| **Programme Template** | |
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| 1. Name of the Programme and Code | MTech in Computing and Intelligent Systems |
| 1. Degree (UG/PG) | PG |
| 1. Minimum Duration of the Programme (Specify for FT and PT, if applicable) | FT – 2 years  PT – 3 Years |
| 1. Maximum Duration of the Programme (Specify for FT and PT, if applicable) | FT – 3 years  PT - 5 years |
| 1. Capacity (Max. Student Strength) of the Programme | 12 – GC  6 – OBC  2 – SC  1 – ST  1 – PH  1 – EWS  Default: 5 (max 20) – Part Time (depending on external requests from organisations) |
| 1. Number of Regular Faculty Members   Involved as Teaching Faculty in the Programme | 15 (as of Jan 2025) |
| 1. Minimum Credit Requirements for the Degree | 62 |
| 1. Articulate the Program Learning Outcomes (PLO)   The programme will produce manpower strong in foundational principles, theoretically proficient, cross-technology domain aware and capable of deep-tech design and translation for national and global needs, *inter alia,* challenges of Sustainable Development  PLO1. Foundational principles of architecture, design and implementation skills needed to bridge computing and communication hardware & software for intelligent computing systems at all scales from large form factor computing servers for AI/ML computing to tiny form factor IoT sensors and edge/fog computing nodes will be taught through Programme Core and Programme Elective courses.  PLO2. Proficiency in cross-technology domain methods, techniques and tools in allied streams of EE (e.g., VLSI design, intelligent communication systems, neuromorphic architectures) will be taught to increase system and application knowledge of students to design and build entire intelligent computing systems for a wide range of current and emerging applications.  PLO3. Focussed skills for deep tech design and translation for cyber-physical systems in domains like Industry 4.0/5.0, healthcare, agriculture, environment, mobility, societal applications in other areas of engineering, basic sciences or humanities will be imparted to students for application in emerging areas, through open elective courses from any department.  PLO4. Proficiency in the design and development of immersive smart spaces, and multimodal HMIs including UI/UX, AR/VR. | |
| 1. Map PLOs with Institute Learning Outcomes (ILOs) of the Degree   [*Indicate ‘1’ for weak, ‘2’ for good, and ‘3’ for excellent relation. Leave the cell blank to indicate no relation*   |  | **PLO1 PLO2 Prog core+electives Cross stream electives Open**  **Electives** | **PLO3** | | --- | --- | --- | | **ILO 1** | 3 3 |  | 3 |  | | **ILO 2** | 3 3 |  | 3 |  | |  |  |  |  |  | |  |  |  |  |  | |  |  |  |  |  | | |
| 1. Number of Programme Core Credits | 32 |
| 1. Number of Programme Elective Credits | 24 (project-based MTech)  33 (course-based MTech) |
| 1. Number of Open Credits | 6 (project-based MTech)  9 (course-based MTech) |
| 1. Number of Project Core Credits | 12 |
| 1. Details of Creative Expression and Ethical Reasoning (CEER) Component in the Programme [Only for UG]  | Number of Credits Assigned |  | | --- | --- | | Courses Involved and Credits Accounted  [*e.g., If one module in AMLXXX with contact hours YY satisfies Z credits, then write AMLXXX (Z credits)*] | 1. xxx (Z1 credits) 2. xxx (Z2 credits) 3. … | | |
| 1. Details of Emerging Trends (ETT) Component in the Programme [Only for UG]  | Number of Credits Assigned |  | | --- | --- | | Courses Involved and Credits Accounted  [*e.g., If one module in AMLXXX with contact hours YY satisfies Z credits, then write AMLXXX (Z credits)*] | 1. xxx (Z1 credits) 2. xxx (Z2 credits) 3. … | | |
