Academic Requirements for the M Tech (ICT) Program

(Effective from 2022-23 batch)

Master of Technology (Information and Communication Technology): M Tech (ICT), duration 2 years, (Four semesters) full-time postgraduate program of DA-IICT will be governed by these rules, subject to amendments, from time to time, as per the needs and requirements. These rules deal only with the post-admission academic activities of the program. Eligibility for admission, admission procedures etc. for the program are outside the purview of this document.

The Dean (Academic Programs)/Registrar may, from time to time, issue such instructions or directions as may be necessary to give effect to and carry out the provisions of these rules. Director, as Chairman of the Academic Council, may relax/exempt some provision(s) of the rulesin exceptional situations and all such cases shall be reported to the Academic Council in the immediate next meeting.

Important terms/expressions used in the document have been defined in the GLOSSARY at theend of this document.

1. REGISTRATION

1.1 Categories of Registration:

a) A student may register in a given semester in two possible categories: resident registration and external registration. Only resident registration will count towards the residence requirement for a Degree. A foreign student on student VISA will not be allowed to register as an external student.

b) To qualify for resident registration, the student must register for a duly approved course programme and pay the prescribed tuition and other fees, including any outstanding dues.

c) To qualify for external registration, a student must register for a duly approved research programme, and pay the prescribed registration fees, with the provision that the Dean (Academic Programs) in consultation with Postgraduate Committee (PGC) may permit/require registration for coursework also. However, this qualification is subject to the proviso that a regular M Tech student may not avail of external registration for the purpose of obtaining an 'S' grade for thesis work, as detailed in Section 2.3 (e).

1.2 New entrants to the program, who are awaiting the results of the qualifying examination may be allowed "provisional" registration. Latest by the date given in the academic calendar (usually about 8 weeks from the date of registration) such candidates will be required to submit, for verification, the Certificates of having passed the qualifying examination. Original Certificates will be returned to the students and a copy will be kept for records.

1.3 Late Registration

If for any compelling reason like illness, a student is unable to register on the day of registration, he/she will be allowed to register during the late registration period as specified in the Academic Calendar (which is about one week from the date of registration). Any student registering late will be required to pay the specified late registration fee.

In exceptional cases, the Dean (Academic Programs) on the recommendation of the Postgraduate Committee (PGC) may consider registration beyond the date of late registration. In such a case, the student will be allowed to register for thesis credits only.

1.4 Academic Advising:

A student will be advised in the selection of courses by the faculty adviser appointed by Dean (Academic Programs) in consultation with the PGC. Thesis supervisors will be assigned based on mutual consent of student and faculty supervisor after one semester of course work.

A student may be permitted to repeat or substitute courses in which he/she has obtained DD, DE or F grades. Permission to repeat/substitute a course will be governed by the guidelines laid down in section 2.3.

1.5 Semester Load Requirements:

The course load is 15/16 credits in first semester, 14/15 credits in second semester, and 12/13 credits in third and 12 credits in fourth semester. The minimum total credits requirement for the degree is 58 credits out which 33 credits are earned through coursework and 25 credits through major/minor projects. Out of the 33 required coursework credits, 13 credits are allocated to compulsory (core) courses and 20 credits are allocated to electives. Depending on the merits of the case, the PGC may permit a student to register for a maximum of 18 credits or a minimum of 12 credits in a regular semester.

1.6 Adding/Dropping of Courses and Withdrawal from a Semester

Adding and dropping of courses is permitted, during the Add/Drop period, only if the student's request is endorsed by the instructor of the course and the Convener PGC. The last dates of applying for adding and dropping of courses are specified in the Academic Calendar.

A student who wishes to withdraw prior to registration for a semester must obtain formal approval from the Dean (Academic Programs) before the prescribed last date for late registration for the concerned semester. Withdrawal after registration for a semester is permitted only on medical grounds or for other exceptional reasons and formal approval for such withdrawal must be obtained from the Dean (Academic Programs) before the date of commencement of the end-semester examination for the concerned semester. Withdrawal from a semester, either prior to registration or after registration, is permitted for only one semester at a time. If a student does not register for a regular semester or does not withdraw with permission from the Dean (Academic Programs) as indicated above, his/her name is liable to be struck off from the rolls of the Institute.

