HANDBOOK OF
INFORMATION

POSTGRADUATE
PROGRAMME 2020-21

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2020-21

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

CONTENTS

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
- ACPGS   Academic Committee for Postgraduate Studies

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. The Indian Institute of Technology Ropar started functioning from the academic year 2008-09 from the campus of IIT Delhi, the mentor institute. The foundation stone laying ceremony was held on 24 February 2009. The Indian Institute of Technology Ropar was registered under the Societies' Registration Act 1860 on 29 July 2009. The Institute shifted to its permanent campus and currently operates from its permanent campus. The permanent campus of IIT Ropar is spread across 501 acres of land located in Rupnagar in the lap of nature at the banks of river Satluj. It has been awarded the 5 Star GRIHA (Green Rating for Integrated Habitat Assessment) rating, one of the highest national ratings for Green Buildings.

1.2 Departments
Each course is offered by an academic unit called department. The various Departments and Center 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

Sr. No.	Name of Academic Unit (alphabetical order)	Code
1	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 and Materials Engineering	MM
11	Physics	PH

1.3 Programmes offered
IIT Ropar offers academic programmes for students with a wide range of backgrounds. Admission to these programmes is based on the students' performance in national level tests / entrance examination. 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 are listed below.

The following Postgraduate Programmes are offered

Sr. No.	M.Tech. in
1.	Artificial Intelligence
2	Biomedical Engineering
3	Chemical Engineering
4.	Civil Engineering (Specialization Water Resources and Environment)
5.	Computer Science & Engineering
6.	Electrical Engineering with the following specialization i) Communication & Signal Processing ii) Microelectronics & VLSI Design iii) Power Engineering
7.	Mechanical Engineering with the following specializations: i) Mechanics & Design ii) Manufacturing Engineering iii) Thermal Engineering.

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

1.4 Student's Entry Number

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

$$2\ 0\ 2\ 0\ M\ A\ S\ 1\ 2\ 3\ 4$$

| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 |

Entry Year
(Academic year
of Joining)

Unique Identification
number for each student.

Programme Code

Fields 5 & 6   :   Academic Unit Code

Field   7   :   M.Tech.   -   M

                :   M.Sc.   -   S
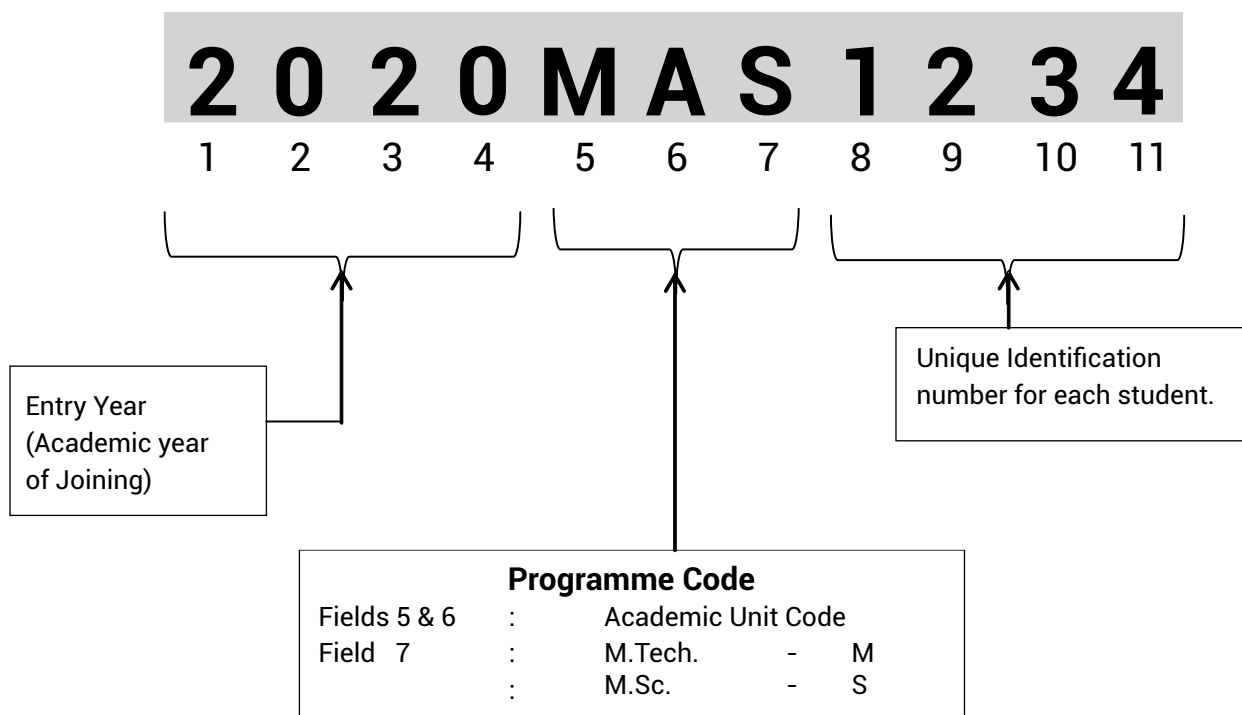
2. Postgraduate Programmes

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 PhD programme.

The current Academic year begins in September and ends in May of the following year. For the academic year 2020-21, the 1st semester starts on September 10, 2020. 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 Programmes offered and Selection Procedure

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

Sr. No.	Programme	Selection Procedure
1.	M.Sc. in Chemistry M.Sc. in Mathematics M.Sc. in Physics	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.	i. M.Tech. in Artificial Intelligence
	ii. M.Tech. in Biomedical Engineering
	iii. M.Tech. in Chemical Engineering
	iv. M.Tech. in Civil Engineering
	   *Specialization Water Resources and Environment.
	v. M.Tech. in Computer Science & Engineering.
	vi. M.Tech. in Electrical Engineering
	   *Specialization Communication & Signal Processing
	   *Specialization Microelectronics & VLSI Design
	   *Specialization Power Engineering
	vii. M.Tech. in Mechanical Engineering,
	   *Specialization Mechanics & Design
	   *Specialization Manufacturing Engineering.
	   *Specialization Thermal 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).
		Admission to MTech. programme is done through COAP (Common Offer Acceptance Portal).
		For further information, please visit: www.iitrpr.ac.in

2.3 Credit System
2.3.1 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.

2.3.2 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
S	-	Satisfactory Completion
U	-	Unsatisfactory
I	-	Incomplete
W	-	Withdrawal

2.3.3 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.

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

U grade: The 'U' grade denotes unsatisfactory performance in the course.

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:

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

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, S, U, 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.

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.

2.3.4 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.

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

The CGPA is calculated on the basis of all pass grades, obtained in all completed semesters.

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

An example of these calculations is given below:

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

Course no. (column 1)	Course credits (column 2)	Grade awarded (column 3)	Earned credits (column 4)	Grade Points (column 5)	Points secured (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	NP	2	–	–

Credits registered in the semester (total of column 2)=21
Credits registered in the semester excluding audit grade course=19 Earned
Credits in the semester (total of column 4)=17
Earned credits in the semester =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

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

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

Semester Performance: Earned Credits (E.C.)   =17SGPA=6.000
Cummulative Performance: Earned Credits (E.C.)   =17CGPA=7.067

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

Course no. (column 1)	Course credits (column 2)	Grade awarded (column 3)	Earned credits (column 4)	Grade Points (column 5)	Points secured (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	NP	1	—	—

Credits registered in the semester (total of column 2)=24
Credits registered in the semester excluding audit grade courses=23 Earned
Credits in the semester (total of column 4)=20
Earned credits in the semester excluding 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

$$\text{SGPA} = \frac{\text{Points secured in the semester}}{\text{Credits registered in the semester, excluding audit grade course}} \quad \frac{154}{19} \; 8.105$$

$$\text{CGPA} = \frac{\text{Cummulative points secured in all passed courses (A-D) Credits}}{\text{Registered in the semester, excluding audit grade course}} \quad \frac{106+154}{15+19} \; 7.647$$

Cumulative earned credits =   17 (past semester(s)) +   20 (this semester)= 37
Semester Performance: Earned credits (E.C.) =   20SGPA =8.105
Cumulative Performance: Earned credits (E.C) =   37CGPA = 7.647

2.3.5 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.

*M.Sc. programme courses will start from 400 level to 700 level.
*M.Tech. courses will start from 500 level to 700 level.
The Department can recommend 400 level courses for PG programme also.

2.4 Registration and Attendance
2.4.1 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.

2.4.2 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.

