GM UNIVERSITY

CURRICULUM

Program Document

B.Tech.
in
Computer
Science- Information Security

GM UNIVERSITY
Innovating Minds

School of Computer Science & Technology
Faculty of Engineering & Technology

B.Tech. – CS-Information Security (CS-IY)

Program Details

Faculty	Engineering and Technology (FET)
School	School of Computer Science and Technology (SCST)
Department	Computer Science & Engineering
Program	B.Tech., Computer Science - Information Security (CS-IY)
Director of School	Dr. Sanjay Pande M.B.
Head of Department	Dr. Aruna Kumar B T

1.	**Title of the Award**	B.Tech., Computer Science - Information Security (CS-IY)
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**	November -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.	**Program Overview for Compute Science -Information Security** The Bachelor's program in Computer Science and Information Security (B.Tech. Computer Science and Information Security) delivers a comprehensive and forward-looking education for students aspiring to excel in the dynamic convergence of computer science, software engineering, and the crucial domain of information security. Meticulously crafted, the program aims to provide students with a robust foundation inboth theoretical principles and practical applications of computer science, nurturing a profound understanding of creative problem-solving, software design, and cutting-edge technologies in the computer science and information security industry. Over the span of four years, students immerse themselves in a meticulously structured curriculum that seamlessly blends core engineering principles with specialized courses in computer science and information security. The program employs a hands-on approach, integrating software projects, system design, and internships to empower students to apply theoretical knowledge to real-world challenges in computerscience and information security. Key areas of study encompass programming principles, algorithms, data structures, artificial intelligence, machine learning, software development methodologies, computer networks, and specialized information security techniques. Proficiency is developed in using leading programming languages, development tools, and simulation software, ensuring graduates are well-prepared for the complexities of the contemporary computer science and information security industry. The B.Tech. Computer Science and Information Security program aim to equip graduates for diverse career opportunities across various sectors, with a specific focus on securing information systems and networks. Potential career paths encompass roles in technology companies, information security firms, government agencies, research and development, and entrepreneurship within the computer science and information security domain. The interdisciplinary nature of computer science and information security provides avenues to explore diverse applications, enabling graduates to contribute to technological advancements, innovative software solutions, and the development of secure systems. Emphasizing continuous learning and staying abreast of the latest industry trends, the program ensures graduates thrive in the rapidly evolving field of computer science and information security. Spanning eight semesters, the program delivers a holistic education

	that readies students for a successful and impactful career in the dynamic realm of computer science and information security innovation.
	Program Educational Objectives (PEOs) for Computer Science - Information Security **PEO-1: Knowledge and Technical Skills:** The Bachelor's program in Computer Science and Information Security strives to furnish graduates with a strong foundation in computer science and engineering principles, covering algorithms, data structures, artificial intelligence, and machine learning. Post-completion, graduates will possess the knowledge and technical skills requisite for analyzing, designing, implementing, and optimizing software systems and intelligent solutions. Their competencies will extend to addressing real-world challenges, especially in the realm of information security, ensuring the confidentiality, integrity, and availability of information systems and networks. **PEO-2: Professional Competence and Leadership** Our program is dedicated to instilling in graduates the technical expertise, practical skills, and leadership acumen essential for success in the dynamic and critical field of computer science and information security. Graduates will excel in various roles within technology companies, information security firms, research and development, and entrepreneurial ventures within the broad spectrum of the computer science domain. They will be adept at assuming both technical and leadership positions, contributing significantly to technological advancements and innovation, with a specific emphasis on securing information systems. **PEO-3: Holistic Development and Adaptability** The program aspires to nurture critical thinking, creativity, innovation, collaboration, effective communication, information literacy, flexibility, adaptability, leadership, responsibility, and social and cross-cultural interactionskills. Graduates will showcase their ability to adapt to evolving professional environments, ensuring they contribute effectively to the dynamic and challenging field of computer science and information security. The interdisciplinary nature of the program is designed to prepare graduates for diverse career trajectories, fostering holistic development and a commitment to lifelong learning. The overarching goal of the B.Tech. in Computer Science and Information Security is to produce graduates who are well-prepared to tackle the challenges of the dynamic computer science and information security industry. They are poised to contribute to technological advancements, enhance innovation, and positively impact the security of information systems and society.