A student who registers for a semester after having withdrawn in previous semester(s) can register for the available courses as prescribed in the curriculum for that particular semester subject to pre-requisites, if any.

The transcript of a student who has “withdrawn” status would show the appropriate status for the concerned semester(s). The transcript of a student who is suspended for an academic or disciplinary reason would also show “withdrawn” status.

The maximum period for completion of M Tech (ICT) program is given in the appropriate subsection of Section 2 includes any semester in which the student has “withdrawn” status.

2. ACADEMIC REQUIREMENTS

2.1 Duration of the Program:

The total credits required in the M Tech (ICT) program will be at least 58. The actual credits will be as specified in the approved curriculum applicable to the concerned batch. The maximum permissible duration for the completion of the programs will be 3 years (six semesters), except that the maximum permissible duration for the MTech program (sponsored category) will be 4 years (eight semesters).

2.2 Audit Courses:

The students are permitted to audit courses. They will be given a “P” grade, which will be enteredin their grade card if they satisfy the requirements placed by the course instructor. If they donot meet the requirements, then they will not get any grade and no entry will be made inthe grade-card/transcript for that course.

2.3 Grades, Semester and Cumulative Performance Index:

A student is awarded a letter grade in each course he/she is registered for, indicating his/her overall performance in that course. These letter grades are assigned points on a 10-point scale as described in the table below:

Letter Grade	Grade Points	Explanation
AA	10	
AB	9	
BB	8	
BC	7	
CC	6	
CD	5	
DD	4	
DE	3	
F	0	Fail
I	-	Incomplete
P*	-	Pass

*For Pass/Fail and Audit Courses only.

a) If a student does not complete all the requirements for a course for a genuine reason, the instructor may award grade I (Incomplete). An I grade must be converted by the instructor to a regular letter grade by the last date for such conversion specified in the Academic Calendar, failing which it is automatically converted to an F grade.

b) A student getting an F grade in a core course must repeat it. An elective course must be either repeated or substituted as suggested by PGC.

c) A student getting a DD or DE grade in a course may substitute it by another course, providedhis/her CPI is less than the prescribed minimum for getting the degree for which he/she is registered and the student is allowed to continue in the program.

d) In case a course is repeated or substituted, the old grade will also appear on the transcript although it will not be taken into account while computing the CPI.

e) The grade S or X will be awarded for research credits as follows:

   At the end of the semester, the thesis supervisor(s) will assess the student's progress towardsthe research work during the semester and will award the grade S for each set of 3 credits if the work is satisfactory and X for every unsatisfactory set of 3 credits.

f) If a student is on leave for a part of the semester or submits his/her thesis in the middleof a semester, the PGC may reduce his/her research credits appropriately.

2.4 Sponsored Category (M Tech):

A student may be admitted as a sponsored student to the M Tech program provided DA-IICT signs an agreement with the sponsoring agency for the same. The Table below indicates the aspects of the student's degree program which would be specified by the agreement. All other requirements would be as indicated in the Academic Requirements for M Tech (ICT) Program.

Requirement	**Sponsored M Tech**
Course Work	33 credits
Research	25 credits min. Part or all the research may be carried out at the Sponsoring agency as indicated in the agreement.
Guidance	Guide from DA-IICT (mandatory), Co-Guide from sponsoring agency (optional).
Infrastructure (Research &Course)	DA-IICT and sponsoring agency respectively for the part in which student stays at DA-IICT and at the Sponsoring agency.
Financial Support (TA/RA)	Not Applicable unless indicated in the agreement
Intellectual Property Rights	DA-IICT jointly with sponsoring agency as specified in the agreement.

