

**Department of Electronics & Communication Engineering  
and  
Department of Computer Science and Engineering**

**Course Structure and Syllabi**

**For**

**2 yrs. M.Tech Programme**

**Effective from 2020 Batch Onwards**



**भारतीय सूचना प्रौद्योगिकी संस्थान राँची**  
**INDIAN INSTITUTE OF INFORMATION TECHNOLOGY, RANCHI**  
(An Institution of National importance under act of Parliament)  
(Ranchi - 834010), Jharkhand

## **I. M.Tech Courses**

IIT Ranchi going to start two years Master of Technology (M.Tech.) course in

- 1) Computer Science & Engineering with specialization in **Data Science & Artificial Intelligence**
- 2) Electronics & Communication Engineering with specialization in **Embedded System & IoT**

A complete new course structure and syllabi for both the specialization is proposed.

## **II. Format of Course codes**

- 1) Course code AA-XYZZ is explained as

AA - Department

X-Academic year

Y-Theory/Lab; 0 ==Theory and 1== Lab

ZZ-odd/even semester; odd number == odd semester and even number == even semester

- 2) For project/seminar/comprehensive viva:

AA= PR

X= 1

- 3) For open electives:

AA= OE

# Indian Institute of Information Technology, Ranchi

## Curriculum for

M. Tech in Computer Science & Engineering with specialization in Data Science & Artificial Intelligence  
and

M.Tech in Electronics & Communication Engineering with specialization in Embedded System & IoT

### Breakup of the credits semester wise

#### Credits required for M.Tech Course: 68-76

Semester/ Projects	Credits
I	21
II	21=42
III	14=56
IV	16=72
Total	72

### Semester wise courses

#### First Semester

Data Science & Artificial Intelligence	Embedded System & IoT	L	T	P	C
CS-5001: Fundamentals of Data Science	EC-5001: Advanced Digital Design	3	0	0	3
CS-5003: Advanced Artificial Intelligence	EC-5003: Embedded Processors & Microcontroller	3	0	0	3
<b>Elective I</b>		3	1	0	4
<b>Elective II</b>		3	1	0	4
HS-5001: Research Methodology and Intellectual Property Rights		3	0	0	3
CS-5101: Data Science Lab	EC-5101: Advanced Digital Design Lab	0	0	3	2
CS-5103: Artificial Intelligence Lab	EC-5103: Embedded Processors & Microcontroller Lab	0	0	3	2
<b>TOTAL</b>		<b>15</b>	<b>2</b>	<b>6</b>	<b>21</b>

**Second Semester**

<b>Data Science &amp; Artificial Intelligence</b>	<b>Embedded System &amp; IoT</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>CS-5002:</b> Data Mining and Data Warehousing	<b>EC-5002:</b> Embedded OS & Device Drivers	<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>
<b>CS-5004:</b> Advanced Machine Learning	<b>EC-5004:</b> IoT Sensors & Actuators	<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>
<b>Elective III</b>		<b>3</b>	<b>1</b>	<b>0</b>	<b>4</b>
<b>Elective IV</b>		<b>3</b>	<b>1</b>	<b>0</b>	<b>4</b>
<b>HS-5002:</b> Professional Communication Skills		<b>2</b>	<b>1</b>	<b>0</b>	<b>3</b>
<b>CS-5102:</b> Data Mining Lab	<b>EC-5102:</b> Embedded OS & Device Drivers Lab	<b>0</b>	<b>0</b>	<b>3</b>	<b>2</b>
<b>CS-5104:</b> Advanced Machine Learning Lab	<b>EC-5104:</b> IoT Sensors & Actuators Lab	<b>0</b>	<b>0</b>	<b>3</b>	<b>2</b>
<b>TOTAL</b>		<b>14</b>	<b>3</b>	<b>6</b>	<b>21</b>

**Third Semester**

<b>Data Science &amp; Artificial Intelligence</b>	<b>Embedded System &amp; IoT</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>PR-6101:</b> Project & Dissertation		-	-	-	<b>12</b>
<b>PR-6103:</b> Comprehensive Viva		-	-	-	<b>02</b>
<b>TOTAL</b>		-	-	-	<b>14</b>

**Fourth Semester**

<b>Data Science &amp; Artificial Intelligence</b>	<b>Embedded System &amp; IoT</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>PR-6102:</b> Project & Dissertation		-	-	-	<b>16</b>
<b>TOTAL</b>		-	-	-	<b>16</b>

**Legend:**

**L** - Number of lecture hours per week

**T** - Number of tutorial hours per week

**P** - Number of practical hours per week

**C** - Number of credits for the course

**List of Electives (ECE)**

**Elective I/II (for first semester)**

1. **EC-5005:** Optical Wireless Communication
2. **EC-5007:** Advanced Digital Image Processing
3. **EC-5009:** Embedded Control Systems
4. **EC-5011:** VLSI testing and testability
5. **EC-5013:** Advanced Antenna Design

6. **CS-5005:** IoT Architecture & Computing
7. **CS-5019:** Stochastic Processes and Queuing Theory
8. **CS-5021:** Information Theory and Coding
9. **CS-5023:** Data Analytics for IoT
10. **CS-5025:** Privacy and Security in IoT

#### **Elective III/IV (for second semester)**

1. **EC-5006:** Wireless Sensor Networks
2. **EC-5008:** SCADA Systems Applications
3. **EC-5010:** Real-time operating system (RTOS)
4. **EC-5012:** Advanced Optical Communication
5. **EC-5014:** Material Science for Micro & Nano Electronics
6. **EC-5016:** MOS Devices
7. **EC-5018:** Embedded System Design
8. **CS-5008:** Cloud Computing
9. **CS-5016:** Real Time Data Analytics

#### **List of Electives (CSE)**

#### **Elective I/II (for first semester)**

1. **CS-5005:** IoT Architecture & Computing
2. **CS-5007:** Advanced Data Structure & Algorithms
3. **CS-5009:** Software & System Engineering
4. **CS-5011:** Ethics and Data Science
5. **CS-5013:** Web services and E-Commerce
6. **CS-5015:** Pattern Recognition
7. **CS-5017:** Evolutionary and Randomized Algorithm
8. **CS-5019:** Stochastic Processes and Queuing Theory
9. **CS-5021:** Information Theory and Coding
10. **CS-5023:** Data Analytics for IoT
11. **CS-5025:** Privacy and Security in IoT

#### **Elective III/ IV (for second semester)**

1. **CS-5006:** Big Data Analytics
2. **CS-5008:** Cloud Computing
3. **CS-5010:** Software Defect & Quality Prediction Techniques
4. **CS-5012:** Simulation and Modeling
5. **CS-5014:** Advanced DBMS
6. **CS-5016:** Real Time Data Analysis
7. **CS-5018:** Deep and Reinforcement Learning Techniques
8. **CS-5020:** Advanced Soft Computing

#### **Note:**

1. Others elective courses as decided by committee to be taken from NPTEL/MOOCs/SWAYAM/COURSERA or any other online platform. Course codes will be decided later as per the format.
2. Elective courses may be added or removed later on the recommendation of competent authority.