B Tech in Computer Science and Engineering

Manipal Institute of Technology, Bengaluru-560 064

Manipal Academy of Higher Education (MAHE)

B Tech Curriculum – 2025

Flexible Total Credits: 160/168/180/188 Mandatory Learning Courses (MLC): 12 Credits (2+9+1)

Flexible Core - Choice Based Credit System (CBCS)

Provisions for awarding credits to students for their performance in NCC and Major Projects (optional) - OEs

Scope for Component level Self Directed Learning (SDL) in a few courses

|  |  |  |
| --- | --- | --- |
| **ACADEMIC YEAR** | **NO. OF CREDITS** | **REMARKS** |
| **FIRST** | 22 + 22 = 44 | EG-I & EG-II – 1 credit each  Universal Human Values & professional ethics– 1 credit  Human Rights and Constitution – 1 credit |
| **SECOND** | 21 + 22 = 43 | ODD SEM: Core + Labs EVEN SEM: Core + Labs |
| **THIRD** | 22 + 20 = 42 | ODD SEM: FLEXIBLE Core + Labs + OE  EVEN SEM: FLEXIBLE Core + OE + PEs + Labs CHOICE BASED CREDIT SYSTEM FOR CORE COURSES  MANDATORY OE – CPI |
| **FOURTH** | 18 + 13 = 31 | ODD SEM: PEs + OE  EVEN SEM: Project Work/Practice School, Industrial Training |

**First Year BTech (2025: CS Stream)**

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| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **YEAR** | **SEMESTER I** | | | | | | | **SEMESTER II** | | | | | | |
| **I** | **Course Code** | **Course Name** | **L** | **T** | **P** | **C** | **Course Code** | | **Course Name** | **L** | **T** | **P** | **C** |
| **MAT 1102** | **Computational Mathematics - I** | **3** | **1** | **0** | **4** | **MAT 1202** | | **Computational Mathematics - II** | **3** | **1** | **0** | **4** |
| **PHY 1002** | **Applied Physics for Engineers** | **3** | **0** | **0** | **3** | **CHM1002** | | **Applied Chemistry for Engineers** | **3** | **0** | **0** | **3** |
| **ECE 1002** | **Fundamentals of Electronics** | **2** | **1** | **0** | **3** | **ELE 1002** | | **Fundamentals of Electrical Engineering** | **3** | **0** | **0** | **3** |
| **CSS 1001** | **Programming for Problem Solving** | **2** | **1** | **0** | **3** | **CIV 1002** | | **Engineering Mechanics and Smart Buildings** | **2** | **1** | **0** | **3** |
| **MME 1002** | **Basic Mechanical Engineering Science** | **3** | **0** | **0** | **3** | **CSS 1002** | | **Introduction to Object Oriented Programming** | **3** | **0** | **0** | **3** |
| **HUM 1001** | **Communication Skills in English** | **1** | **0** | **0** | **2** | **CIV 1001** | | **Environmental Studies** | **1** | **0** | **2** | **2** |
| **HUM 1002** | **Universal Human Values and Professional Ethics (MLC)** | **1** | **0** | **0** | **1** | **CSS 1012** | | **Data Visualisation** | **0** | **1** | **3** | **2** |
| **HUM 1003** | **Human Rights and Constitution (MLC)** | **1** | **0** | **0** | **1** | **CSS 1013** | | **Introduction to Object Oriented Programming Lab** | **0** | **0** | **3** | **1** |
| **MME 1011** | **Workshop Practice** | **0** | **0** | **3** | **1** | **MME 1012** | | **Computer Aided Engineering Graphics** | **0** | **0** | **3** | **1** |
| **CSS 1011** | **Programming for Problem Solving Lab** | **0** | **0** | **3** | **1** |  | |  |  |  |  |  |
| **TOTAL (27 Hours/week)** | | **16** | **3** | **8** | **22** | **TOTAL (27 Hours/week)** | | | **15** | **3** | **11** | **22** |

