2018-19

HANDBOOK OF INFORMATION

POSTGRADUATE PROGRAMME

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2018-19

INDIAN INSTITUTE OF TECHNOLOGY ROPAR
Rupnagar, Punjab-140001 (INDIA)
www.iitrpr.ac.in

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1. Introduction

1.1. Background

The Indian Institute of Technology Ropar is one of the eight IITs set up by the Ministry of Human Resource Development (MHRD), Government of India in 2008. In keeping with the spirit of the IIT system, this institute is committed to provide state-of-the-art technical education in a variety of fields, and also to facilitate transmission of knowledge using the latest developments in pedagogy. In its initial years, IIT Ropar was mentored by IIT Delhi, and the first academic session (2008) of IIT Ropar was held at the campus of IIT Delhi. The institute started operating from the transit campus, i.e., the premises of the Government Polytechnic College for Girls (Ropar) from 18 August 2009. The transit campus of IIT Ropar has all the required facilities such as class rooms fitted with multimedia, faculty rooms and an administrative wing. The four hostels (three for boys and one for girls) on campus have modern mess halls. Faculty recruitment, creation of laboratories and other support facilities are in full swing. The main campus is spread over an area of 500 acres, and is situated on the banks of the Satluj river. The Institute has started functioning from its main campus.

1.2. Departments and Centre

Each course is offered by an academic unit which could either be a department and centre. The various departments and centre and their two letter codes are given below. Some courses are offered jointly by multiple academic units and are classified as interdisciplinary courses.

Academic Departments and Centre

Sr. No.	Name of Academic Unit (alphabetical order)	Code
1	Center for Biomedical Engineering	BM
2	Chemical Engineering	CH
3	Chemistry	CY
4	Civil Engineering	CE
5	Computer Science & Engineering	CS
6	Electrical Engineering	EE
7	Humanities & Social Sciences	HS
8	Mathematics	MA
9	Mechanical Engineering	ME
10	Metallurgical & Materials Engineering	MM
11	Physics	PH

1.3. Programmes Offered

IIT Ropar offers a variety of academic programmes for students with a wide range of backgrounds. Admission to many of these programmes are based on the students' performance in national level tests / entrance examination followed by interviews at IIT Ropar in some cases.

The programmes offered by IIT Ropar are presently classified as Postgraduate and PhD programmes. This classification is based primarily on entry/admission qualification of students rather than the level of degree offered. For all postgraduate programmes, students are admitted after they have obtained at least a college level Bachelor's degree. As this course of study would indicate, there is considerable overlap in courses for senior undergraduate students and junior postgraduate students. The various programmes and their specializations are listed below.

Postgraduate Programmes are offered in the following Departments & Center

Sr. No.	M. Tech. Programmes
1	Biomedical Engineering
2	Computer Science & Engineering
3	Electrical Engineering
4	Mechanical Engineering

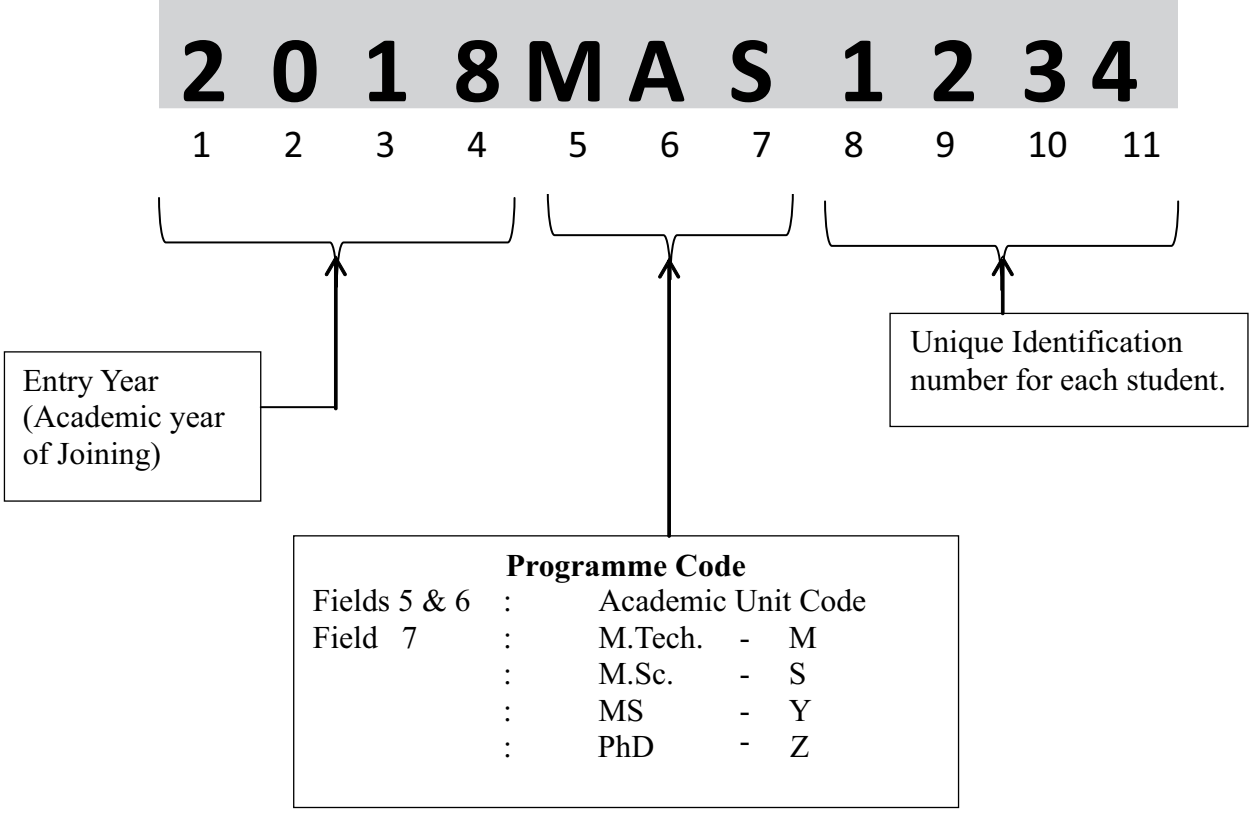
Sr. No.	M. Sc. Programmes
1	Chemistry
2	Mathematics
3	Physics

PhD Programmes are offered in the following Departments & Center

Sr. No.	Departments
1	Biomedical Engineering
2	Chemical Engineering
3	Chemistry
4	Computer Science & Engineering
5	Civil Engineering
6	Electrical Engineering
7	Humanities & Social Sciences
8	Mathematics
9	Mechanical Engineering
10	Metallurgical & Materials Engineering
11	Physics

1.4. Student's Entry Number

The entry number of a student consists of eleven alpha-numerals.



Postgraduate Programmes

Abbreviations

• BME	Biomedical Engineering
• CE	Civil Engineering
• CFTI	Centrally funded technical institute
• CHE	Chemical Engineering
• CSE	Computer Science and Engineering
• CSIR-NET	CSIR National Eligibility Test
• EE	Electrical Engineering
• GOI	Government of India
• HoD	Head of the Department
• HTRA	Half Time Teaching/Research Assistantship
• ME	Mechanical Engineering
• MEE	Materials and Energy Engineering
• MHRD	Ministry of Human Resource and Development
• RPEC	Research Progress Evaluation Committee
• SRF	Senior research fellow
• UGC-NET	UGC National Eligibility Test
•	

2. Postgraduate Programmes

2.1. Academic System

The overall academic system for IIT Ropar has been designed to provide a science-based engineering education with a view to producing quality engineer-scientists. The curriculum provides broad-based knowledge and simultaneously builds a temper for life-long learning and exploring. The Postgraduate programme begins with a set of science and general engineering courses which are reflected in the course plan for the first year. These courses provide a foundation for further discipline-specific courses. The medium of instruction at IIT Ropar is English.

The main goals of the postgraduate programmes are to develop scientific and engineering manpower of the highest quality, to cater to the needs of industry, R&D organizations and educational institutions, and to enable students to have awareness and sensitivity to the needs and aspirations of society. The programmes have been structured in such a way that interested students can upgrade to the MS or PhD programme.

The current Academic year begins in July and ends in May of the following year. For the academic year 2018-2019, the 1st semester starts on August 07, 2018. The detailed schedule of the activities and academic deadlines shall be given in the semester schedule that will be available before the start of the semester.

2.2. Academic Programmes

Currently, the following PG programmes are being offered:

1. M. Sc. Chemistry
2. M. Sc. Physics
3. M.Sc. Mathematics
4. M.Tech. Biomedical Engineering.
5. M.Tech. Computer Science & Engineering
6. MS (Research) Computer Science & Engineering
7. MS (Research) Electrical Engineering
8. M.Tech. Electrical Engineering
   - Specialization - Power Engineering
   - Specialization - Communication & Signal Processing
9. M. Tech. Mechanical Engineering
   - Specialization - Thermal Engineering (TE)
   - Specialization - Mechanics and Design(MD)
   - Specialization - Manufacturing Engineering (MF)

2.3. General Eligibility Criteria for PG Programmes

a) **M. Sc. Chemistry:** Bachelor degree with Chemistry as one of the subject and should have passed Mathematics at the Higher Secondary (10+2) level. Candidate meeting with this requirement must also have valid JAM score.

b) **M.Sc.Mathematics:** Bachelor degree with Mathematics as a subject for at least two years/four semesters

c) **M. Sc. Physics:** Bachelor degree with Physics for three years/Six Semesters and Mathematics Statistics for at least two years/four semesters. Candidate meeting with this requirement must also have valid JAM score.