3. ACADEMIC PERFORMANCE REQUIREMENT

3.1 Semester Performance Index (SPI) and Cumulative Performance Index (CPI):

The SPI is an indicator of the academic performance of a student in all the courses he/she hasregistered during a given semester. It is computed by taking the weighted average of the

grades obtained in that semester. The CPI indicates the cumulative academic performance in allthe courses taken including those taken in the current semester. CPI is computed by taking the cumulative weighted average of the grades earned till that semester. The SPI and CPI is calculated up to two decimal places. Courses with S and X will not be taken into account in the above computations.

3.2 Minimum CPI requirements for graduation in the program:

Program	CPI for Graduation
M Tech (ICT)	6.0

3.3 Academic Probation and Dismissal:

A student whose CPI falls below the minimum required for graduation at the end of any semester will be placed on Academic Probation for the next semester with written intimation. A studentwill also be placed on Academic Probation if he/she obtains an X in a research course. For everystudent placed on Academic Probation for a semester, the PGC will prescribe a specified course load in the concerned semester and may also prescribe a minimum SPI the student must attain in the semester. The PGC will keep a watch on the progress of every student placed onprobation and if the performance of a student is poor so that he/she is not likely to benefit from continuing in the program any further, will recommend to the Director that he/she should leave the Institute. If a student's continuation in the program is terminated, the appropriate authority will issue the letter of termination.

4. Teaching Assistantships:

A student may expect financial support by stipend at par with GATE scholarship in the form of Teaching Assistantship based on need and merits. Weightage should be given to the performance of student in his/her TAship while deciding for the continuation of the TAship or amount of the stipend. The eligibility criteria and amount of stipend will be decided by academicadministration of the Institute.

The students admitted under NON-GATE category may be employed as TAs only if required by the institute, subject to satisfying prescribed minimum academic performance, and possessing appropriate knowledge/skills. The stipend in such cases will be separately decided by the Director.

5. MIGRATION RULES

5.1 Eligibility: Students in the MTech program are eligible to migrate to the Ph D programprovided they fulfill the following criteria:

- Student should have entered the program with a BTech/BE degree or equivalent
- Student should have completed a minimum of two semesters of the M Tech programwith at least 18 credits
- Student should have a minimum CPI of 7.0/10.

5.2 Admission Process: A student who wishes to migrate must submit an application to the Dean (Academic Programs) according to the format specified for admission to the Ph D program in the concerned academic year. This must include a research statement. In

addition, the student must submit letters of recommendation from three faculty members who were the instructors in courses taken by the student. The application would be considered as per the procedure laid down for PhD admissions. However, no application fee or admission fee would be applicable.

5.3 PhD Requirements: The migrated student would be subject to all the requirements as specified for PhD students with a B Tech/BE degree or equivalent. However, semesters registered (with resident/external registration) and credits earned as an MTech student would be carried over to the Ph D program. The prescribed duration for completion of the degreeand for passing the comprehensive examination would be regarded as commencing from the time of admission to MTech program.

5.4 Eligibility for MTech Degree: A PhD student who fails to pass the PhD comprehensive examination within the specified duration, whether admitted directly or via internal migration, is eligible to receive the M Tech degree under the following conditions:

- The student fulfills the eligibility criteria for MTech program
- The student fulfills the criteria for continuation in the MTech program
- The student submits an MTech thesis which fulfills the requirements for such within a maximum of two semesters. This duration would commence from the semester immediately following the semester in which the PhD comprehensive examination has been failed. Furthermore, the student would not be eligible for financial support during this period.

5.5 Completion of Requirements for MTech Program: A student who migrates to the M Tech (ICT) program from the Ph D program must complete all requirements for the MTech (ICT) degree within two years (four semesters) from the time of migration. However, credits earned as a Ph D student would be carried over to the M Tech (ICT)

5.6 program.

6. GLOSSARY

Academic Probation: Academic Probation indicates that a student's academic performance is not up to the expected level. Over and above the academic consequences described in section 3.3, a student who has been placed on probation at any time may be subjected to other restrictions related to financial support, award of medals and prizes, etc.

