IIT Delhi

PG PROGRAMME RULES

COURSES OF STUDY 2024-25

INDIAN INSTITUTE OF TECHNOLOGY DELHI

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IIT DELHI

VISION

To contribute to India and the World through excellence in scientific and technical education and research; to serve as a valuable resource for industry and society; and remain a source of pride for all Indians.

MISSION

To generate new knowledge by engaging in cutting-edge research and to promote academic growth by offering state-of-the-art undergraduate, postgraduate and doctoral programmes.

To identify, based on an informed perception of Indian, regional and global needs, areas of specialization upon which the Institute can concentrate.

To undertake collaborative projects which offer opportunities for long-term interaction with academia and industry.

To develop human potential to its fullest extent so that intellectually capable and imaginatively gifted leaders can emerge in a range of professions.

VALUES

- Academic integrity and accountability.
- Respect and tolerance for the views of every individual.
- Attention to issues of national relevance as well as of global concern.
- Breadth of understanding, including knowledge of the human sciences.
- Appreciation of intellectual excellence and creativity.
- An unfettered spirit of exploration, rationality and enterprise.

COURSES OF STUDY
2024-2025

POSTGRADUATE PROGRAMMES RULES

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Produced by : Publication Cell, IIT Delhi

July 2024

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1. POSTGRADUATE DEGREE REQUIREMENTS, REGULATIONS AND PROCEDURES

1.1 Degree Requirements

The detailed degree requirements for M.Sc., M.B.A., M.Des. M.Tech., M.S. (Research), M.P.P., Ph.D. degrees and P.G. D.I.I.T. are listed in Table 1.

1.2 Continuation Requirements

The detailed requirements for continuation as a student in the respective programme for M.Sc., M.B.A., M.Des. M.Tech., M.S. (Research), M.P.P., Ph.D. degrees and P.G. D.I.I.T. are listed in Table 11. Failure to maintain the specified academic standing will result in termination of registration and the student's name will be struck off the rolls.

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

(a) Only the 1st and 2nd semesters of an academic year can be registered semesters. The summer semester will not be considered as a registered semester.

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

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

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

1.3 Minimum Student Registration for a Programme

M.Sc., M.B.A., M.Des., M.P.P. or M.Tech. programme will not be run unless the number of students registered for that programme is six or more. If the number of students left in a programme at the end of the 2nd semester is less than four, the same programme may be looked into for temporary suspension by the Board of Educational Research and Planning.

1.4 Lower and Upper Limits for Credits Registered

For students pursuing M.Sc., M.B.A., M.Tech., M.P.P. and M.S.(Research), the minimum registration requirements in a semester are specified in Table 1. These minimum credit requirements are not applicable for graduating students who require lower than the proposed minimum to graduate.

1.5 Audit Courses for PG Students

(a) M.Tech./M.S.(R)/M.Sc./M.P.P./Ph.D. students are eligible for auditing a course at any time before completion of the programme.

(b) A student can request for an audit grade in any course provided he/she is eligible to earn audit credits, he/she is already registered for that course and it is not a core requirement of the student's programme. The request for auditing a course should be made on or before the last date for audit requests as defined in the semester schedule.

(c) A student earns either an NP (audit pass) or an NF (audit fail) grade for an audit course. The audit pass (NP) grade may be awarded if the student satisfies the attendance criteria specified for the course and he/she has obtained at least a 'D' grade. The course coordinator can specify a higher criterion for audit pass at the beginning of the semester. If either of these requirements is not fulfilled, the audit fail (NF) grade is awarded.

(d) Grades obtained in an audit course are not considered in the calculation of SGPA or CGPA.

(e) M.Tech., M.Sc., M.S.(R), M.P.P. and Ph.D. students can audit a course over and above their credit requirements, as specified by the supervisor and SRC. Audited credits do not count for graduation requirements of PG students.

(f) Non-credit core courses or core courses not considered for calculation of SGPA or CGPA for PG programmes like Ph.D., MBA, M.Tech., M.P.P., M.S. (R) should not be referred to as audit courses. These courses should be treated like similar core requirements for UG programmes such as Introduction to Programme. A student can earn either a S or Z grade in such courses. The grade S indicates successful completion. A student has to earn a S grade in such a course to meet the core requirements of a programme.

1.6 Award of D.I.I.T. to M.Tech./MBA Students

If a student after completing the maximum period available for the M.Tech. programme is not able to get the required minimum DGPA of 6.0 with the minimum required credits for the respective programme, then he/she can apply for a D.I.I.T. irrespective of whether the department/centre runs a Diploma programme or not. For the award of D.I.I.T., the student must have earned a minimum of 36 valid credits with a minimum CGPA of 5.5. The request for the award of DIIT must be made within 5 years of the date of joining the programme.

In case of M.B.A., DIIT shall be considered if at least 36 credits (9 courses from core and 3 courses from focus module) +4 compulsory audit courses, have been completed satisfactorily with a minimum CGPA of 5.5.

1.7 Regulations for Part-time Students

Normally, part-time M.Tech. and M.S. (Research) students are expected to complete the degree requirements in six semesters. In case of special circumstances, including extension of project work, the student can be allowed to continue beyond six semesters but in any case he/she cannot extend registration beyond ten semesters excluding summer semesters. In case of full-time students converting to part-time registration, the limit of six semesters will continue to apply.

1.8 Leave Rules for P.G. D.I.I.T., M.Des., M.Tech. and M.S. (Research)

A full-time P.G. D.I.I.T., M.Des., M.Tech. or M.S. (Research) student during his/her stay at the Institute will be entitled to leave for 30 days (including leave on medical grounds), per academic year. Even during mid-semester breaks, and summer and winter vacations, he/she will have to explicitly apply for leave. He/she, however, may be permitted to avail of leave only up to 15 days during winter vacation at the end of the first semester.

The leave will be subject to approval of the Head of Department/Centre/Programme/School Coordinator concerned and a proper leave account of each student shall be maintained by the Department/Centre/Programme/School Coordinator concerned.

1.9 Assistantship Requirements

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

The students are expected to put in 8 hours per week towards the work assigned by the Institute. Continuation of assistantship in a subsequent semester would be conditional to satisfactory performance of the assigned work and a SGPA of 7.0 or more (relaxed to 6.75 for SC/ST and PH students registered in M.Des., M.Tech. and M.S. (Research) programmes).

1.10 Summer Registration

Summer semester registration for PG students is admissible. M.Tech./M.S.(R)/M.Des./M.P.P. students will be allowed to register for maximum of one course (upto 4 Credits) and M.B.A./M.Sc. students upto 2 courses in the summer. Summer semester registration for PG students is permitted only when a student would graduate on completion of the courses registered in summer, and it is recommended by DRC/CRC. For projects, in case X grade is awarded in the second semester, the student would be expected to register during summer for completion of the project. Normally regular courses would not be offered during summer semester. Courses can, however, be offered by Departments/Centres/Schools for taking care of special situations subject to the availability and consent of faculty.

1.11 Master of Science (Research) Regulations

The M.S. (Research) programme will comprise of 15 credits of the course work and 36 credits of the research work. The 15 credits of course work should not include any component of minor project. In the first semester, the student has to register for a minimum of 09 and a maximum of 15 credits. In the first semester, the part-time students can only register for course work with minimum and maximum limits of 3 and 12 credits, respectively. The course work must be completed by the end of third semester; otherwise the registration of the student will stand cancelled.

The larger project component gives the student an opportunity to conduct in-depth investigation on a topic of his/her interest. The project will be monitored by the Student Research Committee (SRC) and the students will have to register for thesis (project course no. xxD895, 'xx' is department/school code) for 36 credits. An 'X' grade is awarded at the end of each semester until the project work gets completed and the thesis is written. Nominally the M.S.(R) programme is expected to take 4 semesters (excluding summer). Upon completion of project work, a thesis is written that is evaluated by one internal and one external examiner. Upon satisfactory recommendations from the examiners, the thesis defense can be conducted before a committee. Conversion to Ph.D. is also possible. For further details, see the "Rules and Regulations for Master of Science (Research) Programme" booklet.

1.12 Migration from one PG programme to another PG Programme of the Institute

Provision exists for the PG students of the Institute to move from (i) M.Tech./M.S.(R) to Ph.D., (ii) M.Tech. to M.S.(R), and (iii) M.S.(R) to M.Tech. as per details given in the table below:

	M.Tech./M.S.(R) to Ph.D.	M.Tech. to M.S.(R)	M.S.(R) to M.Tech.
Timing	> 1st Sem.	> 1st Sem. & ≤ 3rd Sem.	> 1st Sem. & ≤ 3rd Sem.
Eligibility	≥ 8.0 SGPA/CGPA & ≥ 12 credits	≥ 12 credits	≥ 12 credits
Admission	DRC/CRC (Evaluation)	DRC/CRC (Evaluation)	DRC/CRC (Evaluation)
Credits	Credits transfer as recommended by DRC/CRC	Credits transfer as recommended by DRC/CRC	Credits transfer as recommended by DRC/CRC
Duration	Max. 7 years from date of joining M.Tech./M.S.(R)	Max. 5 years from date of joining M.Tech.	Max. 5 years from date of joining M.S.(R)

Full-time M.Tech. and M.S.(R) students of IIT Delhi interested in joining the Ph.D. programme within two years of completion of their M.Tech./M.S.(R) will be granted waiver of residency period. The course work requirements can be made up by either additional credits (6 credits as per present norms) taken during their M.Tech./M.S.(R) period (over and above their minimum Degree requirements) or in the summer semester (first or second) by identifying courses. In all cases, the request for such credit transfer should be recommended by the concerned DRC/CRC/SRC as relevant to their respective Ph.D. programmes.

1.13 Doctor of Philosophy (Ph.D.) Regulations

The award of Ph.D. degree is in recognition of high achievements, independent research and application of scientific knowledge to the solution of technical and scientific problems. Creative and productive enquiry is the basic concept underlying the research work. In order to overcome any deficiency in the breadth of fundamental training or proper foundation for advanced work, special preliminary or pre-Ph.D. courses are given by each Department/Centre/School. These courses are given either by faculty members or by guest-speakers and specialists in the field of research.

1.13.1 Course requirements

Candidates admitted to non-engineering departments and having a B.Tech./M.Sc./M.A. or equivalent degree are required to complete a minimum of 12 credits. Relaxation up to 6 credits in the course work can be considered for those with an M.Phil. degree. The minimum requirement of pre-Ph.D. Course Credits/work for Ph.D. student admitted to an engineering department and having B.Tech./M.Sc. Degree is 20 credits. The minimum requirement of pre-Ph.D. Course Credits/work for Ph.D. student admitted to engineering department and having M.Tech. or equivalent Degree is 6 credits. Individual Academic Units may recommend course work requirements above the minimum requirements specified by the Institute.

Table 1. Continuation of Registration and Graduation Requirements for Postgraduate Programmes

Degree/Diploma	Registration limits (Per semester)	Criteria for continuation of registration	Graduation requirements	
			Valid Credits ($)	Max. Period of stay
P.G. D.I.I.T. (Naval Construction)	Minimum 12 credits Maximum 20 credits	CGPA > 5.0 at the end of each semester.	49	6 sem. #
Master of Public Policy	Minimum 12 credits Maximum 17 credits	(i) The minimum acceptable performance level in any registered semester is SGPA of 6.0. (ii) If at the end of any registered semester, the SGPA is less than 6.0 then the student will be issued a warning letter and placed on probation; a copy of the warning letter will be sent to the parents. The Chairperson DRC / CRC shall assess the feasibility of completing degree requirements and identify remedial measures for problems leading to poor performance. (iii) If a student is on probation and his/her academic performance is below the minimum acceptable level in the following registered semester then his/her registration will be terminated. (iv) The registration of any student will be limited to 1.25 times the average earned credits of the previous two registered semesters, subject to a minimum of 12 credits and a maximum of 17 credits.	54	6 sem.
M.Sc., Chemistry	Minimum 12 credits Maximum 26 credits	(i) The minimum acceptable performance level in any registered semester is SGPA of 5.0. (ii) If at the end of any registered semester, the SGPA is less than 5.0 then the student will be issued a warning letter and placed on probation; a copy of the warning letter will be sent to the parents. The Chairperson DRC/CRC shall assess the feasibility of completing degree requirements and identify remedial measures for problems leading to poor performance. (iii) If a student is on probation and his/her academic performance is below the minimum acceptable level in the following registered semester then his/her registration will be terminated. (iv) The registration of any student will be limited to 1.25 times the average earned credits of the previous two registered semesters, subject to a minimum of 15 credits and a maximum of 26 credits.	75-81	6 sem.
M.Sc., Cognitive Science				
M.Sc., Economics				
M.Sc., Mathematics				
M.Sc., Physics				
M.Tech., Full Time	Minimum 09 credits Maximum 15 credits	(i) The minimum acceptable performance level in any registered semester is SGPA of 6.0. (ii) If at the end of any registered semester the SGPA is less than 6.0, then the student will be issued a warning letter and placed on probation; a copy of the warning letter will be sent to Chairperson DRC/CRC. The Chairperson DRC/CRC shall assess the feasibility of completing degree requirements and identify remedial measures for problems leading to poor performance. (iii) If a student is on probation and his/her academic performance is below the minimum acceptable level in the following registered semester then his/her registration will be terminated. (iv) The registration of any student shall be limited to 1.25 times the average earned credits of the previous two registered semesters, subject to a minimum of 09 credits and a maximum of 15 credits for full time students.	48-54 credits	6 sem.
M.Tech., Part Time	Minimum 3 credits Maximum 12 credits			10 sem. @
M. Des.	Minimum 09 credits Maximum 15 credits		54	6 sem.
M.B.A., Full Time	Same as M.Tech. full time		72 (+ 6 compulsory audit courses)	6 sem.
M.B.A., Part Time	Same as M.Tech. part time			10 sem. @

M.S. (Res.) Full Time	See note +	(i) The minimum acceptable performance level in any registered semester is SGPA of 7.0 or more. (ii) If at the end of any registered semester, the SGPA is less than 7.0, then the student should be issued a warning letter and placed on probation; a copy of the warning letter should be sent to the Chairperson DRC/CRC. The Chairperson DRC/CRC shall assess the feasibility of completing degree requirements and identify remedial measures for problems leading to poor performance. (iii) If a student is on probation and his/her academic performance is below the minimum acceptable level in the following registered semester then his/her registration will be terminated. (iv) During the research work period, each unsatisfactory performance grade would entail a warning and two consecutive warnings would result in termination of registration.	51 including Thesis.	6 sem.
M.S. (Res.) Part Time	See note ++			10 sem. +++
Ph.D.	For details please refer to Ph.D. Ordinances and Regulations	(i) A student will be evaluated on completion of pre-Ph.D. course work in terms of Degree Grade Point Average (DGPA) which is calculated on the basis of the best valid credits as prescribed by the Department/Centre/School. The requirement for completion of pre-Ph.D. course work is DGPA of 7.5 or more. within the maximum permissible period i.e 18 and 24 months respectively for full-time and part time students. (ii) Registration of a Ph.D. student will be terminated at the end of Ist Semester on account of performance in the course work if the SGPA is less than 6.0. In case the SGPA is equal to or more than 6.0, the student will be allowed to continue the course work even if the credit requirements as recommended by the SRC have been completed in the first semester itself. (iii) In the subsequent semesters, the student must maintain a CGPA of more than 7.0 to continue registration.	12 for B.Tech./M.Sc., 6 for M.Tech. or equivalent; A Deptt./Centre / School may prescribe additional credits + Thesis	14 sem.

NOTE:

$ Detailed break-up of core, elective and open category courses are given in the latter pages of this document.

\+ In the first semester the student has to register for a minimum of 9 and a maximum of 15 credits of course work only. In the subsequent 3-semesters the student shall complete the research work and the course work remaining, if any.

++ In the first two semesters the part-time student shall register only for the course work with the minimum and maximum limits of 3-15 credits. The research work and the remaining course work, if any, shall be completed in the remaining 4 semesters. However, the course work must be completed within the first 4-semesters of registration.

+++ The 10 Semester rule for part-time M.S. (Research) students will be applicable only to those who have joined initially as part-time students. For students converting from full-time to part-time the maximum stay limit of 6 semesters will be applicable, subject to recommendations of DRC/CRC/SRC and approval by Dean, Academics.

@ The 10 Semester rule for part-time M.Tech. students will be applicable only to those who have joined initially as part-time students. For students converting from full-time to part-time, the maximum stay limit of 6 semester will be applicable.

\# The summer semester will not be considered as a registered semester.

M.Tech. or equivalent degree holders admitted to Ph.D. are required to complete a minimum of 6 credits. The Departments / Centres / Schools may stipulate a larger number of credits in general or in specific cases. The course requirement will be determined by the Department / Centre / School Research Committee (DRC / CRC / SRC) on the recommendations of the supervisor after due consideration of the background of the student in relation to the proposed topic of research. These courses can be prescribed from existing M.Tech. courses and / or from special pre-Ph.D. courses including laboratory, seminar, foreign language, etc. Normally, no independent study course will be allowed for Ph.D. students. The pre-Ph.D. course credits that contribute to the DGPA of the Research Scholar can only be earned from regular lecture courses. In exceptional cases for Research Scholars who join the Ph.D. programme after B.Tech. (or equivalent) degree, a maximum of one course may be allowed having laboratory or programming content only. Such an exception would be allowed by the Dean, Academics on recommendation of the SRC of the student and the corresponding DRC / CRC.

Further, in case a Ph.D. student having completed 15 credits is unable to complete the research at the Ph.D. level for any reason whatsoever, he / she may be allowed to complete M.S. (Research) degree requirement as per Institute rules.

A student shall be formally registered / admitted to the candidacy of Ph.D. degree only after he / she has cleared the comprehensive examination. Students would be permitted to take the comprehensive examination only after they have submitted a research plan and have completed the course work (including compulsory audit course - HSL 800: Research Writing). Full-time and part-time students must clear the comprehensive examination within a period of 18 months and 24 months, respectively, from the date of joining. A maximum of two chances will be given to any student to clear the comprehensive examination. Every student, after having completed the comprehensive examination must formally register for the candidacy on a form obtainable from the Academic Section.

1.13.2 Time limit

In addition to the information in Table 1, the time limits shown in Table 2 apply for Ph.D. work.

Table 2: Time limits for students registered under Ph.D. Programme

S.No.		Candidate's qualification	
		M.Tech. or equivalent	B.Tech. / M.Sc. or equivalent
1	**Limits for Registration**		
1.1	Minimum period of registration	2 years	3 years (can be reduced to 2 years with the approval of Senate)
1.2	Normal maximum period of registration	10 Semesters	10 Semesters
1.3	Extended maximum period of registration	14 Semesters	14 Semesters
2	Conversion from Full-time to Part-time Registration	Comprehensive examination with the approval of Dean Academics	

1.13.3 Leave regulations

(a) Leave during course work

A full-time Ph.D. student, during his/her stay at the Institute will be entitled to leave for 30 days, including leave on medical grounds, per academic year. Even during mid-semester breaks, and summer and winter vacations, he/she will have to explicitly apply for leave. He / she, however, may be permitted to avail of leave only up to 15 days during winter vacation at the end of the first semester.