2.4.3 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

2.4.4 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.

2.4.5 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.

<div align="center">OR</div>

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 or as notified in the Academic Calendar.

2.4.6 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.

2.4.7 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. In extraordinary circumstances like medical grounds, a student may be permitted by the Dean (Academics) to withdraw from a semester completely. Normally, a student will be permitted to withdraw from the programme only for a maximum continuous period of two semesters. To continue registration to the programme, a student has to pay Registration / Enrolment fees.

2.4.8 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.

2.4.9 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.

2.4.10 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.

2.4.11 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. 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)

2.4.12 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.

2.5. Rules and Regulations

2.5.1 Absence during the Semester

(a)   A student must inform the course Instructor / HOD / Supervisor / Academic section 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.

2.5.2 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.

2.6. Curriculum and Structure of the PG Programmes

2.6.1 Credit Structure

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

Category (M.Sc.)	Structure	Credit
M.Sc. in Chemistry	Core Courses	54
	Elective Courses	06
	Project Work	19
	Seminar	1
	Total	80
M.Sc. in Mathematics	Core Courses	41
	Elective Courses	15
	Project Work	12
	Seminar (compulsory)	02
	Total	70
M.Sc. in Physics	Core Courses	53
	Elective Courses	09
	Project Work	13
	Seminar	3
	Total	78

Category (M.Tech.)	Structure	Credit
M.Tech. in Artificial Intelligence	Project Work Electives Courses Core Courses	30 11 20-22
	Total	63
M. Tech. in Biomedical Engineering	Project Work Electives Courses Core Courses	32 06 26
	Total	64
M.Tech. in Chemical Engineering	Project Work Electives Courses Core Courses	30 15/16 18
	Total	63-64
M.Tech. in Civil Engg. (Specialization Water Resources and Environment)	Project Work Elective Courses Core Courses Seminar	30 12 to 14 19 2
	Total	63-65
M.Tech. in Computer Science & Engineering	Project Work Elective Courses Core Courses	30 16 14
	Total	60
M.Tech. in Electrical Engineering (Specialization - Communication & signal processing)	Project Work Elective Courses Core Courses	30 12 18
	Total	60
M.Tech. in Electrical Engineering (Specialization – Microelectronics and VLSI Design)	Project Work Elective Courses Core Courses	30 15/16 18
	Total	63-64
M.Tech. in Electrical Engineering(Specialization - Power Engineering)	Project Work Elective Courses Core Courses	30 06 24
	Total	60
M.Tech. in Mechanical Engineering **∗Specialization** **i) Mechanics and Design** **ii) Manufacturing Engineering** **iii) Thermal Engineering**	Project Work Breadth Elective Courses Depth Elective Courses Core Courses Open Elective Courses	32 3 3 18 6
	Total	62

2.6.2 Minimum CGPA Required for M.Sc., M.Tech. Degree
The Minimum CGPA for the award of M.Sc., M.Tech. degree is 5.0.

2.6.3 Special Requirements
Every student will be required to make presentations in various courses/seminars as per the requirement of curriculum from time to time, and if the department so feels, the student can be asked to take a regular course on this aspect for credit/non-credit. In such cases department may choose letter grades as mentioned in 2.3.2.

2.7. Performance Requirements and Monitoring

2.7.1 Maximum Period for Completing Degree Requirements

A student is normally expected to complete the M.Sc.& M.Tech. programme in four semesters. In case students do not complete their project work in four semesters, they are permitted to submit the report in the fifth semester with the prior approval of project guide, HoD and Dean Academics. Under no circumstances should students be permitted to spend more than 5 semesters to complete the course work and 6 semesters for the total programme, including the project work, from the date of admission to the programme.

2.7.2 Guidelines for Project Evaluation

2.7.2.1 Guidelines for M.Sc. 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%

2.7.2.2 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
a. Project report and
b. 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 projects in respect of M.Tech program should be evaluated and grades (A to F) be awarded by the Project Assessment Committee (PAC). The grades shall be assigned on the basis of marks awarded in the following distribution.
• Assessment of Project work by the Supervisor : 35%
• Assessment of (1) Report and (2) Seminar with viva-voce by PAC : 65%

(vi)   Credits earned from successful completion of Project part-1 and Project part-2 will be added in the calculation of CGPA based on the Letter grade awarded in the project.

2.7.2.3 Supplementary examination for the students of M. Tech. and M. Sc. who fails in core courses. The detailed guidelines are as follows:-

(i)   Students who get "E" in a core course are eligible to seek Supplementary Examination in the immediately following semester.

(ii)   A student is eligible for writing only one Supplementary Examination in a course. In case a student fails in the Supplementary Examination, he/she has to repeat the course in a regular semester, as and when it is offered.

(iii)   The Supplementary Examination will be held on the 1st Saturday/ Sunday of the following semester, before the add/drop process ends.

(iv)   The Supplementary Examination shall be scheduled with the mutual convenience of the

instructor and the student, with intimation to the Academics Section.

(v)   Similar to regular examination, copy of supplementary exam question paper shall be sent to the office of Dean Academics.

(vi)   The syllabus for supplementary exam must remain same as per the regular Semester Policy (declared by the Instructor in the respective course in the regular semester).

(vii)   Final grade will be based on marks obtained in PMT plus new marks secured in the supplementary exam not exceeding 'D' grade on the same grading policy as that used in the regular semester.

(viii) Not more than two supplementary examinations for M. Tech. and three for M.Sc. programme can be written by the student in the entire duration of his/ her degree.

2.7.2.4 Norms for the Students Leaving for Jobs During M.Tech. Programme.

(i)   Students are permitted to break in studies and take up a job, provided they have completed all the course work.

(ii)   The project work can be done during a later period in the Institute in consultation with the project supervisor or in the organization where they work, if it has Research and Development facility. A consent of the Organization/Employer where they work is required for doing the project work.

(iii)   Such students should complete the project work within six semesters from the date of admission to the programme. Under no circumstances, a student should be permitted to spend more than 6 semesters for the total programme, including the project work from the date of admission to the programme.

(iv)   Students desirous of discontinuing their programme at any stage with the intention of completing the project work at a later date should seek and obtain prior permission of the Dean (Academics) through the Faculty Advisor & HoD. The consent letter from the Project Supervisor is required if the student wishes to continue the project work at IIT Ropar.

(v)   The student is required to continue their registration at the Institute by paying the requisite fees.

(vi)   The student is required to complete all the requirements towards the award of M.Tech. degree to him/her as per IIT Ropar norms.

(vii)   The students are not eligible for HTTA (GATE fellowship) during the period.

2.7.3 Continuation, Probation, fellowship and Termination Guidelines

2.7.3.1 M.Sc. Program continuation, probation, fellowship & termination guidelines.

i)   After each semester, if the total earned credits is less than 75% of the registered credits and having SGPA of less than 5.0 then he/she will be placed on probation

ii)   Students on probation are allowed to take only 75% of the credits of the required credits in the next semester. Faculty advisor will recommend as to how many credits have to be registered based on the students' previous performance.

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

iv)   On the recommendation of the faculty advisor and the Head of the Department, the students who are on probation will be advised to go for slow paced programme. Maximum duration of the programme is 3 years.

Termination

(i)   At the end of first year if a student fail to clear minimum of 50% of the credits securing CGPA of less than 5.0 then he/she will be recommended for termination.

2.7.3.2 M.Tech Program continuation, probation, fellowship & termination guidelines.

i)   After each semester, if the total earned credits is less than 75% of the registered credits and having SGPA less than 5.0 then he/she will be placed on probation.

ii)   Students on probation are allowed to take only 75% of the credits of the required credits in the next semester. Faculty advisor will recommend as to how many credits have to be registered based on the students' previous performance.

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

iii)   Students will not be allowed to register for project till they clear 70% of the course credits.

iv)   Students on probation will not be entitled to receive fellowships.

v)   A minimum SGPA of 5.0 and above is required for continuation of fellowship.

vi)   The period for which the student was not entitled for the GATE fellowship because he/she was placed on probation, is not entitled to receive the fellowship in the subsequent semester, if he/she fulfils the requirement criteria. Fellowship of that period will be granted only if the student has done his duties as TA.

vii)   Student on probation will not be placed on TA duties.

viii)   On the recommendation of the faculty advisor and the Head of the Department the students who are on probation will be advised to go for slow paced programme. Maximum duration of the programme is 3 years.

ix)   Termination

At the end of first year if a student fail to clear minimum of 50% of the course credits securing CGPA of less than 5.0 then he/she will be recommended for termination.