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.
	Program Specific Outcomes (PSOs): **PSO-1: Analyze and Address Information Security Challenges** Graduates will exhibit the ability to analyze intricate computational requirements specific to information security, identify challenges, and precisely articulate problems with necessary specifications. Employing their comprehension of computer science principles within the information security context, graduates will deliver inventive solutions, focusing on issues related to secure software development, algorithm design, and computational applications in the information security domain. **PSO-2: Apply Information Security Concepts in System Development** Graduates will be proficient in envisioning, modeling, designing, implementing, and testing secure software systems and computational solutions. They will demonstrate expertise in addressing technical challenges within the field of computer science and information security, utilizing their knowledge of algorithms, data structures, and secure software development methodologies to create efficient, reliable, and innovative applications with a specific focus on information security measures. **PSO-3: Conduct and Lead Experimental Validation in Information Security** Upon program completion, graduates will demonstrate the capability to strategize, coordinate, and execute experiments for the validation and verification of information security systems and solutions. They will adeptly use laboratory techniques and software tools for designing and simulating secure computational processes, emphasizing the importance of information security measures. Graduates will be well-prepared to assume leadership roles in research projects, effectively managing teams and resources in the context of computer science and information security. These Program Specific Objectives are crafted 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 information security. The objectives underscore the application of computer science principles in addressing real-world challenges and the development of innovative and secure solutions in the realm of information security.

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.	UE23IY1101	Foundational Mathematics for Computer Science	3
2.	UE23IY1102	Analog & Digital Fundamentals	3
3.	UE23IY1103	Advanced Materials Integration in Computing Technology	3
4.	UE23IY1104	Problem Solving through C Programming	3
5.	UE23IY1105	Web Designing & Programming	3
6.	UE23IY1106	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.	UE23IY1201	Applied Mathematics for Computer Science	3
2.	UE23IY1202	Applied Physics for CSE	3
3.	UE23IY1203	Data Structures & Algorithms	3
4.	UE23IY1204	Python Programming	3
5.	UE23IY1205	Fundamentals of Computer Networks	2
6.	UE23IY1206	Fundamentals of DBMS	2
7.	UE23IY1207	Project Based Learning / mini project	2
8.	SDTCD	Technical Competency	02
9.	CASP	Life Skills	01
10.	CIBI	Innovation and Entrepreneurial Skills	00
11.	SA	Environmental Awareness and Community Services	01
12.	SA	Athletics, Sports, Yoga, Gymnasium	00
13.	SA	Cultural & Literary Activities	00
14.	SASP	Co-Curricular Activities (Seminar/Conference/Exhibition/Technical Competition)	00
15.	CASP	Placement Training	00
Total			**22**

Semester-3			
S. No.	**Course Code**	**Course Title**	**Credits**
1.	UE23IY2301	Algorithm Design and Complexity Analysis	4
2.	UE23IY2302	Internet of Things	3
3.	UE23IY2303	Object Oriented Programming	3
4.	UE23IY2304	Computer Organization and Architecture	3
5.	UE23IY2305	Operating System Concepts	3
6.	UE23IY2306	Project Based Learning / mini project	2
7.	SDTCD	Technical Competency	02
8.	CASP	Life Skills	01
9.	CIBI	Innovation and Entrepreneurial Skills	00
10.	SA	Environmental Awareness and Community Services	01
11.	SA	Athletics, Sports, Yoga, Gymnasium	01
12.	SA	Cultural & Literary Activities	00
13.	SASP	Co-Curricular Activities (Seminar/Conference/Exhibition/Technical Competition)	00
14.	CASP	Placement Training	01
Total			**24**

Semester-4			
S. No.	**Course Code**	**Course Title**	**Credits**
1.	UE23IY2401	Machine Learning	3
2.	UE23IY2402	Data Mining & Data Warehousing	3
3.	UE23IY2403	Discrete Structures for Computing	2
4.	UE23IY2404	Advanced DBMS + NoSql	3
5.	UE23IY2405	Automata Theory and Compiler Design	3
6.	UE23IY2406	Project Based Learning / mini project on building a Machine Learning Model	2
7.	SDTCD	Technical Competency	02
8.	CASP	Life Skills	01
9.	CIBI	Innovation and Entrepreneurial Skills	01
10.	SA	Environmental Awareness and Community Services	01
11.	SA	Athletics, Sports, Yoga, Gymnasium	01
12.	SA	Cultural & Literary Activities	01
13.	SASP	Co-Curricular Activities (Seminar/Conference/Exhibition/Technical Competition)	00
14.	CASP	Placement Training	01
Total			**24**