Leave beyond 30 days in an academic year may be granted to a research scholar in exceptional cases subject to the following conditions:

(i) the leave beyond 30 days will be without Assistantship / Scholarship, and

(ii) such an extension of up to additional 30 days will be granted only once during the programme of the scholar.

In addition, a Ph.D. student who has completed his / her course work may be granted leave on medical grounds up to 10 days per academic year.

Women research scholars will be eligible for Maternity Leave with assistantship for a period not exceeding 180 days once during the tenure of their Ph.D. programme.

The leave may be subject to the approval of the Head of Department / Centre / School / Programme Coordinator concerned on the recommendation of the Supervisor; and a proper leave account of each research scholar shall be maintained by the Department / Centre / School / Programme Coordinator concerned.

1.13.4 Attendance requirements for assistantship

Any full time Ph.D. student receiving assistantship or scholarship irrespective of the source while pursuing course work, must attend at least 75% of classes in each course in which he/she is registered. In case his/her attendance falls below 75% in any course during a month, he/she will not be paid assistantship for that month. Further, if his/her attendance again falls short of 75% in any course in any subsequent month in that semester, his/her studentship and assistantship will be terminated. A research scholar after having completed the course work must attend to his/her research work on all the working days and mark attendance except when he/she is on duly sanctioned leave. The requirement of 75% attendance will apply as above, on daily attendance except in the cases where longer leave has been duly sanctioned within the leave entitlement of the student. For the above purpose, if 75% works out to be a number which is not a whole number, the immediate lower whole number will be treated as the required 75% attendance.

All scholars who are offered assistantship are expected to put in 8 hours per week towards the work assigned by the Institute. Continuation of assistantship in the subsequent semester would be conditional, subject to satisfactory performance in the work assigned.

The above holds for Prime Minister's Research Fellowship (PMRF) scholars as well. Additional rules governing PMRF scholars may be announced from time to time.

1.13.5 Further regulations governing Ph.D. students

The Ph.D. degree of the Institute may be conferred on a candidate who fulfills all the requirements detailed in the Ordinances and other rules, approved by the Senate. Some of the important regulations are given below:

(i) Applications for Ph.D. registration, i.e., for entry to a course of study and research leading to Ph.D. degree must be made to the Board of Academic Programmes (BAP) on the approved form. The date of registration is normally the date of joining the programme. However, in exceptional cases the date of registration may be preponed by a maximum of 6 months by the BAP if it is convinced that the candidate has spent adequate amount of time on research earlier.

(ii) The academic programme of all the Ph.D. candidates in a Department/Centre/School will be coordinated by the DRC/CRC/SRC appointed by the BAP.

(iii) The supervisor shall be a full-time member of the academic staff of the Institute. The supervisor(s) shall be appointed within three months of joining the programme. For this, Ph.D. candidates must fill up the required portion of the prescribed form, following which supervisor(s) must fill up the required portion, and the Student Research Committee (SRC) must be finalized by the respective DRC/CRC/SRC, of the Academic Unit. This process must be completed within three months of the Ph.D. candidate's date of first registration. If necessary, the Board of Academic Programme on the recommendations of the Supervisor through the DRC/CRC/SRC, may appoint Joint Supervisor(s) not exceeding two from inside or outside the Institute. Normally, there should not be more than two supervisors for a candidate from within the Institute. Appointment of any Joint Supervisor would not be permitted after a lapse of eighteen months from the date of registration of the candidate, except in cases when none of the supervisors is in the Institute for a year or more at a stretch.

(iv) The DRC/CRC/SRC shall meet from time to time and review the progress of each candidate in the course work, as well as research, by any means, including oral examination of the candidate, if necessary, and recommend, after due consultation with the supervisor(s), such steps to the candidate as are necessary to improve his/her performance.

(v) The progress of each candidate will be monitored by the DRC/CRC/SRC. For this purpose, the following procedures will be followed:

  (a) Ph.D. research work will be compulsorily given a course number, DTD 899 (Doctoral Thesis) for all candidates across the Institute.

  (b) The DRC/CRC/SRC Secretary/Ph.D. Coordinator will be coordinating the collection of progress reports written and signed by the scholars and forwarded by the supervisors every semester.

  (c) The supervisor(s)/SRC/DRC/CRC will evaluate the progress of the student every semester.

  (d) X' grade will be awarded if the progress is 'satisfactory' in that semester.

  (e) If the progress is 'unsatisfactory', 'U' grade will be awarded. For the first appearance of 'U' grade, a warning would be issued to the candidate by Dean, Academics. If his/her performance does not improve after warning, the assistantship may be withheld.

(f) If there are two consecutive 'U' grade (in consecutive semesters), the registration will stand terminated.

(g) Submission of progress report should continue till submission of thesis.

(h) Like all other courses, the grades for DTD 899 will be discussed in the Department / Centre / School as per the semester schedule.

The above process will continue till the thesis is submitted.

(vi) The candidate may submit the thesis at any time provided that:

(a) He / she has completed the minimum period of registration including any extension prescribed by the Board of Academic Programmes (BAP).

(b) He / she has completed the course work requirement as prescribed by the DRC / CRC / SRC with DGPA not below 7.50 and has also cleared the comprehensive examination.

(c) He / she has submitted at least two months in advance, the title and a synopsis of the thesis. The Synopsis along with the list of examiners suggested by the supervisor needs to be approved by the DRC / CRC / SRC and then forwarded to Dean, Academics.

(vii) The thesis shall normally be written in English in the specific format and shall contain a critical account of the candidate's research. It should be characterized by a discovery of facts, a fresh approach towards interpretation of facts and theories or significant contribution to knowledge of design or development, or a combination of them. It should bear evidence of the candidate's capacity for analysis and judgement and also his/her ability to carry out independent investigation, design or development. A thesis should normally be supplemented by published work. No part of the thesis or supplementary published work shall be submitted for the award of any other Degree / Diploma. Normally, three copies of thesis in soft cover have to be submitted in the format prescribed by the Institute. In case of joint supervision, four copies of the thesis are required to be submitted.

(viii) On receipt of the title and synopsis of a thesis, the Dean, Academics will appoint a Board of Examiners for each candidate. The Board will consist of one (or two) internal examiner(s), normally the supervisor(s), and two external examiners, one from within India and one from abroad who shall be an expert in the subject of thesis. These external examiners shall be chosen from a list of eight, to be recommended by the supervisor(s) through the DRC/CRC/SRC while forwarding the title and synopsis of the thesis. The candidate will be required to submit a fresh synopsis if more than 9 months elapse from the synopsis submission date to the thesis submission date.

(ix) Each Examiner will submit a detailed assessment report recommending to the BAP, one of the following courses of action:

(a) that the thesis be deemed satisfactory and that the candidate may defend his/her thesis orally before a committee constituted for the purpose and any members of the faculty and research students who wish to be present.

(b) that the candidate may submit a revised thesis before the expiry of a specific period. In the normal circumstances, he / she may submit the revised thesis within a period of one year from the date of communication in this regard from the Dean, Academics. However, in exceptional circumstances, this period may be extended by the BAP by another year: the total revision time irrespective of the number of revisions allowed will not exceed a period of two years.

(c) that the thesis be rejected outright.

In the event of disagreement between the external examiners, the BAP may, as a special case, appoint another external examiner, if the merit of the case so demands. The examiner will report independently to the BAP.

(x) The oral defense of the thesis shall be conducted by a committee consisting of the internal examiner(s) and one external examiner. If none of the external examiners is available for the conduct of the oral defense, an alternative external examiner shall be appointed by the BAP for this purpose only.

(xi) On the completion of all stages of the examination, the Oral Defense Committee shall recommend to the BAP one of the following courses of action:

(a) that the degree be awarded.

(b) that the candidate should be examined on a further occasion in a manner they shall prescribe.

(c) that the degree shall not be awarded.

In the case of (a) above, the Oral Defense Committee shall also provide to the candidate a list of all corrections and modifications, if any, suggested by the examiners.

(xii) The degree shall be awarded by the Senate, provided that:

(a) the Oral Defense Committee, through the BAP so recommends.

(b) the candidate produces a 'no dues certificate' from all concerned in the prescribed form and gets it forwarded along with the report of the Oral Defense Committee; and

(c) the candidate has submitted two hard cover copies of the thesis, after incorporating all necessary corrections and modifications including appropriate IPR notice. The hard-bound copies of the Ph.D. thesis, submitted after the viva-voce examination, must contain the appropriate copyright certificate in the beginning of the thesis, on a separate page on the left side. One of these copies is for the Department / Centre / School Library and the other is for the Central Library. A softcopy of the thesis has been submitted to the Central Library.

(d) A Hindi translation of the thesis abstract is to be submitted as part of final submission (after examiner reports are received). The students can seek assistance from Hindi Cell in this regard.

(xiii) If a member of the academic staff, who is registered for the degree, leaves the Institute before the minimum period of registration is completed, he / she will be permitted to submit his thesis in due course, provided that:

(a) a substantial part of the research has been completed at the Institute; and

(b) any additional work required can be adequately supervised.

(xiv) A member of the academic staff who has commenced his research before joining the Institute may, at the discretion of the BAP and on the recommendation of the Supervisor through the DRC / CRC / SRC concerned, be permitted to include in his period of registration, part or all of the time spent on research before joining the Institute, up to a maximum of one year.

(xv) A member of the non-academic staff of the Institute who satisfies eligibility qualifications may be considered for admission to the degree as a part-time candidate provided his/her application is duly approved by the Director of the Institute.

2. POSTGRADUATE PROGRAMME STRUCTURES

Master of Science in Chemistry

Department of Chemistry

The overall credits structure

Category	PC	PE	OC	*Total*
Credits	**60**	**9**	**6**	**75**

Program Core

CML511	Quantum Chemistry	3	0	0	3
CML512	Stereochemistry & Organic Reaction Mechanisms	3	0	0	3
CML513	Photochemistry & Pericyclic Reactions	3	0	0	3
CML514	Main Group Chemistry	3	0	0	3
CML515	Instrumental Methods of Analysis	3	0	0	3
CML521	Molecular Thermodynamics	3	0	0	3
CML522	Chemical Dynamics & Surface Chemistry	3	0	0	3
CML523	Organic Synthesis	3	0	0	3
CML524	Transition and Inner Transition Metal Chemistry	3	0	0	3
CML525	Basic Organometalic Chemistry	3	0	0	3
CML526	Structure & Function of Cellular Biomolecules	3	0	0	3
CML631	Molecular Biochemistry	3	0	0	3
CMP511	Lab-I	0	0	4	2
CMP512	Lab-II	0	0	4	2
CMP521	Lab-III	0	0	4	2
CMP522	Lab-IV	0	0	4	2
CMD631	Project Part-I	0	0	12	6
CMD641	Project Part-II	0	0	20	10
	Total Credits				***60***

Program Electives

CML661	Solid State Chemistry	3	0	0	3
CML662	Statistical Mechanics & Molecular Simulation Methods	3	0	0	3
CML663	Selected Topics in Spectroscopy	3	0	0	3
CML664	Group Theory & Spectroscopy	3	0	0	3
CML665	Biophysical Chemistry	3	0	0	3
CML671	Supramolecular Chemistry	3	0	0	3
CML672	Recent Trends in Organic Chemistry	3	0	0	3
CML673	Bio-organic and Medicinal Chemistry	3	0	0	3
CML674	Physical Methods of Structure Determination of Organic Compounds	3	0	0	3
CML675/740	Chemistry of Heterocyclic Compounds	3	0	0	3
CML681	Physical Methods in Inorganic Chemistry	3	0	0	3
CML682	Inorganic Polymers	3	0	0	3
CML683	Applied Organometallic Chemistry	3	0	0	3
CML684	Bio-inorganic Chemistry	3	0	0	3
CML691	Microbial Biochemistry	3	0	0	3
CML692	Food Chemistry and Biochemistry	3	0	0	3
CML693/739	Applied Biocatalysis	3	0	0	3
CML696	Physical Organic Chemistry	3	0	0	3
CML670	Organic Chemistry of Biological Systems	3	0	0	3

Sem.	Courses (Number, Abbreviated Title, L-T-P, Credits)								Lecture courses	Contact h/week				Credits
										L	T	P	Total	
I	CML511 Quantum Chemistry (3-0-0) 3	CML512 Stereo-chemistry & Organic Reaction Mechanisms (3-0-0) 3	CML513 Photochemistry & Pericyclic Reactions (3-0-0) 3	CML514 Main Group Chemistry (3-0-0) 3	CML515 Instrumen-tal Methods of Analysis (3-0-0) 3		CMP511 Lab-I (0-0-4) 2	CMP512 Lab-II (0-0-4) 2	5	15	0	8	23	19
II	CML521 Molecular Thermo-dynamics (3-0-0) 3	CML522 Chemical Dynamics & Surface Chemistry (3-0-0) 3	CML523 Organic Synthesis (3-0-0) 3	CML524 Transition and Inner Transition Metal Chemistry (3-0-0) 3	CML525 Basic Organo-metalic Chemistry (3-0-0) 3	CML526 Structure & Function of Cellular Bio-molecules (3-0-0) 3	CMP521 Lab-III (0-0-4) 2	CMP522 Lab-IV (0-0-4) 2	6	18	0	8	26	22
Summer														
III	CML631 Molecular Bio-chemistry (3-0-0) 3	PE-1 (3-0-0) 3	PE-2 (3-0-0) 3	PE-3 (3-0-0) 3	CMD631 Project Part-I (0-0-12) 6				4	12	0	12	24	18
IV	OE-1 (3-0-0) 3	OE-2 (3-0-0) 3	CMD641 Project Part-II (0-0-20) 10						2	6	0	20	26	16

Total = 75

Master of Science in Cognitive Science

Department of Humanities and Social Sciences

The overall credits structure

Category	PC	PE	OC	*Total*
Credits	**60**	**9**	**6**	**75**

Program Core

HSL521	Introduction to Cognitive Science	3	0	2	4
HSS521	Independent Study in Cognitive Science (Bridge course)	0	2	0	2
HSL522	Basics of Programming for Cognitive Science	1	0	2	2
HSL541	Language in the Mind	3	1	0	4
HSL561	Cognitive Neuroscience	3	0	2	4
HSL621	Mathematical Foundations for Cognitive Science	2	1	0	3
HSL622	Computation and Cognition	3	0	2	4
HSL651	Philosophy of Mind and Cognition	3	1	0	4
HSL661	Cognitive Processes: From Labs to Fields	3	0	2	4
HSL721	Research Methods in Cognitive Science	1	0	4	3
HSL747	Language Computations and Mental Architecture	3	0	0	3
HSP700	Workshop on Scientific Writing	0	2	8	2
HSD621	Cognitive Science Project-I	0	0	12	6
HSD622	Cognitive Science Project-II	0	0	18	9
HSD623	Mini Project in Cognitive Science	0	0	4	2
HSP522	Cognitive Science Lecture Series-I	0	0	4	2
HSP523	Cognitive Science Lecture Series-II	0	0	4	2
	Total Credits				***60***

Program Electives

HSL726	Culture and Cognition	3	0	0	3
HUL763	Cognitive Psychology	3	0	0	3
HUL742	Transformational Theories of Language	3	0	0	3
HUL743	Language Acquisition, Teaching and Assessment	3	0	0	3
HUL745	Psycholinguistics	3	0	0	3
HSL727	Advances in Social Cognition	3	0	2	4
HSL767	Emotion and Decision making	3	0	0	3
HSL768	Judgment and Decision Making	3	0	0	3
HSL769	Number Cognition	3	0	2	4
HSL780	Social and Cultural Construction of Emotions	3	0	0	3
HSL722	Data Analysis for Behavioral Research using R	3	0	2	4
HSL723	Advanced Computational Methods	0.5	0	2	1.5
HSL724	Advanced Experimental Methods	0.5	0	2	1.5
HSL725	Advanced Qualitative Methods	0.5	0	2	1.5
HSL748	Natural Language Understanding	3	0	0	3
HSL749	Optimality Theory and Harmonic Grammar	3	0	0	3
HSL821	Eye Movement and Cognitive Processes	2	0	2	3
HSL822	Advanced Data Analysis for Behavioral Research using R	3	0	2	4
HSL844	Computational Models of Meaning	3	0	0	3
HUL843	Reading and Sentence Processing	2	1	0	3

Sem.	Courses (Number, Abbreviated Title, L-T-P, credits)						Lecture courses	Contact h/week				Credits
								L	T	P	Total	
I	Programme Core											
	HSL521 Introduction to Cognitive Science (3-0-2) 4	HSS521 Independent Study in Cognitive Science (Bridge course) (0-2-0) 2	HSL522 Basics of Programming for Cognitive Science (1-0-2) 2	HSL541 Language in the Mind (3-1-0) 4	HSL561 Cognitive Neuroscience (3-0-2) 4	HSL721 Research Methods in Cognitive Science (1-0-4) 3	5	11	3	10	24	19
II	Programme Core				Programme Elective							
	HSL621 Mathematical Foundations for Cognitive Science (2-1-0) 3	HSL622 Computation and Cognition (3-0-2) 4	HSL651 Philosophy of Mind and Cognition (3-1-0) 4	HSL661 Cognitive Processes: From Labs to Fields (3-0-2) 4		PE-1 (3-0-0) 3	5	11	2	4	17	18
Summer	HSD623 Mini Project in Cognitive Science (0-0-4) 2											
	Programme Core				Open Elective	Programme Elective						
III	HSL747 Language Computations and Mental Architecture (3-0-0) 3	HSP522 Cognitive Science Lecture Series-I (0-0-4) 2	HSP700 Workshop on Scientific Writing (0-2-0) 2	HSD621 Cognitive Science Project-I (0-0-12) 6	OE-I (3-0-0) 3	PE-2 (3-0-0) 3	3	9	2	16	27	19
	Programme Core				Open Elective	Programme Elective						
IV	HSD622 Cognitive Science Project II (0-0-18) 9		HSP523 Cognitive Science Lecture-II (0-0-4) 2		OE-II (3-0-0) 3	PE-3 (3-0-0) 3	2	6	0	22	28	17