2.7.4 Eligibility for the award of M.Sc. & M.Tech.Degree

2.7.4.1 Eligibility for award of degree

A student shall be declared to be eligible for the award of M.Sc. degree if he/she has

a.   Registered and successfully completed all the core, elective courses and the project.
b.   Successfully acquired the minimum number of credits prescribed in the curriculum of the given stream within the stipulated time.
c.   No dues to the Institute, Library and Hostels etc.
d.   No disciplinary action pending against him/her.
        secured a CGPA of 5.0, considering only the successfully completed courses.

2.7.4.2 Structure of the M. Sc., M.Tech. Programme

1.   The programme of instruction for each stream of specialization will consist of
i.   Core courses to be compulsorily taken by all the students of the programme.
ii.   Elective courses including domain specialization courses offered (Electives will have to be opted from the courses offered by the Department in the particular quarter from amongst the list of approved courses and may be taken from other department also with the departmental permission.)
iii.   Laboratory courses
iv.   project work

2.   The medium of instruction, examination, seminar and project reports will be in English.

2.7.5 Programme Structure

I) 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 / 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

Students can choose any one course listed at serial no. 03   **Total   21**

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	Bioorganic Chemistry	3-0-0-6-3	3
5	CY530	Project - I	0-0-14-7-7	7

Total   19

Project - I will include submission of dissertation and presentation.

Semester – IV [Core and Electives]

Sr. No.	Course Code	Title	L-T-P-S-C	Credits
Core				
1	CY500	Seminar	-	1
2	CY540	Project – II	0-0-24-12-12	12
Elective				
3	CY---	Elective – 1	3-0-0-6-3	3
4	CY---	Elective - 2	3-0-0-6-3	3

Total   19

Project - II will include submission of dissertation and presentation.
Elective courses including open electives (minimum 6 credits)

Structure	Number of Credits
Core	54
Elective Courses	06
Project Work	19
Seminar	1
Total	**80**

List of Core Courses

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/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
9	CY422	Coordination Chemistry	3-0-0-6-3	3
10	CY423	Solid-State Chemistry	3-0-0-6-3	3
11	CY424	Electrochemistry and Statistical Thermodynamics	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	Bioorganic Chemistry	3-0-0-6-3	3
19	CY530	Project - I	0-0-14-7-7	7
20	CY500	Seminar	-	1
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	CY602	Concepts of Organic Chemistry	3-0-0-6-3	3
2	CY604	Electronic Structure Calculations	2-0-2-5-3	3
3	CY605	Quantum Molecular Reaction Dynamics	3-0-0-6-3	3
4	CY611	Advances in Catalysis	3-0-0-6-3	3
5	CY612	Molecular Recognition	3-0-0-6-3	3
6	CY613	The Chemistry of Metal Carbon Bond	3-0-0-6-3	3
7	CY615	Introduction to Non-Equilibrium Statistical Mechanics	3-0-0-6-3	3
8	CY616	Principles of Molecular Simulations	3-0-0-6-3	3
9	CY621	Advanced Quantum Chemistry	3-0-0-6-3	3
10	CY622	Applied Electrochemistry	3-0-0-6-3	3
11	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 Materials 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

ii) 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	Stochastic 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	MA—	Elective - I	---	3 or 4
5	MA—	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	MA—	Elective - III	---	3 or 4
2	MA—	Elective - IV	---	3 or 4
3	MA—	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	Stochastic 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
11	MA511	Functional Analysis	3-1-0-5-3	3
12	MA512	Mathematical Methods	3-1-0-5-3	3
13	MA513	Optimization Techniques	3-1-0-5-3	3

List of Elective Courses

Sr. No.	Course Code	Course Title	L-T-P-S-C	Credits
1	MA 614	Applied Linear Algebra And Matrix Analysis	3-1-2-6-4	4
2	MA 620	Discrete Mathematics	3-1-0-5-3	3
3	MA 621	Introduction to Calculus of Variations	3-0-0-6-3	3
4	MA 623	Introduction to Knot Theory	3-0-0-6-3	3
5	MA 624	Basics in Coding Theory and Cryptography	3-0-0-6-3	3
6	MA 625	Calculus of variations and integral Equations	3-0-0-6-3	3
7	MA 626	Problem Solving in Mathematics	1-0-4-4-3	3
8	MA 627	Theory of Computation	3-0-0-6-3	3
9	MA717	Advanced Partial Differential Equations	3-0-0-6-3	3

iii) M. Sc. in Physics

Semester-I

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	3-1-2-6-4	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	PH5--/PH6−	Elective - I	3-0-0-6-3	3
5	PH510	Physics Lab-II	0-0-8-4-4	4
6	PH699	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	PH5--/PH6−	Elective - II	3-0-0-6-3	3
2	PH5--/PH6−	Elective - III	3-0-0-6-3	3
3	PH799	Project - II	0-0-20-10-10	10
4	PH500	Seminar + Viva Voce	---	3
			Total	**19**

* Total Credits - M. Sc. in Physics: 78

List of core courses

Sr. No.	Course No.	Course Title	L-T-P-S-C	Credits
1	PH411	ClassicalMechanics	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 MechanicsII	3-1-0-5-3	3
8	PH422	Experimental Methods	3-1-2-6-4	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	PH699	Project-I	0-0-6-3-3	3
18	PH799	Project-II	0-0-20-10-10	10
19	PH500	Seminar + Viva Voce	---	3

List of elective courses

Sr.No.	Course Number	Course Title	LTPSC	Credits
1	PH551	Nano-optics	3-0-0-6-3	3
2	PH552	Physics of Nanomaterials and Nanotechnology	3-0-0-6-3	3
3	PH553	Surface and Interfacial Forces	3-0-0-6-3	3
4	PH554	Nonlinear Optics	3-0-0-6-3	3
5	PH555	Nuclear Reactions & Instability	3-0-0-6-3	3
6	PH556	Particle and Radiation Detectors	3-0-0-6-3	3
7	PH557	Data Reduction and Measurement Techniques	3-0-0-6-3	3
8	PH558	Nuclear Scattering and Heavy Ion Reactions	3-0-0-6-3	3
9	PH559	Physics of Low-dimensional System	3-0-0-6-3	3
10	PH560	Semiconductor Physics	3-0-0-6-3	3
11	PH561	Path Integral Formulation of Quantum Mechanics	3-0-0-6-3	3
12	PH562	Introduction to Quantum Computation and Communication	3-0-0-6-3	3
13	PH563	Quantum Optics I	3-0-0-6-3	3
14	PH610	Quantum Optics II	3-0-0-6-3	3
15	PH612	Thin Films Science and Technology	3-0-0-6-3	3
16	PH614	Laser Physics	3-0-0-6-3	3
17	PH615	Introduction to Quantum Information	3-0-0-6-3	3
18	PH617	Ion Beam Fundamentals and Patterning	3-0-0-6-3	3
19	PH618	Linear and Nonlinear Laser Spectroscopy	3-0-0-6-3	3
20	PH619	Particle Physics	3-0-0-6-3	3
21	PH620	Nuclear Models	3-0-0-6-3	3
22	PH621	Superconductivity and Magnetism	3-0-0-6-3	3
23	PH622	General Theory of Relativity and Cosmology	3-0-0-6-3	3
24	PH623	Quantum Field Theory I	3-0-0-6-3	3

iv) M.Tech. in Artificial Intelligence

Semester - I

Sr. No.	Course No.	Course Title	L-T-P-S-C	Credits
1	CS506	Data Structures and Algorithms	3-1-2-6-4	4
2	CS526	Mathematics for Computer Science	3-1-0-5-3	3
3	CS527	Computer System	3-0-2-7-4	4
4	CS509	PG Software Lab	0-0-6-6-3	3
5	------	Elective 1	---	3 or 4

Semester - II

Sr. No.	Course No.	Course Title	L-T-P-S-C	Credits
1	CS---	AI Program core I	------	3 or 4
2	CS---	AI Program core II	------	3 or 4
3	CS---	Elective II	------	3 or 4
4	CS ---	Elective III	------	3
5	------	Elective IV (CS/Open elective)	------	3 or 4
6	CS500	PG Seminar in Computer Science	------	0 (S/U)

Semester – III

Sr. No.	Course No.	Course Title	L-T-P-S-C	Credits
1	CS551	Colloquium series (approximately) 1 Hr/week	----	0 (S/U)
2	CS699	Project -1	0-0-28-14-14	14

Semester – IV

Sr. No.	Course No.	Course Title	L-T-P-S-C	Credits
1	CS555	PG Seminar-2 (Topics specific to one's research project)	-----	0 (S/U)
2	CS799	Project-2	0-0-32-16-16	16

Appendix A.   List of AI Program Core (at least 2 courses from this list)

Sr. No.	Course No.	Course Title	L-T-P-S-C	Credits
1	CS503	Machine learning	3-0-2-7-4	4
2	CS512	Artificial Intelligence	3-0-2-7-4	4
3	CS521	Fundamental of Data Science	2-0-2-5-3	3
4	CS524	Data Mining	3-0-0-6-3	3
5	CS504	Artificial Neural Networks (Deep Learning)	3-0-0-6-3	3

* In general, as new courses are designed and floated, this list would adapt with time.

