

सीनेट की एकसौवी बैठक का कार्यवृत्त

**MINUTES OF THE 100TH
MEETING OF THE SENATE**

06 मार्च 2024

06th MARCH 2024



**भारतीय प्रौद्योगिकी संस्थान रुड़की
रुड़की – 247 667 (भारत)**

**INDIAN INSTITUTE OF TECHNOLOGY ROORKEE
ROORKEE – 247 667 (INDIA)**

भारतीय प्रौद्योगिकी संस्थान रुड़की
INDIAN INSTITUTE OF TECHNOLOGY ROORKEE

रुड़की 247 667
ROORKEE – 247 667



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**INDIAN INSTITUTE OF TECHNOLOGY ROORKEE
MEETING SECTION**



**Minutes of the 100th Meeting of the Senate held on 06.03.2024 at
04.00 P.M. in the Senate Hall.**

The list of participants who attended the meeting and those who have conveyed their inability to attend are appended at **Annexure-I & Annexure-II** respectively.

At the outset, the Chairman welcomed the members in the 100th meeting of the Senate. In his opening address it was stated that it is an indeed pleasure to be a part of the 100th meeting of the Senate. It is a pleasant journey and occasion to remember the key decisions taken by the august members of Senate during the last 23 years. The Chairman mentioned some such decisions taken by the Senates through a recap. He thanked to all past and present members, Deans of Academic Affairs, academicians, administrators, faculty colleagues, student representatives and others who were involved in different activities in decision making, conducting and organizing the meetings of the Senate. The Chairman highlighted that the fact that IIT Roorkee is currently among the top five engineering institutions of the country is indeed a matter of pride for the Institute and its stakeholders.

The Senate remembered and acknowledged the contributions made by Prof. D.V. Singh, Prof. Prem Vrat, Prof. S.C. Saxena, Prof. Pradipta Banerji and Prof. A.K. Chaturvedi as Chairmen, Senate in the past.

The Chairman thanked and placed on record the valuable contributions of the outgoing following members:

1. Prof. C.B. Mazumdar, Department of Chemical Engineering
2. Prof. Mohd. Israil, Department of Earth Sciences

The agenda was then taken up.

Item No. 100.1: To confirm the minutes of the 99th Senate meeting held on 03.01.2024.

No comments were received. Minutes of 99th meeting of the Senate as circulated on 29.01.2024 were confirmed.


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Item No. 100.2: To report on the actions taken to implement the decisions of the Senate taken in its 99th meeting held on 03.01.2024.

The Senate noted the actions taken on the minutes.

Item No. 100.3: To Consider the request of Mr. Suman Narayan, (Enr. No. 20535028), Ex-Ph.D. (CS) student for allowing him to complete M.Tech. degree.

The Senate approved the restoration of Mr. Suman Narayan from the spring semester 2023-24 and allowed the candidate to work and submit the M.Tech. thesis for consideration of award of M.Tech. degree on the lines of recommendation of IAPC as a special case.

Item No.100.4: To consider the Seat Matrix for admission in the Ph.D. programme in Autumn Semester 2024-2025.

The Senate approved the Seat Matrix as recommended by the IRC (**Appendix-A**).

Further, the Senate advised to take necessary efforts to reduce the gap between intake and seat filled in Ph.D. programmes. The year-wise status of registered Ph.D. students was presented. The Senate took a serious note on the delay of completion of Ph.D. work specifically in the cases beyond the 5th year.

The Chairman suggested that while admitting the students for Ph.D. programme:

- i. The core strength of the candidates on three points viz aptitude towards research, capacity to work hard, innovative and adaptability be suitably assessed.
- ii. There should be bonding between a research scholar and supervisor(s). The mentor mentee relationship is important to ensure the timely completion of work.
- iii. The mentor-mentee culture is also important among the experienced and young faculty members.


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Item No.100.5: To consider the change(s) in Minimum Educational Qualification for admission to M.Tech. programmes received from various Departments/Centres/School.

The Senate approved the Minimum Educational Qualification (MEQ) for admission to the M.Tech. programmes as recommended by the IAPC. **(Appendix-B)**

Item No. 100.6: To consider the eligible GATE disciplines and seat matrix for admission into the M.Tech. programmes through GATE 2024 for the AY 2024-2025.

The Senate approved the recommendations of IAPC on seat matrix with corresponding GATE disciplines for admission into the M. Tech. programmes for the academic year 2024-2025 **(Appendix-C)**.

Item No.100.7: To consider the proposal to introduce a new P.G. Programme by the Department of Metallurgical and Materials Engineering.

The Senate approved the following new M.Tech. programme along with its course structure **(Appendix-D)**.

Department /(Code)	Programmes	MEQ	GATE Disciplines	Seats
Metallurgical & Materials Engineering (MTD)	M.Tech. - Computational Materials Engineering	B.Tech. Degree in Metallurgy/ Materials/ Mechanical/ Production / Mining/ Computer Science/ Chemical/ Biotechnology/ Ceramics/ Polymer/ Textile/ Aerospace Engg. or equivalent in relevant discipline. M.Sc. degree in Physics/ Chemistry/ Materials Science/ Environmental/ Nanotechnology or equivalent	MT/AE/BT / CH/CS/CY / DA/ES/ ME /MN/PH/PI / TF/XE	15


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Item No. 100.8: To consider the proposal of the Department of Design to offer Two-Degrees (M.Des. and Ph.D.) to the students who register for Ph.D. in the Department of Design subject to fulfillment of few criteria.

The Senate approved the proposal to offer Two-Degrees (M.Des. and Ph.D.) to the students who register for Ph.D. in the Department of Design subjected to fulfillment of the notified criteria dated 16.03.2023 aligned to M.Des. **(Appendix-E)**

Item No. 100.9: To consider the structures for the masters programmes offered by various Departments/Centres /School as per the new PG curriculum to be implemented w.e.f. the AY 2024-2025.

The Senate considered the item and approved the presented structures for the master's programmes. **(Appendix-F)**

The Senate further suggested the following:

- i. Each Programme should offer more courses, preferably with L-T-P:2-0-2 loading, in each semester.
- ii. Departments/Centers/School should utilize the opportunity provided by the new curriculum structure to develop the new courses and new programmes in futuristic and socially/industrially relevant areas.
- iii. The Department/Centers/School should ensure that the programme structure offers a multidisciplinary approach and provides flexibility to the learners.
- iv. It can be deliberated in future to reduce the credits for the thesis component and thereby the total credits can be considered to bring into the range of 60-62.
- v. If desired, a department may be provided with a provision to shift one PEC from the second semester to the first semester so long as the total assigned credits to each component (PEC, PCC, SSC, STAR, ISA, etc.) in the approved PG structure for that model remains the same. Such cases, if any, however, shall be required to be moved through IAPC for approval.
- vi. Considering that the process for admission to the masters programmes for the AY 2024-2025 have already been started, all departments/centers/school are advised to submit their programme structure(s) for approval, if not submitted already, by the end of March 2024.


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Item No.100.10: To consider minor modifications in the existing guidelines of Department/Centre/School Faculty Search Committee (DFSC /CFSC/SFSC).

The Senate informed that this item was in the ambit of the Board however, a minor modification on proposal of FSC by DFC/CFC/SFC is ratified as it was earlier placed in the Senate.

Item No.100.11: To report the following approval accorded by the Chairman, Senate on behalf of the Senate.

The Senate noted the items.

Any other item

Item No.100.12: To consider the 2nd mercy appeal of Mr. Anmol Raj (Enr. No. 21113019), B.Tech. (CE), III Yr. regarding name restoration and continuation of program.

The Senate accepted the mercy appeal of Mr. Anmol Raj (Enr. No.21113019) for name restoration.

The meeting ended with a vote of thanks to the Chair.


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Annexure-I

Following were present

1.	Prof. K.K. Pant	Director & Chairman
2.	Prof. U.P. Singh	Dy. Director
3.	Prof. Rajan Arora	Applied Math. and Scientific Computing
4.	Prof. Jaydev	Applied Math. and Scientific Computing
5.	Prof. (Mrs.) Milli Pant	Applied Math. and Scientific Computing
6.	Prof. Sanjay Ghosh	Biosciences & Bioengineering
7.	Prof. Gopinath Packirisamy	Biosciences & Bioengineering
8.	Prof. M.K. Mohan Poluri	Biosciences & Bioengineering
9.	Prof. Ramasare Prasad	Biosciences & Bioengineering
10.	Prof. Debabrata Sircar	Biosciences & Bioengineering
11.	Prof. Shailly Tomar	Biosciences & Bioengineering
12.	Prof. Prakash Biswas	Chemical Engineering
13.	Prof. Amit Kumar Dhiman	Chemical Engineering
14.	Prof. P.P. Kundu	Chemical Engineering
15.	Prof. Ram Prakash	Chemical Engineering
16.	Prof. B. Prasad	Chemical Engineering
17.	Prof. Vimal Chandra Srivastava	Chemical Engineering
18.	Prof. Naseem Ahmad	Chemistry
19.	Prof. R.K. Dutta	Chemistry
20.	Prof. Kaushik Ghosh	Chemistry
21.	Prof. Paritosh Mohanty	Chemistry
22.	Prof. Jeevanandam P.	Chemistry
23.	Prof. R.K. Peddinti	Chemistry
24.	Prof. Muniappan Sankar	Chemistry
25.	Prof. Anuj Sharma	Chemistry
26.	Prof. K.R. Justin Thomas	Chemistry
27.	Prof. Z. Ahmad	Civil Engineering
28.	Prof. Rajib Chowdhury	Civil Engineering
29.	Prof. Rahul Dev Garg	Civil Engineering
30.	Prof. Kamal Jain	Civil Engineering
31.	Prof. Praveen Kumar	Civil Engineering
32.	Prof. K.S. Hari Prasad	Civil Engineering
33.	Prof. Rajat Rastogi	Civil Engineering
34.	Prof. N.K. Samadhiya	Civil Engineering
35.	Prof. Vishwas Sawant	Civil Engineering
36.	Prof. Pramod Kumar Sharma	Civil Engineering
37.	Prof. Umesh Kumar Sharma	Civil Engineering
38.	Prof. Akhil Upadhyay	Civil Engineering
39.	Prof. R. Balasubramanian	Computer Science & Engineering
40.	Prof. Sugata Gangopadhyay	Computer Science & Engineering
41.	Prof. Sandeep Kumar	Computer Science & Engineering
42.	Prof. Rajdeep Niyogi	Computer Science & Engineering
43.	Prof. Durga Toshniwal	Computer Science & Engineering
44.	Prof. Jashodhir Das	Earthquake Engineering
45.	Prof. R.N. Dubey	Earthquake Engineering


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46.	Prof. S.C. Gupta	Earthquake Engineering
47.	Prof. Ravi Shankar Jakka	Earthquake Engineering
48.	Prof. Bal Krishna Maheshwari	Earthquake Engineering
49.	Prof. Daya Shankar	Earthquake Engineering
50.	Prof. Manish Shrikhande	Earthquake Engineering
51.	Prof. Yogendra Singh	Earthquake Engineering
52.	Prof. G.J. Chakrapani	Earth Sciences
53.	Prof. B.R. Bhalja	Electrical Engineering
54.	Prof. E. Fernandez	Electrical Engineering
55.	Prof. C.P. Gupta	Electrical Engineering
56.	Prof. Vishal Kumar	Electrical Engineering
57.	Prof. Mukesh Kumar Pathak	Electrical Engineering
58.	Prof. Manoj Tripathy	Electrical Engineering
59.	Prof. Barjeev Tyagi	Electrical Engineering
60.	Prof. Anand Bulusu	Electronics & Communication Engg.
61.	Prof. Brajesh Kumar Kaushik	Electronics & Communication Engg.
62.	Prof. Sanjeev Manhas	Electronics & Communication Engg.
63.	Prof. Akhilesh Mohan	Electronics & Communication Engg.
64.	Prof. Rajib Kumar Panigrahi	Electronics & Communication Engg.
65.	Prof. Amalendu Patnaik	Electronics & Communication Engg.
66.	Prof. Rashmi Gaur	Humanities & Social Sciences
67.	Prof. Nagendra Kumar	Humanities & Social Sciences
68.	Prof. Binod Mishra	Humanities & Social Sciences
69.	Prof. Anindya Jayanta Mishra	Humanities & Social Sciences
70.	Prof. D.S. Arya	Hydrology
71.	Prof. Brijesh Kumar Yadav	Hydrology
72.	Prof. Sunil Kumar Singhal	Hydro & Renewable Energy
73.	Prof. Ramesh Chandra	Institute Instrumentation Centre
74.	Prof. Ramesh A.	Management Studies
75.	Prof. Rajat Agarwal	Management Studies
76.	Prof. M.K. Barua	Management Studies
77.	Prof. (Mrs.) Usha Lenka	Management Studies
78.	Prof. Vinay Sharma	Management Studies
79.	Prof. Premananda Bera	Mathematics
80.	Prof. Sanjeev Kumar	Mathematics
81.	Prof. Maheshanand	Mathematics
82.	Prof. Tanuja Srivastava	Mathematics
83.	Prof. A. Swaminathan	Mathematics
84.	Prof. Navneet Arora	Mechanical & Industrial Engg.
85.	Prof. Sushanta Dutta	Mechanical & Industrial Engg.
86.	Prof. Akshay Dwivedi	Mechanical & Industrial Engg.
87.	Prof. Dheerendra Kumar Dwivedi	Mechanical & Industrial Engg.
88.	Prof. B.K. Gandhi	Mechanical & Industrial Engg.
89.	Prof. S.P. Harsha	Mechanical & Industrial Engg.
90.	Prof. P.K. Jha	Mechanical & Industrial Engg.
91.	Prof. Ravi Kumar	Mechanical & Industrial Engg.
92.	Prof. Manish Mishra	Mechanical & Industrial Engg.
93.	Prof. V.H.Saran	Mechanical & Industrial Engg.
94.	Prof. Apurbba Kumar Sharma	Mechanical & Industrial Engg.

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| 95. | Prof. Inderdeep Singh | Mechanical & Industrial Engg. |
| 96. | Prof. K.M. Singh | Mechanical & Industrial Engg. |
| 97. | Prof. Indra Vir Singh | Mechanical & Industrial Engg. |
| 98. | Prof. Sudhakar Subudhi | Mechanical & Industrial Engg. |
| 99. | Prof. S.H. Upadhyay | Mechanical & Industrial Engg. |
| 100. | Prof. Gajanan Prabhakar Chaudhuri | Metallurgical & Materials Engg. |
| 101. | Prof. B.S.S. Daniel | Metallurgical & Materials Engg. |
| 102. | Prof. B.V.M. Kumar | Metallurgical & Materials Engg. |
| 103. | Prof.(Mrs.)Debrupa Lahiri | Metallurgical & Materials Engg. |
| 104. | Prof. Indranil Lahiri | Metallurgical & Materials Engg. |
| 105. | Prof. Suhrit Mula | Metallurgical & Materials Engg. |
| 106. | Prof. Ujjwal Prakash | Metallurgical & Materials Engg. |
| 107. | Prof. Anjan Sil | Metallurgical & Materials Engg. |
| 108. | Prof. Dharam Dutt | Paper Technology, Saharanpur Campus |
| 109. | Prof. S.C. Sharma | Paper Technology, Saharanpur Campus |
| 110. | Prof. Chayya Sharma | Paper Technology, Saharanpur Campus |
| 111. | Prof. Ajay | Physics |
| 112. | Prof. Rajdeep Chatterjee | Physics |
| 113. | Prof. (Mrs.) Tulika Maitra | Physics |
| 114. | Prof. Anirban Mitra | Physics |
| 115. | Prof. Tashi Nautiyal | Physics |
| 116. | Prof. Vipul Rastogi | Physics |
| 117. | Prof. Yogesh Kumar Sharma | Physics |
| 118. | Prof. Ghanshyam Das Verma | Physics |
| 119. | Prof. Davinder Kaur Walia | Physics |
| 120. | Prof. Ajay Wasan | Physics |
| 121. | Prof. Kanhaiya Lal Yadav | Physics |
| 122. | Prof. N.C. Mishra | Polymer Science & Engineering |
| 123. | Prof. Thanga Raj Chelliah | WRD&M |
| 124. | Prof. Deepak Khare | WRD&M |
| 125. | Prof. Ashish Pandey | WRD&M |
| 126. | Prof. Anil Kumar Gourishetty, Head, Centre for Indian Knowledge System | |
| 127. | Prof. Sateesh Kumar Peddoju, Head, Institute Computer Centre | |
| 128. | Prof. Uttam Kumar Roy, Head of the Centre of Transportation Systems. | |
| 129. | Prof. Soumitra Satapathi, Head, Centre for Flexible and Smart Energy Device (CFSE). | |
| 130. | Prof. Mukesh Kumar Singhal, Head, Department of Hydro & Renewable Energy | |
| 131. | Prof. Anubrata Dey, Associate Dean, Infra. (Electrical & A/C) | |
| 132. | Prof. Vivek Kumar Malik, Associate Dean Innovation and Incubation | |
| 133. | Prof. Meenakshi Rawat, Associate Dean of Academic Affairs (Curriculum) | |
| 134. | Prof. Ramudu Meka, Associate Dean for Corporate Interaction. | |
| 135. | Dr. C. Jayakumar, Librarian | |
| 136. | Chairman, SCSP | |
| 137. | Mr. Prashant Garg, Registrar & Secretary, Senate | |

Students' representative

138. Mr. Aditya Sindhu, General Secretary, (Hostel Affairs)
 139. Mr. Sanchit Chaba, General Secretary Academic Affairs (UG)
 140. Ms. Anet Maria P., Dy. General Secretary (Hostel Affairs) Girls


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Annexure-II

The following members conveyed their inability to join the meeting.