**Second Year BTech (2025: CS Stream)**

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **YEAR** | **SEMESTER III** | | | | | | | **SEMESTER IV** | | | | | | |
| **II** | **Course Code** | **Course Name** | **L** | **T** | **P** | **C** | **Course Code** | | **Course Name** | **L** | **T** | **P** | **C** |
| MAT 1172 | Discrete Mathematical Structures | **2** | **1** | **0** | **3** | MAT 1272 | | Probability and Optimization | 2 | 1 | 0 | 3 |
| CSS 2101 | Data Structures | 3 | 1 | 0 | 4 | CSS 2201 | | Database Systems | 3 | 1 | 0 | 4 |
| CSS 2102 | Data Communication and Computer Networks | 3 | 1 | 0 | 4 | CSS 2202 | | Design & Analysis of Algorithms | 3 | 1 | 0 | 4 |
| CSS 2103 | Data Analytics | 3 | 1 | 0 | 4 | CSS 2203 | | Introduction to Artificial Intelligence | 3 | 1 | 0 | 4 |
| CSS 2104 | Digital Systems and Computer Organization | 3 | 1 | 0 | 4 | CSS 2204 | | Operating Systems | 3 | 1 | 0 | 4 |
| CSS 2111 | Data Structures Lab | 0 | 0 | 3 | 1 | CSS 2211 | | Operating Systems Lab | 0 | 0 | 3 | 1 |
| CSS 2112 | Digital Systems lab | 0 | 0 | 3 | 1 | CSS 2212 | | Database Lab | 0 | 0 | 3 | 1 |
|  |  |  |  |  |  | CSS 2213 | | Object-Oriented Software Development Lab | 0 | 1 | 3 | 2 |
| **TOTAL ( Hours/week)** | |  |  |  | **21** | **TOTAL ( Hours/week)** | | |  |  |  | **22** |

**Third Year BTech (2025: CS Stream)**

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| YEAR | SEMESTER V | | | | | | SEMESTER VI | | | | | | |
| **III** | **Course Code** | **Course Name** | **L** | **T** | **P** | **C** | **Course Code** | **Course Name** | **L** | **T** | **P** | **C** |
| HUM 3101 | Essentials of Management | 3 | 0 | 0 | 3 | HUM 3102 | Engineering Economics and Financial Management | 2 | 1 | 0 | 3 |
| CSS 3101 | Finite Automata & Compiler Design | 3 | 1 | 0 | 4 | **CSO 3101** | **CS SPECIALIZION (S4)** | **3** | **0** | **3** | **4** |
| **CSO 3101** | **CS SPECIALIZION (S1)** | **3** | **0** | **3** | **4** | **CSO 3102** | **CS SPECIALIZION (S5)** | **3** | **0** | **3** | **4** |
| **CSO 3102** | **CS SPECIALIZION (S2)** | **3** | **0** | **3** | **4** | **CSP 4401** | **PROGRAM ELECTIVE 1/ MINOR 1** |  |  |  | **3** |
| **CSO 3103** | **CS SPECIALIZION (S3)** | **3** | **0** | **3** | **4** | **CSP 4402** | **PROGRAM ELECTIVE 1/ MINOR 2** |  |  |  | **3** |
| **IOE 4301** | **OPEN ELECTIVE – I (MLC)** |  |  |  | **3** | **IOE 4301** | **OPEN ELECTIVE – II (MLC)** | **3** | **0** | **0** | **3** |
| **TOTAL ( HOURS/WEEK)** | |  |  |  | **22** | **TOTAL ( HOURS/WEEK)** | |  |  |  | **20** |

**Fourth Year BTech (2025: CS Stream)**

|  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| YEAR | SEMESTER VII | | | | | | SEMESTER VIII | | | | | |
| **IV** | **Course Code** | **Course Name** | **L** | **T** | **P** | **C** | **Course Code** | **Course Name** | **L** | **T** | **P** | **C** |
| CSP 4403 | PROGRAM ELECTIVE 1/ MINOR 3 |  |  |  | 3 | CSS 4089 | INTERNSHIP (MLC) |  |  |  | 1 |
| CSP 4404 | PROGRAM ELECTIVE 1/ MINOR 4 |  |  |  | 3 | CSS 4098 | CAPSTONE PROJECT |  |  |  | 12 |
| CSP 4405 | PROGRAM ELECTIVE 5 |  |  |  | 3 | CSS 4099 | CAPSTONE PROJECT (HONOURS)^ |  |  |  | 20 |
| CSP 4406 | PROGRAM ELECTIVE 6 |  |  |  | 3 | CSS 4001 | HONOURS COURSE 1^ |  |  |  | 4 |
| CSP 4407 | PROGRAM ELECTIVE 7 |  |  |  | 3 | CSS 4002 | HONOURS COURSE 2^ |  |  |  | 4 |
| IOE 4301 | OPEN ELECTIVE – 3 (MLC) |  |  |  | 3 | CSS 4003 | HONOURS COURSE 3^ |  |  |  | 4 |
| CSP 4499 | MINOR PROJECT\* |  |  |  | 8 |  |  |  |  |  |  |
| TOTAL ( HOURS/WEEK) | |  |  |  | 18/26\* | TOTAL ( HOURS/WEEK) | |  |  |  | 13/33^ |