Appendix B.   List of AI Program Electives (at least 3 other courses from this list)

S.no	Course No	Course Title	L-T-P-S-C	Credits
1	CS503	Machine Learning	3-0-2-7-4	4
2	CS504	Artificial Neural Networks	3-0-0-6-3	3
3	CS507	Multimedia Systems	2-0-2-5-3	3
4	CS512	Artificial Intelligence	3-0-2-7-4	4

5	CS515	Computer Graphics	3-0-0-6-3	3
6	CS517	Digital Image Processing and Analysis	2-1-2-4-3	3
7	CS518	Computer Vision	2-0-2-5-3	3
8	CS521	Fundamentals of Data Sciences	2-0-2-5-3	3
9	CS522	Social Computing and Networks	2-0-2-5-3	3
10	CS524	Data Mining	3-0-0-6-3	3
11	CS530	Multi Agent Systems	2-0-2-5-3	3
12	CS533	Reinforcement Learning	2-0-2-5-3	3
13	CS535	Introduction To Game Theory And Mechanism Design	3-1-0-5-3	3
14	CS539	Internet of Things	3-0-0-6-3	3
15	CS545	Computer Graphics Lab	0-0-2-1-1	1
16	CS612	Advanced Machine Learning	2-0-2-5-3	3
17	CS615	Biomedical Image Processing & Analysis	2-0-2-5-3	3
18	CS616	Advanced Computer Vision	2-0-2-5-3	3
19	CS617	Affective Computing and Interaction	2-0-2-5-3	3
20	CS621	Probabilistic Graphical Models	3-0-0-6-3	3
21	CS623	Multimedia Surveillance Systems	2-0-2-5-3	3
22	CS720	Advanced Spatial Computing	3-0-0-6-3	3
23	CS724	Advanced Data Mining	2-0-2-5-3	3

** In general, as new courses are designed and floated, this list of courses / course credits would adapt with time.

Please Note :
Overall Structure of the Program
- **Specialization Core** (20-22 credits):
  - CSE Core 14 credits + at least 2 courses (6-8 credits) from Appendix A (i.e list of AI program core courses)
- **Elective Course credits** (11 or more credits)
  - **Specialization electives:** At least 3 other courses from Appendix B (i.e. list of AI program electives)
  - **Department/Open Elective:** One additional course i.e. 3/4 additional credits (any PG elective course). Even non-CSE PG course can be considered but with due approval from CSE ACPGS and CSE HoD.

v) M.Tech. in Biomedical Engineering

Semester - I

Sr. No.	Course No.	Course Title	L-T-P-S-C	Credits
1	BM601	Fundamentals of Human Physiology	3-0-2-7-4	4
2	BM604	Introduction to Advanced Biology	2-0-2-5-3	3
3	BM605	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	BM607	Medical Devices and Equipment	3-0-2-7-4	4
2	BM608	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	BM----	Elective - I	---	3
6	BM----	Elective - II	---	3

* Credits not added to total credits required.   **Total 18**

Semester – III

Sr. No.	Course No.	Course Title	L-T-P-S-C	Credits
1	BM699	Project - I	0-0-16-8-8	16

Semester – IV

Sr. No.	Course No.	Course Title	L-T-P-S-C	Credits
1	BM799	Project - II	0-0-16-8-8	16

List of core courses

Sr. No.	Course No.	Course Title	L-T-P-S-C	Credits
1	BM601	Fundamentals of Human physiology	3-0-2-7-4	4
2	BM604	Introduction to Advanced Biology	2-0-2-5-3	3
3	BM605	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.

vi) M.Tech. in Chemical Engineering

Semester - I

Sr. No.	Course No.	Course Title	L-T-P-S-C	Credits
1	CH 601	Chemical Engineering Thermodynamics	3-0-2-7- 4	4
2	CH 602	Advanced Transport Phenomena	3-0-2-7- 4	4
3	CH 610	Chemical Engineering Mathematics	3-0-2-7- 4	4
4	CH 500	Chemical Engineering Technical Communication-I	0-0-2-2-1	1
5	CH 611	Advanced Chemical Reaction Engineering	3-0-2-7- 4	4

Total   17

Semester - II

Sr. No.	Course No.	Course Title	L-T-P-S-C	Credits
1	CH6--	Department Elective - I	3-0-2-7- 4	4
2	CH---	Department Elective - II	----	4
3	CH501	Chemical Engineering Technical Communication - II	0-0-2-2-1	1
4	CH---	Department Elective - III	----	4
5	-----	Open Elective - I	----	3 or 4

Total   16/17

Semester –III

Sr. No.	Course No.	Course Title	L-T-P-S-C	Credits
1	CH699	Project Part I	0-0-30-15-15	15

Semester –IV

Sr. No.	Course No.	Course Title	L-T-P-S-C	Credits
1	CH799	Project Part II	0-0-30-15-15	15

vii) M.Tech. in Civil Engineering (Specialization Water Resources and Environment)

Semester – I

Sr. No.	Course No.	Course Title	L-T-P-S-C	Credits
1	CE501	Advanced Surface Hydrology	3-1-0-5-3	3
2	CE502	Advanced Fluid Mechanics	3-1-0-5-3	3
3	CE503	Groundwater Hydrology	3-1-0-5-3	3
4	CE---	Department Elective - I	---	3 - 4
5	CE---	Department Elective - II	----	3 - 4

Total   15 - 17

Note : Allotment of dissertation topics will be made after the first semester.

Semester – II

Sr. No.	Course No.	Course Title	L-T-P-S-C	Credits
1	CE504	Water Resources Planning and Management	3-1-0-5-3	3
2	CE505	Water Quality Assessment	3-1-0-5-3	4
3	CE506	Environment impact Assessment of Water Resources Development	3-1-0-5-3	3
4	CE---	Department Elective - III	---	3
5	-----	**Open Elective - I	----	3

Total   16

**Dissertation topics would decide the nature of the open elective course subject to the approval of the department.

Student shall conduct preliminary studies related to the seminar and the project during the summer vacation period.

Semester –III

Sr. No.	Course No.	Course Title	L-T-P-S-C	Credits
1	CE507	***Seminar	0-0-4-2-2	2
2	CE699	Project - I	0-0-24-12-12	12
			Total	**14**

** For the seminar, the students have to present a literature review and submit a report before mid-sem.

Semester –IV

Sr. No.	Course No.	Course Title	L-T-P-S-C	Credits
1	CE799	Project – II	0-0-36-18-18	18
			Total	**18**

viii) M.Tech. in Computer Science and Engineering

Semester - I

Sr. No.	Course No.	Course Title	L-T-P-S-C	Credits
1	CS506	Data Structures and Algorithms	3-1-2-6-4	4
2	CS526	Mathematics for Computer Science	3-1-0-5-3	3
3	CS527	Computer System	3-0-2-7-4	4
4	CS509	PG Software lab	0-0-6-3-3	3

Semester - II

Sr. No.	Course No.	Course Title	L-T-P-S-C	Credits
1	CS---	Elective I	------	3
2	CS---	Elective II	-------	3
3	CS---	Elective III	-----	3 or 4
4	CS---	Elective IV	-----	3 or 4
5	-----	Elective V	-----	3 or 4
6	CS500	PG seminar - I	-----	0 (S/U)

Semester – III

Sr. No.	Course No.	Course Title	L-T-P-S-C	Credits
1	CS551	Colloquium Series	---	0 (S/U)
2	CS699	Project -1	0-0-28-14-14	14

Semester – IV

Sr. No.	Course No.	Course Title	L-T-P-S-C	Credits
1	CS555	PG seminar (Topics specific to one's research Project)	--------	0 (S/U)
2	CS799	Project -2	0-0-32-16-16	16