Total = 75

Master of Science in Economics

Department of Humanities and Social Sciences

The overall credits structure

Category	PC	PE	OC	*Total*
Credits	**60**	**9**	**6**	**75**

Program Core

HSL511	Microeconomics-I	3	1	0	4
HSL512	Macroeconomics-I	3	1	0	4
HSL513	Probability and Statistics for Economics	3	0	2	4
HSL516	Mathematical Economics	3	1	0	4
HSL514	Issues in Development	3	0	0	3
HSL611	Microeconomics-II	3	1	0	4
HSL612	Macroeconomics-II	3	1	0	4
HSL613	Econometrics	3	0	2	4
HSL614	Development Economics	3	0	0	3
HSL515	Indian Economy	3	0	0	3
HSP612	Research Seminar in Economics	1	0	4	3
HSP511	Economics Lab	0	0	8	4
HSP611	Advanced Economics Lab	0	0	8	4
HSP520	Research Project in Economics-I	0	0	6	3
HSP620	Research Project in Economics-II	0	0	18	9
	Total Credits				***60***

Program Electives

Microeconomics Track

HSL816	Game Theory	3	0	0	3
HSL815	Theory of Market Design	3	0	0	3
HSL716	Industrial Economics	3	0	0	3
HSL813	Foundations of Decision Theory	3	0	0	3

Macroeconomics Track

HSL714	International Economics	3	0	0	3
HSL711	Macro Development Economics	3	0	0	3
HSL812	Advanced International Trade	3	0	0	3
HSL811	Advanced Economic Growth Theory	3	0	0	3

Quantitative Economics Track

HSL719	Advanced Econometrics	3	0	0	3
HSL715	Time Series Econometrics and Forecasting	3	0	0	3
MTL625	Principles of Optimization Theory	3	0	0	3
MTL725	Stochastic Processes and its Applications	3	0	0	3
MTL732	Financial Mathematics	3	0	0	3
MTL733	Stochastic of Finance	3	0	0	3
MTL766	Multivariate Statistical Methods	3	0	0	3
MTL843	Mathematical Modeling of Credit Risk	3	0	0	3
MTL505	Computer Programming	3	1	0	4
MTL508	Mathematical Programming	3	1	0	4
COL774	Machine Learning	3	0	2	4
ELL885	Machine Learning for Computational Finance	3	0	0	3
COL671	Principles of Artificial Intelligence	3	0	2	4

Development Economics Track

HSL818	Labour Economics	3	0	0	3
HSL817	Health Economics	3	0	0	3
HSL814	Research Methods in Economics	1	0	2	2
HSL717	Perspectives on Indian Economy	3	0	0	3
HSL718	Political Economy of Development	3	0	0	3
HSL775	Agrarian Societies and Rural Development	3	0	0	3
HSL874	Civil Society and Democracy in India	3	0	0	3
HSL878	Globalization	3	0	0	3
HSL783	Science, Technology and Society	3	0	0	3
HSL701	Introduction to Science and Technology Policy Studies	1.5	0	0	1.5
HSL702	Approaches to Science and Technology Policy Studies	1.5	0	0	1.5
HSL703	Perspectives on climate change: Implications for policy	3	0	0	3
HSL704	Inclusive Innovation: Theory and Practice	2	0	4	4
HSL762	Social Issues: Analysis and Policy	3	0	0	3
HSL772	Sociology of India	3	0	0	3
HSL776	Capitalism: Theory and Practice	3	0	0	3
HSL779	Gender and Society	3	0	0	3
HSL781	Potential and Perils of the Digital Welfare	3	0	0	3
HSL782	Perspectives on Development in India	3	0	0	3
HSL801	Law, Technology and Citizenship	3	0	0	3
HSL877	Industry and Society	3	0	0	3

Sem.	Courses (Number, Abbreviated Title, L-T-P, credits)						Lecture courses	Contact h/week				Credits
								L	T	P	Total	
I	Programme Core											
	HSL511 Microeconomics-1 (3-1-0) 4	HSL512 Macroeconomics-1 (3-1-0) 4	HSL513 Probability and Statistics for Economics (3-0-2) 4	HSL516 Mathematical Economics (3-1-0) 4	HSL514 Issues in Development* (3-0-0) 3		5	15	3	2	20	19
II	Programme Core					Programme Elective						
	HSL611 Microeconomics-2 (3-1-0) 4	HSL612 Macroeconomics-2 (3-1-0) 4	HSL613 Econometrics (3-0-2) 4	HSL614 Development Economics (3-0-0) 3	HSP511 Economics Lab (0-0-8) 4	OE-1 (3-0-0) 3	5	15	2	10	27	22
Summer	Summer Internship/Project (optional and non-credit)											
	Programme Core				Programme Elective							
III	HSL515 Indian Economy* (3-0-0) 3	HSP612 Research Seminar (1-0-4) 3	HSP611 Advanced Economics Lab (0-0-8) 4	HSP520 Project-I (0-0-6) 3	PE-1 (3-0-0) 3	PE-2 (3-0-0) 3	PE-3 (3-0-0) 3	5	13	0	18	31	22
	Programme Core				Programme Elective							
IV	HSP620 Project-II (0-0-18) 9				OE-2 (3-0-0) 3			1	3	0	18	21	12

*Issues in Development and India Economy will be offered in alternate years so that both first year and second year students attend one compulsory course together.

Total = 75

Master of Science in Mathematics

Department of Mathematics

The overall credits structure

Category	PC	PE	OC	*Total*
Credits	**57**	**12**	**6**	**75**

Program Core

MTD701	Project-I	0	0	10	5
MTL501	Algebra	3	1	0	4
MTL502	Linear Algebra	3	1	0	4
MTL503	Real Analysis	3	1	0	4
MTL504	Ordinary Differential Equations	3	1	0	4
MTL505	Computer Programming	3	0	2	4
MTL506	Complex Analysis	3	1	0	4
MTL507	Topology	3	1	0	4
MTL508	Mathematical Programming	3	1	0	4
MTL509	Numerical Analysis	3	1	0	4
MTL510	Measure and Integration	3	1	0	4
MTL601	Probability and Statistics	3	1	0	4
MTL602	Functional Analysis	3	1	0	4
MTL603	Partial Differential Equations	3	1	0	4
	Total Credits				***57***

Program Electives

MTD702	Project-II	0	0	12	6
MTL625	Principles of Optimization Theory	3	0	0	3
MTL704	Numerical Optimization	3	0	0	3
MTL712	Computational Methods for Differential Equations	3	0	2	4
MTL717	Fuzzy Sets and Applications	3	0	0	3
MTL720	Neurocomputing and Applications	3	0	0	3
MTL725	Stochastic Processes and its Applications	3	0	0	3
MTL728	Category Theory	3	0	0	3
MTL729	Computational Algebra and its Applications	3	0	0	3
MTL730	Cryptography	3	0	0	3
MTL731	Introduction to Chaotic Dynamical Systems	3	0	0	3
MTL732	Financial Mathematics	3	0	0	3
MTL733	Stochastic of Finance	3	0	0	3
MTL735	Advanced Number Theory	3	0	0	3
MTL736	Analytic Number Theory	3	0	0	3
MTL737	Differential Geometry	3	0	0	3
MTL738	Commutative Algebra	3	0	0	3
MTL739	Representation of Finite Groups	3	0	0	3
MTL741	Fractal Geometry	3	0	0	3
MTL742	Operator Theory	3	0	0	3
MTL743	Fourier Analysis	3	0	0	3
MTL744	Mathematical Theory of Coding	3	0	0	3
MTL745	Advanced Matrix Theory	3	0	0	3
MTL746	Methods of Applied Mathematics	3	0	0	3
MTL747	Mathematical Logic	3	0	0	3
MTL751	Symbolic Dynamics	3	0	0	3
MTL752	Data Structures for Applied Mathematics	3	0	2	4
MTL755	Algebraic Geometry	3	0	0	3
MTL756	Lie Algebras and Lie Groups	3	0	0	3
MTL757	Introduction to Algebraic Topology	3	0	0	3
MTL760	Advanced Algorithms	3	0	0	3
MTL761	Basic Ergodic Theory	3	0	0	3
MTL762	Probability Theory	3	0	0	3
MTL763	Introduction to Game Theory	3	0	0	3
MTL766	Multivariate Statistical Methods	3	0	0	3
MTL768	Graph Theory	3	0	0	3
MTL773	Wavelets and Applications	3	0	0	3
MTL776	Graph Algorithms	3	0	0	3
MTL780	Parameterized Algorithms for NP-hard Problems	3	0	0	3
MTL781	Finite Element Theory and Applications	3	0	0	3
MTL782	Data Mining	3	0	2	4
MTL785	Natural Language Processing	3	0	0	3
MTL792	Modern Methods in Partial Differential equations	3	0	0	3
MTL793	Numerical Methods for Hyperbolic PDEs	3	0	0	3
MTL794	Advanced Probability Theory	3	0	0	3
MTL795	Numerical Method for Partial Differential Equations	3	1	0	4
MTL799	Mathematical Analysis in Learning Theory	3	0	0	3
MTV791	Special Module in Dynamical System	1	0	0	1
MTL843	Mathematical Modeling of Credit Risk	3	0	0	3
MTL851	Applied Numerical Analysis	3	0	0	3
MTL854	Interpolation and Approximation	3	0	0	3
MTL855	Multiple Decision Procedures in Ranking and Selection	3	0	0	3
MTL860	Linear Algebra	3	0	0	3
MTL863	Algebraic Number Theory	3	0	0	3
MTV874	Analysis	3	0	0	3
MTL882	Applied Analysis	3	0	0	3
MTL883	Physical Fluid Mechanics	3	0	0	3
MTL888	Boundary Elements Methods with Computer Implementation	3	0	0	3

Sem.	Courses (Number, Abbreviated Title, L-T-P, Credits)							Lecture courses	Contact h/week				Credits
									L	T	P	Total	
I	MTL501 Algebra (3-1-0) 4	MTL502 Linear Algebra (3-1-0) 4	MTL503 Real Analysis (3-1-0) 4	MTL504 Ordinary Differential Equations (3-1-0) 4	MTL505 Computer Programming (3-0-2) 4			5	15	5	0	20	20
II	MTL506 Complex Analysis (3-1-0) 4	MTL507 Topology (3-1-0) 4	MTL508 Mathematical Programming (3-1-0) 4	MTL509 Numerical Analysis (3-1-0) 4	MTL510 Measure and Integration (3-1-0) 4			5	15	5	0	20	20
Summer													
III	MTL601 Probability and Statistics (3-1-0) 4	MTL602 Functional Analysis (3-1-0) 4	MTL603 Partial Differential Equations (3-1-0) 4	DE-1	MAD701 Project-I (0-0-10) 5			4	12	3	10	25	20
IV	DE-2	DE-3	DE-4	OC-1	OC-2			5	15	0	0	15	15

Total = 75

Master of Science in Physics

Department of Physics

The overall credits structure

Category	PC	PE	OE	*Total*
Credits	**62**	**12**	**6**	**80**

Optional Departmental specialization : Additional 6 credits : Total Credits : 86 with specialization

Program Core

PYD561	Project-I	0	0	6	3
PYD562	Project-II	0	0	12	6
PYL551	Classical Mechanics	3	1	0	4
PYL552	Electrodynamics	3	1	0	4
PYL553	Mathematical Physics	3	1	0	4
PYL555	Quantum Mechanics-I	3	1	0	4
PYL556	Quantum Mechanics-II	3	0	0	3
PYL557	Electronics	3	1	0	4
PYL558	Statistical Mechanics	3	1	0	4
PYL560	Applied Optics	3	1	0	4
PYL563	Solid State Physics	3	1	0	4
PYL567	Atomic and Molecular Physics	3	0	0	3
PYL569	Nuclear and Particle Physics	3	0	0	3
PYP561	Laboratory-I	0	0	8	4
PYP562	Laboratory-II	0	0	8	4
PYP563	Advanced Laboratory	0	0	8	4
	Total Credits				***62***

Program Electives

PYD658	Mini Project	0	0	6	3
PYL653	Semiconductor Electronics	3	0	0	3
PYL656	Microwaves	3	0	0	3
PYL705	Nanostructured Materials	3	0	0	3
PYL711	Introduction to Nonlinear Dynamics	3	1	0	4
PYL723	Vacuum Science and Cryogenics	3	0	0	3
PYL725	Physics of Amorphous Materials	3	0	0	3
PYL792	Optical Electronics	3	0	0	3

Specialization in Photonics Min. 12 credits

PYL650	Fiber and Integrated Optics	3	0	0	3
PYL655	Laser Physics	3	0	0	3
PYL659	Laser Spectroscopy	3	0	0	3
PYL747	Non-linear Optics	3	0	0	3
PYL748	Quantum Optics	3	0	0	3
PYL749	Quantum Information and Computation	3	0	0	3
PYL760	Biomedical optics and Bio-photonics	3	0	0	3
PYL761	Liquid Crystals	3	0	0	3
PYL762	Statistical Optics and Optical Coherence Theory	3	0	0	3
PYL770	Ultra-fast optics and applications	3	0	0	3
PYL793	Photonic Devices	3	0	0	3
PYL892	Guided Wave Photonic Sensors	3	0	0	3

Specialization in Condensed Matter Physics Min. 12 credits

PYL651	Advanced Solid State Physics	3	0	0	3
PYL652	Magnetism and Spintronics	3	0	0	3
PYL702	Physics of Semiconductor Devices	3	0	0	3
PYL704	Science and Technology of Thin Films	3	0	0	3
PYL707	Characterization Techniques for Materials	3	0	0	3
PYL727	Energy Materials and Devices	3	0	0	3
PYL728	Quantum Heterostructures	2	0	0	2
PYL739	Computational Techniques for Solid State Materials	3	0	0	3
PYL740	Advanced Condensed Matter Theory	3	0	0	3

Specialization in Theoretical Physics Min. 12 credits

PYL657	Plasma Physics	3	0	0	3
PYL658	Advanced Plasma Physics	3	0	0	3
PYL730	Plasma Theory and Simulations	3	0	0	3
PYL740	Advanced Condensed Matter Theory	3	0	0	3
PYL741	Field Theory and Quantum Electrodynamics	3	0	0	3
PYL742	General Relativity and Introductory Astrophysics	3	0	0	3
PYL743	Group Theory and its Applications	3	0	0	3
PYL744	High Energy Physics	3	0	0	3
PYL745	Advanced Statistical Mechanics	3	0	0	3
PYL746	Non-equilibrium Statistical Mechanics with Interdisciplinary Applications	3	0	0	3
PYL748	Quantum Optics	3	0	0	3
PYL749	Quantum Information and Computation	3	0	0	3

Sem.	Courses (Number, Abbreviated Title, L-T-P, Credits)								Lecture courses	Contact h/week				Credits
										L	T	P	Total	
I	PYL551 Classical Mechanics (3-1-0) 4	PYL553 Mathematical Physics (3-1-0) 4	PYL555 Quantum Mechanics (3-1-0) 4	PYL557 Electronics (3-1-0) 4	PYP561 Laboratory-I (0-0-8) 4				4	12	4	8	24	20
II	PYL552 Electro-dynamics (3-1-0) 4	PYL556 Quantum Mechanics-II (3-0-0) 3	PYL558 Statistical Mechanics (3-1-0) 4	PYL560 Applied Optics (3-1-0) 4	PYP562 Laboratory-II (0-0-8) 4	PYL563 Solid State Physics (3-1-0) 4			5	15	3	8	26	22
Summer														
III	PYD561 Project-I (0-0-6) 3	PYL567 Atomic and Molecular Physics (3-0-0) 3	PYL569 Nuclear and Particle Physics (3-0-0) 3	PYP563 Advanced Laboratory (0-0-8) 4	PE-I (3-0-0) 3	PE-2 (3-0-0) 3	OE-1 (3-0-0) 3	DS-1 (3-0-0) 3	5-6	15-18	1	14	30-33	23-26
IV	PYD562 Project-II (0-0-12) 6	PE-3 (3-0-0) 3	PE-4 (3-0-0) 3	OE-2 (3-0-0) 3	DS-2 (3-0-0) 3				3-4	9-12	0	12	21-24	15-18

Total = 75-81

Master of Science in Biological Sciences

Department of Biological Sciences

The overall credits structure

Category	PC	PE/OE	NGU	*Total*
Credits	**64**	**12**	**1**	**76**

Program Core

SBL500	Molecular Cell Biology & Genetics	3	0	2	4
SBL510	Mathematical and Statistical Biology	3	0	2	4
SBL520	Biochemistry	3	0	2	4
SBL530	Biology of Microbes	3	0	2	4
SBL540	Experimental Methods in Biology	3	0	2	4
SBL600	Computational Biology and Data Analyses	1	0	6	4
SBV601	Intellectual Property Rights in Biosciences	1	0	0	1
SBQ601	Seminars in Biological Sciences	0	1	0	1 NGU
SBL610	Genetic Engineering and Biotechnology	3	0	2	4
SBL620	Immunobiology	3	0	2	4
SBL630	Advanced Cellular Biology	3	0	2	4
SBL640	Biological Pathways	3	0	2	4
SBD601	Minor Project	0	0	12	6
SBD602	Project / Internship	0	0	34	17
	Total Credits				***65***

All 700/800 courses from KSBS and other academic units at IIT Delhi may be considered as electives, as long as the pre-requisites are fulfilled. No distinction has been made between open electives (OE) and program electives (PE) to ensure and strengthen the interdisciplinary nature of the program.