1. Prof. V. Devdas, Department of Architecture & Planning
2. Prof. Naveen Kumar Nawani, Department of Biosciences & Bioengineering
3. Prof. Ranjana Pathania, Department of Biosciences and Bioengineering
4. Prof. Partha Roy, Department of Biosciences and Bioengineering
5. Prof. Ashwani Kumar Sharma, Department of Biosciences & Bioengineering
6. Prof. Dharmendra Singh Department of Computer Science and Engg.
7. Dr. P. Sumathi, Department of Electrical Engineering,
8. Prof. (Mrs.) Smita Jha, Department of Humanities & Social Sciences
9. Prof. Kaushik Pal, Department of Mechanical & Industrial Engg.
10. Prof. P. Arumugam, Department of Physics
11. Prof. Andallib Tariq, Department of Mechanical and Industrial Engg.
12. Prof. M.L. Kansal, Department of Water Resource Development and Management
13. Prof. Gaurav Manik, Head, Department of Polymer and Process Engg.
14. Prof. E.Rajasekar, Associate Dean, Infrastructure (Civil)



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Appendix-1																				
Category wise vacancy for admission to Ph.D program for Autumn Semester of the session 2024-25 under Institute Assistantship																				
Deptt/ centre	Faculty position as on 06.02.2024	Total Seats = 5 x core faculty & 2 x Joint faculty	Total Intake						Seats Filled						Vacancy					
			Unreserved	Gen-EWS	OBC	SC	ST	Total Intake	Unreserved	Gen-EWS	OBC	SC	ST	Total filled	Unreserved	GEN-EWS	OBC	SC	ST	Total Vacancy
(Roorkee Campus)																				
Architecture & Planning	15+1*	77	31	8	21	11	6	77	16	1	11	6	0	34	15	7	10	5	6	43
Biosciences & Bioengineering	28+2*	144	58	14	39	22	11	144	29	6	14	3	0	52	29	8	25	19	11	92
Chemical Engineering	23	115	46	12	31	17	9	115	17	6	13	11	1	48	29	6	18	6	8	67
Chemistry	27	135	55	14	36	20	10	135	25	5	16	5	2	53	30	9	20	15	8	82
Civil Engineering	55	275	111	28	74	41	21	275	54	13	40	18	8	133	57	15	34	23	13	142
Computer Science & Engg.	17+1*	87	35	9	23	13	7	87	21	0	8	4	0	33	14	9	15	9	7	54
Design	2+13*	36	14	4	10	5	3	36	11	1	3	5	0	20	3	3	7	0*	3	16
Earth Sciences	27	135	55	14	36	20	10	135	14	5	11	0	0	30	41	9	25	20	10	105
Earthquake Engineering	16	80	32	8	22	12	6	80	12	6	10	3	2	33	20	2	12	9	4	47
Electrical Engineering	34	170	69	17	46	25	13	170	29	10	18	11	4	72	40	7	28	14	9	98
Electronics & Communication Engg.	38	190	77	19	51	29	14	190	35	4	26	10	0	75	42	15	25	19	14	115
Humanities & Social Sciences	29	145	59	14	39	22	11	145	23	12	19	11	7	72	36	2	20	11	4	73
Hydro & Renewable Energy	11	55	22	6	15	8	4	55	8	0	6	3	0	17	14	6	9	5	4	38
Hydrology	9	45	18	5	12	7	3	45	13	0	8	5	1	27	5	5	4	2	2	18
Management Studies	21	105	43	10	28	16	8	105	19	8	11	5	0	43	24	2	17	11	8	62
Mathematics	26	130	53	13	35	19	10	130	8	5	5	5	0	23	45	8	30	14	10	107
Mechanical & Industrial Engg.	46	230	93	23	62	35	17	230	52	12	29	9	1	103	41	11	33	26	16	127
Metallurgical & Materials Engg.	27	135	55	14	36	20	10	135	18	0	15	9	0	42	37	14	21	11	10	93
Physics	38+1*	192	78	19	52	29	14	192	40	10	11	4	2	67	38	9	41	25	12	125
Water Resources Development & Management	10+1*	52	21	5	14	8	4	52	11	3	9	4	1	28	10	2	5	4	3	24
Total		2533	1025	256	682	379	191	2533	455	107	283	131	29	1005	570	149	399	248	162	1528
Centres																				
C-Trans	1+9*	23	9	2	6	4	2	23	2	2	3	1	0	8	7	0*	3	3	2	15
Disaster Mitigation & Management	3+13*	41	17	4	11	6	3	41	8	0	2	2	1	13	9	4	9	4	2	28
Nanotechnology	2+20*	50	20	5	14	7	4	50	10	3	3	1	0	17	10	2	11	6	4	33
Institute Instrumentation Centre	1+2*	9	4	1	2	1	1	9	0	0	1	0	0	1	4	1	1	1	1	8
Centre for Photonics & Quantum Communication Technology (CPQCT)	11*	22	9	2	6	3	2	22	3	1	1	1	0	6	6	1	5	2	2	16
Centre for Space Science and Technology	14*	28	11	3	8	4	2	28	0	0	1	0	0	1	11	3	7	4	2	27
Centre for Sustainable Energy	10*	20	8	2	5	3	2	20	1	0	0	1	0	2	7	2	5	2	2	18
International Centre of Excellence for Dams	15*	30	12	3	8	5	2	30	0	0	0	0	0	0	12	3	8	5	2	30
MFSAIDS	21*	42	17	4	12	6	3	42	11	1	4	1	0	17	6	3	8	5	3	25
Total		265	107	26	72	39	21	265	35	7	15	7	1	65	72	19	57	32	20	200
(Saharanpur Campus)																				
Applied Mathematics & Scientific Computing	4+1*	22	9	2	6	3	2	22	6	3	1	0	0	10	3	0*	5	3	2	13
Paper Technology	5	25	10	2	7	4	2	25	7	0	3	2	0	12	3	2	4	2	2	13
Polymer & Process Engg.	11	55	22	6	15	8	4	55	16	1	7	4	1	29	6	5	8	4	3	26
Total		102	41	10	28	15	8	102	29	4	11	6	1	51	12	6	17	9	7	52
Grand total		2900	1173	292	782	433	220	2900	519	118	309	144	31	1121	654	174	473	289	189	1780
* Joint Faculty																				
Note: PwD seats are 5% horizontal																				
# Currently seats are not available under Institute Assistantship																				


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Changes in the Minimum Educational Qualification for admission to M.Tech. programmes

Appendix 'B'
Item No. Senate / 100.5

S. No.	Academic Department/ Centre & (Code)	Academic Programmes	Prog. Code	Minimum Education Qualification
1.	Metallurgical & Materials Engg.	M.Tech. Industrial Metallurgy	39	B.Tech. degree in Metallurgy/ Materials/ Mechanical/ Production / Mining/ Chemical/ Biotechnology/ Ceramics/ Polymer/ Textile/ Aerospace Engg or equivalent in relevant discipline. M.Sc. degree in Physics/ Chemistry/ Materials Science/ Environmental/ Nanotechnology or equivalent in relevant discipline.
		M.Tech. Materials Engg.	40	B.Tech. degree in Metallurgy/Materials / Mechanical/ Mining/ Production/ Chemical/ Biotechnology/ Ceramics/ Polymer/ Textile/ Aerospace Engineering or equivalent in relevant discipline. M.Sc. degree in Physics/ Chemistry/ Materials Science/ Environmental/ Nanotechnology or equivalent in relevant discipline.
2.	Centre for Nanotechnology	M.Tech. Nanotechnology	48	B.Tech. (Met. & Mat. Engg./Mech. Engg./ E&C/ Electronics/ Electrical/ Chemical Engg./ Biotechnology/ Civil/ Biochemical Engineering/ Biomedical Engineering/ Bioengineering/ Polymer Engg/ Polymer Technology/ Pharmaceutical Technology/ Industrial Biotechnology/ Nanotechnology) or equivalent in relevant discipline; M.Sc. (Physics/ Chemistry/ Biotechnology/ Life Science/ nanotechnology), with Maths at 10+2 or higher level.
3.	Hydrology	M.Tech. Hydrology	33	Bachelor's degree in Civil/ Agricultural Engg./ Hydrology/ Geomatics Engg / Data Science & Artificial Intelligence/ Environmental Engineering or equivalent in relevant discipline. OR M.Sc./M.Tech. (Master's) degree in Chemistry/Geology/ Geophysics/ Applied Geology/Applied Geophysics/ Physics/ Meteorology/ Geography/ Atmospheric Physics/Environmental Science with Mathematics in B.Sc. (Bachelor's) course as one of the subjects. OR M.Sc. (Master's) degree in Statistics with Physics or Mathematics at B.Sc. (Bachelor's) level or its equivalent in relevant discipline. OR M.Sc. degree in Mathematics with Physics in B.Sc. or its equivalent in relevant discipline. OR AMIE (Civil) with B.Sc. or Engineering Diploma qualifications with at least 3 years research/teaching /other professional experience in responsible capacities.


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Appendix 'C'

Item No. Senate / 100.6

Seat Matrix for M.Tech./M.Arch./MURP Admission 2024-25

S.No	Academic Department/ Centre & (Code)	Prog. S.No.	Academic Programmes Name	Code	Main Gate Discipline(s) and seats					Other GATE Discipline(s) and seats					EWS 10%	PD 5% horizontal	Spl. Ws intake	Total seats in Dept/Centre	Mode of Intake
					GATE Discipline Code	UR	OBC	SC	ST	GATE Discipline Code	UR	OBC	SC	ST					
1	Architecture and Planning (ARD)	1	M.Arch	10	AR(12)	5	4	2	1	-	-	-	-	-	1	1	13	26	Option B
		2	M.U.R.P.	11	AR(10)	4	3	2	1	CE(2)	1	1	0	0	1	1	13		
2	Hydro and Renewable Energy (HRE)	3	M.Tech. Renewable and Hydro Energy	12	CE(2)	1	1	0	0	AG/CH/EE/EC/ME/PI/XE/IN(17)	7	5	3	2	2	2	21	30	Option B
		4	M.Tech. Environmental Management of Rivers and Lakes	13	CE(3)	1	1	1	0	AG/CH/EE/ME/PI/XE/AR/CY/BT/PH/MA/XL/EY/ES(5)	3	1	0	1	1	2	9		
3	Chemical Engineering (CHD)	5	M.Tech. Chemical Engineering	14	CH(45)	20	13	8	4	-	-	-	-	-	5	3	50	50	Option B
		6	M.Tech. Environmental Engg	16	CE(10)	4	3	2	1	CH(2)	1	1	0	0	1	1	13		
4	Civil Engineering (CED)	7	M.Tech. Geospatial Engg	17	CE/GE(10)	4	3	2	1	AR/CS/EC/EE/AG/MN(4)	2	1	1	0	2	5	16	94	Option B
		8	M.Tech. Geotechnical Engg	18	CE(11)	5	3	2	1	MN(2)	1	1	-	-	1	5	14		
		9	M.Tech. Hydraulic Engg	19	CE(11)	5	3	2	1	-	-	-	-	-	1	1	12		
		10	M.Tech. Structural Engg	20	CE(23)	10	7	4	2	-	-	-	-	-	3	2	26		
		11	M.Tech. Transportation Engg	21	CE(12)	6	3	2	1	-	-	-	-	-	1	1	13		
		12	M.Tech. Soil Dynamics	22	CE(11)	5	3	2	1	-	-	-	-	-	1	1	12		
5	Earthquake Engineering (EQD)	13	M.Tech. Structural Dynamics	23	CE(17)	8	5	3	1	-	-	-	-	-	2	2	19	41	Option B
		14	M.Tech. Seismic Vulnerability and Risk Assessment	24	CE(9)	4	3	1	1	-	-	-	-	-	1	2	10		
6	Electrical Engineering (EED)	15	M.Tech. Electric Drives & Power Electronics	25	EE(13)	6	4	2	1	-	-	-	-	-	2	4	15	77	Option B
		16	M.Tech. Instrumentation and Signal Processing	26	EE(9)	4	3	1	1	EC/IN(4)	2	1	1	0	2	4	15		
		17	M.Tech. Power System Engg	27	EE(13)	6	4	2	1	-	-	-	-	-	2	4	15		
		18	M.Tech. Systems and Control	28	EE(11)	5	3	2	1	EC/IN(4)	2	1	1	0	2	4	17		
		19	M.Tech. Electric Vehicle Technology	56	EE(13)	6	4	2	1	-	-	-	-	-	2	4	15		
7	Electronics and Communication Engineering (ECD)	20	M.Tech. Communication Systems	29	EC/EE/IN(11)	5	3	2	1	-	-	-	-	-	1	3	12	69	Option B
		21	M.Tech. R.F. & Microwave Engg	30	EC/EE/PH/IN(10)	5	3	1	1	-	-	-	-	-	1	3	11		
		22	M.Tech. Microelectronics and VLSI	31	EC/PH/EE/IN(10)	4	3	2	1	-	-	-	-	-	1	3	11		
		23	M.Tech. Terahertz Communication and Sensing	58	EC/PH/EE/IN(18)	4	3	2	1	-	4	2	1	1	2	3	20		
		24	M.Tech. Semiconductor Technology	59	EC/PH/EE/IN(13)	5	3	2	1	-	1	1	0	0	2	3	15		
8	Computer Science and Engineering (CSD)	25	M.Tech. Computer Science & Engg	32	CS(29)	13	9	5	2	-	-	-	-	-	3	2	32	32	Option B
9	Hydrology (HYD)	26	M.Tech. Hydrology	33	CE/AG(20)	9	6	4	1	GE/DA/XE/EG/PH/ES(3)	1	1	0	1	2	1	25	25	Option B
10	Mechanical and Industrial Engineering (MED)	27	M.Tech. Mechanical and Industrial Engg	34	ME/PI (58)	26	17	10	5	-	-	-	-	-	6	3	64	64	Option A
11	Metallurgical and Materials Engineering (MTD)	28	M.Tech. Industrial Metallurgy	39	MT/AE/BI/CH/CY/ES/ME/MN/PH/PI/TF/XE (8)	4	2	1	1	-	-	-	-	-	1	2	9	34	Option B
		29	M.Tech. Materials Engg.	40	MT/AE/BI/CH/CY/ES/ME/MN/PH/PI/TF/XE (8)	4	3	1	1	-	-	-	-	-	1	2	10		
		30	M.Tech. Computational Materials Engineering	62	MT/AE/BI/CH/CS/CY/DA/ES/ME/MN/PH/PI/TF/XE(13)	6	4	2	1	-	-	-	-	-	2	2	15		
12	Paper Technology Saharanpur Campus (PPD)	31	M.Tech. Pulp & Paper Technology	41	CH(7)	3	2	1	1	ME/BI/TF/EY/XL/XL (5)	2	2	1	0	1	1	13	24	Option B
		32	M.Tech. Packaging Technology	42	CH(5)	2	1	1	1	BT/CY/ME/TF/LX/L (5)	3	2	0	0	1	1	11		
13	Water Resources Development and Management (WRD)	33	M.Tech. Irrigation Water Management	43	CE/AG(9)	4	2	1	1	-	-	-	-	-	1	2	9	32	Option B
		34	M.Tech. Water Resources Development	44	CE/EE/ME (12)	5	4	2	1	-	-	-	-	-	1	2	13		
		35	M.Tech. Drinking Water and Sanitation	45	CE/AG/ES/AR/CH/ME(9)	4	3	1	1	-	-	-	-	-	1	2	10		
14	Physics (PHD)	36	M.Tech. Solid State Electronic Technology	46	PH/EE/EC/MT(9)	4	3	1	1	-	-	-	-	-	1	1	10	20	Option B
		37	M.Tech. Photonics	47	PH/EE/EC/MT/IN(9)	4	3	1	1	-	-	-	-	-	1	1	10		
15	Nanotechnology (NTC)	38	M.Tech. Nanotechnology	48	AE/AG/BI/MT/CE/CH/CY/EC/EE/CS/IN/ME/MN/MT/NM/PH/PI/XE/XL(8)	4	2	1	1	-	-	-	-	-	1	1	9	9	Option B
16	Disaster Mitigation and Management (DMC)	39	M.Tech. Disaster Mitigation and Management	49	CE/GE(1)	3	1	1	1	ME/PH/CS/CH/AR/GG/PH/MA/XL/XE/EY/BI/ES(1)	5	4	2	1	2	1	20	20	Option B
17	Transportation Systems (TSC)	40	M.Tech. Transportation Systems Management	50	CE/AR/CS/GE/ME/PI/BI/CH/DA/VE/EE/ES/IN/NM/ST/XE/XH/PE/ AE(13)	6	4	2	1	-	-	-	-	-	2	1	15	15	Option B
18	Biosciences and Bioengineering (BBD)	41	M.Tech. Biomaterials Engineering	51	BT/XE/CH/CS/ME/ES (13)	6	4	2	1	-	-	-	-	-	2	2	15	30	Option B
		42	M.Tech. Structural and Computational Biology	61	CS/DA/BM/BI/XL (13)	6	4	2	1	-	-	-	-	-	2	2	15		
19	Polymer and Process Engg (PPE)	43	M.Tech. Polymer Science and Engg	52	CH/XE(8)	4	2	1	1	CY/ME/PE/PI/TF/XL(12)	5	4	2	1	2	1	22	22	Option B
20	Mehta Family School of Data Science and Artificial Intelligence (MFS)	44	M.Tech. Artificial Intelligence	53	CS/EC/EE (13)	6	4	2	1	MA/CE/IN/ME/PH/ST/GE/DA (5)	2	1	1	1	2	2	20	40	Option B
		45	M.Tech. Data Science	54	CS/EC/EE/MA/CE/ME/ST/DA (13)	6	4	2	1	AE/BI/MT/CH/CY/GE/IN/PH/PI(5)	2	1	1	1	2	2	20		
21	ICED	46	M.Tech. Dam Safety and Rehabilitation	55	CE (7)	3	2	1	1	-	-	-	-	-	1	1	8	8	Option A
22	Applied Mathematics and Scientific Computing (AMS)	47	M.Tech. Applied Mathematics and Scientific Computing	57	MA/ST/CS/EE/EC/XL (18)	8	5	3	2	-	-	-	-	-	2	1	20	20	Option A
23	Centre for Space and Science Technology	48	M.Tech. Space Science and Technology	60	ECE/PH/CY/MA/AE/ME/PI/EE/MT/CE/ GS(13)	6	4	2	1	-	-	-	-	-	2	1	15	15	Option A
Total						278	183	101	56		44	30	14	9	82	43	797	797	

* Including 5 seats sponsored by MNRE

30 MAR 2024

DEPARTMENT OF METALLURGICAL AND MATERIALS ENGINEERING
INDIAN INSTITUTE OF TECHNOLOGY ROORKEE

Program Code: XXX M.Tech. (Computational Materials Engineering)
Department: Department of Metallurgical and Materials Engineering
Year: I
Model: 2

S.No.		Teaching Scheme			Contact Hours/Week			Exam Duration	
		Subject Code	Course Title	Subject Area	Credits	L	T	P	
Semester-I (Autumn)									
1.	MTC-501		Mathematics and Numerical Methods	PCC	3	3	0	0	3
2.	MTC-503		Structure of Materials	PCC	4	3	1	0	3
3.	MTC-505		Atomistic Modelling: Methods and Applications	PCC	3	3	0	0	3
4.	MTC-507		Continuum Modelling: Methods and Applications	PCC	3	3	0	0	3
5.	MTC-509		Materials Modelling and Simulation Lab	PCC	3	0	0	6	0
6.			Social Science Course	SSC	2	-	-	-	-
			Total		18				
Semester-II (Spring)									
1.			Program Elective-I	PEC	4	-	-	-	-
2.			Program Elective-II	PEC	4	-	-	-	-
3.			Program Elective-III	PEC	4	-	-	-	-
4.			Program Elective-IV	PEC	4	-	-	-	-
5.			Science, Technology, and Advanced Research-tools	STAR	3	-	-	-	-
6.	MTC-700		Seminar	SEM	2	-	-	-	-
			Total		21				

30 MAR 2024

DEPARTMENT OF METALLURGICAL AND MATERIALS ENGINEERING
INDIAN INSTITUTE OF TECHNOLOGY ROORKEE

Program Code: XXX M.Tech. (Computational Materials Engineering)
Department: Department of Metallurgical and Materials Engineering
Year: II
Model: 2

Teaching Scheme					Contact Hours/Week			Exam Duration	
S.No.	Subject Code	Course Title	Subject Area	Credits	L	T	P	Theory	Practical
Semester-I (Autumn)									
1	MTC-691	Internship Social Activity	ISA	3	-	-	-	-	-
2	MTC-701A	Thesis Stage-I	THESIS	10	-	-	-	-	-
		Total		13					
Semester-II (Spring)									
1	MTC-701B	Thesis Stage-II	THESIS	14	-	-	-	-	-
		Total		14					

Summary				
Semester	1	2	3	4
Semester-wise Total Credits	18	21	13	14
Total Credits	66			


30 MAR 2024

M.Tech. (Computational Materials Engineering)

