

**Mehta Family School of Data Science and Artificial Intelligence
INDIAN INSTITUTE OF TECHNOLOGY ROORKEE
Proposed Structure**

ANNEXURE I

Program Code : XXX B. Tech. in Data Science and Artificial Intelligence
Department : Mehta Family School of Data Science and Artificial Intelligence

| Year | Credits in Autumn Semester | Credits in Spring Semester | Credits (year-wise) |
|--|--|-----------------------------------|----------------------------|
| 1 | 21 | 24 | 45 |
| 2 | 23 | 20 | 43 |
| 3 | 21 | 19 | 40 |
| 4 | 14 | 16 | 30 |
| Extra-Curricular | | | 04 |
| Grand Total | 79 | 79 | 162 |
| Grand Total with Minor/Honor Specialization Courses | 5 more courses with additional credits 18-20 | | 180-182 |

-10-

08 AUG 2022



**Mehta Family School of Data Science and Artificial Intelligence
INDIAN INSTITUTE OF TECHNOLOGY ROORKEE**

Credits Distributions

| Curricular Components | Credits |
|--|----------------|
| (a) Institute Core Courses | |
| Humanities and Social Sciences | 04 |
| Basic Sciences | 16 |
| Engineering Sciences | 16 |
| General Sciences | 03 |
| Total | 39 |
| (b) Program Core Courses | |
| Class Contact Core Courses | 64 |
| Introduction to Discipline | 02 |
| Lab based Project | 04 |
| B.Tech. Project | 12 |
| Technical Communications | 02 |
| Practical Training/Internship | 02 |
| Total | 86 |
| HSSMEC | 06 |
| PEC | 24 |
| Open Elective Courses | 03 |
| Extra-Curricular Activities (Discipline+NCC/NSO/NSS) | 04 |
| Total | 37 |
| Grand Total without Minor/ Honor Courses | 162 |
| MSC/DHC | 18-20 |
| Grand Total with Minor/ Honor Courses | 180-182 |

-11-

08 AUG 2022



**Mehta Family School of Data Science and Artificial Intelligence
INDIAN INSTITUTE OF TECHNOLOGY ROORKEE**

Program Code : XXX B.Tech. in Data Science and Artificial Intelligence
Department : Mehta Family School of Data Science and Artificial
Intelligence Year : I

| Teaching Scheme | | | | | Contact Hours/Week | | | Exam Duration | | Relative Weight (%) | | | | |
|------------------------|--------------|---------------------------------------|--------------|-----------|--------------------|----------|----------|---------------|-----------|---------------------|-----|-------|-------|-----|
| S. No. | Subject Code | Course Title | Subject Area | Credits | L | T | P | Theory | Practical | CWS | PRS | MTE | ETE | PRE |
| Autumn Semester | | | | | | | | | | | | | | |
| 1. | MAN-001 | Mathematics-I | BSC | 4 | 3 | 1 | 0 | 3 | 0 | 20-35 | - | 20-30 | 40-50 | - |
| 2. | PHN-007 | Modern Physics | BSC | 4 | 3 | 0 | 2 | 3 | 0 | 10-25 | 25 | 15-25 | 30-40 | - |
| 3. | HSN-001 | Communication Skills | HSSC | 2 | 1 | 0 | 2 | 2 | 0 | 20-35 | - | 20-30 | 40-50 | - |
| 4. | HSN-002 | Introduction to Psychology | HSSC | 2 | 1 | 1 | 0 | 2 | 0 | 20-35 | - | 20-30 | 40-50 | - |
| 5. | CEN-105 | Introduction to Environmental Studies | GSC | 3 | 3 | 0 | 0 | 3 | 0 | 20-35 | - | 20-30 | 40-50 | - |
| 6. | DA-101 | Introduction to DS and AI | PCC | 2 | 2 | 0 | 0 | 2 | 0 | 20-35 | - | 20-30 | 40-50 | - |
| 7. | DA-103 | Object Oriented Programming in C++ | ESC | 4 | 3 | 0 | 2 | 3 | 0 | 10-25 | 25 | 15-25 | 30-40 | - |
| Total | | | | 21 | 16 | 2 | 6 | | | | | | | |
| Spring Semester | | | | | | | | | | | | | | |
| 1. | MAN-004 | Numerical Methods | BSC | 4 | 3 | 1 | 0 | 3 | 0 | 20-35 | - | 20-30 | 40-50 | - |
| 2. | MAN-006 | Probability and Statistics | BSC | 4 | 3 | 1 | 0 | 3 | 0 | 20-35 | - | 20-30 | 40-50 | - |
| 3. | DA-102 | Data Structures | PCC | 4 | 3 | 0 | 2 | 3 | 0 | 10-25 | 25 | 15-25 | 30-40 | - |
| 4. | DA-104 | Discrete Structures | PCC | 4 | 3 | 1 | 0 | 3 | 0 | 20-35 | - | 20-30 | 40-50 | - |
| 5. | DA-106 | Ethics in DS and AI | PCC | 4 | 3 | 1 | 0 | 3 | 0 | 20-35 | - | 20-30 | 40-50 | - |
| 6. | MIN-106 | Engineering Thermodynamics | ESC | 4 | 3 | 1 | 0 | 3 | 0 | 20-35 | - | 20-30 | 40-50 | - |
| Total | | | | 24 | 18 | 5 | 2 | | | | | | | |