Note:- For programmes of Physics, Chemistry and Mathematics candidate must have at least 55% aggregate marks without rounding off (taking into account all subjects, including Languages and Subsidiaries, all years combined) for Un-Reserved/OBC Category Candidates and at least 50% aggregate marks, without rounding off (taking into account all subjects, including Languages and Subsidiaries, all years combined) for SC/ST and PwD Category Candidates in the qualifying degree.

d) **M.Tech. Biomedical Engineering :** A bachelor's degree in engineering (BE/B.Tech.), with a minimum of 60% marks (6.5 grade points on scale of 10) and a valid GATE score. A minimum of 55% marks (6.0 grade points on a scale of 10) for SC/ST. OR

A master's degree in Science (M.Sc/MS), Computer application (MCA), or equivalent, with a minimum of 60% marks (6.5 grade points on scale of 10) and a valid GATE score. A minimum of 55% marks (6.0 grade points on a scale of 10) for SC/ST. OR

A bachelor's degree in Medicine/surgery (MBBS), Pharmaceutical Sciences (B.Pharm), Veterinary Science (BVSc), or Dental Surgery (BDS), with a minimum of 60% marks (6.5 grade points on scale of 10) and a valid GATE score. A minimum of 55% marks (6.0 grade points on a scale of 10) for SC/ST.

e) **M. Tech. Computer Science & Engineering :** Candidates with B.Tech./B.E/MCA or M.Sc. in the appropriate area with valid GATE score in Computer Science & Engineering.

f) **M. Tech. Electrical Engineering :** Candidates with B. Tech/B.E or M. Sc. in the appropriate area with valid GATE score in Electrical Engineering.

g) **M. Tech. Mechanical Engineering :** Candidates with B. Tech/B.E or M. Sc. in the appropriate area with valid GATE score in Mechanical Engineering.

Note:- For MS (Research)/ M.Tech. programme, IIT B.Tech. Graduates with a CGPA score of 8.0 or above on a scale of 10 [SC/ST: 7.5 CGPA] are eligible to apply without GATE score.

h) **MS (Research) in Computer Science & Engineering:** Candidates with B.Tech/ B.E/ M.Sc. / MCA in Computer Science and Engineering related area with an excellent academic record a valid GATE score in CS/IT.

i)) **MS (Research) in Electrical Engineering:** A Candidates with a Bachelor's degree in Electrical Engineering (Electrical and Electronics Engineering)/ Electronics Engineering (Electronics and Communication Engineering) / Computer Science & Engineering or equivalent with a valid GATE score.

2.4. Admission Procedure

The candidates can apply for admission to various PG programmes as given :-

Sr. No.	Programme	Selection Procedure
1.	M.Sc. in Mathematics M.Sc. in Physics M.Sc. in Chemistry	To apply for admission to a desired programme, a candidate is required to qualify JAM (Joint Admission Test for M.Sc.) and also satisfy the Minimum Educational Qualifications (MEQs) and Eligibility Requirements (ERs) of the respective academic programme. For further information, candidates can visit the JAM website.
2.	M.Tech. in Biomedical Engineering, M.Tech. in Computer Science & Engineering M.Tech. in Electrical Engineering M.Tech. in Mechanical Engineering,	To apply for admission in this programme the candidates are required to apply online to IIT Ropar and also satisfy the Minimum Educational Qualifications (MEQs) and Eligibility Requirements (ERs). Eligible candidates will be called for counselling. For further information, please visit: **www.iitrpr.ac.in**
3.	MS (Research) in Computer Science & Engineering / Electrical Engineering	To apply for admission in this programme, candidates are required to apply online to IIT Ropar and also satisfy the Minimum Educational Qualifications (MEQs) and Eligibility Requirements (ERs) of the respective academic programme. Eligible candidates will be called for entrance test followed by interview. For further information, please visit **www.iitrpr.ac.in**

2.5. Credit System

2.5.1. Credit System

Education at the Institute is organized around the semester-based credit system. The prominent features of credit system are a process of continuous evaluation of a student's performance/progress and the flexibility to allow a student to progress at an optimum pace suited to his/her ability or convenience. This feature is subject to the fulfillment of the minimum requirements for continuation.

A student's performance/progress is measured by the number of credits that he/she has earned, i.e., completed with a pass grade. Based on the course credits and grade obtained by the student, the grade point average is calculated. A minimum grade point average is required to be maintained for satisfactory progress and continuation in the programme.

All Programmes are defined by the total credit requirement and a pattern of credit distribution over courses of different categories. Details are given below.

a) Course credits assignment

Each course, except a few special courses, has a certain number of credits assigned to it depending upon its lecture, tutorial and practical contact hours in a week. This weighting also indicates the academic expectation that includes in-class contact and self-study beyond class hours. A few courses are without credit and are referred to as non-credit (NC) courses.

L = No. of lecture 'hours' (actually 50 min.) per week , T = No. of tutorial 'hours' = L/3, by default.

P = No. of laboratory 'hours'.

S = Total preparation 'hours' by students including assignments and self-study, S=2L+P/2-T.

C = Total credit-terms, C=L+P/2.

Lectures and Tutorials: One lecture or tutorial hour per week per semester is assigned one credit.

Practical/Laboratory: One laboratory hour per week per semester is assigned half credit. For each lecture or tutorial credit, the self study component is 1 hour/week.

b) Earning credits

At the end of every course, a letter grade is awarded in each course for which a student had registered. On obtaining a pass grade, the student accumulates the course credits as earned credits. A student's performance is measured by the number of credits that he/she has earned and by the weighted grade point average.

c) Course coordinator

Every course is usually coordinated by a member of the teaching staff of the Department which is offering the course in a given semester. This faculty member is designated as the Course Coordinator. He/she has the full responsibility for conducting the course, coordinating the work of the other members of the faculty as well as teaching assistants involved in that course, holding the tests and assignments, and awarding the grades. For any difficulty related to a course, the student is expected to approach the respective course coordinator for advice and clarification. The distribution of the weight for tests, quizzes, assignments, laboratory work, workshop and drawing assignment, term paper, etc. that will be the basis for award of the grade in a course will be decided by the course coordinator of that course and generally announced at the start of the semester.

2.5.2. Grading System

The grading reflects a student's own proficiency in the course. While the relative standing of the student is clearly indicated by his/her grades, the process of awarding grades is not necessarily based upon evaluating the performance of the class based on some statistical distribution. The course coordinator and the associated faculty for a course formulate appropriate procedures to award grades that are reflective of the student's performance vis-a-vis the instructor's expectation.

The credit system enables continuous evaluation of a student's performance, and allows the students to progress at an optimum pace suited to individual ability and convenience. This is subject to the fulfilling of the minimum requirements for continuation.

The grades and their description, along with equivalent numerical points wherever applicable are listed below:

Table 1: Grades with their description

Grade	Grade Points	Description
A	10	Outstanding
A (-)	9	Excellent
B	8	Very good
B (-)	7	Good
C	6	Average
C (-)	5	Below average
D	4	Marginal
E	2	Poor
F	0	Very poor
NP	-	Audit Pass
NF	-	Audit Fail
I	-	Incomplete
S	-	Satisfactory completion
U	-	Unsatisfactory
W	-	Withdrawal

2.5.3. Description of Grades

A grade

The 'A' grade stands for outstanding achievement. The minimum percentage for the award of an 'A' grade is 80%. However, individual course coordinators may set a higher performance requirement.

B grade

The 'B' grade refers to very good/good performance.

C grade

The 'C' grade stands for average performance. This average performance refers to "average" as per instructor's expectations in a holistic sense and not on the average marks.

D grade

The 'D' grade stands for marginal performance, i.e., it is the minimum pass grade in any course. The minimum percentage for the award of 'D' grade is 30%, however, individual course coordinators may set a higher marks requirement.

E and F grades

The 'E' and 'F' grades denote poor and very poor performance, and indicate failing a course. An 'F' grade is also awarded in case of poor attendance (see Attendance Rules). A student has to repeat all the core courses in which he/she obtains either an 'E' or an 'F' grade, until a pass grade is obtained. In case of the elective courses in which either an 'E' or an 'F' grade has been obtained the student may take the same course or any other course from the same category. An 'E' grade in a course makes a student eligible to repeat the course in the summer semester, if the course is offered. Further, 'E' and 'F' grades secured in any course stay permanently on the grade card. These grades are not counted in the calculation of the CGPA; however, these are counted in the calculation of the SGPA.

NP and NF grades

The 'NP' Grade denotes completion of the Audit course. The NF grade denotes Audit fail. These grades are awarded in a course that the student opts to audit. Only an elective course can be audited until one week after the mid semester examination. The Audit Pass (NP) is awarded if the student's attendance is above 75% in the class and he/she has obtained at least a 'D' grade. The Course Coordinator can specify a higher criterion for audit pass at the beginning of the semester. If either of these requirements is not fulfilled, an audit fail (NF) is awarded.