Program Elective Courses

Teaching Scheme					Contact Hours/Week			Exam Duration	
S.No.	Subject Code	Course Title	Subject Area	Credits	L	T	P	Theory	Practical
1.	MTL-501	Crystal Plasticity Modeling	PEC	4	3	1	0	3	0
2.	MTL-502	Additive Manufacturing: Modeling and Simulation	PEC	4	3	1	0	3	0
3.	MTL-503	Materials Informatics	PEC	4	3	1	0	3	0
4.	MTL-504	Modeling and simulations of diffusion-based processes in metallurgy	PEC	4	3	1	0	3	0
5.	MTL-511	Principles of Solidification	PEC	4	3	1	0	3	0
6.	MTL-512	Engineering Ceramics	PEC	4	3	1	0	3	0
7.	MTL-513	Principles of Materials Selection	PEC	4	3	1	0	3	0
8.	MTL-514	High Temperature Materials	PEC	4	3	1	0	3	0
9.	MTL-515	Composite Materials	PEC	4	3	1	0	3	0
10.	MTL-516	Diffusion in Solids	PEC	4	3	1	0	3	0
11.	MTL-517	Defects in Crystalline Materials	PEC	4	3	1	0	3	0
12.	MTL-518	Nanotechnology: Materials & Devices	PEC	4	3	1	0	3	0
13.	MTL-519	Advanced Steel Technology	PEC	4	3	1	0	3	0
14.	MTL-520	Physical Metallurgy of light metals & alloys	PEC	4	3	1	0	3	0
15.	MTL-521	Corrosion protection methods	PEC	4	3	1	0	3	0
16.	MTL-522	Microsensors, MEMS & Smart Devices	PEC	4	3	1	0	3	0
17.	MTL-523	Electro-Ceramics	PEC	4	3	1	0	3	0
18.	MTL-524	Materials for Renewable Energy	PEC	4	3	1	0	3	0
19.	MTL-525	Biomaterials	PEC	4	3	1	0	3	0

20.	MTL-526	Energy Storage Materials	PEC	4	3	1	0	3	0
21.	MTL-527	Failure Analysis	PEC	4	3	1	0	3	0
22.	MTL-528	Tribology of Engineering Materials	PEC	4	3	1	0	3	0
23.	MTL-529	Non-ferrous extraction	PEC	4	3	1	0	3	0
24.	MTL-530	Materials Modeling and Simulation	PEC	4	3	1	0	3	0

Science, Technology, and Advanced Research-tools basket

		Teaching Scheme			Contact Hours/Week			Exam Duration	
S.No.	Subject Code	Course Title	Subject Area	Credits	L	T	P	Theory	Practical
1	MTT-501	Materials for Sustainability	STAR	3	2	1	0	3	0


 30 MAR 2024

Appendix 'E'
ACADEMIC AFFAIRS OFFICE
INDIAN INSTITUTE OF TECHNOLOGY ROORKEE
Roorkee – 247667

No. Acd./1293 /Senate-93

Dated: March 16, 2023

Subject: Two-degrees (M.Tech. and Ph.D.) (Item No. 93.6)

The Senate in its 93rd meeting held on 28.12.2022 considered and approved the proposal to offer Two-degrees (M.Tech. and Ph.D.) to students who register for Ph.D. and meet certain additional criteria as follows:

1. A student admitted in a Ph.D. program with a Master's Degree in an allied discipline, will be awarded M.Tech. degree along with the Ph.D. degree, provided the student earns the course credits (excluding the thesis) required for a M.Tech. program, offered by the parent department/centre/school, with CGPA 8.5 or more.
2. A student admitted in a Ph.D. program with a Bachelor's degree will also be awarded M.Tech. degree along with the Ph.D. degree, provided the student meets the requirements as at point (1) above.
3. Candidates shall earn all credits for the course work (excluding thesis) of a M.Tech. Programme offered by the parent department/centre/school. The requirement of earning credits for pre-Ph.D. courses will be waived-off for such candidates.
4. Fellowship will be allowed for five years from the date of initial registration in the Ph.D. program.
5. Other requirements for award of Ph.D. degree shall apply.
6. On meeting the requirements, the students shall be eligible for two degrees (M.Tech. & Ph.D.) on defending their Ph. D. theses.
7. The exit policy relevant to the Ph.D. program shall be applicable to the students who leave the program prior to completion.


Assistant Registrar
(Evaluation)

Copy to (through e-mail):-

1. Chairman Senate & Director
2. All faculty
3. Head of all Departments/ Centres/ School
4. Dean, Academic Affairs
5. ADoAA (IT Systems & Admission)/ (Curriculum)/ (Evaluation)
6. Assistant Registrar (Curriculum)
7. Meeting Section
8. Channel i / AIS (acad.iitr.ac.in) / Academic webpage of iitr.ac.in


30 MAR 2023

DEPARTMENT OF APPLIED MATHEMATICS AND SCIENTIFIC COMPUTING
INDIAN INSTITUTE OF TECHNOLOGY ROORKEE

Program Code: XXX M.Tech. (Applied Mathematics and Scientific Computing)
Department: Department of Applied Mathematics and Scientific Computing
Year: 1
Model: 2

Teaching Scheme					Contact Hours/Week			Exam Duration	
S.No.	Subject Code	Course Title	Subject Area	Credits	L	T	P	Theory	Practical
Semester-I (Autumn)									
1.	ASC-501	Applied Optimization Techniques	PCC	3	3	0	0	3	0
2.	ASC-503	Theory and Applications of Stochastic Processes	PCC	3	3	0	0	3	0
3.	ASC-505	Numerical Linear Algebra	PCC	3	3	0	0	3	0
4.	ASC-507	Advanced Data Structures and Algorithms	PCC	4	3	0	2	3	0
5.	ASC-509	Programming Lab	PCC	3	0	0	6	0	3
6.		Social Science Course	SSC	2	-	-	-	-	-
		Total		18					
Semester-II (Spring)									
1.		Program Elective-I	PEC	4	-	-	-	-	-
2.		Program Elective-II	PEC	4	-	-	-	-	-
3.		Program Elective-III	PEC	4	-	-	-	-	-
4.		Program Elective-IV	PEC	4	-	-	-	-	-
5.		Science, Technology, and Advanced Research-tools	STAR	3	-	-	-	-	-
6.	ASC-700	Seminar	SEM	2	-	-	-	-	-
		Total		21					

Appendix 'F'
Item No. Senate / 100.9

DEPARTMENT OF APPLIED MATHEMATICS AND SCIENTIFIC COMPUTING
INDIAN INSTITUTE OF TECHNOLOGY ROORKEE

Program Code: XXX M.Tech. (Applied Mathematics and Scientific Computing)
Department: Department of Applied Mathematics and Scientific Computing
Year: II
Model: 2

Teaching Scheme									Contact Hours/Week			Exam Duration	
S.No.	Subject Code	Course Title	Subject Area	Credits	L	T	P		Theory	Practical			
Semester-I (Autumn)													
1.	ASC-691	Internship Social Activity	ISA	3	-	-	-		-	-			
2.	ASC-701A	Thesis Stage-I	THESIS	10	-	-	-		-	-			
		Total		13									
Semester-II (Spring)													
1.	ASC-701B	Thesis Stage-II	THESIS	14	-	-	-		-	-			
		Total		14									

Summary				
Semester	1	2	3	4
Semester-wise Total Credits	18	21	13	14
Total Credits	66			


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M.Tech. (Applied Mathematics and Scientific Computing)

Program Elective Courses

		Teaching Scheme			Contact Hours/Week			Exam Duration	
		Subject Code	Course Title	Subject Area	Credits	L	T	P	
1.	ASL-501	Introduction to Approximation Theory		PEC	4	3	1	0	3 0
2.	ASL-502	Advanced Transform Techniques		PEC	4	3	1	0	3 0
3.	ASL-503	Applied Soft Computing		PEC	4	3	1	0	3 0
4.	ASL-504	Applied Operations Research		PEC	4	3	1	0	3 0
5.	ASL-505	Mathematical Finance		PEC	4	3	1	0	3 0
6.	ASL-506	Mathematical and Computational Biology		PEC	4	3	1	0	3 0
7.	ASL-507	Computational Differential Equations		PEC	4	3	1	0	3 0
8.	ASL-508	Advanced Decision Making		PEC	4	3	1	0	3 0
9.	ASL-509	Ethics in Artificial Intelligence and Data Science		PEC	4	3	1	0	3 0
10.	ASL-510	Advanced Integral Equations and Calculus of Variations		PEC	4	3	1	0	3 0
11.	ASL-511	Advanced Evolutionary Algorithms		PEC	4	3	1	0	3 0
12.	ASL-512	Logistics and Supply Chain Management		PEC	4	3	1	0	3 0
13.	ASL-513	Advanced Computational Fluid Dynamics		PEC	4	3	1	0	3 0
14.	ASL-514	Game Theory		PEC	4	3	1	0	3 0
15.	ASL-515	Explainable Artificial Intelligence		PEC	4	3	1	0	3 0

M.Tech. (Applied Mathematics and Scientific Computing)

Science, Technology, and Advanced Research-tools basket

Teaching Scheme									
					Contact Hours/Week			Exam Duration	
S.No.	Subject Code	Course Title	Subject Area	Credits	L	T	P	Theory	Practical
1.	AST-501	Deep Learning	STAR	3	3	0	0	3	0


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DEPARTMENT OF APPLIED MATHEMATICS AND SCIENTIFIC COMPUTING (AMS)
INDIAN INSTITUTE OF TECHNOLOGY ROORKEE

Program Code: **XXX** Master of Science (by Research) in Applied Mathematics and Scientific Computing
Department: **Department of Applied Mathematics and Scientific Computing**
Year: **I**
Model: **3**

Teaching Scheme									
					Contact Hours/Week			Exam Duration	
S.No.	Subject Code	Course Title	Subject Area	Credits	L	T	P	Theory	Practical
Semester-I (Autumn)									
1.	ASC-501	Applied Optimization Techniques	PCC	3	3	0	0	3	0
2.	ASC-503	Theory and Applications of Stochastic Processes	PCC	3	3	0	0	3	0
3.	ASC-505	Numerical Linear Algebra	PCC	3	3	0	0	3	0
4.	ASC-507	Advanced Data Structures and Algorithms	PCC	4	3	0	2	3	0
5.	ASC-509	Programming Lab	PCC	3	0	0	6	0	3
6.		Social Science Course	SSC	2	-	-	-	-	-
		Total		18					
Semester-II (Spring)									
1.		Program Elective-I	PEC	4	-	-	-	-	-
2.	ASC-751A	Thesis Stage-I	THESIS	13	-	-	-	-	-
		Total		17					


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DEPARTMENT OF DEPARTMENT OF APPLIED MATHEMATICS AND SCIENTIFIC COMPUTING (AMS)
INDIAN INSTITUTE OF TECHNOLOGY ROORKEE

Program Code: XXX Master of Science (by Research) in Applied Mathematics and Scientific Computing
Department: Department of Applied Mathematics and Scientific Computing
Year: II
Model: 3

Teaching Scheme						Contact Hours/Week		Exam Duration	
S.No.	Subject Code	Course Title	Subject Area	Credits	L	T	P	Theory	Practical
Semester-I (Autumn)									
1.	ASC-751B	Thesis Stage-II	THESIS	15	-	-	-	-	-
		Total		15					
Semester-II (Spring)									
1.	ASC-751C	Thesis Stage-III	THESIS	16	-	-	-	-	-
		Total		16					

Summary				
Semester	1	2	3	4
Semester-wise Total Credits	18	17	15	16
Total Credits	66			

Master of Science (by Research) in Applied Mathematics and Scientific Computing

Program Elective Courses

		Teaching Scheme				Contact Hours/Week			Exam Duration	
		Subject Code	Course Title	Subject Area	Credits	L	T	P	Theory	Practical
1.		ASL-501	Introduction to Approximation Theory	PEC	4	3	1	0	3	0
2.		ASL-502	Advanced Transform Techniques	PEC	4	3	1	0	3	0
3.		ASL-503	Applied Soft Computing	PEC	4	3	1	0	3	0
4.		ASL-504	Applied Operations Research	PEC	4	3	1	0	3	0
5.		ASL-505	Mathematical Finance	PEC	4	3	1	0	3	0
6.		ASL-506	Mathematical and Computational Biology	PEC	4	3	1	0	3	0
7.		ASL-507	Computational Differential Equations	PEC	4	3	1	0	3	0
8.		ASL-508	Advanced Decision Making	PEC	4	3	1	0	3	0
9.		ASL-509	Ethics in Artificial Intelligence and Data Science	PEC	4	3	1	0	3	0
10.		ASL-510	Advanced Integral Equations and Calculus of Variations	PEC	4	3	1	0	3	0
11.		ASL-511	Advanced Evolutionary Algorithms	PEC	4	3	1	0	3	0
12.		ASL-512	Logistics and Supply Chain Management	PEC	4	3	1	0	3	0
13.		ASL-513	Advanced Computational Fluid Dynamics	PEC	4	3	1	0	3	0
14.		ASL-514	Game Theory	PEC	4	3	1	0	3	0
15.		ASL-515	Explainable Artificial Intelligence	PEC	4	3	1	0	3	0

DEPARTMENT OF BIOSCIENCES AND BIOENGINEERING
INDIAN INSTITUTE OF TECHNOLOGY ROORKEE

Program Code: XXX M.Tech. (Biomanufacturing)
Department: Department of Biosciences and Bioengineering
Year: I
Model: 2

Teaching Scheme									
S.No	Subject Code	Course Title	Subject Area	Credits	Contact Hours/Week			Exam Duration	
					L	T	P	Theory	Practical
Semester-I (Autumn)									
1	BEC-501	Reaction Engineering in Bioprocesses	PCC	4	3	1	0	3	0
2	BEC-503	Unit Operations in Biomanufacturing	PCC	4	3	1	0	3	0
3	BEC-505	Microbiology and Biochemistry	PCC	4	3	1	0	3	0
4	BEC-507	Biomanufacturing Lab	PCC	3	0	0	6	0	0
5		Social Science Course	SSC	2	-	-	-	-	-
		Total		17					
Semester-II (Spring)									
1.		Program Elective I	PEC	4	-	-	-	-	-
2.		Program Elective II	PEC	4	-	-	-	-	-
3.		Program Elective III	PEC	4	-	-	-	-	-
4.		Program Elective IV	PEC	4	-	-	-	-	-
5.	BEC-700	Seminar	SEM	2	-	-	-	-	-
6.		Science, Technology, and Advance Research-tools	STAR	3	-	-	-	-	-
		Total		21					

DEPARTMENT OF BIOSCIENCES AND BIOENGINEERING
INDIAN INSTITUTE OF TECHNOLOGY ROORKEE

Program Code: XXX M.Tech. (Biomanufacturing)
Department: Department of Biosciences and Bioengineering
Year: II
Model: 2

Teaching Scheme						Contact Hours/Week		Exam Duration	
S.No.	Subject Code	Course Title	Subject Area	Credits	L	T	P	Theory	Practical
Semester-I (Autumn)									
1.	BEC-691	Internship Social Activity	ISA	3	-	-	-	-	-
2	BEC-701A	Thesis Stage-I	THESIS	10	-	-	-	-	-
		Total		13					
Semester-II (Spring)									
1	BEC-701B	Thesis Stage-II	THESIS	14	-	-	-	-	-
		Total		14					

Summary				
Semester	1	2	3	4
Semester-wise Total Credits	17	21	13	14
Total Credits	65			


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M.Tech. (Biomanufacturing)

Program Elective Courses

Teaching Scheme									
S.No.	Subject Code	Course Title	Subject Area	Credits	Contact Hours/Week			Exam Duration	
					L	T	P	Theory	Practical
1	BEL-501	Recombinant DNA Technology	PEC	4	3	1	0	3	0
2	BEL-502	Fluid Mechanics for Biological Engineers	PEC	4	3	1	0	3	0
3	BEL-503	Mass and Heat Transfer operation	PEC	4	3	1	0	3	0
4	BEL-504	Advanced Bioreactor design	PEC	4	3	1	0	3	0
5	BEL-505	Biomanufacturing Process Modeling and Simulation	PEC	4	3	1	0	3	0
6	BEL-506	Computer Aided Design for Bioprocess	PEC	4	3	1	0	3	0
7	BEL-507	Enzyme Production and Industrial Fermentation	PEC	4	3	1	0	3	0
8	BEL-508	Biorefinery for Energy and Value-added Products	PEC	4	3	1	0	3	0
9	BEL-509	Biological Regulatory System and Compliance	PEC	4	3	1	0	3	0
10	BEL-510	Plant Design and Technoeconomic Analysis	PEC	4	3	1	0	3	0

M.Tech. (Biomanufacturing)

Science, Technology, and Advanced Research-tools basket

Teaching Scheme				Contact Hours/Week			Exam Duration	
S.No.	Subject Code	Course Title	Subject Area	Credits	L	T	P	Practical
1.	BET-501	Bioinformatics	STAR	3	2	0	2	3 0

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DEPARTMENT OF BIOSCIENCES AND BIOENGINEERING
INDIAN INSTITUTE OF TECHNOLOGY ROORKEE

Program Code: XXX M.Tech. (Structural and Computational Biology)
Department: Department of Biosciences and Bioengineering
Year: I
Model: 2

Teaching Scheme					Contact Hours/Week			Exam Duration	
S.No	Subject Code	Course Title	Subject Area	Credits	L	T	P	Theory	Practical
Semester-I (Autumn)									
1.	BEC-511	Essentials of Biosciences and Mathematics	PCC	4	3	1	0	3	0
2.	BEC-513	Computer Programming	PCC	3	2	0	2	3	0
3.	BEC-515	Structural Biology	PCC	3	3	0	0	3	0
4.	BEC-517	Bioanalytical Techniques	PCC	3	3	0	0	3	0
5.	BEC-519	SCB Laboratory-I	PCC	3	0	0	6	-	-
6.		Social Science Course	SSC	2	-	-	-	-	-
		Total		18					
Semester-II (Spring)									
1.		Program Elective-I	PEC	4	-	-	-	-	-
2.		Program Elective-II	PEC	4	-	-	-	-	-
3.		Program Elective-III	PEC	4	-	-	-	-	-
4.		Program Elective-IV	PEC	4	-	-	-	-	-
5.		Science, Technology, and Advanced Research-tools	STAR	3	-	-	-	-	-
6.	BEC-700	Seminar	SEM	2	-	-	-	-	-
		Total		21					

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**DEPARTMENT OF BIOSCIENCES AND BIOENGINEERING
INDIAN INSTITUTE OF TECHNOLOGY ROORKEE**

Program Code: XXX M.Tech. (Structural and Computational Biology)
 Department: Department of Biosciences and Bioengineering
 Year: II
 Model: 2

Teaching Scheme									
				Contact Hours/Week			Exam Duration		
S.No.	Subject Code	Course Title	Subject Area	Credits	L	T	P	Theory	Practical
Semester-I (Autumn)									
1	BEC-691	Internship Social Activity	ISA	3	-	-	-	-	-
2	BEC-701A	Thesis Stage-I	THESIS	10	-	-	-	-	-
		Total		13					
Semester-II (Spring)									
1	BEC-701B	Thesis Stage-II	THESIS	14	-	-	-	-	-
		Total		14					

Summary				
Semester	1	2	3	4
Semester-wise Total Credits	18	21	13	14
Total Credits	66			


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M.Tech. (Structural and Computational Biology)
Program Elective Courses

Teaching Scheme									
S.No.	Subject Code	Course Title	Subject Area	Credits	L	T	P	Theory	Practical
1	BEL-511	Protein Design and Engineering	PEC	4	3	1	0	3	0
2	BEL-512	Molecular Dynamics Simulations	PEC	4	3	1	0	3	0
3	BEL-513	Structural and Translational Bioinformatics	PEC	4	3	1	0	3	0
4	BEL-514	Computational Biology	PEC	4	3	1	0	3	0
5	BEL-478	Biomolecular Interactions	PEC	4	3	1	0	3	0
6	BEL-477	Molecular Biophysics	PEC	4	3	1	0	3	0
7	BEL-515	Probabilistic Machine Learning	PEC	4	3	1	0	3	0