| 1. Details of Environment and Sustainability (E&S) Component in the Programme [Only for UG]  | Number of Credits Assigned |  | | --- | --- | | Courses Involved and Credits Accounted  [*e.g., If one module in AMLXXX with contact hours YY satisfies Z credits, then write AMLXXX (Z credits)*] | 1. xxx (Z1 credits) 2. xxx (Z2 credits) 3. … | | |
| 1. Details of Research/Technical Communication Component in the Programme [Only for PG]  | Number of Credits Assigned | 24 | | --- | --- | | Courses Involved and Credits Accounted  [*e.g., If one module in AMLXXX with contact hours YY satisfies Z credits, then write AMLXXX (Z credits)*] | 1. Cornerstone project (3) 2. Minor project (3) 3. Major Project 1 (6) 4. Major Project 2 (12) | | |
| 1. Details of Professional Ethics Component in the Programme [Only for PG]  | Number of Credits Assigned | 1 | | --- | --- | | Courses Involved and Credits Accounted  [*e.g., If one module in AMLXXX with contact hours YY satisfies Z credits, then write AMLXXX (Z credits)*] | Professional Ethics (1) | | |
| 1. Details of External Connect Component in the Programme [Only for PG]  | Number of Credits Assigned | 3 | | --- | --- | | Courses Involved and Credits Accounted  [*e.g., If one module in AMLXXX with contact hours YY satisfies Z credits, then write AMLXXX (Z credits)*] | Minor project/industry internship | | |
| 1. List of prescribed courses in all baskets (BS, GE, DC/PC, DE/PE, …)  | Basic Sciences (BS) | General Engineering (GE) | Departmental/Programme Core (DC/PC) | Departmental/Programme Elective (DE/PE) | | --- | --- | --- | --- | |  |  | Mathematical Foundations of Computer Technology | MTP - 2 | |  |  | Introduction to Machine Learning | Special Topics in Computer 1 | |  |  | Software Fundamentals of Computer Technology | Special Topics in Computer 2 | |  |  | Computer Architecture | Database Management Systems | |  |  | Operating Systems | Deep Learning for Natural Language Processing | |  |  | Minor Project/industry Internship | Edge intelligence | |  |  | MTP - 1 | Advanced Machine Learning | |  |  | Cornerstone Project  (3 credits) | Computational Neuroscience | |  |  | Professional ethics  (1 credit) | Network Security | |  |  |  | Embedded Systems and Applications | |  |  |  | Advances in Deep Learning | |  |  |  | Cloud Computing | |  |  |  | Mixed Signal Circuit Design | |  |  |  | Computational Perception and Cognition | |  |  |  | Detection and Estimation Theory | |  |  |  | Computer Vision | |  |  |  | Coding Theory | |  |  |  | Mobile Computing | |  |  |  | Synthesis of Digital Systems | |  |  |  | Wireless Communication | |  |  |  | Signal Theory | |  |  |  | Digital Communication | |  |  |  | Basic Information Theory | |  |  |  | Digital Image Processing | |  |  |  | Optoelectronic Communication | |  |  |  | Statistical Signal Processing | |  |  |  | Advanced Digital Signal Processing | |  |  |  | Quantum Computing | |  |  |  | Data Security | |  |  |  | Broadband Communication System | |  |  |  | Large Language Models | |  |  |  |  | | |
| 1. Nominal Semester-wise Academic Plan [*An example is provided below*]  | Sem | Courses | | | | | | Contact hrs/wk | | | Credits | | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | | L | T | P | | 1 | [PC­1]  Mathematical Foundations of Computer Technology  (3-0-0)  3 credits | [PC­2]  ELL781 Software Fundamentals for Computer Technology  (3-0-2)  4 credits | [PC­3]  ELL782 Computer Architecture  (3-0-2)  4 credits | [PC­4]  ELL784  Machine Learning  (3-0-2) – 4 credits | [PE­1]  (3­-0-­0)  3 credits | TP & RP  (0-0-6) 3 credits | 15 | 0 | 6 | 18 | | winter break | [PC­7]  Cornerstone Project (Summer break)  (0-0-6) 3 credits  (Evaluation will be done in 3rd semester) | | | | | |  |  |  |  | | 2 | [PC­5] ELL783 Operating Systems (3-­0-­2)  4 credits | [PE­2]  (3­-0-­0) 3 credits | [PE­3] (3­-0-­0) 3 credits | [PE­4]  (3­-0-­0)  3 credits | Cornerstone project evaluation  (0-0-6)  – 3 credits | TP & RP  (0-0-6) 3 credits | 12 | 0 | 8 | 16 | | summer break | [PC­6] Internship/minor project (Pass/fail)  (0-0-6) 3 credits | | | | |  | 0 | 0 | 6 |  | | 3 | [PC­8] ELD880 Major Project Part 1 (0-­0-­12)  6 credits | [OE­1]  (3-­0-­0)  3 credits | [PC­9] Professional Ethics   * 1. 