-12-

08 AUG 2022

**Mehta Family School of Data Science and Artificial Intelligence
INDIAN INSTITUTE OF TECHNOLOGY ROORKEE**

Program Code : XXX B.Tech. in Data Science and Artificial Intelligence
 Department : Mehta Family School of Data Science and Artificial Intelligence
 Year : II

| Teaching Scheme | | | | | Contact Hours/Week | | | Exam Duration | | Relative Weight (%) (Tentative) | | | | |
|------------------------|--------------|--|--------------|-----------|--------------------|----------|----------|---------------|-----------|---------------------------------|-----|-------|-------|-----|
| S. No. | Subject Code | Course Title | Subject Area | Credits | L | T | P | Theory | Practical | CWS | PRS | MTE | ETE | PRE |
| Autumn Semester | | | | | | | | | | | | | | |
| 1. | ECN-207 | Computer Architecture and Organization | ESC | 4 | 3 | 1 | 0 | 3 | 0 | 20-35 | - | 20-30 | 40-50 | - |
| 2. | DA-201 | Applied Linear Algebra | PCC | 4 | 3 | 1 | 0 | 3 | 0 | 20-35 | - | 20-30 | 40-50 | - |
| 3. | DA-203 | Design and Analysis of Algorithms | PCC | 4 | 3 | 1 | 0 | 3 | 0 | 20-35 | - | 20-30 | 40-50 | - |
| 4. | DA-205 | Principles of DS and AI | PCC | 4 | 3 | 1 | 0 | 3 | 0 | 20-35 | - | 20-30 | 40-50 | - |
| 5. | DA-207 | Optimization and Soft Computing Techniques | PCC | 4 | 3 | 1 | 0 | 3 | 0 | 20-35 | - | 20-30 | 40-50 | - |
| 6. | HSN-ELE | HSS elective course | HSSMEC | 3 | 3 | 0 | 0 | 3 | 0 | 20-35 | - | 20-30 | 40-50 | - |
| Total | | | | 23 | 18 | 5 | 0 | | | | | | | |
| Spring Semester | | | | | | | | | | | | | | |
| 1. | CHN-112 | Energy Engineering | ESC | 4 | 3 | 1 | 0 | 3 | 0 | 20-35 | - | 20-30 | 40-50 | - |
| 2. | DA-202 | Applied Machine Learning | PCC | 4 | 3 | 1 | 0 | 3 | 0 | 20-35 | - | 20-30 | 40-50 | - |
| 3. | DA-204 | Artificial Intelligence | PCC | 4 | 3 | 1 | 0 | 3 | 0 | 20-35 | - | 20-30 | 40-50 | - |
| 4. | DA-206 | Programming for DS and AI | PCC | 4 | 3 | 1 | 0 | 3 | 0 | 20-35 | - | 20-30 | 40-50 | - |
| 5. | DA-208 | Time Series Analysis | PCC | 4 | 3 | 1 | 0 | 3 | 0 | 20-35 | - | 20-30 | 40-50 | - |
| Total | | | | 20 | 15 | 5 | 0 | | | | | | | |