M.Tech. (Structural and Computational Biology)
Science, Technology, and Advanced Research-tools basket

Teaching Scheme									
S.No.	Subject Code	Course Title	Subject Area	Credits	L	T	P	Theory	Practical
1	BET-501	Bioinformatics	STAR	3	2	0	2	3	0

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DEPARTMENT OF BIOSCIENCES AND BIOENGINEERING
INDIAN INSTITUTE OF TECHNOLOGY ROORKEE

Program Code: XXX M.Sc. (Biosciences and Bioengineering)
Department: Department of Biosciences and Bioengineering
Year: I
Model: 1-A

Teaching Scheme					Contact Hours/Week			Exam Duration	
S.No	Subject Code	Course Title	Subject Area	Credits	L	T	P	Theory	Practical
Semester-I (Autumn)									
1.	BEC-521	Advanced Biochemistry	PCC	3	3	0	0	3	0
2.	BEC-523	Cell and Molecular Biology	PCC	3	3	0	0	3	0
3.	BEC-525	Applied Microbiology	PCC	3	3	0	0	3	0
4.	BEC-527	Genetics	PCC	3	3	0	0	3	0
5.	BEC-529	Developmental Biology	PCC	3	3	0	0	3	0
6.	BEC-531	BSBE Laboratory-I	PCC	4	0	0	8	0	4
7.		Social Science Course	SSC	2	-	-	-	-	-
		Total		21					
Semester-II (Spring)									
1.	BEC-522	Immunology	PPI	3	3	0	0	3	0
2.	BEC-524	Genetic Engineering	PPI	3	3	0	0	3	0
3.	BEC-526	Animal Biotechnology	PPI	3	3	0	0	3	0
4.	BEC-528	Plant Biotechnology	PPI	3	3	0	0	3	0
5.	BEC-530	BSBE Laboratory-II	PPI	4	0	0	8	0	4
6.		Science, Technology, and Advanced Research-tools	STAR	3	-	-	-	-	-
7.	BEC-700	Seminar	SEM	2	-	-	-	-	-
		Total		21					

**DEPARTMENT OF BIOSCIENCES AND BIOENGINEERING
INDIAN INSTITUTE OF TECHNOLOGY ROORKEE**

Program Code: XXX M.Sc. (Biosciences and Bioengineering)
Department: Department of Biosciences and Bioengineering
Year: II
Model: 1-A

Teaching Scheme														
					Contact Hours/Week					Exam Duration				
S. No.		Subject Code	Course Title		Subject Area	Credits	L	T	P	Theory	Practical			
Semester-I (Autumn)														
1.	BEC-533	Gene Regulation			PPI	3	3	0	0	3	0			
2.	BEC-535	Biophysical Techniques			PPI	3	3	0	0	3	0			
3.		Program Elective-I			PPI	3	-	-	-	-	-			
4.		Program Elective-II			PPI	3	-	-	-	-	-			
5.		Program Elective-III			PPI	2	-	-	-	-	-			
6.		Program Elective- IV			PPI	2	-	-	-	-	-			
7.	BEC-601	Minor project			PROJECT	2	-	-	-	-	-			
8.	BEC-691	Internship Social Activity			ISA	3	-	-	-	-	-			
		Total				21								
Semester-II (Spring)														
1.		Program Elective-V			PEC	3	-	-	-	-	-			
2.	BEC-602	Major Project			PROJECT	12	-	-	-	-	-			
		Total				15								

Summary				
Semester	1	2	3	4
Semester-wise Total Credits	21	21	21	15
Total Credits	78			


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M.Sc. (Biosciences and Bioengineering)

Program Elective Courses

		Teaching Scheme				Contact Hours/Week			Exam Duration	
		Subject Code	Course Title	Subject Area	Credits	L	T	P	Theory	Practical
1.		BEL-516	Advanced Cell and Tissue Engineering	PEC	2	2	0	0	2	0
2.		BEL-517	Genomics, Proteomics and Metabolomics	PEC	3	3	0	0	3	0
3.		BEL-518	Neuroscience	PEC	3	3	0	0	3	0
4.		BEL-519	Translational Bioinformatics	PEC	2	2	0	0	2	0
5.		BEL-520	Bioprocess Engineering	PEC	3	3	0	0	3	0
6.		BEL-521	Molecular Diagnostics	PEC	2	2	0	0	2	0
7.		BEL-522	Cancer Cell Signaling	PEC	3	3	0	0	3	0
8.		BEL-523	Drug Discovery and Development	PEC	3	3	0	0	3	0
9.		BEL-524	Biomedical Engineering	PEC	3	3	0	0	3	0
10.		BEL-525	Nano-biotechnology	PEC	3	3	0	0	3	0

M.Sc. (Biosciences and Bioengineering)
Science, Technology, and Advanced Research-tools basket

Teaching Scheme									
S.No.	Subject Code	Course Title	Subject Area	Credits	Contact Hours/Week			Exam Duration	
					L	T	P	Theory	Practical
1	BET-501	Bioinformatics	STAR	3	2	0	2	3	0


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**DEPARTMENT OF CHEMICAL ENGINEERING
INDIAN INSTITUTE OF TECHNOLOGY ROORKEE**

Program Code: XXX M.Tech. (Chemical Engineering)
Department: Department of Chemical Engineering
Year: I
Model: 2

Teaching Scheme					Contact Hours/Week			Exam Duration	
S.No.	Subject Code	Course Title	Subject Area	Credits	L	T	P	Theory	Practical
Semester-I (Autumn)									
1	CHC-501	Mathematical Methods in Chemical Engineering	PCC	4	3	0	2	3	0
2	CHC-503	Advanced Transport Phenomena	PCC	4	3	0	2	3	0
3	CHC-505	Advanced Reaction Engineering	PCC	4	3	0	2	3	0
4	CHC-507	Advanced Thermodynamics and Molecular Simulations	PCC	4	3	1	0	3	0
5		Social Science Course	SSC	2	-	-	-	-	-
		Total		18					
Semester-II (Spring)									
1		Program Elective-I	PEC	4	-	-	-	-	-
2		Program Elective-II	PEC	4	-	-	-	-	-
3		Program Elective-III	PEC	4	-	-	-	-	-
4		Program Elective-IV	PEC	4	-	-	-	-	-
5		Science, Technology, and Advanced Research-tools	STAR	3	-	-	-	-	-
6	CHC-700	Seminar	SEM	2	-	-	-	-	-
		Total		21					



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**DEPARTMENT OF CHEMICAL ENGINEERING
INDIAN INSTITUTE OF TECHNOLOGY ROORKEE**

Program Code: XXX M.Tech. (Chemical Engineering)
Department: Department of Chemical Engineering
Year: II
Model: 2

Teaching Scheme									
				Contact Hours/Week			Exam Duration		
S.No.	Subject Code	Course Title	Subject Area	Credits	L	T	P	Theory	Practical
Semester-I (Autumn)									
1	CHC-691	Internship Social Activity	ISA	3	-	-	-	-	-
2	CHC-701A	Thesis Stage-I	THESIS	10	-	-	-	-	-
		Total		13					
Semester-II (Spring)									
1	CHC-701B	Thesis Stage-II	THESIS	14	-	-	-	-	-
		Total		14					

Summary				
Semester	1	2	3	4
Semester-wise Total Credits	18	21	13	14
Total Credits	66			


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M.Tech. (Chemical Engineering)

Program Elective Courses

Teaching Scheme									
S.No	Subject Code	Course Title	Subject Area	Credits	Contact Hours/Week			Exam Duration	
					L	T	P	Theory	Practical
1	CHL-511	Process Integration	PEC	4	3	1	0	3	0
2	CHL-513	Biochemical Engineering	PEC	4	3	1	0	3	0
3	CHL-515	Computational Fluid Dynamics	PEC	4	3	1	0	3	0
4	CHL-517	Optimization of Chemical Processes	PEC	4	3	1	0	3	0
5	CHL-510	Advanced Process Control	PEC	4	3	1	0	3	0
6	CHL-512	Solid and Hazardous Waste Management	PEC	4	3	1	0	3	0
7	CHL-514	Pollution Control Systems	PEC	4	3	1	0	3	0
8	CHL-516	Kinetics of Polymerization	PEC	4	3	1	0	3	0
9	CHL-518	Waste to Energy Conversion	PEC	4	3	1	0	3	0
10	CHL-520	Oil and Gas Transport	PEC	4	3	1	0	3	0
11	CHL-522	Nanotechnology in Chemical Engineering	PEC	4	3	1	0	3	0
12	CHL-524	Microfluidics	PEC	4	3	1	0	3	0
13	CHL-526	Supercritical Fluids: Theory and Applications	PEC	4	3	1	0	3	0
14	CHL-528	Introduction to Granular Rheology	PEC	4	3	1	0	3	0
15	CHL-530	Drug Delivery	PEC	4	3	1	0	3	0
16	CHL-532	Colloids and Interfacial Science	PEC	4	3	1	0	3	0
17	CHL-534	Novel Separation Techniques	PEC	4	3	1	0	3	0

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18	CHL-536	Design of Experiments and Parameter Estimation	PEC	4	3	1	0	3	0
19	CHL-538	Industrial Safety and Hazard Management	PEC	4	3	1	0	3	0
20	CHL-540	Multiphase Flow	PEC	4	3	1	0	3	0

Science, Technology, and Advanced Research-tools basket

		Teaching Scheme			Contact Hours/Week			Exam Duration	
					L	T	P	Theory	Practical
S.No.	Subject Code	Course Title	Subject Area	Credits					
1	CHT-501	Computational Fluid Dynamics with Tools	STAR	3	2	1	0	3	0


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**DEPARTMENT OF CHEMICAL ENGINEERING
INDIAN INSTITUTE OF TECHNOLOGY ROORKEE**

Program Code: XXX Master of Science (by Research) in Chemical Engineering
 Department: Department of Chemical Engineering
 Year: I
 Model: 3

Teaching Scheme									
					Contact Hours/Week			Exam Duration	
S.No.	Subject Code	Course Title	Subject Area	Credits	L	T	P	Theory	Practical
Semester-I (Autumn)									
1	CHC-501	Mathematical Methods in Chemical Engineering	PCC	4	3	0	2	3	0
2	CHC-503	Advanced Transport Phenomena	PCC	4	3	0	2	3	0
3	CHC-505	Advanced Reaction Engineering	PCC	4	3	0	2	3	0
4	CHC-507	Advanced Thermodynamics and Molecular Simulations	PCC	4	3	1	0	3	0
5		Social Science Course	SSC	2	-	-	-	-	-
		Total		18					
Semester-II (Spring)									
1	CHC-751A	Thesis Stage-I	THESIS	15	-	-	-	-	-
		Total		15					


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**DEPARTMENT OF CHEMICAL ENGINEERING
INDIAN INSTITUTE OF TECHNOLOGY ROORKEE**

Program Code: XXX Master of Science (by Research) in Chemical Engineering
 Department: Department of Chemical Engineering
 Year: II
 Model: 3

Teaching Scheme						
S.No.	Subject Code	Course Title	Subject Area	Credits	Contact Hours/Week L T P	Exam Duration Theory Practical
Semester-I (Autumn)						
1	CHC-751B	Thesis Stage-II	THESIS	17	- - -	-
		Total		17		
Semester-II (Spring)						
1	CHC-751C	Thesis Stage-III	THESIS	18	- - -	-
		Total		18		

Summary				
Semester	1	2	3	4
Semester-wise Total Credits	18	15	17	18
Total Credits	68			


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**DEPARTMENT OF CIVIL ENGINEERING
INDIAN INSTITUTE OF TECHNOLOGY ROORKEE**

Program Code: XXX M.Tech. (Geospatial Engineering)
 Department: Department of Civil Engineering
 Year: I
 Model: 2

Teaching Scheme				Contact Hours/Week			Exam Duration		
S.No	Subject Code	Course Title	Subject Area	Credits	Semester-I (Autumn)			Theory	Practical
					L	T	P		
1.	CEC-511	Surveying Measurements and Adjustments	PCC	4	3	0	2	3	0
2.	CEC-513	Principles of Photogrammetry	PCC	4	3	0	2	3	0
3.	CEC-515	Principles of Remote Sensing	PCC	3	2	0	2	3	0
4.	CEC-517	Geodesy and GNSS Surveying	PCC	3	2	0	2	3	0
5.	CEC-519	Field Survey Camp*	PCC	2	0	0	4	0	0
6.		Social Science Course	SSC	2	-	-	-	-	-
		Total		18					
* 2 WEEKS CAMP									
Semester-II (Spring)									
1.		Program Elective-I	PEC	4	-	-	-	-	-
2.		Program Elective-II	PEC	4	-	-	-	-	-
3.		Program Elective-III	PEC	4	-	-	-	-	-
4.		Program Elective-IV	PEC	4	-	-	-	-	-
5.		Science, Technology, and Advanced Research-tools	STAR	3	-	-	-	-	-
6.	CEC-700	Seminar	SEM	2	0	0	4	-	-
		Total		21					

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**DEPARTMENT OF CIVIL ENGINEERING
INDIAN INSTITUTE OF TECHNOLOGY ROORKEE**

Program Code: XXX M.Tech. (Geospatial Engineering)
Department: Department of Civil Engineering
Year: II
Model: 2

Teaching Scheme									
S.No.	Subject Code	Course Title	Subject Area	Credits	Contact Hours/Week			Exam Duration	
					L	T	P	Theory	Practical
Semester-I (Autumn)									
1.	CEC-691	Internship Social Activity	ISA	3	-	-	-	-	-
2.	CEC-701A	Thesis Stage-I	THESIS	10	-	-	-	-	-
		Total		13					
Semester-II (Spring)									
1.	CEC-701B	Thesis Stage-II	THESIS	14	-	-	-	-	-
		Total		14					

Summary				
Semester	1	2	3	4
Semester-wise Total Credits	18	21	13	14
Total Credits	66			


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M.Tech. (Geospatial Engineering)

Program Elective Courses

Teaching Scheme									
S.No.	Subject Code	Course Title	Subject Area	Credits	Contact Hours/Week			Exam Duration	
					L	T	P	Theory	Practical
1.	CEL-611	Analytical and Digital Photogrammetry	PEC	4	3	0	2	3	0
2.	CEL-511	Digital Image Processing	PEC	4	3	0	2	3	0
3.	CEL-613	Thermal, Microwave and Hyperspectral Remote Sensing	PEC	4	3	0	2	3	0
4.	CEL-614	Theory and Applications of GIS	PEC	4	3	0	2	3	0
5.	CEL-616	Geoinformatics for Landuse Surveys	PEC	4	3	0	2	3	0
6.	CEL-617	Satellite Geodesy	PEC	4	3	0	2	3	0
7.	CEL-618	Modelling and Analysis of Geospatial Data	PEC	4	3	0	2	3	0

Students should opt for courses in such a way that they earn 03 credits from practical components in the entire programme.

**DEPARTMENT OF CIVIL ENGINEERING
INDIAN INSTITUTE OF TECHNOLOGY ROORKEE**

Program Code: **XXX M.Tech. (Geotechnical Engineering)**
 Department: **Department of Civil Engineering**
 Year: **I**
 Model: **2**

Teaching Scheme									
S.No.	Subject Code	Course Title	Subject Area	Credits	Contact Hours/Week			Exam Duration	
					L	T	P	Theory	Practical
Semester-I (Autumn)									
1.	CEC-521	Advanced Numerical Analysis	PCC	3	2	0	2	3	0
2.	CEC-523	Advanced Soil Mechanics	PCC	4	3	0	2	3	0
3.	CEC-525	Engineering Behaviour of Rocks	PCC	3	3	0	2/2	3	0
4.	CEC-527	Soil Dynamics and Machine Foundations	PCC	3	3	0	0	3	0
5.	CEC-529	FEM in Geotechnical Engineering	PCC	3	2	0	2	3	0
6.		Social Science Course	SSC	2	-	-	-	-	-
		Total		18					
Semester-II (Spring)									
1.		Program Elective-I	PEC	4	-	-	-	-	-
2.		Program Elective-II	PEC	3	-	-	-	-	-
3.		Program Elective-III	PEC	3	-	-	-	-	-
4.		Program Elective-IV	PEC	3	-	-	-	-	-
5.		Science, Technology, and Advanced Research-tools	STAR	3	-	-	-	-	-
6.	CEC-700	Seminar	SEM	2	-	-	4	-	-
		Total		21					


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**DEPARTMENT OF CIVIL ENGINEERING
INDIAN INSTITUTE OF TECHNOLOGY ROORKEE**

Program Code: XXX M.Tech. (Geotechnical Engineering)
 Department: Department of Civil Engineering
 Year: II
 Model: 2

Teaching Scheme						Contact Hours/Week		Exam Duration	
S.No.	Subject Code	Course Title	Subject Area	Credits	L	T	P	Theory	Practical
Semester-I (Autumn)									
1.	CEC-691	Internship Social Activity	ISA	3	-	-	-	-	-
2.	CEC-701A	Thesis Stage-I	THESIS	10	-	-	-	-	-
		Total		13					
Semester-II (Spring)									
1.	CEC-701B	Thesis Stage-II	THESIS	14	-	-	-	-	-
		Total		14					

Summary				
Semester	1	2	3	4
Semester-wise Total Credits	18	21	13	14
Total Credits	66			


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M.Tech. (Geotechnical Engineering)

/ Program Elective Courses

		Teaching Scheme				Contact Hours/Week			Exam Duration	
		Subject Code	Course Title	Subject Area	Credits	L	T	P	Theory	Practical
1.		CEL-625	Ground Improvement Engineering	PEC	3	3	0	0	3	0
2.		CEL-516	Constitutive Models for Geological Materials	PEC	3	3	0	0	3	0
3.		CEL-517	Earthquake Resistant Design of Geotechnical Structures	PEC	3	3	0	0	3	0
4.		CEL-518	Landslides and Mitigation	PEC	3	3	0	0	3	0
5.		CEL-519	Foundations on Weak Rocks	PEC	3	3	0	0	3	0
6.		CEL-520	Probabilistic Methods in Geomechanics	PEC	3	3	0	2/2	3	0
7.		CEL-623	Stability Analysis of Slopes	PEC	3	3	0	0	3	0
8.		CEL-526	Tunnelling and underground excavation	PEC	4	3	1	0	3	0
9.		CEL-527	Advanced Foundation Engineering	PEC	3	3	0	0	3	0

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**DEPARTMENT OF CIVIL ENGINEERING
INDIAN INSTITUTE OF TECHNOLOGY ROORKEE**

Program Code: XXX M.Tech. (Structural Engineering)
Department: Department of Civil Engineering
Year: I
Model: 2

Teaching Scheme									
					Contact Hours/Week			Exam Duration	
					L	T	P	Theory	Practical
S.No.	Subject Code	Course Title	Subject Area	Credits	Semester-I (Autumn)				
1.	CEC-541	Continuum Mechanics	PCC	4	3	1	0	3	0
2.	CEC-543	Advanced Concrete Design	PCC	4	3	0	2	3	0
3.	CEC-545	Structural Dynamics	PCC	4	3	1	0	3	0
4.	CEC-547	Behavior & Design of Steel Structures	PCC	4	3	0	2	3	0
5.		Social Science Course	SSC	2	-	-	-	-	-
		Total		18					
Semester-II (Spring)									
1.		Program Elective-I	PEC	4	-	-	-	-	-
2.		Program Elective-II	PEC	4	-	-	-	-	-
3.		Program Elective-III	PEC	4	-	-	-	-	-
4.		Program Elective-IV	PEC	4	-	-	-	-	-
5.		Science, Technology, and Advanced Research-tools	STAR	3	-	-	-	-	-
6.	CEC-700	Seminar	SEM	2	0	0	4	-	-
		Total		21					

**DEPARTMENT OF CIVIL ENGINEERING
INDIAN INSTITUTE OF TECHNOLOGY ROORKEE**

Program Code: XXX M.Tech. (Structural Engineering)
 Department: Department of Civil Engineering
 Year: II
 Model: 2

Teaching Scheme									
S.No.	Subject Code	Course Title	Subject Area	Credits	Contact Hours/Week			Exam Duration	
					L	T	P	Theory	Practical
Semester-I (Autumn)									
1.	CEC-691	Internship Social Activity	ISA	3	-	-	-	-	-
2.	CEC-701A	Thesis Stage-I	THESIS	10	-	-	-	-	-
		Total		13					
Semester-II (Spring)									
1.	CEC-701B	Thesis Stage-II	THESIS	14	-	-	-	-	-
		Total		14					

Summary				
Semester	1	2	3	4
Semester-wise Total Credits	18	21	13	14
Total Credits	66			


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M.Tech. (Structural Engineering)

Program Elective Courses

Teaching Scheme					Contact Hours/Week			Exam Duration	
S.No.	Subject Code	Course Title	Subject Area	Credits	L	T	P	Theory	Practical
1.	CEL-545	Finite Element Analysis	PEC	4	3	0	2	3	0
2.	CEL-642	Analysis and Design of Bridges	PEC	4	3	0	2	3	0
3.	CEL-538	Tall Buildings	PEC	4	3	0	2	3	0
4.	CEL-644	Analysis and Design of Plates and Shells	PEC	4	3	0	2	3	0
5.	CEL-647	Condition Assessment and Retrofitting of Structures	PEC	4	3	0	2	3	0
6.	CEL-539	Advanced Concrete Technology	PEC	4	3	0	2	3	0
7.	CEL-649	Fracture Mechanics in Quasi-Brittle Materials	PEC	4	3	1	0	3	0
8.	CEL-650	Design of Bridge Substructure	PEC	4	3	0	2	3	0
9.	CEL-651	Wind Engineering	PEC	4	3	0	2	3	0

Students should opt for PECs in such a way that they earn 03 credits from practical components in the entire programme.


