



ENGINEERS WITH
SOCIAL RESPONSIBILITY

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Academic Regulations

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ACADEMIC REQUIREMENT FOR B TECH (ICT) PROGRAM

(Effective from Autumn 2016-17)

This document contains rules governing the B Tech (Bachelor of Technology) program, which is a four-year undergraduate program. These rules are applicable to students admitted to the program in the academic year 2016- 17 and onwards.

These rules deal only with the post-admission academic activities of the program. Eligibility criteria for admission, admission procedures, etc. are outside the purview of this document. They are subject to amendments from time to time as per the needs and requirements.

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 provision(s) of the rules in 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 the end of this document.

1. REGISTRATION

At the beginning of each semester, until the completion of the program, every student must register for the semester and for the courses that he/she will study during the semester.

1.1 Procedure for Registration:

The registration schedule is announced in advance, and registration is normally carried out within the first two days of each semester through the prescribed procedure (Student Registration System or SRS). Late registration may be permitted for valid reasons on submission of an application to the Deputy Registrar and only on payment of the prescribed late registration fee. In any case, registration must be completed before the prescribed last date for late registration in the Academic Calendar. Students having any outstanding dues to the Institute or hostel will not be permitted to register.

1.2 Eligibility for Course Registration:

A student with no backlog courses (i.e. who has passed all the previous courses) will be eligible to register for all courses prescribed in the curriculum for that semester, inclusive of the specified number of electives. A student who has backlog course(s) or is on academic probation may be recommended a different set of courses, by the convenor of the UG Committee.

1.3 Pre-Requisite Courses:

A student registering for a course must have successfully completed the Pre-requisite course(s), if any, for that particular course. For Hard Pre-requisite, a minimum grade of DD is required; for a Soft Pre-requisite, minimum grade of DE is required (see Section 4.2 below).



1.4 Withdrawal from Semester and Discontinued for Failing to Register:

- a) A student who wishes to withdraw prior to registration for a semester must obtain a 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, he/she will be discontinued from the Institute.
- b) A student who registers for a semester after having withdrawn in the previous semester(s) may register for the available courses as prescribed in the curriculum for that particular semester subject to fulfilling of the pre-requisites, if any.
- c) The transcript of a student who has "withdrawn" a semester would show the appropriate status for the corresponding semester(s). The transcript of a student who is suspended from a semester for an academic or disciplinary reason would also show "withdrawn" status in the corresponding semester.

2. AUDITING OF COURSES AND REGISTRATION FOR PG COURSES

2.1 Registration of Courses for AUDIT:

Auditing of courses allows students to gain exposure to additional subjects without increasing unduly their overall course load. Registration of courses for AUDIT is permitted from fifth semester onwards under the following conditions:

- a) A student can take maximum two courses under audit during the entire program.
- b) A student has to enter the courses to be audited in the Course Registration Form while registering for the semester. The word "Audit" would be specially mentioned in the remarks column of the student's course registration form.
- c) A student can register a course for audit provided the following two conditions are satisfied:
 - (i) the course instructor permits and approves the registration, and
 - (ii) the lecture, lab and tutorial time-tables strictly permit.
- d) An audit course will not be considered as an overload.
- e) If the student's performance is satisfactory, a grade of P (Pass) would be awarded. If the performance is not satisfactory, a grade of F (Fail) would be awarded by the instructor.
- f) An audit course will not be considered for the purpose of calculation of Semester Performance Index (SPI)/Cumulative Performance Index (CPI). However, the course will be reflected in the Semester Grade Report and Transcript as an Audit Course provided a grade of P is obtained, otherwise the course will not appear in the Semester Grade Report and Transcript.
- g) In a semester only one course can be registered as an audit course.

2.2 Registration for Post-Graduate level Courses for Credit:

Students with a CPI of 7.4 or above may be permitted to register for available M Tech level courses as credit courses from sixth semester onwards.



Such courses would be regarded as a part of the prescribed course load for the regular semester. A student can register a Post Graduate level course provided the following two conditions are satisfied:

- (i) The course instructor permits and approves the registration, and
- (ii) The lecture, lab and tutorial time tables strictly permit.

3. COURSE LOAD

3.1 Regular Semesters:

A student is permitted to register for additional courses over the prescribed courses in the curriculum for a regular semester provided the total number of courses does not exceed 6 and the total credits do not exceed 26. A student is permitted to underload his/her prescribed academic load in a regular semester by dropping one or more courses provided the number of courses is at least 4 and the registered credits are not less than 12. However, after completion of his/her seventh regular semester, a student will be permitted to register for less than four courses.

3.2 Summer Semester:

The summer semester is a special semester of approximately eight weeks between May and July. In a Summer Semester, a student can register for a maximum of three (3) backlog courses. For the purpose of this rule, internship would be regarded as two (2) courses and BTech Project Part II would be regarded as three (3) courses. BTech Project Part I would be regarded as a single course. However, no other course can be taken along with industrial/rural internship. For Summer Semester only, the term "backlog courses" indicates a course which a student has registered earlier and failed. However, for a student who has completed eight regular semesters, the term "backlog course" would have the standard interpretation as given in the Glossary. Furthermore, students who have completed eight regular semesters are also permitted to register for grade improvement in Summer Semester (see, section 5.2).

4. COURSE ASSESSMENT AND MODES OF ASSESSMENT

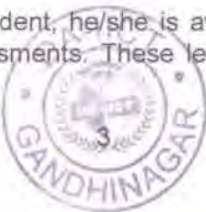
4.1 Course Assessment:

The various modes of assessment used for rating students' performance in a course include home assignments, tutorial assignments, laboratory work, group assignments, quizzes, tests (open or closed book), viva-voce, mini projects, etc. and the end-semester examination. Attendance in lectures/labs/tutorials may also be given due weightage in course assessment. The instructor may make attendance in lectures/tutorials/labs compulsory (80% or less) and award "F" grade to students who do not achieve the prescribed level of attendance in that course. The distribution of weightage for the assessment (continuous evaluation) through the various modes listed above will be as indicated by the course instructor at the beginning of the semester.

Note: Academic requirements such as projects and summer assignments, which are prescribed in the curriculum, are regarded as courses for the purpose of assessment.

4.2 Grading:

a. For every course taken by a student, he/she is awarded a letter grade based on his/her overall performance in all the assessments. These letter grades are assigned on a 10-point scale as described in the table below:



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

b. A student passes the course if he/she gets any grade in the range of AA to DE, but fails if he/she gets the grade F. Certain courses are indicated as Pass/Fail courses in the curriculum, and in these courses a grade of P or F is awarded. F grade may also be awarded in case of reported malpractice in examination(s)/continuous evaluation process.

c. Pass/Fail courses are not considered for calculation of SPI/CPI.

d. "I" grade will be awarded in a course if the overall performance of the student is satisfactory in the course, but the student either misses the end-semester examination due to illness, accident/death in the family and therefore obtains an approval from the Dean (Academic Programs) under exceptional circumstances. A student who misses the end-semester examination must apply to the Convener of Undergraduate Committee and his/her application must be supported by (i) proper medical certificate duly approved by the Medical Authority of the Institute in the case of illness, or (ii) adequate evidence in the event of accident/death in the family. An application not so supported will not be considered. Grade "I" awarded for missing the end-semester examination will be converted into a performance grade (depending on the overall performance of the student in the course) after taking an examination equivalent to the end-semester examination of that particular course. An "I" grade must be converted into a performance grade by the specified date in the Academic Calendar for the next semester, otherwise it will be converted into "F" grade.

5. REPEATING A COURSE

5.1 A student must repeat a course in which he/she has obtained an F grade in a course taken for credit. Such a course is regarded as a backlog course and is subject to the regulations for registration as indicated in Paragraph 3. A backlog elective course can be replaced by another elective of the same category (technical/open/ science).

5.2 Grade Improvement:

A student whose CPI is less than 5.0 is allowed to repeat a course in which a DD or DE grade was obtained for the purpose of grade improvement in a regular semester only. The grade obtained in the repeated attempt will be considered for the purpose of calculating the CPI. The grade obtained in the first attempt will be shown in the Transcript, but will not be considered for calculating the CPI.



6. B TECH PROJECT

All students are required to complete the B Tech Project (BTP). The total number of credits will be as normally prescribed in the curriculum from time to time.

7. PERFORMANCE INDICES

7.1 Semester Performance Index (SPI):

The performance of a student in a semester is indicated by the Semester Performance Index (SPI). The SPI is the weighted average of the grade points obtained in all the courses registered by the student during the semester, calculated to two decimal places.

7.2 Cumulative Performance Index (CPI):

An up-to-date assessment of the overall performance of a student from the time of entering the Institute is obtained by calculating the student's Cumulative Performance Index (CPI). The CPI is weighted average of the grade points obtained in all the courses registered for credit by the student after entering the Institute. The CPI is also calculated to two decimal places.

8. MINIMUM REQUIREMENTS OF ACADEMIC PERFORMANCE

8.1 Academic Probation:

A student will be placed on Academic Probation for his/her second semester with written intimation if his/her SPI at the end of first semester is less than 4.5. In subsequent semesters, a student will be placed on Academic Probation with written intimation if his/her CPI in the previous semester is less than 5.0 or if his/her SPI is less than 4.5 in the previous semester.

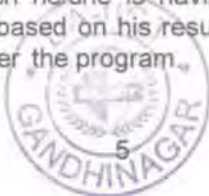
For every student placed on Academic Probation, the Dean (Academic Programs) may prescribe a minimum SPI the student must attain in the semester. The minimum SPI so stipulated will be arrived at on the basis of the performance of the student in terms of her/his SPI/CPI as compared to the minimum requirements for graduation.

8.2 Discontinuation from the Institute on Account of Poor Academic Performance:

If the performance of a student is poor so that he/she is not likely to benefit from continuing in the program any further, he/she would be required to leave the Institute. For this purpose an assessment of the student's academic performance will initially be made at the end of the second semester of his/her stay at the Institute and thereafter at the end of every subsequent semester. This assessment will be based on the CPI and SPI obtained by the student.

8.3 Discontinuation from the Institute on account of Poor Academic Performance at the end of the Second and Fourth Semester:

A student whose CPI is less than 4.0 at the end of second or fourth semester shall be discontinued from the Institute. However, such a student may be allowed to register for the available backlog courses offered in the summer semester, following his/her second or fourth semester. Such a student is permitted to register for a maximum of three (3) of the available summer courses in which he/she is having F or DE grade. In case the student achieves the minimum CPI of 4.0 based on his results including the said summer semester, he/she would be allowed to re-enter the program.



8.4 Minimum and Maximum Period for Completion of B Tech Program:

The minimum period to complete the program is four academic years. In any case a student should fulfill the requirements for her/his degree within a maximum period of six academic years, failing which she/he will be required to leave the Institute. The period of six years includes any semester for which the student has "withdrawn" status.

9. AWARD OF DEGREE

9.1 The B Tech (ICT) Degree will be conferred on a student after he/she has fulfilled the following requirements:

- a. The student should have taken for credit and passed all the foundation and elective courses prescribed in the curriculum for the program. The minimum total number of course credits is 152, of which 111 correspond to foundation courses; the remaining 41 credits must be obtained through elective courses in form of (i) ICT electives (minimum three courses), (ii) technical electives (minimum four courses), (iii) science electives (minimum two courses) and (iv) open electives (minimum two courses).
- b. The minimum number of grade points required from course work for graduation is 760 (152 x 5). For this requirement, internships and BTP are not considered. In case the student has earned the minimum number of credits, but does not have the minimum number of grade points, then he/she must take additional elective courses (up to the maximum specified for each category) in order to fulfill the requirement.
- c. The student should have passed all the foundation courses including the Pass/Fail courses prescribed in the curriculum, and also all the prescribed internships.
- d. The student should have obtained a passing grade for the BTP, as prescribed in the curriculum.
- e. The student should have registered for at least eight regular semesters (i.e., excluding summer semester and the withdrawn semester) as a regular student and should have paid all the institute dues.
- f. The student should have no case of indiscipline pending against him/her.

9.2 Final CPI and Class:

a) For the purposes of computing the CPI at the end of the program, the student's CPI will be computed on the basis of the best CPI obtainable from the courses taken subject to:

- The total credits from course work will be taken from the least number of courses which are required to obtain 760 grade points; provided that these total credits must be at least 152, and must include 111 credits from foundation courses and must satisfy the minimum requirements for different categories of electives, as indicated in paragraph 9.1 (a) above.
- All other courses taken by the student will be categorized as extra credits and not considered for calculating the final CPI.
- The CPI would be computed inclusive of the grade points earned from course work, as described in 9.2 (a) and from the BTEch Project.
- The requirement of earned course credits and grade points is subject to change, with the Director's approval, in case credit structure of a course is modified.



b) The Transcript will indicate Distinction if the student obtains a CPI of 9.0 or above and First Class if the student obtains a CPI of 6.5 or above but less than 9.0

9.3 Certificate of Academic Accomplishment:

A student who is unable to complete the degree requirements within the stipulated maximum period (see Clause 8.4 above) would be eligible to receive a "Certificate of Academic Accomplishment" by applying for it. The eligibility criteria and procedure for issue of the Certificate would be as laid down by the Institute from time to time.

10. GLOSSARY

Backlog Course: A course prescribed in the curriculum which has either not been registered or failed by a student.

Course Credit: Weighted sum of number of Lecture hours (L), Tutorial hours (T) and Practical hours (P) associated with the course. The weight for L and T is 1.0, and the weight for P is 0.5.

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

Semester: An academic year consists of two regular semesters of approximately 16 weeks duration each, the first (Autumn Semester) extending from July to December and the second (Winter Semester) from January to May. The summer semester is not a regular but a special semester of approximately eight weeks usually between May and July.

Semester Grade Report: Official record of the grades obtained in all the courses registered by a student in a semester.

Transcript: Official record of the grades obtained in all the courses registered by a student and is issued after the completion of the degree requirements.

Under-Graduate Committee (UG Committee): Committee of the Institute responsible for Policy Guidelines & Implementation Strategies covering the Undergraduate Program.

DA-IICT, Gandhinagar
July 2016





BTech (ICT) Curriculum

(Effective from BTech 2016-17 batch)

1. Introduction: The Academic Council has approved the BTech Curriculum Review Committee Final Report, and directed that the revised curriculum contained therein should be followed with effect from the 2016 batch and onwards. The document contains the official description of the course structure for the BTech 2016 batch onwards.

2. Course Structure for BTech (ICT) Program with effect from 2016 Batch is indicated in Table 1:

Table 1

Semester I	L-T-P-C	Semester IV	L-T-P-C	Semester VII	L-T-P-C
Basic Electronic Circuits	3-0-3-4.5	Analog Circuits	3-0-3-4.5	Open Elective – 3 / Science Elective – 2	3-0-0-3
Introduction to Programming	3-0-0-3	Analog Communication and Transmission Line Theory	3-0-2-4	ICT Elective – 4	3-4
Introduction to Programming Lab	0-0-4-2	Systems Software	3-0-3-4.5	Technical Elective – 3	3-4
Calculus	3-1-0-4	Probability, Statistics and Information Theory	3-1-0-4	Technical Elective – 4 / Science Elective – 3	3-4
Engineering Design Workshop	1-0-3-2.5	Engineered Materials	3-0-0-3	ICT Elective – 5 / Technical Elective – 5	3-4
Language and Literature	3-0-0-3	Environmental Studies	2-0-0-2	Open Elective – 4 / Science Elective – 4	3-0-0-3
				Any Elective (CS students) / BTP 1	3-4
Semester credits	13-1-10-19	Semester credits	17-1-8-22	Semester credits	(21/26-0-0) 21-26
Semester II	L-T-P-C	Semester V	L-T-P-C	Semester VIII	L-T-P-C
Digital Logic Design	3-0-3-4.5	Embedded Hardware Design	3-0-3-4.5	BTP 2 / BTP 9 / 13	
Introduction to Communication Systems	3-0-3-4.5	Digital Communications	3-0-3-4.5		
Data Structures	3-0-0-3	Computer Networks	3-0-3-4.5		
Data Structures Lab	0-0-4-2	Database Management Systems	3-0-3-4.5		
Discrete Mathematics	3-1-0-4	Principles of Economics	3-0-0-3		
Approaches to Indian Society	3-0-0-3	ICT Elective 1	3-4		
Semester credits	15-1-10-21	Semester credits	(18/19-0-12) 24-25	Semester credits	(9/13-0-0) 9-13



Semester III	L-T-P-C	Semester VI	L-T-P-C
Signals and Systems	3-1-0—4	Software Engineering	3-0-3—4.5
Computer Organization	3-0-3—4.5	ICT Elective – 2	3—4
Design and Analysis of Algorithms	3-0-2—4	Open Elective – 1 (non-CS students)	3-0-0—3
Groups and Linear Algebra	3-1-0—4	Open Elective – 2 / Science Elective – 1	3-0-0—3
Electromagnetic Theory	3-1-0—4	Technical Elective – 1	3-0-0—3
Science, Technology, Society	3-0-0—3	ICT Elective – 3 / Technical Elective – 2	3—4
Semester credits	18-3-5—23.5	Semester credits	(18/20-0-3) 19.5-21.5
Rural Internship (4 credits)		Research/Industrial Internship (6 credits)	

3. Table 2 shows the minimum and maximum number of courses permitted in each category.

Table 2: Allowed number of courses in Electives

Type	Min	Max	Credits	Remarks
ICT Electives	3	5	9-17	Additional courses taken in this category will be treated as Technical electives
Technical Electives	4	6	12-20	Courses offered as ICT Electives can be taken in place of the courses in this category. However, a course in this category does not qualify to ICT elective
Science Electives	2	4	6-12	Maths/Physics/Bio-informatics or allied science disciplines
Open Electives	2	3	6-9	Engineering Arts, Humanities, Social Management

4. **Additional Elements of the Curriculum:** The provisions governing electives are indicated below.

4.1 ICT Electives: The ICT electives are technical courses in the areas of ICT with components of Electronics, Signal Processing, Communication, Information Technology, Computer Science and multi-disciplinary domains as well. The ICT electives category would be technical courses which have breadth/components in (at least) two of these three emerging fields Computer Systems, Communication Technology, and Electronics Engineering. Every student is required to take a minimum of 3 courses (9 credits) and up to a maximum of 5 courses (17 credits) from the set of ICT electives. If a student passes more than 3 courses from the ICT electives category, then he/she can consider the additional course(s) as Technical electives.

4.2 Technical Electives: The Technical electives fall in one of the groups of Electronics, Signal Processing and Communication, Information Technology and Computer Science, and Interdisciplinary. Every student is required to take a minimum of 4 Technical elective courses (12



credits) and up to a maximum of 5 courses (20 credits). Any ICT elective course can be taken in place of a Technical elective. In other words, a student taking more than 3 ICT elective subjects may treat the additional ICT elective(s) as Technical elective(s), but the reverse is not applicable.

4.3 Open Electives. Open electives are elective courses offered in the areas of Humanities, Social Sciences, Management and Engineering Arts (including Design), which are not covered in the Technical electives. Every student must take a minimum of 2 courses (6 credits) and is permitted to take up to a maximum of 3 courses (9 credits) from this category. Appendix 5 lists the representative courses of Open electives.

4.4 Science Electives: Science Electives are courses offered in the areas of Physics, Mathematics, Bioinformatics, Engineering Sciences and so on. It is proposed that the courses of Science electives should be inter-disciplinary in nature. The undergraduate committee in consultation with Dean(AP) needs to look into the inter-disciplinary factor of the courses offered in this category. Every student must take a minimum of 2 courses (6 credits) and is permitted to take up to a maximum of 4 courses (12 credits) from this category. Appendix 4 lists the representative courses of Science electives.

4.5 Free Electives. Free electives allow students to take any electives (Open, Science, Technical or ICT) with a total of 8 credits from this category. Students may also do Mini-Project (MP) under this category. The credit structure of Mini-Project is 0-1-4-3. A student can register a course for MP provided the following conditions are satisfied:

- Student is allowed to register for MP from his/her 5th semester onwards (that is, after completion of the first four semesters).
- Student needs to have a CPI of 7.5 to register for MP.
- Student has to do MP under the in-campus faculty supervision. The faculty supervisor needs to permit and approve the MP registration.
- Student is allowed to register for at most one MP in one semester.
- Student is allowed to register for a maximum two MP (the combined credit for MP should not exceed 6) during the entire program.
- An MP course will not be considered as an overload.
- Credits accumulated from MP will be counted credits from *Free electives*.
- Student is allowed to register for MP in the semester in which he/she is not registering for any Audit course.

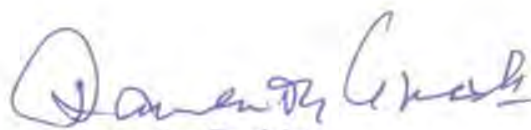
4.6 B Tech Project: All students must undertake and pass B Tech Project Part 1 (3 credits) and Part 2 (10 credits); either Part 1 may be taken in Semester VII and Part 2 in Semester VIII or both parts may be taken in Semester VIII.

4.7 Internships: All students must undertake and pass Rural Internship of 4 credits (normally offered in the Semester Break between Semesters III and IV) and Industrial/Research Internship of 6 credits (normally offered in Summer Semester after Semester VI).

NB: The course outlines will be notified separately.

DA-IICT, Gandhinagar
July 2016




Executive Registrar
DA-IICT, Gandhinagar



ACADEMIC REQUIREMENT FOR B TECH (ICT) PROGRAM *(Effective from Autumn 2021-22)*

This document contains Rules governing the B Tech (Bachelor of Technology) program, which is a four-year undergraduate program. These rules are applicable to students admitted to the program in the academic year 2021-22 and onwards.

These Rules deal only with the post-admission academic activities of the program. Eligibility criteria for admission, admission procedures, etc. are outside the purview of this document. The Rules are subject to amendments from time to time as per the needs and requirements.

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 provision(s) of the Rules in 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 the end of this document.

1. REGISTRATION

At the beginning of each semester, until the completion of the program, every student must register for the semester and for the courses that she/he will study during the semester.

1.1 Procedure for Registration:

The registration schedule is announced in advance, and registration is normally carried out within the first two days of each semester through the prescribed procedure (Student Registration System or SRS). Late registration may be permitted for valid reasons on submission of an application to the Deputy Registrar and only on payment of the prescribed late registration fee. In any case, registration must be completed before the prescribed last date for late registration in the Academic Calendar. Students having any outstanding dues to the Institute or hostel will not be permitted to register.

1.2 Eligibility for Course Registration:

A student with no backlog courses (i.e., who has passed all the previous courses) will be eligible to register for all courses prescribed in the curriculum for that semester, inclusive of the specified number of electives. A student who has backlog course(s) or is on academic probation may be recommended a different set of courses, by the Convenor of the UG Committee.



1.3 Withdrawal from Semester and Discontinued for Failing to Register:

- a) A student who wishes to withdraw prior to registration for a semester must obtain a 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, she/he will be discontinued from the Institute.
- b) A student who registers for a semester after having withdrawn in the previous semester(s) may register for the available courses as prescribed in the curriculum for that particular semester as suggested by the UG Committee.
- c) The transcript of a student who has "withdrawn" a semester would show the appropriate status for the corresponding semester(s). The transcript of a student who is suspended from a semester for an academic or disciplinary reason would also show "withdrawn" status in the corresponding semester.

2. AUDITING OF COURSES AND REGISTRATION FOR PG COURSES

2.1 Registration of Courses for AUDIT:

Auditing of courses allows students to gain exposure to additional subjects without increasing unduly their overall course load. Registration of courses for AUDIT is permitted from fifth semester onwards under the following conditions:

- a) A student can take maximum two courses under audit during the entire program.
- b) A student has to enter the courses to be audited in the Course Registration Form while registering for the semester. The word "Audit" would be specially mentioned in the remarks column of the student's course registration form.
- c) A student can register a course for audit provided the following two conditions are satisfied:
 - (i) The course Instructor permits and approves the registration.
 - (ii) The lecture, lab and tutorial time-tables strictly permit.
- d) An audit course will not be considered as an overload.
- e) If the student's performance is satisfactory, a grade of P (Pass) would be awarded. If the performance is not satisfactory, a grade of F (Fail) would be awarded by the Instructor.
- f) An audit course will not be considered for the purpose of calculation of Semester Performance Index (SPI)/Cumulative Performance Index (CPI). However, the course will be reflected in the Semester Grade Report and Transcript as an Audit Course provided a grade of P is obtained, otherwise the course will not appear in the Semester Grade Report and Transcript.
- g) In a semester only one course can be registered as an audit course.



2.2 Registration for Post Graduate Level Courses for Credit:

Students with a CPI of 7.4 or above may be permitted to register for available MTech level courses as credit courses from fifth semester onwards. Such courses would be regarded as a part of the prescribed course load for the regular semester. A student can register a Post Graduate level course provided the following two conditions are satisfied:

- (i) The program convenor approves the registration, and
- (ii) The lecture, lab and tutorial time-tables strictly permit.

3. COURSE LOAD

3.1 Regular Semesters:

A student is permitted to register for additional courses over the prescribed courses in the curriculum for a regular semester provided the total number of courses does not exceed 7 (excluding Co-Curricular Activities) and the total credits do not exceed 28. A student is permitted to underload her/his prescribed academic load in a regular semester by dropping one or more courses provided the number of courses is at least 4 and the registered credits are not less than 12. However, after completion of her/his seventh regular semester, a student will be permitted to register for less than four courses.

3.2 Summer Semester:

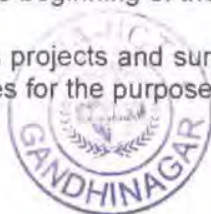
The summer semester is a special semester of approximately eight weeks between May and July. In a Summer Semester, a student can register for a maximum of three (3) backlog courses. For the purpose of this rule, internship would be regarded as two (2) courses and BTech Project Part II would be regarded as three (3) courses. BTech Project Part I would be regarded as a single course. However, no other course can be taken along with industrial/rural internship. For Summer Semester only, the term "backlog courses" indicates a course which a student has registered earlier and failed. However, for a student who has completed eight regular semesters, the term "backlog course" would have the standard interpretation as given in the Glossary. Furthermore, students who have completed eight regular semesters are also permitted to register for grade improvement in Summer Semester (see, section 5.2).

4. COURSE ASSESSMENT AND MODES OF ASSESSMENT

4.1 Course Assessment:

The various modes of assessment used for rating students' performance in a course include home assignments, tutorial assignments, laboratory work, group assignments, quizzes, tests (open or closed book), viva-voce, mini projects, etc. and the end-semester examination. Attendance in lectures/labs/tutorials may also be given due weightage in course assessment. The Instructor may make attendance in lectures/tutorials/labs compulsory (80% or less) and award "F" grade to students who do not achieve the prescribed level of attendance in that course. The distribution of weightage for the assessment (continuous evaluation) through the various modes listed above will be as indicated by the course instructor at the beginning of the semester.

Note: Academic requirements such as projects and summer assignments, which are prescribed in the curriculum, are regarded as courses for the purpose of assessment.



4.2 Grading:

- a) For every course taken by a student, she/he is awarded a letter grade based on her/his overall performance in all the assessments. These letter grades are assigned on a 10-point scale as described in the Table below:

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

- b) A student passes the course if she/he gets any grade in the range of AA to DE, but fails if she/he gets the grade F. Certain courses are indicated as Pass/Fail courses in the curriculum, and in these courses a grade of P or F is awarded. F grade may also be awarded in case of reported malpractice in examination(s)/continuous evaluation process.
- c) Pass/Fail courses are not considered for calculation of SPI/CPI.
- d) "I" grade will be awarded in a course if the overall performance of the student is satisfactory in the course, but the student either misses the end-semester examination due to illness, accident/death in the family and obtains an approval from the Dean (Academic Programs) under exceptional circumstances. A student who misses the end-semester examination must apply to the Convener of Undergraduate Committee and her/his application must be supported by (i) proper medical certificate duly approved by the Medical Authority of the Institute in the case of illness, or (ii) adequate evidence in the event of accident/death in the family. An application not so supported will not be considered. Grade "I" awarded for missing the end-semester examination will be converted into a performance grade (depending on the overall performance of the student in the course) after taking an examination equivalent to the end-semester examination of that particular course. An "I" grade must be converted into a performance grade by the specified date in the Academic Calendar for the next semester, otherwise it will be converted into "F" grade.

5. REPEATING A COURSE

- 5.1 A student must repeat a course in which she/he has obtained an F grade in a course taken for credit. Such a course is regarded as a backlog course and is subject to the regulations for registration as indicated in Section 3. A backlog-elective course can be replaced by another elective of the same category (ICT/Technical/HASS/Open/Science).