**List of Specializations Offered**

A. **ARTIFICIAL INTELLIGENCE & MACHINE LEARNING**

CSO \*\*\*\* Foundation of Computer Vision

CSO \*\*\*\* Machine Learning

CSO \*\*\*\* High Performance Computing in AI & ML

CSO \*\*\*\* Deep Learning and Applications

CSO \*\*\*\* Natural Language Processing

**B. QUANTUM COMPUTING**

CSO \*\*\*\* Fundamentals of Quantum Computing

CSO \*\*\*\* Quantum Algorithms

CSO \*\*\*\* Quantum Communication and Quantum Networks

CSO \*\*\*\* Advanced Quantum Algorithms

CSO \*\*\*\* Industrial Applications of Quantum Computing

**C. ROBOTICS AND ARTIFICIAL INTELLIGENCE**

CSO \*\*\*\* Fundamentals of Robotics

CSO \*\*\*\* Robot Sensing and Vision

CSO \*\*\*\* Robot Operating System

CSO \*\*\*\* Deep Learning for Robotics

CSO \*\*\*\* Advanced Robotics Programming

**D. CYBER SECURITY**

CSO \*\*\*\* Number Theory and Cryptography

CSO \*\*\*\* Essentials of Cyber Security

CSO \*\*\*\* Incident Response and Threat Intelligence

CSO \*\*\*\* Advanced Cryptography

CSO \*\*\*\* Cyber Law, Cyber Crime and Cyber Ethics

**E. DATA SCIENCE**

CSO \*\*\*\* Data Privacy and Security

CSO \*\*\*\* Machine Learning

CSO \*\*\*\* Parallel Computer Architecture and Programming

CSO \*\*\*\* Deep Learning & Applications

CSO \*\*\*\* Generative AI

**F. GAMIFICATION AND DIGITAL TWINNING**

CSO \*\*\*\* Fundamentals of Game Design

CSO \*\*\*\* Introduction to Digital Twin Technologies

CSO \*\*\*\* Game Engine Architecture

CSO \*\*\*\* Game Development and Documentation

CSO \*\*\*\* Digital Twins and Gaming

1. **OTHER COURSES OFFERED WITH LABS**

CSO \*\*\*\* Principles of Cryptography

CSO \*\*\*\* Software Engineering

CSO \*\*\*\* Cloud Computing and DevOps

|  |  |  |
| --- | --- | --- |
| **Minor Specializations**   1. **Advanced Security Systems**   CSE XXXX Cryptography & Network Security  CSE XXXX Distributed Cloud Security  CSE XXXX Cyber Law and Ethics  CSE XXXX AI in Cyber Security   1. **Internet of Things**   CSE XXXX Introduction to IoT  CSE XXXX IoT in Agriculture  CSE XXXX IoT for Healthcare  CSE XXXX Smart Cities   1. **Blockchain Technology**   CSE XXXX Ethereum Smart Contract Using Solidity  CSE XXXX Fundamentals of Blockchain Technology  CSE XXXX Bitcoin and Cryptocurrencies  CSE XXXX Blockchain for Business   1. **Data Analytics**   CSE XXXX Information Retrieval  CSE XXXX Big Data Analytics  CSE XXXX Social Network Analysis  CSE XXXX Semantic Web   1. **Computational Intelligence**   CSE XXXX Artificial Intelligence  CSE XXXX Machine Learning  CSE XXXX Pattern recognition  CSE XXXX Neural Computation and Applications   1. **Software System Design**   CSE XXXX Advanced Software Engineering  CSE XXXX Software Architecture  CSE XXXX Software Quality Management  CSE XXXX Software Construction | **Other Programme Electives**  CSE XXXX Cryptanalysis  CSE XXXX Blockchain technology  CSE XXXX Mobile security and privacy  CSE XXXX Ethical hacking and cyber security  CSE XXXX Information retrieval  CSE XXXX Wireless networks  CSE XXXX Software-defined networks  CSE XXXX Hardware security  CSE XXXX Quantum computing  CSE XXXX Network security  CSE XXXX Cyber forensics  CSE XXXX Database and application security  CSE XXXX Software engineering  CSE XXXX Distributed systems  CSE XXXX Advanced computer networks  CSE XXXX Android application development  CSE XXXX Data warehousing and advanced data mining  CSE XXXX Cognitive systems  CSE XXXX Robotics and intelligent systems  CSE XXXX Object-oriented system design  CSE XXXX Fundamentals of Swift Programming  CSE XXXX iOS Application Development  CSE XXXX Advanced Programming in Swift  CSE XXXX Fog and Edge Computing |  |