The grades obtained in an audit course are not considered for the calculation of SGPA or CGPA.

I grade

The 'I' grade denotes incomplete performance in any L (lecture), P (practical), V (special module) category courses. It may be awarded in case of absence on medical grounds or other special circumstances, before or during the major examination period. The student should complete all requirements within:

(i) 10 days of the last date of the Major Tests; the request is to be made to the Head of the Department of the student's programme who will notify the same to the concerned course coordinators, OR

(ii) With the permission of the Dean (Academics) the period can be extended to the first week of the next semester. Upon completion of all course requirements, the 'I' grade is converted to a regular grade (A to F, NP or NF). The 'I' grade does not appear permanently in the grade card. Requests for an I-grade should be made at the earliest but not later than the last day of the major tests.

For (ii), the request is to be made to the Dean (Academics). A student may be considered for the award of an 'I' grade in a course only if the attendance in the course is 75%.

Attendance in the course for which an I-grade is being sought will be certified by the course coordinator of the course.

S grade

The 'S' grade denotes satisfactory performance and completion of a course.

U grade

The 'U' grade denotes unsatisfactory performance of the course.

W grade

The 'W' grade is awarded in a course where the student has opted to withdraw from the course. Withdrawal from a course is permitted until one week after the Mid Semester Examination. The W grade stays on the grade card.

2.5.4. Evaluation of Performance

The performance of a student will be evaluated in terms of two indices, viz. the Semester Grade Point Average (SGPA) which is the Grade Point Average for a semester, and Cumulative Grade Point Average (CGPA) which is the Grade Point Average for all the completed semesters at any point in time.

The Earned Credits (E.C.) are defined as the sum of course credits of courses in which students have been awarded grades between A to D; for PG students, credits from courses in which an NP or an S grade has been obtained are also added.

Points earned in a course = (Course credits × Grade Point) for courses in which A -F grade has been obtained.

The SGPA is calculated on the basis of grades obtained in all courses registered for in the particular semester, except the audit courses and the courses in which an S grade has been awarded.

$$\text{SGPA} = \frac{\text{Points secured in the semester}}{\text{Credits registered in the semester, excluding S and audit grade courses}}$$

The CGPA is calculated on the basis of all pass grades, except the courses in which S grade has been awarded, obtained in all completed semesters.

$$\text{CGPA} = \frac{\text{Cummulative points secured in all passed courses (A-D)}}{\text{Cummulative earned credits, excluding S and audit grade courses}}$$

An example of these calculations is given below:

Table 2(a). Typical academic performance calculations-I semester

Course no.	Course credits	Grade awarded	Earned credits	Grade Points	Points secured
(column 1)	(column 2)	(column 3)	(column 4)	(column 5)	(column 6)
MAXXX	5	C	5	6	30
CYXXX	4	C(-)	4	5	20
PHXXX	4	A	4	10	40
PHXXX	2	B	2	8	16
MEXXX	4	E	0	2	08
TTXXX	2	S	2	–	–

Credits registered in the semester (total of column 2) = 21
Credits registered in the semester excluding S and audit grade course = 19
Earned credits in the semester (total of column 4) = 17
Earned credits in the semester excluding S grade courses = 15
Points secured in this semester (total of column 6) = 114
Points secured in this semester in all passed courses
(Total of column 6 & A–D grade) = 106

$$\text{SGPA} = \frac{\text{Points secured in the semester}}{\text{Credits registered in the semester, excluding S and audit grade course}} = \frac{114}{19} = 6.000$$

$$\text{CGPA} = \frac{\text{Cummulative points secured in all passed courses (A-D)}}{\text{Cummulative earned credits, excluding S and audit grade courses}} = \frac{106}{15} = 7.067$$

Semester performance: Earned credits (E.C.) = 17 SGPA = 6.000
Cumulative Performance: Earned credits (E.C.) = 17 CGPA = 7.067

Table 2(b). Typical academic performance calculations-II semester

Course no.	Course credits	Grade awarded	Earned credits	Grade Points	Points secured
(column 1)	(column 2)	(column 3)	(column 4)	(column 5)	(column 6)
MAXXX	5	B	5	8	40
EEXXX	4	A(-)	4	9	36
CYXXX	4	W	—	—	—
CYXXX	2	B(-)	2	7	14
MEXXX	4	C	4	6	24
AMXXX	4	A	4	10	40
HUXXX	1	S	1	—	—

Credits registered in the semester (total of column 2) = 24
Credits registered in the semester excluding S/Z & audit grade courses = 23
Earned credits in the semester (total of column 4) = 20
Earned credits in the semester excluding S/Z & audit grade courses = 19
Points secured in this semester (total of column 6) = 154
Points secured in this semester in all passed courses
(Total of column 6 & A-D grade) = 154
Cumulative points earned in all
passed courses = 106 (past semesters) + 154 (this sem.) = 260

$$\text{SGPA} = \frac{\text{Points secured in the semester}}{\text{Credits registered in the semester, excluding S / Z and audit grade courses}} = \frac{154}{19} = 8.105$$

$$\text{CGPA} = \frac{\text{Cummulative points secured in all passed courses (A-D)}}{\text{Cummulative earned credits,excluding S / Z and audit grade courses}} = \frac{106+154}{15+19} = 7.647$$

Cumulative earned credits = 17 (past semesters) + 20 (this semester) = 37

Semester Performance:	Earned credits (E.C.) = 20	SGPA = 8.105
Cumulative Performance:	Earned credits (E.C) = 37	CGPA = 7.647

2.5.5. Course Numbering Scheme

Every course runs for the full length of the semester. At the beginning of the semester, a student registers for the courses that he/she wants to study and at the end of the semester a grade is awarded. On obtaining a pass grade, the student earns all the credits associated with the course while a fail grade does not get any credit; partial credits are not awarded. Each course is associated with a certain number of credits.

(a) Level of the course

The first digit of the numeric part of the course code indicates the level of the course as determined by the prerequisite course and/or by the maturity required for registering for the course.

2.6. Registration and Attendance

2.6.1. Registration

Registration is a very important procedural part of the academic system. The registration procedure ensures that the student's name is on the roll list of each course that he/she wants to study. No credit is given if the student attends a course for which he/she has not registered. Registration for courses to be taken in a particular semester will be done according to a specified schedule before the end of the previous semester. The student must also take steps to pay his/her dues before the beginning of the semester by a demand draft or by making use of internet banking facility of SBI. Students who do not make payments by a stipulated date will be de-registered for the particular semester. In absentia registration or registration after the specified date will be allowed only in rare cases at the discretion of the Dean (Academics). In case of illness or absence during registration, the student should intimate the same to his/her course advisor and Dean (Academics). A student must meet his/her adviser within the first week of the new semester for the confirmation of his/her registration. The registration record should be preserved until the semester grade card is received. Various activities related to registration are listed below. The relevant dates are included in the Semester Schedule that is available before the start of the semester.

2.6.2. Registration and Student Status

Registration by a student confirms his/her status as a student at the Institute. Failure to register before the last date for late registration will imply that the student has discontinued studies and his/her name will be struck-off the rolls. Every registered student is considered as a full-time student at the institute. They are expected to be present at the Institute and devote full time to academics.

2.6.3. Advice on Courses

At the time of registration, each student must consult his/her faculty advisor/programme coordinator to finalize the academic programme, keeping in view factors, such as, minimum/maximum numbers of total and lecture credits, past performance, backlog of courses, SGPA/CGPA, pre-requisite, work load and student's interests, amongst others. Special Provisions exist for academically weak students.

2.6.4. Registration Validation

Before the first day of classes, every student is required to be present on campus and validate his/her registration. The updated registration record will be available on the website and the hard copy will be available with the student's adviser. Students who do not do registration validation will not be permitted to add/drop courses.

2.6.5. Late Registration

Late registration is permitted under the following conditions:

- A student, who was not on campus during the period of registration in the previous semester, needs to complete the registration process on or before the first day of the semester before the commencement of classes.
  OR
- For reasons beyond his/her control, if a student is not able to register or send an authorized representative with a medical certificate, he/she may apply to the Dean (Academics) for late registration. Dean (Academics) may consider and approve late registration in genuine cases on payment of an extra fee called late registration fee. Late registration is permitted until one week after the start of the semester.

2.6.6. Add, Drop, Audit and Withdrawal from Courses

a. **Add/Drop:** A student has the option to add a course (s) that he/she has not registered for, or drop a course (s) for which he/she has already registered for. This facility is restricted to the first week of the semester.
b. **Audit:** A student may apply for changing a credit course to an audit one within one week of the end of the mid semester examination. Audit is not allowed in any 1st year course and also for any core course. The credit of the courses which are audited will not be counted in the final degree requirements.
c. **Withdrawal:** A student who wants to withdraw from a course should apply within one week of the end of the mid semester examination. A withdrawal grade (W) will be awarded in such cases.

2.6.7. Semester Withdrawal

If a student is absent for more than 20 teaching days in a semester on medical grounds, he/she may apply for withdrawal for that semester, i.e., withdrawal from all courses registered in that semester. Application for semester withdrawal must be made as early as possible at least before the start of the major tests. Partial withdrawal from the courses registered in a semester is not allowed.