Cumulative Performance Index (CPI): CPI indicates the cumulative academic performance inall the courses taken including those taken in the current semester. CPI is computed by taking the cumulative weighted average of the grades earned till that semester.

Grade Points: Product of the credits and points of a letter grade awarded to the course.

Postgraduate Committee (PGC): Committee of the Institute responsible for Policy Guidelinesand Implementation Strategies covering the Postgraduate Programs.

Semester: Approximately 16 weeks duration each, the first one (Autumn Semester) extending from July to November and the second (Winter Semester) from December/ January to April.

Semester Credits: The sum of credits of courses registered by the student in a semester.

Semester Grade Points: The sum of the products of credits and points for each course registeredby a student in a semester.

Semester Performance Index (SPI): SPI is an indicator of the academic performance of a student in all the courses he/she has registered during a given semester. It is computed by taking the weighted average of the grades obtained in that semester.

DA-IICT,Gandhinagar
November, 2022

Course Structure

Semester-Wise Program Structure

Semester-I Total Credits:15

General Elective-I
General Elective-II
Program Core-I
Program Core-II
Specialization Core-I

- TWO **general elective** courses of 6 credits. One course is to be taken from a basket of designated mathematics courses. The other course is to be taken from a basket of designated technical elective courses. These baskets may include upper level undergraduate courses or refresher courses.
- TWO **program core** courses of 5 credits. These courses are common to students of all specializations. The courses are:
- Communication Skills and Technical Writing (2 credits)
- Programming Lab (3 credits)
- ONE **specialization core** course of 4 credits.

Note: Each student joining the program will be assigned a faculty advisor who will provide general academic guidance and support to the student.

Semester-II Total Credits: 14

Specialization Core-II
Specialization Elective-I
Specialization Elective-II
Minor Project-I

- ONE **specialization core** course of 4 credits
- TWO **specialization elective** courses of 7 credits
- ONE **minor project** of 3 credits. The minor project is a supervised project under the guidance of a faculty mentor.

Summer Total Credits: 4

Major Project-I

- **Major project I** (0-0-8-4). The major project I is a supervised project under the guidance of a faculty mentor. During the summer, the student undertakes preliminary work leading to the problem definition/formulation. The faculty mentors for minor project and major project I may be same or different.

Semester-III Total Credits: 13

Specialization Elective-III
Specialization Elective-IV
Major Project-I

- TWO **specialization electives** of 7 credits
- Continuation of **major project I** - Summer (0-0-12-6)

Semester-IV Total Credits: 12

Major Project-II
OR
Industrial Training Project

- **Major project II** OR **Industrial Training Project**
  In this semester, a student can choose to do major project II on campus or undertake an internship in industry. If the student undertakes major project II, it must be a continuation of Major project I.

Note: Upon successful completion of major project II, student is awarded a thesis certificate.

Total course credits: 33
Total project credits: 25

The curriculum mandates a total of 58 credits, 33 earned through coursework and 25 credits earned through the minor and the major projects and/or internship. Out of the 33 required coursework credits, 13 credits are allocated to compulsory (core) courses, and 20 credits are allocated to electives.

The distribution of courses for MTech (ICT) degree is as under:

Subject Area	Number of Credits
Program Core courses	5
Specialization Core courses	8
Specialization Elective courses	14
General Elective courses	6
Minor/Major Project	25
Total Credits:	**58**

M Tech (ICT): Detailed Program Structure

Specialization: Software Systems

Semester-I

- Communication and Technical Writing (2 credit)
- Programming lab (3 credit)
- Specialization Core I: Advanced Algorithm (4 credit)
- General Elective (Maths) (3/4 credit)
- General Elective (Technical) (3/4 credit)

Semester-II

- Specialization Core II – Advanced Software Engineering (4 credit)
- Minor Project (3 credit)
- Specialization Elective I (3/4 credit)
- Specialization Elective II (4/3 credit)

Summer: Major Project I (4 credit)

Semester-III

- Major Project I (Continued) (6 credit)
- Specialization Elective III (3/4 credit)
- Specialization Elective IV (4/3 credit)