5.2 Grade Improvement

A student whose CPI is less than 5.0 is allowed to repeat a course in which a DD or DE grade was obtained for the purpose of grade improvement in a regular semester only. The grade obtained in the repeated attempt will be considered for the purpose of calculating the CPI. The grade obtained in the first attempt will be shown in the Transcript, but will not be considered for calculating the CPI.

5.3 Backlog/Grade Improvement

A student will be allowed to register for one Backlog/Grade Improvement course during regular semesters subject to conditions stated in 5.1 & 5.2, and subject to conditions on maximum course load stated in section 3.1. The student should ensure while registering that there is no clash in the evaluation of the Backlog/Grade Improvement course and other regular course.

6. B TECH PROJECT / INDUSTRIAL TRAINING PROJECT

All students are required to complete the B Tech Project (BTP) or Industrial Training Project (ITP). The total number of credits will be as normally prescribed in the curriculum from time to time.

7. PERFORMANCE INDICES

7.1 Semester Performance Index (SPI):

The performance of a student in a semester is indicated by the Semester Performance Index (SPI). The SPI is the weighted average of the grade points obtained in all the courses registered by the student during the semester, calculated to two decimal places.

7.2 Cumulative Performance Index (CPI):

An up-to-date assessment of the overall performance of a student from the time of entering the Institute is obtained by calculating the student's Cumulative Performance Index (CPI). The CPI is weighted average of the grade points obtained in all the courses registered for credit by the student after entering the Institute. The CPI is also calculated to two decimal places.

8. MINIMUM REQUIREMENTS OF ACADEMIC PERFORMANCE

8.1 Academic Probation:

A student will be placed on Academic Probation with written intimation for his/her second semester if her/his SPI at the end of first semester is less than 4.5. In subsequent semesters, a student will be placed on Academic Probation with written intimation if his/her CPI in the previous semester is less than 5.0 or if his/her SPI is less than 4.5 in the previous semester.



For every student placed on Academic Probation, the Dean (Academic Programs) may prescribe a minimum SPI the student must attain in the semester. The minimum SPI so stipulated will be arrived at on the basis of the performance of the student in terms of her/his SPI/CP, as compared to the minimum requirements for graduation.

8.2 Discontinuation from the Institute on Account of Poor Academic Performance:

If the performance of a student is poor so that she/he is not likely to benefit from continuing in the program any further, she/he would be required to leave the institute. For this purpose, an assessment of the student's academic performance will initially be made at the end of the second semester of her/his stay at the Institute and thereafter, at the end of every subsequent semester. This assessment will be based on the CPI and SPI obtained by the student.

8.3 Repeat a year OR Discontinuation from the Institute on account of Poor Academic Performance at the end of the Second and Fourth Semester:

A student whose CPI is less than 4.0 at the end of second or fourth semester shall be asked to repeat a year as appropriate with course improvement options in order to improve his/her academic performance. A student, who is placed on academic probation, may be allowed to register for the available backlog courses offered in the summer semester, following his/her second/fourth semester. Such a student is permitted to register for a maximum of three (3) of the available summer courses in which he/she is having F or DE grade. In case the student achieves the minimum CPI of 4.0 based on his results including the said summer semester, he/she would be allowed to continue the program; otherwise, the student will be asked to repeat a year OR discontinue from the program.

8.4 Minimum and Maximum Period for Completion of B Tech Program:

The minimum period to complete the program is four academic years. In any case, a student should fulfill the requirements for her/his Degree within a maximum period of six academic years, failing which she/he will be required to leave the Institute. The period of six years includes any semester for which the student has "withdrawn" status.

9. AWARD OF DEGREE

9.1 The B Tech (ICT) Degree will be conferred on a student after she/he has fulfilled the following requirements:

- a. The student should have taken for credit and passed all the foundation and elective courses including internships, BTP/ITP, co-curricular activity and exploratory projects courses prescribed in the curriculum for the program.
- b. The minimum total number of credits to be cleared is 154: 129 through core and elective courses, 19 through internships and BTP/ITP, 6 through co-curricular activities and exploratory project courses. Total course credits is 129, of which 90 correspond to foundation courses; the remaining 39 credits must be obtained through elective courses in form of (i) ICT electives (minimum three courses), (ii) technical electives (minimum four courses), (iii) science electives (minimum two courses), (iv) HASS electives (minimum one course), and (v) open electives (minimum two courses).
- c. The minimum Final CPI (as described in Section 9.2) should be 5.0.



- d) The minimum number of grade points required from course work for graduation is 645 (129 x 5.0). For this requirement, internships and BTP/ITP credits 19 are not considered. In case the student has earned the minimum number of credits, but does not have the minimum number of grade points, then she/he must take additional elective courses (up to the maximum specified for each category) in order to fulfill the requirement.
- e) The student should have registered for at least eight regular semesters (i.e., excluding summer semester and the withdrawn semester) as a regular student and should have paid all the institute dues.
- f) The student should have no case of indiscipline pending against her/him.

9.2 Final CPI and Class:

- a) For the purposes of computing the CPI at the end of the program, the student's CPI will be computed on the basis of the best CPI obtainable from the courses taken subject to:
 - i) The total credits from course work will be taken from the least number of courses which are required to obtain 645 grade points; provided that these total credits must be at least 129, and must include 90 credits from foundation courses and must satisfy the minimum requirements for different categories of electives, as indicated in paragraph 9.1 (b) above.
 - ii) All other courses taken by the student will be categorized as extra credits and not considered for calculating the final CPI.
 - iii) The CPI would be computed inclusive of the grade points earned from course work, as described in 9.2 (a) and from the BTP. ITP has no impact on CPI since it is a Pass/Fail course.
 - iv) The requirement of earned course credits and grade points is subject to change, with the Director's approval, in case credit structure of a course is modified.
- b) The Transcript will indicate Distinction if the student obtains a CPI of 9.0 or above and First Class if the student obtains a CPI of 6.5 or above but less than 9.0.

9.3 Certificate of Academic Accomplishment:

A student who is unable to complete the degree requirements within the stipulated maximum period (see Clause 8.4 above) would be eligible to receive a "Certificate of Academic Accomplishment" by applying for it. The eligibility criteria and procedure for issue of the Certificate would be as laid down by the Institute from time to time.

10. B Tech (ICT) Honors degree:

A student will be awarded the degree of B.Tech in ICT with Honors if apart from meeting all requirements of the B.Tech(ICT) program,

- (a) the student takes additional minimum 5 courses and additional minimum 15 credits from a designated set of Honors courses starting from the fourth semester, and
- (b) the student must have obtained passing grade in the five designated Honours courses, and
- (c) the student should have obtained a minimum Final CPI of 6.5.



In case a student does not satisfy point (c), but meets the graduation requirements of the B.Tech(ICT) program, the student will receive a degree in B.Tech(ICT).

The total minimum credits for the B.Tech(ICT) with Honors program is 169, from which 129 come from foundational and elective courses, 15 from Honors courses, 19 from internships, 6 from co-curricular and exploratory project courses.

The CPI computation for the Honors program will include the grade points earned in the Honors courses.

11. GLOSSARY

Backlog Course: A course prescribed in the curriculum which has either not been registered or failed by a student.

Course Credit: Weighted sum of number of Lecture hours (L), Tutorial hours (T) and Practical hours (P) associated with the course. The weight for L and T is 1.0, and the weight for P is 0.5.

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

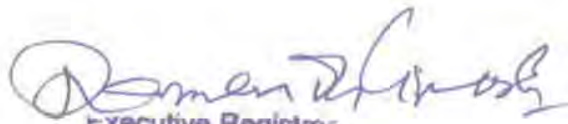
Semester: An academic year consists of two regular semesters of approximately 16 weeks duration each, the first (Autumn Semester) extending from July to December and the second (Winter Semester) from January to May. The summer semester is not a regular but a special semester of approximately eight weeks usually between May and July.

Semester Grade Report: Official record of the grades obtained in all the courses registered by a student in a semester.

Transcript: Official record of the grades obtained in all the courses registered by a student and is issued after the completion of the degree requirements.

Under-Graduate Committee (UG Committee): Committee of the Institute responsible for Policy Guidelines & Implementation Strategies covering the Undergraduate Program.

DA-IICT, Gandhinagar
October 2022


Executive Registrar
DA-IICT, Gandhinagar





BTech (ICT) and BTech (ICT) Honours Curriculum (Effective from BTech 2021-22 batch)

1. Introduction: The Academic Council has approved the BTech Curriculum Review Committee Final Report, and directed that the revised curriculum contained therein should be followed with effect from the 2021 batch and onwards. The document contains the official description of the course structure for the BTech 2021 batch onwards.

2. Course Structure for B Tech (ICT) and B Tech (ICT) Honours Program with effect from 2021 Batch is indicated in Table 1:

Table 1

Semester-1	L-T-P-C	Semester-2	L-T-P-C
Introduction to ICT	1-0-2-2	Approaches to Indian Society	3-0-0-3
Language and Literature	3-0-0-3	Discrete Mathematics	3-1-0-4
Calculus	3-1-0-4	Digital Logic and Computer Organization	3-0-2-4
Introduction to Programming	3-0-0-3	Data Structures	3-0-0-3
Programming Lab	0-0-2-1	Data Structures Lab using OOP	1-0-2-2
Basic Electronic Circuits	3-0-2-4	Electromagnetic Theory	3-1-0-4
		Exploration Project	0-1-0-1
Co-Curricular Activities 1	0-0-2-1	Co-Curricular Activities 2	0-0-2-1
TOTAL	18	TOTAL	22

Semester-3	L-T-P-C	Semester-4	L-T-P-C
Science, Technology, Society	3-0-0-3	Principles of Economics	3-0-0-3
Linear Algebra	3-1-0-4	Probability and Statistics	3-1-0-4
Design and Analysis of Algorithms	3-1-0-4	Database Management System	3-0-2-4
Computer Systems Programming	3-0-2-4	Embedded Hardware Design	3-0-2-4
Signal and Systems	3-0-2-4	Introduction to Communication Systems	3-0-2-4
Exploration Project	0-0-2-1	Honors-1	3-x-x-3/4
Co-Curricular Activities 3	0-0-2-1	Co-Curricular Activities 4	0-0-2-1
TOTAL	21	TOTAL	20+(3/4)



Semester-5	L-T-P-C	Semester-6	L-T-P-C
Software Engineering	3-0-2-4	Environmental Science	3-0-0-3
Digital Communications	3-0-2-4	SE-1	3-0-0-3
Computer Networks	3-0-2-4	ICTE-2	3-0-2-4
ICTE-1	3-0-2-4	TE-2	3-0-0-3
TE-1	3-0-0-3	TE-3	3-0-0-3
Honors-2	3-x-x-3/4	Honors-4	3-x-x-3/4
Overload Slot		Overload Slot	
TOTAL	19+(3/4)	TOTAL	16+(3/4)

Semester-7	L-T-P-C	Semester-8	L-T-P-C
BTP-1	0-1-4-3	BTP-2/ BTP-1 & BTP-2/ ITP	0-2-14-9/ 0-3-18-12/ 0-0-24-12
ICTE-3	3-0-2-4	OE-1	3-0-0-3
TE-4	3-0-0-3	OE-2	3-0-0-3
HASSE-1	3-0-0-3		
SE-2	3-0-0-3		
Overload Slot		Overload Slot	
TOTAL	16	TOTAL	6+9/12/12

Course category and Credits

Type	Credits	Type	Credits
Core	90	Course Total	129
TE	12	Internships	7
ICTE	12	BTP/ITP	12
HASSE	3	Honours	15
SE	6	CoCurr	4
OE	6	Exp. Project	2
Honours	15	TOTAL	154+(15)
Rural Intern	3		
Res. Intern	4		
BTP/ITP	12		
Exp Proj	2		
CoCurr	4		

3. Table 2 shows the minimum and maximum number of courses permitted in each category.

Table 2: Allowed number of courses in Electives

Type	Min	Max	Credits	Remarks
ICT Electives	3	-	12	Additional courses taken in this category will be treated as Technical electives
Technical Electives	4	6	12-20	Courses offered as ICT Electives can be taken in place of the courses in this category. However, a course in this category does not qualify to ICT elective.



Type	Min	Max	Credits	Remarks
Science Electives	2	4	6-12	Physics, Mathematics, Life Sciences, and Engineering Sciences.
Humanities and Social Science (HASS) Electives	1	3	3-9	Humanities, Social Sciences, Management and Engineering Arts including Design.
Open Electives	2	-	6	Eligible courses in Open Elective category will be worked out by UGC/Dean (AP).

4. Additional Elements of the Curriculum: The provisions governing electives are indicated below.

4.1 ICT Electives: The ICT electives are technical courses in the areas of ICT with components of Electronics, Signal Processing, Communication, Information Technology, Computer Science and multi-disciplinary domains as well. The ICT electives category would be technical courses which have breadth/components in two or more of these three emerging fields Computer Systems, Communication Technology, and Electronics Engineering. These electives may also be in the nature of mathematical foundation courses that may be required by the ICT electives. Every student is required to take a minimum of 3 courses (12 credits) from the set of ICT electives. If a student passes more than 3 courses from the ICT electives category, then she/he can consider the additional course(s) as Technical electives. Appendix 2 lists the representative courses of ICT electives.

4.2 Technical Electives: The Technical electives fall in one of the groups of Electronics, Signal Processing and Communication, Information Technology and Computer Science, and Interdisciplinary. Every student is required to take a minimum of 4 Technical elective courses (12 credits) and up to a maximum of 6 courses (20 credits). Any ICT elective course can be taken in place of a Technical elective. In other words, a student taking more than 3 ICT elective subjects may treat the additional ICT elective(s) as Technical elective(s), but the reverse is not applicable.

4.3 Science Electives: Science Electives are courses offered in the areas of Physics, Mathematics, Life Sciences, and Engineering Sciences. Every student must take a minimum of 2 courses (6 credits) and is permitted to take up to a maximum of 4 courses (12 credits) from this category.

4.4 Humanities and Social Science (HASS) Electives: HASS electives are elective courses offered in the areas of Humanities, Social Sciences, Management and Engineering Arts including Design, which are not covered in the Technical electives. Every student must take one course (3 credits) and is permitted to take up to a maximum of 3 courses (9 credits) from this category.

4.5 Open Electives: There are two open elective slots (6 credits) available to students. Electives from any of the mentioned category qualify as an open elective.

4.6 Introduction of New Electives: The curriculum structure provides flexibility to the faculty to update the course contents, particularly for the elective courses, to keep pace with the latest technologies used in industry. Faculty members are encouraged to propose new electives in the ICT, Technical, Science, and HASS categories. The proposer of a new elective course is required to submit her/his course plan to Dean (Academic Programs). Then, the Undergraduate Committee conducts the review process of the course proposal with the help of internal and external faculty/experts. A new course proposal is reviewed by at least two reviewers and after the review process, the review comments are forwarded to the course proposer for incorporation in the course



proposal. Once the proposer incorporates the review comments in the new course, the course proposal is approved by the Dean (Academic Programs) and added into the program.

4.7 Internships: All students must undertake and pass Rural Internship of 3 credits (normally offered in the Semester Break between Semesters III and IV) and Research Internship of 4 credits (normally offered in Summer Semester after Semester VI).

4.8 B Tech/Industrial Training Project: The students must undertake and pass B Tech or Industrial Training Project (12 credits). The B Tech project can be taken on two parts; Part 1 (3 credits) and Part 2 (9 credits); either Part 1 may be taken in Semester VII and Part 2 in Semester VIII or both parts may be taken in Semester VIII.

4.9 Industrial Training Project (ITP): A student has option to do an Industrial Training Project (ITP) in the 8th semester in the off-campus mode. ITP is to be done at an approved industry site with a designated industry mentor and a well specified project. This option is suitable for those students who want to gain an early industry experience to better prepare them as an industry professional. This option may also be suitable for students who wish to gain this experience before heading out for higher studies. ITP is proposed to be graded on Pass/Fail basis. Industry mentor will assess the performance of the student and submit the grade to the ITP coordinator.

Graduation Requirement — B Tech (ICT)

1. Total credits – 154 (included 4 Co-Curricular and 2 Exploratory Project credits)
2. Course credits – 129
3. Internships and BTP/ITP credits – 19
4. Minimum Final CPI – 5.0

Additional Graduation Requirement – B Tech (ICT) Hons.

1. Honours courses – 5
2. Honours course credits Min. – 15
3. Minimum Final CPI – 6.5

4.10 B Tech (ICT) Hons. Degree will be conferred on a student after she/he has fulfilled all the requirements for the BTech (ICT) Degree and has also fulfilled these additional requirements:

- a. The student must have obtained passing grade in the five designated Honours courses.
- b. The student should have obtained a minimum Final CPI of 6.5.

NB: The course outlines will be notified separately.




Executive Registrar
DA-IICT, Gandhinagar

**DHIRUBHAI AMBANI
INSTITUTE OF INFORMATION AND COMMUNICATION TECHNOLOGY
GANDHINAGAR**

**Academic requirement for B. Tech. (Honours) in ICT
with minor in computational science program**

(To be effective from Autumn 2016-2017 for 2016 batch and onwards)

The Rules governing the B Tech (Bachelor of Technology) program of DA-IICT, which is a four-year undergraduate program, are defined in a document referred as "Academic Requirement for B. Tech. (ICT) Program." This document contains specific rules governing the four-year undergraduate B. Tech. (Honours) in ICT with minor in Computational Science program. All other rules apply uniformly to all B Tech. (ICT) programs as mentioned in a document referred to as 'Academic Requirement for B. Tech. (ICT) Program,' whereas B. TECH. (Honours) in ICT with minor in Computational Science program specific rules are defined in related sections in this document.

These Rules deal only with the post-admission academic activities of the program. Eligibility criteria for admission, admission procedures, etc., are outside the purview of this document. They are subject to amendments from time to time as per the needs and requirements. 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 provision(s) of the rules in exceptional situations and all such cases shall be reported to the Academic Council in its immediate meeting. Important terms/expressions used in the document have been defined in the GLOSSARY at the end of this document.

3. COURSE LOAD

3.1 Regular Semesters:

3.1.1 B Tech (Honours in ICT with minor in Computational Science) program

A student is permitted to register for additional courses over the prescribed courses in the curriculum for a regular semester provided the total number of courses does not exceed 7 and the total credits do not exceed **29.5**. However, rural internship is not considered for the purpose of this limit. A student is permitted to under-load his/her prescribed academic load in a regular semester by dropping one or more courses provided the number of courses is at least 4 and the registered credits are not less than 12. However, after completion of his/her seventh regular semester, a student will be permitted to register for less than four courses.

9. AWARD OF DEGREE

9.1 B Tech ((Honours) in ICT with minor in Computational Science

The Degree will be conferred on a student after he/she has fulfilled the following requirements:

- (a) The student should pass all the foundation and elective courses prescribed in the curriculum for the program to earn credit. They have to take a minimum of 170 course credits of which 129 correspond to foundation courses, the remaining credits must be



obtained through elective courses. Eighteen credits (18) in the foundation courses should come from Computational Science core courses. The remaining elective courses must be (i) ICT electives (minimum three courses), (ii) technical electives (minimum four courses), a few with computational science feature, (iii) science electives (minimum two courses), a few with computational science feature and (iv) open electives (minimum two courses). The minimum number of grade points required from course work for graduation is 850 (170×5.0). For this requirement, Pass/Fail courses, internships and B Tech Project are not considered. In case the student has earned the minimum number of credits, but does not have the minimum number of grade points then he/she must take additional elective courses (up to the maximum specified for each category) in order to fulfil the requirement.

- (b) The student must have obtained a final CPI of 6.5 (see Section 9.2 below for rules governing calculation of CPI). A student who does not have a final CPI of 6.5 but has completed the requirements for the B Tech (ICT) degree will be awarded the B Tech (ICT) degree.
- (c) The student should have passed all the foundation Pass/Fail courses prescribed in the curriculum, including all prescribed internships.
- (d) The student should have obtained a passing grade for the B Tech Project, as prescribed in the curriculum.
- (e) The student should have registered for at least eight regular semesters (i.e. excluding summer semester) as a regular student and should have paid all the institute dues.
- (f) The student should have no case of indiscipline pending against him/her.

9.2 Final CPI and Class:

- (a) For the purposes of computing the CPI at the end of the program, the student's CPI will be computed on the basis of the best CPI obtainable from the courses taken subject to the program-specific requirements as indicated in Section 9.1.
- (b) All other courses taken by the student will be categorized as extra credits and not considered for calculating the final CPI.
- (c) The CPI would be computed inclusive of the grade points earned from course work, as described in 9.3 (a) and from the B Tech Project.
- (d) The requirement of earned course credits and grade points is subject to change, with the approval of the Director, in case credit structure of a program or course is modified.
- (e) The Transcript will indicate 'Distinction' if the student obtains a CPI of 9.0 or above and 'First Class' if the student obtains a CPI of 6.5 or above but less than 9.0.

9.3 Certificate of Academic Accomplishment:

A student who is unable to complete the Degree requirements within the stipulated maximum period (refer Clause 8.5 of 'Academic Requirement for B. Tech. (ICT) Program' document) would be eligible to receive a 'Certificate of Academic Accomplishment' by applying for it. The eligibility criteria and procedure for issue of the Certificate would be as laid down by the Institute from time to time.



10. Transfer between B Tech and B Tech (Honours) programs

10.1 Continuation in B Tech (Honours) programs:

A student admitted to the B Tech (Honours) Program must obtain a minimum CPI of 6.5 after completion of Semester III to continue in the program failing which she/he will be moved to the B Tech (ICT) Program subject to her/his meeting the academic requirements stipulated therein.

10.2 Transfer from B Tech program to B Tech (Honours) program:

A student admitted to the B Tech (ICT) Program who has obtained a CPI of 7.5 and above may apply to the Dean (Academic Programs) at the end of the third Semester for transfer to the B Tech. (Honours) Program. The transfer will be granted subject to availability of seats and in descending order from the highest CPI obtained.

11. GLOSSARY

Backlog Course: A course prescribed in the curriculum which has either not been registered or failed by a student.

Course Credit: Weighted sum of number of Lecture hours (L), Tutorial hours (T) and Practical hours (P) associated with the course. The weight for L and T is 1.0, and the weight for P is 0.5.

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

Semester: An academic year consists of two regular semesters of approximately 16 weeks duration each, the first (Autumn Semester) extending from July to December and the second (Winter Semester) from January to May. The summer semester is not a regular but a special semester of approximately eight weeks usually between May and July.

Semester Grade Report: Official record of the grades obtained in all the courses registered by a student in a semester.

Transcript: Official record of the grades obtained in all the courses registered by a student and is issued after the completion of the degree requirements.

Under-Graduate Committee (UG Committee): Committee of the Institute responsible for Policy Guidelines & Implementation Strategies covering the Undergraduate Program.

DA-ICT, Gandhinagar
July 2016



**Course structure of
B.Tech (Hons.) in ICT with minor in Computational Science
(2016 batch onwards)**

The semester wise breakup for computational Science program is shown below:

Semester I	L-T-P-C	Semester II	L-T-P-C
Basic Electronic Circuits	3-0-3—4.5	Digital Logic Design	3-0-3—4.5
Introduction to Programming	3-0-0—3	Introduction to Communication Systems	3-0-3—4.5
Introduction to Programming Lab	0-0-4—2	Data Structures	3-0-0—3
Calculus	3-1-0—4	Data Structures Lab	0-0-4-2
Engineering Design Workshop	1-0-3—2.5	Discrete Mathematics	3-1-0—4
Language and Literature	3-0-0—3	Approaches to Indian Society	3-0-0—3
Semester credits	13-1-10—19	Semester credits	15-1-10—21

Semester III	L-T-P-C	Semester IV	L-T-P-C
Signals and Systems	3-1-0—4	Analog Circuits	3-0-3—4.5
Computer Organization	3-0-3—4.5	Analog Communication and Transmission Line Theory	3-0-2—4
Design and Analysis of Algorithms	3-0-2—4	Systems Software	3-0-3—4.5
Groups and Linear Algebra	3-1-0—4	Probability, Statistics and Information Theory	3-1-0—4
Electromagnetic Theory	3-1-0—4	Engineered Materials	3-0-0—3
Science, Technology, Society	3-0-0—3	Environmental Studies	2-0-0—2
		Intro. Computational Physics	3-0-3—4.5
Semester credits	18-3-5—23.5	Semester credits	20-1-11—26.5

Rural Internship (4 credits)



Semester V	L-T-P-C	Semester VI	L-T-P-C
Embedded Hardware Design	3-0-3—4.5	Software Engineering	3-0-3—4.5
Digital Communications	3-0-3—4.5	ICT Elective – 2	3—4
Computer Networks	3-0-3—4.5	Open Elective – 1 (non-CS students)	3-0-0—3
Database Management Systems	3-0-3—4.5	Open Elective – 2 / Science Elective – 1	3-0-0—3
Principles of Economics	3-0-0—3	Technical Elective – 1	3-0-0—3
ICT Elective 1	3—4	ICT Elective – 3 / Technical Elective – 2	3—4
Numerical and Computational Methods	3-0-3—4.5	High Performance Computing	3-0-3-4.5
		Modelling and Simulation	3-0-3—4.5
Semester credits	(21/22-0-15) 28.5-29.5	Semester credits	(21/23-0-9) 25.5-27.5

Research/Industrial Internship (6 credits)

Semester VII	L-T-P-C	Semester VIII	L-T-P-C
Open Elective – 3 / Science Elective – 2	3-0-0—3	BTP 2 / BTP	9 / 13
ICT Elective – 4	3—4		
Technical Elective – 3	3—4		
Technical Elective – 4 / Science Elective – 3	3—4		
ICT Elective – 5 / Technical Elective – 5	3—4		
Open Elective – 4 / Science Elective – 4	3-0-0—3		
Any Elective (CS students) / BTP 1	3—4		
Semester credits	(21/26-0-0) 21-26	Semester credits	(9/13-0-0) 9-13



Course structure :

The list of the mandatory four **Core Courses (worth 18 credits)** are given below:

1. Introductory Computational Physics (core, 4.5 credits, Semester -IV)
2. Numerical and Computational Methods (core, 4.5 credits, Semester -V)
3. High Performance Computing (core, 4.5 credits, Semester -VI)
4. Modelling and Simulation (core, 4.5 credits, Semester -VI)

ICT Electives: As per course offering list

Proposed List of Science and Technical Electives

Science Electives:

1. Nonlinear Science
2. Optimization
3. Computational Electromagnetics
4. Synthetic Biology
5. Computational Drug Discovery

Technical Electives:

1. Computational Finance
2. Introduction to Complex Networks
3. Computational and Systems Biology
4. Introduction to Bioinformatics and Computational Biology
5. Stochastic Processes and Simulation
6. Computational Coding Theory
7. Natural Computing
8. Computational Advertisement
9. Advanced Numerical Methods

Some of the above electives (Science and Technical) will be explicitly offered to only B. TECH. (HONOURS IN ICT WITH MINOR IN COMPUTATIONAL SCIENCE) students.


Executive Registrar
DA-IICT, Gandhinagar





ACADEMIC REQUIREMENT FOR B TECH (HONOURS) IN ICT WITH MINOR IN COMPUTATIONAL SCIENCE PROGRAM *(Effective from Autumn 2021-22)*

The Rules governing the B Tech (Bachelor of Technology) program of DA-IICT, which is a four-year undergraduate program, are defined in a document referred as "Academic Requirement for B Tech (ICT) Program." This document contains specific rules governing the four-year undergraduate B Tech (Honours) in ICT with minor in Computational Science program. All other rules apply uniformly to all B Tech (ICT) programs as mentioned in a document referred to as 'Academic Requirement for B Tech (ICT) Program,' whereas B Tech (Honours) in ICT with minor in Computational Science program specific rules are defined in related sections in this document.

These Rules deal only with the post-admission academic activities of the program. Eligibility criteria for admission, admission procedures, etc., are outside the purview of this document. They are subject to amendments from time to time as per the needs and requirements. 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 provision(s) of the rules in exceptional situations and all such cases shall be reported to the Academic Council in its immediate meeting. Important terms/expressions used in the document have been defined in the GLOSSARY at the end of this document.