Program/Open Electives

Sem.	Courses (Number, Abbreviated Title, L-T-P, Credits)						Lecture courses	Contact h/week				Credits
								L	T	P	Total	
I	SBL500 Molecular Cell Biology & Genetics (3-0-2) 4	SBL510 Mathematical and Statistical Biology (3-0-2) 4	SBL520 Biochemistry (3-0-2) 4	SBL530 Biology of Microbes (3-0-2) 4	SBL540 Experimental Methods in Biology (3-0-2) 4			15	0	5	25	20
II	SBL600 Computational Biology and Data Analyses (1-0-6) 4	SBL610 Genetic Engineering and Biotechnology (3-0-2) 4	SBL620 Immunobiology (3-0-2) 4	SBL630 Advanced Cellular Biology (3-0-2) 4	SBL640 Biological Pathways (3-0-2) 4	SVL601 Intellectual Property Rights in Biosciences (1-0-0) 1		14	0	7	28	21
III	Elective I (3-0-0) 3	Elective II (3-0-0) 3	Elective III (3-0-0) 3	Elective IV (3-0-0) 3	SBD601 Minor Project (0-0-12) 6	SBQ601 Seminars in Biological Sciences (0-1-0) 1 NGU		12	1 NGU	6	24	18 (+1 NGU)
IV	SBD602 Project/Internship (0-0-34) 17							0	0	17	34	17
	Overall Credits											76 (+1 NGU)

Total = 76

Master of Design in Industrial Design

Department of Design

The overall credits structure

Category	PC	PE	OE	*Total*
Credits	**39**	**9**	**3**	**51**

Program Core

DDD792	Design Project-I	0	0	6	3
DDD891	Design Project-II	0	0	12	6
DDD892	Industry/Research Design Project	0	0	18	9
DDL710	Framework of Design	2	0	0	2
DDL732	Adv. Mat. Processes & Die Design	2	0	2	3
DDL751	Form and Aesthetics	2	0	2	3
DDP711	Computer Aided Product Detailing	1	0	4	3
DDP721	Design and Innovation Methods	1	0	4	3
DDP722	Applied Ergonomics	1	0	2	2
DDP731	Communication and Presentation Skills	1	0	4	3
DDP741	Product Interface & Design	1	0	2	2
DDR761	Social Immersion (Non-credit)	0	0	2	0
DDR801	Summer Internship (Non-credit)	0	0	4	0
	Total Credits				***39***

Program Electives

DDL725	Information Design & Data Visualization	2	0	2	3
DDL768	Design Research Methodology	2	0	2	3
DDL782	Design for Usability	2	0	2	3
DDL810	Special Topics in Design-I	3	0	0	3
DDL820	Special Topics in Design-II	3	0	0	3
DDL841	Design Management and Professional Practice	3	0	0	3
DDP712	Exhibitions and Environmental Design	2	0	2	3
DDR762	Vehicle Design	2	0	2	3
DDR772	Transportation Design	2	0	2	3
DDR812	Media Studies	2	0	2	3
DDR822	Design for Sustainability	2	0	2	3
DDD830	Self-initiated Design Project	0	0	6	3
DDR832	Design for User Experience	3	0	0	3
DDR852	Strategic Design Management	2	0	2	3
DDR862	Design in Indian Context	3	0	0	3
DDV820	Special Modules in Design	1	0	0	1

Sem.	Courses (Number, Abbreviated Title, L-T-P, Credits)						Lecture courses	Contact h/week				Credits
								L	T	P	Total	
I	DDL710 Framework of Design (2-0-0) 2	DDP721 Design and Innovation Methods (1-0-4) 3	DDP731 Communication and Presentation Skills (1-0-4) 3	DDP741 Product Interface & Design (1-0-2) 2	DDL751 Form and Aesthetics (2-0-2) 3		2	7	0	12	19	13
Winter	DDR761 Social Immersion (Non-credit core)											
II	DDP711 Computer Aided Product Detailing (1-0-4) 3	DDP722 Applied Ergonomics (1-0-2) 2	DDL732 Adv. Mat. Processes & Die Design (2-0-2) 3	DDD792 Design Project-I (0-0-6) 3	PE-1 (2-0-2/3-0-0) 3		2	6-7	0	14-16	21-22	14
Summer	DSR801 Summer Intership (Non-credit core)											
III	DDD891 Design Project-II (0-0-12) 6	PE-2 (2-0-2/3-0-0) 3	PE-3 (2-0-2/3-0-0) 3				2	4-6	0	6-10	12-14	12
IV	DDD892 Industry/ Research Design Project (0-0-18) 9	OE (3-0-0) 3					1	3	0	18	21	12

Total = 51

Master of Business Administration

Department of Management Studies

The overall credits structure

Category	Programme Core PC (Total 33 Credits)		Streamed Electives SE (Total 12 credits)		Non-credit Core NC	Programme Electives PE	*Total*
	Common Core CC	Unique Core UC	Analytical Skills Stream AS	People Skills Stream PS			
Credits	**30**	**3**	**6**	**6**	**3**	**27**	**72**

Program Core

Programme Core consists of Common Core (CC) courses and Unique Core (UC) courses. The total credits of Programme Core would be 33.

MSL705*	HRM Systems	1.5	0	0	1.5
MSL706**	Business Laws	3	0	0	3
MSL707*	Management Accounting	3	0	0	3
MSL708*	Financial Management	3	0	0	3
MSL709*	Business Research Methods	1.5	0	0	1.5
MSL711*	Strategic Management	3	0	0	3
MSL712*	Ethics & Values Based Leadership	1.5	0	0	1.5
MSL713*	Information Systems Management	3	0	0	3
MSL720*	Macroeconomic Environment of Business	3	0	0	3
MSL745	Operations Management	3	0	0	3
MSL760	Marketing Management	3	0	0	3
MSL780*	Managerial Economics	1.5	0	0	1.5
MDD801	MBA Project (Unique Core)	0	0	6	3

Notes:

The UC will include the MBA project which would focus on a research driven application of skills acquired in a particular functional area, through the programme.

* *These are new courses which have been designed and/or modified as a part of the curriculum review.*

** *MSL706 was initially an elective, MSL887. This course's content is the same, only the number has been changed to now reflect a core course.*

Total Credits ***33***

Streamed Electives (SE)

Streamed Electives consist of Analytical Skills (AS) Stream and People Skills (PS) Stream. The total credits of Streamed Electives would be 12 – 6 from AS and 6 from PS.

a) Analytical Skills (AS) Stream

MSL719*	Statistics for Management	3	0	0	3
MSL721*	Econometrics	3	0	0	3
MSL740	Quantitative Methods in Management	3	0	0	3
MTL732	Financial Mathematics	3	1	0	4

* *These are new courses which have been designed and/or modified as a part of the curriculum review.*

b) People Skills (PS) Stream

MSL710	Creative Problem Solving	3	0	0	3
MSL724*	Business Communication	1.5	0	0	1.5
MSL725*	Business Negotiations	1.5	0	0	1.5
MSL727*	Interpersonal Behavior & Team Dynamics	1.5	0	0	1.5
MSL729*	Individual Behavior in Organization	1.5	0	0	1.5
MSL730*	Managing With Power	1.5	0	0	1.5
MSL731*	Developing Self Awareness	1.5	0	0	1.5
MSL733*	Organization Theory	1.5	0	0	1.5

* *These are new courses which have been designed and/or modified as a part of the curriculum review.*

Non-credit Core (NC)

MST893	Corporate Sector Attachment	0	0	4	2
MST894*	Social Sector Attachment	0	0	2	1

* *This is a new course which has been designed as a part of the curriculum review.*

Program Electives (PE)

MDL800	Management of Blockchain Technologies	1.5	0	0	1.5
MDL801	Managing Digital Transformation	1.5	0	0	1.5
MDL802	Entrepreneurial Finance	3	0	0	3
MDL803	Fixed Income Securities	3	0	0	3
MDL804	Behavioral Finance	1.5	0	0	1.5
MDL805	Financial Technology	1.5	0	0	1.5
MDL809	Career Management Strategies	3	0	0	3
MDL810	Consumer Behavior	3	0	0	3
MSL716	Fundamentals of Management Systems	3	0	0	3
MSL717*	Business Systems Analysis & Design	3	0	0	3
MSL811	Management Control Systems	3	0	0	3
MSL802	Management of Intellectual Property Rights	3	0	0	3
MSL835	Labor Legislation and Industrial Relations	3	0	0	3
MSL704	Science & Technology Policy Systems	3	0	0	3
MSL801	Technology Forecasting & Assessment	1	0	0	3
MSV801	Selected Topics in OB & HR Management	1	0	0	1
MSV802	Selected Topics in Finance	1	0	0	1
MSL803	Technical Entrepreneurship	3	0	0	3
MSV803	Selected Topics in Information Technology Mgmt.	1	0	0	1
MSV804	Selected Topics in Operations Management	1	0	0	1
MSV805	Selected Topics in Economics	1	0	0	1
MSL806*	Mergers & Acquisitions	3	0	0	3
MSV806	Selected Topics in Marketing Management	1	0	0	1
MSL807*	Selected Topics in Strategic Management	1	0	0	1
MSL808*	Systems Thinking	3	0	0	3
MSL809*	Cyber Security: Managing Risks	3	0	0	3
MSL810*	Advanced Data Mining for Business Decisions	1.5	0	0	1.5
MSL812	Flexible Systems Management	3	0	0	3
MSL813	Systems Methodology for Management	3	0	0	3
MSL814*	Data Visualization	1.5	0	0	1.5
MSL815	Decision Support and Expert Systems	3	0	0	3
MSL817	Systems Waste & Sustainability	3	0	0	3
MSL819	Business Process Re-engineering	3	0	0	3
MSL820	Global Business Environment	3	0	0	3
MSL821*	Strategy Execution Excellence	3	0	0	3
MSL822	International Business	3	0	0	3
MSL823	Strategic Change & Flexibility	3	0	0	3
MSL824	Policy Dynamics & Learning Organization	3	0	0	3
MSL825	Strategies in Functional Management	3	0	0	3
MSL826	Business Ethics	3	0	0	3
MSL827	International Competitiveness	3	0	0	3
MSL828	Global Strategic Management	3	0	0	3
MSL829	Current & Emerging Issues in Strategic Management	3	0	0	3
MSL851*	Strategic Alliance	1.5	0	0	1.5
MSL714	Organizational Dynamics and Environment	3	0	0	3
MSL830	Organizational Structure and Processes	3	0	0	3
MSL831	Management of Change	3	0	0	3
MSL832	Managing Innovation for Organizational Effectiveness	3	0	0	3
MSL833	Organizational Development	3	0	0	3
MSL834*	Managing Diversity at Workplace	1.5	0	0	1.5
MSL836*	International Human Resources Management	1.5	0	0	1.5
MSL839	Current & Emerging Issues in Organizational Management	3	0	0	3
MSL804*	Procurement Management	3	0	0	3
MSL805*	Services Operations Management	3	0	0	3
MSL715	Quality and Environment Management Systems	3	0	0	3
MSL816	Total Quality Management	3	0	0	3
MSL818	Industrial Waste Management	3	0	0	3
MSL840	Manufacturing Strategy	3	0	0	3
MSL841*	Supply Chain Analytics	3	0	0	3
MSL842*	Supply Chain Modeling	3	0	0	3
MSL843	Supply Chain Logistics Management	3	0	0	3
MSL844	Systems Reliability, Safety and Maintenance Management	3	0	0	3
MSL845	Total Project Systems Management	3	0	0	3

MSL846	Total Productivity Management	3	0	0	3
MSL848*	Applied Operations Research	3	0	0	3
MSL849	Current & Emerging Issues in Manufacturing Management	3	0	0	3
MSL850	Management of Information Technology	3	0	0	3
MSL852	Network System: Applications and Mgmt.	3	0	0	3
MSL853*	Software Project Management	3	0	0	3
MSL854*	Big Data Analytics & Data Science	1.5	0	0	1.5
MSL855*	Electronic Commerce	3	0	0	3
MSL856*	Business Intelligence	3	0	0	3
MSL858*	Business Process Management with IT	1.5	0	0	1.5
MSL859	Current and Emerging Issues in IT Mgmt.	3	0	0	3
MSL868*	Digital Research Methods	1.5	0	0	1.5
MSL876*	Economics of Digital Business	1.5	0	0	1.5
MSL877*	Electronic Government	1.5	0	0	1.5
MSL878*	Electronic Payments	1.5	0	0	1.5
MSL882*	Enterprise Cloud Computing	1.5	0	0	1.5
MSL883*	ICTs, Development and Business	1.5	0	0	1.5
MSL884*	Information System Strategy	3	0	0	3
MSL885*	Digital Marketing-Analytics & Optimization	3	0	0	3
MSL886*	IT Consulting & Practice	3	0	0	3
MSL887*	Mobile Commerce	3	0	0	3
MSL888*	Data Warehousing for Business Decision	1.5	0	0	1.5
MSL891*	Data Analytics using SPSS	1.5	0	0	1.5
MSL892*	Predictive Analytics	1.5	0	0	1.5
MSL861	Market Research	3	0	0	3
MSL862	Product Management	3	0	0	3
MSL863	Advertising and Sales Promotion Management	3	0	0	3
MSL864*	Corporate Communication	3	0	0	3
MSL865	Sales Management	3	0	0	3
MSL866	International Marketing	3	0	0	3
MSL867	Industrial Marketing Management	3	0	0	3
MSL869	Current & Emerging Issues in Marketing	3	0	0	3
MSL870*	Corporate Governance	1.5	0	0	1.5
MSL871*	Banking and Financial Services	1.5	0	0	1.5
MSL872	Working Capital Management	3	0	0	3
MSL873	Security Analysis & Portfolio Management	3	0	0	3
MSL874*	Indian Financial System	1.5	0	0	1.5
MSL875	International Financial Management	3	0	0	3
MSL879	Current & Emerging Issues in Finance	3	0	0	3
MSL734	Management of Small & Medium Scale Industrial Enterprises	3	0	0	3
MSL847	Advanced Methods for Management Research	3	0	0	3
MSL880	Selected Topics in Management Methodology	3	0	0	3
MSL881	Mgmt. of Public Sector Enterprises in India	3	0	0	3
MSL889	Current & Emerging Issues in Public Sector Mgmt.	3	0	0	3
MSL897	Consultancy Process & Skills	3	0	0	3
MSL898	Consultancy Professional Practice	3	0	0	3
MSL899	Current & Emerging Issues in Consultancy Mgmt.	3	0	0	3
MSL895	Advanced Data Analysis for Management	3	0	0	3
MSL896	International Economic Policy	3	0	0	3
MSV801	Selected Topics in OB & HR Management	1	0	0	1
MSV802	Selected Topics in Finance	1	0	0	1
MSV803	Selected Topics in IT Management	1	0	0	1
MSV804	Selected Topics in Operations Management	1	0	0	1
MSV805	Selected Topics in Economics	1	0	0	1
MSV806	Selected Topics in Marketing Management	1	0	0	1
MSV815	Case Study Teaching and Writing	1	0	0	1
MSL799	Theories in IS research	3	0	0	3
MSV816	Contemporary Issue in Management	1	0	0	1
MSV817	Art of Scholarship in Management Research	1	0	0	1
MSP801	Interdisciplinary Research in Management	0	0	2	1
MSV818	Contemporary Issues in OB & HR Mgmt.	1	0	0	1
MSV819	Contemporary Issues in Finance	1	0	0	1
MSV820	Contemporary Issues in IT Management	1	0	0	1
MSV821	Contemporary Issues in Operations Mgmt.	1	0	0	1
MSV822	Contemporary Issues in Economic Policy	1	0	0	1
MSV824	Contemporary Issues in Strategic Mgmt.	1	0	0	1
MSV826	Frontiers in OB & HR Management	1	0	0	1
MSV827	Frontiers in Finance	1	0	0	1
MSV828	Frontiers in Information Systems Mgmt.	1	0	0	1
MSV832	Frontiers in Strategic Management	1	0	0	1
MSL735	Qualitative Methods in Management	3	0	0	3
MSL781	Macroeconomic Dynamics	3	0	0	3
MDL806	Derivatives	3	0	0	3
MSL890	Financial Engineering	3	0	0	3
MSL310	Financial Institutions and Markets	3	0	0	3
MSL718	Management of Blockchain Technology	1.5	0	0	1.5
MSL722	Managing Enterprise AI/ML Systems	1.5	0	0	1.5
MSL782	Business Cycles and Global Economy	1.5	0	0	1.5
MSL783	Global Economic Development	1.5	0	0	1.5
MSL784	Sovereign Debt and Default	3	0	0	3

Sem.	Courses (Number, Abbreviated Title, L-T-P, Credits)									Lecture courses	Contact h/week				Credits
											L	T	P	Total	
I	MSL707 Mgmt. Accounting (3-0-0) 3	MSL709 Business Research Methods (1.5-0-0) 1.5	MSL712 Ethics & Values Based Leadership (1.5-0-0) 1.5	MSL760 Marketing Mgmt. (3-0-0) 3	MSL780 Managerial Economics (1.5-0-0) 1.5	SE AS-1 (3-0-0) 3	SE AS-2 (3-0-0) 3	SE PS-1 (1.5-0-0) 1.5	SE PS-2 (1.5-0-0) 1.5	9	19.5	0	0	19.5	19.5
Winter	MST894 Social Sector Attachment														
II	MSL705 HRM Systems (1.5-0-0) 1.5	MSL708 Financial Mgmt. (3-0-0) 3	MSL711 Strategic Mgmt. (3-0-0) 3	MSL713 Information Systems Mgmt. (3-0-0) 3	MSL720 Macro-economic Environment of Business (3-0-0) 3	MSL745 Operations Mgmt. (3-0-0) 3	SE PS-3 (1.5-0-0) 1.5	SE PS-4 (1.5-0-0) 1.5	SE PS-5 (3-0-0) 3	7/8	19.5	0	0	19.5	19.5
Summer	MST893 Corporate Sector Attachment														
III	PE (Credits 15-18)									6/7	15-18	0	0	15-18	15-18
IV	MDD801 MBA Project (0-0-6) 3	MSL706 Business Laws (3-0-0) 3	PE (Credits 9-12)							4/6	12-15	0	6	18-21	15-18

SE = Streamed Electives, AS = Analytical Skills Stream, PS = People Skills Stream, PE = Programme Electives

Total = 72

Programme Code: **SMT**

Master of Business Administration (Telecommunication Systems Management)

Department of Management Studies

The overall credits structure

Category	Programme Core PC (Total 33 Credits)		Streamed Electives SE (Total 12 credits)		Focus Electives FE	Non-credit Core NC	Programme Electives PE	*Total*
	Common Core CC	Unique Core UC	Analytical Skills Stream AS	People Skills Stream PS				
Credits	**30**	**3**	**6**	**6**	**6**	**3**	**21**	**72**

Program Core (PC)

Programme Core consists of Common Core (CC) courses and Unique Core (UC) courses. The total credits of Programme Core would be 33.

MSL705*	HRM Systems	1.5	0	0	1.5
MSL706**	Business Laws	3	0	0	3
MSL707*	Management Accounting	3	0	0	3
MSL708*	Financial Management	3	0	0	3
MSL709*	Business Research Methods	1.5	0	0	1.5
MSL711*	Strategic Management	3	0	0	3
MSL712*	Ethics & Values Based Leadership	1.5	0	0	1.5
MSL713*	Information Systems Management	3	0	0	3
MSL720*	Macroeconomic Environment of Business	3	0	0	3
MSL745	Operations Management	3	0	0	3
MSL760	Marketing Management	3	0	0	3
MSL780*	Managerial Economics	1.5	0	0	1.5
MDD802	MBA Project (Unique Core)	0	0	6	3

Notes:

The UC will include the MBA project which would focus on a research driven application of skills acquired in a particular functional area, through the programme.