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M.Tech. (Structural Engineering)

Science, Technology, and Advanced Research-tools basket

		Teaching Scheme			Contact Hours/Week			Exam Duration	
		Subject Code	Course Title	Subject Area	Credits	L	T	P	
1.	CET-501		Nonlinear Finite Element Analysis	STAR	3	3	0	0	3 0
2.	CET-502		Advanced Characterization of Sustainable Building Materials	STAR	3	3	0	0	3 0
3.	CET-503		Mechanics of Composites	STAR	3	3	0	2/2	3 0
4.	CET-504		Introduction to the theories of inelasticity	STAR	3	3	0	2/2	3 0
5.	CET-505		Engineering Design Optimization and Reliability	STAR	3	3	0	2/2	3 0


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**DEPARTMENT OF CIVIL ENGINEERING
INDIAN INSTITUTE OF TECHNOLOGY ROORKEE**

Program Code: XXX M.Tech. (Transportation Engineering)
Department: Department of Civil Engineering
Year: I
Model: 2

Teaching Scheme									
S.No.	Subject Code	Course Title	Subject Area	Credits	Contact Hours/Week			Exam Duration	
					L	T	P	Theory	Practical
Semester-I (Autumn)									
1.	CEC-551	Traffic Analysis and Design	PCC	3	3	0	0	3	0
2.	CEC-553	Highway Material Characterisation	PCC	4	3	0	2	3	0
3.	CEC-555	Pavement Evaluation and Management	PCC	3	3	0	0	3	0
4.	CEC-557	Geometric Design	PCC	3	3	0	0	3	0
5.	CEC-559	Transportation Planning	PCC	3	3	0	0	3	0
6.		Social Science Course	SSC	2	-	-	-	-	-
		Total		18					
Semester-II (Spring)									
1.		Program Elective-I	PEC	4	3	0	2	-	-
2.		Program Elective-II	PEC	4	3	0	2	-	-
3.		Program Elective-III	PEC	4	-	-	-	-	-
4.		Program Elective-IV	PEC	4	-	-	-	-	-
5.		Science, Technology, and Advanced Research-tools	STAR	3	-	-	-	-	-
6.	CEC-700	Seminar	SEM	2	-	-	-	-	-
		Total		21					

**DEPARTMENT OF CIVIL ENGINEERING
INDIAN INSTITUTE OF TECHNOLOGY ROORKEE**

Program Code: XXX M.Tech. (Transportation Engineering)
 Department: Department of Civil Engineering
 Year: II
 Model: 2

Teaching Scheme					Contact Hours/Week			Exam Duration	
S.No.	Subject Code	Course Title	Subject Area	Credits	L	T	P	Theory	Practical
Semester-I (Autumn)									
1.	CEC-691	Internship Social Activity	ISA	3	-	-	-	-	-
2.	CEC-701A	Thesis Stage-I	THESIS	10	-	-	-	-	-
		Total		13					
Semester-II (Spring)									
1.	CEC-701B	Thesis Stage-II	THESIS	14	-	-	-	-	-
		Total		14					

Summary				
Semester	1	2	3	4
Semester-wise Total Credits	18	21	13	14
Total Credits	66			


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M.Tech. (Transportation Engineering)

Program Elective Courses

S. No.		Teaching Scheme			Contact Hours/Week			Exam Duration	
		Subject Code	Course Title	Subject Area	Credits	L	T	P	
1.		CEL-540	Pavement Analysis and Design	PEC	4	3	1	0	3 0
2.		CEL-666	Transport Economics	PEC	4	3	1	0	3 0
3.		CEL-662	Intersection Design and Control	PEC	4	3	1	0	3 0
4.		CEL-563	Urban Mass Transit Systems	PEC	4	3	1	0	3 0
5.		CEL-565	Planning, Design, and Construction of Rural Roads	PEC	4	3	1	0	3 0
6.		CEL-567	Transportation Systems Analysis	PEC	4	3	0	2	3 0
7.		CEL-541	Transportation Data Analysis Techniques	PEC	4	3	0	2	3 0
8.		CEL-546	Advanced Highway Construction and Maintenance	PEC	4	3	0	2	3 0
9.		CEL-665	Road Traffic Safety	PEC	4	3	0	2	3 0

Students should opt for PECs in such a way that they earn 03 credits from practical components in the entire programme.


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DEPARTMENT OF CIVIL ENGINEERING
INDIAN INSTITUTE OF TECHNOLOGY ROORKEE

Program Code: XXX M.Tech. (Hydraulics Engineering)
Department: Department of Civil Engineering
Year: I
Model: 2

S.No		Teaching Scheme			Contact Hours/Week			Exam Duration	
		Subject Code	Course Title	Subject Area	Credits	L	T	P	
Semester-I (Autumn)									
1.	CEC-531		Advanced Hydrology	PCC	3	3	0	0	3
2.	CEC-533		Advanced Fluid Mechanics	PCC	4	3	0	2	3
3.	CEC-535		Free Surface Flows	PCC	3	3	0	0	3
4.	CEC-537		Modelling, Simulation and Optimization	PCC	3	2	0	2	3
5.	CEC-539		Ground Water Engineering	PCC	3	3	0	0	3
6.			Social Science Course	SSC	2	-	-	-	-
			Total		18				
Semester-II (Spring)									
1.			Program Elective-I	PEC	4	3	0	2	-
2.			Program Elective-II	PEC	4	-	-	-	-
3.			Program Elective-III	PEC	4	-	-	-	-
4.			Program Elective-IV	PEC	4	-	-	-	-
5.			Science, Technology, and Advanced Research-tools	STAR	3	-	-	-	-
6.	CEC-700		Seminar	SEM	2	-	-	-	-
			Total		21				

**DEPARTMENT OF CIVIL ENGINEERING
INDIAN INSTITUTE OF TECHNOLOGY ROORKEE**

Program Code: **XXX M.Tech. (Hydraulics Engineering)**
 Department: **Department of Civil Engineering**
 Year: **II**
 Model: **2**

Teaching Scheme						Contact Hours/Week		Exam Duration	
S.No.	Subject Code	Course Title	Subject Area	Credits	L	T	P	Theory	Practical
Semester-I (Autumn)									
1.	CEC-691	Internship Social Activity	ISA	3	-	-	-	-	-
2.	CEC-701A	Thesis Stage-I	THESIS	10	-	-	-	-	-
		Total		13					
Semester-II (Spring)									
1.	CEC-701B	Thesis Stage-II	THESIS	14	-	-	-	-	-
		Total		14					

Summary				
Semester	1	2	3	4
Semester-wise Total Credits	18	21	13	14
Total Credits	66			

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M.Tech. (Hydraulics Engineering)
Program Elective Courses

Teaching Scheme										Contact Hours/Week			Exam Duration	
S.No.	Subject Code	Course Title	Subject Area	Credits	L	T	P	Theory	Practical					
1.	CEL-614	Theory and Applications of GIS	PEC	4	3	0	2	3	0					
2.	CEL-528	Advanced Numerical Analysis	PEC	4	3	0	2	3	0					
3.	CEL-529	Environmental Hydraulics	PEC	4	3	1	0	3	0					
4.	CEL-530	Climate Change and its Impact on Water Resources	PEC	4	3	1	0	3	0					
5.	CEL-532	Fluvial Hydraulics	PEC	4	3	1	0	3	0					
6.	CEL-632	Hydraulic Structures	PEC	4	3	1	0	3	0					
7.	CEL-507	Systems Engineering	PEC	4	3	1	0	3	0					
8.	CEL-535	Water Resources Systems Planning	PEC	4	3	1	0	3	0					
9.	CEL-536	Irrigation and Drainage	PEC	4	3	1	0	3	0					
10.	CEL-636	Hydro Power Engineering	PEC	4	3	1	0	3	0					
11.	CEL-537	Computational Methods in Fluid Mechanics	PEC	4	3	1	0	3	0					

Students should opt for PECs in such a way that they earn 03 credits from practical components in the entire programme.


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DEPARTMENT OF CIVIL ENGINEERING
INDIAN INSTITUTE OF TECHNOLOGY ROORKEE

Program Code: XXX M.Tech. (Environmental Engineering)
Department: Department of Civil Engineering
Year: I
Model: 2

S.No.		Teaching Scheme			Contact Hours/Week			Exam Duration	
		Subject Code	Course Title	Subject Area	Credits	L	T	P	
Semester-I (Autumn)									
1.	CEC-501		Environmental Separation Processes	PCC	4	3	1	0	3 0
2.	CEC-503		Wastewater Treatment	PCC	3	3	0	0	3 0
3.	CEC-505		Environmental Chemistry	PCC	5	3	1	2	3 0
4.	CEC-507		Environmental Modelling and Simulation	PCC	4	3	0	2	3 0
5.			Social Science Course	SSC	2	-	-	-	-
			Total		18				
Semester-II (Spring)									
1.			Program Elective-I	PEC	4	-	-	-	-
2.			Program Elective-II	PEC	4	-	-	-	-
3.			Program Elective-III	PEC	4	-	-	-	-
4.			Program Elective-IV	PEC	4	-	-	-	-
5.			Science, Technology, and Advanced Research-tools	STAR	3	-	-	-	-
6.	CEC-700		Seminar	SEM	2	-	-	-	-
			Total		21				

**DEPARTMENT OF CIVIL ENGINEERING
INDIAN INSTITUTE OF TECHNOLOGY ROORKEE**

Program Code: XXX M.Tech. (Environmental Engineering)
 Department: Department of Civil Engineering
 Year: II
 Model: 2

S.No.		Teaching Scheme			Contact Hours/Week			Exam Duration	
		Subject Code	Course Title	Subject Area	Credits	L	T	P	
Semester-I (Autumn)									
1.	CEC-69I	Internship Social Activity		ISA	3	-	-	-	-
2.	CEC-70IA	Thesis Stage-I		THESIS	10	-	-	-	-
			Total		13				
Semester-II (Spring)									
1.	CEC-70IB	Thesis Stage-II		THESIS	14	-	-	-	-
			Total		14	-	-	-	-

Summary				
Semester	1	2	3	4
Semester-wise Total Credits	18	21	13	14
Total Credits	66			

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M.Tech. (Environmental Engineering)
Program Elective Courses

Teaching Scheme					Contact Hours/Week			Exam Duration	
S.No.	Subject Code	Course Title	Subject Area	Credits	L	T	P	Theory	Practical
1.	CEL-602	Water Quality Management	PEC	4	3	1	0	3	0
2.	CEL-603	Industrial and Hazardous Waste Management	PEC	4	3	1	0	3	0
3.	CEL-604	Environmental Impact and Risk Assessment	PEC	4	3	1	0	3	0
4.	CEL-606	Environmental Remediation of Contaminated Sites	PEC	4	3	1	0	3	0
5.	CEL-506	Ground Water Engineering	PEC	4	3	1	0	3	0
6.	CEL-614	Theory and Application of GIS	PEC	4	3	0	2	3	0
7.	CEL-507	Systems Engineering	PEC	4	3	1	0	3	0
8.	CEL-508	Environmental Nanotechnology	PEC	4	3	1	0	3	0
9.	CEL-509	Statistics and Instrumentation for Environmental Engineers	PEC	4	3	0	2	3	0
10.	CEL-504	Air Pollution and Control	PEC	4	3	0	2	3	0
11.	CEL-605	Solid Waste Management	PEC	4	3	0	2	3	0

Students should opt for PECs in such a way that they earn 03 credits from practical components in the entire programme.

DEPARTMENT OF DESIGN
INDIAN INSTITUTE OF TECHNOLOGY ROORKEE

Program Code: XXX M.Des. (Industrial Design)
Department: Department of Design
Year: I
Model: 2

Teaching Scheme									
S.No.	Subject Code	Course Title	Subject Area	Credits	Contact Hours/Week			Exam Duration	
					L	T	P	Theory	Practical
Semester-I (Autumn)									
1.	DEC-501	Introduction to Design and Prototyping**	PCC	Audit	-	-	-	-	-
2.	DEC-503	Design Methodology	PCC	3	2	0	2	2	0
3.	DEC-505	Design Thinking	PCC	3	1	0	4	2	0
4.	DEC-507	Elements and Principles of Visual Design	PCC	3	2	0	2	2	0
5.	DEC-509	Human Factor Design	PCC	3	1	2	0	2	0
6.	DEC-511	Materials and Manufacturing	PCC	2	1	0	2	2	0
7.	DEC-513	User Experience Design	PCC	2	1	0	2	2	0
8.		Social Sciences Course	SSC	2	-	-	-	-	-
		Total		18					
** This is a foundation course (L=15; T=5; P=10) will be conducted during the first two weekends after the commencement of classes to give orientation of Design course.									
Semester-II (Spring)									
1.		Program Elective I	PEC	4	-	-	-	-	-
2.		Program Elective II	PEC	4	-	-	-	-	-
3.		Program Elective III	PEC	3/4	-	-	-	-	-
4.		Program Elective IV	PEC	3/4	-	-	-	-	-
5.	DEC-700	Design Seminar	SEM	2	-	-	4	-	-
6.		Science, Technology, and Advanced Research-Tools	STAR	3	-	-	-	-	-
		Total		19-21					

DEPARTMENT OF DESIGN
INDIAN INSTITUTE OF TECHNOLOGY ROORKEE

Program Code: XXX M.Des. (Industrial Design)
Department: Department of Design
Year: II
Model: 2

Teaching Scheme					Contact Hours/Week			Exam Duration	
S.No.	Subject Code	Course Title	Subject Area	Credits	L	T	P	Theory	Practical
Semester-I (Autumn)									
1	DEC-691	Internship Social Activity	ISA	5	-	-	-	-	-
2	DEC-701A	Thesis Stage-I	Thesis	10	-	-	-	-	-
		Total		15					
\$\$ Evaluation scheme: (Industry: 40 + Institute: 60) Internship will be completed during summer break.									
Semester-II (Spring)									
1	DEC-701B	Thesis Stage-II	Thesis	14	-	-	-	-	-
		Total		14					

Summary				
Semester	1	2	3	4
Semester-wise Total Credits	18	19-21	15	14
Total Credits	66-68			

M.Des. (Industrial Design)

Program Elective Courses

Teaching Scheme					Contact Hours/Week			Exam Duration	
S.No	Subject Code	Course Title	Subject Area	Credits	L	T	P	Theory	Practical
1	DEL-501	Form Design	PEC	4	2	1	2	3	0
2	DEL-502	Sensors, Actuators and IOT	PEC	4	2	1	2	3	0
3	DEL-503	Computer Aided Design	PEC	4	2	1	2	3	0
4	DEL-504	Rapid Prototyping	PEC	4	3	0	2	3	0
5	DEL-505	Artificial Intelligence and Data Science	PEC	4	3	1	0	3	0
6	DEL-506	Interaction Design	PEC	4	2	1	2	3	0
7	DEL-507	Research Methods in Design	PEC	4	3	1	0	3	0
8	DEL-508	Inter-Disciplinary Design	PEC	4	3	0	2/2	3	0
9	DEL-509	Design for Sustainability	PEC	3	2	1	0	2	0
10	DEL-510	CAE in Product Design	PEC	3	3	0	0	3	0
11	DEL-511	Reverse Engineering	PEC	3	2	0	2	2	0
12	DEL-512	Product Planning and Marketing	PEC	3	3	0	0	3	0
13	DEL-513	Business and Service Innovation	PEC	3	3	0	0	3	0
14	DEL-514	Business Valuation	PEC	3	2	1	0	2	0
15	DEL-515	Intellectual Property Management	PEC	3	2	1	0	2	0
16	DEL-516	Legal Standards/IPR	PEC	3	3	0	0	3	0
17	DEL-517	Systems Thinking	PEC	3	3	0	0	3	0
18	DEL-518	Mobility Design	PEC	3	3	0	0	3	0
19	DEL-519	Service Design	PEC	3	2	1	0	2	0

Teaching Scheme									
S.No.	Subject Code	Course Title	Subject Area	Credits	Contact Hours/Week			Exam Duration	
					L	T	P	Theory	Practical
20	DEL-520	Research into Design	PEC	3	2	1	0	2	0
21	DEL-521	Bio Inspired Design	PEC	3	3	0	0	3	0
22	DEL-522	Computer Game Design	PEC	3	3	0	0	3	0
23	DEL-523	Design for Society	PEC	3	3	0	0	3	0
24	DEL-524	Graphic Design	PEC	3	2	0	2	2	0
25	DEL-525	Product Detailing	PEC	3	2	0	2	2	0
26	DEL-526	Contemporary Visual Design	PEC	3	3	0	0	3	0
27	DEL-527	Representation Techniques for Animation	PEC	3	3	0	0	3	0
28	DEL-528	Visual Narrative	PEC	3	3	0	0	3	0
29	DEL-529	Product Design	PEC	3	3	0	0	3	0
30	DEL-530	Manufacturing Guidelines for Product Design	PEC	3	3	0	0	3	0
31	DEL-531	Design for Social Inclusion	PEC	3	2	0	2/2	2	0
32	DEL-532	Introduction to Emotional Design	PEC	3	2	1	0	2	0
33	DEL-533	Technology Management	PEC	2	2	0	0	2	0
34	DEL-534	Product Innovation Management	PEC	2	2	0	0	2	0

M.Des. (Industrial Design)

Science, Technology, and Advanced Research-tools basket

Teaching Scheme					Contact Hours/Week			Exam Duration	
S.No.	Subject Code	Course Title	Subject Area	Credits	L	T	P	Theory	Practical
1	DET-501	User Experience and Interface Design	STAR	3	2	0	2	2	0