(Regulations 1 and 2 are as applicable to B Tech (ICT) program)

3. COURSE LOAD

3.1 Regular Semesters:

3.1.1 B Tech (Honours) in ICT with minor in Computational Science program

A student is permitted to register for additional courses over the prescribed courses in the curriculum for a regular semester provided the total number of courses does not exceed 7 (excluding Co-Curricular Activities) and the total credits does not exceed 30. However, rural internship is not considered for the purpose of this limit. A student is permitted to under-load her/his prescribed academic load in a regular semester by dropping one or more courses provided the number of courses is at least 4 and the registered credits are not less than 12. However, after completion of her/his seventh regular semester, a student will be permitted to register for less than four courses.



(Regulations 3.2 to 8 are as applicable to B Tech (ICT) program.)

9. AWARD OF DEGREE

9.1 B Tech (Honours) in ICT with minor in Computational Science

The Degree will be conferred on a student after she/he has fulfilled the following requirements:

- (a) The student should have taken for credit and passed all the foundation and elective courses including internships and BTP/ITP prescribed in the curriculum for the program.
- (b) The minimum total number of course credits is 147, of which 90 correspond to foundational courses. 18 from Honours/Minor in Computational Science designated courses; the remaining 39 credits must be obtained through elective courses in the form of
 - (i) ICT electives (minimum three courses, at least one with Computational Science feature),
 - (ii) Technical electives (minimum four courses, at least one with Computational Science feature),
 - (iii) Science electives (minimum two courses, at least one with Computational Science feature)
 - (iv) Humanities and Social Science electives (minimum one), and
 - (v) Open electives (minimum two courses).
- (vi) The minimum credits to be earned for Internships and BTP/ITP are 19.
- (c) The minimum number of grade points required from course work for graduation is 735 (147×5.0). For this requirement, internships and BTP/ITP credits 19 are not considered. In case the student has earned the minimum number of credits, but does not have the minimum number of grade points, then she/he must take additional elective courses (up to the maximum specified for each category) in order to fulfill the requirement.
- (d) The student must have obtained a minimum Final CPI of 6.5 (see Section 9.2 below for rules governing calculation of CPI). A student who does not have a final CPI of 6.5 but has completed the requirements for the B Tech (ICT) Degree will be awarded the B Tech (ICT) Degree.
- (e) The student should have registered for at least eight regular semesters (i.e. excluding summer semester) as a regular student and should have paid all the institute dues.
- (f) The student should have no case of indiscipline pending against her/him.

9.2 Final CPI and Class:

- (a) For the purposes of computing the CPI at the end of the program, the student's CPI will be computed on the basis of the best CPI obtainable from the courses taken subject to the program-specific requirements as indicated in Section 9.1.



- (b) All other courses taken by the student will be categorized as extra credits and not considered for calculating the final CPI.
- (c) The CPI would be computed inclusive of the grade points earned from course work, as described in 9.2 (a) and from the BTP. ITP has no impact on CPI since it is a Pass/Fail course.
- (d) The requirement of earned course credits and grade points is subject to change, with the approval of the Director, in case credit structure of a program or course is modified.
- (e) The Transcript will indicate 'Distinction' if the student obtains a CPI of 9.0 or above and 'First Class' if the student obtains a CPI of 6.5 or above but less than 9.0.

9.3 Certificate of Academic Accomplishment:

A student who is unable to complete the Degree requirements within the stipulated maximum period (refer Clause 8.5 of 'Academic Requirement for B Tech (ICT) Program' document) would be eligible to receive a 'Certificate of Academic Accomplishment' by applying for it. The eligibility criteria and procedure for issue of the Certificate would be as laid down by the Institute from time to time.

10. Transfer between B Tech (ICT) and B Tech (Honours) in ICT with minor in Computational Science

10.1 Continuation in B Tech (Honours) in ICT with minor in Computational Science programs:

A student admitted to the B Tech (Honours) Program must obtain a minimum CPI of 6.5 after completion of Semester III to continue in the program failing which she/he will be moved to the B Tech (ICT) Program subject to her/his meeting the academic requirements stipulated therein.

10.2 Transfer from B Tech (ICT) to B Tech (Honours) in ICT with minor in Computational Science:

A student admitted to the B Tech (ICT) Program who has obtained a CPI of 7.5 and above may apply to the Dean (Academic Programs) at the end of the third Semester for transfer to the B Tech. (Honours) Program. The transfer will be granted subject to availability of seats and in descending order from the highest CPI obtained.

11. GLOSSARY

Backlog Course: A course prescribed in the curriculum which has either not been registered or failed by a student.



Course Credit: Weighted sum of number of Lecture hours (L), Tutorial hours (T) and Practical hours (P) associated with the course. The weight for L and T is 1.0, and the weight for P is 0.5.

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

Semester: An academic year consists of two regular semesters of approximately 16 weeks duration each, the first (Autumn Semester) extending from July to December and the second (Winter Semester) from January to May. The summer semester is not a regular but a special semester of approximately eight weeks usually between May and July.

Semester Grade Report: Official record of the grades obtained in all the courses registered by a student in a semester.

Transcript: Official record of the grades obtained in all the courses registered by a student and is issued after the completion of the degree requirements.

Under-Graduate Committee (UG Committee): Committee of the Institute responsible for Policy Guidelines & Implementation Strategies covering the Undergraduate Program.

DA-IICT, Gandhinagar
October 2022





B Tech (Honours) in ICT with minor in Computational Science Curriculum (Effective from B Tech 2021-22 batch)

1. Introduction: The Academic Council has approved the B Tech Curriculum Review Committee Final Report, and directed that the revised curriculum contained therein should be followed with effect from the 2021 batch and onwards. The document contains the official description of the course structure for the B Tech 2021 batch onwards.

2. Course Structure for B Tech (Honours) in ICT with minor CS Program with effect from 2021 Batch is indicated in Table 1:

Table 1

Semester-1	L-T-P-C	Semester-2	L-T-P-C
Introduction to ICT	1-0-2-2	Approaches to Indian Society	3-0-0-3
Language and Literature	3-0-0-3	Discrete Mathematics	3-1-0-4
Calculus	3-1-0-4	Digital Logic and Computer Organization	3-0-2-4
Introduction to Programming	3-0-0-3	Data Structures	3-0-0-3
Programming Lab	0-0-2-1	Data Structures Lab using OOP	1-0-2-2
Basic Electronic Circuits	3-0-2-4	Electromagnetic Theory	3-1-0-4
		Exploration Project	0-1-0-1
Co-Curricular Activities 1	0-0-2-1	Co-Curricular Activities 2	0-0-2-1
TOTAL	18	TOTAL	22

Semester-3	L-T-P-C	Semester-4	L-T-P-C
Science, Technology, Society	3-0-0-3	Principles of Economics	3-0-0-3
Linear Algebra	3-1-0-4	Probability and Statistics	3-1-0-4
Design and Analysis of Algorithms	3-1-0-4	Database Management System	3-0-2-4
Computer Systems Programming	3-0-2-4	Embedded Hardware Design	3-0-2-4
Signal and Systems	3-0-2-4	Introduction to Communication Systems	3-0-2-4
Exploration Project	0-0-2-1	Introduction to Computational Physics	3-0-3-4.5
Co-Curricular Activities 3	0-0-2-1	Co-Curricular Activities 4	0-0-2-1
TOTAL	21	TOTAL	24.5



Semester-5	L-T-P-C	Semester-6	L-T-P-C
Software Engineering	3-0-2-4	Environmental Science	3-0-0-3
Digital Communications	3-0-2-4	SE-1	3-0-0-3
Computer Networks	3-0-2-4	ICTE-2	3-0-2-4
ICTE-1	3-0-2-4	TE-2	3-0-0-3
TE-1	3-0-0-3	TE-3	3-0-0-3
Numerical and Computational Methods	3-0-3-4.5	Modelling & Simulation	3-0-3-4.5
		High Performance Computing	3-0-3-4.5
Overload Slot		Overload Slot	
TOTAL	23.5	TOTAL	25

Semester-7	L-T-P-C	Semester-8	L-T-P-C
BTP-1	0-1-4-3	BTP-2/ BTP-1 & BTP-2/ ITP	0-2-14-9/ 0-3-18-12/ 0-0-24-12
ICTE-3	3-0-2-4	OE-1	3-0-0-3
TE-4	3-0-0-3	OE-2	3-0-0-3
HASSE-1	3-0-0-3		
SE-2	3-0-0-3		
Overload Slot		Overload Slot	
TOTAL	16	TOTAL	6+9/12/12

Course category and Credits

Type	Credits	Type	Credits
Core	90	Course Total	147
CS Core	18	Internships	7
TE	12	BTP/ITP	12
ICTE	12	CoCurr	4
HASSE	3	Exp. Project	2
SE	6	TOTAL	166+6
OE	6		
Rural Intern	3		
Res. Intern	4		
BTP/ITP	12		
Exp Proj	2		
CoCurr	4		



The list of the mandatory four **Core Courses (worth 18 credits)** are given below:

1. Introductory Computational Physics (core, 4.5 credits, Semester -IV)
2. Numerical and Computational Methods (core, 4.5 credits, Semester -V)
3. High Performance Computing (core, 4.5 credits, Semester -VI)
4. Modelling and Simulation (core, 4.5 credits, Semester -VI)

3. Table 2 shows the minimum and maximum number of courses permitted in each category.

Table 2: Allowed number of courses in Electives

Type	Min	Max	Credits	Remarks
ICT Electives	3	-	12	Additional courses taken in this category will be treated as Technical electives
Technical Electives	4	6	12-20	Courses offered as ICT Electives can be taken in place of the courses in this category. However, a course in this category does not qualify to ICT elective.
Science Electives	2	4	6-12	Physics, Mathematics, Life Sciences, and Engineering Sciences.
Humanities and Social Science (HASS) Electives	1	3	3-9	Humanities, Social Sciences, Management and Engineering Arts including Design.
Open Electives	2	-	6	Eligible courses in Open Elective category will be worked out by UGC/Dean (AP).

4. Additional Elements of the Curriculum: The provisions governing electives are indicated below.

4.1 ICT Electives: The ICT electives are technical courses in the areas of ICT with components of Electronics, Signal Processing, Communication, Information Technology, Computer Science and multi-disciplinary domains as well. The ICT electives category would be technical courses which have breadth/components in two or more of these three emerging fields Computer Systems, Communication Technology, and Electronics Engineering. These electives may also be in the nature of mathematical foundation courses that may be required by the ICT electives. Every student is required to take a minimum of 3 courses (12 credits) from the set of ICT electives. If a student passes more than 3 courses from the ICT electives category, then she/he can consider the additional course(s) as Technical electives. Appendix 2 lists the representative courses of ICT electives.

4.2 Technical Electives: The Technical electives fall in one of the groups of Electronics, Signal Processing and Communication, Information Technology and Computer Science, and Interdisciplinary. Every student is required to take a minimum of 4 Technical elective courses (12 credits) and up to a maximum of 6 courses (20 credits). Any ICT elective course can be taken in



place of a Technical elective. In other words, a student taking more than 3 ICT elective subjects may treat the additional ICT elective(s) as Technical elective(s) but the reverse is not applicable.

4.3 Science Electives: Science Electives are courses offered in the areas of Physics, Mathematics, Life Sciences, and Engineering Sciences. Every student must take a minimum of 2 courses (6 credits) and is permitted to take up to a maximum of 4 courses (12 credits) from this category.

4.4 Humanities and Social Science (HASS) Electives: HASS electives are elective courses offered in the areas of Humanities, Social Sciences, Management and Engineering Arts including Design, which are not covered in the Technical electives. Every student must take one course (3 credits) and is permitted to take up to a maximum of 3 courses (9 credits) from this category.

4.5 Open Electives: There are two open elective slots (6 credits) available to students. Electives from any of the mentioned category qualify as an open elective.

4.6 Introduction of New Electives: The curriculum structure provides flexibility to the faculty to update the course contents, particularly for the elective courses, to keep pace with the latest technologies used in industry. Faculty members are encouraged to propose new electives in the ICT, Technical, Science, and HASS categories. The proposer of a new elective course is required to submit her/his course plan to Dean (Academic Programs). Then, the Undergraduate Committee conducts the review process of the course proposal with the help of internal and external faculty/experts. A new course proposal is reviewed by at least two reviewers and after the review process, the review comments are forwarded to the course proposer for incorporation in the course proposal. Once the proposer incorporates the review comments in the new course, the course proposal is approved by the Dean (Academic Programs) and added into the program.

4.7 Internships: All students must undertake and pass Rural Internship of 3 credits (normally offered in the Semester Break between Semesters III and IV) and Research Internship of 4 credits (normally offered in Summer Semester after Semester VI).

4.8 B Tech/Industrial Training Project: The students must undertake and pass B Tech or Industrial Training Project (12 credits). The B Tech project can be taken on two parts; Part 1 (3 credits) and Part 2 (9 credits); either Part 1 may be taken in Semester VII and Part 2 in Semester VIII or both parts may be taken in Semester VIII.

4.9 Industrial Training Project (ITP): A student has option to do an Industrial Training Project (ITP) in the 8th semester in the off-campus mode. ITP is to be done at an approved industry site with a designated industry mentor and a well specified project. This option is suitable for those students who want to gain an early industry experience to better prepare them as an industry professional. This option may also be suitable for students who wish to gain this experience before heading out for higher studies. ITP is proposed to be graded on Pass/Fail basis. Industry mentor will assess the performance of the student and submit the grade to the ITP coordinator.



Graduation Requirement — B Tech (Honours) in ICT with minor in CS

- 1 Total credits - 172 (included 4 Co-Curricular and 2 Exploratory Project credits)
- 2 Course credits - 147
- 3 Internships and BTP/ITP credits - 19
- 4 Minimum Final CPI - 6.5

NB: The course outlines will be notified separately.


Executive Re
DA-IICT, Gand





ACADEMIC REQUIREMENT FOR B TECH (MnC) PROGRAM

(Effective from Autumn 2020-21)

This document contains rules governing the B Tech (Bachelor of Technology) in Mathematics and Computing program, which is a four-year undergraduate program. These rules are applicable to students admitted to the program in the academic year 2020- 21 and onwards.

These rules deal only with the post-admission academic activities of the program. Eligibility criteria for admission, admission procedures, etc. are outside the purview of this document. They are subject to amendments from time to time as per the needs and requirements.

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 provision(s) of the rules in 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 the end of this document.

1. REGISTRATION

At the beginning of each semester, until the completion of the program, every student must register for the semester and for the courses that he/she will study during the semester.

1.1 Procedure for Registration:

The registration schedule is announced in advance, and registration is normally carried out within the first two days of each semester through the prescribed procedure (Student Registration System or SRS). Late registration may be permitted for valid reasons on submission of an application to the Deputy Registrar and only on payment of the prescribed late registration fee. In any case, registration must be completed before the prescribed last date for late registration in the Academic Calendar. Students having any outstanding dues to the Institute or hostel will not be permitted to register.

1.2 Eligibility for Course Registration:

A student with no backlog courses (i.e. who has passed all the previous courses) will be eligible to register for all courses prescribed in the curriculum for that semester, inclusive of the specified number of electives. A student who has backlog course(s) or is on academic probation may be recommended a different set of courses, by the Convenor of the UG Committee.

1.3 Pre-Requisite Courses:

A student registering for a course must have successfully completed the Pre-requisite course(s), if any, for that particular course. For Hard Pre-requisite, a minimum grade of DD is required; for a Soft Pre-requisite, minimum grade of DE is required (see Section 4.2 below).



1.4 Withdrawal from Semester and Discontinued for Failing to Register

- a) A student who wishes to withdraw prior to registration for a semester must obtain a 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, he/she will be discontinued from the Institute.
- b) A student who registers for a semester after having withdrawn in the previous semester(s) may register for the available courses as prescribed in the curriculum for that particular semester subject to fulfilling of the pre-requisites, if any.
- c) The transcript of a student who has "withdrawn" a semester would show the appropriate status for the corresponding semester(s). The transcript of a student who is suspended from a semester for an academic or disciplinary reason would also show "withdrawn" status in the corresponding semester.

2. AUDITING OF COURSES AND REGISTRATION FOR PG COURSES

2.1 Registration of Courses for AUDIT:

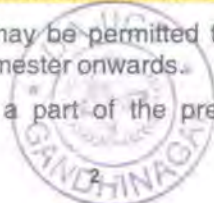
Auditing of courses allows students to gain exposure to additional subjects without increasing unduly their overall course load. Registration of courses for AUDIT is permitted from fifth semester onwards under the following conditions:

- a) A student can take maximum two courses under audit during the entire program.
- b) A student has to enter the courses to be audited in the Course Registration Form while registering for the semester. The word "Audit" would be specially mentioned in the remarks column of the student's course registration form.
- c) A student can register a course for audit provided the following two conditions are satisfied:
 - (i) the course instructor permits and approves the registration, and
 - (ii) the lecture, lab and tutorial time-tables strictly permit.
- d) An audit course will not be considered as an overload.
- e) If the student's performance is satisfactory, a grade of P (Pass) would be awarded. If the performance is not satisfactory, a grade of F (Fail) would be awarded by the instructor.
- f) An audit course will not be considered for the purpose of calculation of Semester Performance Index (SPI)/Cumulative Performance Index (CPI). However, the course will be reflected in the Semester Grade Report and Transcript as an Audit Course provided a grade of P is obtained, otherwise the course will not appear in the Semester Grade Report and Transcript.
- g) In a semester only one course can be registered as an audit course.

2.2 Registration for Post-Graduate level Courses for Credit:

Students with a CPI of 7.4 or above may be permitted to register for available M Tech level courses as credit courses from sixth semester onwards.

Such courses would be regarded as a part of the prescribed course load for the regular



semester. A student can register a Post Graduate level course provided the following two conditions are satisfied:

- (i) The course instructor permits and approves the registration, and
- (ii) The lecture, lab and tutorial time tables strictly permit.

3. COURSE LOAD

3.1 Regular Semesters:

A student is permitted to register for additional courses over the prescribed courses in the curriculum for a regular semester provided the total number of courses does not exceed 6 and the total credits do not exceed 26. A student is permitted to underload his/her prescribed academic load in a regular semester by dropping one or more courses provided the number of courses is at least 4 and the registered credits are not less than 12. However, after completion of his/her seventh regular semester, a student will be permitted to register for less than four courses.

3.2 Summer Semester:

The summer semester is a special semester of approximately eight weeks between May and July. In a Summer Semester, a student can register for a maximum of three (3) backlog courses. For the purpose of this rule, internship would be regarded as two (2) courses and BTech Project Part II would be regarded as three (3) courses. BTech Project Part I would be regarded as a single course. However, no other course can be taken along with industrial/rural internship. For Summer Semester only, the term "backlog courses" indicates a course which a student has registered earlier and failed. However, for a student who has completed eight regular semesters, the term "backlog course" would have the standard interpretation as given in the Glossary. Furthermore, students who have completed eight regular semesters are also permitted to register for grade improvement in Summer Semester (see, section 5.2).

4. COURSE ASSESSMENT AND MODES OF ASSESSMENT

4.1 Course Assessment:

The various modes of assessment used for rating students' performance in a course include home assignments, tutorial assignments, laboratory work, group assignments, quizzes, tests (open or closed book), viva-voce, mini projects, etc. and the end-semester examination. Attendance in lectures/labs/tutorials may also be given due weightage in course assessment. The instructor may make attendance in lectures/tutorials/labs compulsory (80% or less) and award "F" grade to students who do not achieve the prescribed level of attendance in that course. The distribution of weightage for the assessment (continuous evaluation) through the various modes listed above will be as indicated by the course instructor at the beginning of the semester.

Note: Academic requirements such as projects and summer assignments, which are prescribed in the curriculum, are regarded as courses for the purpose of assessment.

4.2 Grading:

- a. For every course taken by a student, he/she is awarded a letter grade based on his/her overall performance in all the assessments. These letter grades are assigned on a 10-point scale as described in the table below:



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

- b. A student passes the course if he/she gets any grade in the range of AA to DE, but fails if he/she gets the grade F. Certain courses are indicated as Pass/Fail courses in the curriculum, and in these courses a grade of P or F is awarded. F grade may also be awarded in case of reported malpractice in examination(s)/continuous evaluation process.
- c. Pass/Fail courses are not considered for calculation of SPI/CPI.
- d. "I" grade will be awarded in a course if the overall performance of the student is satisfactory in the course, but the student either misses the end-semester examination due to illness, accident/death in the family and therefore obtains an approval from the Dean (Academic Programs) under exceptional circumstances. A student who misses the end-semester examination must apply to the Convener of Undergraduate Committee and his/her application must be supported by (i) proper medical certificate duly approved by the Medical Authority of the Institute in the case of illness, or (ii) adequate evidence in the event of accident/death in the family. An application not so supported will not be considered. Grade "I" awarded for missing the end-semester examination will be converted into a performance grade (depending on the overall performance of the student in the course) after taking an examination equivalent to the end-semester examination of that particular course. An "I" grade must be converted into a performance grade by the specified date in the Academic Calendar for the next semester, otherwise it will be converted into "F" grade.

5. REPEATING A COURSE

5.1 A student must repeat a course in which he/she has obtained an F grade in a course taken for credit. Such a course is regarded as a backlog course and is subject to the regulations for registration as indicated in Paragraph 3. A backlog elective course can be replaced by another elective of the same category (technical/open/ science).

5.2 Grade Improvement:

A student whose CPI is less than 5.0 is allowed to repeat a course in which a DD or DE grade was obtained for the purpose of grade improvement in a regular semester only. The grade obtained in the repeated attempt will be considered for the purpose of calculating the CPI. The grade obtained in the first attempt will be shown in the Transcript, but will not be considered for calculating the CPI.



6. B TECH PROJECT

All students are required to complete the B Tech Project (BTP). The total number of credits will be as normally prescribed in the curriculum from time to time.

7. PERFORMANCE INDICES

7.1 Semester Performance Index (SPI):

The performance of a student in a semester is indicated by the Semester Performance Index (SPI). The SPI is the weighted average of the grade points obtained in all the courses registered by the student during the semester, calculated to two decimal places.

7.2 Cumulative Performance Index (CPI):

An up-to-date assessment of the overall performance of a student from the time of entering the Institute is obtained by calculating the student's Cumulative Performance Index (CPI). The CPI is weighted average of the grade points obtained in all the courses registered for credit by the student after entering the Institute. The CPI is also calculated to two decimal places.

8. MINIMUM REQUIREMENTS OF ACADEMIC PERFORMANCE

8.1 Academic Probation:

A student will be placed on Academic Probation for his/her second semester with written intimation if his/her SPI at the end of first semester is less than 4.5. In subsequent semesters, a student will be placed on Academic Probation with written intimation if his/her CPI at the end of the previous semester is less than 5.0 or if his/her SPI is less than 4.5 in the previous semester.

For every student placed on Academic Probation, the Dean (Academic Programs) may prescribe a minimum SPI the student must attain in the semester. The minimum SPI so stipulated will be arrived at on the basis of the performance of the student in terms of her/his SPI/CPI as compared to the minimum requirements for graduation.

8.2 Discontinuation from the Institute on Account of Poor Academic Performance:

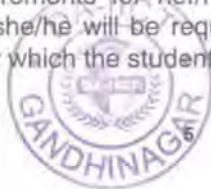
If the performance of a student is poor so that he/she is not likely to benefit from continuing in the program any further, he/she would be required to leave the Institute. For this purpose an assessment of the student's academic performance will initially be made at the end of the second semester of his/her stay at the Institute and thereafter at the end of every subsequent semester. This assessment will be based on the CPI and SPI obtained by the student.

8.3 Discontinuation from the Institute on account of Poor Academic Performance at the end of the Second and Fourth Semester:

A student whose CPI is less than 4.0 at the end of second or fourth semester shall be discontinued from the Institute. However, such a student may be allowed to register for the available backlog courses offered in the summer semester, following his/her second or fourth semester. Such a student is permitted to register for a maximum of three (3) of the available summer courses in which he/she is having F or DE grade. In case the student achieves the minimum CPI of 4.0 based on his results including the said summer semester, he/she would be allowed to re-enter the program.

8.4 Minimum and Maximum Period for Completion of B Tech Program:

The minimum period to complete the program is four academic years. In any case, a student should fulfill the requirements for her/his degree within a maximum period of six academic years, failing which she/he will be required to leave the Institute. The period of six years includes any semester for which the student has "withdrawn" status.



9. AWARD OF DEGREE

9.1 The B Tech (MnC) Degree will be conferred on a student after he/she has fulfilled the following requirements:

- a. The student should have taken for credit and passed all the foundation and elective courses prescribed in the curriculum for the program. The minimum total number of course credits is 136, of which 100 correspond to foundation courses; the remaining 36 credits must be obtained through elective courses in form of (i) MnC electives (minimum ten courses) and (ii) open electives (minimum two courses).
- b. The minimum number of grade points required from course work for graduation is 680 (136 x 5). For this requirement, internships, independent projects and BTP are not considered. In case the student has earned the minimum number of credits, but does not have the minimum number of grade points, then he/she must take additional elective courses (up to the maximum specified for each category) in order to fulfill the requirement.
- c. The student should have passed all the foundation courses including the Pass/Fail courses prescribed in the curriculum, and also all the prescribed internships and independent projects.
- d. The student should have obtained a passing grade for the BTP, as prescribed in the curriculum.
- e. The student should have registered for at least eight regular semesters (i.e., excluding summer semester and the withdrawn semester) as a regular student and should have paid all the institute dues.
- f. The student should have no case of indiscipline pending against him/her.

9.2 Final CPI and Class:

- a) For the purposes of computing the CPI at the end of the program, the student's CPI will be computed on the basis of the best CPI obtainable from the courses taken subject to:
 - The total credits from course work will be taken from the least number of courses which are required to obtain 680 grade points; provided that these total credits must be at least 136, and must include 100 credits from foundation courses and must satisfy the minimum requirements for different categories of electives, as indicated in paragraph 9.1 (a) above.
 - All other courses taken by the student will be categorized as extra credits and not considered for calculating the final CPI.
 - The CPI would be computed inclusive of the grade points earned from course work, as described in 9.2 (a) and from the BTech Project.
 - The requirement of earned course credits and grade points is subject to change, with the Director's approval, in case credit structure of a course is modified.
- b) The Transcript will indicate Distinction if the student obtains a CPI of 9.0 or above and First Class if the student obtains a CPI of 6.5 or above but less than 9.0.

9.3 Certificate of Academic Accomplishment:

A student who is unable to complete the degree requirements within the stipulated maximum period (see Clause 8.4 above) would be eligible to receive a "Certificate of Academic Accomplishment" by applying for it. The eligibility criteria and procedure for issue of the Certificate would be as laid down by the Institute from time to time.



10. GLOSSARY

Backlog Course: A course prescribed in the curriculum which has either not been registered or failed by a student.

Course Credit: Weighted sum of number of Lecture hours (L), Tutorial hours (T) and Practical hours (P) associated with the course. The weight for L and T is 1.0, and the weight for P is 0.5.

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

Semester: An academic year consists of two regular semesters of approximately 16 weeks duration each, the first (Autumn Semester) extending from July to December and the second (Winter Semester) from January to May. The summer semester is not a regular but a special semester of approximately eight weeks usually between May and July.

Semester Grade Report: Official record of the grades obtained in all the courses registered by a student in a semester.

Transcript: Official record of the grades obtained in all the courses registered by a student and is issued after the completion of the degree requirements.

Under-Graduate Committee (UG Committee): Committee of the Institute responsible for Policy Guidelines & Implementation Strategies covering the Undergraduate Program.

DA-IICT, Gandhinagar

Date: 08/02/2021





BTech (MnC) Curriculum

(Effective from 2020-21 batch)

1. Introduction: The Academic Council has approved the BTech (MnC) Curriculum Review Committee's Final Report, and directed that the curriculum contained therein should be followed with effect from the 2020 batch and onwards. The document contains the official description of the course structure for the BTech (MnC) 2020 batch onwards.