* *These are new courses which have been designed and/or modified as a part of the curriculum review.*

** *MSL706 was initially an elective, MSL887. This course's content is the same, only the number has been changed to now reflect a core course.*

Total Credits ***33***

Streamed Electives (SE)

Streamed Electives consist of Analytical Skills (AS) Stream and People Skills (PS) Stream. The total credits of Streamed Electives would be 12 – 6 from AS and 6 from PS.

a) Analytical Skills (AS) Stream

MSL719*	Statistics for Management	3	0	0	3
MSL721*	Econometrics	3	0	0	3
MSL740	Quantitative Methods in Management	3	0	0	3
MTL732	Financial Mathematics	3	1	0	4

* *These are new courses which have been designed and/or modified as a part of the curriculum review.*

b) People Skills (PS) Stream

MSL710	Creative Problem Solving	3	0	0	3
MSL724*	Business Communication	1.5	0	0	1.5
MSL725*	Business Negotiations	1.5	0	0	1.5
MSL727*	Interpersonal Behavior & Team Dynamics	1.5	0	0	1.5
MSL729*	Individual Behavior in Organization	1.5	0	0	1.5
MSL730*	Managing With Power	1.5	0	0	1.5
MSL731*	Developing Self Awareness	1.5	0	0	1.5
MSL733*	Organization Theory	1.5	0	0	1.5

* *These are new courses which have been designed and/or modified as a part of the curriculum review.*

Focus Electives (FE)

MSL723	Telecommunication Systems	3	0	0	3
MSL726	Telecom System Analysis, Planning & Design	3	0	0	3
MSL728	International Telecommunication Management	3	0	0	3
EEL767	Telecom Systems	3	0	0	3

Non-credit Core (NC)

MST893	Corporate Sector Attachment	0	0	4	2
MST894*	Social Sector Attachment	0	0	2	1

* *This is a new course which has been designed as a part of the curriculum review.*

Program Electives (PE)

MDL800	Management of Blockchain Technologies	1.5	0	0	1.5
MDL801	Managing Digital Transformation	1.5	0	0	1.5
MDL803	Fixed Income Securities	3	0	0	3
MDL804	Behavioral Finance	1.5	0	0	1.5
MDL805	Financial Technology	1.5	0	0	1.5
MDL809	Career Management Strategies	3	0	0	3
MDL810	Consumer Behavior	3	0	0	3
MSL716	Fundamentals of Management Systems	3	0	0	3
MSL717*	Business Systems Analysis & Design	3	0	0	3
MSL811	Management Control Systems	3	0	0	3
MSL802	Management of Intellectual Property Rights	3	0	0	3
MSL835	Labor Legislation and Industrial Relations	3	0	0	3
MSL704	Science & Technology Policy Systems	3	0	0	3
MSL801	Technology Forecasting & Assessment	3	0	0	3
MSL803	Technical Entrepreneurship	3	0	0	3
MSL806*	Mergers & Acquisitions	3	0	0	3
MSL807*	Selected Topics in Strategic Management	1	0	0	1
MSL808*	Systems Thinking	3	0	0	3
MSL812	Flexible Systems Management	3	0	0	3
MSL813	Systems Methodology for Management	3	0	0	3
MSL817	Systems Waste & Sustainability	3	0	0	3
MSL819	Business Process Re-engineering	3	0	0	3
MSL820	Global Business Environment	3	0	0	3
MSL821*	Strategy Execution Excellence	3	0	0	3
MSL822	International Business	3	0	0	3
MSL823	Strategic Change & Flexibility	3	0	0	3
MSL824	Policy Dynamics & Learning Organization	3	0	0	3
MSL825	Strategies in Functional Management	3	0	0	3
MSL826	Business Ethics	3	0	0	3
MSL827	International Competitiveness	3	0	0	3
MSL828	Global Strategic Management	3	0	0	3
MSL829	Current & Emerging Issues in Strategic Mgmt.	3	0	0	3
MSL851*	Strategic Alliance	1.5	0	0	1.5
MSL714	Organizational Dynamics and Environment	3	0	0	3
MSL809*	Cyber Security: Managing Risks	3	0	0	3
MSL810*	Advanced Data Mining for Business Decisions	1.5	0	0	1.5
MSL814*	Data Visualization	1.5	0	0	1.5
MSL815	Decision Support and Expert Systems	3	0	0	3
MSL830	Organizational Structure and Processes	3	0	0	3
MSL831	Management of Change	3	0	0	3
MSL832	Managing Innovation for Organizational Effectiveness	3	0	0	3
MSL833	Organizational Development	3	0	0	3
MSL834*	Managing Diversity at Workplace	1.5	0	0	1.5
MSL836*	International Human Resources Management	1.5	0	0	1.5
MSL839	Current & Emerging Issues in Organizational Management	3	0	0	3
MSL804*	Procurement Management	3	0	0	3
MSL805*	Services Operations Management	3	0	0	3
MSL715	Quality and Environment Management Systems	3	0	0	3
MSL816	Total Quality Management	3	0	0	3
MSL818	Industrial Waste Management	3	0	0	3
MSL840	Manufacturing Strategy	3	0	0	3
MSL841*	Supply Chain Analytics	3	0	0	3
MSL842*	Supply Chain Modeling	3	0	0	3
MSL843	Supply Chain Logistics Management	3	0	0	3
MSL844	Systems Reliability, Safety and Maintenance Management	3	0	0	3
MSL845	Total Project Systems Management	3	0	0	3
MSL846	Total Productivity Management	3	0	0	3
MSL848*	Applied Operations Research	3	0	0	3

MSL849	Current & Emerging Issues in Manufacturing Management	3	0	0	3
MSL850	Management of Information Technology	3	0	0	3
MSL852	Network System: Applications and Management	3	0	0	3
MSL853*	Software Project Management	3	0	0	3
MSL854*	Big Data Analytics & Data Science	1.5	0	0	1.5
MSL855*	Electronic Commerce	3	0	0	3
MSL856*	Business Intelligence	3	0	0	3
MSL858*	Business Process Management with IT	1.5	0	0	1.5
MSL859	Current and Emerging Issues in IT Mgmt.	3	0	0	3
MSL868*	Digital Research Methods	1.5	0	0	1.5
MSL876*	Economics of Digital Business	1.5	0	0	1.5
MSL877*	Electronic Government	1.5	0	0	1.5
MSL878*	Electronic Payments	1.5	0	0	1.5
MSL882*	Enterprise Cloud Computing	1.5	0	0	1.5
MSL883*	ICTs, Development and Business	1.5	0	0	1.5
MSL884*	Information System Strategy	3	0	0	3
MSL885*	Digital Marketing-Analytics & Optimization	3	0	0	3
MSL886*	IT Consulting & Practice	3	0	0	3
MSL887*	Mobile Commerce	3	0	0	3
MSL888*	Data Warehousing for Business Decision	1.5	0	0	1.5
MSL891*	Data Analytics using SPSS	1.5	0	0	1.5
MSL892*	Predictive Analytics	1.5	0	0	1.5
MSL861	Market Research	3	0	0	3
MSL862	Product Management	3	0	0	3
MSL863	Advertising and Sales Promotion Management	3	0	0	3
MSL864*	Corporate Communication	3	0	0	3
MSL865	Sales Management	3	0	0	3
MSL866	International Marketing	3	0	0	3
MSL867	Industrial Marketing Management	3	0	0	3
MSL869	Current & Emerging Issues in Marketing	3	0	0	3
MSL870*	Corporate Governance	1.5	0	0	1.5
MSL871*	Banking and Financial Services	1.5	0	0	1.5
MSL872	Working Capital Management	3	0	0	3
MSL873	Security Analysis & Portfolio Management	3	0	0	3
MSL874*	Indian Financial System	1.5	0	0	1.5
MSL875	International Financial Management	3	0	0	3
MSL879	Current & Emerging Issues in Finance	3	0	0	3
MSL734	Management of Small & Medium Scale Industrial Enterprises	3	0	0	3
MSL847	Advanced Methods for Management Research	3	0	0	3
MSL880	Selected Topics in Management Methodology	3	0	0	3
MSL881	Mgmt. of Public Sector Enterprises in India	3	0	0	3
MSL889	Current & Emerging Issues in Public Sector Mgmt.	3	0	0	3
MSL897	Consultancy Process & Skills	3	0	0	3
MSL898	Consultancy Professional Practice	3	0	0	3
MSL899	Current & Emerging Issues in Consultancy Management	3	0	0	3
MSL895	Advanced Data Analysis for Management	3	0	0	3
MSL896	International Economic Policy	3	0	0	3
MSV801	Selected Topics in OB & HR Management	1	0	0	1
MSV802	Selected Topics in Finance	1	0	0	1
MSV803	Selected Topics in IT Management	1	0	0	1
MSV804	Selected Topics in Operations Management	1	0	0	1
MSV805	Selected Topics in Economics	1	0	0	1
MSV806	Selected Topics in Marketing Management	1	0	0	1
MSV815	Case Study Teaching and Writing	1	0	0	1
MSL799	Theories in IS research	3	0	0	3
MSV816	Contemporary Issue in Management	1	0	0	1
MSV817	Art of Scholarship in Management Research	1	0	0	1
MSP801	Interdisciplinary Research in Management	0	0	2	1
MSV818	Contemporary Issues in OB & HR Mgmt.	1	0	0	1
MSV819	Contemporary Issues in Finance	1	0	0	1
MSV820	Contemporary Issues in IT Management	1	0	0	1
MSV821	Contemporary Issues in Operations Mgmt.	1	0	0	1
MSV822	Contemporary Issues in Economic Policy	1	0	0	1
MSV824	Contemporary Issues in Strategic Mgmt.	1	0	0	1
MSV826	Frontiers in OB & HR Management	1	0	0	1
MSV827	Frontiers in Finance	1	0	0	1
MSV828	Frontiers in Information Systems Mgmt.	1	0	0	1
MSV832	Frontiers in Strategic Management	1	0	0	1
MSL735	Qualitative Methods in Management	3	0	0	3
MSL781	Macroeconomic Dynamics	3	0	0	3
MDL806	Derivatives	3	0	0	3
MSL890	Financial Engineering	3	0	0	3
MSL310	Financial Institutions and Markets	3	0	0	3
MSL718	Management of Blockchain Technology	1.5	0	0	1.5
MSL722	Managing Enterprise AI/ML Systems	1.5	0	0	1.5
MSL782	Business Cycles and Global Economy	1.5	0	0	1.5
MSL783	Global Economic Development	1.5	0	0	1.5
MSL784	Sovereign Debt and Default	3	0	0	3

Sem.	Courses (Number, Abbreviated Title, L-T-P, credits)									Lecture courses	Contact h/week				Credits
											L	T	P	Total	
I	MSL707 Mgmt. Accounting (3-0-0) 3	MSL709 Business Research Methods (1.5-0-0) 1.5	MSL712 Ethics & Values Based Leadership (1.5-0-0) 1.5	MSL760 Marketing Mgmt. (3-0-0) 3	MSL780 Managerial Economics (1.5-0-0) 1.5	SE AS-1 (3-0-0) 3	SE AS-2 (3-0-0) 3	SE PS-1 (1.5-0-0) 1.5	SE PS-2 (1.5-0-0) 1.5	9	19.5	0	0	19.5	19.5
Winter	MST894 Social Sector Attachment														
II	MSL705 HRM Systems (1.5-0-0) 1.5	MSL708 Financial Mgmt. (3-0-0) 3	MSL711 Strategic Mgmt. (3-0-0) 3	MSL713 Infor-mation Systems Mgmt. (3-0-0) 3	MSL720 Macroeconomic Environment of Business (3-0-0) 3	MSL745 Operations Mgmt. (3-0-0) 3	SE PS-3 (1.5-0-0) 1.5	SE PS-4 (1.5-0-0) 1.5	SE PS-5 (3-0-0) 3	7/8	19.5	0	0	19.5	19.5
Summer	MST893 Corporate Sector Attachment														
III	PE (Credits 15-18)									6/7	15-18	0	0	15-18	15-18
IV	MDD802 MBA Project (0-0-6) 3	MSL706 Business Laws (3-0-0) 3	FE-1 (3-0-0) 3	FE-2 (3-0-0) 3	PE (Credits 3-6)					4/6	12-15	0	6	18-21	15-18

SE = Streamed Electives, AS = Analytical Skills Stream, PS = People Skills Stream, PE = Programme Electives

Total = 72

Master of Business Administration (Executive)

Department of Management Studies

The overall credits structure

Category	Programme Core PC (Total 36 Credits)		Streamed Electives SE (Total 12 credits)		Non-credit Core NC	Programme Electives PE	*Total*
	Common Core CC	Unique Core UC	Analytical Skills Stream AS	People Skills Stream PS			
Credits	**24**	**3**	**6**	**4.5**	**3**	**16.5**	**54**

Program Core (PC)

Programme Core consists of Common Core (CC) courses and Unique Core (UC) courses. The total credits of Programme Core would be 33.

MSL705*	HRM Systems	1.5	0	0	1.5
MSL707*	Management Accounting	3	0	0	3
MSL709*	Business Research Methods	1.5	0	0	1.5
MSL711*	Strategic Management	3	0	0	3
MSL712*	Ethics & Values Based Leadership	1.5	0	0	1.5
MSL713*	Information Systems Management	3	0	0	3
MSL719*	Statistics for Management	3	0	0	3
MSL720*	Macroeconomic Environment of Business	3	0	0	3
MSL724*	Business Communication	1.5	0	0	1.5
MSL727*	Interpersonal Behavior & Team Dynamics	1.5	0	0	1.5
MSL729*	Individual Behavior in Organization	1.5	0	0	1.5
MSL740	Quantitative Methods in Management	3	0	0	3
MSL745	Operations Management	3	0	0	3
MSL760	Marketing Management	3	0	0	3
MSL780*	Managerial Economics	1.5	0	0	1.5
MDD803	MBA Project (Unique Core)	0	0	6	3
	Total Credits				***33***

Notes:

The UC will include MBA project which would focus on a research driven application of skills acquired in a particular functional area, through the programme.

* *These are new courses which have been designed and/or modified as a part of the curriculum review.*

** *MSL706 was initially an elective, MSL887. This course's content is the same, only the number has been changed to now reflect a core course.*

Streamed Electives (SE)

Streamed Electives consist of Analytical Skills (AS) Stream and People Skills (PS) Stream. The total credits of Streamed Electives would be 12 – 6 from AS and 6 from PS.

a) Analytical Skills (AS) Stream

MSL721*	Econometrics	3	0	0	3
MTL732	Financial Mathematics	3	1	0	4

* *These are new courses which have been designed and/or modified as a part of the curriculum review.*

b) People Skills (PS) Stream

MSL710	Creative Problem Solving	3	0	0	3
MSL725*	Business Negotiations	1.5	0	0	1.5
MSL730*	Managing With Power	1.5	0	0	1.5
MSL731*	Developing Self Awareness	1.5	0	0	1.5
MSL733*	Organization Theory	1.5	0	0	1.5

* *These are new courses which have been designed and/or modified as a part of the curriculum review.*

Focus Electives (FE)

MSL700	Fundamentals of Management of Technology	3	0	0	3
MSL701	Strategic Technology Management	3	0	0	3
MSL702	Management of Innovation and R&D	3	0	0	3
MSL703	Mgmt. of Technology Transfer and Absorption	3	0	0	3

Non-credit Core (NC)

MSC894*	Seminar	0	0	6	3

* *This is a new course which has been designed as a part of the curriculum review.*

Program Electives (PE)

MSL706**	Business Laws	3	0	0	3
MSL708*	Financial Management	3	0	0	3
MDL800	Management of Blockchain Technologies	1.5	0	0	1.5
MDL801	Managing Digital Transformation	1.5	0	0	1.5
MDL802	Entrepreneurial Finance	3	0	0	3
MDL803	Fixed Income Securities	3	0	0	3
MDL804	Behavioral Finance	1.5	0	0	1.5
MDL805	Financial Technology	1.5	0	0	1.5
MDL809	Career Management Strategies	3	0	0	3
MDL810	Consumer Behavior	3	0	0	3
MSL716	Fundamentals of Management Systems	3	0	0	3
MSL717*	Business Systems Analysis & Design	3	0	0	3
MSL811	Management Control Systems	3	0	0	3
MSL802	Management of Intellectual Property Rights	3	0	0	3
MSL835	Labor Legislation and Industrial Relations	3	0	0	3
MSL704	Science & Technology Policy Systems	3	0	0	3
MSL801	Technology Forecasting & Assessment	3	0	0	3
MSL803	Technical Entrepreneurship	3	0	0	3
MSL806*	Mergers & Acquisitions	3	0	0	3
MSL807*	Selected Topics in Strategic Management	1	0	0	1
MSL808*	Systems Thinking	3	0	0	3
MSL812	Flexible Systems Management	3	0	0	3
MSL813	Systems Methodology for Management	3	0	0	3
MSL817	Systems Waste & Sustainability	3	0	0	3
MSL819	Business Process Re-engineering	3	0	0	3
MSL820	Global Business Environment	3	0	0	3
MSL821*	Strategy Execution Excellence	3	0	0	3
MSL822	International Business	3	0	0	3
MSL823	Strategic Change & Flexibility	3	0	0	3
MSL824	Policy Dynamics & Learning Organization	3	0	0	3
MSL825	Strategies in Functional Management	3	0	0	3
MSL826	Business Ethics	3	0	0	3
MSL827	International Competitiveness	3	0	0	3
MSL828	Global Strategic Management	3	0	0	3
MSL829	Current & Emerging Issues in Strategic Mgmt.	3	0	0	3
MSL851*	Strategic Alliance	1.5	0	0	1.5
MSL714	Organizational Dynamics and Environment	3	0	0	3
MSL830	Organizational Structure and Processes	3	0	0	3
MSL831	Management of Change	3	0	0	3
MSL832	Managing Innovation for Organizational Effectiveness	3	0	0	3
MSL833	Organizational Development	3	0	0	3
MSL834*	Managing Diversity at Workplace	1.5	0	0	1.5
MSL836*	International Human Resources Management	1.5	0	0	1.5
MSL839	Current & Emerging Issues in Organizational Management	3	0	0	3
MSL804*	Procurement Management	3	0	0	3
MSL805*	Services Operations Management	3	0	0	3
MSL715	Quality and Environment Management Systems	3	0	0	3
MSL814*	Data Visualization	1.5	0	0	1.5
MSL815	Decision Support and Expert Systems	3	0	0	3
MSL816	Total Quality Management	3	0	0	3
MSL818	Industrial Waste Management	3	0	0	3
MSL840	Manufacturing Strategy	3	0	0	3
MSL841*	Supply Chain Analytics	3	0	0	3
MSL842*	Supply Chain Modeling	3	0	0	3
MSL843	Supply Chain Logistics Management	3	0	0	3
MSL844	Systems Reliability, Safety and Maintenance Mgmt.	3	0	0	3
MSL845	Total Project Systems Management	3	0	0	3
MSL846	Total Productivity Management	3	0	0	3
MSL848*	Applied Operations Research	3	0	0	3
MSL849	Current & Emerging Issues in Manufacturing Mgmt.	3	0	0	3
MSL809*	Cyber Security: Managing Risks	3	0	0	3
MSL810*	Advanced Data Mining for Business Decisions	1.5	0	0	1.5

