 1. Face to Face Lectures using Audio-Visuals 2. Laboratory work/Field work/Workshop 3. Project Based Learning 4. Problem Based Learning 5. Group Exercises/Assignments 6. Demonstrations 7. Guest Lectures 8. Industry Visit 9. Workshops, Group Discussions, Debates, Presentations 10. Project Work 11. Project Exhibitions 12. Technical Competitions
21	**Attendance** A minimum of 85% attendance is essential to appear for semester end examinations. Condoning of attendance Shortage is as per the Academic Regulations of B. Tech. Programme.

22	**Assessment and Grading**
	1. Every course will be assessed for a weight of 100
	2. There are 4 components:
	   a. Quiz -15%
	   b. Class Tests: 25%
	   c. Application Based open assignments/ Activity/project-based learning/problem-based learning andany such assessment: 20%
	   d. Semester End Examination: 40%
	3. Based on total marks scored grade is Awarded.If marks scored is:
	   a. 91 and above O (outstanding); 81-90: A+ (Excellent); 71-80: A (Very Good); 61-70: B+ (Good); 51-60: B (Above Average); 40 -50: C (Average); below 40: D (Not satisfactory)
	   b. If one scores D grade, the candidate is required to re-register for the course (for core courses only, students can exercise their choice in case of electives or open electives –means they can re-register orregister for a different elective course) and earn the required credits
	   c. A minimum of overall 40% is required for completion of course by acquiring minimum grade (pass)with a minimum of 40% in each component.
	   4. End of each semester –grade card will be issued with SGPA displayed

23	**Award of Degree**
	Every student registering for the program need to complete a **minimum of 160 credits, completing a minimum of 130 credits in academic courses (Core, elective, open elective) for the award of the degree**.
	Award of Degree Certificate:
	Students will be issued consolidated grade card with CGPA displayed and GM University Degree Certificate.
	Award of Gold Medal: A student with highest CGPA (Not less than 9.0 on a scale of 10) in the class without getting a D grade in any course over 8 semesters and completing the program within the specified period of 4 years (8 semesters) will
	be awarded Gold Medal.
24	**Student Support for Learning**
	1. Course Notes
	2. Reference Books in the Library
	3. Magazines and Journals
	4. Internet Facility
	5. Computing Facility
	6. Laboratory Facility
	7. Workshop Facility
	8. Staff Support
	9. Lounges for Discussions
	10. Any other support that enhances their learning
25	**Quality Control Measures**
	1. Review of Course Notes
	2. Review of Question Papers and Assignment Questions
	3. Student Feedback
	4. Moderation of Assessed Work
	5. Opportunities for students to see their assessed work
	6. Review by external examiners and external examiners reports
	7. Staff Student Consultative Committee meetings
	8. Student exit feedback
	9. Course Assessment Board (CAB)
	10. Programme Assessment Board (PAB)

26. Mapping of POs with Cos.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
Course-1												
CO1												
CO2												
CO3												
CO4												
CO5												
CO6												
Course-2												
CO1												
CO2												
CO3												
CO4												
CO5												
CO6												
-												
-												
-												