2. Course Structure for BTech (MnC) Program with effect from 2020 Batch is given in Table 1:

Table 1

Semester – I

Semester I	L-T-P-C
Mathematical, Algorithmic, and Computational Thinking	3-1-0-4
Computer Organization and Programming	3-0-0-3
Computer Organization and Programming Lab	0-0-4-2
Functions of Single Variable and ODEs	3-1-0-4
Mathematical and Computational Tools	1-0-2-2
Language and Literature	3-0-0-3
Semester credits	13-2-6-18

Semester – II

Semester II	L-T-P-C
Probability and Random Processes	3-1-0-4
Object Oriented Programming	2-0-2-3
Data Structures and Algorithms	3-0-2-4
Discrete Mathematics	3-1-0-4
Approaches to Indian Society	3-0-0-3
Semester credits	14-2-4-18

Semester – III

Semester III	L-T-P-C
Mathematical Statistics	3-1-0-4
Operating Systems	3-0-2-4
Design and Analysis of Algorithms	3-1-0-4
Algebraic Structures	3-1-0-4
Theory of Computation	3-1-0-4
Science, Technology, Society	3-0-0-3
Semester credits	18-4-2-23
Winter Break	L-T-P-C
Rural Internship	0-0-8-4

Semester – IV

Semester IV	L-T-P-C
Functions of Several Variables and PDEs	3-1-0—4
Data Storage and Management	3-0-2—4
Parallel and Distributed Algorithms	3-1-0—4
Linear Algebra	3-1-0—4
Numerical and Computational Methods	3-0-2—4
Environmental Studies	2-0-0—2
Semester credits	17-3-4—22

Semester – V

Semester V	L-T-P--C
Mathematical Optimization	3-1-0—4
Modelling and Simulation	3-0-2—4
Machine Learning	3-0-2—4
Principles of Economics	3-0-0—3
MnC Elective – 1	3-0-2—4
	3-1-0—4
	3-0-0—3
MnC Elective - 2	3-0-2—4
	3-1-0—4
	3-0-0—3
Semester credits	18-x-y—(21-23)

Semester – VI

Semester VI	L-T-P-C
Real and Complex Analysis	3-1-0—4
Open Elective – 1	3-0-0—3
MnC Elective – 3	3-0-0—3
MnC Elective – 4	3-0-2—4
	3-1-0—4
	3-0-0—3
MnC Elective – 5	3-0-2—4
	3-1-0—4
	3-0-0—3
Independent Project – 1/ MnC Elective – 6	0-0-6—3
	3-0-2—4
	3-1-0—4
	3-0-0—3
Semester credits	x-y-z—(19-23)

Summer Break	L-T-P—C
BTech Summer Industrial / Research Internship	0-0-12—6

Semester – VII

Semester VII	L-T-P-C
Independent Project – 1	0-0-6—3
	3-0-2—4



Semester VII	L-T-P-C
MnC Elective – 6	3-1-0—4 3-0-0—3
MnC Elective – 7	3-0-2—4 3-1-0—4 3-0-0—3
MnC Elective -8	3-0-2—4 3-1-0—4 3-0-0—3
Open Elective – 2	3-0-0—3
MnC Elective – 9	3-0-2—4 3-1-0—4 3-0-0—3
Independent Project – 2 / MnC Elective – 10 / BTP - 1	0-0-6—3 3-0-2—4 3-1-0—4 3-0-0—3 0-0-8—4
Semester credits	x-y-z—(18-23)

Semester – VIII

Semester VIII	L-T-P-C
MnC Elective – 10 / BTP-1	3-0-2—4 3-1-0—4 3-0-0—3 0-0-8—4
BTP-2	0-0-18—9
Semester credits	x-y-z—(12-13)

3. Table 2 shows the minimum and maximum number of courses permitted in each category.

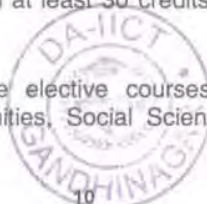
Table 2: Allowed number of courses in Electives

Type	Min	Max	Credits	Remarks
MnC Electives	9	10	Min. 30	Mathematics, Computer Science, Information Technology, and Interdisciplinary domains of MnC
Open Electives	2	-	6	Engineering Arts and Design, Humanities, Social Sciences and Management

4. **Additional Elements of the Curriculum: The provisions governing electives are indicated below.**

4.1 ICT Electives: The MnC electives fall under the knowledge areas of Mathematics, Computer Science, Information Technology, and Interdisciplinary domains of MnC. A student is required to take at least 9 MnC electives and earn at least 30 credits from these electives. A student cannot take more than 10 MnC electives.

4.2 Open Electives: Open electives are elective courses offered in the knowledge areas of Engineering Arts and Design, Humanities, Social Sciences, and Management, which are not



covered under MnC electives. A student is required to take 2 open electives and earn at least 6 credits from these electives.

43 Independent Projects: Independent Projects (IP) allow a student to get a feel of his/her research ability as well as to expand and update his/her knowledge base in an MnC subject of his/her choice. The credit structure of an IP is 0-0-6-3. An IP is to be taken up under the supervision of a member of the faculty. A student is allowed to take up IP only during the sixth and seventh semester and can take up at most one IP during a semester. A student must take up at least one IP and can take up at most 2 IPs during the entire program. Further, IPs cannot be taken up along with any part of BTP.

44 B Tech Project: All students must undertake and pass B Tech Project Part 1 (4 credits) and Part 2 (9 credits); either Part 1 may be taken in Semester VII and Part 2 in Semester VIII or both parts may be taken in Semester VIII.

45 Internships: All students must undertake and pass Rural Internship of 4 credits (normally offered in the Semester Break between Semesters III and IV) and Industrial/Research Internship of 6 credits (normally offered in Summer Semester after Semester VI).

NB: The course outlines will be notified separately.

DA-IICT, Gandhinagar

Date: 08/02/2021


Executive Registrar
DA-IICT, Gandhinagar





Academic Requirements for the M Tech (ICT) Program (Effective from 2017-18 batch)

Master of Technology (Information and Communication Technology) M Tech (ICT) duration – two (2) year postgraduate program 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 rules in 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 the end of this document.

1. REGISTRATION

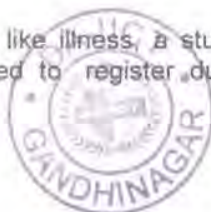
1.1 Categories of Registration:

- a) A student has to register in the resident registration category only. For sponsored M Tech (ICT) student external registration will be allowed depending on the conditions of MoU with the sponsoring organization. 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 PG Committee 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 self-attested copy will be kept for records.

1.3 Late Registration:

- a) 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.

b) In exceptional cases, the Dean (Academic Programs) on the recommendation of the Post Graduate 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) A student will be advised in the selection of courses by the faculty adviser appointed by Dean (Academic Programs) in consultation with the PGC.

b) 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 load of a student is 17/18 credits per semester in the first year and 12/13 credits per semester in the second year. The total credits requirement for the Degree is 60 credits, so the average load per semester is 15 credits. 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.

1.6 Adding/Dropping of Courses and Withdrawal from a Semester

a) 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.

b) A student who wishes to withdraw prior to registration for a semester must obtain a 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 during the entire program. 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.

c) 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.

d) 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.

e) 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 M Tech (ICT) Program

The total credits required in the program will be at least 60. 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 is 3 years, except that the maximum permissible duration for the (sponsored category) is 4 years.

2.2 Audit Courses:

The students are permitted to audit courses. They will be given a 'P' grade, which will be entered in their grade card if they satisfy the requirements placed by the course instructor. If they do not meet the requirements, then they will not get any grade and no entry will be made in the 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.

- 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.
- 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.
- A student getting a 'DD' or 'DE' grade in an elective course may substitute it by another course, provided his/her CPI is less than the prescribed minimum for getting the Degree and the student is allowed to continue in the program.
- 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.
- The grade 'S' or 'X' will be awarded for research/project credits as follows:
At the end of the semester, the thesis/project supervisor(s) will assess the student's progress towards the research work during the semester and will award the grade 'S' if the work is satisfactory and 'X' for unsatisfactory work.



- f. If a student is on leave for a part of the semester or submits his/her thesis in the middle of 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. The sponsored category student will be allowed only for Thesis mode of study. All other requirements would be as indicated in the Academic Requirements for M Tech (ICT) Program.

Requirement	Sponsored M Tech
Course Work	38 credits at DA-IICT
Research	22 credits. Part or all the research may be carried out at the sponsoring agency as indicated in the agreement.
Guidance	Guide from DA-IICT. Co-Guide from sponsoring agency.
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 has registered 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 all 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. 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 student will also be placed on Academic Probation if he/she obtains an 'X' in a research course. For every student 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 on probation 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 Thesis Mode student may expect financial support by stipend in the form of Teaching Assistantship. Based on need and merits, eligible Project Mode students may also be considered for Teaching Assistantships with stipend. Weightage would be given to the performance of student in his/her TAsip while deciding for the continuation of the TAsip or amount of the stipend. The eligibility criteria and amount of stipend will be decided by Competent Authority of the Institute.

5. MIGRATION RULES

5.1 Eligibility: Students in the M Tech program are eligible to migrate to the Ph D program provided they fulfil the following criteria:

- Student should have entered the program with a B Tech/BE Degree or equivalent.
- Student should have completed a minimum of two semesters of the M Tech program with 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 and 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 Ph D admissions. However, no application fee or admission fee would be applicable.

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

5.4 Eligibility for M Tech Degree: A Ph D student who fails to pass the Ph D 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 fulfils the eligibility criteria for M Tech program.
- The student fulfils the criteria for continuation in the M Tech program.
- The student submits an M Tech thesis or project which fulfils the requirements for such within a maximum of two semesters. This duration would commence from the semester immediately following the semester in which the student failed in the Ph D



comprehensive examination. Furthermore, the student would not be eligible for any financial support during this period.

5.5 Completion of Requirements for M Tech Program: A student who migrates to the M Tech (ICT) program from the Ph D program must complete all requirements for the M Tech (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) 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 may be subjected to other restrictions related to financial support, award of medals and prizes, etc. at any time.

Cumulative Performance Index (CPI): CPI indicates the cumulative academic performance in all 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, Guidelines and 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 registered by 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-ICT, Gandhinagar
Created as of August 2017.



M Tech (ICT) Program

COURSE STRUCTURE 2017 onwards

The program has been specially designed to meet the increasing needs of professionals who would be able to respond to the convergence between computers and communication Systems. The program aims to provide exposure to students who wish to build a professional career in ICT, working at the cutting edge of technology, research and development. On successful completion of the program, the students will be able to acquire essential technical and practical knowledge for solving real-world problems in the ICT domain using modern technologies and tools, and will have ability to demonstrate excellent analytical, logical and problem solving skills that would bridge the digital divide between urban and rural developments. The student will also have ability to acquire social and ethical attributes that enable them in applying their skills for societal needs with effective communication both orally and in writing.

The curriculum is organized with core courses, elective courses and thesis/project work. Program Core courses are foundational and compulsory, which will build core competence for getting into ICT domain knowledge areas. Once the student acquires knowledge in foundational courses, he/she will have choice for selecting Group Core courses which are interdisciplinary in nature and will provide breadth in ICT research exploration. Subsequently, the student will have adequate choice of electives in order to dwell deeper into areas of his/her research interest. Finally, student will have option to pursue one full year (two semesters) of research work in the form of thesis or a semester long internship/project work, depending on his/her category (Thesis or Project mode) in the program..

The structure of the curriculum is broadly classified into 4 categories. The first category, referred to as *Foundation (Program Core)*, is a set of compulsory courses required to be taken by every student in the program. The next one is domain knowledge in ICT, termed as *Group Core*. The third category is *Electives* in ICT. The fourth one is either a *Thesis* spread over in third and fourth semesters or a *Project* in fourth semester.

Program Core

Program core courses are designed to make the students acquire the necessary mathematical background and basic foundations in ICT, which will enable them to cope with Group core courses, electives and to pursue research in interdisciplinary areas in the subsequent semesters. As the input to the program is primarily from CSE or ECE disciplines, the curriculum aims to train students with Program core courses in First semester for building their basic foundation in ICT, which are common to all students.

Group Core courses

Group core courses are technical courses in the areas of CSE, ECE and interdisciplinary areas. The Group core courses would enable students in broadening their knowledge of ICT disciplines and then would motivate them to specialize in specific disciplines through elective courses. A student requires to take a minimum of 3-4 Group core courses based on his/her options in Thesis mode or Project mode. Following are the Group courses offered by faculty from the respective research groups.



- **Machine Intelligence and Analytics:** Pattern Recognition and Machine Learning, Image Processing, Computer Vision, Information retrieval, Approaches to Semantic Web, Data Analytics, Artificial Intelligence, Neural Networks, Language Processing
- **Intelligent Systems and Security:** Network architecture and protocol design, Network and System Security, Internet-Of-Things, Wireless Sensor Networks, Human Computer Interaction, Control System
- **Parallel & Distributed Computing:** Distributed Systems, Cloud Computing, Parallel and Distributed Algorithms, Graph Algorithms
- **Software Engineering:** Advanced Software Engineering, Software Project Management, Formal Specification and Verification
- **Signal and Image Processing:** Speech Communication, Computer Vision, Image Processing, Detection and Estimation Theory, Biomedical Signal Processing, Adaptive Filter Theory, Deep Learning.
- **Communication Systems:** Advanced Wireless Communications, Satellite Communications, RF/Microwave Applications, Smart Antennas and Radar Systems, Information Theory and Coding, Wireless System Design, Statistical Signal Processing, LTE, 4G/5G and MIMO Channels
- **VLSI and Embedded Systems:** Embedded Systems, VLSI Subsystem Design, Low Power VLSI Design, Advanced Solid State Devices, Nano-electronics

Electives

Electives courses are adopted from the disciplines of Computer Science, Electronics, Communication and Signal Processing, and interdisciplinary areas of ICT. Students will have a wide variety of choices amongst the currently existing technical and science electives. A representative list of elective courses is as follows:

Logic for Computer Science, Web Data Management, Introduction to Coding Theory and Applications, Elements of Synthetic Biology, Combinatorial Algorithms, Introduction to Data Science, Artificial Neural Networks, Fuzzy Logic and Applications, Topics in Deep Learning, Advanced Digital Communications, Real Time Embedded Systems.

Thesis Mode

Student entry in *Thesis* mode will be decided based on student choice and counseling by faculty at the end of First semester. Student in thesis mode is expected to carry out research work in the form of thesis in third and fourth semester. The student will carry out research under the supervision of a faculty member at DA-ICT in an area of mutual interest.

Project Mode

Like Thesis mode, student entry in *Project mode* will be decided based on student choice and counseling by faculty at the end of first semester. The student is required to take a semester long MTech project (MTP) in the fourth semester, during which he/she is required to demonstrate his/her ability to learn current areas of research and/or industrial interest. A student will have the option to do his/her MTP as on-campus or off-campus mode, where the *on-campus* mode allows the student to explore his/her research interest under the supervision of a faculty and the *off-campus mode* allows the student in getting exposure to industry and/or other R&D organizations/universities.



Semester-wise course sequence

(L-Lecture, T-Tutorial, P-Practical, C-Credit)

Thesis Mode		Project Mode	
Semester I	L-T-P-C	Semester I	L-T-P-C
Mathematical Methods for ICT	3-0-0—3	Mathematical Methods for ICT	3-0-0—3
Probability and Statistics	3-0-0—3	Probability and Statistics	3-0-0—3
Computer Systems	3-0-2—4	Computer Systems	3-0-2—4
Basics of Communications Systems	3-0-0—3	Basics of Communications Systems	3-0-0—3
Introduction to Digital Design	2-0-2—3	Introduction to Digital Design	2-0-2—3
ICT Foundation Lab	0-0-4—2	ICT Foundation Lab	0-0-4—2
Semester credits	14-0-8—18	Semester credits	14-0-8—18
Semester II	L-T-P-C	Semester II	L-T-P-C
Communication Skills & Technical Writing	3-0-0—3	Communication Skills & Technical Writing	3-0-0—3
Group Core – 1	3-0-2—4	Group Core – 1	3-0-2—4
Group Core – 2	3-0-2—4	Group Core – 2	3-0-2—4
Group Core – 3	3-0-0—3	Group Core – 3	3-0-0—3
Elective – 1	3-0-0/2—3/4	Elective – 1	3-0-0/2—3/4
Semester credits	15-0-4/6—17/18	Semester credits	15-0-4/6—17/18
Semester III	L-T-P-C	Semester III	L-T-P-C
Elective – 2	3-0-0/2—3/4	Group Core – 4	3-0-0—3
Research Unit –1, 2, 3	0-0-18—9	Elective – 2	3-0-0/2—3/4
		Elective – 3	3-0-0—3
		Elective – 4	3-0-0—3
Semester credits	3-0-18/20—12/13	Semester credits	12-0-0/2—12/13
Semester IV	L-T-P-C	Semester IV	L-T-P-C
Research Unit – 4, 5, 6, 7	0-0-26—13	Project	0-0-26—13
Semester credits	0-0-26—13	Semester credits	0-0-26—13

The curriculum mandates 60 credits.

A Thesis Mode student is required to earn 38 credits from coursework and 22 credits from thesis work. Out of the 38 required coursework credits, 21 credits are allocated to compulsory courses (Program core in the first semester) and 11 credits are allocated to three Group core courses, and 6-8 credits are allocated to two electives.



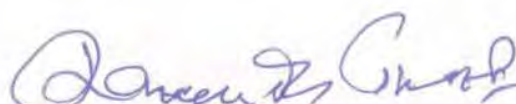
A Project Mode student is required to earn 47 credits from course work and 13 credits from project work. Out of the 47 required coursework credits, 21 credits are allocated to compulsory courses (Program core in the first semester) and 14 credits are allocated to four Group core courses, and 12-14 credits are allocated to four electives.

Graduation Requirement

Total Credits $\geq$ 60

<i>Thesis Mode:</i>	<i>Project Mode:</i>
Course Credits $\geq$ 38	Course Credits $\geq$ 47
Research/Thesis Credits: 22	Project Credits: 13

CPI (Cumulative Performance Index) $\geq$ 6.0


Executive Registrar
DA-IICT, Gandhinagar





Academic Requirements for the M Tech (ICT) Program

(Effective from 2019-20 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 this program. Eligibility for admission, admission procedures etc. for this 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 rules in 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 the end of this document.

1. REGISTRATION

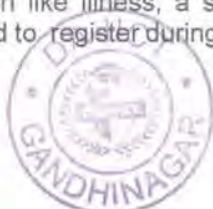
1.1 Categories of Registration:

- 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 postgraduate programs, 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:

- a) 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.

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

b) 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 load of a student is 14/15 credits per semester in the first year and second year. The total credits requirement for the degree is 55 credits out of which 36 credits are earned through coursework and 19 credits through research credits. Out of the 36 required coursework credits, 8 credits are allocated to compulsory courses (Program core), 25 credits are allocated to Specialization core courses, 3 credits are allocated to an elective. 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

a) 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.

b) A student who wishes to withdraw prior to registration for a semester must obtain a 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.

c) 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.

d) 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.

e) 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 M Tech (ICT) Program:

The total credits required in the M Tech (ICT) program will be at least 55. 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 M Tech 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 entered in their grade card if they satisfy the requirements placed by the course instructor. If they do not meet the requirements, then they will not get any grade and no entry will be made in the 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.

- 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.
- 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.
- A student getting a DD or DE grade in a course may substitute it by another course, provided his/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.
- 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 towards the 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 middle of 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	36 credits min. at DA- IICT.
Research	19 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 has registered 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 all 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. 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 student will also be placed on Academic Probation if he/she obtains an X in a research course. For every student 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 on probation 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 academic administration of the Institute.

5. MIGRATION RULES

5.1 Eligibility: Students in the M Tech program are eligible to migrate to the Ph D program provided they fulfil the following criteria:

- Student should have entered the program with a B Tech/BE degree or equivalent
- Student should have completed a minimum of two semesters of the M Tech program with 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 Ph D admissions. However, no application fee or admission fee would be applicable.

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



5.4 Eligibility for M Tech Degree: A Ph D student who fails to pass the Ph D 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 fulfils the eligibility criteria for M Tech program
- The student fulfils the criteria for continuation in the M Tech program
- The student submits an M Tech thesis which fulfils the requirements for such within a maximum of two semesters. This duration would commence from the semester immediately following the semester in which the Ph D comprehensive examination has been failed. Furthermore, the student would not be eligible for financial support during this period

5.5 Completion of Requirements for M Tech Program A student who migrates to the M Tech (ICT) program from the Ph D program must complete all requirements for the M Tech (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) 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 in all 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 Guidelines and 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 registered by 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
23 October 2019.



M Tech (ICT) Program

COURSE STRUCTURE 2019 onwards

M Tech (ICT) is a full-time two-year (four semesters) program. The program has been specially designed to meet the increasing needs of professionals who would be able to respond to the convergence between computers and communication systems. The program aims to provide exposure to students who wish to build a professional career in ICT, working at the intersection of technology, research, and development in the areas of Machine Intelligence, Data Analytics, Intelligent Systems, Cyber Security, Distributed Computing, Software Engineering, Image Processing, Computer Vision, Speech Communication, RF and Antenna Theory, Signal Processing, Wireless Systems, Next Generation communication technology and MIMO channel, Embedded Systems, VLSI Subsystem Design, FPGA, and Nano electronics.

The Program curriculum includes four specializations tracks that provide a strong foundation and advanced courses in each track. The Program tries to leverage the strength and diversity of our faculty and currently offers the following specialization tracks:

- Communication and Signal Processing
- Machine Learning
- Software Systems
- VLSI and Embedded Systems

The specializations offered by this Program are different in a qualitative way from the specializations offered in other institutions. Apart from courses, students are required to pursue one full year (two semesters) of research under the guidance of a faculty advisor and submit a master's thesis in order to obtain the degree of M Tech (ICT) specializing in the respective track. On successful completion of the program, the students will be able to acquire essential technical and practical knowledge for solving real-world problems in the ICT domain using modern technologies and tools, and will have the ability to demonstrate excellent analytical and logical problem-solving skills which may bridge the digital divide between urban and rural worlds. Apart from receiving rigorous exposure to various areas of scholastic study and research, students will be groomed to cultivate sound professional ethics.

Semester-wise course sequence

(L-lecture, T-tutorial, P-practical, C-credit)

Semester	Courses	Credit Structure (L-T-P-C)
Semester 1	Program Core 1	3-0-0-3
	Program Core 2	1-0-4-3
	Program Core 3	1-0-0-1
	Specialization Core 1	3-0-0-3
	Specialization Core 2	3-0-2-4



Semester	Courses	Credit Structure (L-T-P-C)
Semester 2	Specialization Core 3	3-0-0-3
	Specialization Core 4	3-0-2-4
	Specialization Core 5	3-0-2-4
	Elective	3-0-0/2-3/4
Semester 3	Program Core 4	1-0-0-1
	Specialization Core 6	3-0-0-3
	Specialization Core 7	3-0-2-4
	Thesis	0-0-12-6
Semester 4	Thesis (continuation)	0-0-26-13
Total Credits		30-0-50/52-55/56

1 lecture hour contributes 1 credit; 1 tutorial hour contributes 1 credit; 2 laboratory hours contribute 1 credit

The curriculum mandates a minimum of 55 credits, 36 earned through coursework and 19 through research credits. Out of the 36 required coursework credits, 8 credits are allocated to compulsory courses (Program core), 25 credits are allocated to Specialization core courses, 3 credits are allocated to an elective.

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

Subject area	No. of credits
Program Core courses	8
Specialization Core courses	25
Elective courses	3
Thesis work	19
Total credits	55

Detailed Curriculum

The Program Core courses are targeted to strengthen mathematical foundations required in all specializations, along with imparting proper technical communication and writing skills. The Specialization Core courses impart foundational knowledge specific to each specialization to begin with, followed by advanced courses in the respective specialization. Some specializations may offer a choice for specialization core courses, especially in Semester 2 and 3. Topics covered in such advanced courses typically will introduce students to possible areas of research in the respective specialization. The Research Thesis gives a firsthand experience of contributing knowledge to the existing body of knowledge in each specialization, under the supervision of a faculty member at DA-IIT.

The Program Core and Specialization Core courses are mentioned below:



Program Core Courses

Probability and Random Variables

The objective of this course is to study the concepts of probability, random variables, and their applications in information and communication technology. Topics include: review of probability theory, Definitions, Set theory, Axioms of probability, Conditional probability, Bayes' theorem, Total probability, Concept of Random variable, Discrete and Continuous random variables, Commutative Distribution Function and its properties, Probability density function and its properties, Function of a random variable, Mean, variance and moments of a random variable, Characteristic functions, Bernoulli trials, Binomial distribution, Poisson distribution, Geometric distribution, Uniform distribution, Exponential distribution, Gaussian distribution, Rayleigh distribution, Joint random variables and their characterization and their application to real world problem solving, Convergence concepts, Law of large numbers, Central limit theorem, concept of mean square estimation

Programming Lab

This course aims to provide hands-on practice in software tools and technologies used in ICT. The broad coverage of this course is as follows:

Module 1: Familiarity in Linux, Shell Programming; Perl (basic and process control); Programming tools (Makefiles, version control, debugger, profiler).

Module 2: Problem solving and programming using Python.

Module 3: Introduction to circuit modelling and analysis through LTSPICE; System design using FPGA.

Module 4: Understanding MATLAB; Lab on Sampling, Quantization and PCM; Bit error rate based performance analysis of PSK and QAM.

Communication Skills

This course is especially designed for the post graduate students of engineering to train them in communicating effectively. Not only will the students develop skills required for everyday writing, but they will also be able to present their ideas in the professional scenario. Most of the classes will employ task based activities aimed at providing the students with the basic competencies in language viz., reading, writing, listening, speaking and thinking. Modules in this course include: Comprehension; Everyday communication; Descriptive Writing; Writing Paragraphs; Group Discussions; and Presentation Skills

Technical Writing

Fluent communication and technical writing are functional skills central to science and engineering research. This course will provide the learners with a practical framework and structural orientation toward language used in technical documents. The course will teach and train students to read, decipher and comprehend complex ideas which are indispensable to technical discourse. Besides preparing the students to construct documents (such as abstracts, research papers, proposals, memorandums and notes) the course will enable them to edit and proof read their own constructions. The communication aspect of the course will cater to honing the skills of speaking, expressing and adequately conveying one's ideas across. This will include teaching the students to successfully carry out powerpoint presentations, interviews, impromptu speeches and discussions/deliberations. The writing aspect will focus on document construction and information processing.



Specialization Core Courses

Software Systems

Advanced Algorithms

This course aims to cover the fundamentals of algorithm design and to enhance the problem-solving skills necessary for developing efficient software systems in various applications. The coverage of the course starts with the algorithm design technique including divide-and-conquer, greedy approaches, dynamic programming, heuristic algorithms, and approximation algorithms. Substantial emphasis will be given for discussion on relevant data structures while discussing these topics and the complexity analysis of algorithm design.

Software Engineering

The main objective of this course is to understand and learn how complexity and change are engineered during large software development. The course will focus on the methodologies (processes), techniques (methods), and tools that can be used to successfully design and validate large software systems. The course will focus on the state-of-the-art in applying quantitative assessment methods in Software Engineering and other related fields. The contents of this course to be covered are: (1) Software Requirements Modeling and Specifications, (2) Software Architecture and Design Patterns, Software Development Methodologies, (3) Software Measurement and Metrics, (4) Empirical Software Engineering, (5) Computer Aided Software Engineering and Tool Support (DevOps, Automation), (6) Applications of ML and AI in analyzing software products, and (7) Assessment and Evaluation in Software Engineering.

Network Security

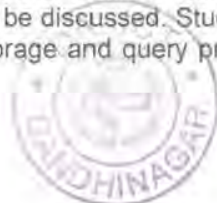
In this course the student is exposed to different attacks and threats in computer networks including network mapping, port scanning, sniffing, DDoS, reflection attacks, attacks on DNS and leveraging P2P deployments for attacks. The course will also review some cryptographic primitives, such as the concepts of block ciphers, stream ciphers, pseudo-random functions, public key cryptography, digital signatures and key distribution, relevant to secure networking protocols. The course will discuss several secure networking protocols, including PGP, SSL, IPsec and wireless security protocols. The course is expected to examine operational security, including firewalls and intrusion-detection systems. Students would be expected to read recent research papers on network security and participate in an important lab component that includes packet sniffing, network mapping, firewalls, SSL and IPsec.

Computing and Complexity

The objective of the course is twofold. The first objective is to introduce the students with the exact notion of algorithms in terms of time and storage capacity. For this, different mathematical machine models are defined. The second objective of this course is to teach students how to divide problems into various complexity classes based on the resources required to solve them. Topics include Formal definition of Turing machine, variants of Turing machine, decidable languages, semi decidable languages, Universal Turing machine, undecidable languages, Cantor's diagonalization, Halting problem, Post correspondence problem, Turing computable function, Rice's theorem, decidable logical theory, undecidable logical theory, Godel's incompleteness theorem, the class P, the class NP, NP-completeness, polynomial reducibility, Cook-Levin theorem, Savitch's theorem, the class PSPACE, PSPACE-completeness, the class L and NL, EXSPACE, EXSPACE completeness, Hierarchy theorem, relativization, introduction to circuit complexity, and introduction to communication complexity.