**DEPARTMENT OF HUMANITIES AND SOCIAL SCIENCES
INDIAN INSTITUTE OF TECHNOLOGY ROORKEE**

Program Code: **XXX M.Sc. (Economics)**
 Department: **Department of Humanities and Social Sciences**
 Year: **I**
 Model: **1-A**

Teaching Scheme						Contact Hours/Week		Exam Duration	
S.No	Subject Code	Course Title	Subject Area	Credits	L	T	P	Theory	Practical
Semester-I (Autumn)									
1.	HSC-501	Microeconomics-I	PCC	4	3	1	0	3	0
2.	HSC-503	Macroeconomics-I	PCC	4	3	1	0	3	0
3.	HSC-505	Basic Econometrics	PCC	4	3	0	2	3	0
4.	HSC-507	Development Economics	PCC	4	3	1	0	3	0
5.	HSC-509	Mathematical Economics	PCC	4	3	1	0	3	0
6.		Social Science Course	SSC	2	-	-	-	-	-
		Total		22					
Semester-II (Spring)									
1.	HSC-502	Microeconomics-II	PPI	4	3	1	0	3	0
2.	HSC-504	Macroeconomics-II	PPI	4	3	1	0	3	0
3.	HSC-506	Public Policy: Theory and Practice	PPI	4	3	1	0	3	0
4.		Program Elective-I	PPI	4	-	-	-	-	-
5.		Science, Technology, and Advanced Research-tools	STAR	3	-	-	-	-	-
6.	HSC-700	Seminar	SEM	2	-	-	-	-	-
		Total		21					

**DEPARTMENT OF HUMANITIES AND SOCIAL SCIENCES
INDIAN INSTITUTE OF TECHNOLOGY ROORKEE**

Program Code: XXX M.Sc. (Economics)
Department: Department of Humanities and Social Sciences
Year: II
Model: 1-A

Teaching Scheme												
S.No.	Subject Code	Course Title	Subject Area	Credits	Contact Hours/Week			Exam Duration				
					L	T	P	Theory	Practical			
Semester-I (Autumn)												
1.	HSC-511	Financial Economics: Theory and Practice	PPI	4	3	0	2	3	0			
2.		Program Elective-II	PPI	4	-	-	-	-	-			
3.		Program Elective-III	PPI	4	-	-	-	-	-			
4.	HSC-691	Internship Social Activity	ISA	3	-	-	-	-	-			
5.	HSC-601	Project Stage-I	PROJECT	4	-	-	-	-	-			
		Total		19								
Semester-II (Spring)												
1.		Program Elective-IV	PEC	4	-	-	-	-	-			
2.		Program Elective-V	PEC	4	-	-	-	-	-			
3.	HSC-602	Project Stage-II	PROJECT	6	-	-	-	-	-			
		Total		14								

Summary				
Semester	1	2	3	4
Semester-wise Total Credits	22	21	19	14
Total Credits	76			

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M.Sc. (Economics)

Program Elective Courses

S.No.		Teaching Scheme				Contact Hours/Week			Exam Duration	
		Subject Code	Course Title	Subject Area	Credits	L	T	P	Theory	Practical
1.		HSL-521	International Economics	PEC	4	3	1	0	3	0
2.		HSL-522	Environmental Economics	PEC	4	3	1	0	3	0
3.		HSL-523	Advanced Econometrics	PEC	4	3	0	2	3	0
4.		HSL-524	Money, Banking and Financial Markets	PEC	4	3	1	0	3	0
5.		HSL-532	Labour Economics : Theory & Practical	PEC	4	3	1	0	3	0
6.		HSL-525	Advanced Topics in Growth Theory	PEC	4	3	1	0	3	0
7.		HSL-526	Efficiency and Productivity Analysis	PEC	4	3	0	2	3	0
8.		HSL-527	Agriculture Economics & Policy	PEC	4	3	1	0	3	0
9.		HSL-528	Handling Large-scale Survey Data	PEC	4	3	0	2	3	0
10.		HSL-529	Social and Economic Networks	PEC	4	3	0	2	3	0
11.		HSL-530	Analytics for Business and Society	PEC	4	3	0	2	3	0
12.		HSL-531	Financial Econometrics	PEC	4	3	0	2	3	0

Students should opt for PECs in such a way that they earn 03 credits from practical components in the entire programme.

M.Sc. (Economics)

Science, Technology, and Advanced Research-tools basket

Teaching Scheme					Contact Hours/Week			Exam Duration	
S.No.	Subject Code	Course Title	Subject Area	Credits	L	T	P	Theory	Practical
1.	HST-501	Statistical Application for Behavioural and Social Research	STAR	3	2	1	0	3	0

Social Sciences Course Basket

S.No.	Subject Code	Course Title	Subject Area	Credits	L	T	P	Theory	Practical
1.	HSS-501	Economic and Business Environment	SSC	2	2	0	0	2	0
2.	HSS-502	Sociology of Work	SSC	2	2	0	0	2	0
3.	HSS-503	Learning and Memory	SSC	2	2	0	0	2	0

DEPARTMENT OF METALLURGICAL AND MATERIALS ENGINEERING
INDIAN INSTITUTE OF TECHNOLOGY ROORKEE

Program Code: XXX M.Tech. (Industrial Metallurgy)
Department: Department of Metallurgical and Materials Engineering
Year: I
Model: 2

Teaching Scheme												
							Contact Hours/Week			Exam Duration		
S.No.	Subject Code	Course Title	Subject Area	Credits	L	T	P	Theory	Practical			
Semester-I (Autumn)												
1.	MTC-503	Structure of Materials	PCC	4	3	1	0	3	0			
2.	MTC-513	Characterization of Materials	PCC	3	0	0	6	0	0			
3.	MTC-515	Phase Transformations	PCC	4	3	1	0	3	0			
4.	MTC-517	Heat and Mass Transfer	PCC	4	3	1	0	3	0			
5.		Social Science Course	SSC	2	-	-	-	-	-			
		Total		17								
Semester-II (Spring)												
1.		Program Elective-I	PEC	4	-	-	-	-	-			
2.		Program Elective-II	PEC	4	-	-	-	-	-			
3.		Program Elective-III	PEC	4	-	-	-	-	-			
4.		Program Elective-IV	PEC	4	-	-	-	-	-			
5.		Science, Technology, and Advanced Research-tools	STAR	3	-	-	-	-	-			
6.	MTC-700	Seminar	SEM	2	-	-	-	-	-			
		Total		21								

DEPARTMENT OF METALLURGICAL AND MATERIALS ENGINEERING
INDIAN INSTITUTE OF TECHNOLOGY ROORKEE

Program Code: XXX M.Tech. (Industrial Metallurgy)
Department: Department of Metallurgical and Materials Engineering
Year: II
Model: 2

Teaching Scheme					Contact Hours/Week			Exam Duration	
S.No.	Subject Code	Course Title	Subject Area	Credits	L	T	P	Theory	Practical
Semester-I (Autumn)									
1.	MTC-691	Internship Social Activity	ISA	3	-	-	-	-	-
2.	MTC-701A	Thesis Stage-I	THESIS	10	-	-	-	-	-
		Total		13					
Semester-II (Spring)									
1.	MTC-701B	Thesis Stage-II	THESIS	14	-	-	-	-	-
		Total		14					

Summary				
Semester	1	2	3	4
Semester-wise Total Credits	17	21	13	14
Total Credits	65			

M.Tech. (Industrial Metallurgy)

Program Elective Courses

Teaching Scheme					Contact Hours/Week			Exam Duration	
S.No.	Subject Code	Course Title	Subject Area	Credits	L	T	P	Theory	Practical
1.	MTL-531	Non Destructive testing	PEC	4	3	1	0	3	0
2.	MTL-532	Casting and Solidification	PEC	4	3	1	0	3	0
3.	MTL-533	Joining of Materials	PEC	4	3	1	0	3	0
4.	MTL-534	Theory of Metal Forming	PEC	4	3	1	0	3	0
5.	MTL-515	Composite Materials	PEC	4	3	1	0	3	0
6.	MTL-535	Powder Metallurgy	PEC	4	3	1	0	3	0
7.	MTL-513	Principles of Materials Selection	PEC	4	3	1	0	3	0
8.	MTL-527	Failure Analysis	PEC	4	3	1	0	3	0
9.	MTL-528	Tribology of Engineering Materials	PEC	4	3	1	0	3	0
10.	MTL-521	Corrosion Protection Methods	PEC	4	3	1	0	3	0
11.	MTL-501	Crystal Plasticity Modeling	PEC	4	3	1	0	3	0
12.	MTL-502	Additive Manufacturing: Modeling and Simulation	PEC	4	3	1	0	3	0
13.	MTL-503	Materials Informatics	PEC	4	3	1	0	3	0
14.	MTL-504	Modeling and simulations of diffusion-based processes in metallurgy	PEC	4	3	1	0	3	0

M.Tech. (Industrial Metallurgy)

Science, Technology, and Advanced Research-tools basket

S.No.		Subject Code	Course Title	Subject Area	Credits	Teaching Scheme			Contact Hours/Week	Exam Duration
						L	T	P		
1.		MTT-501	Materials for Sustainability	STAR	3	2	1	0	3	0
									Theory	Practical

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**DEPARTMENT OF METALLURGICAL AND MATERIALS ENGINEERING
INDIAN INSTITUTE OF TECHNOLOGY ROORKEE**

Program Code: XXX M.Tech. (Materials Engineering)
Department: Department of Metallurgical and Materials Engineering
Year: I
Model: 2

		Teaching Scheme			Contact Hours/Week			Exam Duration	
		Subject Code	Course Title	Subject Area	Credits	L	T	P	
Semester-I (Autumn)									
1.	MTC-503	Structure of Material	PCC	4	3	1	0	3	0
2.	MTC-513	Characterization of Materials	PCC	3	0	0	6	0	0
3.	MTC-521	Mechanical Behavior of Material	PCC	4	3	1	0	3	0
4.	MTC-523	Advanced Thermodynamics	PCC	4	3	1	0	3	0
5.		Social Science Course	SSC	2	-	-	-	-	-
		Total		17					
Semester-II (Spring)									
1.		Program Elective-I	PEC	4	-	-	-	-	-
2.		Program Elective-II	PEC	4	-	-	-	-	-
3.		Program Elective-III	PEC	4	-	-	-	-	-
4.		Program Elective-IV	PEC	4	-	-	-	-	-
5.		Science, Technology, and Advanced Research-tools	STAR	3	-	-	-	-	-
6.	MTC-700	Seminar	SEM	2	-	-	-	-	-
		Total		21					

**DEPARTMENT OF METALLURGICAL AND MATERIALS ENGINEERING
INDIAN INSTITUTE OF TECHNOLOGY ROORKEE**

Program Code: XXX M.Tech. (Materials Engineering)
 Department: Department of Metallurgical and Materials Engineering
 Year: II
 Model: 2

Teaching Scheme									
					Contact Hours/Week			Exam Duration	
S.No.	Subject Code	Course Title	Subject Area	Credits	L	T	P	Theory	Practical
Semester-I (Autumn)									
1.	MTC-691	Internship Social Activity	ISA	3	-	-	-	-	-
2.	MTC-701A	Thesis Stage-I	THESIS	10	-	-	-	-	-
		Total		13					
Semester-II (Spring)									
1.	MTC-701B	Thesis Stage-II	THESIS	14	-	-	-	-	-
		Total		14					

Summary				
Semester	1	2	3	4
Semester-wise Total Credits	17	21	13	14
Total Credits	65			


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M.Tech. (Materials Engineering)

Program Elective Courses

Teaching Scheme									
S.No.	Subject Code	Course Title	Subject Area	Credits	Contact Hours/Week			Exam Duration	
					L	T	P	Theory	Practical
1.	MTL-512	Engineering Ceramics	PEC	4	3	1	0	3	0
2.	MTL-515	Composite Materials	PEC	4	3	1	0	3	0
3.	MTL-536	Thin Film Technology	PEC	4	3	1	0	3	0
4.	MTL-537	Electronic Materials	PEC	4	3	1	0	3	0
5.	MTL-514	High Temperature Materials	PEC	4	3	1	0	3	0
6.	MTL-525	Biomaterials	PEC	4	3	1	0	3	0
7.	MTL-513	Principles of Materials Selection	PEC	4	3	1	0	3	0
8.	MTL-538	Nanomaterials and Applications	PEC	4	3	1	0	3	0
9.	MTL-528	Tribology of Engineering Materials	PEC	4	3	1	0	3	0
10.	MTL-526	Energy Storage Materials	PEC	4	3	1	0	3	0
11.	MTL-501	Crystal Plasticity Modeling	PEC	4	3	1	0	3	-
12.	MTL-502	Additive Manufacturing: Modeling and Simulation	PEC	4	3	1	0	3	-
13.	MTL-503	Materials Informatics	PEC	4	3	1	0	3	-
14.	MTL-504	Modeling and simulations of diffusion-based processes in metallurgy	PEC	4	3	1	0	3	-

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M.Tech. (Materials Engineering)

Science, Technology, and Advanced Research-tools basket

Teaching Scheme									
S.No.	Subject Code	Course Title	Subject Area	Credits	Contact Hours/Week			Exam Duration	
					L	T	P	Theory	Practical
1.	MTT-501	Materials for Sustainability	STAR	3	2	1	0	3	0

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**CENTRE FOR SPACE SCIENCE AND TECHNOLOGY
INDIAN INSTITUTE OF TECHNOLOGY ROORKEE**

Program Code: XXX M.Tech. (Space Science and Technology)
Centre: Centre for Space Science and Technology
Year: I
Model: 2

Teaching Scheme									
S.No	Subject Code	Course Title	Subject Area	Credits	Contact Hours/Week			Exam Duration	
					L	T	P	Theory	Practical
Semester-I (Autumn)									
1.	SSC-501	Introduction to Space Sciences	PCC	4	3	0	2	3	-
2.	SSC-503	Experimental Techniques for Space Exploration	PCC	4	3	0	2	3	-
3.	SSC-505	Launch Vehicle Technology	PCC	4	3	1	0	3	-
4.	SSC-507	Satellite System Technology	PCC	4	3	0	2	3	-
5.		Social Science Course	SSC	2					
		Total		18					
Semester-II (Spring)									
1.		Program Elective-I	PEC	4	-	-	-	-	-
2.		Program Elective-II	PEC	4	-	-	-	-	-
3.		Program Elective-III	PEC	4	-	-	-	-	-
4.		Program Elective-IV	PEC	4	-	-	-	-	-
5.		Science, Technology, and Advanced Research-tools	STAR	3	-	-	-	-	-
6.	SSC-700	Seminar	SEM	2	-	-	-	-	-
		Total		21					

**CENTRE FOR SPACE SCIENCE AND TECHNOLOGY
INDIAN INSTITUTE OF TECHNOLOGY ROORKEE**

Program Code: **XXX M.Tech. (Space Science and Technology)**
 Centre: **Centre for Space Science and Technology**
 Year: **II**
 Model: **2**

Teaching Scheme									
				Contact Hours/Week			Exam Duration		
S.No.	Subject Code	Course Title	Subject Area	Credits	L	T	P	Theory	Practical
Semester-I (Autumn)									
1.	SSC-691	Internship Social Activity	ISA	3	-	-	-	-	-
2.	SSC-701A	Thesis Stage-I	THESIS	10	-	-	-	-	-
		Total		13					
Semester-II (Spring)									
1.	SSC-701B	Thesis Stage-II	THESIS	14	-	-	-	-	-
		Total		14					

Summary				
Semester	1	2	3	4
Semester-wise Total Credits	18	21	13	14
Total Credits	66			

M.Tech. (Space Science and Technology)
Program Elective Courses

Teaching Scheme					Contact Hours/Week			Exam Duration	
S.No	Subject Code	Course Title	Subject Area	Credits	L	T	P	Theory	Practical
1.	SSL-501	Materials for Extreme Conditions	PEC	4	3	1	0	3	-
2	SSL-502	Antennas for Space Applications	PEC	4	3	1	0	3	-
3.	SSL-503	Observing & Predicting Climate of Planets	PEC	4	3	1	0	3	-
4.	SSL-504	Orbital Mechanics	PEC	4	3	1	0	3	-
5.	SSL-505	Space Mission Design and Optimization	PEC	4	3	1	0	3	-
6.	SSL-506	Terrestrial Planets & Their Climate	PEC	4	3	1	0	3	-
7.	SSL-507	Astrochemistry	PEC	4	3	1	0	3	-
8.	SSL-508	Navigation, Guidance and Control of Launch Vehicles and Satellites	PEC	4	3	1	0	3	-
9.	SSL-509	Rocket Propulsion	PEC	4	3	1	0	3	-
10.	SSL-510	Space Economics and Policy	PEC	4	3	1	0	3	-
11.	SSL-511	Exploration of Planetary Interiors	PEC	4	3	1	0	3	-
12.	SSL-512	Statistics and Machine Learning for Space Studies	PEC	4	3	1	0	3	-
13.	SSL-513	Satellite Meteorology	PEC	4	3	1	0	3	-
14.	SSL-514	Astrobiology	PEC	4	3	1	0	3	-
15.	MTL-512	Engineering Ceramics	PEC	4	3	1	0	3	-
16.	ECL-631	RF Receiver Design	PEC	4	3	1	0	3	-
17.	ECL-550	Radar Signal Processing	PEC	4	3	1	0	3	-
18.	ESL-XXX	Planetary Science and Space Exploration	PEC	4	3	1	0	3	-
19.	PHL-514	Solar Terrestrial Physics	PEC	4	3	1	0	3	-

M.Tech. (Space Science and Technology)

Science, Technology, and Advanced Research-tools basket

Teaching Scheme									
Subject Code		Course Title	Subject Area	Credits	Contact Hours/Week			Exam Duration	
S.No.					L	T	P	Theory	Practical
1.	SST-501	Space Exploration and Applications	STAR	3	2	1	0	3	-


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CENTRE OF EXCELLENCE IN DISASTER MITIGATION & MANAGEMENT

INDIAN INSTITUTE OF TECHNOLOGY ROORKEE

Program Code: XXX M.Tech. (Disaster Mitigation and Management)
Centre: Centre of Excellence in Disaster Mitigation & Management

Year: I
Model: 2

S. No.		Teaching Scheme			Contact Hours/Week			Exam Duration	
		Subject Code	Course Title	Subject Area	Credits	L	T	P	Practical
Semester-I (Autumn)									
1.	DMC-501		Introduction to Disaster Mitigation and Management	PCC	3	3	0	0	-
2.	DMC-503		Geodata Processing Techniques and Models	PCC	4	3	0	2	-
3.	DMC-505		Natural Hazards: Processes, Monitoring & Prediction	PCC	4	3	0	2	-
4.	DMC-507		Climate Change: Impact, Adaptation and Mitigation	PCC	4	2	1	2	-
5.			Social Science Course	SSC	2	-	-	-	-
			Total		17				
Semester-II (Spring)									
1.			Program Elective-I	PEC	4	-	-	-	-
2.			Program Elective-II	PEC	4	-	-	-	-
3.			Program Elective-III	PEC	4	-	-	-	-
4.			Program Elective-IV	PEC	4	-	-	-	-
5.			Science, Technology, and Advanced Research-tools	STAR	3	-	-	-	-
6.	DMC-700		Seminar	SEM	2	-	-	-	-
			Total		21				

Program Code: XXX M.Tech. (Disaster Mitigation and Management)
 Department: Centre of Excellence in Disaster Mitigation & Management
 Year: II
 Model: 2