Semester-5			
S. No.	**Course Code**	**Course Title**	**Credits**
1.	UE23IY3501	Advance Machine Learning	3
2.	UE23IY3502	Software Engineering	3
3.	UE23IY3503	Malware Analysis	3
4.	UE23IY3504	Information and Network Security	3
5.	UE23IY3505	Project Based Learning / mini projec	3
6.	UE23IY3540	Professional Elective – 1 Data Privacy	3
7.	SDTCD	Technical Competency	02
8.	CASP	Life Skills	00
9.	CIBI	Innovation and Entrepreneurial Skills	00
10.	SA	Environmental Awareness and Community Services	00
11.	SA	Athletics, Sports, Yoga, Gymnasium	01
12.	SA	Cultural & Literary Activities	00
13.	SASP	Co-Curricular Activities (Seminar/Conference/Exhibition/Technical Competition)	00
14.	CASP	Placement Training	01
Total			**22**

Semester-6			
S. No.	**Course Code**	**Course Title**	**Credits**
1.	UE23IY3601	Secure Programming	3
2.	UE23IY3602	Defensive Security	3
3.	UE23IY3603	Blockchain Technology	3
4.	UE23IY3604	Project Based Learning / mini project on Block Chain	3
5.	UE23IY36XX	Professional Elective - 2	3
6.	SDTCD	Technical Competency	02
7.	CASP	Life Skills	00
8.	CIBI	Innovation and Entrepreneurial Skills	01
9.	SA	Environmental Awareness and Community Services	00
10.	SA	Athletics, Sports, Yoga, Gymnasium	00
11.	SA	Cultural & Literary Activities	01
12.	SASP	Co-Curricular Activities (Seminar/Conference/Exhibition/Technical Competition)	00
13.	CASP	Placement Training	00
Total			**19**

Semester-7			
S. No.	**Course Code**	**Course Title**	**Credits**
1.	UE23IY4701	Intellectual Property Rights	3
2.	UE23IY4702	Industry Internship	3
3.	UE23IY4703	Project - 1	4
4.	UE23IY47XX	Open Elective -1	4
5.	SDTCD	Technical Competency	00
6.	CASP	Life Skills	00
7.	CIBI	Innovation and Entrepreneurial Skills	00
8.	SA	Environmental Awareness and Community Services	00
9.	SA	Athletics, Sports, Yoga, Gymnasium	00
10.	SA	Cultural & Literary Activities	01
11.	SASP	Co-Curricular Activities (Seminar/Conference/Exhibition/Technical Competition)	01
12.	CASP	Placement Training	00
Total			**16**

Semester-8			
S. No.	**Course Code**	**Course Title**	**Credits**
1.	UE23IY4801	Engineering Project Management	3
2.	UE23IY4802	Project - 2	3
3.	UE23IY48XX	Open Elective -2	6
4.	SDTCD	Technical Competency	00
5.	CASP	Life Skills	00
6.	CIBI	Innovation and Entrepreneurial Skills	01
7.	SA	Environmental Awareness and Community Services	00
8.	SA	Athletics, Sports, Yoga, Gymnasium	00
9.	SA	Cultural & Literary Activities	00
10.	SASP	Co-Curricular Activities (Seminar/Conference/Exhibition/Technical Competition)	01
11.	CASP	Placement Training	00
Total			**14**

List of Electives Offered

List of Professional Electives offered for 5th Semester

Sl	Course Code	Course Title	Credits
1	UE23IY3540	Data Privacy	3
2	UE23IY3541	Advanced Cryptography	3
3	UE23IY3542	Cloud Computing and Its Applications	3

List of Professional Electives offered for 6th Semester

Sl	Course Code	Course Title	Credits
1	UE23IY3640	Wireless Adhoc Networks	3
2	UE23IY3641	Malware Analysis	3
3	UE23IY3642	Sensor and Sensing Systems	3
	UE23IY3643	Security threat and Vulnerability	3
	UE23IY3644	Data wrangling using Python	3
	UE23IY3645	Cyber Security and Secure Systems	3