Distributed Databases

Collection of correlated databases distributed over a cluster of servers can facilitate scalable query processing. This course includes foundational work, recent developments and trends in scalable database management systems. Modern Data Storage and Query processing for Parallel and distributed databases will be discussed. Students will be working on projects in the domain of modern distributed data storage and query processing during labs. Students will be



using various SQL and NoSQL database management tools for implementing their projects. Topics include: Distributed architecture, distributed database design considerations and strategies, fragmentation and allocation, distribution and replication models, scalable query processing and optimization, query cost estimation, distributed transaction management, concurrency control, database interoperability, various data models, SQL and NoSQL databases, RDF and graph databases, static and streaming data, research issues in modern distributed database management.

Advanced Computer Networks

This course aims to provide an exposure to basic knowledge of networking concepts and background, such as basics of Internet protocols, link layer and framing concepts etc. However, an in-depth review of undergraduate level networks material will be done in this course. This course will emphasize the concepts and issues underlying the design and implementation of the Internet. We will also spend time learning to quantitatively analyze the performance of network protocols. Topics include: Datagram, circuit, and connection-oriented networks; Multiple access: contention and ordered techniques; TCP/IP group of protocols: routing and end-to-end reliability; Open and Closed loop flow control; CSMA/CD protocol analysis - efficiency, latency; Point-to-point routing: OSPF, BGP, convergence, Performance Analysis; Multicast protocols and Anycast protocols; Reliability Issues in Broadcast and Multicast; Performance Issues in TCP: Modeling and Analysis; Active Queue Management in TCP Networks; QoS definition, Mapping models; Label Switching, MPLS; Mobility support in Internet; Networking virtualization.

Distributed Systems

Distributed systems are systems comprising of computing elements that are spread across geographical locations. Examples include Internet, Google file systems etc. Contents of the course include (a) architectures of various distributed systems, (b) refresher on processes, clients and servers, (c) fundamentals of network communication, remote procedure calls, message oriented versus stream oriented communication, multicast communication, (d) domain name service and its architecture, (e) synchronization using Lamport logical clocks, mutual exclusion algorithms, (f) replication and consistency models, and (g) fault tolerance.

Blockchain and Crypto-Currency

This course explores the fundamentals of blockchains and cryptocurrencies. Topics covered include basic cryptographic tools, early digital cash, Bitcoin blockchain, Script language, Bitcoin wallets, applications of Bitcoin scripts, distributed consensus algorithms, proof of work, mining pools, mining attacks, altcoins, virtual mining, cross-chain transactions, Bitcoin exchanges, anonymity and privacy techniques, scaling blockchains, smart contracts, decentralized applications, and Ethereum blockchain.

Software Testing and Verification

Testing and verification of the software systems is not a —silver bullet that can guarantee the production of high quality applications. While a —correct correctness proof demonstrates that a software system (which exactly meets its specification) will always operate in a given manner, software testing that is not fully exhaustive can only suggest the presence of flaws and cannot prove their absence. Software systems are therefore always checked for correctness before they are deployed. Verification and testing are two predominant ways for checking the correctness of software systems. This course is aimed at learning various techniques of testing and verification. The coverage of this course includes the following modules:

Module 1: Software Testing: Basic concepts and preliminaries

Module 2: Model-based Testing

Module 3: Design and Code Inspections to Reduce Errors in Program Development

Module 4: Applications of AI in Software Quality Assurance

Module 5: Verification of Software Systems

Module 6: Testing of Web GUI and Mobile Apps

Module 7: AI and ML for Security Testing



Machine Learning

Linear Algebra and Optimization

This course aims to strengthen the mathematical foundations in the areas of Linear Algebra and Optimization, necessary to understand and analyze problems and algorithms in Machine Learning. Machine Learning deals with modeling, analysis and processing of large amounts of data. A popular way of modeling data is using vector spaces, which are (pre-)processed using tools from Linear algebra and Optimization. The contents of the course are: (a) Linear Algebra - Importance of Vector spaces, Basis, Linear transformations, Matrices, Matrix Rank, Similarity transformations, Matrix Diagonalization, Eigenvectors & Eigenvalues, SVD, Norms, Inner products, Least squares, Projection and (b) Optimization-Unconstrained Optimization (First & Second Order Conditions, Gradient Descent and its variants), Constrained Optimization (KKT Conditions), Convex sets and functions.

Accelerated Computing

This course aims to cover the important topics of GPU programming such as design of parallel algorithms, GPU and CPU architecture, data parallelism, CUDA programming model, GPU memory model, memory performance and optimization, parallel complexity analysis, performance modeling, and case studies focused on important parallel patterns supported by lab assignments.

Pattern Recognition and Machine Learning

Machine learning concerns with designing and developing of algorithms that allow machines, essentially computers, to evolve realistic or human like behavior based on the empirical data available. This course aims to discuss the building blocks of pattern recognition problem and provide an overview of the machine learning and advanced topics. The focus would be to discuss various algorithms for pattern recognition and discuss the tools for pattern recognition.

Brain Cognitive Science

The objective of this course is to familiarize the student about brain science and cognition, and its entanglement with artificial intelligence and computer sciences. This course will introduce you about how various mental processes (information processing) like sensation, perception, attention, memory, learning, action and decision making etc. that are accomplished by the brain. In the later part of this course, we will study the various topics and techniques in the area of artificial intelligences that are partly or fully inspired from the principles of information processing in the brain. This course will also introduce you about brain-computer interaction (BCI) and neuromorphic computing.

Advanced Image Processing

The objective of this course is to introduce some basic to advanced levels of techniques for processing image. The techniques include various spatial domain, transformed domain techniques to enhance, to restore, and to segment image for higher level processing. This also includes 3D vision related perspective, and also discusses different metrics to measure the quality of image. The course will emphasize mathematical model of degradation, Noise models, Restoration in presence of noise, Periodic noise reduction, Linear position-invariant degradation, Estimating the degradation function, Inverse filtering, Wiener filtering, Constraint least square filtering. Image quality assessment metrics with Reference based metrics: MSE, PSNR, ISNR, SSIM, FSIM. No-Reference based metrics: FADE, UIQM, UCIQE will also be discussed in this course.

Information Retrieval

Unstructured information accounts for more than 70–80% of all data in organizations and is expected to grow even more in days ahead. The lion share of this is typically text. Apart from navigating the web (e.g. Google, Bing) a search engine is also useful for several other tasks like searching within intranet of an organization, looking for information in a database of documents



that might not always be in public domain (e.g. enterprise search). The objective of this course is to study different components of an information retrieval system to access information from unstructured and semi-structured text. The three major components of this course are: Indexing, Retrieval and Evaluation. Indexing (Representation) includes vector space and embedded space representation. Implementation of Vector-Space Model, tokenizing, stop-word removal, and stemming. Retrieval models include vector space model, language model, probabilistic model, boolean model and a fair understanding of query processing. Query operations like Query expansion (Relevance feedback) in both supervised and unsupervised framework will be discussed. Evaluation will cover performance metrics: recall, precision, and F-measure; Evaluations on benchmark text collections. Given the above foundation this course will explore several domain Specific IR problems, like, IR form Legal, Medical, Financial and Social Domain.

Computer Vision

Past several decades researchers have endeavored hard to develop computers with the capacity to —see and comprehend the world around them, as humans would do. This course aims to convey the nature of some of the fundamental problems in computer/machine/robot vision, and to explain a variety of techniques used to overcome them. Vision is a rapidly evolving area and new and emerging approaches to vision problems. We will cover some of them along with some classical techniques. Various vision problems are considered, including: feature detection in images, edge detection, and the accumulation of edge data to form lines; recovery of 3D shape from images, the use of a stereo image pair to derive 3D information; forming image mosaics; video surveillance techniques. Tracking objects in video; motion detection in video images; recognizing and classifying objects in images.

Deep Learning

Deep learning is a new area of Machine Learning research and a growing field in the area of pattern recognition, natural language processing, speech processing, image processing and vision. This course provides a broad introduction to deep learning architectures. The objectives include: (1) Formulate machine learning problems related to different applications and solve using deep learning approaches; and (2) Read current research papers and understand the issues in current research. The coverage of this course includes the following modules:

Module 1 – Machine learning (ML): Types of learning - Supervised, unsupervised, reinforcement. Linear Regression, Logistic Regression, Algorithms in ML—k-means, SVM, PCA. Concept of Over-fitting, Regularization.

Module 2 – Introduction to Neural Networks: Motivation, Simple Neural Network (shallow) and its learning (Intuition), Back propagation, Convergence Issues.

Module 3 – Deep learning Architectures: Deep Neural Network, Auto-encoder and Deep Auto-encoders, Sparse, De-noising, Convolutional Neural Networks (CNN) and Deep CNN. Recurrent Neural network, Generative Adversarial Networks (GANs), mode collapse, Variational Encoder Enhancement GAN (VEEGAN), Variational Autoencoder (VAE), and applications.

Natural Language Processing

This course presents an introduction to the computational modelling of natural language. Topics covered include: computational morphology, language modelling, syntactic parsing, lexical and compositional semantics, and discourse analysis. We will consider selected applications such as automatic summarization, machine translation, and speech processing. We will also study machine learning algorithms that are used in natural language processing.



Communication and Signal Processing

Advanced Digital Signal Processing

This course aims to discuss few advanced topics from digital signal processing, and also to explore current research areas like compressive sensing and graph signal processing. This course would be useful for some specialized courses like speech signal processing, image processing and adaptive signal processing. The coverage of this course includes the following modules:

Module 1: Discrete-time Filters; DTFT; DFT; Design of FIR and IIR Filters.

Module 2: Multirate Signal Processing; Sampling Rate Change Operations: Upsampling and Downsampling; Fractional Sampling; Interpolation.

Module 3: Compressive Sensing; Sub-Nyquist Sampling; Reconstruction of sparse signals- Orthogonal Matching Pursuit; Orthogonal Least Square; Subspace Pursuit; Basis Pursuit; Generalized Orthogonal Matching Pursuit.

Module 4: Wavelet Transform and Filter Banks: Haar Wavelets; Daubechies Wavelets; Orthogonal and Biorthogonal Wavelets; Gabor Transform.

Module 5: Graph Signal Processing; Representation of Signals over Graphs; Graph Fourier Transform; Graph Filters.

Advanced Digital Communication

A digital communication system converts the information to be transmitted into a stream of bits, and then into symbols that can be transmitted over wireline or wireless channels. This concept applies regardless of the type of information generating source (audio, video, image, etc.) and the type of information conveying medium or channel (cable, satellites, microwave and terrestrial links, etc.). This course will combine mathematical principles and their practical engineering applications to build the student's skills in designing and analyzing the digital method of communications.

(a) Information Theoretic Limits and Power versus Bandwidth Tradeoff (Entropy and Mutual Information, Channel Capacity, power and bandwidth efficiencies, and trade-off between them).

(b) Digital Modulation Schemes (Base band and bandpass communication, vector space representation of signals, linear and nonlinear modulation techniques, M-ary modulation techniques (PSK, QAM), orthogonal modulation techniques, spectral characteristics of digital modulation);

(c) Design of Receivers and Demodulators (Maximum A Posteriori Decision Theory, Optimum Receivers, Probability of Error Analysis, Correlation demodulator, matched filter, maximum likelihood sequence detector, differential and noncoherent detectors; characterization of fading multipath channels, RAKE demodulator, multiuser detection techniques);

(d) Digital Communication Transceiver Signal Processing (transmitter side signal processing (pulse shaping and zero ISI Nyquist criteria, Direct Digital Synthesis), signal processing at the receiver (symbol timing, carrier frequency and phase offset estimation), interference mitigation techniques (Intersymbol Interference and Channel Equalization));

(e) Wireless Communication Channels and Advanced Architectures (flat and frequency selective channel fading, SIMO and MISO diversity for fade mitigation, MIMO architectures, OFDM and SC-FDMA, spread-spectrum techniques and Non-Orthogonal Multiple Access (NOMA)); Channel Coding Schemes (linear block codes, convolution codes, trellis-coded modulation, Turbo coding, Soft-Output Viterbi Algorithm (SOVA), LDPC Codes, Message Passing Algorithms).

Adaptive Signal Processing

This course aims to discuss algorithms to process the signals in an adaptive manner where it is assumed that the underline system/channel may vary over time. Its application areas include sonar, radar, biomedical and communication signal processing. This course will discuss all the classical adaptive algorithms like LMS, NLMS, RLS etc. The emphasis is on finding theoretical analyses of the adaptive algorithms and also on the recently proposed algorithms.



Wireless System Design

Wireless System Design is one of the most exciting fields in Communication Engineering today. This course combines theory with real-life examples to provide students wireless communication system concepts and to help them close the gap between traditional RF engineering design and the needs of modern communication systems. A key premise of this course is that a coherence understanding of wireless system performance and design can only be obtained by treating the relevant technical topics in an integrated manner. Topics include:

Introduction to Wireless Systems: Classification of Wireless Systems, Design and Performance Issues, Introduction to Wireless System Components, Cellular telephone Systems and Standards.

Noise and Distortion in Systems: Noise in Linear Systems, Noise Temperature, Noise Figure and Inter-modulation Distortion.

System Design Fundamentals: Radio Receiver Architectures, Wireless Communication Requirements: Methodologies, E_b/N_0 vs SNR, BER vs Noise, Bandwidth Limitation.

RF System Design Considerations: Receiver Sensitivity, Spurious-free and Blocking (Linear) Dynamic ranges, Power Output and Spectral Efficiency, System Limitations.

Mixers: Properties and Characteristics: Conversion Loss/Gain, Noise Figure, RF/IF Isolation, LO/IF Isolation, Distortion, Power Consumption, Mixer Types (Single-ended, Balanced, Double-Balanced, Image Rejection).

Amplifiers & Oscillators: Large Signal: Power Output vs Efficiency, Gain and Phase Requirements, Non-linearity issues Inter-modulation Distortion (IMD) in Amplifiers, VCOs & Frequency Synthesizers.

Support Circuit Design: Frequency Multipliers, RF Switches, Attenuators, AGCs, Baluns, Splitters/Combiners, Directional Couplers, Phase Shifters.

Systematic Analysis of Transceiver Design: Specifications, Block diagrams, Small Signal Analysis, dB Power, Link Budgets, System Design Trade-offs, Gains/Losses, Signal-to-Noise, Probability of Error, Bit Error Rate, E_b/N_0 , Link Margin, Tracking Noise and Signal level through a complete system, Effects and Advantages of using Spread Spectrum techniques.

Transmitter Design: Various types and system designs of transmitters, local oscillator, upconverters, sideband elimination, power amplifiers, standing wave ratios.

Receiver Design: Dynamic Range, Image Rejection, Limiters, Minimum Discernable Signal (MDS), Tangential Signal Sensitivity (TSS), Super-heterodyne Receivers, Importance of Low Noise Amplifiers, Phase Noise.

Measurement Tools and Instruments: Spectrum Analyzer, Scalar and Vector Network Analyzer, Time Domain Reflectometer (TDR), Power Meter and Sensors, Software Tools like Agilent Technologies' ADS.

EMI & EMC Issues: Electromagnetic Interference and Electromagnetic Compatibility in Wireless Devices.

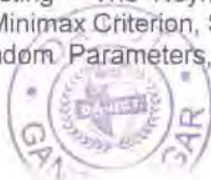
Recent Trends & Technologies: Practical aspects of designing with RFICs and MMICs, MEMS, MIMO, Smart Antennas.

Detection and Estimation Theory

Different problems in signal processing and communication involve detection and processing of the signals to make inference. In practical scenario, the signals could be noisy. The objective of this course is to provide fundamental and theoretical concepts to develop frameworks such that the inference problem can be addressed in those areas.

(a) Foundations: Probability- conditional probability, PDFs, Continuous random variable, Functions of random variables, Characteristic Functions, Expectation and Moments, Central Limit Theorem. Random processes - Ensemble Correlation Functions, Time averages, Power Spectral Density, Gaussian Process, Sampling and Random Sequences, Poisson Process. Linear Vector Spaces, Hilbert Spaces. Constrained and unconstrained optimization.

(b) Detection theory: Hypothesis testing - The Neyman-Pearson Criterion, Bayes Criterion, Minimum Error Probability Criterion, Minimax Criterion, Sequential Hypothesis Testing. Detection in the Presence of Unknowns: Random Parameters, Non-random parameters. Detection of



Signals in Gaussian Noise: White Gaussian, Colored Gaussian. Spectral detection. Detection in the Presence of Uncertainties: Unknown signal and Noise parameters. Non-Gaussian Detection Theory. Robust Hypothesis Testing. Non Parametric Model Evaluation. Partially Known Signals and Noise. Partially Known Signal Waveform. Partially Known Noise Amplitude Distribution. Non-Gaussian Observations.

(c) Estimation theory. Terminology in Estimation Theory. Minimum variance unbiased estimation. Unbiased estimators. Minimum variance criterion. Existence and search of the minimum variance unbiased estimator. Extension to a vector parameter. Cramer-Rao Lower Bound - Signals in white Gaussian noise. parameter transformation. vector parameter. general Gaussian case. and WSS Gaussian random process. Practical Estimation of Signal Parameter. Best Linear Unbiased Estimators. Maximum Likelihood Estimators. Least Squares estimation. Parameter Estimation via Bayesian. Bayesian linear model. nuisance parameter. Bayesian Estimation for Deterministic Parameters. Risk Functions. MMSE and MAP Estimator. Sequential Linear MMSE estimators. Wiener Filtering. Kalman Filtering.

Speech Technology

The objective of this course is to understand the potential of various speech technologies, such as, speech, speaker and language recognition, voice conversion, text-to-speech (TTS) synthesis, audio search, query-by-humming (QBH). Finally, course also discusses applications of speech technology in medical-domain, such as, infant cry classification, autism spectrum disorder (ASD), cleft speech, vocal fold pathology, hearing aids, voice cloning or voice banking, etc. Topics include: Overview of Speech Technology, Speech Production, Speech Analysis, Speaker and Language Identification, Voice Conversion, Automatic Speech Recognition, Audio Search, Query-by-Humming, Text to Speech Synthesis.

Wireless Communication

The course aims to expose the students to understand mobile radio communication principles and to study the recent trends adopted in cellular systems and wireless standards. The coverage of this course includes the following modules:

Module 1: Cellular Concepts – System Design Fundamentals: Cellular concept-channel reuse-handoff strategies-dynamic resource allocation-interference and system capacity-improving capacity and coverage of cellular systems. Second and third generation network standards: GSM standardization-architecture and function partitioning-GSM radio aspects-security aspects-protocol model-call flow sequences-evolution to 2.5G mobile radio networks. IS-95 service and radio aspects, key features of IS-95 CDMA systems ECWDM-UMTS physical layer-UMTS network architecture-CDMA 2000 physical layer.

Module 2: Radio Wave Propagation: Free space propagation model- basic propagation mechanisms –reflection- ground reflection model diffraction-scattering-practical link budget design-outdoor and indoor propagation models. Small scale fading and multipath: Small scale multipath propagation-Impulse response model of multipath channel –small scale multipath measurements-parameters of mobile multipath channels –types of small-scale fading.

Module 3: Capacity of Wireless Channels: Capacity of Flat Fading Channel- Channel Distribution Information known – Channel Side Information at Receiver – Channel Side Information at Transmitter and Receiver – Capacity with Receiver diversity – Capacity comparisons – Capacity of Frequency Selective Fading channels. Performance of digital modulation over wireless channels: Error probability of BPSK, FSK, MSK, GMSK, QPSK, M-ary PSK, M-ary QAM and M-ary FSK on AWGN channels- Fading– Outage Probability, Average Probability of Error, Combined Outage.

Module 4: Diversity: Realization of Independent Fading Paths – Receiver Diversity – Selection Combining – Threshold Combining – Maximal-Ratio Combining – Equal - Gain Combining – Transmitter Diversity – Channel known at Transmitter – Channel unknown at Transmitter – The Alamouti Scheme-basic concepts of RAKE receivers.

Module 5: Multiple Access Techniques: Frequency division multiple access-time division multiple access-spread spectrum multiple access space division multiple access- packet radio. MIMO and



multicarrier modulation- Narrowband MIMO model-parallel decomposition of MIMO channel- MIMO channel capacity-MIMO diversity gain-data transmission using multiple carrier multicarrier modulation with overlapping sub channels-mitigation of subcarrier fading-basic concepts of OFDM

Optical Communication

Fiber optic and optical wireless communication systems are the backbones which support the Internet and Telephone/ Cellular phone/ E-Commerce/Entertainment industries in the world. In 5G communication networks we use millimetre-wave technology now. In the near future 6G and 7G will rest heavily on optical frequencies in the range of 10^{14} - 10^{15} Hz. Optical interconnects are revolutionising computer industry hardware. Optical surgery and optical medical instruments have made medical diagnosis and treatments more effective and painless. Aircrafts, rockets and satellites are becoming —fly-by-light!! Optical communication principles behind all these advancements in the information technology is discussed in this course.

Maxwell's equations, Propagation of Light, Gaussian beam and diffraction, propagation of light in planar dielectric waveguides, optical fibers, propagation of light in fiber waveguides, modes, single and multimode fibers, attenuation and dispersion in optical fibers, nonlinearities in optical fiber, optical resonators, laser principles, diode lasers, coupling of laser and optical fibers, photodiodes, optical receivers, bit-error-rate in IM-DD optical communication, EDFA amplifiers, dispersion compensators, IMDD optical fiber communication link design, optical LANs, time-division-multiplexing in optical communication, wavelength-division-multiplexing and demultiplexing, optical MZ interferometers, electrooptic modulation, optical switches, optical wireless design in free space, atmospheric effects, optical wireless communication systems for LAN and FTTH.

Information Theory and Coding

Information Theory and Coding are the primary building blocks of any digital communication system. This course introduces the principles and applications of information theory. The course aims to the following modules:

Module 1: Basics of Information Theory: Introduction to Information theory - Information - Measure of Information - Average information content (Entropy) of symbols in long independent sequences - Average information content (Entropy) of symbols in long dependent sequences - Joint and conditional entropies - Mutual information - Markov statistical model for information sources - Entropy and information rate of Markov sources - Information measure for continuous random variables.

Module 2: Source Encoding: Shannon's first fundamental theorem - Noiseless coding - Source with finite memory - Shannon's second fundamental theorem on coding for memory less noisy channels - Channel capacity theorem - Shannon's Encoding algorithm - Huffman Coding Algorithm.

Module 3: Channels and Channel Capacity: Communication channels, discrete communication channel - Rate of information transmission over a discrete channel - capacity of a discrete memory less channel - Shannon - Hartley theorem and its implications. Types of channels and their capacities - Binary channel - BSC, BEC - cascaded channels-symmetric channel - asymmetric channel - channel capacity for MIMO system.

Module 4: Error Correcting Codes: Types of errors - Linear block codes - Error detection and error correction - Single error correcting Hamming codes - Binary cyclic codes - Encoder, Syndrome calculation, error detection and correction - BCH Codes - Burst Error Correcting codes - Burst and random error correcting codes - Galois fields, vector spaces and matrices - Convolution codes and Trellis codes - Viterbi decoding of convolutional codes - Turbo codes - Encoding and Decoding- Trellis coded modulation - Majority logic decoding -Two dimensional codes - ARQ.



VLSI and Embedded Systems

Basics of VLSI

This course is an overview to modern CMOS VLSI Design, mostly digital logic. It will start with a basic introduction of MOS transistors as switches and CMOS inverter characteristics. Following topics will be covered in this course: Introduction to VLSI Design; MOSFET Transistor Theory and characteristics; Scaling; CMOS Process Technology and Design Rules; Physical Layout of CMOS ICs, Stick Diagram; CMOS inverter characteristics, Power Dissipation; Pass Transistor Logic; Static Logic Gates; Logical effort and delay estimation of logic gates; Delay estimation in long wire; buffer insertion; Driving large capacitive load, delay minimization in an inverter cascade; Ratioed logic; Resistive load inverter, Pseudo-nMOS logic, inverter and other logic gates using Pseudo-nMOS; Transmission gate circuits; Dynamic logic circuits, Domino logic; Clocking strategies: one phase and two phase clocking. Clock Distribution; Physical Design Automation: Partitioning, Floor planning, Placement and Routing; VLSI testing.

Digital Design using HDL and FPGA

The course aims to impart digital logic concept realization using hardware description language (HDL) and its practical implementation on FPGA based hardware kits. The HDL will be discussed in detail with all its abstraction levels and modeling schemes. The focus of the course will be to develop practical realizable projects using HDL and FPGA. Topics include:

Introduction to digital design, concept of hierarchical and structured design, role of CAD tools in VLSI design process. Introduction to HDL, basics of Verilog language, synthesis, FPGA, familiarization with Xilinx Spartan-3E FPGA development board. Combinational systems realization using HDL and FPGA—arithmetic functions, multiplexer, demultiplexer, encoder and decoder, code converters. User-defined primitives, instantiation, parameterized module, realization of test benches, timing and delay models. Description and design of sequential circuits—latches, flip-flops, register, counter. Defining procedural blocks, procedural flow control, blocking and non-blocking assignments, implementation of synchronous and asynchronous designs. Data subsystems, storage modules, memory, stack, queue, functional modules, data paths, control subsystems, FSM and I/O subsystem, Mealy and Moore designs. System task and functions, operations related to I/O subsystems, compiler directives. VeSPA (Very Small Processor Architecture) processor - developing behavioral and structural modeling using HDL and FPGA. Designing of practical systems.

Digital System Architecture

This course covers the basics of uniprocessor, Multicore architecture and programming; Fundamentals of Computer Design; ARM architecture; Instruction Level Parallelism and its Dynamic Exploitation; Memory Hierarchy Design; Multiprocessors and TLP; Parallel Programs (Lab); Cilk (Lab); Programming for performance; Workload Driven Evaluation; Shared memory multiprocessor.

VLSI Subsystem Design

The objective of this course is to provide students with a sound knowledge of VLSI subsystem design. The modules of this course include:

Wires and Interconnect: Resistance, Capacitance, RC delay analysis, Cross-talk delay and noise effects, Repeaters, Logical Effort, Crosstalk control, etc.

Dynamic Logic, Domino logic, Keepers, etc.

Sequential Circuits: Latches, Flip-flops, RC delay analysis, Sequencing Methods: FF based, 2-phase Latch based, and Pulsed latch based. Timing analysis: Set-up time (Max-delay) constraint, Hold time (Min-delay) constraint, Clock-skew budgeting, Time borrowing, simple synchronizer, FSM, introduction to pipelined system/ALU, etc.

Datapath Subsystems:

- Adders: Full Adder using a variety of Logics styles, bit-serial Adder, Ripple Carry Adder, Carry-skip Adder, Carry Look-ahead Adder, Brent-Kung Adder, Kogge-Stone Adder,



- Carry-Save Adder (multi-operand addition), etc.
- Multipliers: Unsigned Array Multiplier, Booth Encoded Multiplier, Baugh-Wooley Multiplier, Wallace tree multiplier, etc.
- Division: Non-restoring method, and restoring method, etc.
- Standard Math function implementation: Cordic Algorithm, Newton-Raphson method, etc.
- Comparators, shifter-registers, random number generator based on Linear Feedback Shift Registers (LFSR), etc.
- Error Correcting Codes: LFSR based CRC, and Hamming 7-4 codes

Memory Array Subsystems: Register-file, Content-addressable memory, LIFO and FIFO, SRAM decoders, column MUX, RC Analysis, etc.

Embedded System Design

This course aims to provide the students an in-depth understanding of fundamental concepts on embedded systems. The course focuses on embedded system overview, design challenge: Optimizing design metrics, Processor Technology: General purpose Processors, Single purpose Processors, and Application Specific Processors, IC Technology: Full custom/ VLSI, Semicustom ASIC, PLD, Trends, Design Technology: Processor Design: Custom Single purpose Processor: RTL combinational components, RTL sequential components, Custom Single purpose Processor Design, Optimizing Custom Single purpose Processors, Optimizing the FSM, Optimizing the datapath, optimizing the FSM, General purpose Processors: Basic architecture, Datapath, Control unit, Memory, Pipelining. The course will emphasize on portable embedded devices design and implementation features with some use cases.