MSL850	Management of Information Technology	3	0	0	3
MSL852	Network System: Applications and Mgmt.	3	0	0	3
MSL853*	Software Project Management	3	0	0	3
MSL854*	Big Data Analytics & Data Science	1.5	0	0	1.5
MSL855*	Electronic Commerce	3	0	0	3
MSL856*	Business Intelligence	3	0	0	3
MSL858*	Business Process Management with IT	1.5	0	0	1.5
MSL859	Current and Emerging Issues in IT Mgmt.	3	0	0	3
MSL868*	Digital Research Methods	1.5	0	0	1.5
MSL876*	Economics of Digital Business	1.5	0	0	1.5
MSL877*	Electronic Government	1.5	0	0	1.5
MSL878*	Electronic Payments	1.5	0	0	1.5
MSL882*	Enterprise Cloud Computing	1.5	0	0	1.5
MSL883*	ICTs, Development and Business	1.5	0	0	1.5
MSL884*	Information System Strategy	3	0	0	3
MSL885*	Digital Marketing-Analytics & Optimization	3	0	0	3
MSL886*	IT Consulting & Practice	3	0	0	3
MSL887*	Mobile Commerce	3	0	0	3
MSL888*	Data Warehousing for Business Decision	1.5	0	0	1.5
MSL891*	Data Analytics using SPSS	1.5	0	0	1.5
MSL892*	Predictive Analytics	1.5	0	0	1.5
MSL861	Market Research	3	0	0	3
MSL862	Product Management	3	0	0	3
MSL863	Advertising and Sales Promotion Management	3	0	0	3
MSL864*	Corporate Communication	3	0	0	3
MSL865	Sales Management	3	0	0	3
MSL866	International Marketing	3	0	0	3
MSL867	Industrial Marketing Management	3	0	0	3
MSL869	Current & Emerging Issues in Marketing	3	0	0	3
MSL870*	Corporate Governance	1.5	0	0	1.5
MSL871*	Banking and Financial Services	1.5	0	0	1.5
MSL872	Working Capital Management	3	0	0	3
MSL873	Security Analysis & Portfolio Management	3	0	0	3
MSL874*	Indian Financial System	1.5	0	0	1.5
MSL875	International Financial Management	3	0	0	3
MSL879	Current & Emerging Issues in Finance	3	0	0	3
MSL734	Management of Small & Medium Scale Industrial Enterprises	3	0	0	3
MSL847	Advanced Methods for Management Research	3	0	0	3
MSL880	Selected Topics in Management Methodology	3	0	0	3
MSL881	Mgmt. of Public Sector Enterprises in India	3	0	0	3
MSL889	Current & Emerging Issues in Public Sector Mgmt.	3	0	0	3
MSL897	Consultancy Process & Skills	3	0	0	3
MSL898	Consultancy Professional Practice	3	0	0	3
MSL899	Current & Emerging Issues in Consultancy Mgmt.	3	0	0	3
MSL895	Advanced Data Analysis for Management	3	0	0	3
MSL896	International Economic Policy	3	0	0	3
MSV801	Selected Topics in OB & HR Management	1	0	0	1
MSV802	Selected Topics in Finance	1	0	0	1
MSV803	Selected Topics in IT Management	1	0	0	1
MSV804	Selected Topics in Operations Management	1	0	0	1
MSV805	Selected Topics in Economics	1	0	0	1
MSV806	Selected Topics in Marketing Management	1	0	0	1
MSV815	Case Study Teaching and Writing	1	0	0	1
MSL799	Theories in IS research	3	0	0	3
MSV816	Contemporary Issue in Management	1	0	0	1
MSV817	Art of Scholarship in Management Research	1	0	0	1
MSP801	Interdisciplinary Research in Management	0	0	2	1
MSV818	Contemporary Issues in OB & HR Mgmt.	1	0	0	1
MSV819	Contemporary Issues in Finance	1	0	0	1
MSV820	Contemporary Issues in IT Management	1	0	0	1
MSV821	Contemporary Issues in Operations Mgmt.	1	0	0	1
MSV822	Contemporary Issues in Economic Policy	1	0	0	1
MSV824	Contemporary Issues in Strategic Mgmt.	1	0	0	1
MSV826	Frontiers in OB & HR Management	1	0	0	1
MSV827	Frontiers in Finance	1	0	0	1
MSV828	Frontiers in Information Systems Mgmt.	1	0	0	1
MSV832	Frontiers in Strategic Management	1	0	0	1
MSL735	Qualitative Methods in Management	3	0	0	3
MSL781	Macroeconomic Dynamics	3	0	0	3
MDL806	Derivatives	3	0	0	3
MSL890	Financial Engineering	3	0	0	3
MSL310	Financial Institutions and Markets	3	0	0	3
MSL718	Management of Blockchain Technology	1.5	0	0	1.5
MSL722	Managing Enterprise AI/ML Systems	1.5	0	0	1.5
MSL782	Business Cycles and Global Economy	1.5	0	0	1.5
MSL783	Global Economic Development	1.5	0	0	1.5
MSL784	Sovereign Debt and Default	3	0	0	3

Sem.	Courses (Number, Abbreviated Title, L-T-P, credits)						Lecture courses	Contact h/week				Credits
								L	T	P	Total	
I	MSL707 Mgmt. Accounting (3-0-0) 3	MSL708 Financial Mgmt. (3-0-0) 3	MSL712 Ethics & Values Based Leadership (1.5-0-0) 1.5	MSL740 Quantitative Methods in Mgmt. (3-0-0) 3	MSL729 Individual Behavior in Organization (1.5-0-0) 1.5 + MSL724 Business Communication (1.5-0-0) 1.5	MSL719 Statistics for Mmgt. (3-0-0) 3	6	15	0	0	15	15
II	MSL705 HRM Systems (1.5-0-0) 1.5	MSL720 Macroeconomic Environment of Business (3-0-0) 3	MSL713 Information Systems Mgmt. (3-0-0) 3	MSL745 Operations Mgmt. (3-0-0) 3	MSL727 Interperso nal Behavior & Team Dynamics (1.5-0-0) 1.5	MSL760 Marketing Mgmt. (3-0-0) 3	6	15	0	0	15	15
Summer	MSC894 Seminar											
III	MSL709 Business Re-search Methods (1.5-0-0) 1.5	MSL711 Strategic Mmgt. (3-0-0) 3	PE (0-0-21) 10.5				7/9	15	0	0	15	15
IV	MDD803 MBA Project (0-0-6) 3	PE (6-0-0) 6					2/3	9	0	0	9	9

Total = 54

Master of Arts in Culture, Society, Thought

Department of Humanities and Social Sciences

The overall credits structure

Category	PC	PE	OE	*Total*
Credits	**53**	**15**	**6**	**74**

Program Core

HSN500	Interdisciplinary Reading Bootcamp: Culture, Society, Thought	0	1	0	1
HSN590	Writing Workshop	1	0	6	4
XXX	Dept Seminars	0	0	0	4
HSL531	Literary Theory	3	0	0	3
HSL551	Philosophical Thinking	3	0	0	3
HSL582	Theory & Methods in Humanities and Social Sciences	3	0	0	3
HSL571	Contemporary Social Theory	3	0	0	3
HSL584	Political Thought	3	0	0	3
HSL583	Introduction to Research Methods	3	0	0	3
HSL572	Programming for Digital Humanities*	1	0	2	2
HSL575	Fieldwork Methods*	2	0	0	2
HSV735	Narrative Matters*	2	0	0	2
HSL581	Archival Methods*	1	0	2	2
HSV734	Dimensions of Language*	2	0	0	2
HSL585	Introduction to Digitization*	1	0	2	2
HSD690	Research Project Part I	0	0	6	3
HSD691	Research Project Part II	0	0	8	4
HSD692	Research Project Part III	0	0	26	13
	Total Credits				***53***

(*any three have to be taken)

Program Electives

HSL631	Study of an Author	3	0	0	3
HSL686	Foundations in Digital Humanities	3	0	0	3
HSL675	Education and Society	3	0	0	3
HSL676	Religion and Society	3	0	0	3
HSL682	Introduction to Anti-Caste Thought and Literature	3	0	0	3
HSL688	Agrarian Societies and Transformation	3	0	0	3
HSL683	Feminist Thought	3	0	0	3
HSL657	Machine Minds: Philosophy of Artificial Intelligence	3	0	0	3
HSL632	The World Novel	3	0	0	3
HSL633	The Lyric Poet in Modernity	3	0	0	3
HSL634	Political Theatre	3	0	0	3
HSL652	Philosophy and Its Histories	3	0	0	3
HSL653	Principles of Rationalism and Empiricism	3	0	0	3
HSL654	Ideas of Freedom	3	0	0	3
HSL655	The Idea of Democracy	3	0	0	3
HSL656	Critical Philosophy of Race	3	0	0	3
HSL671	Reading Ethnographic Texts	3	0	0	3
HSL672	Making Sense of the Everyday: Theories, Debates and Critiques	3	0	0	3
HSL673	Family, Marriage and Kinship	3	0	0	3
HSL674	Urban Ethnography	3	0	0	3
HSL677	Comparative Literature: History, Theory and Method	3	0	0	3
HSL678	Cinemas of India	3	0	0	3
HSL681	Print Culture and History	3	0	0	3
HSL684	Queering Gender and Sexuality: Debates from India	3	0	0	3
HSL685	Culture and Politics	3	0	0	3
HSL687	Introduction to Medical Humanities	3	0	0	3

Sem.	Courses (Number, Abbreviated Title, L-T-P, credits)							Lecture course	Contact h/week L	T	P	Total	Credits	NGU	Total
I	Programme Core				Programme Electives		Colloquium								
	HSN500 Reading Bootcamp (0-1-0) 1	HSL531 Literary Theory (3-0-0) 3	HSL551 Philosophical Thinking (3-0-0) 3	HSL582 Theory & Methods in HSS (3-0-0) 3	PE-1 (3-0-0) 3		NGU-1 Department Seminar Series	4	12	0	0	12	12	2	14
II	Programme Core			Research	Programme Electives		Colloquium								
	HSL571 Contemporary Social Theory (3-0-0) 3	HSL584 Political Thought (3-0-0) 3	HSL583 Introduction to Research Methods (3-0-0) 3	HSD690 Research Project Part-1 (0-0-6) 3	PE-2 (3-0-0) 3	PE-3 (3-0-0) 3	NGU-1 Department Seminar Series	5	15	15	0	15	15+3 (Research Project)=18	1	19
Summer	HSN900 Writing Workshop													4	4
III	Programme Core		Research	Programme Electives		Open	Colloquium								
	HSL572 Programming for DH HSL573 Narrative Matters HSL581 Archival Methods	HSL574 Dimensions of Language HSL575 Fieldwork Methods HSL585 Intro to Digitisation	HSD691 Research Project Part II (0-0-8) 4	PE-4 (3-0-0) 3	PE-5 (3-0-0) 3	OE-1 (3-0-0) 3	NGU-1 Department Seminar Series	5	13	0	0	13	13+4 (Research Project) = 17	1	18
	Any Two form this list														
IV	Programme Core		Research		Open		Colloquium								
	HSL572 Programming for DH HSL573 Narrative Matters HSL581 Archival Methods	HSL574 Dimensions of Language HSL575 Fieldwork Methods HSL585 Intro to Digitisation	HSD692 Research Project Part III (0-0-26) 13		OE-2 (3-0-0) 3		NGU-1 Department Seminar Series	2	5	0	0	5	5+13 (Research Project) = 18	1	19
	Any One form this list														

Note: HSL572, HSL573, HSL575, HSL581 and HSL585 are basket of courses on methods. Students compulsorily have to choose three out of the combination of courses that are offered.

Total = 74

Master of Technology in Engineering Analysis and Design

Department of Applied Mechanics

The overall credits structure

Category	PC	PE	OC	Total
Credits	34	12	6	52

Program Core (PC)

APL701	Continuum Mechanics	3	0	0		3
APL702	Experimental Methods for Solids and Fluids	2	0	2		3
APL703	Engineering Mathematic and Computation	3	0	2		4
APL734	Advanced Dynamics	3	0	0		3
APL775	Design Methods	3	0	0		3
AMP811	Project-I	0	0	12		6
AMP812	Project-II	0	0	24		12

Product Design (Program Electives)

APL710	Computer Aided Design	3	0	2		4
APL737	Advanced Design of Machine Elements	3	0	0		3
APL767	Engineering Failure Analysis and Prevention	3	0	0		3
APL771	Design Optimization and Decision Theory	3	0	0		3
APL774	Modeling & Analysis of Mechanical Systems	3	0	0		3
APL776	Product Design and Feasibility Study (Stream Core)	2	0	4		4
APL787	Fatigue Failure and Design	3	0	0		3
APL871	Product Reliability	3	0	0		3
MCL741	Control Engineering	3	0	2		4
MCL749	Mechatronics Product Design	3	0	2		4

Engineering Mechanics (Program Electives)

APL705	Finite Element Method	3	0	2		4
APL711	Advanced Fluid Mechanics	3	0	0		3
APL713	Turbulence and its Modeling	3	0	0		3
APL715	Physics of Turbulent Flows	3	0	0		3
APL716	Fluid Transportation Systems	3	0	0		3
APL720	Computational Fluid Dynamics	3	0	2		4
AML833	Applied Plasticity	3	0	0		3
APL737	Advanced Design of Machine Elements	3	0	0		3
APL736	Multiscale Modelling of Crystalline Materials	3	0	2		4
APL742	Advanced Biomechanics	3	0	0		3
APL744	Probabilistic Machine Learning for Mechanics	3	0	2		4
APL745	Deep Learning for Mechanics	3	0	2		4
APL746	Environmental Fluid Dynamics	3	0	0		3
APL747	Uncertainty Quantification and Propogation	3	0	0		3
APL765	Fracture Mechanics	3	0	0		3
APL787	Fatigue Failure and Design	3	0	0		3
APL796	Advanced Solid Mechanics	3	0	0		3
APL805	Advanced Finite Element Method	3	0	0		3
AML811	Advanced CFD	3	0	0		3
APL815	Hydrodynamic Stability	3	0	0		3
AML816	Compressible Fluid Flow and Gas Dynamics	3	0	0		3
APL831	Theory of Plates and Shells	3	0	0		3
APL835	Mechanics of Composite Materials	3	0	0		3

Materials (Program Electives)

APL750	Modern Engineering Materials	3	0	0		3
APL756	Microstructural Characterization of Materials	3	0	2		4
APL759	Phase Transformations	3	0	0		3
APL763	Micro & Nanoscale Mechanical Behaviour of Materials	3	0	2		4
APL764	Mechanical Behaviour of Biomaterials	3	0	0		3
APL765	Fracture Mechanics	3	0	0		3
APL767	Engineering Failure Analysis and Prevention	3	0	0		3
APL	Selected Topics in Material Engineering	3	0	0		3

Semester wise course breakup for two streams

Sem.	Courses (Number, Abbreviated Title, L-T-P, credits)							Lecture courses	Contact h/week				Credits
									L	T	P	Total	
I	APL775 Design Methods (3-0-0) 3	APL734 Advanced Dynamics (3-0-0) 3	APL703 Engineering Mathematics & Computation (3-0-2) 4	APL701 Continuum Mechanics (3-0-0) 3	APL702 Experimental Methods for Solids & Fluids (2-0-2) 3			5	14	0	4	18	16
II	PE-1	PE-2	PE-3	OE-1				4	12	0	0	12	12
Summer													
III	OE2	AMP811	PE-4					2	6	0	12	18	12
IV	AMP812							0	0	0	24	24	12

Total = 52

Programme Code: **BEM**

Master of Technology in Biomolecular and Bioprocess Engineering

Department of Biochemical Engineering and Biotechnology

The overall credits structure

Category	PC	PE	OE	*Total*
Credits	**41**	**12**	**-**	**53**

Program Core

BBL771	Microbial Biochemistry and Molecular Biology	3	0	2	4
BBL772	Data Analytics and Informatics in Biotechnology	2	0	2	3
BBL773	Applied Mathematics for Biochemical Engg.	3	0	0	3
BBL774	Biomolecular Engineering	3	0	2	4
BBL775	Bioreaction Engineering	3	0	3	4.5
BBL731	Bioseparation Engineering	3	0	3	4.5
BBD855	MTP PART-I	0	0	12	6
BBD856	MTP PART-II	0	0	24	12
	Total Credits				***41***

Program Electives

BBL734	Metabolic Regulation & Engineering	3	0	0	3
BBL735	Genomics and Proteomics	2	0	2	3
BBL736	Dynamics of Microbial Systems	3	0	0	3
BBL737	Instrumentation and Analytical Methods in Bioengineering	2	0	2	3
BBL740	Plant Cell Technology	3	0	2	4
BBL741	Protein Science & Engineering	3	0	0	3
BBL742	Biological Waste Treatment	3	0	2	4
BBL745	Combinatorial Biotechnology	3	0	0	3
BBL747	Bionanotechnology	3	0	0	3
BBL749	Cancer Cell Biology	3	0	3	4.5
BBL750	Genome Engineering	2	0	2	3
BBL752	Microbial Ecology	3	0	0	3
BBL754	Optics with Life Sciences	3	0	0	3
BBL757	Electromicrobiology and Bioelectrochemical Systems	3	0	0	3

Sem.	Courses (Number, Abbreviated Title, L-T-P, Credits)				Lecture courses	Contact h/week				Credits
						L	T	P	Total	
I	BBL771 Microbial Biochemistry and Molecular Biology (3-0-2) 4	BBL772 Data Analytics and Informatics in Biotechnology (2-0-2) 3	BBL773 Applied Mathematics for Biochemical Engineering (3-0-0) 3	PE-1	4	--	--	--		13
II	BBL731 Bioseparation Engineering (3-0-3) 4.5	BBL774 Biomolecular Engineering (3-0-2) 4	BBL775 Bioreaction Engineering (3-0-3) 4.5	PE-2	4	--	--	--		16
III	BBD855 Major Project-I (0-0-12) 6		PE-3	PE-4	2	--	--	--		12
IV	BBD856 Major Project-II (0-0-24) 12				0	0	0	24	24	12

Total = 53

Master of Technology in Chemical Engineering

Department of Chemical Engineering

The overall credits structure

Category	PC	PE	OE	Total
Credits	37	12	3	52

Program Core

CLD771	Minor Project	0	0	6	3
CLD781	Major Project Part-I	0	0	16	8
CLD782	Major Project Part-II	0	0	24	12
CLL701	Modelling of Transport Processes	2	0	0	2
CLL702	Principles of Thermodynamics, Reaction Kinetics and Reactors	2	0	0	2
CLL703	Process Engineering	3	0	0	3
CLP704	Technical Communication for Chemical Engineers	0	0	2	1
CLL731	Advanced Transport Phenomena	3	0	0	3
CLL733	Industrial Multiphase Reactors	3	0	0	3
	Total Credits				***37***

