**INDIAN INSTITUTE OF TECHNOLOGY ROORKEE**

**M.Tech. in Artificial Intelligence**

**Program Code : TBD**

**Centre : CAIDS**

**Year : I**

| Teaching Scheme | | | | | Contact Hours/Week | | | Exam Duration (Hrs.) | | Relative Weight (%) | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **S. No.** | **Subject Code** | **Course Title** | **Subject Area** | **Credits** | **L** | **T** | **P** | **Theory** | **Practical** | **CWS** | **PRS** | **MTE** | **ETE** | **PRE** |
| **Autumn Semester** | | | | | | | | | | | | | | |
| 1. | TBD | Essential Mathematics for AI | PCC | 4 | 3 | 1 | 0 | 3 | 0 | 20-35 | - | 20-30 | 40-50 | - |
| 2. | TBD | Hardware Architectures for AI | PCC | 4 | 3 | 1 | 0 | 3 | 0 | 20-35 | - | 20-30 | 40-50 | - |
| 3. | TBD | Machine Learning | PCC | 4 | 3 | 1 | 0 | 3 | 0 | 20-35 | - | 20-30 | 40-50 | - |
| 4. | TBD | Advanced Data Structures and Algorithms | PCC | 4 | 3 | 1 | 0 | 3 | 0 | 20-35 | - | 20-30 | 40-50 | - |
| 5. | TBD | Programming for AI | PCC | 2 | 0 | 0 | 4 | 0 | 2 | - | 50 | - | | 50 |
| 6. | TBD | PEC-I | PEC | 3/4 | 3 | 0/1 | 0/2 | 3 | 0 | 25/10-25 | 0/25 | 20-30/ 15-25 | 40-50/ 30-40 | - |
| **Total** | | | | **21/22** | **15** | **4/5** | **4/6** | **15** | **2** | | | | | |
| **Spring Semester** | | | | | | | | | | | | | | |
| 1. | TBD | PEC-II | PEC | 3/4 | 3 | 0/1 | 0/2 | 3 | 0 | 25/10-25 | 0/25 | 20-30/ 15-25 | 40-50/ 30-40 | - |
| 2. | TBD | PEC-III | PEC | 3/4 | 3 | 0/1 | 0/2 | 3 | 0 | 25/10-25 | 0/25 | 20-30/ 15-25 | 40-50/ 30-40 | - |
| 3. | TBD | PEC-IV | PEC | 3/4 | 3 | 0/1 | 0/2 | 3 | 0 | 25/10-25 | 0/25 | 20-30/ 15-25 | 40-50/ 30-40 | - |
| 4. | TBD | PEC-V | PEC | 3/4 | 3 | 0/1 | 0/2 | 3 | 0 | 25/10-25 | 0/25 | 20-30/ 15-25 | 40-50/ 30-40 | - |
| 5. | TBD | Project in AI | PCC | 2 | | | | | | | | 30 | 70 | |
| 6. | TBD | SEMINAR | PCC | 2 | 0 | 0 | 0 | 0 | 0 | | | 30 | 70 | - |
| **Total** | | | | **16/20** | **-** | **-** | **-** | | | | | | | |
| **The contact hours, exam duration and relative weight of PEC will be as per the course nature (3+0+0) or (3+1+0) or (3+0+2) and detailed syllabi** | | | | | | | | | | | | | | |

**Program Code : TBD**
**Centre : CAIDS**
**Year : II**

| Teaching Scheme | | | | | Contact Hours/Week | | | Exam Duration (Hrs.) | | Relative Weight (%) | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **S. No.** | **Subject Code** | **Course Title** | **Subject Area** | **Credits** | **L** | **T** | **P** | **Theory** | **Practical** | **CWS** | **PRS** | **MTE** | **ETE** | **PRE** |
| **Autumn Semester** | | | | | | | | | | | | | | |
| 1. | TBD | Dissertation Stage-I | PCC | 12 | | | | | | | | | | |
| **Total** | | | | **12** | | | | | | | | | | |
| **Spring Semester** | | | | | | | | | | | | | | |
| 1. | TBD | Dissertation Stage-II | PCC | 18 | | | | | | | | | | |
| **Total** | | | | **18** | | | | | | | | | | |

**There are two baskets for electives: "Core AI" and "Applications of AI". A student needs to take 5 electives, of which, at least two electives should be from the Core AI basket and at least two electives should be from the Applications of AI basket.**

| B1:LIST OF CORE AI ELECTIVES | | | B2:LIST OF AI APPLICATIONS ELECTIVES | | |
|---|---|---|---|---|---|
| S. No. | Course Title | | S. No. | Course Title | |
| 1. | Convex Optimization in Machine Learning | | 1. | AI in decision making | |
| 2. | Data Mining and Warehousing | | 2. | AI for Earth Observation | |
| 3. | Deep Learning | | 3. | AI for investment | |
| 4. | Digital Image Processing | | 4. | Applications of AI in Physics | |
| 5. | Evolutionary Algorithms | | 5. | Medical Physics for AI | |
| 6. | Natural Language Processing | | 6. | Computer Vision | |
| 7. | Numerical Optimization | | 7. | Game Theory | |
| 8. | Reinforcement Learning | | 8. | Internet of Things | |
| 9. | Time Series Data Analysis | | 9. | Introduction to Materials Informatics | |
| 10. | Introduction to Compressive Sensing | | 10. | Social Network Analysis | |
| 11. | Neuromorphic computing with emerging memories and architectures | | 11. | Statistical Machine Learning for Variation-Aware Electronic Device and Circuit Simulation | |
| 12. | Data Stream Mining | | 12. | ML and AI Applications in Earth Science | |
| 13. | Stochastic & Randomized Processes | | 13. | Intelligent Control Techniques | |
| | | | 14. | Applications of AI in Biology | |
| | | | 15. | VLSI architectures for AI in CMOS technology | |