Semester-IV

- Major Project II/Industrial Training Project (12 credit)

Representative List of General Elective (Mathematics)

- Probability & Random Variables
- Linear Algebra
- Optimization
- Graph Theory
- Any other relevant course

Representative List of General Elective (Technical)

- Operating Systems
- Machine Learning
- Natural Language Processing
- Cloud computing
- Artificial Intelligence
- Human Computer Interaction
- Any other relevant course

Representative List of Specialization Electives I and II

- Distributed Systems
- Distributed Databases
- Approximation Algorithms
- Information Security
- Multimedia Security & Forensic
- Any other relevant course

Representative List of Specialization Elective III and IV

- Big Data Processing
- Blockchains and Cryptocurrency
- Advanced Computer Networks
- Software Specification and Verification
- Any other relevant course

Specialization: Machine Learning

Semester-I

- Communication and Technical Writing (2 credit)
- Programming lab (3 credit)
- Specialization Core I: Foundations of Machine Learning (4 credit)
- General Elective (Maths) (3/4 credit)
- General Elective (Technical) (3/4 credit)

Semester-II

- Specialization Core II – Advanced Machine Learning (4 credit)
- Minor Project (3 credit)
- Specialization Elective I (3/4 credit)
- Specialization Elective II (4/3 credit)

Summer: Major Project I (4 credit)

Semester-III

- Major Project I (Continued) (6 credit)
- Specialization Elective III (3/4 credit)
- Specialization Elective IV (3/4 credit)

Semester-IV

- Major Project II/Industrial Training Project (12 credit)

Representative List of General Elective (Mathematics)

- Probability & Statistics
- Linear Algebra
- Optimization
- Graph Theory
- Any other relevant course

Representative List of General Elective (Technical)

- Advanced Algorithm
- Cloud computing
- Artificial Intelligence
- Human Computer Interaction
- Any other relevant course

Representative List of Specialization Electives I and II

- Digital Image Processing
- Information Retrieval
- Recommendation System

- Adversarial Machine Learning
- Deep Learning
- Multimedia Security & Forensic
- Speech Technology
- Any other relevant course

Representative List of Specialization Elective III and IV

- Computer Vision
- Natural Language Processing
- Reinforcement Learning
- Computational Shape Modeling
- Wavelet Image Processing
- Time Series Forecasting
- Any other relevant course

Specialization: VLSI & Embedded Systems

Semester-I

- Communication and Technical Writing (2 credit)
- Programming lab (3 credit)
- Specialization Core I: VLSI System Design (4 credit)
- General Elective (Maths) (3/4 credit)
- General Elective (Technical) (3/4 credit)

Semester-II

- Specialization Core II – Embedded Hardware Design (4 credit)
- Minor Project (3 credit)
- Specialization Elective I (3/4 credit) - Choose any one
- ASIC Design
- Analog VLSI Design
- Specialization Elective II (4/3 credit) - Choose any one
- Digital System Architecture
- Cyber Physical Systems and IoT

Summer: Major Project I (4 credit)

Semester-III

- Major Project I (Continued) (6 credit)
- Specialization Elective III (3/4 credit)
- Specialization Elective IV (3/4 credit)

Semester-IV

- Major Project II/Industrial Training Project (12 credit)

Representative List of General Elective (Mathematics)

- Probability & Random Variables
- Linear Algebra
- Optimization
- Graph Theory
- Any other relevant course

Representative List of General Elective (Technical)

- Digital Programming
- Internet of Things
- Machine Learning
- Robotics
- Edge Computing
- Any other relevant course

Representative List of Specialization Electives I and II

- ASIC Design
- Analog VLSI Design

- Digital System Architecture
- Cyber Physical Systems and IoT
- Any other relevant course

Representative List of Specialization Elective III and IV

- VLSI Testing and Verification
- Low Power VLSI Design
- VLSI for Digital Signal processing
- Device Modeling and Simulation
- Nanoelectronics
- Any other relevant course

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