2.6.8. Registration and Fees Payment

Every registered student must pay the stipulated fees in full before the specified deadlines. In the event that a student does not make these payments, he/she will be de-registered from all courses and his/her name will be struck-off from the roll list.

2.6.9. Registration Record

In addition to web-based entries related to registration, the student should ensure that the same are entered on the Registration Record. Queries related to registration will be considered only when accompanied by the original Registration Record. This record must be preserved until the semester grade card is received by the student.

2.6.10. Continuous Absence and Registration Status

If a student is absent from the Institute for more than four weeks without notifying the Head of the Department

or the Dean (Academics) his/her registration will be terminated and the name will be removed from the Institute rolls.

2.6.11. Attendance Rules

All students must attend every lecture, tutorial and practical class. However, to account for late registration, sickness or other such contingencies, the attendance requirement will be a minimum of 75% of the classes actually held. If a student has less than 75% attendance in a course during the semester, in lectures, tutorials and practical's taken together (as applicable), the course coordinator may award an 'F' grade in that course irrespective of his/her performance in the tests. For the purpose of attendance calculation, every scheduled lecture, tutorial or practical class will count as one unit irrespective of the number of contact hours.

An M.Tech. or MS (Research) student irrespective of the source of assistantship, must attend at least 75% of classes in each course in which he / she is registered. In case his/her attendance falls below 75% in any course during a month, he/ she will not be paid assistantship for that month. Further, if his/ her attendance again falls short of 75% in any course in any subsequent month in that semester, his/her studentship will be terminated. For the above purpose, if 75%works out to be a number is not a whole number; the immediate lower whole number will be treated as the required 75% attendance.

Attendance record will be maintained based upon roll calls (or any equivalent operation) in every scheduled lecture, tutorial and practical class. The course coordinator will maintain and consolidate attendance record for the course (lectures, tutorials and practical's together, as applicable)

2.6.12. Leave Rules

A full time M.Tech. student during his/her stay at the Institute will be entitled to leave for 30 days (including leave on medical ground), per academic year. Even during mid-semester breaks, and summer and winter vacations, he/she will have to explicitly apply for leave. The leave will be subject to approval of the Head of Department and a proper leave account of each student shall be maintained by the Department /Centre concerned. The student if found absent, his/her fellowship will be deducted.

The M.Sc. student during his/her stay at the Institute will be entitled to avail summer/winter vacation.

2.7. Rules and Regulations

2.7.1. Absence during the Semester

(a) A student must inform the course Instructor / HOD / Supervisor immediately of any instance of continuous absence from classes.

(b) A student who is absent due to illness or any other emergency, up to a maximum of two weeks, should approach the course coordinator for make-up quizzes, assignments and laboratory work.

(c) A student who has been absent from mid semester examination due to illness should approach the course coordinator for a make-up test immediately on return to class. The request should be supported with a medical certificate from institute's medical officer. A certificate from a registered medical practitioner will also be acceptable for a student normally residing off-campus provided registration number of the medical practitioner appears explicitly on the certificate.

(d) In case of absence on medical grounds or other special circumstances, before or during the major examination period, the student can apply for I-grade. 75% attendance in a course is necessary for being eligible for an I-grade in that course. An application requesting I-grade should be made at the earliest but not later than the last day of major tests. The application should be made to the Head of the Department of the student's programme who will grant approval depending on the merit of the case and inform the course coordinators and PG section. The student should complete all the course requirements within ten days from the last day of the Major Tests. The I-grade will then be converted to a proper grade (A to F, NP or NF).

(e) In special situations arising due to the inability to be present at the institute during the stipulated period, in (d) above, the period for conversion of I grade can be extended to the first week of the next semester. Approval for this extension can be granted by the Dean (Academics) on recommendations of the concerned Head of the Department and the course coordinators. A request to this effect must be included in the application for I-grade.

f) In case of the period of absence on medical grounds is more than 20 working days during the semester, a

student may apply for withdrawal from the semester, i.e., withdrawal from all courses registered that semester. Such application must be made as early as possible and latest before the start of the major tests. No applications for semester withdrawal will be considered after the major tests have commenced. The Dean (Academics) depending on the merit of the case, will approve such applications. Partial withdrawal from courses registered in a semester is not allowed.

(g) If a student is continuously absent from the institute for more than four weeks without notifying the Dean (Academics)/HOD, his/her name will be removed from institute rolls.

2.7.2. Measures for Helping SC/ST Students

A number of measures exist for helping students belonging to SC and ST categories. A senior faculty member is appointed as advisor to SC/ST students for advising them on academic and non-academic matters. Financial measures for helping SC and ST student are also available.

2.8. Curriculum and Structure of the PG Programmes

2.8.1. Credit Structure

The total earned credit requirements for PG programme among the various categories is given below in Table 1.

Category	Structure	Credit Requirement
Biomedical Engineering (M.Tech)	Project Work Elective Core Course	32 06 26
	Total	64
Computer Science & Engineering (M.Tech)	Project Work Elective Core Course	28 18 15
	Total	61
Electrical Engineering (M.Tech)	Project Work Elective Core Course	30 06 24
	Total	60
Mechanical Engineering (M.Tech)	Project Work Elective Core Course Soft core	32 06 18 06
	Total	**62**
Mathematics (M.Sc.)	Core Elective Project Work Seminar(compulsory)	41 15 12 02
	Total	**70**
Chemistry (M.Sc.)	Core Elective Project Work **Total**	56 06 20 **82**
Physics (M.Sc.)	Core Elective Project Work	53 09 16
	Total	**78**

2.8.2. Minimum CGPA Required for M.Sc., MS & M.Tech. Degree

The Minimum CGPA for the award of M.Sc., M.Tech. & MS degree is 5.0.

2.8.3. Special Requirements

Every student will be required to make presentations in various courses and if the Department so feels, the student can be asked to take a regular course on this aspect for credit.

2.9. Performance Requirements and Monitoring

2.9.1. Maximum Period for Completing Degree Requirements

The maximum permitted duration of each programme is determined in terms of number of registered regular semesters, herein after called registered semesters. Any semester in which a student has registered for a course will be called registered semester subject to the following:

(a) Only the first and second semesters of an academic year can be registered semesters. The summer semester will not be considered as a registered semester.

(b) A semester when a student has been granted withdrawal or granted leave will not be considered as a registered semester.

(c) The semester when a student is suspended from the Institute on disciplinary grounds will not be counted towards the number of registered semesters.

The summer semesters falling in between the permitted registered semesters shall be available for earning credits. After the student has registered for the maximum permissible number of registered semesters, the subsequent summer semesters will not be available for earning credits.

2.9.2 Guidelines for M.Tech. Project Evaluation

(i) The student shall submit the project report at the completion of project before end-semester exam.

(ii) Project will be evaluated by Project Assessment Committee (PAC).
(PAC consists of Supervisor(s), HoD/Nominee of HoD, Internal Examiner)
The evaluation will be based on

- Project report and
- Seminar+viva-voce on the project

(iii) The student will have to appear before PAC and deliver a seminar of 20-25 minutes duration followed by viva-voce.

(iv) The dissertation seminar and viva-voce shall be conducted as scheduled in the academic calendar

(v) The grades shall be assigned on the basis of marks awarded in the following distribution:

Assessment of Project work by the Supervisor	50%
Assessment of (1) Report and (2) Seminar with viva-voce by PAC	50%

The Department can assign separate weightage on (1) and (2)

2.9.3. M. Sc. Continuation, Probation and Termination Guidelines

Continuation & Probation

(a) After 1st semester, if the total earned credits is less than 75% of the required credits or having SGPA < 5.0, then he/she will be placed in probation.

(b) After 1st year, if the total earned credits is less than 75% of the required credits or having CGPA < 5.0, then he/she will be placed in probation.

(c) After 1st year, if a student complete atleast 50% of required credits with CGPA < 5.0, then he/she will be placed on probation and will be recommended for slow-paced programme. Maximum duration of the programme is 3 years.

(d) After 1st year, if a student does not complete minimum of 50% of required credits and with CGPA > 5.0, then he/she will be placed on probation and will be recommended for slow-placed programme.

(e) Students in probation are allowed to take a maximum of 75% of the credit of the required credits in the next semester. [Course adviser will recommend how many credits to do based on the students overall performance, SGPA/CGPA and earned credits).

(f) The registration of any student is limited to 1.25 times the average earned credits of the previous two semesters, subject to a minimum of 9 credits and a maximum of 24 credits.

Termination

(g) After 1st year, if a student does not complete minimum 50% of the required credits and with CGPA< 5.0, then he/she will be recommended for termination.

2.9.4. M.Tech. Continuation, Probation, Fellowship & Termination Guidelines

(a) A student in this program has to earn at least 6 credits with minimum SGPA of 5.0 in any semester, failing which he/she will be issued a warning and placed on probation.

(b) A minimum of 5.0 CGPA is required for continuation of the fellowship.

(c) The students who are on probation will not be entitled to receive fellowship.

(d) Credits earned from successful completion of Project part-1 and Project part-2 will not be considered for calculating CGPA and 'S' grade (satisfactory performance and completion of a course) or 'U' grade (unsatisfactory performance) will only be awarded for the project works.