Program Electives

CLL704	Natural Gas Processing	3	0	0	3
CLL705	Petroleum Reservoir Engineering	3	0	0	3
CLL706	Petroleum Production Engineering	3	0	0	3
CLL707	Population Balance Modeling	3	0	0	3
CLL720	Principles of Electrochemical Engineering	3	0	0	3
CLL721	Electrochemical Methods	3	0	0	3
CLL722	Electrochemical Conversion and Storage Devices	3	0	0	3
CLL723	Hydrogen Energy and Fuel Cell Technology	3	0	0	3
CLL724	Environmental Engineering and Waste Management	3	0	0	3
CLL725	Air Pollution Control Engineering	3	0	0	3
CLL726	Molecular Modeling of Catalytic Reactions	3	0	0	3
CLL727	Heterogeneous Catalysis and Catalytic Reactors	3	0	0	3
CLL728	Biomass Conversion and Utilization	3	0	0	3
CLL730	Structure, Transport and Reactions in BioNano Systems	3	0	0	3
CLL732	Advanced Chemical Engineering Thermodynamics	3	0	0	3
CLL734	Process Intensification and Novel Reactors	3	0	0	3
CLL735	Design of Multicomponent Separation Processes	3	0	0	3
CLL736	Experimental Characterization of Multiphase Reactors	3	0	0	3
CLL742	Experimental Characterization of BioMacromolecules	3	0	0	3
CLL743	Petrochemicals Technology	3	0	0	3
CLL761	Chemical Engineering Mathematics	3	0	0	3
CLL762	Advanced Computational Techniques in Chemical Engineering	2	0	2	3
CLL766	Interfacial Engineering	3	0	0	3
CLL767	Structures and Properties of Polymers	3	0	0	3
CLL768	Fundamentals of Computational Fluid Dynamics	2	0	2	3
CLL769	Applications of Computational Fluid Dynamics	2	0	2	3
CLL770	Introduction to Microfluidics and Microfabrication	3	0	0	3
CLL771	Introduction to Complex Fluids	3	0	0	3
CLL772	Transport Phenomena in Complex Fluids	3	0	0	3
CLL773	Thermodynamics of Complex Fluids	3	0	0	3
CLL774	Simulation Techniques for Complex Fluids	3	0	0	3
CLL775	Polymerization Process Modeling	3	0	0	3
CLL776	Granular Materials	3	0	0	3
CLL777	Complex Fluids Technology	3	0	0	3
CLL778	Interfacial Behaviour and Transport of Biomolecules	3	0	0	3
CLL779	Molecular Biotechnology and in-vitro Diagnostics	3	0	0	3
CLL780	Bioprocessing and Bioseparations	3	0	0	3
CLL781	Process Operations Scheduling	3	0	0	3
CLL782	Process Optimization	3	0	0	3
CLL783	Advanced Process Control	3	0	0	3
CLL784	Process Modeling and Simulation	3	0	0	3
CLL785	Evolutionary Optimization	3	0	0	3
CLL786	Fine Chemicals Technology	3	0	0	3
CLL787	Statistical Methods for Chemical Engg.	3	0	0	3
CLL788	Process Data Analytics	3	0	0	3
CLL791	Chemical Product and Process Integration	3	0	0	3
CLL792	Chemical Product Development and Commercialization	3	0	0	3
CLL793	Membrane Science and Engineering	3	0	0	3
CLL794	Petroleum Refinery Engineering	3	0	0	3
CLL798	Selected Topics in Chemical Engineering-I	3	0	0	3
CLL799	Selected Topics in Chemical Engineering-II	3	0	0	3
CLV796	Current Topics in Chemical Engineering	1	0	0	1
CLV797	Recent Advances in Chemical Engineering	2	0	0	2

Sem.	Courses (Number, Abbreviated Title, L-T-P, credits)						Lecture courses	Contact h/week				Credits
								L	T	P	Total	
I	CLL701 Modelling of Transport Processes (2-0-0) 2	CLL702 Principles of Thermodynamics, Reaction Kinetics and Reactors (2-0-0) 2	CLL703 Process Engineering (3-0-0) 3	PE-1 (3-0-0) 3	PE-2 (3-0-0) 3		5	13	0	0	13	13
II	CLL731 Advanced Transport Phenomena (3-0-0) 3	CLL733 Industrial Multiphase Reactors (3-0-0) 3	CLD771 Minor Project (0-0-6) 3	PE-3 (3-0-0) 3	CLP704 Tech. Commu. Chem. Engineers (0-0-2) 1		3	9	0	8	17	13
Summer												
III			CLD781 Major Project Part-I (0-0-16) 8	PE-4 (3-0-0) 3	OE-1 (3-0-0) 3		2	6	0	16	22	14
IV			CLD782 Major Project Part-II (0-0-24) 12				0	0	0	24	24	12

Total = 52

Programme Code: **CYM**

Master of Technology in Molecular Engineering : Chemical Synthesis and Analysis

Department of Chemistry

The overall credits structure

Category	PC	PE/OE	Total
Credits	**42**	**12**	**54**

Program Core

CMD806	Major Project Part-I	0	0	18	9
CMD807	Major Project Part-II	0	0	18	9
CML721	Design and Synthesis of Organic Molecules	3	0	0	3
CML724	Synthesis of Industrially Important Inorganic Materials	3	0	0	3
CML726	Cheminformatics and Molecular Modelling	3	0	0	3
CMP728	Instrumentation Laboratory	0	0	6	3
CML729	Material Characterization	3	0	0	3
CML731	Chemical Separation and Electroanalytical Methods	3	0	0	3
CML737	Applied Spectroscopy	3	0	0	3
CMP722	Synthesis of Organic and Inorganic Compounds	0	0	6	3
	Total Credits				***42***

Program Electives

CMD799	Minor Project	0	0	6	3
CML723	Principles and Practice of NMR and Optical Spectroscopy	3	0	0	3
CML733	Chemistry of Industrial Catalysts	3	0	0	3
CML735	Biosynthetic Approach Towards Natural Products	3	0	0	3
CML734	Chemistry of Nanostructured Materials	3	0	0	3
CML738	Applications of P-block Elements and their Compounds	3	0	0	3
CML739	Applied Biocatalysis	3	0	0	3
CML740	Chemistry of Heterocyclic Compounds	3	0	0	3
CML741	Organo and Organometallic Catalysis	3	0	0	3
CML742	Reagents in Synthetic Transformations	3	0	0	3
CML743	Physical Organic Chemistry Advanced	3	0	0	3
CML801	Molecular Modelling and Simulations: Concepts and Techniques	3	0	0	3

Sem.	Courses (Number, Abbreviated Title, L-T-P, credits)							Lecture courses	Contact h/week				Credits
									L	T	P	Total	
I	CML721 Design & Synthesis (3-0-0) 3	CML726 Cheminformatics (3-0-0) 3	CML731 Separation & Electroanalytical (3-0-0) 3	CMP722 Lab on Synthesis (0-0-6) 3	PE-1 (3-0-0) 3			4	12	0	6	18	15
II	CML724 Inorganic Materials (3-0-0) 3	CML729 Material Characterization (3-0-0) 3	CML737 Applied Spectroscopy (3-0-0) 3	CMP728 Instru. Lab. (0-0-6) 3	PE-2 (3-0-0) 3			4	12	0	6	18	15
III	CMD805 Major Project Part-I (0-0-12) 6	PE-3 (3-0-0) 3	PE-4 (3-0-0) 3					2	6	0	18	24	12
IV	CMD807 Major Project Part-II (0-0-24) 12							0	0	0	18	18	12

Total = 54

Master of Technology in Construction Technology and Management

Department of Civil Engineering

The overall credits structure

Category	PC	PE	OE	Total
Credits	37.5	15	0	52.5

Program Core

CVC771	Seminar In Construction Technology and Management-I	0	0	2	0
CVC772	Seminar In Construction Technology and Management-II	0	0	2	0
CVD772	Major Project Part-I (CEC)	0	0	18	9
CVD773	Major Project Part-II (CEC)	0	0	24	12
CVL772	Construction Project Management	3	0	0	3
CVL773	Quantitative Methods in Construction Management	3	0	0	3
CVL774	Construction Contract Management	3	0	0	3
CVL775	Construction Economics and Finance	3	0	0	3
CVL776	Construction Practices and Equipment	3	0	0	3
CVP772	Computational Laboratory for Construction Management	0	0	3	1.5
	Total Credits				***37.5***

Program Electives for All Background

CVD771	Minor Project (CEC)	0	0	6	3
CVS771	Independent Study (CEC)	0	3	0	3
MCL754	Operations Planning and Control	3	0	0	3
MCL756	Supply Chain Management	3	0	0	3
MCL757	Logistics	3	0	0	3
MCL771	Value Engineering and Life Cycle Costing	3	0	0	3
MSL705	HRM Systems	2	0	0	1.5
MSL804	Procurement Management	3	0	0	3
MSL822	International Business	3	0	0	3
MSL846	Total Productivity Management	3	0	0	3
MCL772	Reliability Engineering	3	0	0	3

Program Electives for Civil Engineering Background

EEL747	Electrical Systems for Construction Industries	3	0	2	4
CVL702	Ground Improvement and Geosynthetics	3	0	0	3
CVL714	Field Exploration and Geotechnical Processes	3	0	0	3
CVL715	Excavation Methods and Underground Space Technology	3	0	0	3
CVL727	Environmental risk assessment	3	0	0	3
CVL747	Transportation Safety and Environment	3	0	0	3
CVL750	Intelligent Transportation Systems	3	0	0	3
CVL765	Concrete Mechanics	3	0	0	3
CVL771	Advanced Concrete Technology	3	0	0	3
CVL777	Building Science	3	0	0	3
CVL778	Building Services and Maintenance Management	3	0	0	3
CVL779	Formwork for Concrete Structures	3	0	0	3
CVL820	Environmental Impact Assessment	3	0	0	3
CVL838	Geographic Information Systems	2	0	2	3
CVL840	Planning and Design of Sustainable Transport Systems	3	0	0	3
CVL871	Durability and Repair of Concrete Structures	3	0	0	3
CVL872	Infrastructure Development and Management	3	0	0	3
CVL873	Fire Engineering and Design	3	0	0	3
CVL874	Quality and Safety in Construction	3	0	0	3
CVL875	Sustainable Materials and Green Buildings	3	0	0	3

Program Electives for Electrical Engineering Background

ELL700	Linear Systems Theory	3	0	0	3
ELL712	Digital Communications	3	0	0	3
ELL750	Modelling of Electrical Machines	3	0	0	3
ELL751	Power Electronic Converters	3	0	0	3
ELL752	Electric Drive System	3	0	0	3
ELL753	Physical Phenomena in Electrical Machines	3	0	0	3
ELL754	Permanent Magnet Machines	3	0	0	3
ELL755	Variable Reluctance Machines	3	0	0	3
ELL756	Special Electrical Machines	3	0	0	3
ELL757	Energy Efficient Motors	3	0	0	3
ELL758	Power Quality	3	0	0	3
ELL759	Power Electronic Converters for Renewable Energy Systems	3	0	0	3
ELL760	Switched Mode Power Conversion	3	0	0	3
ELL761	Power Electronics for Utility Interface	3	0	0	3
ELL762	Intelligent Motor Controllers	3	0	0	3
ELL763	Advanced Electric Drives	3	0	0	3
ELL764	Electric Vehicles	3	0	0	3
ELL765	Smart Grid Technology	3	0	0	3
ELL766	Appliance Systems	3	0	0	3
ELL767	Mechatronics	3	0	0	3
ELL770	Power System Analysis	3	0	0	3
ELL771	Advanced Power System Protection	3	0	0	3
ELL772	Planning and Operation of a Smart Grid	3	0	0	3
ELL773	High Voltage DC Transmission	3	0	0	3
ELL774	Flexible AC Transmission system	3	0	0	3
ELL775	Power System Dynamics	3	0	0	3
ELL776	Advanced Power System Optimization	3	0	0	3
ELL777	Power System operation and control	3	0	0	3
ELL778	Dynamic Modelling And Control of Sustainable Energy Systems	3	0	0	3
ELL850	Digital Control of Power Electronics and Drive Systems	3	0	0	3
ELL851	Computer Aided Design of Electrical Machines	3	0	0	3
ELL852	Condition Monitoring of Electrical Machines	3	0	0	3
ELL853	Advanced Topics in Electrical Machines	3	0	0	3
ELL854	Selected Topics in Electrical Machines	3	0	0	3
ELL855	High Power Converters	3	0	0	3
ELL856	Advanced Topics in Power Electronics	3	0	0	3
ELL857	Selected Topics in Power Electronics	3	0	0	3
ELL858	Advanced Topics in Electric Drives	3	0	0	3
ELL859	Selected Topics in Electric Drives	3	0	0	3
ELL870	Restructured Power System	3	0	0	3
ELL871	Distribution System Operation and Planning	3	0	0	3
ELL872	Selected Topics in Power System	3	0	0	3
ELL873	Power System Transient	3	0	0	3
ELL874	Power System Reliability	3	0	0	3
ELP850	Electrical Machines Laboratory	0	0	3	1.5
ELP851	Power Electronics Laboratory	0	0	3	1.5
ELP852	Electrical Drives Laboratory	0	0	3	1.5
ELP853	DSP Based Control of Power Electronics and Drives Laboratory	0	0	3	1.5
ELP854	Electrical Machines CAD Laboratory	0	1	4	3
ELP855	Smart Grids Laboratory	0	1	4	3
ELP870	Power System Lab I	0	1	4	3
ELP871	Power System Lab II	0	1	4	3
ESL718	Power Generation, Transmission and Distribution	3	0	0	3
ESL732	Bioconversion and Processing of Waste	3	0	0	3
ESL734	Nuclear Energy	3	0	0	3
ESL740	Non-conventional Sources of Energy	3	0	0	3
ESL746	Hydrogen Energy	3	0	0	3
ESL768	Wind Energy and Hydro Power Systems	3	0	0	3
ESL770	Solar Energy Utilization	3	0	0	3
ESL870	Fusion Energy	3	0	0	3

Program Electives for Mechanical Engineering Background

EEL747	Electrical Systems for Construction Industries	3	0	2	4
ESL768	Wind Engery & Hydro Power System	3	0	0	3
ITL709	Maintenance Planning and Control	3	0	0	3
ITL752	Bulk Materials Handling	2	0	2	3
MCL749	Mechatronics Product Design	3	0	2	4
MCL751	Industrial Engineering Systems	1	0	4	3
MCL753	Manufacturing Informatics	3	0	2	4
MCL755	Service System Design	3	0	0	3
MCL769	Metal Forming Analysis	3	0	2	4
MCL776	Advances in Metal Forming	3	0	0	3
MCL778	Design and Metallurgy of Welded Joints	3	0	2	4
MCL780	Casting Technology	3	0	2	4
MCL781	Machining Processes and Analysis	3	0	2	4
MCL783	Automation in Manufacturing	3	0	2	4
MCL784	Computer Aided Manufacturing	3	0	2	4
MCL785	Advanced Machining Processes	3	0	0	3
MCL787	Welding Science and Technology	3	0	2	4
MCL788	Surface Engineering	3	0	2	4
MCL791	Processing and Mechanics of Composite Materials	3	0	2	4
MCL792	Injection Molding and Mold Design	2	0	2	3
MCL818*	Heating, Ventilating and Air-conditioning	3	0	2	3
MCL866	Maintenance Management	3	0	0	3

Sem.	Courses (Number, Abbreviated Title, L-T-P, Credits)						Lecture courses	Contact h/week				Credits
								L	T	P	Total	
I	CVL772 Construction Project Management (3-0-0) 3	CVL773 Quantitative Methods in Construction Management (3-0-0) 3	CVP772 Computational Laboratory for Construction Management (0-0-3) 1.5	CVC771 Seminar In Construction Technology and Management-I (0-0-2) 0	PE-1 (3-0-0) 3	PE-2 (3-0-0) 3	4	12	0	5	17	13.5
II	CVL775 Construction Economics and Finance (3-0-0) 3	CVL776 Construction Practices and Equipment (3-0-0) 3	CVL774 Construction Contract Management (3-0-0) 3	CVC772 Seminar In Construction Technology and Management-II (0-0-2) 0	PE-3 (3-0-0) 3		4	12	0	2	14	12
Summer												
III	CVD772 Major Project Part-I (CEC) (0-0-18) 9	PE-4 (3-0-0) 3	PE-5 (3-0-0) 3				2	6	0	18	24	15
IV	CVD773 Major Project Part-II (CEC) (0-0-24) 12						0	0	0	24	24	12

Total = 52.5

Programme Code: **CEG**

Master of Technology in Geotechnical and Geoenvironmental Engineering

Department of Civil Engineering

The overall credits structure

Category	PC	PE	OE	Total
Credits	**36**	**12**	**0**	**48**

Program Core

CVD800	Major Project Part-I	0	0	12	6
CVD801	Major Project Part-II	0	0	24	12
CVL700	Engineering Behaviour of Soils	3	0	0	3
CVL701	Site Investigation and Foundation Design	3	0	0	3
CVL702	Ground Improvement and Geosynthetics	3	0	0	3
CVL703	Geoenvironmental Engineering	3	0	0	3
CVP700	Soil Engineering Lab	0	0	6	3
CVP800	Geoenvironmental and Geotechnical Engineering Lab	0	0	6	3
	Total Credits				***36***

Program Electives

CVD700*	Minor Project	0	0	6	3
CVL704	Finite Element Method in Geotechnical Engg.	3	0	0	3
CVL705	Slopes and Retaining Structures	3	0	0	3
CVL706	Soil Dynamics and Earthquake Geotechnical Engineering	3	0	0	3
CVL707	Soil-Structure Interaction Analysis	3	0	0	3
CVL708	Geotechnology of Waste Disposal Facilities	3	0	0	3
CVL709	Offshore Geotechnical Engineering	3	0	0	3
CVL800	Emerging Topics in Geotechnical Engineering	3	0	0	3
CVL801	Constitutive Modelling in Geotechnics	3	0	0	3
CVS800	Independent Study	0	3	0	3

* This course is only for Part-Time students in lieu of CVP800 and DAAD students.