-13-

08 AUG 2022

**Mehta Family School of Data Science and Artificial Intelligence
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Program Code : XXX B.Tech. in Data Science and Artificial Intelligence
 Department : Mehta Family School of Data Science and Artificial Intelligence
 Year : III

| Teaching Scheme | | | | | Contact Hours/Week | | | Exam Duration | | Relative Weight (%) | | | | |
|------------------------|--------------|--|--------------|--------------|--------------------|------------|----------|---------------|-----------|---------------------|-----|-------|-------|-----|
| S. No. | Subject Code | Course Title | Subject Area | Credits | L | T | P | Theory | Practical | CWS | PRS | MTE | ETE | PRE |
| Autumn Semester | | | | | | | | | | | | | | |
| 1. | DA-301 | Deep and Reinforcement Learning | PCC | 4 | 3 | 1 | 0 | 3 | 0 | 20-35 | - | 20-30 | 40-50 | - |
| 2. | DA-303 | Distributed Systems and Data Analytics | PCC | 4 | 3 | 1 | 0 | 3 | 0 | 20-35 | - | 20-30 | 40-50 | - |
| 3. | DA-305 | Statistical Learning Theory | PCC | 4 | 3 | 1 | 0 | 3 | 0 | 20-35 | - | 20-30 | 40-50 | - |
| 4. | DA-391 | Technical Communication | PCC | 2 | 2 | 0 | 0 | 2 | 0 | 20-35 | - | 20-30 | 40-50 | - |
| 5. | BM-ELE | Management Elective | HSSMEC | 3 | 3 | 0 | 0 | 3 | 0 | 20-35 | - | 20-30 | 40-50 | - |
| 6. | DA-ELE | Department Elective - 1 | PEC | 4 | 3 | 1 | 0 | 3 | 0 | 20-35 | - | 20-30 | 40-50 | - |
| Total | | | | 21 | 17 | 4 | 0 | | | | | | | |
| Spring Semester | | | | | | | | | | | | | | |
| 1. | DA-300 | Lab-based Project | PCC | 4 | 0 | 0 | 4 | 0 | 0 | 100 | - | - | - | - |
| 2. | DA-302 | Image and Video Analytics | PCC | 4 | 3 | 1 | 0 | 3 | 0 | 20-35 | - | 20-30 | 40-50 | - |
| 3. | DA-304 | Natural Language Processing | PCC | 4 | 3 | 1 | 0 | 3 | 0 | 20-35 | - | 20-30 | 40-50 | - |
| 4. | DA-ELE | Department Elective - 2 | PEC | 4 | 3 | 1 | 0 | 3 | 0 | 20-35 | - | 20-30 | 40-50 | - |
| 5. | OEC | Open Elective Course | OEC | 3 | 3 | 0 | 0 | 3 | 0 | 20-35 | - | 20-30 | 40-50 | - |
| 6. | MSC/DHC | Minor Specialization Course-1/DHC-1 | MSC/DHC | 4 | 3 | 1 | 0 | 3 | 0 | 20-35 | - | 20-30 | 40-50 | - |
| Total | | | | 19/23 | 12/15 | 3/4 | 4 | | | | | | | |

-14-

08 AUG 2022



**Mehta Family School of Data Science and Artificial Intelligence
INDIAN INSTITUTE OF TECHNOLOGY ROORKEE**

Program Code : XXX B.Tech. in Data Science and Artificial Intelligence
 Department : Mehta Family School of Data Science and Artificial Intelligence
 Year : IV