Termination

(e) The names of the students who are on probation for two consecutive semesters will be recommended for termination.

2.9.5. MS(Research) Continuation Guidelines

If the performance at the end of first two registered semesters is very poor, then registration will be terminated.

2.10. Programme Structure

2.10.1. M. Sc. in Chemistry

Semester – I [Core]

Sr. No.	Course No.	Course Title	L-T-P-S-C	Credits
1	CY411	Concise Inorganic Chemistry	3-0-0-6-3	3
2	CY412	Concise Organic Chemistry	3-0-0-6-3	3
3	CY414/ CY415	An introduction to Biochemistry / Num erical Methods for Chemists	3-0-0-6-3	3
4	CY416	Reaction rates and Chemical Thermodynamics	3-0-0-6-3	3
5	CY417	Quantum Chemistry and Group Theory	3-0-0-6-3	3
6	CY401	Practical - 1	0-0-6-3-3	3
7	CY402	Practical - 2	0-0-6-3-3	3
			Total	**21**

Students can choose any one course of serial no. 03

Semester – II [Core]

Sr. No.	Course No.	Course Title	L-T-P-S-C	Credits
1	CY421	Advanced Organic Chemistry	3-0-0-6-3	3
2	CY422	Coordination Chemistry	3-0-0-6-3	3
3	CY423	Solid -State Chemistry	3-0-0-6-3	3
4	CY424	Electrochemistry and Statistical Thermodynamics	3-0-0-6-3	3
5	CY427	Interpretative Molecular Spectroscopy	3-0-0-6-3	3
6	CY403	Practical - 3	0-0-6-3-3	3
7	CY404	Practical - 4	0-0-6-3-3	3
			Total	**21**

Semester – III [Core]

Sr. No.	Course No.	Course Title	L-T-P-S-C	Credits
1	CY511	Instrumentation Analysis	3-0-0-6-3	3
2	CY513	Polymer Chemistry	3-0-0-6-3	3
3	CY514	Environmental Chemistry	3-0-0-6-3	3
4	CY515	Bio -organic Chemistry	3-0-0-6-3	3
5	CY530	Project - I	0-0-16-8-8	8
			Total	**20**

Dissertation with presentation for the Project-I

Semester – IV [Core and El ectives]

Sr. No.	Course No.	Course Title	L-T-P-S-C	Credits
Core				
1	CY 500	Seminar	-	2
2	CY540	Project -II	0-0-24-12-12	12
Electives				
3	CYXXX	Elective – 1	3-0-0-6-3	3
4	CYXXX	Elective – 2	3-0-0-6-3	3
			Total	**20**

- Dissertation with presentation for the Project-II (12 credits)
- Elective courses including Open (Minimum 6 credits)
- Minimum CGPA to pass M.Sc. degree: 5.0

List of Core Courses

Sr. No.	Course No.	Course Title	L-T-P-S-C	Credits
1	CY 411	Concise Inorganic Chemistry	3-0-0-6-3	3
2	CY412	Concise Organic Chemistry	3-0-0-6-3	3
3	CY414 / CY415	An introduction to Biochemistry/ Numerical Methods for Chemists	3-0-0-6-3	3
4	CY416	Reaction rates and Chemical Thermodynamics	3-0-0-6-3	3
5	CY417	Quantum Chemistry and Group Theory	3-0-0-6-3	3
6	CY401	Practical – 1	0-0-6-3-3	3
7	CY402	Practical – 2	0-0-6-3-3	3
8	CY421	Advanced Organic Chemistry	3-0-0-6-3	3
	CY423	Solid -State Chemistry	3-0-0-6-3	3
10	CY424	Electrochemistry and Statistical Thermodynamics	3-0-0-6-3	3
11	CY426	Coordination Chemistry	3-0-0-6-3	3
12	CY427	Interpretative Molecular Spectroscopy	3-0-0-6-3	3
13	CY403	Practical – 3	0-0-6-3-3	3
14	CY404	Practical – 4	0-0-6-3-3	3
15	CY511	Instrumentation Analysis	3-0-0-6-3	3
16	CY513	Polymer Chemistry	3-0-0-6-3	3
17	CY514	Environmental Chemistry	3-0-0-6-3	3
18	CY515	Bio -organic Chemistry	3-0-0-6-3	3
19	CY530	Project -I	0-0-16-8-8	8
20	CY500	Seminar	- - -	2
21	CY540	Project -II	0-0-24-12-12	12

List of Elective Courses

Sr. No.	Course No.	Course Title	L-T-P-S-C	Credits
1	CY604	Electronic Structure Calculations	2-0-2-5-3	3
2	CY605	Quantum Molecular Reaction Dynamics	3-0-0-6-3	3
3	CY611	Advances in Catalysis	3-0-0-6-3	3
4	CY612	Molecular Recognition	3-0-0-6-3	3
5	CY613	The Chemistry of Metal Carbon bond	3-0-0-6-3	3
6	CY615	Introduction to Non Equilibrium Statistical Mechanics	3-0-0-6-3	3
7	CY616	Principles of molecular simulation	3-0-0-6-3	3
8	CY621	Advanced Quantum Chemistry	3-0-0-6-3	3
9	CY622	Applied Electrochemistry	3-0-0-6-3	3
10	CY623	Heterogeneous Catalysis and Interfacial Phenomena	3-0-0-6-3	3
11	CY624	Chemistry of Natural Products	3-0-0-6-3	3
12	CY625	Inorganic Material Chemistry	3-0-0-6-3	3
13	CY626	Synthetic Organic Chemistry	3-0-0-6-3	3
14	CY627	Principles of Nuclear Magnetic Resonance Spectroscopy	3-0-0-6-3	3
15	CY701	Molecular Spectroscopy	3-0-0-6-3	3
16	CY702	Chemistry of Novel Heterogeneous Catalytic Materials	3-0-0-6-3	3
17	CY703	Strategies in Supramolecular Chemistry	3-0-0-6-3	3
18	CY704	Chemical Synthetic Strategy of Organic Reactions	3-0-0-6-3	3
19	CY705	Bioconjugates: Techniques and Applications	3-0-0-6-3	3
20	CY706	Advances in *Ab Initio* Methods	3-0-0-6-3	3
21	CY707	Non-adiabatic Effects in Chemical Dynamics	3-0-0-6-3	3

- Subject to revision of credits of course structure

2.10.2. M.Sc. in Mathematics

Semester - I

Sr.No.	Course No.	Course Title	L-T-P-S-C	Credits
1	MA411	Real Analysis	3-1-0-5-3	3
2	MA412	Linear Algebra	3-1-0-5-3	3
3	MA413	Computer Programming	3-0-2-7-4	4
4	MA414	Ordinary Differential Equation	3-1-0-5-3	3
5	MA415	Algebra	3-1-0-5-3	3
			Total	**16**

Semester- II

Sr.No.	Course No.	Course Title	L-T-P-S-C	Credits
1	MA421	Complex Analysis	3-1-0-5-3	3
2	MA422	Partial Differential Equation	3-1-0-5-3	3
3	MA423	Stocastic Processes	3-1-0-5-3	3
4	MA424	Numerical Analysis	3-0-2-7-4	4
5	MA425	Topology	3-1-0-5-3	3
6	MA500	Seminar	0-0-4-2-2	2
			Total	**18**

Semester - III

Sr. No.	Course No.	Course Title	L-T-P-S-C	Credits
1	MA511	Functional Analysis	3-1-0-5-3	3
2	MA512	Mathematical Methods	3-1-0-5-3	3
3	MA513	Optimization Techniques	3-1-0-5-3	3
4	MAXXX	Elective - I	---	3 or 4
5	MAXXX	Elective - II	3 or 4 credits	- - -
6	MA530	Project - I	0-0-6-3-3	3
			Total	**18 - 20**

Semester - IV

Sr. No.	Course No.	Course Title	L-T-P-S-C	Credits
1	MAXXX	Elective - III	------	3 or 4
2	MAXXX	Elective - IV	------	3 or 4
3	MAXXX	Elective - V	------	3 or 4
4	MA540	Project - II	0-0-18-9-9	9
			Total	**18 - 21**

- Out of total electives maximum 6 or 8 credits students can opt from open electives.
- Students may be allowed for project I & II only if their CGPA is more than or equal to 7.0 CGPA by the end of the 2nd semester evaluation. Further, students may opt relevant number of courses in place of project credit for the completion of credit requirements for the MSc degree. However, the minimum credit required to complete the MSc (Mathematics) is 70.
- The elective courses can be chosen by the department time to time of 500 and above level courses from the math department and may be taken from other department also with the departmental permission.