Appendix A: List of CSE Electives

S.no	Course No	Course Title	L-T-P-S-C	Credits
1.	CS503	Machine Learning	3-0-2-7-4	4
2.	CS504	Artificial Neural Networks	3-0-0-6-3	3
3.	CS505	Digital Imaging Systems	2-0-2-5-3	3
4.	CS507	Multimedia Systems	2-0-2-5-3	3
5.	CS510	Advanced Computer Architecture	3-1-0-5-3	3
6.	CS511	Real Time Systems	2-0-2-5-3	3
7.	CS512	Artificial Intelligence	3-0-2-7-4	4
8.	CS515	Computer Graphics	3-0-0-6-3	3
9.	CS516	Wireless Ad-Hoc Networks	2-0-2-5-3	3
10.	CS517	Digital Image Processing and Analysis	2-1-2-4-3	3
11.	CS518	Computer Vision	2-0-2-5-3	3
12.	CS519	System Level Design And Modelling	3-0-0-9-3	3
13.	CS520	Database System Implementation	3-0-2-7-4	4
14.	CS521	Fundamentals of Data Sciences	2-0-2-5-3	3
15.	CS522	Social Computing and Networks	2-0-2-5-3	3
16.	CS523	Applied Cryptography	3-0-2-7-4	4
17.	CS524	Data Mining	3-0-0-6-3	3
18.	CS525	Post-Quantum Crypto	3-0-0-6-3	3
19.	CS530	Multi Agent Systems	2-0-2-5-3	3
20.	CS533	Reinforcement Learning	2-0-2-5-3	3
21.	CS535	Introduction To Game Theory And Mechanism Design	3-1-0-5-3	3
22.	CS539	Internet of Things	3-0-0-6-3	3
23.	CS540	Cryptocurrencies and Blockchain Technology	3-0-0-6-3	3
24.	CS545	Computer Graphics Lab	0-0-2-1-1	1
25.	CS601	Approximation Algorithms	3-0-0-6-3	3
26.	CS602	Randomized Algorithms	3-0-0-6-3	3
27.	CS603	Combinatorial Optimizations	3-0-0-6-3	3

28.	CS604	Advanced Operating Systems	3-0-0-6-3	3
29.	CS606	Advanced Software Architecture	2-0-2-5-3	3
30.	CS607	Contemporary Computing Platforms	2-0-2-5-3	3
31.	CS608	Topics in Internet Technologies	2-0-2-5-3	3
32.	CS612	Advanced Machine Learning	2-0-2-5-3	3
33.	CS615	Biomedical Image Processing & Analysis	2-0-2-5-3	3
34.	CS616	Advanced Computer Vision	2-0-2-5-3	3
35.	CS617	Affective Computing and Interaction	2-0-2-5-3	3
36.	CS621	Probabilistic Graphical Models	3-0-0-6-3	3
37.	CS623	Multimedia Surveillance Systems	2-0-2-5-3	3
38.	CS720	Advanced Spatial Computing	3-0-0-6-3	3
39.	CS724	Advanced Data Mining	2-0-2-5-3	3

* Note that this list would adapt with time as new courses are designed and floated. Course credits may also get updated. In general, any 500-level, 600-level and 700-level courses offered in the CSE dept would be included in this list (after approval from dept).

Please Note:
- **Core courses :** 14 credits
- **Elective Course credits** (16 credits or more as per following conditions:
    - Any PG course offered in the CSE Department.
    - Atmost one non-CSE PG course (with due approval from the CSE ACPGS and CSE HOD) can be considered.

ix) M.Tech. in Electrical Engineering (Specialization Communication & Signal Processing)

Semester –I

Sr. No.	Course No.	Course Title	L-T-P-S-C	Credits
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	EE527	Advanced DSP (core)	3-0-0-6-3	3
5	EE---	Elective 1	---	3

Semester –II

Sr. No.	Course No.	Course Title	L-T-P-S-C	Credits
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
3	EE526	Communication & Signal Processing lab(2)	0-0-3-1.5-1.5	1.5
4	EE---	Elective II	---	3
5	EE---	Elective III (Open)	---	3
6	EE---	Elective IV	---	3

Semester -III

Sr. No.	Course No.	Course Title	L-T-P-S-C	Credits
1	EE699	Project -1	0-0-30-15-15	15

Semester -IV

Sr. No.	Course No.	Course Title	L-T-P-S-C	Credits
1	EE799	Project -2	0-0-30-15-15	15

List of Elective Courses

Sr. No.	Course No.	Course Title	L-T-P-S-C	Credits
1	EE625	Information Theory and Coding Techniques	3-0-0-6-3	3
2	EE626	Data Communication and Networking	3-0-0-6-3	3
3	EE627	Mobile and Wireless Communication	3-0-0-6-3	3
4	EE628	RF systems for Communication	3-0-0-6-3	3
5	EE629	Special Topics in Communication	3-0-0-6-3	3
6	EE638	Digital Image Processing	3-0-0-6-3	3
7	EE639	Computer Vision	3-0-0-6-3	3
8	EE640	Biomedical Signal Processing	3-0-0-6-3	3
9	EE641	Special Topics in Signal Processing	3-0-0-6-3	3

x) M.Tech. in Electrical Engineering (Specialization Microelectronics and VLSI Design)

Semester –I

Sr. No.	Course No.	Course Title	L-T-P-S-C	Credits
1	EE531	Core- Semiconductor Device Physics modeling	3-0-0-6-3	3
2	EE533	Core - CMOS Analog IC Design	3-0-0-6-3	3
3	EE535	Core - Digital IC Design	3-0-0-6-3	3
4	EE537	Core Lab - Circuit Simulation Lab	0-0-4-2-2	2
5	EE---	Program Elective	---	3
6	EE---	Program Elective	---	3
7	EE539	Core - Seminar 1	0-0-0-3-1	1

Semester – II

Sr. No.	Course No.	Course Title	L-T-P-S-C	Credits
1	EE530	Core - VLSI Fabrication Technology	3-0-0-6-3	3
2	EE532	Core Lab - Device Stimulation Lab	0-0-4-2-2	2
3	EE534	Core- Seminar 2	0-0-0-3-1	1
4	EE---	Program Elective	----	3
5	EE---	Program Elective	----	3
6	----	Open Elective	----	3 or 4
			Total	**15-16**

Semester -III

Sr. No.	Course No.	Course Title	L-T-P-S-C	Credits
1	EE699	Project -1	----	15
			Total	**15**

Semester -IV

Sr. No.	Course No.	Course Title	L-T-P-S-C	Credits
1	EE799	Project -2	----	15
			Total	**15**

xi) List of Electives

S. No.	Course No.	Course title	L-T-P-S-C	Credits
1.	EE650	CMOS Active Filter Design	3-0-0-6-3	3
2.	EE651	Biomedical ASIC Design	3-0-0-6-3	3
3.	EE652	Broadband Communication Circuit Design	3-0-0-6-3	3
4.	EE653	Digital Signal Processing for VLSI	3-0-0-6-3	3
5.	EE654	Electronic Packaging	3-0-0-6-3	3
6.	EE655	Electronic System Design	3-0-0-6-3	3
7.	EE656	CAD for VLSI Design	3-0-0-6-3	3
8.	EE657	Mixed Signal IC Design	3-0-0-6-3	3
9.	EE658	Nanoscale MOSFET and beyond CMOS Devices	3-0-0-6-3	3
10.	EE659	Radio Frequency Integrated Circuit Design	3-0-0-6-3	3
11.	EE660	Sensors and Instrumentati on	3-0-0-6-3	3

xii) 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	5
3	EE515	Power Converter Analysis & Design	3-0-0-6-3	3
4	EE---	Department Elective – 1	---	3
			Total	**14**

Semester – II

Sr. No.	Course No.	Course Title	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	EE---	Elective – 2 (Open Elective)	---	3
5	EE518	Power Converter Analysis & 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	EE699	Project – 1	0-0-30-15-15	15

Semester –IV

Sr. No.	Course No.	Course Title	L-T-P-S-C	Credits
1	EE799	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	Credits
1	EE601	Synchrophasor Technology & ITS Applications in Power	3-0-0-6-3	3
2	EE605	Fundamentals of Power System Operation under Restructured Environment	3-0-0-6-3	3
3	EE606	Optimization and control of Power System Operation	3-0-0-6-3	3
4	EE607	Power system protection	3-0-0-6-3	3
5	EE620	Power cable technology	3-0-0-6-3	3

xiii) M.Tech. in Mechanical Engineering

a) Courses for Mechanics and Design specialization in Semester I & II:

Semester – I

Sr. No.	Course No.	Course Title	L-T-P-S-C	Credits
1	ME501	Mathematics for Engineers (Core-I)	3-0-0-6-3	3
2	ME502	Applied Numerical Methods (Core-2)	3-0-0-6-3	3
3	ME503	Measurements and Instrumentation (Core-3)	2-0-2-5-3	3
4	ME517	Advanced Solid Mechanics (Core-4)	3-0-0-6-3	3
5	ME518	Multibody Dynamics (Core-5)	3-0-0-6-3	3

Semester – II

Sr. No.	Course No.	Course Title	L-T-P-S-C	Credits
1	ME515	Finite Element Methods in Engineering (Core-6)	3-1-0-5-3	3
2	MEXYZ	Depth Elective*; (X=5 or 6; Y=1 to 3; Z=0 to 9)	---	3
3	MEXYZ	Breadth Elective*; (X=5 or 6; Y=0 or 4 to 9; Z= 0 to 9)	---	3
4	---	Open Elective – 1**	---	3
5	---	Open Elective – 2**	---	3

b) Courses for Manufacturing Engineering specialization in Semester I & II:

Semester – I

Sr. No.	Course No.	Course Title	L-T-P-S-C	Credits
1	ME501	Mathematics for Engineers (Core-1)	3-0-0-6-3	3
2	ME502	Applied Numerical Methods (Core-2)	3-0-0-6-3	3
3	ME503	Measurements and Instrumentation (Core-3)	2-0-2-5-3	3
4	ME547	Analysis of Material Removal Processes (Core-4)	3-0-0-6-3	3
5	ME548	Analysis of Casting, Forming and Joining Processes (Core-5)	3-0-0-6-3	3

Semester – II

Sr. No.	Course No.	Course Title	L-T-P-S-C	Credits
1	ME559	Computer Integrated Design and Manufacturing Systems (Core-6)	---	3
2	MEXYZ	Depth Elective*; (X=5 or 6; Y=4 to 6; Z=0 to 9)	---	3
3	MEXYZ	Breadth Elective*; (X=5 or 6; Y=0 to 3 or 7 to 9; Z= 0 to 9)	---	3
4	---	Open Elective – 1**	---	3
5	---	Open Elective – 2**	---	3

c) Courses for Thermal Engineering specialization in Semester I & II:

Semester – I

Sr. No.	Course No.	Course Title	L-T-P-S-C	Credits
1	ME501	Mathematics for Engineers (Core-1)	3-0-0-6-3	3
2	ME502	Applied Numerical Methods (Core-2)	3-0-0-6-3	3
3	ME503	Measurements and Instrumentation (Core-3)	2-0-2-5-3	3
4	ME571	Advanced Fluid Mechanics (Core-4)	3-0-0-6-3	3
5	ME579	Advanced Thermodynamics (Core-5)	3-0-0-6-3	3

Semester – II

Sr. No.	Course No.	Course Title	L-T-P-S-C	Credits
1	ME575	Turbomachines (Core-6)	3-0-0-6-3	3
2	MEXYZ	Depth Elective*; (X=5 or 6; Y=7 to 9; Z=0 to 9)	---	3
3	MEXYZ	Breadth Elective*; (X=5 or 6; Y=0 to 6; Z= 0 to 9)	---	3
4	---	Open Elective – 1**	---	3
5	---	Open Elective – 2**	---	3

See List of Probable Courses to be Floated in Semester-II by the Department*
** PG level courses from any department can be chosen as Open Elective

d) Project work for all specializations in Semester III & IV

Semester – III

Sr. No.	Course No.	Course Title	L-T-P-S-C	Credits
1	ME699	Project Part-1	0-0-32-16-16	16

Semester – IV

Sr. No.	Course No.	Course Title	L-T-P-S-C	Credits
1	ME799	Project Part-2	0-0-32-16-16	16

List of Probable Courses to be Floated in Semester-II by the Department*
***Please consult your faculty advisor for updated list of courses available for selection

Sr. No.	Course No.	Course Title	L-T-P-S-C	Credits
1	ME504	Deep learning for physical systems	3-0-0-6-3	3
2	ME511	Theory of Elasticity	3-0-0-6-3	3
3	ME514	Fracture & Fatigue	3-0-0-6-3	3
4	ME516	Introduction to Plasticity	3-0-0-6-3	3
5	ME519	Engineering Design Optimization	3-1-0-5-3	3
6	ME526	Atomistic Simulation and Modeling of Materials	2-0-2-5-3	3
7	ME541	Manufacturing Science-I	3-0-0-6-3	3
8	ME542	Modern Manufacturing Processes	3-0-0-6-3	3
9	ME550	Solidification Processing	3-0-0-6-3	3
10	ME561	Advanced Welding Technology	3-0-0-6-3	3
11	ME575	Turbomachines	3-0-0-6-3	3
12	ME576	Convective Heat Transfer	3-0-0-6-3	3
13	ME580	Computational Fluid Dynamics	3-0-0-6-3	3
14	ME624	Machine Vibration Analysis	3-0-0-6-3	3
15	ME643	Science of Machining	3-0-0-6-3	3
16	ME674	Solar Thermal Engineering	3-0-0-6-3	3
17	ME677	Thermal Management of Electronics	3-0-0-6-3	3
18	ME685	Combustion Engineering	3-0-0-6-3	3

3   Fees

3.1   Mode of Payment

(a)   Institute dues
All Institute dues are to be paid through Demand Draft in favour of "IIT Ropar Fee account, IIT Ropar" payable at Ropar or through State Bank of India Internet Banking as available.

(b)   Mess dues
Mess dues are to be paid by demand draft in favour of "The Director, IIT Ropar, Hostel Account" payable at Ropar or through internet Banking as available.

Deadlines for Payment

(a)   Institute dues

(I)   All Institute dues to be paid in full before the last date for Late Registration (this is typically one week after the first day of classes).

(ii)   Students who do not pay the required amount by this date, or those who make partial payments, shall have their registration cancelled. Registration will be restored on payment of fees and a fine as stipulated in the Institute rules.

(iii)   In case of new entrants, the fees has to be paid by demand draft on the day of registration at the time of joining the Institute.

(b)   Mess dues
All Mess dues are to be paid on or before the date for Registration Validation, i.e. before the first day of classes.

3.2   Refund of Fees
The whole amount of fees/other charges deposited by the students will be refundable after deduction of Rs. 1,000/, if the students do not join the programme after paying the dues and leave the Institute by applying for refund on or before the date of registration. No refund of fees will be permissible to students who have registered for the programme but leave immediately thereafter. In such cases, only caution money will be refunded and that too only at the end of the semester.

3.3   Withdrawal from the Institute
If a student is continuously absent from the Institute for more than four weeks without informing the Dean (Academics), his/her name will be removed from the Institute rolls. Such absence during the first year will render the student ineligible for re-admission.A student wishing to leave the Institute on his/her own should submit an application duly countersigned by his/her father/guardian. He/she shall also obtain "Clearance Certificate" from the Department, the Librarian, the Warden, the Officer Commanding, NCC, and the Accounts Section, and submit to the Academics Section (PG) for settling his/her accounts in the Accounts Section. The student shall remain liable to pay all dues till the date on which his/her name is formally struck off the Institute rolls.