Analog CMOS IC Design

This course will introduce advanced concepts in analog circuit design specifically relevant to CMOS IC design. The course will cover circuit noise and mismatch, their analysis, and their impact on CMOS and design. Topics include: Revision of Circuit Theory, Poles and Zeros, Dominant pole concept and stability; Passive elements in CMOS technology; MOSFET model, small signal parameter of the MOSFET; Current Sources and Current Mirrors; Single ended single stage amps -CS, CD, CG; Differential Amps; Cascade and Cascode Amplifiers; Effect of feedback in amplifiers; Layout of CMOS analog circuits; Noise in CMOS analog circuits

Low Power VLSI Design

The aim of this course is to give a broad grounding in the principles and practice of Electronic Design Automation techniques for System on Chip Design. The course covers topics in Ultra Low Power VLSI digital circuits (Digital IC design, layout, simulation, synthesis, VLSI design techniques and system architecture; CAD tools and techniques, Low Power, ultra-low power circuit techniques and energy harvesting electronics). This course is a design intensive course that will cover moderate to advanced use of the following tools and languages:

- Magic or Cadence icfb, h/p/lt Spice
- VHDL simulator, synthesis tool
- (Circuits) MOS gate characteristics
- (HDL) VHDL or Verilog
- CMOS technology (0.18 μ CMOS).

Selected topics in VLSI

The content of this course will be made available to students before the start of semester III of respective batch.

Representative list of Electives (typically the list gets updated in every academic session)



Ramendra Choudhary
Executive Registrar
DA-IICT, Gandhinagar



Academic Requirements for the M Tech (ICT) Program

(Effective from 2021-22 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 rules in 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 the end of this document.

1. REGISTRATION

1.1 Categories of Registration:

- 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.
- 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.
- 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 13 credits each in third and fourth semester. The minimum total credits requirement for the degree is 55 credits out of which 36 credits are earned through coursework and 19 credits through research credits. Out of the 36 required coursework credits, 5 credits are allocated to compulsory courses (Program core), 28/29 credits are allocated to specialization core courses and 3 credits are allocated to an elective. 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 55. 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 entered in their grade card if they satisfy the requirements placed by the course instructor. If they do not meet the requirements, then they will not get any grade and no entry will be made in the 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 provided his/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 towards the 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 middle of 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	36 credits
Research	19 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 has registered 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 all 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. 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 student will also be placed on Academic Probation if he/she obtains an X in a research course. For every student 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 on probation 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 TAsip while deciding for the continuation of the TAsip or amount of the stipend. The eligibility criteria and amount of stipend will be decided by academic administration 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 program provided 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 program with 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 degree and 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) 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 ~~extra~~ related to financial support, award of medals and prizes, etc.

Cumulative Performance Index (CPI): CPI indicates the cumulative academic performance in all 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 Guidelines and 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 registered by 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
August 2021



Course Structure

Semester-wise Program Structure		
Semester	Courses	Credit Structure
Semester 1	Program Core 1	1-0-4-3
	Program Core 2	2-0-0-2
	Specialization Core 1	3-0-0-3
	Specialization Core 2	3-0-0/2-3/4
	Specialization Core 3	3-0-2-4
Semester 2	Specialization Core 4	3-0-0-3
	Specialization Core 5	3-0-2-4
	Specialization Core 6	3-0-2-4
	Elective	3-0-0/2-3/4
Semester 3	Specialization Core 7	3-0-0-3
	Specialization Core 8	3-0-2-4
	Thesis	0-0-12-6
Semester 4	Thesis(Continuation)	0-0-26-13
Total Credits		30-0-52/54- 55/56

Distribution of courses

Subject area	No. of credits
Program Core courses	5
Specialization Core courses	28/29
Elective courses	3
Thesis work	19
Total credits	55/56

Course Details

There may be a few minor changes and updates to this list.

Semester 1				
	Machine Learning	Signal Processing and Machine Learning	Software Systems	VLSI and Embedded Systems
Program Core	Programming Lab			
	Communication Skills and Technical Writing			
Specialization Core	Probability and Random Variables	Linear Algebra, Random Variables and Random Processes	Probability and Random Variables	Introduction to Embedded Systems
	Linear Algebra and Optimization	Advanced Digital Signal Processing	Advanced Algorithms	Basics of VLSI
	Accelerated Computing	Introduction to Machine Learning	Advanced Software Engineering	Digital Design using HDL and FPGA



Semester II				
Specialization Core (Any Three)	Advanced Image Processing	Detection and Estimation	Information Security	Digital System Architecture
	Pattern Recognition and Machine Learning	Adaptive Signal Processing	Distributed Systems	Embedded System Design
	Information Retrieval	Topics in Deep Learning	Distributed Databases	VLSI Subsystem Design
	Brain Cognitive Science	Wavelet Signal Processing	Advanced Computer Networks	Analog IC Design
	Computational Shape Modeling			
Semester III				
Specialization Core (Any two)	Computer Vision	Adversarial Machine Learning	Software Testing and Verification	Low Power VLSI Design
	Deep Learning	Accelerated Computing	Blockchains and Cryptocurrencies	Selected Topics in VLSI
		Computer Vision		
Thesis	M.Tech Thesis			
Semester IV				
Thesis	M.Tech Thesis (Continuation)			

Representative List of Electives (Any One)
1) Speech Technology
2) Advanced Image Processing
3) Natural Language Processing
4) Cyber Physical Systems and Internet of Things


 Executive Registrar
 DA-IICT, Gandhinagar





Academic Requirements for the M Tech (EC) Program with specialization in Wireless Communication and Embedded Systems (Effective from 2019-20 batch)

Master of Technology (Electronics and Communications) with specialization in Wireless Communication and Embedded Systems: M Tech (EC) duration- 2 years (Four semesters) full-time postgraduate program, jointly offered by DA-IICT and CR Rao AIMSCS, Hyderabad 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 this program. Eligibility for admission, admission procedures etc. for this 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 rules in 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 the end 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 postgraduate programs, 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:

a) 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.

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

b) 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 load of a student is 18 credits per semester in the first year and 12/13 credits per semester in the second and third year. The total credits requirement for the degree is 61 credits out of which 40 credits are earned through coursework and 21 credits through research credits. Out of the 40 required coursework credits, 33 credits are allocated to compulsory courses (Program core), 7 credits are allocated to elective courses. Depending on the merits of the case, the PGC may permit a student to register for a maximum of 21 credits or a minimum of 9 credits in a regular semester.

1.6 Adding/Dropping of Courses and Withdrawal from a Semester

a) 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.

b) A student who wishes to withdraw prior to registration for a semester must obtain a 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.

c) 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.

d) 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.

e) The maximum period for completion of M Tech (EC) 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 M Tech (EC) Program:

The total credits required in the M Tech (EC) program will be at least 61. 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 M Tech 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 entered in their grade card if they satisfy the requirements placed by the course instructor. If they do not meet the requirements, then they will not get any grade and no entry will be made in the 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.

- 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.
- 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.
- A student getting a DD or DE grade in a course may substitute it by another course, provided his/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 towards the 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 middle of 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 or CR Rao AIMSCS signs an agreement with the sponsoring agency for the same or student is from government organizations, Indian research and development Institutes or leading PSUs. 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 (EC) Program.

Requirement	Sponsored M Tech
Course Work	40 credits min. at DA- IICT.
Research	21 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 has registered 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 all 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. 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 (EC)	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 student will also be placed on Academic Probation if he/she obtains an X in a research course. For every student 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 on probation 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 academic administration of the Institute.

5. MIGRATION RULES

5.1 Eligibility: Students in the M Tech program are eligible to migrate to the Ph D program provided they fulfil the following criteria:

- Student should have entered the program with a B Tech/BE degree or equivalent
- Student should have completed a minimum of two semesters of the M Tech program with 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 Ph D admissions. However, no application fee or admission fee would be applicable.

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



5.4 Eligibility for M Tech Degree: A Ph D student who fails to pass the Ph D 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 fulfils the eligibility criteria for M Tech program
- The student fulfils the criteria for continuation in the M Tech program
- The student submits an M Tech thesis which fulfils the requirements for such within a maximum of two semesters. This duration would commence from the semester immediately following the semester in which the Ph D comprehensive examination has been failed. Furthermore, the student would not be eligible for financial support during this period.

Completion of Requirements for M Tech Program: A student who migrates to the M Tech (EC) program from the Ph D program must complete all requirements for the M Tech (EC) 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 (EC) 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 in all 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 Guidelines and 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 registered by 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
23 October 2019.



M Tech (EC) Program

COURSE STRUCTURE 2019 onwards

Master of Technology in Electronics and Communication with Specialization in Wireless Communication and Embedded Systems is a full-time two-year (four semesters) program. The program has been specially designed to meet the increasing need for the professionals who would be able to respond to the convergence between communication systems and embedded systems. The program aims to provide exposure to students who wish to build a professional career in ICT, working at the intersection of technology, research, and development in the areas of Wireless Communications (LTE, 5G Technology and MIMO channel), RF and Antenna theory, Signal Processing, Embedded Systems, VLSI and FPGA subsystem design, etc.

Apart from courses, students are required to pursue one full year (two semesters) of research under the guidance of a faculty advisor and submit a master's thesis in order to obtain the degree of M Tech (EC). On successful completion of the program, the students will be able to acquire essential technical and practical knowledge for solving real-world problems in the Wireless Communications and Embedded Systems domain using modern technologies and tools, and will have the ability to demonstrate excellent analytical and logical problem-solving skills. Apart from receiving rigorous exposure to various areas of scholastic study and research, students are at the same time groomed to cultivate sound professional ethics.

Semester-wise course sequence

(L-lecture, T-tutorial, P-practical, C-credit)

Semester-wise Courses and Credits	L	T	P	C
Semester I				
Linear Algebra, Random Variables and Processes	3	0	0	3
Advanced Digital Communication	3	0	2	4
RF and Antenna Engineering	3	0	0	3
Digital Design using HDL and FPGA	3	0	2	4
Advanced Digital Signal Processing	3	0	2	4
Total Credits	15	0	6	18
Semester II				
Wireless Communication	3	0	2	4
Real Time Operating Systems for Embedded Systems	3	0	2	4
Cyber Physical Systems	3	0	2	4
Detection and Estimation Theory	3	0	0	3
Elective I	3	0	0	3
Total Credits	15	0	6	18
Semester III				
Elective II	3	0	2	4
Communication Skills and Technical Writing	1	0	0	1
M. Tech. Research Seminar	0	0	4	2
M. Tech. Thesis Preliminary Research	0	0	12	6
Total Credits	4	0	18	13
Semester IV				
M. Tech. Thesis Research	0	0	24	12
Total Credits	0	0	24	12



To be offered at	Semester II	Semester III
DA-IICT	• Embedded Systems for Smart Sensing • Advanced Computer Architecture • Information Theory and Coding	• Next Generation Advanced Wireless Systems • Advanced VLSI and FPGA Design • Network and Physical Layer Security
CR Rao AIMSCS	N/A	• Side Channel Analysis • Pattern Recognition and AI • Cognitive and Software Defined Radio

The curriculum mandates a minimum of 61 credits, 40 earned through coursework and 21 through research credits. Out of the 40 required coursework credits, 33 credits are allocated to compulsory (core) courses, 7 credits are allocated to electives.

The distribution of courses for M Tech (EC) degree is as under:

Summary of Credit Requirements	L	T	P	C
M Tech Degree Credits	34	0	54	61
Credits for the Core Courses	27	0	12	33
Credits for the Elective Courses	6	0	2	7
Research Credits (including Research Seminar)	1	0	40	21


 Executive Registrar
 DA-IICT, Gandhinagar





Academic Requirements for the M. Tech (CS&ML) Program

(Effective from 2021-22 batch)

Master of Technology in Communication Systems and Machine Learning (CS&ML) is a full-time two-year (four semesters) program. The program is jointly offered by DA-ICT and CR Rao AIMSCS, Hyderabad. The program will be governed by these rules, subject to amendments, from time to time, as per the needs and requirements. The rules deal only with the post-admission academic activities of this program. Eligibility for admission, admission procedures etc. for this program are outside the purview of 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 rules in exceptional situations and all such cases shall be reported to the Academic Council in the immediate next meeting.

Important terms/expressions used in the Rules have been defined in the GLOSSARY at the end 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 program 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 program 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 is subject to the provision 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 students 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:

- a) 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.
- b) In exceptional cases, the Dean (Academic Programs) on the recommendation of the 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) 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.
- b) 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 load of a student is 17 credits in the first semester and 19 credits in the second semester in the first year. The summer semester is devoted for Research or Industrial Internship with 2 credits. The third and fourth semester (Thesis Research) in the second year have 10 and 12 credits respectively. The total credits requirement for the degree is 61 credits out of which 40 credits are earned through coursework and 21 credits through research credits. Out of the 40 required coursework credits, 24 credits are allocated to core courses and 16 to elective courses. Depending on the merits of the case, the PGC may permit a student to register for a maximum of 21 credits or a minimum of 9 credits in a regular semester.

1.6 Adding/Dropping of Courses and Withdrawal from a Semester

- a) 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.
- b) A student who wishes to withdraw prior to registration for a semester must obtain a 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.



- c) 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.
- d) 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.
- e) The maximum period for completion of M Tech (EC) 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 (CSML) program will be at least 61. 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 M Tech 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 entered in their grade card if they satisfy the requirements placed by the course instructor. If they do not meet the requirements, then they will not get any grade and no entry will be made in the 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, provided his/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 towards the 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 middle of 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 or CR Rao AIMSCS signs an agreement with the sponsoring agency for the same or student is from government organizations, Indian research and development Institutes or leading Public Sector Organizations. 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 (CS & ML) Program.

Requirement	Sponsored M Tech
Course Work	40 credits.
Research	21 credits min. Part or all the research may be carried out at the sponsoring agency as indicated in the agreement of CR Rao AIMSCS.
Guidance	Guide from DA-IICT (mandatory), Co-Guide from sponsoring agency (optional).
Infrastructure (for Research & Course work)	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 has registered 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 all 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. 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
MTech (CS & ML)	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 student will also be placed on Academic Probation if he/she obtains an X in a research course. For every student 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 on probation 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 program. 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 will 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 academic administration 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 program provided 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 MTech program with 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 PhD 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 Degree and 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.

Completion of Requirements for MTech Program: A student who migrates to the MTech (CS & ML) program from the PhD program must complete all requirements for the MTech (CS & ML) Degree within two years (four semesters) from the time of migration. However, credits earned as a PhD student would be carried over to the MTech (CS&ML) 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 in all 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 Guidelines and Implementation Strategies covering the Postgraduate Programs.

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

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 registered by 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
August, 2021



Semester-wise Course Sequence

(L-lecture, T-tutorial, P-practical, C-credit)

Semester-wise Courses and Credits	L	T	P	C
Semester I				
Communications Skills and Technical Writing	2	0	0	2
Linear Algebra, Random Variables and Processes	3	0	0	3
Advanced Digital Communication	3	0	2	4
Introduction to Machine Learning	3	0	2	4
Elective I	3	0	2	4
Total Credits	14	0	6	17
Semester II				
Next Generation Communication Networks	3	0	2	4
Topics in Deep Learning	3	0	2	4
Detection and Estimation Theory	3	0	0	3
Elective II & III	6	0	4	8
Total Credits	15	0	8	19
Summer Semester				
Research or Industrial Internship	0	0	4	2
Semester III				
Elective IV	3	0	2	4
M. Tech. Thesis Preliminary Research	0	0	12	6
Total Credits	3	0	14	10
Semester IV				
M. Tech. Thesis Research	0	0	24	12
Total Credits	0	0	24	12
Summary of Credit Requirements				
M. Tech Degree Credits	33	0	56	61
Credits for the Core Courses	20	0	8	24
Credits for the Elective Courses	12	0	8	16
Research Credits (including Research Seminar)	1	0	40	21

The credit structure of a course is given by a sequence of 4 numbers: (1) Number of lecture hours per week (L), (2) Number of tutorial hours per week (T), (3) Number of lab hours per week (P), and (4) the Total credit of the course (C). 1 lecture hour/week contributes 1 credit; 1 tutorial hour/week contributes 1 credit; 2 laboratory hours/week contribute 1 credit

Representative List of Electives

Elective I

- 1) Wireless system Design
- 2) Optimization Theory
- 3) Advanced Digital Signal Processing

Elective II & III

- 1) Cyber Physical Systems and Internet of Things
- 2) Advanced Image Processing
- 2) Adaptive Signal Processing

Elective IV

- 1) Cognitive and Software Defined Radios
- 2) Advanced Wireless Communications
- 3) Machine Learning for Communications Network Security



Demanda Ghosh
Executive Registrar
 DA-IICT, Gandhinagar



Academic Requirements for the M Sc (IT) Program (Effective from Autumn 2017-18)

Master of Science (Information Technology): M Sc (IT): duration – two (2) year postgraduate program of DA-ICT 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 rules in 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 the end of this document.

1. REGISTRATION

1.1 Categories of Registration:

- a) A student has to register in the resident registration category only.
- 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.

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 self-attested copy will be kept for records.

1.3 Late Registration:

- a) 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.
- b) In exceptional cases, the Dean (Academic Programs) on the recommendation of the Post-Graduate Committee (PGC) may consider registration beyond the date of late registration.

1.4 Academic Advising:

- a) A student will be advised in the selection of courses by the faculty adviser appointed by Dean (Academic Programs) in consultation with the PGC.



2. 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:

a. For M Sc (IT), semester load will be as prescribed from time to time in the approved program/course structure document.

1.6 Adding/Dropping of Courses and Withdrawal from a Semester

a) 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.

b) A student who wishes to withdraw prior to registration for a semester must obtain a 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 during the entire program. 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.

c) 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.

d) 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.

e) The maximum period for completion of the program as given in the appropriate subsection of Section 2 includes any semester in which the student has 'withdrawn' status.

2. ACADEMIC REQUIREMENTS

2.1 M Sc (IT) Program:

The total credits required in the M Sc (IT) programs will be at least 79. 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 is 3 years.

2.2 Audit Courses:

The students are permitted to audit courses. They will be given a 'P' grade, which will be entered in their grade card if they satisfy the requirements placed by the course instructor. If they do not meet the requirements, then they will not get any grade and no entry will be made in the 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.

- 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.
- 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.
- A student getting a 'DD' or 'DE' grade in an elective course may substitute it by another course, provided his/her CPI is less than the prescribed minimum for getting the Degree and the student is allowed to continue in the program.
- 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.

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 has registered 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 all 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. The SPI and CPI is calculated up to two decimal places.



3.2 Minimum CPI requirements for graduation in the program:

Program	CPI for Graduation
M Sc (IT)	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. For every student 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 on probation 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. 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 may be subjected to other restrictions related to financial support, award of medals and prizes, etc. at any time.

Cumulative Performance Index (CPI): CPI indicates the cumulative academic performance in all 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 Guidelines and 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 registered by 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.



M Sc (IT) – Master of Science (Information Technology) Program Structure

Curriculum structure

Semester-I		L-T-P-C
SC612	Discrete Mathematics	3-1-0-4
IT603	C Programming	3-0-2-4
IT616	Algorithms and Data Structures	3-1-0-4
IT615	Database Management Systems	3-0-2-4
PC613	Communication Skills	3-0-2-4
Semester I Credits: 15-2-6-20		
Semester-II		
IT602	Object Oriented Programming	3-0-2-4
IT632	Software Engineering	3-0-2-4
IT6??	Systems Programming	3-0-2-4
IT694	Computer Networks	3-0-2-4
IT6??	Web Programming	3-0-2-4
Semester II Credits: 15-0-10-20		
Summer-I		
PC649	Summer Internship (4 credits)	Pass/Fail
Semester-III		
IT619	Design of Software Systems	3-0-2-4
IT618	Enterprise Computing	3-0-2-4
	Technical Elective-I	3-0-2-4
	Technical Elective-II	3-0-2-4
	Open Elective-I	3-0-0-3
Semester III Credits: 15-0-8-19		
Semester-IV		
PC641	Project Internship (16 credits)	Pass/Fail


 Executive Registrar
 DA-IICT, Gandhinagar.





Academic Requirements for the M Sc (DS) Program

(Effective from Autumn 2020-21)

Master of Science (Data Science): M Sc (DS): duration – two (2) year postgraduate program of DA-ICT 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 rules in 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 the end of this document.

1. REGISTRATION

1.1 Categories of Registration:

- a) A student has to register in the resident registration category only.
- 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.

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 Original Certificates of having passed the qualifying examination. Original certificates will be returned to the students and a self-attested copy will be kept for records.

1.3 Late Registration:

- a) 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.
- b) In exceptional cases, the Dean (Academic Programs) on the recommendation of the Post-Graduate Committee (PGC) may consider registration beyond the date of late registration.

1.4 Academic Advising:

- a) A student will be advised in the selection of courses by the faculty adviser appointed by Dean (Academic Programs) in consultation with the PGC.



b) 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:

a) For M Sc (DS) semester load will be as prescribed from time to time in the approved program/course structure document.

1.6 Adding/Dropping of Courses and Withdrawal from a Semester

a) 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.

b) A student who wishes to withdraw prior to registration for a semester must obtain a 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 during the entire program. 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.

c) 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.

d) 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.

e) The maximum period for completion of the program as given in the appropriate subsection of Section 2 includes any semester in which the student has 'withdrawn' status.

2. ACADEMIC REQUIREMENTS

2.1 M Sc (DS) Program:

The total course credits required in the M Sc (DS) programs will be at least 56. 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 is 3 years.

2.2 Audit Courses:

The students are permitted to audit courses. They will be given a 'P' grade, which will be entered in their grade card if they satisfy the requirements placed by the course instructor. If they do not meet the requirements, then they will not get any grade and no entry will be made in the 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.

- 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.
- 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.
- A student getting a 'DD' or 'DE' grade in an elective course may substitute it by another course, provided his/her CPI is less than the prescribed minimum for getting the Degree and the student is allowed to continue in the program.
- 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.

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 has registered 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 all 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. The SPI and CPI is calculated up to two decimal places.



3.2 Minimum CPI requirements for graduation in the program:

Program	CPI for Graduation
M Sc (DS)	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. For every student 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 on probation 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. 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 may be subjected to other restrictions related to financial support, award of medals and prizes, etc. at any time.

Cumulative Performance Index (CPI): CPI indicates the cumulative academic performance in all 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 Guidelines and 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 registered by 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.



M Sc (DS) – Master of Science (Data Science) Program Structure

Curriculum structure

Semester-I	L-T-P-C
Mathematical Foundation for Data Science	3-1-0-4
Data Structures and Algorithms (Lab: Python)	3-0-2-4
Statistical Methods (Lab: R)	3-0-2-4
Programming Lab	0-0-4-2
Introduction to Database Management	3-0-2-4
Semester I Credits: 18	
Semester-II	
Machine Learning	3-0-2-4
Numerical Methods for Data Science	3-0-2-4
Big-Data Processing	2-0-2-3
Mini Project 1	0-0-4-2
Optimization	2-0-2-3
Technical Elective 1	3-0-2-4
Semester II Credits: 20	
Semester-III	
Deep Learning	3-0-2-4
Interactive Data Visualization	3-0-2-4
Open Elective-I	3-0-0-3
Technical Elective-II	3/4 credits
Mini Project 2	0-0-4-2
Mini Project 3	0-0-4-2
Semester III Credits: 18/19	
Semester-IV	
Project Internship (16 credits)	Pass/Fail

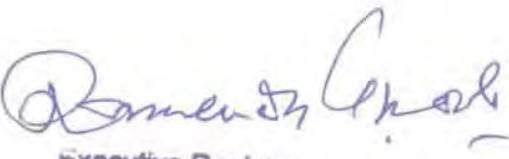
List of Technical Electives

• Image Processing	• Information Retrieval
• Speech Processing	• Social Media Analytics
• Computer Vision	• Cloud Security
• Natural Language Processing	• Cloud Computing
• Financial/ Business Data Analysis	• Data Warehousing and Data Mining
• Multimedia Security and Forensics	



SAS certification courses:

After Autumn Semester (Semester I) - WINTER BREAK	
MACRO & SQL PROGRAMMING FOR DATA SCIENCE IN SAS INTRODUCTION TO SAS AND HADOOP SAS Certification Exam – I (SAS Certified Specialist: Base Programming Using SAS 9.4)	48 hours (2 weeks)
After Winter Semester (Semester II) - SUMMER BREAK	
BIG DATA VISUALIZATION – ESSENTIALS AND ADVANCED STATISTICAL INFERENCE AND MODELING USING SAS APPLIED MACHINE LEARNING USING SAS SAS Certification Exam – II (SAS Certified Data Integration Developer for SAS 9) SAS Certification Exam - III (SAS Certified Specialist: Machine Learning Using SAS VIYA 3.4)	72 Hours (2-3 weeks)
After Autumn Semester (Semester III) - WINTER BREAK	
VISUAL FORECASTING USING SAS OPTIMIZATION CONCEPTS FOR DATA SCIENCE AND ARTIFICIAL INTELLIGENCE SAS Certification Exam - IV (SAS Certified Specialist: Natural Language Processing and Computer Vision Using SAS VIYA 3.4) SAS Certification Exam – V (SAS Certified Specialist: Forecasting and Optimization Using SAS VIYA 3.4)	32 hours (1 week)


Executive Registrar
DA-IICT, Gandhinagar





Academic Requirements for the M Des (CD) Program (Effective from Autumn 2017-18)

Master in Design (Communication Design): M Des (CD): duration – two (2) year postgraduate program 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 rules in 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 the end of this document.

1. REGISTRATION

1.1 Categories of Registration:

- a) A student has to register in the resident registration category only.
- 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.

1.2 New entrants to the postgraduate programs, 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 self-attested copy will be kept for records.

1.3 Late Registration:

- a) 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.
- b) In exceptional cases, the Dean (Academic Programs) on the recommendation of the Post-Graduate Committee (PGC) may consider registration beyond the date of late registration.

1.4 Academic Advising:

- a) A student will be advised in the selection of courses by the faculty adviser appointed by Dean (Academic Programs) in consultation with the PGC.



b) 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:

a) For M Des (CD) semester load will be as prescribed from time to time in the approved program/course structure document.

1.6 Adding/Dropping of Courses and Withdrawal from a Semester

a) 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.

b) A student who wishes to withdraw prior to registration for a semester must obtain a 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 during the entire program. 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.

c) 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.

d) 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.

e) The maximum period for completion of the program as given in the appropriate subsection of Section 2 includes any semester in which the student has 'withdrawn' status.

2. ACADEMIC REQUIREMENTS

2.1 M Des (CD) Program:

The total credits required in the M Des (CD) programs will be at least 70. 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 is 3 years.

2.2 Audit Courses:

The students are permitted to audit courses. They will be given a 'P' grade, which will be entered in their grade card if they satisfy the requirements placed by the course instructor. If they do not meet the requirements, then they will not get any grade and no entry will be made in the 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.

- 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.
- 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.
- A student getting a 'DD' or 'DE' grade in an elective course may substitute it by another course, provided his/her CPI is less than the prescribed minimum for getting the Degree and the student is allowed to continue in the program.
- 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.

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 has registered 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 all 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. The SPI and CPI is calculated up to two decimal places.

3.2 Minimum CPI requirements for graduation in the program:

Program	CPI for Graduation
M Des (CD)	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. For every student 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 on probation 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. 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 may be subjected to other restrictions related to financial support, award of medals and prizes, etc. at any time.

Cumulative Performance Index (CPI): CPI indicates the cumulative academic performance in all 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 Guidelines and 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 registered by 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
Created as of August 2017.



MDes –Masters in Design (Communication Design) Program Structure

Curriculum structure

Semester I
Approaches to Culture and Communication: (3-0-0-3)
Fundamentals of Design – I (3-0-2-4)
Principles of Interaction Design (3-0-2-4)
Object Oriented Programming (3-0-4-5)
Writing, Presentation and Communication Skills (1-0-2-3) (P/F course)
Semester II
Fundamentals of Design - II (3-0-2-4)
Research Methodologies - Ethnography and its Applications (3-0-0-3)
Introduction to Narratology (3-0-2-4)
Web Design: Applications, Inter- connectivity (2-0-4-4)
Open Elective (3-0-0-3)
Semester III
Animation (3-0-2-4)
Games, Simulations and Modeling (3-0-2-4)
Thematic Seminar/Workshop or a RR Course (3-0-0-3) P/F course
Research Application: Constructing Narratives (3-0-2-4)
Research Proposal Seminar: Rationale, Process, Outcome (1-0-4-3)
Semester IV
Individual Design Project (0-0-30-15)


Executive Registrar
DA-ICT, Gandhinagar





Academic Requirements for the Ph D Program

(Effective from Autumn 2017-18)

Doctor of Philosophy: Ph D: duration - typically a 3 to 5 years program. The program 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 rules in 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 the end 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 PG Committee may permit/require registration for coursework also.
- d) A student is not required to register in the semester in which the final PhD thesis is submitted for evaluation.
- e) A student who holds an M Tech or M.Phil or an equivalent post-graduate Degree should complete six semesters of residency (attending campus regularly and going through the attendance verification system) and those who holds a B.Tech or M.Sc or an equivalent Degree should complete eight semesters of residency.
- f) A student, irrespective of his/her registration as full time or external (after the residency requirement) is required to pay the prescribed semester tuition fee and registration fee.

