

Integrated M.Sc. Computer Science
(With Specialization Options
AI and Data Science/Internet of Things/Cyber Security)

Course Structure

w.e.f. 2021-22



Department of Computer Engineering
Gujarat Power Engineering and Research Institute,
Mevad



Constituent College of Gujarat Technological University
Nr. Toll Booth, Mehsana –Ahmedabad Expressway, Mehsana

Rationale of the Program:

Integrated M.Sc. in Computer Science (With Specialization options Artificial Intelligence and Data Science/Internet of Things(IoT)/Cyber Security) is a program offered at the Gujarat Power Engineering and Research Institute (GPRI), a constituent college of GTU which is located at Mehsana campus. This program teaches practical skills, underpinned by core theories so that students can gain expertise in the key skill areas of AI and Data Science/ Internet of Things(IoT)/Cyber Security.

Artificial intelligence (AI) is the state-of-the-art in Computer Science for creating human-level thought processes. Data Science is an interdisciplinary discipline that can derive knowledge/insights from any type of data, whether structured, unstructured, or semi-structured. This program covers basic computer science courses and specialization in a wide range of mathematics topics relevant to data science and artificial intelligence/IoT/Cyber Security.

It is a unique program designed to impart the essential skills to cater to the fastest-growing trends in the industry. The curriculum is a blend of core and advanced specialized courses in statistics and predictive analytics using Python, Machine Learning, Data Visualization. This Integrated MSc equips students with the key skills to design and engineer the next generation of connected devices and systems. The student will also gain a solid understanding of AI-driven data analysis and learn how human interaction with IoT goes far beyond the Internet. This program has been specifically designed to meet the industry need for a new kind of IT specialist with a strong foundation in mathematics, communication skills. Students will gain the technical knowledge and skills to protect and defend computer systems and networks that can plan, implement, and monitor cyber security mechanisms to help ensure the protection of information technology assets. The program will provide students with an opportunity to get exposed to a broad range of subjects leading to a high level of data science/IoT/Cyber Security skills. The project gives the much-needed hands-on learning experience in the final semester, where they can analyze and draw actionable inferences from raw data using analytics based on statistical and mathematical understanding.

Program Outcome

- **Knowledge in Mathematics and Computer Science:** Understand the basic concepts, fundamental principles, and scientific theories related to Data Science.
- **Abstract thinking:** Ability to absorb and understand the abstract concepts that lead to various advanced theories in Mathematics, Statistics, and Computer science.
- **Modeling and solving:** Ability in modeling and solving problems by identifying and employing the appropriate existing theories and methods.
- **Advanced theories and methods:** Understand advanced theories and methods to design solutions for complex data science problems.

Integrated M.Sc.Computer Science (With Specialization Options:
AI and Data Science/IoT/Cyber Security)

Course Structure
w.e.f. 2021-22

- **Applications in Engineering and Sciences:** Understand the role of mathematical sciences and apply the same to solve real-life problems in fields of data science.
- **Modern software tool usage:** Acquire the skills in handling scientific tools towards problem-solving and solution analysis.
- **Environment and sustainability:** Understand the significance of preserving the environment towards sustainable development.
- **Ethics:** Imbibe ethical, moral and social values in personal and social life leading to a highly cultured and civilized personality. Continue to enhance the knowledge and skills in mathematics and computer science for constructive activities, and demonstrate the highest standards of professional ethics.
- **Individual and teamwork:** Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
- **Communication:** Develop various communication skills such as reading, listening, and speaking which will help in expressing ideas and views clearly and effectively.
- **Project management and Research:** Demonstrate knowledge, understand the scientific and management principles and apply these to one's own work, as a member/ leader in a team to manage projects and multidisciplinary research environments. Also, use the research-based knowledge to analyze and solve advanced problems in data science.
- **Life-long 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.

Course Details:

Title of Degree	Specialization Options	Intake	Entry-level qualification	Remarks
Integrated M.Sc. Computer Science Duration:05 Years	1. Artificial Intelligence and Data Science 2. Internet of Things(IoT) 3. Cyber Security	60	12 th (Mandatory Subjects: Physics, Chemistry, Mathematics/Biology from a recognized board)	After completion of 3 rd year, a student will be awarded B.Sc.Computer Science and student can voluntarily exit the course or may continue it and after completion of 5 th year, a student will be awarded M.Sc. Computer Science (With Specialization options)

Integrated M.Sc.Computer Science (With Specialization Options:
AI and Data Science/IoT/Cyber Security)

Course Structure
w.e.f. 2021-22

Course Structure:

Semester-I										
Course Code	Courses	L	T	P	Cr	E	M	I	V	Total
	Communication Skills	2	2	0	4	50	-	-	-	50
	Mathematics-I	3	2	0	5	70	30	20	30	150
	Fundamentals of Computer and Basics of Programming	3	0	2	4	70	30	20	30	150
	Introduction to PC package & Operating system	2	0	4	4	70	30	20	30	150
	Internet and Web technology	3	0	2	4	70	30	20	30	150
	Fundamentals of Mathematics (Non-credit mandatory course for 12 th science 'B' group students only. It will not be offer to 12 th science 'A' group students)	2	2	0	0	-	30	20	-	50
		15	6	8	21					