List of Open Electives offered for 7th Semester

Sl	Course Code	Course Title	Credits
1	UE23IY4780	M& E	2
2	UE23IY4781	Biology of Enginers	2
3	UE23IY4782	Nano Technology	2

List of Open Electives offered for 8th Semester

Sl	Course Code	Course Title	Credits
1	UE23IY4880	Renewable Energy Resources	2
2	UE23IY4881	Agricultural Robotics	2
3	UE23IY4882	Occupational Health & Safety	2

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 or register 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.

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO10	PO11	PO12
Course- 1												
CO1												
CO2												
CO3												
CO4												
CO5												
CO6												
Course -2												
CO1												
CO2												
CO3												
CO4												
CO5												
CO6												
-												
-												
-												

B.Tech. – CS-Information Security (CS-IY)

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3.	**Awarding Institution /Body**	GM University
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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.

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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.	UE24IY1101	Foundational Mathematics for Computer Science	3
2.	UE24IY1102	Analog & Digital Fundamentals	3
3.	UE24IY1103	Advanced Materials Integration in Computing Technology	3
4.	UE24IY1104	Problem Solving through C Programming	3
5.	UE24IY1105	Web Designing & Programming	3
6.	UE24IY1106	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.	UE24IY1201	Applied Mathematics for Computer Science	3
2.	UE24IY1202	Applied Physics for CSE	3
3.	UE24IY1203	Data Structures & Algorithms	3
4.	UE24IY1204	Python Programming	3
5.	UE24IY1205	Fundamentals of Computer Networks	2
6.	UE24IY1206	Fundamentals of DBMS	2
7.	UE24IY1207	Project Based Learning / mini project	2
8.	SDTCD	Technical Competency	02
9.	CASP	Life Skills	01
10.	CIBI	Innovation and Entrepreneurial Skills	00
11.	SA	Environmental Awareness and Community Services	01
12.	SA	Athletics, Sports, Yoga, Gymnasium	00
13.	SA	Cultural & Literary Activities	00
14.	SASP	Co-Curricular Activities (Seminar/Conference/Exhibition/Technical Competition)	00
15.	CASP	Placement Training	00
Total			**22**

Semester-3			
S. No.	**Course Code**	**Course Title**	**Credits**
1.	UE24IY2301	Algorithm Design and Complexity Analysis	4
2.	UE24IY2302	Internet of Things	3
3.	UE24IY2303	Object Oriented Programming	3
4.	UE24IY2304	Computer Organization and Architecture	3
5.	UE24IY2305	Operating System Concepts	3
6.	UE24IY2306	Project Based Learning / mini project	2
7.	SDTCD	Technical Competency	02
8.	CASP	Life Skills	01
9.	CIBI	Innovation and Entrepreneurial Skills	00
10.	SA	Environmental Awareness and Community Services	01
11.	SA	Athletics, Sports, Yoga, Gymnasium	01
12.	SA	Cultural & Literary Activities	00
13.	SASP	Co-Curricular Activities (Seminar/Conference/Exhibition/Technical Competition)	00
14.	CASP	Placement Training	01
Total			**24**

Semester-4			
S. No.	**Course Code**	**Course Title**	**Credits**
1.	UE24IY2401	Machine Learning	3
2.	UE24IY2402	Data Mining & Data Warehousing	3
3.	UE24IY2403	Discrete Structures for Computing	2
4.	UE24IY2404	Advanced DBMS + NoSql	3
5.	UE24IY2405	Automata Theory and Compiler Design	3
6.	UE24IY2406	Project Based Learning / mini project on building a Machine Learning Model	2
7.	SDTCD	Technical Competency	02
8.	CASP	Life Skills	01
9.	CIBI	Innovation and Entrepreneurial Skills	01
10.	SA	Environmental Awareness and Community Services	01
11.	SA	Athletics, Sports, Yoga, Gymnasium	01
12.	SA	Cultural & Literary Activities	01
13.	SASP	Co-Curricular Activities (Seminar/Conference/Exhibition/Technical Competition)	00
14.	CASP	Placement Training	01
Total			**24**