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 self-attested copy will be kept for records.



1.3 Late Registration:

- a) 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.
- b) In exceptional cases, the Dean (Academic Programs) on the recommendation of the Post-Graduate 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:

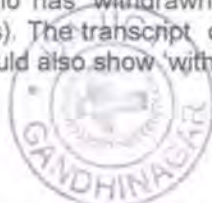
- a) A student will be advised in the selection of courses by the faculty adviser appointed by Dean (Academic Programs) in consultation with the PGC. The students will be assigned a thesis supervisor after passing the comprehensive examination (details given in section 4).
- b) A student may be permitted 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 2.4.

1.5 Semester Load Requirements:

- a) A semester load is defined as equivalent of 12 credits. A student registered for a full semester load solely by course work would typically take 4 courses. Depending on the merits of the case, the PGC may permit a student to register for a maximum of 15 credits or a minimum of 9 credits at the beginning of the semester.
- b) A student in the external registration program, when registering for research only, can register for a maximum of 12 credits or a minimum of 3 credits during the regular semester.

1.6 Adding/Dropping of Courses and Withdrawal from a Semester

- a) 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.
- b) A student who wishes to withdraw prior to registration for a semester must obtain a 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.
- c) 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.
- d) 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.



e) The maximum period for completion of the program as given in the appropriate subsection of Section 2 includes any semester in which the student has 'withdrawn' status.

2. ACADEMIC REQUIREMENTS

2.1 Ph D Program:

Category	Minimum Total Credits	Minimum Course Credits	Minimum Research Credits	Minimum number of Courses	Minimum residency (Semesters)	Maximum Duration (Years)**
Ph D-after B Tech/M Sc	96	33	48	11	8	7
Ph D – after M Tech/ M Phil	72	12 ^{\$}	48	4	6	6
Ph D – sponsored after M Tech/M Phil	72	12 ^{\$}	48	4	1	7
Ph D – sponsored after B Tech/ M Sc	96	33 [*]	48	11	2	8

2.1.1 \$: The Course requirement includes two compulsory courses. This requirement may be waived for the students who have already taken these courses.

2.1.2 For self-study courses, a student should apply to the Dean (Academic Programs) with (a) detailed content of the study; (b) expected outcome; and (c) consent from the faculty under whom the course would be registered. The student enrolled for self-study courses is required to deliver public seminar on each of the self-study course at the end of the semester.

2.1.3 The students are required to register the Synopsis as one Research Unit (3 credits).

2.1.4 *: course credits for sponsored candidates with B. Tech./MSc degree and appropriate research experience can be relaxed based on the recommendations of the PGC and approval of the Dean-AP.

2.1.5 **: The candidate who has not defended his/her PhD Synopsis successfully before the 'Max Duration (Years)' allowed then admission of that PhD candidate will be terminated from PhD program. Such a candidate may request for fresh admission to PhD program by submitting an application to the Admission Committee. If the Admission Committee approves his/her admission, the candidate can be registered as a fresh PhD student and he/she will require completing academic requirements as mentioned in section 2.1.

2.2 Audit Courses:

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

2.3 Registration for B Tech first and second year core Courses

The PhD Students may be permitted to register for B Tech first and second year core courses with the prior approval of the Dean (Academic Programs) during their course work period. For courses registered, the students should obtain a minimum Grade of 'C' to be eligible to appear for Comprehensive Examination.



2.4 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.

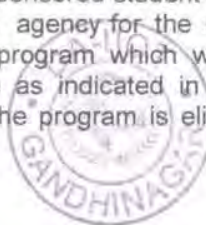
- If a student does not complete all the requirements for a course for a genuine reason, the instructor may award grade 'I' (Incomplete). An 'I' grade must be converted by the instructor to a regular letter grade by the last date for such conversion specified in the Academic Calendar, failing which it is automatically converted to an 'F' grade.
- 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.
- A student getting a 'DD' or 'DE' grade in a course may substitute it by another course, provided his/her CPI is less than the prescribed minimum for getting the Degree and the student is allowed to continue in the program. For PhD students, replacement/substitution by another course is allowed, subject to his/her CPI is less than the prescribed minimum requirement for PhD comprehensive examination.
- 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.
- The grade 'S' or 'X' will be awarded for Ph D research credits as follows:

At the end of the semester, the thesis supervisor(s) will assess the student's progress towards the 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.

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

2.5 Sponsored Category (Ph D):

A student may be admitted as a sponsored student to the 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 the Program. A student admitted to the program is eligible to move to sponsored category



during his/her tenure at DA-IICT.

Requirement	Sponsored Ph D
Course Work	12 credits min. at DA-IICT. Additional credits, if required, may be obtained at DA-IICT or could be transferred from his/her sponsoring agency if indicated in the agreement.
Research	48 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, Co-Guide from sponsoring agency.
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 has registered 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 all 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. 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
Ph D	7.0

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 student in the Ph D program will be placed on Academic Probation if he/she obtains an X in a research course. For every student 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 on probation 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. A student who obtains more than 5 unsatisfactory (X) grades shall be discontinued

from the program. If a student's continuation in the program is terminated, the appropriate authority will issue the letter of termination.

3.4 Fellowships/Teaching Assistantships

The stipend would be decreased by 50% for the following semester in case a student obtains more than one unsatisfactory (X) grade in any semester or the CPI falls below 7/10.

4. COMPREHENSIVE EXAMINATION

4.1 Students registered in the program must pass a comprehensive examination designed to test the overall comprehension of the student in the relevant subjects.

4.2 Students admitted with B Tech, M Sc, MA or M Phil Degrees may appear in the comprehensive examination earliest at the end of the second semester, but must pass it before the end of the fourth semester after their first registration. Students admitted with M Tech or equivalent Degrees may appear in the comprehensive examination earliest at the end of the first semester, but must pass it before the end of the third semester after their first registration. The above time limits are exclusive of the period of sanctioned withdrawal, if any. The Dean (AP) may relax this requirement for sponsored category of students. The students working in sponsored research projects of DA-IICT shall be permitted to defer comprehensive examination by one semester over and the above the stipulated number of semesters.

4.3 Students should have a minimum CPI of 7.0/10 in order to be eligible for appearing in the comprehensive examination.

4.4 The examination will contain oral and/or written part. The PGC will be responsible for organizing the comprehensive examination for all eligible students every semester.

4.5 Dean (Academic Programs) will, in consultation with the PGC and the concerned Faculty Advisor, constitute the comprehensive examination board, which will consist of at least three but not more than five faculty members. The board will meet as soon as possible after it is constituted and will submit its recommendations to the Dean (Academic Programs).

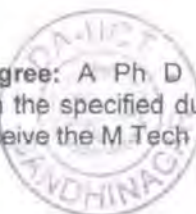
4.6 When a student has not passed the comprehensive examination in his/her first attempt, a second comprehensive examination will be conducted by the same board that was constituted earlier unless decided otherwise by the Dean (Academic Programs). Both the attempts should be within the stipulated period as indicated in Rule 5.2. In case the duration between the first examination and the desired second one is considered to be short, he/she may not be allowed to appear for the second examination.

4.7 A student will have to discontinue the program, if he/she fails to pass the comprehensive examination even in the second attempt.

4.8 A student enrolled in the program is formally admitted to the candidacy for the Ph D Degree after he/she has passed the comprehensive examination.

5. MIGRATION RULES

5.1 **Eligibility for M Tech Degree:** A Ph D student who fails to pass the Ph D 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 fulfils the eligibility criteria for M Tech program
- The student fulfils the criteria for continuation in the M Tech program
- The student submits an M Tech thesis which fulfils the requirements for such within a maximum of two semesters. This duration would commence from the semester immediately following the semester in which the student failed the Ph D comprehensive examination. Furthermore, the student would not be eligible for financial support during this period

5.2 Ph D to M Tech Migration: Students in the Ph D program are eligible to migrate to the M Tech program provided they submit an application to the Dean (Academic Programs). Such an application can be accepted only when a student has completed a minimum of two semesters of Ph D and fulfils the following criteria.

- Student should have entered the program with a BTech/BE degree or equivalent
- An appropriate M Tech program should be available in the Institute.
- At least 18 course credits completed.
- Student should have a minimum CPI of 6.0/10.0

5.3 Completion of Requirements for M Tech Program: A student who migrates to the M Tech program from the Ph D program must complete all requirements for the M Tech 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 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 in all 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 Guidelines and 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 registered by 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.



Ph D Program

COURSE STRUCTURE 2017 onwards

1. Academic Requirement

Table 1 summarizes the academic requirement for the PhD program. Based on their respective categories students are required to complete the minimum total credits within the maximum duration. In addition, the minimum residency should also be fulfilled

Table 1 Summary of the Academic requirement for the PhD program based on the category of admission

Category	Minimum Total Credits	Minimum Course Credits	Minimum Research Credits	Minimum number of Courses	Minimum residency (Semesters)	Maximum Duration (Years)
Ph D-after B Tech/M Sc	96	33	48	11	8	7
Ph D – after M Tech/ M Phil	72	12	48	4	6	6
Ph D – sponsored after M Tech/M Phil	72	12	48	4	1	7
Ph D – sponsored after B Tech/ M Sc	96	33	48	11	2	8

NOTES:

- Regular credit load per semester is 12. This can be lowered to 9 or increased to 15 by applying to the PGC at the beginning of the semester.
- The required course credits for sponsored candidates with B. Tech./MSc degree and appropriate research experience can be relaxed based on the recommendations of the PGC and approval of the Dean-AP.

1.1 Course Credits:

A PhD student depending on the category needs to take a certain number of minimum course credits (Table-1). The different types of courses that a candidate takes are (i) compulsory courses (ii) Elective courses based on the broad domain of the area of interest, and (iii) Self Study.

Compulsory courses:

Students with **B. Tech./MSc** of the minimum 33 course credits are required to take the following courses which provide them with the necessary foundation for research and prepares them for the qualifying exam.

- HM502: Communication skills and Technical Writing (3-0-0-3)
- SC526: Mathematical Methods for ICT (3-0-0-3)
- SC527: Probability and Statistics(3-0-0-3)

And any one from the following:

- IT576: Computer Systems (3-0-2-4)
- CT542: Basics of Communication Systems (3-0-0-3)
- EL522: Introduction to Digital design (2-0-2-3)



Students with **M. Tech./M. Phil.** of the minimum 12 course credits are required to take the following courses:

- HM502: Communication skills and Technical Writing (3-0-0-3)
- All students must take a compulsory course "Research Methodology".

Other allowed courses:

The following courses are allowed to be taken towards course credits:

- **Courses with 2-letter grades** (AA, AB, BB, BC, CC, CD, DD, DE, F(Fail), I (Incomplete))
 - M Tech level courses (series 5xx, 6xx, 7xx, etc)-Example: EL511 VLSI Design (3 credit course)
 - B Tech level courses (series 4xx and 3xx) that are co-offered to or open to M Tech.-Example: EL426 Digital System Architecture (4 credit course)

Level-3 courses: Up to a maximum of **two** 300 level courses (3 credits each) would be considered towards the course credit requirement for candidates with B. Tech/ MSc degree, provided these courses are required to strengthen their foundation in the proposed area of study/interest.

Candidates with M. Tech./M.Phil. degree can also register for 300 level courses based on supervisor/mentor's advice, but the credits earned may not be counted towards course credit requirement.

Self study courses:

- (i) Can be taken if suitable **regular courses** (series 4xx, 5xx) are not offered, and/or are not related to the research interests of the student. Table 1.1 shows the sequence to be followed while taking self study courses.
- (ii) A student earns 3-credits for every self study course taken.
- (iii) Maximum number of allowed self study courses is **two** with no more than **one** in a single semester.

To take a self study course Student should apply to the Dean-AP with

- (i) the detailed course contents.
- (ii) expected outcome of the course.
- (iii) consent from the faculty under whom the self-study course should be taken.
- (iv) at the end of the semester the student should give a public seminar.

Title of Self Study Course	Code	Numbering	Credits
Self Study 1	PC	831	3
Self Study 2	PC	832	3
Self Study 3	PC	833	3
Self Study 4	PC	834	3
Self Study 5	PC	835	3
Self Study 6	PC	836	3
Self Study 7	PC	837	3
Self Study 8	PC	838	3
Self Study 9	PC	839	3
Self Study 10	PC	840	3

Table 1.1 Sequence to be followed when registering on E-campus for self study courses.

1.2 Research Credits.

Research courses are with 1-letter grade S (Satisfactory) / X (Unsatisfactory). Research credits are usually taken by students after clearing the qualifying examination (Example PC801 Research 1 (3 credit))

Important Points

- In a particular semester if a student receives a X grade in one or more of the research courses then they should take the course again in the next semester.
- Students have to register for PC 859 PhD Comprehensive in the semester they give their Comprehensive exam.
- Students have to register for PC 861 PhD Synopsis (3 credit course) in the semester they give the PhD Synopsis exam.
- **Research courses before clearing the comprehensive examination:** A student can take research credits before clearing the comprehensive exam if it is allowed by Dean-AP/PGC. However, not more than 3 of such research courses (not credits) are allowed.

To take research credits before passing the comprehensive examination

- The student should get approval from Dean-AP/PGC.
- A faculty member should give consent for the same via an email to PhD coordinator with course code.
- The same faculty member should email the grades at the end of the semester (before the last date of submission of grades) to PhD Coordinator.

Title of Research Course	Code	Numbering	Credits
Research 1	PC	801	3
Research 2	PC	802	3
Research 3	PC	803	3
Research 4	PC	804	3
Research 5	PC	805	3
Research 6	PC	806	3
Research 7	PC	807	3
Research 8	PC	808	3
Research 9	PC	809	3
Research 10	PC	810	3
Research 11	PC	811	3
Research 12	PC	812	3
Research 13	PC	813	3
Research 14	PC	814	3
Research 15	PC	815	3
Research 16	PC	816	3
Research 17	PC	817	3
Research 18	PC	818	3
Research 19	PC	819	3
Research 20	PC	820	3
Research 21	PC	821	3
Research 22	PC	822	3
Research 23	PC	823	3
Research 24	PC	824	3
Research 25	PC	825	3
Research 26	PC	826	3
Research 27	PC	827	3
Research 28	PC	828	3
Research 29	PC	829	3
Research 30	PC	830	3
Research Additional 1	PC	851	3

Title of Research Course	Code	Numbering	Credits
Research Additional 2	PC	852	3
Research Additional 3	PC	853	3
Research Additional 4	PC	854	3
Research Additional 5	PC	855	3
Research Additional 6	PC	856	3
Research Additional 7	PC	857	3
Research Additional 8	PC	858	3
Research Additional 9	PC	870	3

Table 1.2 Sequence of courses to be followed on e-campus for research credits.
(Notice that there can be certain gaps in the course codes)

1.3 Residency requirement

Residency requirement is applicable from the first semester (i.e. semester of entry to the PhD program), and should be completed during the initial 8 or 6 semesters (depending on the category) of the PhD program.

Residency during a semester implies that:

- Student is available on DA-IICT campus for academic and research activities during all working days of the semester.
- Students should have taken a total of 12 credits during the semester. (Summer semester does not count towards residency requirement.)

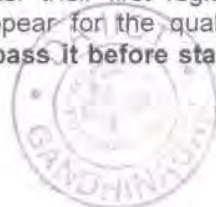
Under certain special circumstances the residency requirement may be relaxed. This is done on a case by case basis for which the candidate should apply directly to Post Graduate Committee (PGC).

2. Supervisor Selection

Supervisor selection means a faculty member of DA-IICT has to give a formal consent to the Dean- AP to act as the supervisor of a particular student.

3. Comprehensive Examination

- Students registered in the Ph D program must pass a comprehensive examination designed to test the overall comprehension of the student in the relevant subjects.
- The comprehensive examination consists of two parts: (i) **Written or qualifiers** and (ii) **Proposal defense**. The **qualifier** exam is common to all candidates in the broad discipline of **ICT and related areas, Mathematics and natural sciences and computational sciences**. The syllabus is broadly based on the foundation areas of ICT or the compulsory courses for candidates with B Tech/MSc as the qualifying degree. The **proposal** defense is however customized per students and consists of a research proposal presented to an expert committee no later than 6 months of a candidate clearing the qualifier exam.
- For candidates pursuing PhD in the area of Humanities and Social Sciences the comprehensive examination will consist of two parts written and oral/presentation. For each student the syllabus is set by the PhD comprehensive committee. The respective comprehensive examination committee will be responsible for organizing the comprehensive examination for the Ph D student.
- Students admitted with **B Tech / BE /MSc / MCA** degree may appear for the qualifier examination **earliest after completing second semester but must pass it before starting the fifth semester** after their first registration. Students admitted with **M Tech / ME / MPhil** degree may appear for the qualifier examination **earliest after completing first semester but must pass it before starting the fourth semester** after



their first registration. The above time limits are exclusive of the period of sanctioned withdrawal, if any.

- The maximum number of attempts for the comprehensive exam is **two**. The students can appear for only one Ph.D. Comprehensive examination in a given semester.
- Students should have a minimum CPI of 7.0/10 in order to be eligible for appearing in the comprehensive examination.
- A student will have to discontinue the Ph.D. program if he/she fails to pass the comprehensive examination even in the second attempt.
- A Student enrolled in the Ph.D. program is formally admitted to the candidacy for the Ph.D. degree after he/she has passed the comprehensive examination.

4. Research Progress Seminar

Research Progress seminar is held twice a year, (once in October (Autumn Semester) and once in April (winter) after a student clears his/her comprehensive examination.

- The committee for research progress seminar is selected by Dean-AP based on Supervisor's input.
- Grades- To be solely decided by the supervisor, other committee members may agree/disagree.

5. Synopsis

- A PhD student is expected to successfully complete PhD Synopsis examination by the stipulated **Maximum Duration**.
- Student needs to register for synopsis on E-campus at the beginning of the semester.
- The Synopsis Committee for the candidate will be constituted by Dean-AP.

Steps after successfully completing PhD Synopsis exam

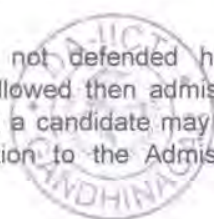
- Submit PhD thesis to Dean-AP within a **maximum time of 6 months**.
- PhD thesis is sent for a review to external experts by Dean-AP.
- Public defence of PhD thesis.
- PhD thesis defence and PhD synopsis exam cannot be taken in the same semester.

6. Fee Payment

A PhD student, irrespective of registered as resident (during the residency period), and resident/external (after the residency requirement), is required to pay full fees (tuition fee, registration fee etc. as prescribed by the Registrar), every semester, until (including) the semester during which the student submits his/her PhD thesis to the Dean-AP. This rule also applies to sponsored category students.

7. Termination

- More than 5 unsatisfactory(X) grade during the entire PhD program would lead to termination from the programme.
- The PhD candidate who has not defended his/her PhD Synopsis successfully before the 'Max Duration (Years)' allowed then admission of that PhD candidate will be terminated from PhD program. Such a candidate may request for fresh admission to PhD program by submitting an application to the Admission Committee. If the Admission

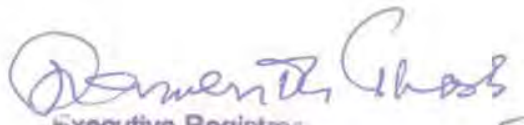


Committee approves his/her admission, the candidate can be registered as a fresh PhD student and he/she will require completing academic requirements.

- A student will have to discontinue the PhD program if he/she fails to pass the comprehensive examination even in the second attempt.

For all academic matters the students should write to PGC. In particular, a student should contact the PGC for issues related to

1. Relaxation in residency
2. Change in the regular credit load in a given semester
3. Taking research credits before passing the comprehensive examination


Executive Registrar
DA-IICT, Gandhinagar





**Academic Requirements for the Ph D Program
in
Engineering in ICT disciplines
Science and Mathematics**

(Effective from Autumn 2019-20)

Doctor of Philosophy: Ph D: duration - typically a 4 to 6 years program. The program 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 rules in 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 the end of this document.

1. REGISTRATION

1.1 Categories of Registration:

- a) A student may register in a given semester in three possible categories: Regular (Full-time) registration, Sponsored (Part-time) registration, and External (Part-time) 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 regular (resident) category registration, the student must be residential, a minimum of 3 years from the time of first semester registration for a duly approved course programme and pay the prescribed tuition and other fees, including any outstanding dues. The student must carry his/her course work and research work at the Institute.
- c) To qualify for sponsored (part-time) and external (part-time) category registration, a student must register for a duly approved research programme, and pay the prescribed tuition and other fees, including any outstanding dues. The student requires to do the course work followed by comprehensive examination as prescribed.
- d) A student is required to register in the semester in which the final PhD thesis is submitted for evaluation and pay the prescribed tuition and other fees, including any outstanding dues.

- 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 self- attested copy will be kept for records.



1.3 Late Registration

- a) 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.
- b) In exceptional cases, the Dean (Academic Programs) on the recommendation of the Post Graduate 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:

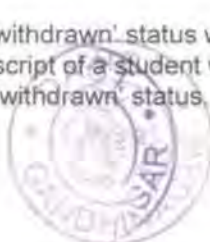
- a) A student will be advised in the selection of courses by the faculty adviser appointed by Dean (Academic Programs) in consultation with the PGC. The students will be assigned a thesis supervisor after fulfilling the course work and passing the comprehensive examination (details given in section 4).
- b) A prospective supervisor/mentor in the relevant research area will be formed by the Dean (AP)'s office for the student as early as possible, preferably by the end of First semester of his/her registration OR after completion of his/her comprehensive examination, as applicable based on the merits and research experience of the applicant.
- c) 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 2.4.

1.5 Semester Load Requirements:

- a) A semester load is defined equivalent of 12 credits. A student registered for a full semester load solely by course work would typically take 4 courses. Depending on the merits of the case, the PGC may permit a student to register for a maximum of 15 credits or a minimum of 9 credits at the beginning of the semester.
- b) A student in the external registration program, when registering for research only, can register for a maximum of 12 credits or a minimum of 3 credits during the regular semester.

1.6 Adding/Dropping of Courses and Withdrawal from a Semester

- a) 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.
- b) A student who wishes to withdraw prior to registration for a semester must obtain a 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.
- c) 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.
- d) 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.



- e) The maximum period for completion of the program as given in the appropriate subsection of Section 2 includes any semester in which the student has 'withdrawn' status.

2. ACADEMIC REQUIREMENTS

2.1 Ph D Program:

Category	Minimum Total Credits	Minimum Course Credits	Minimum Research Credits	Duration (Years)
Regular (Full-time) – MTech/ME/MS/MPhil	72	12	48	4-5
Regular (Full-time) – MSc	80	20	48	5-6
Regular (Full-time) – MA	80	21 to 24	48	5-6
Regular (Full-time) – BTech/BE/MCA	80	24	48	5-6
Sponsored/External (Part-time) – MTech/ME/MS/MPhil	72	12	48	4-5
Sponsored/External (Part-time) – MSc	80	20	48	5-6
Sponsored/External (Part-time) – MA	80	21 to 24	48	5-6
Sponsored/External (Part-time) – BTech/BE/MCA	80	24	48	5-6

Table 1: Course work requirement for the PhD program

- 2.1.1** A student depending on the category needs to take a certain number of minimum course credits, as mentioned in Table-1. The prospective supervisor/mentor of the student will advise the student to take necessary courses based on the broad domain of the area of interest.
- 2.1.2** Research credits (Example: PC801 Research-1 (3 credit)) are advisable for the student once he/she successfully clears comprehensive examination. The number of research credits a student can register in a semester is same as course credits (i.e., min. 9 credits and max. 15 credits). The students are required to register the Synopsis as one Research Unit (3 credits).
- 2.1.3** Undergraduate course of level 3 and 4 may be open to PhD student for course credit, and extra academic components could be added to such undergraduate courses, to elevate them at par with the PhD level course work. Such permissible course should have a different course identity for the PhD student's registration.
- 2.1.4** A student earns 3-credits for every self-study course taken. Maximum number of allowed Self-study courses is three with no more than one in a single semester before appearing the comprehensive examinations. For taking a self-study course, student should apply to the Dean(AP) with
- the detailed course contents.
 - expected outcome of the course.
 - consent from the supervisor/mentor with whom the self-study course is taken.

The student's performance on his/her self-study course would be evaluated by the course Instructor/mentor with whom the student is doing self-study course. A letter grade would be awarded by the instructor/mentor of the student based on the student's performance in self-study course.

- 2.1.5** Professional research experience in relevant area more than 5 years in R&D organizations, industry/research Labs, Universities may be considered for counting 6 credits in respective domain expertise based on the recommendations of the faculty supervisor/mentor and approval of the Dean (AP).



2.1.6 Research courses before clearing the comprehensive examination: A student can take research credits before clearing the comprehensive exam if it is allowed by Dean (AP)/PGC/Supervisor/Mentor. However, not more than 3 of such research courses are allowed. To take research credits before passing the comprehensive examination:

- student should get approval from Dean(AP)/PGC
- supervisor/mentor should give consent for the same to PhD coordinator
- supervisor/mentor should award the grades at the end of the semester and communicate the same to PhD coordinator

2.1.7 Transfer of credits: as applicable, at postgraduate level course in reputed organization may be considered based on the production of valid certificate or weightage of the course(s) and on the recommendations of the faculty supervisor/mentor and approval of the Dean (AP)

NOTE: Transfer of credits for courses done outside: Students may be permitted to do courses in places of repute outside DA-IICT. Based on their performance and the content/nature of the course, the PGC may consider them equivalent to some course credits and waive credit requirements for required course work credits at DA-IICT. Any such waivers/transfer is permitted only if the courses being considered have not been counted for any other degree/diploma requirement.

2.2 Audit Courses:

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

2.3 Registration for B Tech first and second year core Courses

The PhD Students may be permitted to register for B Tech first and second year core courses with the prior approval of the Dean (Academic Programs) during their course work period. For courses registered, the students should obtain a minimum Grade of 'C' to be eligible to appear for Comprehensive Examination.

2.4 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.

- d) The grade 'S' or 'X' will be awarded for Pn: D research credits as follows.
At the end of the semester, the thesis supervisor(s) will assess the student's progress towards the 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.
- e) 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. In a particular semester, if a student receives an 'X' grade in one or more of the research courses then he/she should take the course again in the next semester.
- f) A student getting a 'DD' or 'DE' grade in a course may substitute it by another course, provided his/her CPI is less than the prescribed minimum for getting the Degree and the student is allowed to continue in the program. For PhD students, replacement/substitution by another course is allowed, subject to his/her CPI is less than the prescribed minimum requirement for PhD comprehensive examination.
- g) 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.
- h) If a student is on leave for a part of the semester or submits his/her thesis in the middle of a semester, the PGC may reduce his/her research credits appropriately.

2.5 Sponsored (Part-Time) / External (Part-Time) Category (Ph D):

Apart from the general eligibility criteria prescribed by the Institute, sponsored/external candidates require to fulfill the following additional requirements:

- a) Candidates must be sponsored by their employers for pursuing PhD studies in the Institute.
- b) Candidates require to do course work followed by comprehensive examination as prescribed in Academic Requirement of the PhD program of the Institute.
- c) After fulfilling the course work and comprehensive requirement of the PhD program, the candidate will be allowed to register for PhD with a Supervisor at the Institute.
- d) A prospective supervisor/mentor in the relevant research area will be formed by the Dean(AP)'s office for the candidate as early as possible, preferably by the end of First semester of his/her registration OR after completion of his/her comprehensive examination, as applicable based on the merits and research experience of the applicant.
- e) Sponsorship letter should be submitted in the prescribed format at the time of the PhD admissions. The Sponsorship Certificate (and a NO OBJECTION CERTIFICATE for the candidates sponsored by College/University) from the organization in which he/she is employed should provide an undertaking that the candidate will be released to fulfill the course work requirement and comprehensive examination.
- f) The Sponsorship Certificate should mention that the candidate's services shall be retained with the employer after fulfilling the course work and comprehensive requirement at the Institute and the candidate will be allowed to go back to his/her parent organization where he/she will be doing the research work.
- g) Sponsored/external candidate should possess a minimum of three years job experience in an organization of repute.
- h) The competence of sponsored/external candidates will be assessed along with the regular candidates.
- i) Sponsored/external candidate will not receive any stipend/scholarship from the Institute and the candidate will not be assigned any teaching assistantship.