3.4 Transcripts, Degree and other Certificates
Additional transcripts, duplicate degrees/diplomas, etc can be obtained on payment of the following charges:

a) Degree, in person   :   Rs.1000

b) Degree, in absentia   (In India)   :   Rs.1000

a) Degree, in person   :   Rs.1000

			(In India)	:	Rs.1000
b) Degree, in absentia			(In India)	:	Rs.1000
			(In Abroad)	:	Rs.1500
			Or	:	US$150

c) Migration Certificate   :   Rs.500
(Only one original)

d) Duplicate Degree/certificate   (In India)   :   Rs.2500
(Only one Original)   (In Abroad)   :   US$250

e) Transcripts   (In India)   :   Rs.500
(1 Original + 4 Attested Copies)   (In Abroad)   :   US$50

f) Duplicate Identity Card   :   Rs.500

g) Certificate of medium of instruction in English   (In India)   :   Rs.100
(Only one original)   (In Abroad)   :   US$10

h) Verification of degree certificate,   (In India)   :   Rs.1000
   membership of Institute bodies,   (In Abroad)   :   US$100
   etc. (for each individual verification)

i) Character Certificate (only one original)   (In India)   :   Rs.100
                                   (In Abroad)   :   US$10

3.5 Details of Semester Fees for Indian Nationals for the Academic Year 2020-21

ITEM	Student's Programme →	M.Tech. /	M.Tech/ (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		6,785	1,785	4235	1,735
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		1,500	1,500	1,500	1,500
vii) Library		500	500	500	500
viii) Hostel & Mess Establishment, Amenities charges		1,000	1,000	1,000	1,000
ix) Transfer charges (Campus Bus Services)		0	0	0	0
1.2. **HOSTEL FEES +**					
i) Hostel Seat Rent		3,000	3,000	3,000	3,000
ii) Fan, Electricity and water charges		2,300	2,300	2,300	2,300
TOTAL (Semester Fees to be paid)		**16,235**	**11,235**	**13,685**	**11,185**

2.	ONE TIME PAYMENTS (Non - refundable) To be paid at thetime 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	1,000	1,000	1,000	1,000
	x)Training & Placement	500	500	500	500
	Total (one time payment at the time of admission)	**3,000**	**3,000**	**3,000**	**3,000**
3.	**Deposits (Refundable)**				
	i) Institute security deposit	2,000	2,000	2,000	2,000
	ii) Library security deposit	2,000	2,000	2,000	2,000
4.	OTHER PAYMENTS Insurance Scheme (To be paid every year in 1st semester)	500	500	500	500
	GRAND TOTAL	**23,735**	**18,735**	**21,185**	**18,685**

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

3.6 Semester Fees for Foreign Nationals will be same as per Indian Nationals

3.7 HOSTEL/MESS FEES : To be notified separately

*subject to revision in every semester.
Please Note : The students are required to pay the Hostel/Mess Fees every semester.

3.8 Fellowships & Scholarships

3.8.1 Fellowships for M.Tech Students

Qualifying Degree	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 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 programmes. However, they can avail the CSIR fellowship for doing the PhD programme.

3.8.2 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.

4 Discipline and Attendance

4.1 Discipline

(a) Students are expected to dress and to conduct themselves in a proper manner.
(b) All forms of ragging are prohibited. If any incident of ragging comes to the notice of the authorities, the student concerned shall be given the opportunity to explain. If the explanation is not found to be satisfactory, the authorities can expel him/her from the Institute.
(c) The students are expected to conduct themselves in a manner that provides a safe working environment for women. Sexual harassment of any kind is unacceptable and will attract appropriate disciplinary action.

4.2 Punishment to the students who indulge in unfair means during quizzes/mid semester/end-semester examinations .

The following graded punishments will be imposed on those who indulge in Academic Mal-practices —unfair means during Mid-semester/End-semester examinations:

(a) For rude behaviour

(i) Severe warning shall be issued to a student who is found to display rude behaviour towards fellow students /invigilators.
(ii) The student is liable to be expelled from the examination hall.
(iii) In such cases, the parents of that student would be informed of such indiscipline.

(b) Malpractices and corresponding Punishments

S.No.	Nature of Malpractice	Recommended Punishment
1.	Communicating with neighbours in the examination hall.	The erring student(s) shall be awarded `F' grade in the subject concerned.
2.	Possessing incriminating∗ materials inside the examination hall. (or) Possessing the answer book of another candidate. (or) Passing on answer book to another student. (or) Exchange of question papers, with some answers noted down on them. (or) Individual referral of material / discussion with other students, during visit outside the examination hall.	The Disc iplinary Committee shall have the discretion to recommend one of the following punishments: (a) The erring students(s) shall be awarded 'F' grade in the subject concerned. (or) (b) The erring student(s) shall be awarded 'F' grade in the subject concerned and one grade less in all the other subjects in the concerned semester. (or) (c) The concerned student(s) shall be awarded `F' grade in all the subjects in the concerned semester.
3.	Involved in malpractice in the examination for the second time, in a premeditated manner.	The concerned student i) shall be awarded 'F' grade in all subjects, in the concerned semester and ii) shall be debarred from attending classes and taking examinations in the subsequent semester.
4.	Impersonation in the examination.	The concerned student i) shall be awarded `F' grade in all subjects, in the concerned semester and ii) shall be debarred from attending classes and taking examinations in the next two subsequent semesters.

(∗ incriminating materials include written/printed material; unauthorized additional sheets without or with write-ups, bits, scribbles on scales / handkerchief / on the body; abuse of calculator / organizer / cell phone, etc.)

INDIAN INSTITUTE OF TECHNOLOGY ROPAR, PUNJAB
5. The Honour Code

I, ………………………………………………..……………………………………………IIT ROPAR…… www.iitrpr.ac.in……………..

Entry ………

Do hereby undertake that as a student of IIT Ropar, Punjab:

1.   I will not give or receive aid in examination; that I will not give or receive unpermitted aid in classwork, in preparation of reports or in other work that is to be used by the instructor as the basis of grading; and
2.   I will do my share and take an active part in seeing to it that others as well as I uphold the spirit and letter of the Honour Code.
3.   I realize that some examples of misconduct which are regarded as being in violation of the Honour Code include:

- Copying from another's examination paper or allowing another to copy from one's own paper;
- Unpermitted collaboration;
- Plagiarism;
- Revising and resubmitting a marked quiz or examination paper for regarding without the instructor's knowledge and concern;
- Giving or receiving unpermitted aid on take home examination;
- Representing as one's own work the work of another, including information available on the internet;
- Giving or receiving aid on academic assignments under circumstances in which a responsible person should have known that such aid was not permitted; and
- Committing a cyber offence such as breaking passwords and accounts, sharing passwords, electronic copying, planting viruses etc.

I accept that any act of mine that can be considered to be an Honour Code violation will invite disciplinary action.

Date:…………………….

                                        Student's Signature………………...……………..……………

                                        Name:………………………………………..……………………......

                                        Entry No: ………………………………..………………………

6   Academic Integrity

1.   Cases of ethical lapses emanating from institutions of scientific research are increasingly being reported in the news. In this context, we need to create awareness and come up with a set of clear guidelines to maintain academic integrity. A flourishing academic environment entails individual and community responsibility for doing so. The three broad categories of improper academic behavior that will be considered are: I) plagiarism, II) cheating and III) conflict of interest.

2.   Cases of ethical plagiarism are the use of material, ideas, figures, code or data without appropriate acknowledgment or permission (in some cases) of the original source. This may involve submission of material, verbatim or paraphrased, that is authored by another person or published earlier by oneself. Examples of plagiarism include:

(a)   Reproducing, in whole or part, text/sentences from a report, book, thesis, publication or internet.

(b)   Reproducing one's own previously published data, illustrations, figures, images, or someone else's data, etc.

(c)   Taking material from class-notes or downloading material from internet sites, and incorporating it in one's class reports, presentations, manuscripts or thesis without citing the original source.

(d)   Self-plagiarism, which constitutes copying verbatim from one's own earlier published work in a journal or conference proceedings without appropriate citations.
The resources given in Subsection (8) explain how to carry out proper referencing, as well as examples of plagiarism and how to avoid it.

3.   Cheating is another form of unacceptable academic behavior and may be classified into different categories:

(a)   Copying during exams, and copying of homework assignments, term papers or manuscripts.
(b)   Allowing or facilitating copying, or writing a report or exam for someone else.
(c)   Using unauthorized material, copying, collaborating when not authorized, and purchasing or borrowing papers or material from various sources.
(d)   Fabricating (making up) or falsifying (manipulating) data and reporting them in thesis and publications.

4.   Some guidelines for academic conduct are provided below to guard against negligence as well as deliberate dishonesty:

(a)   Use proper methodology for experiments and computational work. Accurately describe and compile data.

(b)   Carefully record and save primary and secondary data such as original pictures, instrument data readouts, laboratory notebooks, and computer folders. There should be minimal digital manipulation of images/photos; the original version should be saved for later scrutiny, if required, and the changes made should be clearly described.

(c)   Ensure robust reproducibility and statistical analysis of experiments and simulations. It is important to be truthful about the data and not to omit some data points to make an impressive figure (commonly known as "cherry picking").

(d)   Lab notebooks must be well maintained in bound notebooks with printed page numbers to enable checking later during publications or patent. Date should be indicated on each page.

(e)   Write clearly in your own words. It is necessary to resist the temptation to "copy and paste' from the Internet or other sources for class assignments, manuscripts and thesis.