List of Core Courses

Sr.No.	Course No.	Course Title	L-T-P-S-C	Credits
1	MA411	Real Analysis	3-1-0-5-3	3
2	MA412	Linear Algebra	3-1-0-5-3	3
3	MA413	Computer Programming	3-0-2-7-4	4
4	MA414	Ordinary Differential Equation	3-1-0-5-3	3
5	MA415	Algebra	3-1-0-5-3	3
6	MA421	Complex Analysis	3-1-0-5-3	3
7	MA422	Partial Differential Equation	3-1-0-5-3	3
8	MA423	Stocastic Processes	3-1-0-5-3	3
9	MA424	Numerical Analysis	3-0-2-7-4	4
10	MA425	Topology	3-1-0-5-3	3
12	MA511	Functional Analysis	3-1-0-5-3	3
13	MA512	Mathematical Methods	3-1-0-5-3	3
14	MA513	Optimization Techniques	3-1-0-5-3	3

2.10.3. M.Sc. in Physics

Semester-1

Sr.No.	Course No.	Course Title	L-T-P-S-C	Credits
1	PH411	Classical Mechanics	3-1-0-5-3	3
2	PH412	Mathematical Physics	3-1-0-5-3	3
3	PH413	Quantum Mechanics-I	3-1-0-5-3	3
4	PH414	Electromagnetic Theory	3-1-0-5-3	3
5	PH415	Electronics	3-1-0-5-3	3
6	PH410	Electronics Lab	0-0-6-3-3	3
			Total	**18**

Semester - II

Sr.No.	Course No.	Course Title	L-T-P-S-C	Credits
1	PH421	Quantum Mechanics-II	3-1-0-5-3	3
2	PH422	Experimental Methods	3-0-2-7-4	4
3	PH423	Atomic and Molecular Physics	3-1-0-5-3	3
4	PH424	Nuclear and Particle Physics	3-1-0-5-3	3
5	PH425	Condensed Matter Physics	3-1-0-5-3	3
6	PH420	Physics Lab-I	0-0-8-4-4	4
			Total	**20**

Physics Lab-I: Experiments related to Solid State Physics, Modern Physics, and Nuclear Physics

Semester - III

Sr.No.	Course No.	Course Title	L-T-P-S-C	Credits
1	PH511	Modern Optics	3-1-0-5-3	3
2	PH512	Statistical Mechanics	3-1-0-5-3	3
3	PH513	Numerical Methods and Programming	2-0-6-7-5	5
4	PH5xx/PH6XX	MSc Elective-I	3-0-0-6-3	3
5	PH510	Physics Lab-II	0-0-8-4-4	4
6	PH530	MSc Project-I	0-0-6-3-3	3
			Total	**21**

Physics Lab-II: Experiments related to Optics, Electromagnetism, and Spectroscopy

Semester - IV

Sr.No.	Course No.	Course Title	L-T-P-S-C	Credits
1	PH5xx/PH6xx	MSc Elective-II	3-0-0-6-3	3
2	PH5xx/PH6xx	MSc Elective-III	3-0-0-6-3	3
3	PH540	MSc Project-II	0-0-20-10-10	10
4	PH500	MSc Seminar + Viva Voce	-----	3
			Total	**19**

*Total Credits - M. Sc. Physics :78

List of Core Courses

Sr.No.	Course No.	Course Title	L-T-P-S-C	Credits
1	PH411	Classical Mechanics	3-1-0-5-3	3
2	PH412	Mathematical Physics	3-1-0-5-3	3
3	PH413	Quantum Mechanics-I	3-1-0-5-3	3
4	PH414	Electromagnetic Theory	3-1-0-5-3	3
5	PH415	Electronics	3-1-0-5-3	3
6	PH410	Electronics Lab	0-0-6-3-3	3
7	PH421	Quantum Mechanics-II	3-1-0-5-3	3
8	PH422	Experimental Methods	3-0-2-7-4	4
9	PH423	Atomic and Molecular Physic	3-1-0-5-3	3
10	PH424	Nuclear and Particle Physics	3-1-0-5-3	3
11	PH425	Condensed Matter Physics	3-1-0-5-3	3
12	PH420	Physics Lab-I	0-0-8-4-4	4
13	PH511	Modern Optics	3-1-0-5-3	3
14	PH512	Statistical Mechanics	3-1-0-5-3	3
15	PH513	Numerical Methods and Programming	2-0-6-7-5	5
16	PH510	Physics Lab-II	0-0-8-4-4	4
17	PH530	MSc Project-I	-----	3
18	PH540	MSc Project-II	-----	10
19	PH500	MSc Seminar + Viva Voce	-----	3

2.10.4. M.Tech. in Biomedical Engineering

Semester - I

Sr.No.	Course No.	Course Title	L-T-P-S-C	Credits
1	BM 601	Fundamentals of Human Physiology	3-0-2-7-4	4
2	BM 604	Introduction to Advanced Biology	2-0-2-5-3	3
3	BM 605	Biomedical Electronics and Communication	3-0-2-7-4	4
4	BM606	Biomaterial and Tissue Interactions	2-0-2-5-3	3
5	-	Weekly seminars (no credit, 1 hour/week)		

Total 14

Semester - II

Sr.No.	Course No.	Course Title	L-T-P-S-C	Credits
1	BM 607	Medical Devices and Equipment	3-0-2-7-4	4
2	BM 608	Biomechanics	3-0-2-7-4	4
3	BM609	Physics of Medical Imaging	3-0-2-7-4	4
4	BM610	Research ethics and professional/Scientific communication (Compulsory Course)*	2-0-0-4-2	2
5	BMXXX	Elective - I	-----	3
6	BMXXX	Elective - II	-----	3
			Total	**18**

* Credits not added to total credits required.

Semester III

Sr. No.	Course No.	Course Title	Credits
1	--	Project work (Part-1) Interim Evaluation	16

Semester IV

Sr. No.	Course No.	Course Title	Credits
1	--	Project work (Part-2) Interim Evaluation	16

List of core courses

S.No	Course code	Course title	L-T-P-S-C	Credits
1	BM 601	Fundamentals of Human physiology	3-0-2-7-4	4
2	BM 604	Introduction to Advanced Biology	2-0-2-5-3	3
3	BM 605	Biomedical Electronics and Communication	3-0-2-7-4	4
4	BM606	Biomaterials and Tissue interactions	2-0-2-5-3	3
5	BM607	Medical Devices and Equipment	3-0-2-7-4	4
6	BM608	Biomechanics	3-0-2-7-4	4
7	BM609	Physics of Medical Imaging	3-0-2-7-4	4
8	BM610	Research ethics and Professional/ Scientific communication**(compulsory course)***	2-0-0-4-2	2

***Credits are not counted towards total credit requirements.**

2.10.5. M.Tech. in Computer Science & Engineering

Semester -I

Sr.No.	Course No.	Course Title	L-T-P-S-C	Credits
1	CS 506	Data Structures and Algorithms	3-0-0-6-3	3
2	CS509	PG Software lab	0-0-6-3-3	3
3	CSXXX	Elective 1	-----	3 or 4
4	CSXXX	Elective 2	-----	3 or 4

Semester -II

Sr.No.	Course No.	Course Title	L-T-P-S-C	Credits
1	CS508	Foundations of Computer Science	3-0-0-6-3	3
2	CS510	Advanced Computer Architecture	3-0-2-7-4	4
3	CSXXX	Elective 3	-----	3 or 4
4	CSXXX	Elective 4	-----	3 or 4
5	CS 500	PG seminar in Computer Science	NC	---

Semester -III

Sr.No.	Course No.	Course Title	L-T-P-S-C	Credits
1	CS XXX	Elective 5	-----	3 or 4
2	CS 698	Project -1	0-0-24-12-12	12

Semester –IV

Sr.No.	Course No.	Course Title	L-T-P-S-C	Credits
1	CS 699	Project -2	0-0-36-16-16	16

List of core and elective courses available for M.Tech in Computer Science and Engineering

S. No.	Course No.	Course Title	L-T-P-S-C	Credits
1	CS500	PG Seminar in Computer Science	NC	
2	CS501	Computational Complexity	3-0-0-6- 3	3
3	CS502	Computational Geometry	3-0-0-6- 3	3
4	CS503	Machine Learning	3-0-2-7- 4	4
5	CS504	Artificial Neural Network	3-0-0-6- 3	3
6	CS505	Digital Imaging Systems	3-0-2-7- 4	4
7	CS506	Data Structures and Algorithms	3-0-0-6- 3	3
8	CS507	Multimedia Systems	2-0-4-6- 4	4
9	CS508	Foundations of Computer Science	3-0-0-6- 3	3
10	CS509	PG Software Lab	0-0-6-3- 3	3
11	CS510	Advanced Computer Architecture	3-0-2-7- 4	4