Semester-5			
S. No.	**Course Code**	**Course Title**	**Credits**
1.	UE24CY3501	Cyber security and cyber Law	3
2.	UE24IY3502	Cloud Computing and its Applications	3
3.	UE24CC3503	Network & Cloud Security	3
4.	UE24CY3504	Web Application & Database Security	3
5.	UE24CY3505	Project Based Learning / mini project on Ethical Hacking	3
6.	UE24IY35XX	Professional Elective - 1	3
7.	SDTCD	Technical Competency	02
8.	CASP	Life Skills	00
9.	CIBI	Innovation and Entrepreneurial Skills	00
10.	SA	Environmental Awareness and Community Services	00
11.	SA	Athletics, Sports, Yoga, Gymnasium	01
12.	SA	Cultural & Literary Activities	00
13.	SASP	Co-Curricular Activities (Seminar/Conference/Exhibition/Technical Competition)	00
14.	CASP	Placement Training	01
Total			**22**

Semester-6			
S. No.	**Course Code**	**Course Title**	**Credits**
1.	UE24CY3601	Secure Programming	3
2.	UE24CY3602	Defensive Security	3
3.	UE24IY3603	Blockchain Technology	3
4.	UE24IY3604	Project Based Learning / mini project on Block Chain	3
5.	UE24IY36XX	Professional Elective - 2	3
6.	SDTCD	Technical Competency	02
7.	CASP	Life Skills	00
8.	CIBI	Innovation and Entrepreneurial Skills	01
9.	SA	Environmental Awareness and Community Services	00
10.	SA	Athletics, Sports, Yoga, Gymnasium	00
11.	SA	Cultural & Literary Activities	01
12.	SASP	Co-Curricular Activities (Seminar/Conference/Exhibition/Technical Competition)	00
13.	CASP	Placement Training	00
Total			**19**

Semester-7			
S. No.	**Course Code**	**Course Title**	**Credits**
1.	UE24IY4701	Intellectual Property Rights	3
2.	UE24IY4702	Industry Internship	3
3.	UE24IY4703	Project - 1	4
4.	UE24IY47XX	Open Elective -1	4
5.	SDTCD	Technical Competency	00
6.	CASP	Life Skills	00
7.	CIBI	Innovation and Entrepreneurial Skills	00
8.	SA	Environmental Awareness and Community Services	00
9.	SA	Athletics, Sports, Yoga, Gymnasium	00
10.	SA	Cultural & Literary Activities	01
11.	SASP	Co-Curricular Activities (Seminar/Conference/Exhibition/Technical Competition)	01
12.	CASP	Placement Training	00
Total			**16**

Semester-8			
S. No.	**Course Code**	**Course Title**	**Credits**
1.	UE24IY4801	Engineering Project Management	3
2.	UE24IY4802	Project - 2	3
3.	UE24IY48XX	Open Elective -2	6
4.	SDTCD	Technical Competency	00
5.	CASP	Life Skills	00
6.	CIBI	Innovation and Entrepreneurial Skills	01
7.	SA	Environmental Awareness and Community Services	00
8.	SA	Athletics, Sports, Yoga, Gymnasium	00
9.	SA	Cultural & Literary Activities	00
10.	SASP	Co-Curricular Activities (Seminar/Conference/Exhibition/Technical Competition)	01
11.	CASP	Placement Training	00
Total			**14**

List of Electives Offered

List of Professional Electives offered for 5th Semester

Sl	Course Code	Course Title	Credits
1	UE24IY3540	Devops Essential	3
2	UE24IY3541	Principles of Artificial Intelligence	3
3	UE24IY3542	Software Engineering	3
	UE24IY3543	Ethical Hacking	3
	UE24IY3544	Information Network Security	3
	UE24IY3545	Advanced Cryptography	3

List of Professional Electives offered for 6th Semester

Sl	Course Code	Course Title	Credits
1	UE24IY3640	Wireless Adhoc Networks	3
2	UE24IY3641	Malware Analysis	3
3	UE24IY3642	Sensor and Sensing Systems	3
	UE24IY3643	Security threat and Vulnerability	3
	UE24IY3644	Data wrangling using Python	3
	UE24IY3645	Cyber Security and Secure Systems	3

List of Open Electives offered for 7th Semester

Sl	Course Code	Course Title	Credits
1	UE24IY4780	M& E	2
2	UE24IY4781	Biology of Enginers	2
3	UE24IY4782	Nano Technology	2

List of Open Electives offered for 8th Semester

Sl	Course Code	Course Title	Credits
1	UE24IY4880	Renewable Energy Resources	2
2	UE24IY4881	Agricultural Robotics	2
3	UE24IY4882	Occupational Health & Safety	2

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 or register 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.

