

Indian Institute of Technology Jodhpur

Course Booklet

for

M.Tech. (AI)

and

Dual degree M.Tech. (AI) + PhD

Programs

offered by the

Department of Computer Science and Engineering

July 2019

M.Tech in Artificial Intelligence (AI)

Introduction:

Artificial Intelligence (AI) is a branch of computer science that aims to create machines to act with higher levels of intelligence and emulate the human capabilities of sense, comprehend and act. The core problems of artificial intelligence include programming computers for certain traits such as Knowledge, Reasoning, Problem-solving, Perception, Learning and Planning. AI technology development and applications are evolving rapidly with major implications for economies and societies. As the demand for such applications increases, there is also an increasing need for building the future workforce for AI. For developing the AI ecosystem, this program will be executed in synergy with other M.Tech programs running in IIT Jodhpur, such as Sensors & IoT, Cyber-Physical Systems, and Advanced Manufacturing and Design.

Objectives:

This M.Tech in AI programme will offer students with deep knowledge of both fundamental AI technologies, as well as application-oriented AI. A student completing this program will be capable to undertake careers in industry as well as academia. He/She will have the option to explore a variety of domains including Manufacturing, Fintech, Healthcare, Agriculture/Food Processing, Education, Retail/Customer Engagement, Human and Robot interaction/intelligent automation, Smart City, Aid for Differently Abled/Accessibility Technology.

Expected Graduate Attributes:

After completing this programme, a student will be able to develop an ability to:

1. Comprehend fundamental concepts and hands-on knowledge of the state-of-the-art AI methodologies.
2. Design and Build real-world AI systems for complex planning, decision making and learning, solving application-specific problems, and to reason about them.
3. Conceive, Design and Develop Intelligent multi-modal multi-sensory Man-Machine interfaces.
4. Design, Develop and Deploy machine learning based applications using structured and unstructured data (e.g., speech, text, images/videos).
5. Understand and Assess reliability, dependability and trust-worthiness of AI-based systems.
6. Design and develop AI applications for resource constrained environments.
7. Adhere to evolving ethics and privacy laws across various domains and territories.
8. Plan and manage technical projects.

Learning Outcome:

1. Understand the fundamentals of Artificial Intelligence, Machine Learning, Inference Engines, Speech, Vision, Natural Language Understanding, Robotics, and Human Computer Interaction.
2. Unify the knowledge of human cognition, AI, Machine Learning and data engineering for designing systems.
3. Demonstrate hands-on knowledge of state-of-the-art AI tools for real-world problem-solving.
4. Ability to develop real-time and robust AI-based systems with specific software, hardware and data requirements.
5. Build solutions to explore fully immersive computer-generated worlds (in VR), and overlay computer graphics onto our view of our immediate environment (AR) along with smart, cognitive functionality.
6. Demonstrate advanced skills to comprehend and communicate effectively.
7. Carry out projects using intelligent cognitive solutions provided by AI algorithms to get more insights in stakeholder management, risk modeling, intelligent resource scheduling and managing project constraints with intelligent use of data models.

Course Structure for
M.Tech. (AI) Program and Dual degree M.Tech. (AI) + PhD

Cat	Code	Course Title	L-T-P	Cr	Cat	Code	Course Title	L-T-P	Cr
I Semester					II Semester				
C	MAL7xx0	Statistics I Matrix Computation Optimization	1-0-0 1-0-0 1-0-0	3	C	CSL8xx0	Artificial Intelligence II	3-0-0	3
C	CSL7xx0	Artificial Intelligence I	3-0-0	3	C	CSL8xx0	Machine Learning II	3-0-0	3
C	CSL7xx0	Machine Learning I	3-0-0	3	C	CSL8xx0	Real Time Autonomous Systems	2-0-0	2
C	CSP7xx0	Data Structures and Practices	0-0-2	1	PE	xxxxx	Program Elective 3	3-0-0	3
PE	xxxxx	Program Elective 1	3-0-0	3	OE	xxxxx	Open Elective 1	3-0-0	3
PE	xxxxx	Program Elective 2	3-0-0	3	NG	xxxxx	Ethics and Professional Life	1-0-0	1
	xxxxx	Technical Communication	1-0-0	1					
Total Credits: 17					Total Credits: 15				

*Maths Fractals: Linear Algebra, Probability and Random Processes, Optimization

Cat	Code	Course Title	L-T-P	Cr	Cat	Code	Course Title	L-T-P	Cr
III Semester					IV Semester				
P	CSDxx0	Major Project – Part 1	0-0-10	5	P	CSDxx0	Major Project – Part 2	0-0-22	11
PE	xxxxx	Program Elective 4	3-0-0	3	PE	xxxxx	Program Elective 6	3-0-0	3
PE	xxxxx	Program Elective 5	3-0-0	3	NG	xxxxx	Intellectual Property	1-0-0	1
OE	xxxxx	Open Elective - 2	3-0-0	3					
NG	xxxxx	System Engineering and Project Management	1-0-0	1					
Total Credits: 15					Total Credits: 15				

Credit Distribution		
1	Program Core	18 credits
2	Program Electives	18 credits
3	Open Electives	6 credits
4	Project	16 credits
5	Non-graded	4 credits
Total		62 credits