S. No.	Course No.	Course Title	L-T-P-S-C	Credits
12	CS511	Real Time Systems	3-0-2-7- 4	4
13	CS512	Artificial Intelligence	3-0-2-7- 4	4
14	CS513	Algorithms in Bioinformatics	3-0-2-7- 4	4
15	CS514	Computer System Security	3-0-2-7- 4	4
16	CS516	Wireless Ad-Hoc Networks	2-0-4-6- 4	4
17	CS517	Digital Image Processing & Analysis	3-0-2-7- 4	4
18	CS518	Computer Vision	3-0-2-7- 4	4
19	CS519	System Level Design and Modelling	3-0-2-7- 4	4
20	CS520	Database System Implementation	3-0-2-7- 4	4
21	CS521	Fundamentals of Data Sciences	3-0-2-7- 4	4
22	CS522	Social Networks	3-0-2-7- 4	4
23	CS523	Applied Cryptography	3-0-2-7- 4	4
24	CS600	Independent Study	3-0-2-7- 4	4
25	CS601	Approximational Algorithms	3-0-2-7- 4	4
26	CS602	Randomized Algorithms	3-0-2-7- 4	4
27	CS603	Combinatorial Optimizations	3-0-2-7- 4	4
28	CS604	Advanced Operating Systems	3-0-2-7- 4	4
29	CS605	Constraint Programming	3-0-2-7- 4	4
30	CS606	Advanced Software Architecture	3-0-2-7- 4	4
31	CS607	Advanced Topics in Contemporary Computing Platforms	3-0-2-7- 4	4
32	CS608	Advanced Topics in Internet Technologies	3-0-2-7- 4	4
33	CS609	Network Science	3-0-2-7- 4	4
34	CS610	Algorithms Exemplified	3-0-2-7- 4	4
35	CS612	Advanced Machine Learning	2-0-4-6- 4	4
36	CS613	Game Theory in Wireless Networks	3-0-0-6- 3	3
37	CS615	Biomedical Image Processing & Analysis	3-0-2-7- 4	4
38	CS616	Advanced Computer Vision	3-0-2-7- 4	4
39	CS617	Affective Computing & Interaction	3-0-2-7- 4	4
40	CS618	Artificial Neural Networks	3-0-2-7- 4	4
41	CS619	Advanced Algorithms	3-0-0-6- 3	3
42	CS620	Introduction to Spatial Computing	3-0-2-7- 4	4
43	CS621	Probabilistic Graphical Models	3-0-2-7- 4	4
44	CS622	Advanced Image Processing	3-0-2-7- 4	4
45	CS698	Project –I	0-0-24-12- 12	12
46	CS699	Project-II	0-0-36-16- 16	16
47	CS701	Special Topics in Complex Networks	3-0-2-7- 4	4
48	CS702	Special Topics in Social Computing	3-0-2-7- 4	4

2.10.6. M.Tech. in Electrical Engineering (Specialization Power Engineering)

Semester -I

Sr.No.	Course No.	Course Title	L-T-P-S-C	Credits
1	EE511	HV Power Equipment	3-0-0-6-3	3
2	EE513	Simulation & Analysis of Modern Power Systems	3-0-4-8-5	3+2
3	EE515	Power Converter Analysis & Design	3-0-0-6-3	3
4	EEXXX	Department Elective - 1	-----	3
			TOTAL	**14**

Semester -II

Sr.No.	Course code	Course Name	L-T-P-S-C	Credits
1	EE510	High Voltage Engineering	3-1-4-7-5	5
2	EE512	Stability & Control of Power Systems	3-0-0-6-3	3
3	EE514	Design & Application of Electric Drives	3-1-0-5-3	3
4	EEXXX	Elective – 2 (Open Elective)	-----	3
5	EE518	Power Converter Ana lysis & Design Lab	0-0-4-2-2	2
			TOTAL	**16**

Semester -III

Sr.No.	Course No.	Course Title	L-T-P-S-C	Credits
1	EEXXX	Project-1	0-0-30-15-15	15

Semester -IV

Sr.No.	Course No.	Course Title	L-T-P-S-C	Credits
1	EEXXX	Project -2	0-0-30-15-15	15
			TOTAL CREDITS	**60**

List of Elective Courses

Sr.No.	Course No.	Course Title	L-T-P-S-C	Credit
1	EE601	Synchrophasor Technology & ITS Applications in Power	3-0-0-6-3	3
2	EE602	Transients in Power Systems	3-0-0-6-3	3
3	EE603	Signal Processing and Applications	3-0-0-6-3	3
4	EE604	Steady State and Dynamic of Electronic Machines	3-0-4-8-5	5
5	EE605	Fundamentals of Power System Operation under Restructured Environment	3-0-0-6-3	3
6	EE606	Optimization and control of Power System Operation	3-0-0-6-3	3
7	EE607	Power system protection	3-0-0-6-3	3
8	EE701	Control & Instrumentation of Power Electroni c System	3-0-0-6-3	3
9	EE702	Power generation by renewable energy	3-0-0-6-3	3
10	EE703	Computational Electromagnetics	2-0-0-4-2	2

2.10.7 M.Tech. in Electrical Engg. (Specialization Communication & Signal Processing)

Semester –I

Sr.No.	Course No.	Course Title	L-T-P-S-C	Credit
1	EE521	Analytical Techniques for Communication & Signal Processing (core)	3-0-0-6-3	3
2	EE523	Advanced Digital Communication (core)	3-0-0-6-3	3
3	EE525	Communication & Signal Processing Lab (1)	0-0-3-1.5-1.5	1.5
4	EE 527	Advanced DSP (core)	3-0-0-6-3	3
5	EEXXX	Elective 1	-----	3

Semester – II

Sr.No.	Course No.	Course Title	L-T-P-S-C	Credit
1	EE522	Adaptive Signal Processing (core)	3-0-0-6-3	3
2	EE524	Detection and Estimation Theory (core)	3-0-0-6-3	3
6	EE526	Communication & Signal Processing lab(2)	0-0-3-1.5-1.5	1.5
3.	EEXXX	Elective II	-----	3
4	EEXXX	Elective III (Open)	-----	3
5	EEXXX	Elective IV	-----	3

Semester -III

Sr.No.	Course No.	Course Title	L-T-P-S-C	Credits
1	EE XXX	Project -1	0-0-30-15-15	15

Semester -IV

Sr.No.	Course code	Course Name	L-T-P-S-C	Credits
1	EE XXX	Project -2	0-0-30-15-15	15
			TOTAL	**60**

List of Elective Courses

Sr. No.	Course No.	Course Title	L-T-P-S-C	Credits
1	EE638	Digital Image Processing	3-0-0-6-3	3
2	EE625	Computer Vision	3-0-0-6-3	3
3	EE640	Biomedical Signal Processing	3-0-0-6-3	3
4	EE641	Special Topics in Signal Processing	3-0-0-6-3	3
5	EE625	Information Theory and Coding Techniques	3-0-0-6-3	3
6	EE626	Data Communication and Networking	3-0-0-6-3	3
7	EE627	Mobile and Wireless Communication	3-0-0-6-3	3
8	EE628	RF systems for Communication	3-0-0-6-3	3
9	EE629	Special Topics in Communication	3-0-0-6-3	3

2.10.8. M.Tech. in Mechanical Engineering

Semester -I (15 Credits)	Semester -II (15 Credits)
Math – 1(core 1)	Core 5
Math – 2(core 2)	Core 6
(Core -3)	(Soft Core – 2)
(Core -4)	Open Elective 1
(Soft Core – 1)	Open Elective 2
Thesis supervisor to be decided after mid sem of 1 st sem	
Semester -III (16 Credits)	**Semester - IV (16 Credits)**
Project part – 1	Project part - 2
Weekly Seminar (NC)	Weekly Seminar (NC)

List of Courses

MATHEMATICS

1. ME501/MEL632 Mathematics for Engineers (3-0-0-6-3/3-0-0)/3 credits
2. ME502 /MEL633 Numerical Methods in Mechanical Engineering (3-0-0-6-3/3-0-0)/3 credits

MANUFACTURING

1. ME542/ MEL606 Modern Manufacturing Processes: (3-0-0-6-3/3-0-0) 3 Credits
2. ME511/MEL626 Theory of Elasticity: (3-0-0-6-3/3-0-0) 3 Credits
3. ME541/MEL631 Manufacturing Science: (3-0-0-6-3/3-0-0) 3 Credits

DESIGN

1. ME512/MEL518 Robot Manipulators: Kinematics,Dynamics and Control:(3-0-2-7-4/3-0-2)4 Credits

THERMAL

1. ME572/ MEL610 Advanced Conduction & Radiative Heat Transfer: (3-0-0-6-3/3-0-0) 3 Credits
2. ME571/ MEL629 Advanced Fluid Mechanics: (3-0-0-6-3/3-0-0) 3 Credits

2.10.9 Course Content of all the courses are available as course booklet for PG on www.iitrpr.ac.in

2.10.10 MS-Research Program in Computer Science & Engineering and Electrical Engineering : Procedures and Guidelines

Following are the details of the M.S. (R) programme offered by Department of Computer Science & Engineering and Department of Electrical Engineering, IIT Ropar:

2.10.10.1 Duration

Minimum Duration: Two Years Maximum Duration: Three Years

The candidate has to carry out research work under the supervision of a faculty member from the department.

Student Supervisory Committee: A Student supervisory Committee (SSC) will be formed within 2 months of the student joining the MS (R) program. The SSC should consist of the primary supervisor of the student and two additional members. At least one of the additional member should belong to the same department. The student is allowed to have a maximum of 2 thesis co-supervisors. The head of the department will serve as ex-officio member of the SSC.

Monitoring the Progress of the Student: The Supervisor will monitor the progress of the student through written reports and/or oral presentations. The student will submit a report to the supervisor within 15 days of the end of each semester in which the student has registered for thesis credits. The supervisor recommends the number of thesis credits considered as cleared at the end of the semester.