(f)   Give due credit to previous reports, methods, computer programs etc. with appropriate citations. Material taken from your own published work should also be cited; as mentioned above, it will be considered self-plagiarism otherwise.

5. A clash of personal or private interests with professional activities can lead to a potential conflict of interest, in diverse activities such as teaching, research, publication, work on committees, research funding and consultancy. It is necessary to protect actual professional independence, objectivity and commitment, and also to avoid an appearance of any impropriety arising from conflicts of interest. Conflict of interest is not restricted to personal financial gain; it extends to a large gamut of professional academic activities including peer reviewing, serving on various committees, which may, for example, oversee funding or give recognition, as well as influencing public policy. To promote transparency and enhance credibility, potential conflicts of interests must be disclosed in writing to appropriate authorities, so that a considered decision can be made on a case-by-case basis. Some additional information is available in the section below dealing with resources.

6. The responsibility varies with the role one plays.

(a) Student roles: Before submitting a thesis to the department, the student is responsible for checking the thesis for plagiarism using software that is available on the web. In addition, the student should certify that they are aware of the academic guidelines of the institute, have checked their document for plagiarism, and that the thesis is original work. A web-check does not necessarily rule out plagiarism.

(b) Faculty should ensure that proper methods are followed for experiments, computations and theoretical developments, and that data are properly recorded and saved for future reference. In addition, they should review manuscripts and theses carefully. Apart from the student certification regarding a web-check for plagiarism for theses, the Institute will provide some commercial software at SERC for plagiarism checking. Faculty members are encouraged to use this facility for checking reports, theses and manuscripts. Faculty members are also responsible for ensuring personal compliance with the above broad issues relating to academic integrity.

(c) A breach of academic integrity is a serious offence with long lasting consequences for both the individual and the institute, and this can lead to various sections. In the case of a student, the first violation of academic breach will lead to a warning and/or an "F" course grade. A repeat offence, if deemed sufficiently serious, could lead to expulsion. It is recommended that faculty members bring any academic violations to the notice of the Department Chairman. Upon receipt of reports of scientific misconduct, the Director may appoint a committee to investigate the matter and suggest appropriate measures on a case to case basis.

7. The Indian Institute of Technology Ropar will own the Intellectual Property (IP) made or created by any student carrying out research under the supervision of any employee of the Institute, or the IP developed individually by the student in the course of his/her studies at IIT Ropar, or with any use of IIT Ropar facilities. By accepting admission to IIT Ropar, a student agrees to assign to the IIT Ropar all such IP made or created at IIT Ropar, including inventions and copyright-able material; and to execute all papers required to assign, apply for, obtain, maintain, issue and enforce IP and IP rights.

8. References:
National Academy of Sciences article "On being a scientist,"
I. http://www.nap.edu/openbook.php?record_id=4917&page=RI
ii. http://www.admin.cam.ac.uk/univ/plagiarism/
iii. http://www.aresearchguide.com/6plagiar.html
iv. https://www.indiana.edu/~tedfrick/plagiarism
v. http://www.files.chem.vt.edu/chem-ed/ethics/index.html
vi. http://www.ncusd203.org/central/html/where/plagiarism_stoppers.html
vii. http://sja.ucdavis.edu/files/plagiarism.pdf
viii. http://web.mit.edu/academicintegrity/
ix. http://www.northwestern.edu/provost/students/integrity/
x. http://www.ais.up.ac.za/plagiarism/websources.htm#info
xi. http://ori.dhhs.gov/
http://www.scientificvalues.org/ceses.html

7 Library Facilities

The Central Library functions as the primary information resource centre and repository of printed and electronic resources for teaching and research activities at the institute. Apart from textbooks and recommended reading materials prescribed for each course offered at the institute, the library houses a growing collection of research monographs, reports, multi-volume reference works, dictionaries, encyclopedias, handbooks, and so on. The library facilitates access to electronic journals through its participation in consortia, such as E-Shodh Sindhu. The library also subscribes to several e-journals directly from publishers as well as through reputed subscription agencies. At present, users can consult more than 22,000 books (available on shelves) and thousands of electronic books, journals. Online access is also provided to economic and political databases, scientometric databases such as Scopus, MathSciNet, and Web of Science.

The library operations are automated using LIBSYS 7 (EJB Version) software. The Online Public Access Catalogue (OPAC) which is on the public domain, enables users to search documents in possession of the library. The library is using the Radio Frequency Identification Technology (RFID), a state-of-the-art auto identification technique which helps in self-servicing and enhanced security. A separate e-resources section is provided in the library to browse CDs and DVDs of books, theses, and dissertations. The library has developed an institutional digital repository (IDR) using open source software (DSpace) to archive and provide online access to the intellectual output of the institute. IDR is available publicly. These steps will significantly enhance the library's efficiency in making the resources available to the academic community at large and also enable the institute to participate in various inter-library initiatives at national and international levels. Library also provided access to Indian Research Information Network System (IRINS) developed by INFLIBNET which gave comprehensive information about the research profiles of IIT Ropar.

The library is offering extensive research support services such as citation analysis, usage of reference management tools, copyright and plagiarism support etc. The library is using a Turnitin, a leading academic plagiarism tool and the Grammarly an English grammar checking tool to improve the quality of writing and research publications. The library is continuously striving to identify and adopt the emerging academic and research support tools and helping the institute in achieving its vision and mission.

8 Health Care

Presently the Institute Medical Centre is located in a utility building adjoining the hostel complex. Medical Centre consist of full time medical officers, paramedical staff to attend faculty, staff and students and having facility of visiting specialist doctors. The medical centre has facilities of outdoor patient treatment (OPD), day care services, medical emergency care 24x7 and having referral facility via well equipped ambulance round the clock. In addition, the Institute has empanelment with local Ropar hospital and a few superspecialty hospitals in the city Mohali and Chandigarh for providing medical care to IIT fraternity. IIT Ropar provides cashless facilities for OPD treatment from the local empanelled hospitals in Ropar. The students are covered under medical insurance for indoor treatment subject to terms and conditions of insurance policy. Medical Health care aims to enhance the health care experience of IIT Ropar campus community by providing health care with respect, consideration and confidentiality.

9 Hostel and Dining Facilities

IIT ROPAR | The Institute campus houses eight hostels with latest and modern facilities:-Satluj, Beas, Chenab, Jupiter, Mercury (Wing A, Wing B and Wing C), Hostels for boys, and Raavi, Venus, Neptune for girls. The Institute can accommodate 1950 boys and 500 female students in its both campus hostels i.e Transit Campus and Permanent Campus. Out of these, four are new hostels (three for boys and one for girls) accommodating 2005 students in the Permanent campus. All hostels are provided with excellent drinking water facilities. Each hostel has common facilities indoor, recreation and games. The hostel complex also includes a few shops that cater to the basic needs of the residents. IIT Ropar also provides gymnasium facility within its campus for its students. Lush green IIT campus add enormous fuel in the daily life of the students. We have lively and

enchanting campus life wherein the students are provided with all the amenities for the recreational activities. Here at IIT Ropar students rejuvenate their hidden talent and relive their hobbies. State of the art classroom with Audio visualaids and state of the art laboratories with latest research facilities enhance the teaching-learning process while Hightech library with tremendous books, journals, periodicals etc helps them to connect with the entire word of information and knowledge. At IIT Ropar, Students relish research and extracurricular activities to grow as an aspiring engineer with moral and ethical integrity.

10 Student Activities

The Institute has a Society for Publication and Communication Skills Development. In addition, there are Music, Dance, Dramatics, Arturo, Fine Arts, Literary clubs and also Science & Technology, Robotic Societies, Monochrome, Computer Integrated Manufacturing, Astronomy, Quiz, Coding clubs where the students can participate and develop a well– rounded personality.

11 General Facilities

The Institute has a branch of SBI as well as a Post office to cater to the needs of the faculty members, staff and students.

12 Details of Medals

Name of the Medal	Criteria for Award
Institute Silver Medal (For each programme)	Institute Silver Medal For Each Programme: To a candidate (one in each programme) who obtains the highest CGPA among and graduating class of the Institute in his/her programme. A minimum CGPA of 8.5 is required for award of Institute Silver Medal for all courses/programmes.

13 Academic Calendar for the 1st Semester of Academic Year 2020-21
Please visit - www.iitrpr.ac.in/academic-calendar-0

CONTACT INFORMATION

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(email sent to this address will only be monitored)
Contact No. 01881-231112, 01881-231115

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