Semester-II										
Course Code	Courses	L	T	P	Cr	E	M	I	V	Total
	Mathematics-II	3	2	0	5	70	30	20	30	150
	Database Management System	3	0	2	4	70	30	20	30	150
	Data structure	3	0	2	4	70	30	20	30	150
	Object oriented Programming in C++	3	0	2	4	70	30	20	30	150
	Hardware configuration and solutions	2	0	4	4	70	30	20	30	150
		14	2	10	21					

Semester-III										
Course Code	Courses	L	T	P	Cr	E	M	I	V	Total
	Numerical Methods	3	0	2	4	70	30	20	30	150
	Operating system	3	0	2	4	70	30	20	30	150
	Digital Electronics	3	0	2	4	70	30	20	30	150
	Client server architecture and interface	3	0	2	4	70	30	20	30	150
	Object Oriented Programming with JAVA	3	0	2	4	70	30	20	30	150
		15	0	10	20					

Integrated M.Sc.Computer Science (With Specialization Options:
AI and Data Science/IoT/Cyber Security)

Course Structure
w.e.f. 2021-22

Semester-IV										
Course Code	Courses	L	T	P	Cr	E	M	I	V	Total
	System Analysis and Design	3	0	2	4	70	30	20	30	150
	Statistical Methods and probabilities	3	0	2	4	70	30	20	30	150
	Computer Network	3	0	2	4	70	30	20	30	150
	Introduction to Web Designing	3	0	2	4	70	30	20	30	150
	Cryptography	3	0	2	4	70	30	20	30	150
		15	0	10	20					

Semester-V										
Course Code	Courses	L	T	P	Cr	E	M	I	V	Total
	Software Engineering	3	0	2	4	70	30	20	30	150
	Introduction to Algorithms	3	0	2	4	70	30	20	30	150
	Data warehouse and mining	3	0	2	4	70	30	20	30	150
	Advance Database Architecture	3	0	2	4	70	30	20	30	150
	Mobile application development	3	0	2	4	70	30	20	30	150
		15	0	10	20					

Semester-VI										
Course Code	Courses	L	T	P	Cr	E	M	I	V	Total
	Design and analysis of Algorithm	3	0	2	4	70	30	20	30	150
	Computer Graphics	3	0	2	4	70	30	20	30	150
	Management Information System	4	0	2	5	70	30	20	30	150
	Seminar	0	0	2	2	-	-	20	30	50
	Project -I	0	0	10	5	-	-	50	100	150
		10	0	18	20					

Semester-VII										
Course Code	Courses	L	T	P	Cr	E	M	I	V	Total
	Distributed System	4	0	2	5	70	30	20	30	150
	Software Testing and quality assurance	3	0	2	4	70	30	20	30	150
	Personality development and Aptitude	2	0	0	2	70	30	20	30	150
	Elective-I	3	0	2	4	70	30	20	30	150

Integrated M.Sc.Computer Science (With Specialization Options:
AI and Data Science/IoT/Cyber Security)

Course Structure
w.e.f. 2021-22

	1. Introduction to AI and Data Science 2. Introduction to IOT 3. Introduction to Cybersecurity									
	Elective-II 1. Statistics and Exploratory Data Analysis 2. Wireless Sensor network 3. Cybercrimes ethics and laws	3	0	2	4	70	30	20	30	150
		15	0	8	19					

Semester-VIII										
Course Code	Courses	L	T	P	Cr	E	M	I	V	Total
	Advance operating system	3	0	2	4	70	30	20	30	150
	Information and network Security	3	0	2	4	70	30	20	30	150
	Python programming	3	0	2	4	70	30	20	30	150
	Elective-III 1. Machine learning 2. IOT and Smart Sensors 3. Cyber security administration and management	3	0	2	4	70	30	20	30	150
	Elective-IV 1. Data Visualization 2. IOT Architecture and protocols 3. Blockchain Technology	3	0	2	4	70	30	20	30	150
		15	0	10	20					

Semester-IX										
Course Code	Courses	L	T	P	Cr	E	M	I	V	Total
	Cloud Computing	3	0	2	4	70	30	20	30	150
	Project management practices and evaluation	3	0	2	4	70	30	20	30	150
	Embedded System	3	0	2	4	70	30	20	30	150
	Elective-V 1. Deep learning 2. Industrial IOT 3. Ethical hacking	3	0	2	4	70	30	20	30	150
	Elective-VI 1. Big Data Analytics 2. IOT security 3. Web and database security	3	0	2	4	70	30	20	30	150

Integrated M.Sc.Computer Science (With Specialization Options:
AI and Data Science/IoT/Cyber Security)

Course Structure
w.e.f. 2021-22

		15	0	10	20					
--	--	----	---	----	----	--	--	--	--	--

Semester-X										
Course Code	Courses	L	T	P	Cr	E	M	I	V	Total
	Project-II	0	0	24	12	0	0	100	200	300
	Internship	0	0	0	2	0	0	20	30	50
		0	0	24	14					

Students will be carrying out an internship of 2 weeks after the University Exam of Semester IX and before the commencement of semester X

*L=lectures, T=tutorial, P=Practical, E=Theory External, M=Theory Internal, I=Practical Internal, V=Practical External