Evaluation of Thesis: Subject to fulfilling the course credit requirements and other conditions as may be laid down from time to time, the candidate may submit by M.S. thesis. The Research Supervisor will recommend to the Senate a panel of five experts approved by the SSC. One expert from the panel shall be appointed as external' examiner and the supervisor(s) will be the internal examiner(s). The thesis shall be forwarded to all examiners who shall report separately on the thesis and forward their recommendation to the Associate Dean (Research). The Associate Dean (Research) will examine the reports of the thesis examiners and send them to Chairman, Senate. The reports shall thereafter be sent to the Research Supervisor for their perusal and necessary action. There may be three-possible situations arising out of the nature of the reports, and the steps to be taken appropriate to the circumstances shall be as laid down below:

(i) The examiners are unanimous in recommending the award of the degree on the basis of the thesis without any modification. This is a clear case for going in for the final requirement of viva voce.

(ii) The external examiner is recommending the award of the degree but has suggested modification and/or has asked for clarifications. The candidate in that case shall make modification and provide the clarifications as suggested within a time to be fixed by the Associate Dean (Research) which in no case shall exceed two months from the date the communication is sent to the candidate. These may be sent to the examiners, if so desired by them.

(iii) The external examiner does not recommend the award of the degree. The Dean (Research) in such a case may either ask the candidate to modify the thesis as suggested within a given time not exceeding six months and send the modified thesis to the same examiner again or recommend to the Senate to appoint another external examiner or send the thesis to him/her in its original form. The recommendation of this additional examiner, at this stage, shall be taken as final.

Once the reports of the examiners have been accepted as satisfactory the candidate will have to defend his/her thesis before a viva board is not satisfied, the candidate has to appear again before the board within the next three months. The SSC shall recommend to the Senate the award of the M.S. Research degree if the viva voce is satisfactory and all the other requirements have been fulfilled. After the recommendations of the SSC either for acceptance of the thesis for the M.S. Research degree or for its rejection/modification have been accepted by the Senate and the Board of Governors or by their Chairman as the case may be, a copy of the reports of the examiners may be issued to the candidate at his/her request. However, the names of the examiners are not to be disclosed. On the basis of the report of the Board of Examiners, the Senate

decides the student's eligibility for the award of master in Science Research degree. Nothing contained in these Regulations shall preclude a candidate from publishing/patenting either independently or jointly with the supervisor the result of work incorporated in the thesis, at any time before or after submitting the thesis for examination.

(iv) Converting form MS-R to Ph.D program: A minimum GPA of 8 after the first two semesters of coursework is required for a student in the MS-R program to enroll into the Ph.D program. There must also be a faculty member of the department willing to supervise the student. Students, however must satisfy other requirements for the admission into the Ph.D program. The student is allowed to join the Ph.D program anytime between 12-18 months after joining the MS-R program. The student must submit an application to the head of the department. The head of the department will forward the application to the SSC for its recommendation. The SSC's recommendation is then forwarded to the Dean's office. The date of conversion is the date of registration in the Ph.D. program.

The credit and thesis requirement for the Ph.D. program will remain the same. However the student will be allowed to transfer the course an thesis credits earned in the MS (R) program. The duration of the Ph.D. program will still remain the same- 5 years. Fellowship will be provided to the students from the date of conversion to the Ph.D. program according to the institute rules without any arrears.

2.11 Details of Semester Fees for Indian Nationals for the Academic Year 2018-19.

	ITEM ↓ Student's → Programme	M.Tech/ MS-R/MS (Gen)	M.Tech/ MS-R/MS (SC/ST)	M.Sc (Gen)	M.Sc (SC/ST)
1.	**SEMESTER FEES (To be paid every semester)**	**(INR)**	**(INR)**	**(INR)**	**(INR)**
1.1	**INSTITUTE FEES**				
	i) Tuition Fee	6785	1785	4235	1735
	ii) Examination Fee	350	350	350	350
	iii) Registration/Enrolment Fee	250	250	250	250
	iv) Gymkhana Fee	500	500	500	500
	v) Medical Fee	50	50	50	50
	vi) Laboratory & other facilities	1500	1500	1500	1500
	vii) Library	500	500	500	500
	viii) Hostel & Mess Establishment, Amenities charges	1000	1000	1000	1000
	ix) Transfer charges (Campus Bus Services)	0	0	0	0
1.2	**HOSTEL FEES +**				
	i) Hostel Seat Rent	3000	3000	3000	3000
	ii) Fan, Electricity and water charges	2300	2300	2300	2300
	TOTAL (Semester Fees to be paid)	**16235**	**11235**	**13685**	**11185**
2.	**ONE TIME PAYMENTS (Non -refundable) To be paid at the time of admission**				
	i)Admission Fees	200	200	200	200
	ii) Thesis Fees	0	0	0	0
	iii) Grade card	200	200	200	200
	iv) Provisional certificate	200	200	200	200
	v) Student welfare fund	300	300	300	300
	vi) Modernization fees	400	400	400	400
	vii) Identity card	100	100	100	100
	viii) Benevolent fund	100	100	100	100
	ix) Alumni fees	1000	1000	1000	1000
	x)Training & Placement	500	500	500	500
	Total (one time payment at the time of admission)	**3000**	**3000**	**3000**	**3000**
3	**Deposits (Refundable)**				
	i) Institute security deposit	2000	2000	2000	2000
	ii) Library security deposit	2000	2000	2000	2000
4	**OTHER PAYMENTS** Insurance Scheme (To be paid every year in 1st semester)	500	500	500	500
	GRAND TOTAL	**23735**	**18735**	**21185**	**18685**

The fee payable at IIT Ropar is subject to change as per the Institute rules.
Note: Mess charges will be notified separately.

2.12 Details of Semester Fees for Foreign Nationals:

		(SAARC Countries)			(Other Countries)	
	ITEM **Student's Programme→** ↓	**M.Tech/ MS (R)**	**M.Sc**	**PhD**	**M.Tech/ MS (R)**	**M.Sc**
1	SEMESTER FEES (to be paid every semester)	(USD)	(USD)	(USD)	(USD)	(USD)
1.1	Institute Fees					
	Tuition Fee	850	850	850	1500	1500
	Examination Fee, Registration/Enrolment Fee, Gymkhana Fee, Medical Fee, Laboratory, Library & other facilities	100	100	100	100	100
1.2	HOSTEL FEES					
	Hostel Seat Rent, Electricity and water charges, Hostel & Mess Establishment, Amenities charges	200	200	200	200	200
	TOTAL (Semester fee to be paid)	**1150**	**1150**	**1150**	**1800**	**1800**
2	ONE TIME PAYMENTS (Non- refundable) To be paid at the time of admission					
	Admission Fees, Thesis Fees, Grade card, Provisional certificate, Student welfare fund, Modernization fees, Identity card, Alumni fees, Benevolent fund, Training & Placement	200	200	200	200	200
3	Deposits (Refundable)					
	Institute security deposit, Library security deposit	200	200	200	200	200
4	OTHER PAYMENTS Insurance Fee (To be paid every year in 1st Semester)	25	25	25	25	25
5	MESS ADVANCE	250	250	250	250	250
	GRAND TOTAL (USD)	**1825**	**1825**	**1825**	**2475**	**2475**

2.13 Fellowships & Scholarships

2.13.1 Fellowships for M.Tech./MS-Research Scholars

Qualifying Degre	Fellowship Amount	Hours/week Teaching Assistance
B.E./B.Tech./BS/B.Des and GATE/GPAT qualified	Rs. 12,400/-p.m (Both 1st and 2nd year and 5th year of Dual Degree Programmes.	8 hrs/week

The above is subject to change as per MHRD guidelines

- The maximum duration for which Fellowship can be awarded to M.Tech/ MS(R) students is 4 semesters.
- Only full-time non-sponsored students who have qualified GATE are eligible for Fellowship.
- In the first instance, the assistantship is awarded only for one semester. Thereafter continuation of the assistantship during each semester is contingent upon satisfactory academic performance and satisfactory performance in the discharge of responsibilities assigned under the assistantship scheme. For this purpose an SGPA of not less than 5.00 at the end of the semester is treated as satisfactory academic performance.
- Candidates qualified for CSIR JRF will not be allowed to avail fellowship for doing M.Tech / M.S- (R) programmes. However, they can avail the CSIR fellowship for doing the Ph.D programme.

2.13.2 Merit-cum-Means scholarship to M.Sc. students

The M.Sc. students are eligible for for Merit-cum-Means scholarship (MCM) in the form of tuition fee waiver and monthly pocket allowance on the following terms and conditions.

The students are exempted from paying tuition fee and will further receive a pocket allowance of Rs. 1000/- per month at par with B.Tech. students.

M.Sc. students will be eligible to receive MCM in the first semester based on All India Rank in JAM. The scholarship will be renewed/continued on semester to semester basis until he/she clears all academic requirements of the programme, provided that he/she continues to satisfy the eligibility and continuation criteria. This is continuation of MCM, the performance of the student will be reviewed at the end of each semester.

Criteria for Continuation.

1. CGPA must be 6.0 or more; and
2. Earned credit requirement. (Each department will notify the no. of credits required to be registered by the students and number of credits to be passed)
3. SGPA in the previous semester must be 6.0 or more.

   Only those students are eligible whose parents have a gross yearly income upto Rs. 4.5 lac per annum or as notified by govt. of India from time to time.