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO10	PO11	PO12
Course- 1												
CO1												
CO2												
CO3												
CO4												
CO5												
CO6												
Course -2												
CO1												
CO2												
CO3												
CO4												
CO5												
CO6												
-												
-												
-												

B.Tech. – CS-Information Security (CS-IY)

Program Details

Faculty	Engineering and Technology (FET)
School	School of Computer Science and Technology (SCST)
Department	Computer Science & Engineering
Program	B.Tech., Computer Science - Information Security (CS-IY)
Director of School	Dr. Sanjay Pande M.B.
Head of Department	Dr. Aruna Kumar B T

1.	**Title of the Award**	B.Tech., Computer Science - Information Security (CS-IY)
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**	November -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.	**Program Overview for Compute Science -Information Security** The Bachelor's program in Computer Science and Information Security (B.Tech. Computer Science and Information Security) delivers a comprehensive and forward-looking education for students aspiring to excel in the dynamic convergence of computer science, software engineering, and the crucial domain of information security. Meticulously crafted, the program aims to provide students with a robust foundation in both theoretical principles and practical applications of computer science, nurturing a profound understanding of creative problem-solving, software design, and cutting-edge technologies in the computer science and information security industry. Over the span of four years, students immerse themselves in a meticulously structured curriculum that seamlessly blends core engineering principles with specialized courses in computer science and information security. The program employs a hands-on approach, integrating software projects, system design, and internships to empower students to apply theoretical knowledge to real-world challenges in computerscience and information security. Key areas of study encompass programming principles, algorithms, data structures, artificial intelligence, machine learning, software development methodologies, computer networks, and specialized information security techniques. Proficiency is developed in using leading programming languages, development tools, and simulation software, ensuring graduates are well-prepared for the complexities of the contemporary computer science and information security industry. The B.Tech. Computer Science and Information Security program aim to equip graduates for diverse career opportunities across various sectors, with a specific focus on securing information systems and networks. Potential career paths encompass roles in technology companies, information security firms, government agencies, research and development, and entrepreneurship within the computer science and information security domain. The interdisciplinary nature of computer science and information security provides avenues to explorediverse applications, enabling graduates to contribute to technological advancements, innovative software solutions, and the development of secure systems. Emphasizing continuous learning and staying abreast of the latest industry trends, the program ensures graduates thrive in the rapidly evolving field of computer science and information security. Spanning eight semesters, the program delivers a holistic education that readies students for a

	successful and impactful career in the dynamic realm of computer science and information security innovation.
	Program Educational Objectives (PEOs) for Computer Science - Information Security **PEO-1: Knowledge and Technical Skills:** The Bachelor's program in Computer Science and Information Security strives to furnish graduates with a strong foundation in computer science and engineering principles, covering algorithms, data structures, artificial intelligence, and machine learning. Post-completion, graduates will possess the knowledge and technical skills requisite for analyzing, designing, implementing, and optimizing software systems and intelligent solutions. Their competencies will extend to addressing real-world challenges, especially in the realm of information security, ensuring the confidentiality, integrity, and availability of information systems and networks. **PEO-2: Professional Competence and Leadership** Our program is dedicated to instilling in graduates the technical expertise, practical skills, and leadership acumen essential for success in the dynamic and critical field of computer science and information security. Graduates will excel in various roles within technology companies, information security firms, research and development, and entrepreneurial ventures within the broad spectrum of the computer science domain. They will be adept at assuming both technical and leadership positions, contributing significantly to technological advancements and innovation, with a specific emphasis on securing information systems. **PEO-3: Holistic Development and Adaptability** The program aspires to nurture critical thinking, creativity, innovation, collaboration, effective communication, information literacy, flexibility, adaptability, leadership, responsibility, and social and cross-cultural interaction skills. Graduates will showcase their ability to adapt to evolving professional environments, ensuring they contribute effectively to the dynamic and challenging field of computer science and information security. The interdisciplinary nature of the program is designed to prepare graduates for diverse career trajectories, fostering holistic development and a commitment to lifelong learning. The overarching goal of the B.Tech. in Computer Science and Information Security is to produce graduates who are well-prepared to tackle the challenges of the dynamic computer science and information security industry. They are poised to contribute to technological advancements, enhance innovation, and positively impact the security of information systems and society.