Teaching Scheme									
S.No.	Subject Code	Course Title	Subject Area	Credits	Contact Hours/Week			Exam Duration	
					L	T	P	Theory	Practical
Semester-I (Autumn)									
1	DMC-691	Internship Social Activity	ISA	3	-	-	-	-	-
2	DMC-701A	Thesis Stage-I	THESIS	10	-	-	-	-	-
		Total		13					
Semester-II (Spring)									
1	DMC-701B	Thesis Stage-II	THESIS	14	-	-	-	-	-
		Total		14					

Summary				
Semester	1	2	3	4
Semester-wise Total Credits	17	21	13	14
Total Credits	65			

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M.Tech. (Disaster Mitigation & Management)

Program Elective Courses

Teaching Scheme					Contact Hours/Week			Exam Duration	
S.No	Subject Code	Course Title	Subject Area	Credits	L	T	P	Theory	Practical
1	DML-501	Analysis of Hydrological Extremes	PEC	4	3	1	0	3	0
2	DML-502	Landslide Hazard Assessment and Mitigation	PEC	4	2	1	2	3	0
3	DML-503	Cyclone and Wind Engineering	PEC	4	3	1	0	3	0
4	DML-504	Disaster Preparedness and Mitigation	PEC	4	3	1	0	3	0
5	DML-505	Weather and Climate Modelling	PEC	4	2	1	2	3	0
6	DML-506	Advanced Landslide Analysis	PEC	4	2	1	2	3	0
7	DML-507	Disaster Induced Risks	PEC	4	3	1	0	3	0
8	DML-508	Instrumentation and Measurements	PEC	4	2	1	2	3	0
9	DML-509	Application of Geospatial Data for Disaster Mitigation	PEC	4	3	1	0	3	0
10	DML-510	Vulnerability and Risk Analysis	PEC	4	3	1	0	3	0
11	DML-511	Manmade and Biological Disasters Detection and Mitigation	PEC	4	3	0	2	3	0
12	DML-512	Socio-Economic Aspects of Disaster Management	PEC	4	3	1	0	3	0
13	DML-513	Managerial and Financial Aspects of Disaster Management	PEC	4	3	1	0	3	0
14	DML-514	Industrial/Manmade Disasters and Safety	PEC	4	3	1	0	3	0
15	DML-515	Nuclear Physics for Disaster Mitigation	PEC	4	3	1	0	3	0
16	DML-516	Cryosphere Hazards	PEC	4	3	1	0	3	0
17	DML-517	Seismic Hazards	PEC	4	3	1	0	3	0

18	DML-518	Data Analytics for Disaster Management	PEC	4	2	1	2	3	0
19	DML-519	Fire Science & Engineering	PEC	4	3	0	2	3	0

Science, Technology, and Advanced Research-tools basket

Teaching Scheme									
S.No.	Subject Code	Course Title	Subject Area	Credits	Contact Hours/Week			Exam Duration	
					L	T	P	Theory	Practical
1	DMT-501	AI/ML in Disaster Management	STAR	3	2	1	0	3	0


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**INTERNATIONAL CENTRE OF EXCELLENCE FOR DAMS
INDIAN INSTITUTE OF TECHNOLOGY ROORKEE**

Program Code: **XXX M.Tech. (Dam Safety and Rehabilitation)**
 Department: **International Centre of Excellence for Dams**
 Year: **I**
 Model: **2**

		Teaching Scheme			Contact Hours/Week			Exam Duration	
		Subject Code	Course Title	Subject Area	Credits	L	T	P	Practical
Semester-I (Autumn)									
1.	DSC-501	Hydrologic Safety Evaluation of Dams		PCC	3	2	1	0	-
2.	DSC-503	Reservoir Sedimentation and Silt Management		PCC	3	2	0	2	-
3.	DSC-505	Seepage through Dams		PCC	3	2	0	2	-
4.	DSC-507	Geotechnical safety evaluation of Dams		PCC	3	2	0	2	-
5.	DSC-509	Seismic Hazard Assessment for dams		PCC	3	2	0	2	-
6.		Social Science Course		SSC	2	-	-	-	-
		Total			17				
Semester-II (Spring)									
1.		Program Elective-I		PEC	3	-	-	-	-
2.		Program Elective-II		PEC	3	-	-	-	-
3.		Program Elective-III		PEC	3	-	-	-	-
4.		Program Elective-IV		PEC	3	-	-	-	-
5.		Program Elective-V		PEC	3	-	-	-	-
6.		Science, Technology, and Advanced Research-tools		STAR	3	-	-	-	-
7.	DSC-700	Seminar		SEM	2	-	-	-	-
		Total			20				

**INTERNATIONAL CENTRE OF EXCELLENCE FOR DAMS
INDIAN INSTITUTE OF TECHNOLOGY ROORKEE**

Program Code: XXX M.Tech. (Dam Safety and Rehabilitation)
Department: International Centre of Excellence for Dams
Year: II
Model: 2

Teaching Scheme									
					Contact Hours/Week			Exam Duration	
S.No.	Subject Code	Course Title	Subject Area	Credits	L	T	P	Theory	Practical
Semester-I (Autumn)									
1	DSC-691	Internship Social Activity	ISA	5	-	-	-	-	-
2	DSC-701A	Thesis Stage-I	THESIS	10	-	-	-	-	-
		Total		15					
Semester-II (Spring)									
1	DSC-701B	Thesis Stage-II	THESIS	14	-	-	-	-	-
		Total		14					

Summary					
Semester	1	2	3	4	
Semester-wise Total Credits	17	20	15	14	
Total Credits	66				

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M.Tech. (Dam Safety and Rehabilitation)

Program Elective Courses

Teaching Scheme									
S.No.	Subject Code	Course Title	Subject Area	Credits	Contact Hours/Week			Exam Duration	
					L	T	P	Theory	Practical
1	DSL-501	Assessing and Managing Risks Associated with Dams	PEC	3	2	1	0	3	0
2	DSL-502	Disaster Management and EAPs for dams	PEC	3	2	0	2	3	0
3	DSL-503	Dam Safety Surveillance, Instrumentation and Monitoring	PEC	3	2	1	0	3	0
4	DSL-504	Environmental Monitoring and Impact Assessment of Dams	PEC	3	2	0	2	3	0
5	DSL-505	Earthquake Geotechnical Engineering	PEC	3	2	0	2	3	0
6	DSL-506	Geospatial Techniques for Monitoring of Dams	PEC	3	2	0	2	3	0
7	DSL-507	Hydraulic design of spillways and energy dissipators	PEC	3	2	0	2	3	0
8	DSL-508	Contract and Financial Management	PEC	3	2	1	0	3	0
9	DSL-509	Seismic Safety Evaluation of Dams	PEC	3	2	0	2	3	0
10	DSL-510	Planning and Design of Hydro-Mechanical Components in Dams	PEC	3	2	1	0	3	0
11	DSL-511	Ground Improvement and Geo-synthetics	PEC	3	2	0	2	3	0

M.Tech. (Dam Safety and Rehabilitation)

Science, Technology, and Advanced Research-tools basket

Teaching Scheme									
					Contact Hours/Week			Exam Duration	
S.No.	Subject Code	Course Title	Subject Area	Credits	L	T	P	Theory	Practical
1	DST-501	Analysis of Dam Instrumentation Data	STAR	3	2	1	0	3	0

Social Sciences Course Basket

S.No.	Subject Code	Course Title	Subject Area	Credits	L	T	P	Theory	Practical
1	DSS-501	Sustainable Tourism around Dams	SSC	2	1	0	2	-	-

**DEPARTMENT OF POLYMER AND PROCESS ENGINEERING
INDIAN INSTITUTE OF TECHNOLOGY ROORKEE**

Program Code: XXX M.Tech. (Polymer Science and Engineering)
Department: Department of Polymer and Process Engineering
Year: I
Model: 2

Teaching Scheme					Contact Hours/Week			Exam Duration	
S.No.	Subject Code	Course Title	Subject Area	Credits	L	T	P	Theory	Practical
Semester-I (Autumn)									
1	PEC-501	Polymeric Materials & their properties	PCC	2	2	0	0	2	0
2	PEC-503	Polymer Rheology and Physics	PCC	3	3	0	0	3	0
3	PEC-505	Macromolecular Chemistry	PCC	3	3	0	0	3	0
4	PEC-507	Elastomer Technology and Processing	PCC	2	2	0	0	2	0
5	PEC-509	Advanced Polymer Characterization	PCC	3	3	0	0	3	0
6	PEC-511	Polymer Synthesis, Processing and Characterization Lab	PCC	3	0	0	6	0	3
7		Social Science Course	SSC	2	-	-	-	-	-
		Total		18					
Semester-II (Spring)									
1		Program Elective- I	PEC	4	-	-	-	-	-
2		Program Elective- II	PEC	3	-	-	-	-	-
3		Program Elective- III	PEC	3	-	-	-	-	-
4		Program Elective- IV	PEC	3	-	-	-	-	-
5		Program Elective- V	PEC	3	-	-	-	-	-
6		Science, Technology, and Advanced Research-tools	STAR	3	-	-	-	-	-
7	PEC-700	Seminar	SEM	2	-	-	-	-	-
		Total		21					

DEPARTMENT OF POLYMER AND PROCESS ENGINEERING
INDIAN INSTITUTE OF TECHNOLOGY ROORKEE

Program Code: XXX M.Tech. (Polymer Science and Engineering)
Department: Department of Polymer and Process Engineering
Year: II
Model: 2

Teaching Scheme									
		Course Title	Subject Area	Credits	Contact Hours/Week			Exam Duration	
S.No.	Subject Code				L	T	P	Theory	Practical
Semester-I (Autumn)									
1	PEC-691	ISA	ISA	4	-	-	-	-	-
2	PEC-701A	Thesis Stage-I	THESIS	10	-	-	-	-	-
		Total		14					
Semester-II (Spring)									
1	PEC-701B	Thesis Stage-II	THESIS	14	-	-	-	-	-
		Total		14					

Summary					
Semester	1	2	3	4	
Semester-wise Total Credits	18	21	14	14	
Total Credits	67				

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M.Tech. (Polymer Science and Engineering)

Program Elective Courses

		Teaching Scheme			Contact Hours/Week			Exam Duration	
S.No	Subject Code	Course Title	Subject Area	Credits	L	T	P	Theory	Practical
1	PEL-501	Advanced Engineering Mathematics	PEC	4	3	1	0	3	0
2	PEL-502	Statistical Analysis	PEC	4	3	1	0	3	0
3	PEL-503	Process Equipment Design	PEC	4	3	1	0	3	0
4	PEL-504	Advanced Optimization Techniques	PEC	4	3	1	0	3	0
5	PEL-505	Polymer Blends and Composites	PEC	4	3	1	0	3	0
6	PEL-506	Polymer Colloids	PEC	3	3	0	0	3	0
7	PEL-507	Product Standardizations and Regulatory Standards in Polymers	PEC	3	3	0	0	3	0
8	PEL-508	Molecular Modelling and Simulation	PEC	3	3	0	0	3	0
9	PEL-509	Computer Aided Polymer Product Design	PEC	3	3	0	0	3	0
10	PEL-510	Bio and Bio-medical Polymers	PEC	3	3	0	0	3	0
11	PEL-511	Heat and Mass Transfer in Polymeric Materials	PEC	3	3	0	0	3	0
12	PEL-512	Quality Management	PEC	3	3	0	0	3	0
13	PEL-513	Functional Polymer	PEC	3	3	0	0	3	0
14	PEL-514	High Performance and Conducting Polymers	PEC	3	3	0	0	3	0
15	PEL-515	Polymer Film & Fibre Technology	PEC	3	3	0	0	3	0
16	PEL-516	Polymer Degradation & Recycling	PEC	3	3	0	0	3	0
17	PEL-517	Advanced Polymeric Technology	PEC	3	3	0	0	3	0

18	PEL-518	Polymer Processing	PEC	3	3	0	2/2	3	0
19	PEL-519	Polymer Reaction Engineering	PEC	3	3	0	2/2	3	0
20	PEL-520	Advanced Process Control	PEC	3	3	0	2/2	3	0
21	PEL-521	Polymeric Membrane Technology	PEC	3	3	0	2/2	3	0

Science, Technology, and Advanced Research-tools basket

Teaching Scheme									
S.No.	Subject Code	Course Title	Subject Area	Credits	Contact Hours/Week			Exam Duration	
					L	T	P	Theory	Practical
1	PET-501	Polymers for Advanced Applications	STAR	3	3	0	0	3	0
2	PET-502	Membrane Fabrication & Applications	STAR	3	3	0	0	3	0


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**DEPARTMENT OF WATER RESOURCES DEVELOPMENT AND MANAGEMENT
INDIAN INSTITUTE OF TECHNOLOGY ROORKEE**

Program Code: XXX M.Tech. Drinking Water and Sanitation
 Department: Department of Water Resources Development and Management
 Year: I
 Model: 2

		Teaching Scheme				Contact Hours/Week			Exam Duration	
		Subject Code	Course Title	Subject Area	Credits	L	T	P	Theory	Practical
Semester-I (Autumn)										
1.	WRC-503		Water Resource Planning and Management	PCC	4	3	1	-	3	-
2.	WRC-543		Drinking Water and Sanitation Sustainability	PCC	4	3	0	2	3	-
3.	WRC-545		Water sanitation, Hygiene, and Infrastructural Management	PCC	4	3	0	2	3	-
4.	WRC-506		Rural and Urban Water Supply	PCC	4	3	0	2	3	-
5.			Social Science Course	SSC	2	-	-	-	-	-
			Total		18					
Semester-II (Spring)										
1.			Program Elective-I	PEC	4	-	-	-	-	-
2.			Program Elective-II	PEC	4	-	-	-	-	-
3.			Program Elective-III	PEC	4	-	-	-	-	-
4.			Program Elective-IV	PEC	4	-	-	-	-	-
5.			Science, Technology, and Advanced Research-tools	STAR	3	-	-	-	-	-
6.	WRC-700		Seminar	SEM	2	-	-	-	-	-
			Total		21					

**DEPARTMENT OF WATER RESOURCES DEVELOPMENT AND MANAGEMENT
INDIAN INSTITUTE OF TECHNOLOGY ROORKEE**

Program Code: XXX M.Tech. Drinking Water and Sanitation
 Department: Department of Water Resources Development and Management
 Year: II
 Model: 2

Teaching Scheme					Contact Hours/Week			Exam Duration	
S.No.	Subject Code	Course Title	Subject Area	Credits	L	T	P	Theory	Practical
Semester-I (Autumn)									
1.	WRC-691	Internship Social Activity	ISA	4	-	-	-	-	-
2.	WRC-701A	Thesis Stage-I	THESIS	10	-	-	-	-	-
		Total		14					
Note: Students can take 1 or 2 audit courses as adv issued by the supervisor if required.									
Semester-II (Spring)									
1.	WRC-701B	Thesis Stage-II	THESIS	14	-	-	-	-	-
		Total		14					

Summary				
Semester	1	2	3	4
Semester-wise Total Credits	18	21	14	14
Total Credits	67			

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M.Tech. Drinking Water and Sanitation

Program Elective Courses

		Teaching Scheme				Contact Hours/Week			Exam Duration	
		Subject Code	Course Title	Subject Area	Credits	L	T	P	Theory	Practical
1.	WRL-536		Water Quality Monitoring and Modeling	PEC	4	3	1	-	3	-
2.	WRL-537		Groundwater Development and Management	PEC	4	3	1	-	3	-
3.	WRL-538		Watershed Development and Management	PEC	4	3	1	-	3	-
4.	WRL-542		Ecological Modeling and Sustainability	PEC	4	3	0	2	3	-
5.	WRL-552		Drinking-Water for Low-Income Societies	PEC	4	3	1	-	3	-
6.	WRL-553		Wastewater and Fecal Sludge Management	PEC	4	3	1	-	3	-
7.	WRL-554		Resilience, Shocks, and Emergencies	PEC	4	3	1	-	3	-
8.	WRL-555		Management and Operation of Water Utilities	PEC	4	3	1	-	3	-
9.	WRL-556		Water and Wastewater Engineering	PEC	4	3	1	-	3	-
10.	WRL-558		Flow Hydraulics and Urban Drainage	PEC	4	3	1	-	3	-
11.	WRL-535		Renewable Energy System Technology	PEC	4	3	1	-	3	-
12.	WRL-560		Circular Water Economy	PEC	4	3	1	-	3	-
13.	WRL-561		Sustainable Water Resources	PEC	4	3	1	-	3	-
14.	WRL-507		River Engineering	PEC	4	3	0	2	3	-

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M.Tech. Drinking Water and Sanitation (DWS)

Science, Technology, and Advanced Research-tools basket

Teaching Scheme						
S.No.	Subject Code	Course Title	Subject Area	Credits	Contact Hours/Week L T P	Exam Duration Theory Practical
1.	WRT-501	Artificial Intelligence (AI) & Machine Learning (ML) for Water Resources	STAR	3	2 0 2	3 -

Social Sciences Course Basket

S.No.	Subject Code	Course Title	Subject Area	Credits	L T P	Theory Practical
1.	WRS-501	Water and Society	SSC	2	2 0 0	3 -

**DEPARTMENT OF WATER RESOURCES DEVELOPMENT AND MANAGEMENT
INDIAN INSTITUTE OF TECHNOLOGY ROORKEE**

Program Code: XXXX M.Tech. (Water Resources Development)/P.G. Diploma in Water Resources Development (WRD)
 Department: Department of Water Resources Development and Management
 Year: I
 Model: 2

Teaching Scheme											
S.No.	Subject Code	Course Title	Subject Area	Credits	Contact Hours/Week			Exam Duration			
					L	T	P	Theory	Practical		
Semester-I (Autumn)											
1.		Program Core Course 1	PCC	4	3	1	0	3	-		
2.		Program Core Course 2	PCC	4	3	0	2	3	-		
3.		Program Core Course 3	PCC	4	3	0	2	3	-		
4.		Program Core Course 4	PCC	4	3	0	2	3	-		
5.		Social Science Course	SSC	2	-	-	-	-	-		
		Total		18							
Semester-II (Spring)											
1.		Program Elective-I	PEC	4	-	-	-	-	-		
2.		Program Elective-II	PEC	4	-	-	-	-	-		
3.		Program Elective-III	PEC	4	-	-	-	-	-		
4.		Program Elective-IV	PEC	4	-	-	-	-	-		
5.		Science, Technology, and Advanced Research-tools	STAR	3	-	-	-	-	-		
6.	WRC-700	Seminar	SEM	2	-	-	-	-	-		
		Total		21							
Note: P.G. Diploma course in WRD shall be of One Year duration comprising of semesters I and II only, with a minimum credit of 39											

**DEPARTMENT OF WATER RESOURCES DEVELOPMENT AND MANAGEMENT
INDIAN INSTITUTE OF TECHNOLOGY ROORKEE**

Program Code: XXX M.Tech. (Water Resources Development)
 Department: Department of Water Resources Development and Management
 Year: II
 Model: 2

S.No.		Teaching Scheme			Contact Hours/Week			Exam Duration	
		Subject Code	Course Title	Subject Area	Credits	L	T	P	
Semester-I (Autumn)									
1.	WRC-691		Internship Social Activity	ISA	4	-	-	-	-
2.	WRC-701A		Thesis Stage-I	THESIS	10	-	-	-	-
			Total		14				
Semester-II (Spring)									
1.	WRC-701B		Thesis Stage-II	THESIS	14	-	-	-	-
			Total		14				

Summary				
Semester	1	2	3	4
Semester-wise Total Credits	18	21	14	14
Total Credits	67			

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M.Tech. (Water Resources Development)/P.G. Diploma in Water Resources Development (WRD)

Programme Core Subjects (for CE/EE/ME backgrounds)