NOTE:

- 1. *Sponsored candidates from the organizations with whom DA-IICT has MoU may be exempted from appearing the entrance test of the PhD admissions, but require to face the interview of the PhD admissions.*



2. Sponsored candidates from the organizations with whom DA-IICT does not have MoU require to clear the entrance test followed by the interview of the PhD admissions.

Requirement	Sponsored / External Ph D
Guidance	Guide from DA-IICT, Co-Guide from sponsoring agency. However, Co-Guide from sponsoring agency is optional and subject to mutual acceptance between Guide and Co-Guide.
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.

2.6 Residency requirement

Residency during a semester implies that student is available in the campus of the Institute for course work and research activities during all working days of the semester.

- Students enrolled under Regular category should fulfil residency requirement during course work credits and research credits, both.
- Students enrolled under Sponsored and External category should fulfil residency requirement during course work credits.

Under certain special circumstances the residential requirement for the sponsored and external candidates may be relaxed or waived, who may be permitted to complete their course work requirements through recognized web based on-line courses (e.g. MOOCs) or to earn course credits from an organization of repute on the basis of the recommendations of the faculty supervisor/mentor and approval of the Dean (AP).

2.7 PhD Synopsis

A PhD student is expected to successfully complete PhD Synopsis examination by the stipulated maximum duration, as indicated in Table 1.

- Student should obtain consent of his/her supervisor/RPC for synopsis registration.
- Student needs to register for synopsis in the beginning of the semester.
- The Synopsis Committee for the candidate will be constituted by Dean (AP).

After successfully completing PhD Synopsis exam

- Student should submit PhD thesis to Dean (AP) within a maximum time of 6 months.

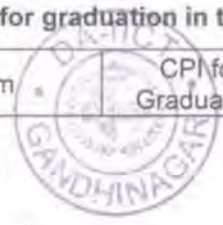
3. ACADEMIC PERFORMANCE REQUIREMENT

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 has registered 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 all 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. 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
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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 student in the Ph D program will be placed on Academic Probation if he/she obtains an X in a research course. For every student 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 on probation 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. A student who obtains more than 5 unsatisfactory (X) grades shall be discontinued from the program. If a student's continuation in the program is terminated, the appropriate authority will issue the letter of termination.

4. FELLOWSHIPS/TEACHING ASSISTANTSHIPS

- 4.1 Student admitted under Regular (full-time) category will be eligible for financial support (stipend) in the form of Teaching Assistantship (TA) / Research Assistantship (RA). The stipend is for a **maximum duration of four years after passing the comprehensive examination or clearing of Synopsis**, whichever is earlier. The responsibilities associated with the teaching / research assistantship includes conducting laboratory courses and tutorials for undergraduate/postgraduate students, assisting in teaching, research projects, and academic administration. The PhD stipend amount is announced in Admissions Policy (and available in website) of the Institute. Student can clarify stipend related doubts with Dean (AP)/PGC.
- 4.2 The stipend would be decreased by 50% for the following semester in case a student obtains more than one unsatisfactory (X) grade in any semester or the CPI falls below 7/10.

5. COMPREHENSIVE EXAMINATION

- 5.1 Students registered in the program must pass a comprehensive examination designed to test the overall comprehension of the student in the relevant subjects.
- 5.2 The comprehensive examination consists of two parts: (i) **Written or qualifiers** and (ii) **Proposal defense**. The **qualifier** examination will test candidate's competency in the broad discipline, in which the candidate plan to pursue his/her PhD study. The syllabus of comprehensive examination should be based on the foundation subjects of candidate's area of interest. The **proposal** defense consists of a research proposal which must be presented to Comprehensive committee no later than two months of a candidate clearing the qualifier exam. The PGC will be responsible for organizing the comprehensive examination for all eligible students every semester.
- 5.3 Students admitted with **MTech/ME/MS** degree may appear for the qualifier examination **earliest after completing first semester but must pass it before starting the third semester** after their first registration. Students admitted with **MSc/BTech/BE/MCA** degree may appear for the qualifier examination **earliest after completing second semester but must pass it before starting the fourth semester** after their first registration. The above time limits are exclusive of the period of sanctioned withdrawal, if any. The Dean (AP) may relax this requirement for sponsored category of students. The students working in sponsored research projects of DA-IICT shall be permitted to defer comprehensive examination by one semester over and the above the stipulated number of semesters.
- 5.4 Students should have a minimum CPI of 7.0/10 in order to be eligible for appearing in the comprehensive examination.
- 5.5 Dean (Academic Programs) will, in consultation with the PGC and the concerned Faculty Advisor, constitute the comprehensive examination board, which can evaluate the



candidate's qualifier and proposal defense. The board will consist of at least three but not more than five faculty members. The board will meet as soon as possible after it is constituted and will submit its recommendations to the Dean (Academic Programs).

- 5.6 The maximum number of attempts for the comprehensive exam is **two**. A student can appear for only one PhD Comprehensive examination in a given semester.
- 5.7 When a student has not passed the comprehensive examination in his/her first attempt, a second comprehensive examination will be conducted by the same board that was constituted earlier unless decided otherwise by the Dean (Academic Programs). Both the attempts should be within the stipulated period as indicated in Rule 5.3. In case the duration between the first examination and the desired second one is considered to be short, he/she may not be allowed to appear for the second examination.
- 5.8 A student will have to discontinue the program, if he/she fails to pass the comprehensive examination even in the second attempt.
- 5.9 A student enrolled in the program is formally admitted to the candidacy for the Ph D Degree after he/she has passed the comprehensive examination.

6. Supervisor Selection and RPC Formation

Supervisor or faculty mentor for a student enrolled in the PhD program can be identified by the student as early as possible, preferably by the end of the first semester. Once a prospective supervisor or faculty mentor is identified, Dean (AP) can formally assign the student with the supervisor/mentor. After successful completion of comprehensive examination of a student, a formal consent of the supervisor(s) will be obtained by the office of Dean (AP), who will act as the supervisor(s) for the student.

Research Progress Committee (RPC) comprising a prospective supervisor and two faculty members in the relevant research area will be formed by the Dean(AP)'s office for the candidate after completion of the student's comprehensive examination.

7. Research Progress Seminar

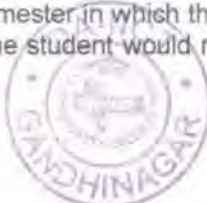
Research Progress Seminar (RPS) is held twice a year, (typically once in November (for Autumn Semester), and once in April (for Winter Semester) for the students who have cleared their comprehensive examination.

- RPC of the student will assess the student's research progress.
- RPC may invite an external expert during the student's RPS. The supervisor of the student requires a formal approval of the Dean(AP) for involving an external expert in his/her student's RPS.
- Grades of the student will be decided by the supervisor in consultations with the RPC members.

8. MIGRATION RULES

8.1 Eligibility for M Tech Degree: A Ph D student who fails to pass the Ph D 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 fulfils the eligibility criteria for M Tech program
- The student fulfils the criteria for continuation in the M Tech program
- The student submits an M Tech thesis which fulfils the requirements for such within a maximum of two semesters. This duration would commence from the semester immediately following the semester in which the student failed the Ph D comprehensive examination. Furthermore, the student would not be eligible for financial support during this period.



8.2 Ph D to M Tech Migration: Students in the Ph D program are eligible to migrate to the M Tech program provided they submit an application to the Dean (Academic Programs). Such an application can be accepted only when a student has completed a minimum of two semesters of Ph D and fulfils the following criteria:

- Student should have entered the program with a BTech/BE degree or equivalent.
- An appropriate M Tech program should be available in the Institute.
- At least 18 course credits completed.
- Student should have a minimum CPI of 6.5/10.0.

8.3 Completion of Requirements for M Tech Program: A student who migrates to the M Tech program from the Ph D program must complete all requirements for the M Tech 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 program.

9. Termination of a student's PhD Admission

- More than 5 unsatisfactory(X) grade in research courses during the entire PhD program would lead to a termination.
- Student who has not defended his/her PhD Synopsis successfully before the 'Max Duration (Years)' allowed then admission of that student will be terminated from PhD program. Such a student may request for fresh admission to PhD program by submitting an application to the Admission Committee. If the Admission Committee approves his/her admission, the candidate can be registered as a fresh PhD student and he/she will require completing academic requirements.
- If the student fails to pass the comprehensive examination even in the second attempt, then his/her PhD admission will get terminated.

10. 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 in all 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 Guidelines and 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.

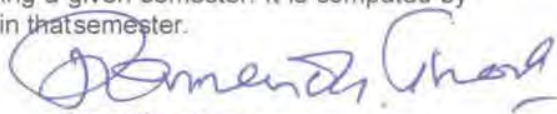
Semester Credits: The sum of credits of courses registered by the student in a semester.

Semester Grade Points: The sum of the products of credits and points for each course registered by 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
23 October 2019.




Executive Registrar
DA-IICT, Gandhinagar.



Academic Requirements for the Ph D Program
in
Humanities, Social Sciences and Design

(Effective from Autumn 2019-20)

Doctor of Philosophy: Ph D: duration - typically a 4 to 6 years program. The program 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 rules in 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 the end of this document.

1. REGISTRATION

1.1 Categories of Registration:

- a) A student may register in a given semester in three possible categories: Regular (Full-time) registration, Sponsored (Part-time) registration, and External (Part-time) 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 regular (resident) category registration, the student must be residential, a minimum of 3 years from the time of first semester registration for a duly approved course programme and pay the prescribed tuition and other fees, including any outstanding dues. The student must carry his/her course work and research work at the Institute.
- c) To qualify for sponsored (part-time) and external (part-time) category registration, a student must register for a duly approved research programme, and pay the prescribed tuition and other fees, including any outstanding dues. The student requires to do the course work followed by comprehensive examination as prescribed.
- d) A student is required to register in the semester in which the final PhD thesis is submitted for evaluation and pay the prescribed tuition and other fees, including any outstanding dues.

- 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 self- attested copy



will be kept for records.

1.3 Late Registration

- a) 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.
- b) In exceptional cases, the Dean (Academic Programs) on the recommendation of the Post-Graduate 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) A student will be advised in the selection of courses by the faculty adviser appointed by Dean (Academic Programs) in consultation with the PGC. The students will be assigned a thesis supervisor after fulfilling the course work and passing the comprehensive examination (details given in section 4).
- b) A prospective supervisor/mentor in the relevant research area will be formed by the Dean (AP)'s office for the student as early as possible, preferably by the end of First semester of his/her registration OR after completion of his/her comprehensive examination, as applicable based on the merits and research experience of the applicant.
- c) 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 2.4.

1.5 Semester Load Requirements:

- a) A semester load is defined equivalent of 12 credits. A student registered for a full semester load solely by course work would typically take 4 courses. Depending on the merits of the case, the PGC may permit a student to register for a maximum of 15 credits or a minimum of 9 credits at the beginning of the semester.
- b) A student in the external registration program, when registering for research only, can register for a maximum of 12 credits or a minimum of 3 credits during the regular semester.

1.6 Adding/Dropping of Courses and Withdrawal from a Semester

- a) 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.
- b) A student who wishes to withdraw prior to registration for a semester must obtain a 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.

- c) 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.
- d) 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.
- e) The maximum period for completion of the program as given in the appropriate subsection of Section 2 includes any semester in which the student has 'withdrawn' status.

2. ACADEMIC REQUIREMENTS

2.1 Ph D Program:

Category	Minimum Total Credits	Minimum Course Credits	Minimum Research Credits	Duration (Years)
Regular (Full-time) – MTech/ME/MS/MPhil	72	12	48	4-5
Regular (Full-time) – MSc	80	20	48	5-6
Regular (Full-time) – MA	80	21 to 24	48	5-6
Regular (Full-time) – BTech/BE/MCA	80	24	48	5-6
Sponsored/External (Part-time) – MTech/ME/MS/MPhil	72	12	48	4-5
Sponsored/External (Part-time) – MSc	80	20	48	5-6
Sponsored/External (Part-time) – MA	80	21 to 24	48	5-6
Sponsored/External (Part-time) – BTech/BE/MCA	80	24	48	5-6

Table 1: Course work requirement for the PhD program

- 2.1.1 A student depending on the category needs to take a certain number of minimum course credits, as mentioned in Table-1. The prospective supervisor/mentor of the student will advise the student to take necessary courses based on the broad domain of the area of interest.
- 2.1.2 Research credits (Example: PC801 Research-1 (3 credit)) are advisable for the student once he/she successfully clears comprehensive examination. The number of research credits a student can register in a semester is same as course credits (i.e., min. 9 credits and max. 15 credits). The students are required to register the Synopsis as one Research Unit (3 credits).
- 2.1.3 Undergraduate course of level 3 and 4 may be open to PhD student for course credit, and extra academic components could be added to such undergraduate courses, to elevate them at par with the PhD level course work. Such permissible course should have a different course identity for the PhD student's registration.
- 2.1.4 A student earns 3-credits for every self-study course taken. Maximum number of allowed Self-study courses is three with no more than one in a single semester before appearing the comprehensive examinations. For taking a self-study course, student should apply to the Dean(AP) with
 - (i) the detailed course contents.



- ..i) expected outcome of the course
- (iii) consent from the supervisor/mentor with whom the self-study course is taken

The student's performance on his/her self-study course would be evaluated by the course instructor/mentor with whom the student is doing self-study course. A letter grade would be awarded by the instructor/mentor of the student based on the student's performance in self-study course.

2.1.5 Professional research experience in relevant area more than 5 years in R&D organizations, industry/research Labs Universities may be considered for counting 6 credits in respective domain expertise based on the recommendations of the faculty supervisor/mentor and approval of the Dean (AP).

2.1.6 Research courses before clearing the comprehensive examination: A student can take research credits before clearing the comprehensive exam if it is allowed by Dean (AP)/PGC/Supervisor/Mentor. However, not more than 3 of such research courses are allowed. To take research credits before passing the comprehensive examination

- student should get approval from Dean(AP)/PGC.
- supervisor/mentor should give consent for the same to PhD coordinator
- supervisor/mentor should award the grades at the end of the semester and communicate the same to PhD coordinator

2.1.7 Transfer of credits, as applicable, at postgraduate level course in reputed organization may be considered based on the production of valid certificate or weightage of the course(s) and on the recommendations of the faculty supervisor/mentor and approval of the Dean (AP).

NOTE: Transfer of credits for courses done outside: Students may be permitted to do courses in places of repute outside DA-IICT. Based on their performance and the content/nature of the course, the PGC may consider them equivalent to some course credits and waive credit requirements for required course work credits at DA-IICT. Any such waivers/transfer is permitted only if the courses being considered have not been counted for any other degree/diploma requirement.

2.2 Audit Courses:

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

2.3 Registration for B Tech first and second year core Courses

The PhD Students may be permitted to register for B Tech first and second year core courses with the prior approval of the Dean (Academic Programs) during their course work period. For courses registered, the students should obtain a minimum Grade of 'C' to be eligible to appear for Comprehensive Examination.

2.4 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.

- 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.
- The grade 'S' or 'X' will be awarded for Ph D research credits as follows:
At the end of the semester, the thesis supervisor(s) will assess the student's progress towards the 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.
- 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. In a particular semester if a student receives an 'X' grade in one or more of the research courses then he/she should take the course again in the next semester.
- A student getting a 'DD' or 'DE' grade in a course may substitute it by another course, provided his/her CPI is less than the prescribed minimum for getting the Degree and the student is allowed to continue in the program. For PhD students, replacement/substitution by another course is allowed, subject to his/her CPI is less than the prescribed minimum requirement for PhD comprehensive examination.
- 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.
- If a student is on leave for a part of the semester or submits his/her thesis in the middle of a semester, the PGC may reduce his/her research credits appropriately.

2.5 Sponsored (Part-Time) / External (Part-Time) Category (Ph D):

Apart from the general eligibility criteria prescribed by the Institute, sponsored/external candidates require to fulfill the following additional requirements:

- Candidates must be sponsored by their employers for pursuing PhD studies in the Institute.
- Candidates require to do course work followed by comprehensive examination as prescribed in Academic Requirement of the PhD program of the Institute.
- After fulfilling the course work and comprehensive requirement of the PhD program, the candidate will be allowed to register for PhD with a Supervisor at the Institute.
- A prospective supervisor/mentor in the relevant research area will be formed by the Dean(AP)'s office for the candidate as early as possible, preferably by the end of First semester of his/her registration OR after completion of his/her comprehensive examination, as applicable based on the merits and research experience of the applicant.
- Sponsorship letter should be submitted in the prescribed format at the time of the PhD admissions. The Sponsorship Certificate (and a NO OBJECTION CERTIFICATE for the candidates sponsored by College/University) from the organization in which he/she is employed should provide an undertaking that the candidate will be released to fulfill the course work requirement and comprehensive examination.



The Sponsorship Certificate should mention that the candidate's services shall be retained with the employer after fulfilling the course work and comprehensive requirement at the Institute and the candidate will be allowed to go back to his/her parent organization where he/she will be doing the research work.

- g) Sponsored/external candidate should possess a minimum of three years job experience in an organization of repute.
- n) The competence of sponsored/external candidates will be assessed along with the regular candidates.
- o) Sponsored/external candidate will not receive any stipend/scholarship from the Institute and the candidate will not be assigned any teaching assistantship.

NOTE:

- 1) Sponsored candidates from the organizations with whom DA-IICT has MoU may be exempted from appearing the entrance test of the PhD admissions, but require to face the interview of the PhD admissions.
- 2) Sponsored candidates from the organizations with whom DA-IICT does not have MoU require to clear the entrance test followed by the interview of the PhD admissions.

Requirement	Sponsored / External Ph D
Guidance	Guide from DA-IICT, Co-Guide from sponsoring agency.
Infrastructure (Research & Course)	DA-IICT and sponsoring agency respectively for the part in which student stays at DA-IICT and at the sponsoring agency. However, Co-Guide from sponsoring agency is optional and subject to mutual acceptance between Guide and Co-Guide.
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.

2.6 Residency requirement

Residency during a semester implies that student is available in the campus of the Institute for course work and research activities during all working days of the semester.

- Students enrolled under Regular category should fulfil residency requirement during course work credits and research credits, both.
- Students enrolled under Sponsored and External category should fulfil residency requirement during course work credits.

Under certain special circumstances the residential requirement for the sponsored and external candidates may be relaxed or waived, who may be permitted to complete their course work requirements through recognized web based on-line courses (e.g. MOOCs) or to earn course credits from an organization of repute on the basis of the recommendations of the faculty supervisor/mentor and approval of the Dean (AP).

2.7 PhD Synopsis

A PhD student is expected to successfully complete PhD Synopsis examination by the stipulated maximum duration, as indicated in Table 1.

- Student should obtain consent of his/her supervisor/RPC for synopsis registration.
- Student needs to register for synopsis in the beginning of the semester.
- The Synopsis Committee for the candidate will be constituted by Dean (AP).

After successfully completing PhD Synopsis exam



- Student should submit PhD thesis to Dean (AP) within a maximum time of 6 months.

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 has registered 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 all 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. 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
Ph D	7.0

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 student in the Ph D program will be placed on Academic Probation if he/she obtains an X in a research course. For every student 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 on probation 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. A student who obtains more than 5 unsatisfactory (X) grades shall be discontinued from the program. If a student's continuation in the program is terminated, the appropriate authority will issue the letter of termination.

4. **FELLOWSHIPS/TEACHING ASSISTANTSHIPS**

- 4.1 Student admitted under Regular (full-time) category will be eligible for financial support (stipend) in the form of Teaching Assistantship (TA) / Research Assistantship (RA). The stipend is for a **maximum duration of four years after passing the comprehensive examination or clearing of Synopsis**, whichever is earlier. The responsibilities associated with the teaching / research assistantship includes conducting laboratory courses and tutorials for undergraduate/postgraduate students, assisting in teaching, research projects, and academic administration. The PhD stipend amount is announced in Admissions Policy (and available in website) of the Institute. Student can clarify stipend related doubts with Dean (AP)/PGC.
- 4.2 The stipend would be decreased by 50% for the following semester in case a student obtains more than one unsatisfactory (X) grade in any semester or the CPI falls below 7/10.

5. **COMPREHENSIVE EXAMINATION AND PROPOSAL DEFENSE**

- 5.1 Students registered in the program must pass a comprehensive examination designed to test the overall comprehension of the student in the relevant subjects.



- 5.2. The PhD comprehensive examination for the disciplines of the Humanities and Social Sciences has two components: 1) an exam 2) a viva-voce with the committee. The examination may be based on either of the two options: 1) a choice of two courses cleared by the student which may have a bearing on his/her research; 2) a choice of two to three preferred areas of study with an accompanying reading list (prepared in consultation with a faculty member). The examination may be administered either through a question paper, or the student may be asked to submit a revised coursework essay of journal-article length (about 10,000 words including notes and bibliography) tailored for a specific scholarly journal. The format of the examination will be decided by the comprehensive examination committee after due consultation with the student. It is desired that the student clears the comprehensive examination as soon as the course work requirement is finished.
- 5.3. The comprehensive examination will be followed by 1) Research Pro-Seminar and 2) Dissertation Proposal Seminar. These seminars may be either evaluated by a committee or by the supervisor/mentor alone. The Dean (AP), as per his/her discretion, will determine the modus operandi of both these seminars. The pro-seminar requirement is aimed at refining the candidate's methodological focus, and it will be fulfilled by submitting a short paper with an accompanying public presentation. Typically, in a pro-seminar the goal is to frame a research question within the scope of a topic either suggested by the supervisor or independently chosen by the candidate. The topic may be connected with the broader research focus of the candidate, but the scope of its work should be narrow and restricted. The emphasis would be on public presentation. The candidate is expected to provide in his/her paper an answer to the question with an accompanying defense; arguments for the respective thesis/theses to be defended; and therefore evidence for his/her preparedness for research. As part of the Dissertation Proposal Seminar, the candidate will present his/her proposed study and its scope, the hypotheses he/she aims to defend and substantiate, and a plan for the future course of action such as fieldwork, library work etc. In addition, the candidate will have undertaken extensive literature survey, honed his/her methodological grounding, and prepared the necessary ground for field work.
- 5.4. Students admitted with **MPhil** degree may appear for the qualifier examination **earliest after completing first semester but must pass it before starting the third semester** after their first registration. Students admitted with **MSc/MA** or equivalent degree may appear for the comprehensive examination **earliest after completing second semester but must pass it before starting the fourth semester** after their first registration. The above time limits are exclusive of the period of sanctioned withdrawal, if any. The Dean (AP) may relax this requirement for sponsored category of students. The students working in sponsored research projects of DA-ICT shall be permitted to defer comprehensive examination by one semester over and the above the stipulated number of semesters.
- 5.5. Students should have a minimum CPI of 7.0/10 in order to be eligible for appearing in the comprehensive examination.
- 5.6. Dean (Academic Programs) will, in consultation with the PGC and the concerned Faculty Advisor, constitute the comprehensive examination board, which can evaluate the candidate's qualifier and proposal defense. The board will consist of at least three but not more than five faculty members. The board will meet as soon as possible after it is constituted and will submit its recommendations to the Dean (Academic Programs).
- 5.7. The maximum number of attempts for the comprehensive exam is **two**. A student can appear for only one PhD Comprehensive examination in a given semester.
- 5.8. When a student has not passed the comprehensive examination in his/her first attempt, a second comprehensive examination will be conducted by the same board that was constituted earlier unless decided otherwise by the Dean (Academic Programs). Both the



attempts should be within the stipulated period as indicated in Rule 5.3. In case the duration between the first examination and the desired second one is considered to be short, he/she may not be allowed to appear for the second examination.

5.9 A student will have to discontinue the program, if he/she fails to pass the comprehensive examination even in the second attempt.

5.10A A student enrolled in the program is formally admitted to the candidacy for the Ph.D. Degree after he/she has passed the comprehensive examination.

6. SUPERVISOR SELECTION AND RPC FORMATION

Supervisor or faculty mentor for a student enrolled in the PhD program can be identified by the student as early as possible, preferably by the end of the first semester. Once a prospective supervisor or faculty mentor is identified, Dean (AP) can formally assign the student with the supervisor/mentor. After successful completion of comprehensive examination of a student, a formal consent of the supervisor(s) will be obtained by the office of Dean (AP), who will act as the supervisor(s) for the student.

Research Progress Committee (RPC) comprising a prospective supervisor and two faculty members in the relevant research area will be formed by the Dean (AP)'s office for the candidate after completion of the student's comprehensive examination.

7. RESEARCH PROGRESS SEMINAR

Research Progress Seminar (RPS) is held twice a year, (typically once in November (for Autumn Semester), and once in April (for Winter Semester) for the students who have cleared their comprehensive examination.

- RPC of the student will assess the student's research progress.
- RPC may invite an external expert during the student's RPS. The supervisor of the student requires a formal approval of the Dean (AP) for involving an external expert in his/her student's RPS.
- Grades of the student will be decided by the supervisor in consultations with the RPC members.

8. MIGRATION RULES

8.1 Eligibility for M Tech Degree: A Ph.D. student who fails to pass the Ph.D. 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 fulfils the eligibility criteria for M Tech program
- The student fulfils the criteria for continuation in the M Tech program
- The student submits an M Tech thesis which fulfils the requirements for such within a maximum of two semesters. This duration would commence from the semester immediately following the semester in which the student failed the Ph.D. comprehensive examination. Furthermore, the student would not be eligible for financial support during this period.

8.2 Ph.D. to M Tech Migration: Students in the Ph.D. program are eligible to migrate to the M Tech program provided they submit an application to the Dean (Academic Programs). Such an application can be accepted only when a student has completed a minimum of two semesters of Ph.D. and fulfils the following criteria:

- Student should have entered the program with a BTech/BE degree or equivalent.
- An appropriate M Tech program should be available in the Institute.
- At least 18 course credits completed.
- Student should have a minimum CPI of 6.5/10.0.

8.3 Completion of Requirements for M Tech Program: A student who migrates to the M Tech program from the Ph D program must complete all requirements for the M Tech 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 program.

9. TERMINATION OF A STUDENT'S PHD ADMISSION

- More than 5 unsatisfactory(X) grade in research courses during the entire PhD program would lead to a termination.
- Student who has not defended his/her PhD Synopsis successfully before the 'Max Duration (Years)' allowed then admission of that student will be terminated from PhD program. Such a student may request for fresh admission to PhD program by submitting an application to the Admission Committee. If the Admission Committee approves his/her admission, the candidate can be registered as a fresh PhD student and he/she will require completing academic requirements.
- If the student fails to pass the comprehensive examination even in the second attempt, then his/her PhD admission will get terminated.

10. 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 in all 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 Guidelines and 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 registered by 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
23 October 2019.



APPENDIX

A Note on Courses on Directed Study, Independent Study and Reading Courses:

The defining terms of these categories may be modified to suit the specific pedagogic constraints at DA-IICT. None of these courses involve a public presentation on behalf of the student.

1. Directed Study

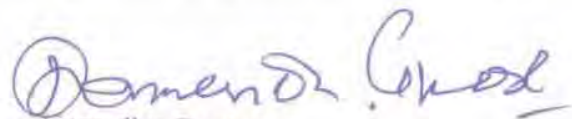
Directed Study is designed to be a substitute for a traditional course that is not offered in the semester for which the student wishes to enroll. The material covered in such courses is essentially the same as that covered in the traditional course. The evaluation may be based on presentation, term paper, exam etc.

2. Independent Study

Independent Study is intended to be an extension, or "spin-off," of a traditional course. It provides the student with an opportunity to pursue/research a subject in more depth and in a more independent manner than would be possible in a traditional course. These courses enable graduate students to pursue previously studied topics in greater depth. A content outline for each independent study course is developed through consultation between the student and the instructor to suit the needs and interests of the student and the special competence of the instructor. The student seeking to do an independent study course should be able to demonstrate adequate background for the proposed area or question of study. The evaluation may be based on presentation, project work, term paper, exam etc.

3. Reading Course

A reading course is a specially designed course not normally offered as part of the curriculum that is arranged between a student and a faculty member. The course is run as a tutorial and counts as a regular course. It may count as a departmental in your concentration but may not satisfy distribution requirements. The evaluation may be based on presentation, project work, term paper, exam etc.


Executive Registrar
DA-IICT, Gandhinagar