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 andmanagement 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.
	Program Specific Outcomes (PSOs): **PSO-1: Analyze and Address Information Security Challenges** Graduates will exhibit the ability to analyze intricate computational requirements specific to information security, identify challenges, and precisely articulate problems with necessary specifications. Employing their comprehension of computer science principles within the information security context, graduates will deliver inventive solutions, focusing on issues related to secure software development, algorithm design, and computational applications in the information security domain. **PSO-2: Apply Information Security Concepts in System Development** Graduates will be proficient in envisioning, modeling, designing, implementing, and testing secure software systems and computational solutions. They will demonstrate expertise in addressing technical challenges within the field of computer science and information security, utilizing their knowledge of algorithms, data structures, and secure software development methodologies to create efficient, reliable, and innovative applications with a specific focus on information security measures. **PSO-3: Conduct and Lead Experimental Validation in Information Security** Upon program completion, graduates will demonstrate the capability to strategize, coordinate, and execute experiments for the validation and verification of information security systems and solutions. They will adeptly use laboratory techniques and software tools for designing and simulating secure computational processes, emphasizing the importance of information security measures. Graduates will be well-prepared to assume leadership roles in research projects, effectively managing teams and resources in the context of computer science and information security. These Program Specific Objectives are crafted 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 information security. The objectives underscore the application of computer science principles in addressing real-world challenges and the development of innovative and secure solutions in the realm of information security.

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 & Algorithms	3
4.	UE24CS1204	Python Programming	3
5.	UE24CS1205	Fundamentals of Computer Networks	2
6.	UE24CS1206	Fundamentals of DBMS	2
7.	UE24CS1207	Project Based Learning / mini project	2
8.	SDTCD	Technical Competency	02
9.	CASP	Life Skills	01
10.	CIBI	Innovation and Entrepreneurial Skills	00
11.	SA	Environmental Awareness and Community Services	01
12.	SA	Athletics, Sports, Yoga, Gymnasium	00
13.	SA	Cultural & Literary Activities	00
14.	SASP	Co-Curricular Activities (Seminar/Conference/Exhibition/Technical Competition)	00
15.	CASP	Placement Training	00
Total			**22**

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	02
8.	CASP	Life Skills	01
9.	CIBI	Innovation and Entrepreneurial Skills	00
10.	SA	Environmental Awareness and Community Services	01
11.	SA	Athletics, Sports, Yoga, Gymnasium	01
12.	SA	Cultural & Literary Activities	00
13.	SASP	Co-Curricular Activities (Seminar/Conference/Exhibition/Technical Competition)	00
14.	CASP	Placement Training	01
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 + NoSql	3
5.	UE24CS2405	Automata Theory and Compiler Design	3
6.	UE24CS2406	Project Based Learning / mini project on building a Machine Learning Model	2
7.	SDTCD	Technical Competency	02
8.	CASP	Life Skills	01
9.	CIBI	Innovation and Entrepreneurial Skills	01
10.	SA	Environmental Awareness and Community Services	01
11.	SA	Athletics, Sports, Yoga, Gymnasium	01
12.	SA	Cultural & Literary Activities	01
13.	SASP	Co-Curricular Activities (Seminar/Conference/Exhibition/Technical Competition)	00
14.	CASP	Placement Training	01
Total			**24**