		Teaching Scheme			Contact Hours/Week			Exam Duration	
S.No.	Subject Code	Course Title	Subject Area	Credits	L	T	P	Theory	Practical
For Civil Background									
1.	WRC-501	Design of Water Resources Structures	PCC	4	3	0	2	3	-
2.	WRC-503	Water Resources Planning and Management	PCC	4	3	1	0	3	-
3.	WRC-505	Applied Hydrology	PCC	4	3	0	2	3	-
4.	WRC-507	System Design Techniques	PCC	4	3	0	2	3	-
For Electrical Background									
1.	WRC-511	Hydro Generating Equipment	PCC	4	3	0	2	3	-
2.	WRC-513	Hydropower System Planning	PCC	4	3	1	0	3	-
3.	WRC-515	Project Planning and Management	PCC	4	3	0	2	3	-
4.	WRC-517	Hybrid Renewable Energy System	PCC	4	3	0	2	3	-
For Mechanical Background									
1.	WRC-513	Hydropower System Planning	PCC	4	3	1	0	3	-
2.	WRC-521	Design of Hydro Mechanical Equipment	PCC	4	3	0	2	3	-
3.	WRC-515	Project Planning and Management	PCC	4	3	0	2	3	-
4.	WRC-517	Hybrid Renewable Energy System	PCC	4	3	0	2	3	-

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M.Tech. (Water Resources Development)/P.G. Diploma in Water Resources Development

Program Elective Courses

Teaching Scheme										Exam Duration	
S.No	Subject Code	Course Title	Subject Area	Credits	Contact Hours/Week			Theory		Practical	
					L	T	P				
1.	WRL-501	Geotechnical Engineering	PEC	4	3	1	-	3		-	
2.	WRL-502	Hydropower and Appurtenant Works	PEC	4	3	1	-	3		-	
3.	WRL-503	Earth and Rockfill Dams	PEC	4	3	1	-	3		-	
4.	WRL-504	Masonry and Concrete Dams	PEC	4	3	1	-	3		-	
5.	WRL-505	Irrigation Structures	PEC	4	3	1	-	3		-	
6.	WRL-507	River Engineering	PEC	4	3	0	2	3		-	
7.	WRL-508	Finite Element Methods	PEC	4	3	1	-	3		-	
8.	WRL-509	Water Resources System Reliability	PEC	4	3	1	-	3		-	
9.	WRL-510	Environmental Impact Assessment of Water Resource Projects	PEC	4	3	1	-	3		-	
10.	WRL-511	Groundwater Hydrology	PEC	4	3	1	-	3		-	
11.	WRL-512	Climate Change and Water Resources	PEC	4	3	1	-	3		-	
12.	WRL-513	Substation and Transmission line Design	PEC	4	3	1	-	3		-	
13.	WRL-514	Installation Maintenance and Testing of Hydro Generating Equipment	PEC	4	3	1	-	3		-	
14.	WRL-515	Maintenance Management in Power Plants	PEC	4	3	1	-	3		-	
15.	WRL-516	Power System Management	PEC	4	3	1	-	3		-	
16.	WRL-517	Electrical Design of Hydro Power Station	PEC	4	3	1	-	3		-	
17.	WRL-518	Power System Operation and Control	PEC	4	3	1	-	3		-	

18.	WRL-519	Control and Instrumentation of Hydro Power Plant	PEC	4	3	1	-	3	-
19.	WRL-520	Power System Analysis	PEC	4	3	1	-	3	-
20.	WRL-521	Power System Reliability	PEC	4	3	1	-	3	-
21.	WRL-522	Insulating Systems	PEC	4	3	1	-	3	-
22.	WRL-523	Planning and Design of Small Hydro Power Schemes	PEC	4	3	1	-	3	-
23.	WRL-524	Power Electronics Controlled Hydro-Electric Systems	PEC	4	3	1	-	3	-
24.	WRL-525	Modelling and Simulation of Hydro-Electric Energy Systems	PEC	4	1	1	4	2	2
25.	WRL-526	Synchronous and Asynchronous Generators Laboratory	PEC	4	1	-	6	-	3
26.	WRL-527	Power Electronics Laboratory	PEC	4	1	-	6	-	3
27.	WRL-528	Control and Instrumentation Laboratory	PEC	4	1	-	6	-	3
28.	WRL-529	Design of Construction Job Facilities	PEC	4	3	1	-	3	-
29.	WRL-530	Construction Plant Machinery	PEC	4	3	1	-	3	-
30.	WRL-531	Air Conditioning and Ventilation	PEC	4	3	1	-	3	-
31.	WRL-532	Construction Techniques	PEC	4	3	1	-	3	-
32.	WRL-534	Soil and Agronomy	PEC	4	3	1	-	3	-
33.	WRL-535	Renewable Energy System Technology	PEC	4	3	1	-	3	-
34.	WRL-536	Water Quality Monitoring and Modeling	PEC	4	3	1	-	3	-
35.	WRL-537	Groundwater Development and Management	PEC	4	3	1	-	3	-
36.	WRL-538	Watershed Development and Management	PEC	4	3	1	-	3	-
37.	WRL-539	Remote Sensing and GIS Applications in Water Systems	PEC	4	3	0	2	3	-
38.	WRL-540	Sustainable Water Resources	PEC	4	3	1	-	3	-
39.	WRL-542	Ecohydrological Modeling and Sustainability	PEC	4	3	0	2	3	-

M.Tech. (Water Resources Development)/P.G. Diploma in Water Resources Development (WRD)

Science, Technology, and Advanced Research-tools basket

Teaching Scheme									
S.No.	Subject Code	Course Title	Subject Area	Credits	Contact Hours/Week			Exam Duration	
					L	T	P	Theory	Practical
1.	WRT-501	Artificial Intelligence (AI) & Machine Learning (ML) for Water Resources	STAR	3	2	0	2	3	-

Social Sciences Course Basket

S.No.	Subject Code	Course Title	Subject Area	Credits	L	T	P	Theory	Practical
1.	WRS-501	Water and Society	SSC	2	2	0	0	3	-

**DEPARTMENT OF WATER RESOURCES DEVELOPMENT AND MANAGEMENT
INDIAN INSTITUTE OF TECHNOLOGY ROORKEE**

Program Code: XXX M.Tech. (Irrigation Water Management)/P.G. Diploma in Irrigation Water Management (IWM)
 Department: Department of Water Resources Development and Management
 Year: I
 Model: 2

S.No.		Teaching Scheme			Contact Hours/Week			Exam Duration	
		Subject Code	Course Title	Subject Area	Credits	L	T	P	Practical
Semester-I (Autumn)									
1.	WRC-503		Water Resources Planning and Management	PCC	4	3	1	0	3
2.	WRC-533		Design of Irrigation Structures and Drainage Works	PCC	4	3	0	2	3
3.	WRC-535		On Farm Development	PCC	4	3	0	2	3
4.	WRC-537		Principles and Practices of Irrigation	PCC	4	3	0	2	3
5.			Social Science Course	SSC	2	-	-	-	-
			Total		18				
Semester-II (Spring)									
1.			Program Elective-I	PEC	4	-	-	-	-
2.			Program Elective-II	PEC	4	-	-	-	-
3.			Program Elective-III	PEC	4	-	-	-	-
4.			Program Elective-IV	PEC	4	-	-	-	-
5.			Science, Technology, and Advanced Research-tools	STAR	3	-	-	-	-
6.	WRC-700		Seminar	SEM	2	-	-	-	-
			Total		21				
Note: P.G. Diploma course in IWM shall be of One Year duration comprising of semesters I and II only, with a minimum credit of 39									

DEPARTMENT OF WATER RESOURCES DEVELOPMENT AND MANAGEMENT
INDIAN INSTITUTE OF TECHNOLOGY ROORKEE

Program Code: XXX M.Tech. (Irrigation Water Management)/P.G. Diploma in Irrigation Water Management (IWM)
Department: Department of Water Resources Development and Management
Year: II
Model: 2

Teaching Scheme									
S.No.	Subject Code	Course Title	Subject Area	Credits	Contact Hours/Week			Exam Duration	
					L	T	P	Theory	Practical
Semester-I (Autumn)									
1.	WRC-691	Internship Social Activity	ISA	4	-	-	-	-	-
2.	WRC-701A	Thesis Stage-I	THESIS	10	-	-	-	-	-
		Total		14					
Semester-II (Spring)									
1.	WRC-701B	Thesis Stage-II	THESIS	14	-	-	-	-	-
		Total		14					

Summary				
Semester	1	2	3	4
Semester-wise Total Credits	18	21	14	14
Total Credits	67			

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M.Tech. (Irrigation Water Management)/P.G. Diploma in Irrigation Water Management

Program Elective Courses

Teaching Scheme					Contact Hours/Week			Exam Duration	
S.No.	Subject Code	Course Title	Subject Area	Credits	L	T	P	Theory	Practical
1.	WRL-503	Earth and Rockfill Dams	PEC	4	3	1	-	3	-
2.	WRL-510	Environmental Impact Assessment of Water Resource Projects	PEC	4	3	1	-	3	-
3.	WRL-512	Climate Change and Water Resources	PEC	4	3	1	-	3	-
4.	WRL-534	Soil and Agronomy	PEC	4	3	1	-	3	-
5.	WRL-535	Renewable Energy System Technology	PEC	4	3	1	-	3	-
6.	WRL-536	Water Quality Monitoring and Modeling	PEC	4	3	1	-	3	-
7.	WRL-537	Groundwater Development and Management	PEC	4	3	1	-	3	-
8.	WRL-538	Watershed Development and Management	PEC	4	3	1	-	3	-
9.	WRL-540	Sustainable Water Resources	PEC	4	3	1	-	3	-
10.	WRL-542	Ecohydrological Modeling and Sustainability	PEC	4	3	0	2	3	-
11.	WRL-544	Operation Maintenance and Management of Irrigation Systems	PEC	4	3	1	-	3	-
12.	WRL-545	Water and Land Laws	PEC	4	3	1	-	3	-
13.	WRL-546	Rural Sociology and Irrigation Economics	PEC	4	3	1	-	3	-
14.	WRL-547	Evaluation of Irrigation Project	PEC	4	3	1	-	3	-
15.	WRL-548	Theory of Seepage	PEC	4	3	1	-	3	-
16.	WRL-549	Cropping System Modeling	PEC	4	3	1	-	3	-
17.	WRL-550	Environmental Impact of Irrigated Agriculture	PEC	4	3	1	-	3	-
18.	WRL-551	Smart Irrigation Systems	PEC	4	3	1	-	3	-

M.Tech. (Irrigation Water Management)/P.G. Diploma in Irrigation Water Management

Science, Technology, and Advanced Research-tools basket

Teaching Scheme								
S.No.	Subject Code	Course Title	Subject Area	Credits	Contact Hours/Week			Exam Duration
					L	T	P	
1.	WRT-501	Artificial Intelligence (AI) & Machine Learning (ML) for Water Resources	STAR	3	2	0	2	3
								Practical
								-

Social Sciences Course Basket

Subject Code		Course Title	Subject Area	Credits	L	T	P	Theory	Practical
S.No.									
1.	WRS-501	Water and Society	SSC	2	2	0	0	3	-

**CENTRE FOR NANOTECHNOLOGY
INDIAN INSTITUTE OF TECHNOLOGY ROORKEE**

Program Code: XXX M.Tech. (Nanotechnology)
Centre: Centre for Nanotechnology
Year: I
Model: 2

Teaching Scheme									
S.No	Subject Code	Course Title	Subject Area	Credits	Contact Hours/Week			Exam Duration	
					L	T	P	Theory	Practical
Semester-I (Autumn)									
1.	NTC-501	Nanoscale Materials	PCC	3	3	0	0	3	0
2.	NTC-503	Advanced Characterizations and Analytical Techniques	PCC	3	3	0	0	3	0
3.	NTC-505	Emerging Applications of Nanomaterials	PCC	4	3	1	0	3	0
4.	NTC-507	Nanoscale Modelling and Simulation	PCC	4	3	0	2	3	0
5.	NTC-509	Laboratory	PCC	2	0	0	4	0	4
6.		Social Science Course	SSC	2	-	-	-	-	-
		Total		18					
Semester-II (Spring)									
1.		Program elective-I	PEC	4	-	-	-	-	-
2.		Program elective-II	PEC	4	-	-	-	-	-
3.		Program elective-III	PEC	4	-	-	-	-	-
4.		Program elective-IV	PEC	4	-	-	-	-	-
5.		Science, Technology, and, Advance Research-tools	STAR	3	-	-	-	-	-
6.	NTC-700	Seminar	SEM	2	-	-	-	-	-
		Total		21					

**CENTRE FOR NANOTECHNOLOGY
INDIAN INSTITUTE OF TECHNOLOGY ROORKEE**

Program Code: XXX M.Tech. (Nanotechnology)
Centre: Centre for Nanotechnology
Year: II
Model: 2

Teaching Scheme					Contact Hours/Week			Exam Duration	
S.No.	Subject Code	Course Title	Subject Area	Credits	L	T	P	Theory	Practical
Semester-I (Autumn)									
1.	NTC-691	Internship Social Activity	ISA	3	-	-	-	-	-
2.	NTC-701A	Thesis Stage-I	THESIS	10	-	-	-	-	-
		Total		13					
Semester-II (Spring)									
1.	NTC-701B	Thesis Stage-II	THESIS	14	-	-	-	-	-
		Total		14					

Summary				
Semester	1	2	3	4
Semester-wise Total Credits	18	21	13	14
Total Credits	66			


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M.Tech. (Nanotechnology)
Program Elective Courses

Teaching Scheme									
					Contact Hours/Week			Exam Duration	
S.No.	Subject Code	Course Title	Subject Area	Credits	L	T	P	Theory	Practical
1.	NTL-501	Structural Analysis of Nanomaterials	PEC	4	3	1	0	3	0
2.	NTL-502	Supramolecular Chemistry of Nanomaterials	PEC	4	3	1	0	3	0
3.	NTL-503	Physics of Nanomaterials	PEC	4	3	1	0	3	0
4.	NTL-504	Biomedical Nanotechnology	PEC	4	3	1	0	3	0
5.	NTL-505	Electronic Properties and Measurement Techniques of Nanomaterials	PEC	4	3	1	0	3	0
6.	NTL-506	Nanoscale Fabrication Techniques	PEC	4	3	1	0	3	0
7.	NTL-507	Environmental Nanotechnology	PEC	4	3	1	0	3	0
8.	NTL-508	Surface Engineering of Nanoscale Materials	PEC	4	3	1	0	3	0


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M.Tech. (Nanotechnology)
Science, Technology, and Advanced Research-tools basket

Teaching Scheme									
			Contact Hours/Week			Exam Duration			
S.No.	Subject Code	Course Title	Subject Area	Credits	L	T	P	Theory	Practical
1.	NTT-501	Technology of Nanoscale Devices	STAR	3	3	0	0	3	0
2.	NTT-502	Quantum Materials	STAR	3	3	0	0	3	0
3.	NTT-503	AI and ML for Nanotechnology	STAR	3	2	0	2	3	0

Social Sciences Course Basket

S.No.	Subject Code	Course Title	Subject Area	Credits	L	T	P	Theory	Practical
1.	NTS-501	Safety and Ethics in Nanotechnology Research	SSC	2	2	0	0	3	0

**CENTRE FOR TRANSPORTATION SYSTEMS
INDIAN INSTITUTE OF TECHNOLOGY ROORKEE**

Program Code: XXX M.Tech. (Transportation Systems Management)

Centre: Centre for Transportation Systems

Year: 1

Model: 2

Teaching Scheme									
S.No.	Subject Code	Course Title	Subject Area	Credits	Contact Hours/Week			Exam Duration	
					L	T	P	Theory	Practical
Semester-I (Autumn)									
1.	TSC-501	Introduction to Transportation Infrastructure Planning	PCC	4	3	1	0	3	0
2.	TSC-503	Transportation Systems Analytics	PCC	4	3	1	0	3	0
3.	TSC-505	Public Transport Operations & Management	PCC	4	3	1	0	3	0
4.	TSC-507	Transportation Planning & Management Studio	PCC	4	0	0	8	0	0
5.		Social Science Course	SSC	2	-	-	-	-	-
		Total		18					
Semester-II (Spring)									
1.		Program Elective-I	PEC	4	-	-	-	-	-
2.		Program Elective-II	PEC	4	-	-	-	-	-
3.		Program Elective-III	PEC	3/4	-	-	-	-	-
4.		Program Elective-IV	PEC	3/4	-	-	-	-	-
5.		Science, Technology, and Advanced Research-tools	STAR	3	-	-	-	-	-
6.	TSC-700	Seminar	SEM	2	-	-	-	-	-
		Total		19-21					

**CENTRE FOR TRANSPORTATION SYSTEMS
INDIAN INSTITUTE OF TECHNOLOGY ROORKEE**

Program Code: XXX M.Tech. (Transportation Systems Management)
 Centre: Centre for Transportation Systems
 Year: II
 Model: 2

S.No.		Teaching Scheme			Contact Hours/Week			Exam Duration	
		Subject Code	Course Title	Subject Area	Credits	L	T	P	Practical
Semester-I (Autumn)									
1.	TSC-691	Internship Social Activity		ISA	3	-	-	-	-
2.	TSC-701A	Thesis Stage-I		THESIS	10	-	-	-	-
		Total			13				
Semester-II (Spring)									
1.	TSC-701B	Thesis Stage-II		THESIS	14	-	-	-	-
		Total			14				

Summary				
Semester	1	2	3	4
Semester-wise Total Credits	18	19-21	13	14
Total Credits	64-66			

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M.Tech. (Transportation Systems Management)

Program Elective Courses

		Teaching Scheme			Contact Hours/Week			Exam Duration	
					L	T	P	Theory	Practical
S.No.	Subject Code	Course Title	Subject Area	Credits					
1.	TSL-501	Design & Rejuvenation of Urban Transport	PEC	4	3	1	0	3	0
2.	TSL-502	Advance Transportation Analytics	PEC	4	3	1	0	3	0
3.	TSL-503	Freight Transportation Planning & Management	PEC	4	3	1	0	3	0
4.	TSL-504	Management of Transportation Projects	PEC	4	3	1	0	3	0
5.	TSL-505	Planning and Management of Non-motorized Transport	PEC	4	3	1	0	3	0
6.	TSL-506	Active Mobility and Health	PEC	4	3	1	0	3	0
7.	TSL-507	Geographical Information System (GIS) Applications in Transportation Systems	PEC	4	3	0	2	3	0
8.	TSL-508	Intelligent Transportation System	PEC	4	3	1	0	3	0
9.	TSL-509	Sustainable Transportation Systems	PEC	4	3	1	0	3	0
10.	TSL-510	Ropeway Infrastructure Planning & Design	PEC	4	3	1	0	3	0
11.	TSL-511	Multimodal Transportation	PEC	4	3	1	0	3	0
12.	TSL-512	Inland Navigation and Water Transport	PEC	4	3	1	0	3	0

13.	TSL-513	Advance Transport Planning	PEC	3	2	1	0	3	0
14.	TSL-514	Airport Planning and Design	PEC	4	3	1	0	3	0
15.	TSL-515	Road Traffic Safety	PEC	4	3	1	0	3	0
16.	TSL-516	Transport Economics	PEC	4	3	1	0	3	0
17.	TSL-517	EV Charging Infrastructure	PEC	4	3	1	0	3	0

Science, Technology, and Advanced Research-tools basket

Teaching Scheme				Contact Hours/Week			Exam Duration	
S.No.	Subject Code	Course Title	Subject Area	Credits	L	T	P	Practical
1.	TST-501	Data Analytics in Transportation	STAR	3	2	1	0	3 0


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