| Teaching Scheme | | | | | Contact Hours/Week | | | Exam Duration | | Relative Weight (%) | | | | |
|------------------------|--------------|---------------------------------------|--------------|--------------|--------------------|------------|----------|---------------|-----------|---------------------|-----|-------|-------|-----|
| S. No. | Subject Code | Course Title | Subject Area | Credits | L | T | P | Theory | Practical | CWS | PRS | MTE | ETE | PRE |
| Autumn Semester | | | | | | | | | | | | | | |
| 1. | DA-400A | B.Tech. Project | PCC | 4 | 0 | 0 | 4 | - | - | 100 | - | - | - | - |
| 2. | DA-499 | Practical Training/Internship Seminar | PCC | 2 | 0 | 0 | 2 | - | - | 100 | - | - | - | - |
| 3. | DA-ELE | Department Elective - 3 | PEC | 4 | 3 | 1 | 0 | 3 | 0 | 20-35 | - | 20-30 | 40-50 | - |
| 4. | DA-ELE | Department Elective - 4 | PEC | 4 | 3 | 1 | 0 | 3 | 0 | 20-35 | - | 20-30 | 40-50 | - |
| 5. | MSC/DHC | Minor Specialization Course-2/DHC-2 | MSC/DHC | 4 | 3 | 1 | 0 | 3 | 0 | 20-35 | - | 20-30 | 40-50 | - |
| 6. | MSC/DHC | Minor Specialization Course-3/DHC-3 | MSC/DHC | 4 | 3 | 1 | 0 | 3 | 0 | 20-35 | - | 20-30 | 40-50 | - |
| Total | | | | 14/22 | 6/12 | 2/4 | 6 | | | | | | | |
| Spring Semester | | | | | | | | | | | | | | |
| 1. | DA-400B | B.Tech. Project Continues | PCC | 8 | 0 | 0 | 8 | - | - | 100 | - | - | - | - |
| 2. | DA-ELE | Department Elective -5 | PEC | 4 | 3 | 1 | 0 | 3 | 0 | 20-35 | - | 20-30 | 40-50 | - |
| 3. | DA-ELE | Department Elective - 6 | PEC | 4 | 3 | 1 | 0 | 3 | 0 | 20-35 | - | 20-30 | 40-50 | - |
| 4. | MSC/DHC | Minor Specialization Course-4/DHC-4 | MSC/DHC | 4 | 3 | 1 | 0 | 3 | 0 | 20-35 | - | 20-30 | 40-50 | - |
| 5. | MSC/DHC | Minor Specialization Course-5/DHC-5 | MSC/DHC | 4 | 3 | 1 | 0 | 3 | 0 | 20-35 | - | 20-30 | 40-50 | - |
| Total | | | | 16/24 | 6/12 | 2/4 | 8 | | | | | | | |

-15-

08 AUG 2022



**Mehta Family School of Data Science and Artificial Intelligence
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LIST OF ELECTIVES

Program Code : XXX B.Tech. in Data Science and Artificial Intelligence
Department Code : Mehta Family School of Data Science and Artificial Intelligence

| Teaching Scheme | | Contact Hours/Week | | | Exam Duration | | Relative Weight (%) | | | | | | | |
|--|--------------|--|--------------|---------|---------------|---|---------------------|--------|-----------|-------|-----|-------|-------|-----|
| S. No. | Subject Code | Course Title | Subject Area | Credits | L | T | P | Theory | Practical | CWS | PRS | MTE | ETE | PRE |
| Program Elective Courses (B1: Foundational/Theoretical/Maths) | | | | | | | | | | | | | | |
| 1. | DA-XXX | Causal Inference | PEC | 4 | 3 | 1 | 0 | 3 | 0 | 20-35 | - | 20-30 | 40-50 | - |
| 2. | DA-XXX | Computer Vision | PEC | 4 | 3 | 1 | 0 | 3 | 0 | 20-35 | - | 20-30 | 40-50 | - |
| 3. | DA-XXX | Stochastic Processes and Applications | PEC | 4 | 3 | 1 | 0 | 3 | 0 | 20-35 | - | 20-30 | 40-50 | - |
| 4. | DA-XXX | Evolutionary Algorithms | PEC | 4 | 3 | 1 | 0 | 3 | 0 | 20-35 | - | 20-30 | 40-50 | - |
| 5. | DA-XXX | Information Theory and Cryptography | PEC | 4 | 3 | 1 | 0 | 3 | 0 | 20-35 | - | 20-30 | 40-50 | - |
| Program Elective Courses (B2: Computer Science Electives) | | | | | | | | | | | | | | |
| 1. | DA-XXX | Data Stream Mining | PEC | 4 | 3 | 1 | 0 | 3 | 0 | 20-35 | - | 20-30 | 40-50 | - |
| 2. | DA-XXX | Information Retrieval | PEC | 4 | 3 | 1 | 0 | 3 | 0 | 20-35 | - | 20-30 | 40-50 | - |
| 3. | DA-XXX | Computer Architecture for AI | PEC | 4 | 3 | 1 | 0 | 3 | 0 | 20-35 | - | 20-30 | 40-50 | - |
| 4. | DA-XXX | Intelligent Robotics | PEC | 4 | 3 | 1 | 0 | 3 | 0 | 20-35 | - | 20-30 | 40-50 | - |
| 5. | DA-XXX | Intelligent Cloud Computing | PEC | 4 | 3 | 1 | 0 | 3 | 0 | 20-35 | - | 20-30 | 40-50 | - |
| 6. | DA-XXX | Big Data Analytics | PEC | 4 | 3 | 1 | 0 | 3 | 0 | 20-35 | - | 20-30 | 40-50 | - |
| 7. | DA-XXX | Security and Privacy | PEC | 4 | 3 | 1 | 0 | 3 | 0 | 20-35 | - | 20-30 | 40-50 | - |
| 8. | DA-XXX | Advanced Applications of Pattern Recognition | PEC | 4 | 3 | 1 | 0 | 3 | 0 | 20-35 | - | 20-30 | 40-50 | - |