Semester-5			
S. No.	**Course Code**	**Course Title**	**Credits**
1.	UE24CY3501	Cyber security and cyber Law	3
2.	UE24CS3502	Cloud Computing and its Applications	3
3.	UE24CC3503	Network & Cloud Security	3
4.	UE24CY3504	Web Application & Database Security	3
5.	UE24CY3505	Project Based Learning / mini project on Ethical Hacking	3
6.	UE24CS35XX	Professional Elective - 1	3
7.	SDTCD	Technical Competency	02
8.	CASP	Life Skills	00
9.	CIBI	Innovation and Entrepreneurial Skills	00
10.	SA	Environmental Awareness and Community Services	00
11.	SA	Athletics, Sports, Yoga, Gymnasium	01
12.	SA	Cultural & Literary Activities	00
13.	SASP	Co-Curricular Activities (Seminar/Conference/Exhibition/Technical Competition)	00
14.	CASP	Placement Training	01
Total			**22**

Semester-6			
S. No.	**Course Code**	**Course Title**	**Credits**
1.	UE24CY3601	Secure Programming	3
2.	UE24CY3602	Defensive Security	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	02
7.	CASP	Life Skills	00
8.	CIBI	Innovation and Entrepreneurial Skills	01
9.	SA	Environmental Awareness and Community Services	00
10.	SA	Athletics, Sports, Yoga, Gymnasium	00
11.	SA	Cultural & Literary Activities	01
12.	SASP	Co-Curricular Activities (Seminar/Conference/Exhibition/Technical Competition)	00
13.	CASP	Placement Training	00
Total			**19**

Semester-7			
S. No.	**Course Code**	**Course Title**	**Credits**
1.	UE24CS4701	Intellectual Property Rights	3
2.	UE24CS4702	Industry Internship	3
3.	UE24CS4703	Project - 1	4
4.	UE24CS47XX	Open Elective -1	4
5.	SDTCD	Technical Competency	00
6.	CASP	Life Skills	00
7.	CIBI	Innovation and Entrepreneurial Skills	00
8.	SA	Environmental Awareness and Community Services	00
9.	SA	Athletics, Sports, Yoga, Gymnasium	00
10.	SA	Cultural & Literary Activities	01
11.	SASP	Co-Curricular Activities (Seminar/Conference/Exhibition/Technical Competition)	01
12.	CASP	Placement Training	00
Total			**16**

Semester-8			
S. No.	**Course Code**	**Course Title**	**Credits**
1.	UE24IY4801	Engineering Project Management	3
2.	UE24CS4802	Project - 2	3
3.	UE24CS48XX	Open Elective -2	6
4.	SDTCD	Technical Competency	00
5.	CASP	Life Skills	00
6.	CIBI	Innovation and Entrepreneurial Skills	01
7.	SA	Environmental Awareness and Community Services	00
8.	SA	Athletics, Sports, Yoga, Gymnasium	00
9.	SA	Cultural & Literary Activities	00
10.	SASP	Co-Curricular Activities (Seminar/Conference/Exhibition/Technical Competition)	01
11.	CASP	Placement Training	00
Total			**14**

List of Electives Offered

List of Professional Electives offered for 5th Semester

Sl	Course Code	Course Title	Credits
1	UE24CS3540	Devops Essential	3
2	UE24CS3541	Principles of Artificial Intelligence	3
3	UE24CS3542	Software Engineering	3
	UE24CS3543	Ethical Hacking	3
	UE24CS3544	Information Network Security	3
	UE24CS3545	Advanced Cryptography	3

List of Professional Electives offered for 6th Semester

Sl	Course Code	Course Title	Credits
1	UE24CS3640	Wireless Adhoc Networks	3
2	UE24CS3641	Malware Analysis	3
3	UE24CS3642	Sensor and Sensing Systems	3
	UE24CS3643	Security threat and Vulnerability	3
	UE24CS3644	Data wrangling using Python	3
	UE24CS3645	Cyber Security and Secure Systems	3

List of Open Electives offered for 7th Semester

Sl	Course Code	Course Title	Credits
1	UE24CS4780	M& E	2
2	UE24CS4781	Biology of Enginers	2
3	UE24CS4782	Nano Technology	2

List of Open Electives offered for 8th Semester

Sl	Course Code	Course Title	Credits
1	UE24CS4880	Renewable Energy Resources	2
2	UE24CS4881	Agricultural Robotics	2
3	UE24CS4882	Occupational Health & Safety	2

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 or register 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.

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO10	PO11	PO12
Course- 1												
CO1												
CO2												
CO3												
CO4												
CO5												
CO6												
Course -2												
CO1												
CO2												
CO3												
CO4												
CO5												
CO6												
-												
-												
-												

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