1 cedit |  |  | TP & RP  (0-0-6) 3 credits | 4 | 0 | 12 | 13 | | 4  (Project-based) | [PE­5] ELD881 Major Project Part 2 (0­-0­-24)  12 credits | [OE­2] (3-­0-­0)  3 credits |  |  |  | TP & RP  (0-0-6) 3 credits | 3 | 0 | 24 | 15 | | 4 (Course-based) | [PE­5]  (3-­0-­0)  3 credits | [PE­6] (3-­0-­0)  3 credits | [PE­7]  (3-­0-­0)  3 credits | [OE­2] (3-­0-­0)  3 credits | [PE­8]  (3-­0-­0)  3 credits | TP & RP  (0-0-6) 3 credits | 15 | 0 | 0 | 15 | |  |  |  |  |  |  |  | 49 | 0 | 56 | **62** |   TP & RP: Teaching Practicum & Research Practicum (satisfactory/Unsatisfactory) | |
| 1. Average Contact Hours per Faculty *per Week,* for this Programme | ((L+T+P)/4/#f)\*2  =((49+0+56)/4/15)\*2  =3.5 |
| 1. Average Credit Students per Faculty per Semester, for this Programme | = ((Total credits)/4/#f)\*2\*28  =57.68 |
| 1. If the program is a revision of an existing program, please list the major changes made. | The proposed PG programme titled “Computing and Intelligent Systems” is a revision of the existing programme titled “Computer Technology”.  Major changes:   1. The total credits for the award of the degree will be 62 credits 2. Students will take 32 credits of Programme Core 3. Students will take 24 (or 33) credits of Programme Electives 4. Students will take 6 (or 9) credits of Open Electives 5. Students will do a cornerstone project in groups for 3 credits during the winter break after semester 1. 6. Program core courses (which have major programming assignments) are made 4 credits (prev- 3 credits) except the Mathematics Foundation course. 7. The "Intro to Machine Learning" course has been added as the program core with 4 credits. Earlier it was PE with 3 credits. |
| 1. Please elaborate on, |  |
| 1. how flexibility for the students has increased? | 1. A basket of Cross Programme Elective courses has been introduced to equip each student with cross-domain skills in subjects of her / his interest, so that she / he may be ready for a professional life in emerging areas requiring such cross-domain knowledge. 2. A cornerstone Project has been introduced during the summer break after semester 2, so that the student may prepare herself/himself for working in a two semester long project spanning semesters 3 and 4, resulting in a complete and functional system which may find application in the industry or advanced research. |
| 1. how engagement and interaction with the student have increased? | The programme has been re-designed to be project intensive so that there is continuous interaction of the students with the supervisor. Since projects are foreseen to be across various streams of EE, the students' interaction with supervising and evaluating faculty and other students across the department is expected to increase too. |
| 1. how hands-on learning is emphasized in the program? | 1. Every course will be designed to have a significant project component in the evaluation 2. The Capstone, MTP-1 and MTP-2 will be aimed towards creating a continuing stream of work resulting in integrated intelligent computing systems and thereby teaching students skills in hardware, software and interface design and implementation, h/w+s/w integration, system testing and debugging and sign-off. |