-16-

08 AUG 2022



**Mehta Family School of Data Science and Artificial Intelligence
INDIAN INSTITUTE OF TECHNOLOGY ROORKEE**

| Program Elective Courses (B3: Social/Business/Finance Electives) | | | | | | | | | | | | | | |
|--|--------|--|-----|---|---|---|---|---|---|-------|---|-------|-------|---|
| 1. | DA-XXX | AI and Medical Physics | PEC | 4 | 3 | 1 | 0 | 3 | 0 | 20-35 | - | 20-30 | 40-50 | - |
| 2. | DA-XXX | Leveraging Data Science for Finance | PEC | 4 | 3 | 1 | 0 | 3 | 0 | 20-35 | - | 20-30 | 40-50 | - |
| 3. | DA-XXX | Social Network Analysis | PEC | 4 | 3 | 1 | 0 | 3 | 0 | 20-35 | - | 20-30 | 40-50 | - |
| 4. | DA-XXX | E-commerce | PEC | 4 | 3 | 1 | 0 | 3 | 0 | 20-35 | - | 20-30 | 40-50 | - |
| 5. | DA-XXX | Intelligent and Learning Agents | PEC | 4 | 3 | 1 | 0 | 3 | 0 | 20-35 | - | 20-30 | 40-50 | - |
| 6. | DA-XXX | Recommender Systems | PEC | 4 | 3 | 1 | 0 | 3 | 0 | 20-35 | - | 20-30 | 40-50 | - |
| 7. | DA-XXX | AI for Investment | PEC | 4 | 3 | 1 | 0 | 3 | 0 | 20-35 | - | 20-30 | 40-50 | - |
| Program Elective Courses (B4: Healthcare/Transportation/Infrastructure Electives) | | | | | | | | | | | | | | |
| 1. | DA-XXX | AI and Medical Physics | PEC | 4 | 3 | 1 | 0 | 3 | 0 | 20-35 | - | 20-30 | 40-50 | - |
| 2. | DA-XXX | Introduction to Materials Informatics | PEC | 4 | 3 | 1 | 0 | 3 | 0 | 20-35 | - | 20-30 | 40-50 | - |
| 3. | DA-XXX | Applications of AI in Healthcare | PEC | 4 | 3 | 1 | 0 | 3 | 0 | 20-35 | - | 20-30 | 40-50 | - |
| 4. | DA-XXX | Bioinformatics | PEC | 4 | 3 | 1 | 0 | 3 | 0 | 20-35 | - | 20-30 | 40-50 | - |
| 5. | DA-XXX | AI in Neuroscience & Cognitive Behaviour | PEC | 4 | 3 | 1 | 0 | 3 | 0 | 20-35 | - | 20-30 | 40-50 | - |
| 6. | DA-XXX | AI based Diagnostics tools | PEC | 4 | 3 | 1 | 0 | 3 | 0 | 20-35 | - | 20-30 | 40-50 | - |
| 7. | DA-XXX | ML and AI for Earth Science | PEC | 4 | 3 | 1 | 0 | 3 | 0 | 20-35 | - | 20-30 | 40-50 | - |
| 8. | DA-XXX | AI for Earth Observations | PEC | 4 | 3 | 1 | 0 | 3 | 0 | 20-35 | - | 20-30 | 40-50 | - |
| 9. | DA-XXX | Data-driven Analytics for Smart Transportation Systems | PEC | 4 | 3 | 1 | 0 | 3 | 0 | 20-35 | - | 20-30 | 40-50 | - |

-17-

08 AUG 2022