Sem.	Courses (Number, Abbreviated Title, L-T-P, credits)					Lecture courses	Contact h/week				Credits
							L	T	P	Total	
I	CVL700 Engineering Behaviour of Soils (3-0-0) 3	CVL701 Site Investigation and Foundation Design (3-0-0) 3	CVP700 Soil Engineering Lab (0-0-6) 3	PE-1 (3-0-0) 3		3	9	0	6	15	12
II	CVL702 Ground Improvement and Geosynthetics (3-0-0) 3	CVL703 Geoenvironmental Engineering (3-0-0) 3	CVP800 Geoenvironmental and Geotechnical Engg. Lab/ CVD700 Minor Project (for Part Time Students) (0-0-6) 3	PE-2 (3-0-0) 3	PE-3 (3-0-0) 3	4	12	0	6	18	15
Summer											
III	CVD800 Major Project Part-I (0-0-12) 6	PE-4 (3-0-0) 3				1	3	0	12	15	9
IV	CVD801 Major Project Part-II (0-0-24) 12					0	0	0	24	24	12

Total = 48

Programme Code: **CEP**

Master of Technology in Transportation Engineering

Department of Civil Engineering

The overall credits structure

Category	PC	PE	OC	Total
Credits	**36**	**18**	**0**	**54**

Including 6 Credits of Restricted Electives

Program Core

CVD853	Major Project Part-I	0	0	18	9
CVD854	Major Project Part-II	0	0	24	12
CVL740	Pavement Materials and Design of Pavements	3	0	2	4
CVL741	Urban and Regional Transportation Planning	3	0	2	4
CVL742	Traffic Engineering	3	0	2	4
CVS852	Advanced Topics in Transportation Engineering	0	0	6	3
	Total Credits				***36***

Restricted Electives (6 Credits)

CVL763	Analytical & Numerical Methods in Structural Engineering	3	0	0	3
CVL729	Environmental Statistics and Experimental Design	2	0	2	3
MCL761	Probability and Statistics	3	0	0	3
CVL731	Optimization Techniques in Water Resources	3	0	0	3
CVL748	Data Analysis for Transportation Engineering	3	0	0	3
CVS753	Minor Project in Transportation Engineering	0	0	6	3

Program Electives

CVL743	Airport Planning and Design	3	0	0	3
CVL744	Transportation Infrastructure Design	2	0	2	3
CVL745	Modeling of Pavement Materials	2	0	2	3
CVL746	Public Transportation Systems	3	0	0	3
CVL747	Transportation Safety and Environment	3	0	0	3
CVL749	Planning and Design of Bus Transportation System	3	0	0	3
CVL750	Intelligent Transportation Systems	3	0	0	3
CVL840	Planning and Design of Sustainable Transport Systems	3	0	0	3
CVL841	Advanced Transportation Modelling	2	0	2	3
CVL842	Geometric Design of Roads	2	0	2	3
CVL844	Transportation Infrastructure Management	3	0	0	3
CVL845	Viscoelastic Behavior of Bituminous Materials	3	0	0	3
CVL846	Transportation System Management	3	0	0	3
CVL847	Transportation Economics	3	0	0	3
CVL848	Discrete Choice Methods for Travel Demand Analysis	2	0	2	3
CVL849	Traffic Flow Modelling	3	0	0	3
CVL850	Transportation Logistics	3	0	0	3
CVL851	Special Topics in Transportation Engineering	3	0	0	3
CVS754	Independent Study	0	3	0	3

Sem.	Courses (Number, Abbreviated Title, L-T-P, credits)					Lecture courses	Contact h/week				Credits
							L	T	P	Total	
I	CVL741 Urban & Regional Transport Planning (3-0-2) 4	CVL740 Pavement Materials and Design of Pavements (3-0-2) 4	CVL742 Traffic Engineering (3-0-2) 4	RE-1* (3-0-0 or 2-0-2) 3			Min. 11 Max. 12	0	Min. 6 Max. 8	18	15
II	PE-1 (2-0-2) 3	PE-2 (2-0-2) 3	PE-3 (2-0-2) 3	RE-2# (3-0-0 or 2-0-2) 3			Min. 8 Max. 9		Min. 6 Max. 8	12	12
Summer	CVS852 Advanced Topics in Transportation Engineering (0-0-6) 3										3
III	PE-4 (2-0-2) 3	CVD853 Major Project Part-I (0-0-18) 9					0	0	6	6	12
IV	CVD854 Major Project Part-II (0-0-24) 12						3	0	18	24	12

* Should be listed in restricted elective course category.

Any course (relevant to research area) offered in that semester with consent of thesis supervisor. Alternatively minor project can be opted.

Total = 54

Master of Technology in Structural Engineering

Department of Civil Engineering

The overall credits structure

Category	PC	PE	OC	Total
Credits	42	12	0	54

Program Core

CVD757	Major Project Part-I (CES)	0	0	18	9
CVD758	Major Project Part-II (CES)	0	0	18	9
CVL756	Advanced Structural Analysis	3	0	0	3
CVL757	Finite Element Methods in Structural Engineering	2	0	2	3
CVL758	Solid Mechanics in Structural Engineering	3	0	0	3
CVL759	Structural Dynamics	3	0	0	3
CVL760	Theory of Concrete Structures	3	0	0	3
CVL761	Theory of Steel Structures	3	0	0	3
CVL762	Earthquake Analysis and Design	3	0	0	3
CVP756	Structural Engineering Laboratory	0	0	6	3
	Total Credits				***42***

Program Electives

CVD756	Minor Project in Structural Engineering	0	0	6	3
CVL763	Analytical and Numerical Methods for Structural Engineering	3	0	0	3
CVL764	Blast Resistant Design of Structures	2	0	2	3
CVL765	Concrete Mechanics	3	0	0	3
CVL766	Design of Bridge Structures	3	0	0	3
CVL767	Design of Fiber Reinforced Composite Structures	3	0	0	3
CVL768	Design of Masonry Structures	3	0	0	3
CVL769	Design of Tall Buildings	3	0	0	3
CVL770	Prestressed and Composite Structures	2	0	2	3
CVL856	Strengthening and Retrofitting of Structures	3	0	0	3
CVL857	Structural Safety and Reliability	3	0	0	3
CVL858	Theory of Plates and Shells	3	0	0	3
CVL859	Theory of Structural Stability	3	0	0	3
CVL860	Advanced Finite Element Method and Programming	2	0	2	3
CVL861	Analysis and Design of Machine Foundations	2	0	2	3
CVL862	Design of Offshore Structures	3	0	0	3
CVL863	General Continuum Mechanics	3	0	0	3
CVL864	Structural Health Monitoring	2	0	2	3
CVL865	Structural Vibration Control	3	0	0	3
CVL866	Wind Resistant Design of Structures	3	0	0	3
CVS756	Independent Study (CES)	0	3	0	3
CVL771	Advanced Concrete Technology	3	0	0	3
CVL873	Fire Engineering and Design	3	0	0	3
CVL779	Formwork for Concrete Structures	3	0	0	3
CVL871	Durability and Repair of Concrete Structures	3	0	0	3
CVL868	Waves through Periodic Structures and metamaterials	3	0	0	3
CVL867	Atomistic & Multiscale Modelling of Materials	3	0	0	3
CVL869	Probabilistic Structural Dynamics	3	0	0	3

Sem.	Courses (Number, Abbreviated Title, L-T-P, credits)						Lecture courses	Contact h/week				Credits
								L	T	P	Total	
I	CVL756 Advanced Structural Analysis (3-0-0) 3	CVL759 Structural Dynamics (3-0-0) 3	CVL757 Finite Element Methods in Structural Engineering (2-0-2) 3	CVL758 Solid Mechanics in Structural Engineering (3-0-0) 3	PE-1 (3-0-0) 3 or (2-0-2) 3		5	(13, 14)	0	(2,4)	(16, 17)	15
II	CVP756 Structural Engineering Laboratory (0-0-6) 3	CVL762 Earthquake Analysis and Design (3-0-0) 3	CVL760 Theory of Concrete Structures (3-0-0) 3	CVL761 Theory of Steel Structures (3-0-0) 3	PE-2 (3-0-0) 3 or (2-0-2) 3		4	(11, 12)	0	(6,8)	(18, 19)	15
Summer												
III	CVD757 Major Project Part-I (CES) (0-0-18) 9	PE-3 (3-0-0) 3 or (2-0-2) 3	PE-4 (3-0-0) 3 or (2-0-2) 3				2	(4,6)	0	(18, 22)	(24, 26)	15
IV	CVD758 Major Project Part-I (CES) (0-0-18) 9						0	0	0	18	18	9

Total = 54

Programme Code: **CET**

Master of Technology in Construction Engineering and Management

Department of Civil Engineering

The overall credits structure

Category	PC	PE	OC	Total
Credits	**42**	**12**	**0**	**54**

Program Core

CVD777	Major Project Part-I (CET)	0	0	18	9
CVD778	Major Project Part-II (CET)	0	0	24	12
CVL771	Advanced Concrete Technology	3	0	0	3
CVL772	Construction Project Management	3	0	0	3
CVL773	Quantitative Methods in Construction Management	3	0	0	3
CVL774	Construction Contract Management	3	0	0	3
CVL775	Construction Economics and Finance	3	0	0	3
CVL776	Construction Practices and Equipment	3	0	0	3
CVP771	Construction Technology Laboratory	0	0	3	1.5
CVP772	Computational Laboratory for Construction Management	0	0	3	1.5
	Total Credits				***42***

Program Electives

CVD776	Minor Project (CET)	0	0	6	3
CVL765	Concrete Mechanics	3	0	0	3
CVL777	Building Science	3	0	0	3
CVL778	Building Services and Maintenance Management	3	0	0	3
CVL779	Formwork for Concrete Structures	3	0	0	3
CVL871	Durability and Repair of Concrete Structures	3	0	0	3
CVL872	Infrastructure Development and Management	3	0	0	3
CVL873	Fire Engineering and Design	3	0	0	3
CVL874	Quality and Safety in Construction	3	0	0	3
CVL875	Sustainable Materials and Green Buildings	3	0	0	3
CVL876	Digital Design and Construction	2	0	2	3
CVS776	Independent Study (CET)	0	3	0	3

Sem.	Courses (Number, Abbreviated Title, L-T-P, Credits)						Lecture courses	Contact h/week				Credits
								L	T	P	Total	
I	CVL772 Construction Project Management (3-0-0) 3	CVL773 Quantitative Methods in Construction Management (3-0-0) 3	CVL771 Advanced Concrete Technology (3-0-0) 3	CVP772 Computational Laboratory for Construction Management (0-0-3) 1.5	PE-1 (3-0-0) 3		4	12	0	3	15	13.5
II	CVL775 Construction Economics and Finance (3-0-0) 3	CVL776 Construction Practices and Equipment (3-0-0) 3	CVL774 Construction Contract Management (3-0-0) 3	CVP771 Construction Technology Laboratory (0-0-3) 1.5	PE-2 (3-0-0) 3		4	12	0	3	15	13.5
Summer												
III	CVD777 Major Project Part-I (CET) (0-0-18) 9	PE-3 (3-0-0) 3	PE-4 (3-0-0) 3				2	6	0	18	24	15
IV	CVD778 Major Project Part-II (CET) (0-0-24) 12						0	0	0	24	24	12

Total = 54

Programme Code: **CEU**

Master of Technology in Rock Engineering and Underground Structures

Department of Civil Engineering

The overall credits structure

Category	PC	PE	OC	Total
Credits	36	12	0	48

Program Core

CVD810	Major Project Part-I	0	0	12	6
CVD811	Major Project Part-II	0	0	24	12
CVL710	Engineering Properties of Rocks and Rock Masses	3	0	0	3
CVL711	Structural Geology	3	0	0	3
CVL712	Slopes and Foundations	3	0	0	3
CVL713	Analysis and Design of Underground Structures	3	0	0	3
CVP710	Rock Mechanics Laboratory-I	0	0	6	3
CVP810	Rock Mechanics Laboratory-II	0	0	6	3
	Total Credits				***36***

Program Electives

CVD710*	Minor Project	0	0	6	3
CVL704	Finite Element Method in Geotechnical Engg.	3	0	0	3
CVL714	Field Exploration and Geotechnical Processes	3	0	0	3
CVL715	Excavation Methods and Underground Space Technology	3	0	0	3
CVL716	Environmental Rock Engineering	3	0	0	3
CVL810	Emerging Topics in Rock Engineering and Underground Structures	3	0	0	3
CVL811	Numerical and Computer Methods in Geomechanics	3	0	0	3
CVS810	Independent Study	0	0	6	3

* This course is only for Part-Time students in lieu of CVP800 and DAAD students.

Sem.	Courses (Number, Abbreviated Title, L-T-P, Credits)						Lecture courses	Contact h/week				Credits
								L	T	P	Total	
I	CVL710 Engineering Properties of Rocks and Rock Masses (3-0-0) 3	CVL711 Structural Geology (3-0-0) 3	CVP710 Rock Mechanics Laboratory-I (0-0-6) 3	PE-1 (3-0-0) 3			3	9	0	6	15	12
II	CVL712 Slopes and Foundations (3-0-0) 3	CVL713 Analysis and Design of Underground Structures (3-0-0) 3	CVP810 Rock Mechanics Laboratory-II / CVD710 Minor Project (0-0-6) 3	PE-2 (3-0-0) 3	PE-3 (3-0-0) 3		4	12	0	6	18	15
Summer												
III	CVD810 Major Project Part-I (0-0-12) 6	PE-4 (3-0-0) 3					1	3	0	12	15	9
IV	CVD811 Major Project Part-II (0-0-24) 12						0	0	0	24	24	12

Total = 48

Programme Code: **CEV**

Master of Technology in Environmental Engineering and Management

Department of Civil Engineering

The overall credits structure

Category	PC	PE	OC	Total
Credits	**39**	**9**	**6**	**54**

Program Core

CVD720	Major Thesis Part-I	0	0	12	6
CVD721	Major Thesis Part-II	0	0	24	12
CVD726	Minor Project	0	0	6	3
CVL720	Air Pollution and Control	3	0	0	3
CVL721	Solid Waste Engineering	3	0	0	3
CVL722	Water Engineering	3	0	0	3
CVL723	Wastewater Engineering	3	0	0	3
CVL724	Environmental Systems Analysis	3	0	0	3
CVL725	Environmental Chemistry and Microbiology	1	0	4	3
	Total Credits				***39***

Program Electives

CVL727	Environmental risk assessment	3	0	0	3
CVL728	Environmental Quality Modeling	3	0	0	3
CVL729	Environmental Statistics and Experimental Design	2	0	2	3
CVL820	Environmental Impact Assessment	3	0	0	3
CVL821	Industrial Waste Management and Audit	3	0	0	3
CVL822	Emerging Technologies for Environmental Management	3	0	0	3
CVL823	Thermal Techniques for Waste Management	3	0	0	3
CVL824	Life Cycle Analysis and Design for Environment	3	0	0	3
CVL825	Fundamental of Aerosol: Health and Climate Change	3	0	0	3
CVL826	Quantitative Microbial Risk Assessment	1	0	0	1
CVL827	Environmental Implications of Engineered Nanomaterials	2	0	0	2
CVL828	Water Distribution and Sewerage Network Design	3	0	0	3
CVL829	Indoor Environmental Quality: Theory and Practice	2	0	2	3
CVP820	Advanced Air Pollution Laboratory	1	0	4	3
CVP821	Advanced Water and Wastewater Laboratory	1	0	4	3
CVS720	Independent Study	0	3	0	3

Sem.	Courses (Number, Abbreviated Title, L-T-P, Credits)					Lecture courses	Contact h/week				Credits
							L	T	P	Total	
I	CVL725 Environmental Chemistry and Microbiology (1-0-4) 3	CVL722 Water Engineering (3-0-0) 3	CVL720 Air pollution and control (3-0-0) 3	PE-1 (3-0-0) 3 or (2-0-2) 3 or (1-0-4)		4	(8, 10)	0	(4,8)	(14, 16)	12
II	CVL721 Solid Waste Engineering (3-0-0) 3	CVL724 Environmental Systems Analysis (3-0-0) 3	CVL723 Wastewater Engineering (3-0-0) 3	PE-2 (3-0-0) 3 or (2-0-2) 3 or (1-0-4)	OE-1 (3-0-0) 3	5	(13, 15)	0	(0,4)	(15, 17)	15
Summer	CVD726 Minor project (0-0-6) 3										3
III	CVD720 Major Thesis Part-I (0-0-12) 6			PE-3 (3-0-0) 3 or (2-0-2) 3 or (1-0-4)	OE-2 (3-0-0) 3	2	(4,6)	0	(12, 16)	(18, 20)	12
IV	CVD721 Major Thesis Part-II (0-0-24) 12					0	0	0	24	24	12

Total = 54

Programme Code: **CEW**

Master of Technology in Water Resources Engineering

Department of Civil Engineering

The overall credits structure

Category	PC	PE	OC	Total
Credits	39	15	0	54

Program Core

CVD831	Major Project Part-I	0	0	12	6
CVD832	Major Project Part-II	0	0	24	12
CVL730	Hydrologic Processes and Modeling	3	0	0	3
CVL731	Optimization Techniques in Water Resources	3	0	0	3
CVL732	Groundwater Hydrology	3	0	0	3
CVL733	Stochastic Hydrology	2	0	2	3
CVL734	Advanced Hydraulics	3	0	0	3
CVL735	Finite Element in Water Resources	3	0	0	3
CVP730	Simulation Laboratory-I	0	0	3	1.5
CVP731	Simulation Laboratory-II	0	0	3	1.5
	Total Credits				***39***

Program Electives

CVL736	Soft Computing Techniques in Water Resources	2	0	2	3
CVL737	Environmental Dynamics and Management	3	0	0	3
CVL738	Economic Aspects of Water Resources Development	3	0	0	3
CVL830	Groundwater Flow and Pollution Modeling	3	0	0	3
CVL831	Surface Water Quality Modeling and Control	3	0	0	3
CVL832	Hydroelectric Engineering	3	0	0	3
CVL833	Water Resources Systems	3	0	0	3
CVL834	Urban Water Infrastructure	3	0	0	3
CVL835	Eco-hydraulics and Hydrology	3	0	0	3
CVL836	Advanced Hydrologic Land Surface Processes	3	0	0	3
CVL837	Mechanics of Sediment Transport	2	0	2	3
CVL838	Geographic Information Systems	2	0	2	3
CVL839	Hydrologic Applications of Remote Sensing	2	0	2	3
CVS730	Minor Project	0	0	6	3
CVS830	Independent Study	0	3	0	3

Sem.	Courses (Number, Abbreviated Title, L-T-P, Credits)						Lecture courses	Contact h/week				Credits
								L	T	P	Total	
I	CVL730 Hyd. Process (3-0-0) 3	CVL731 Opt. Tech. (3-0-0) 3	CVL732 GW Hyd. (3-0-0) 3	CVL735 Stochastic Hyd. (2-0-2) 3	PE-1 (3-0-0) 3 or (2-0-2) 3		5	14/13	0	2/4	16/17	15
II	CVL733 Adv. Hydraulics (3-0-0) 3	CVL734 Finite Element (3-0-0) 3	CVP730 Sim. Lab-I (0-0-3) 1.5	CVP731 Sim. Lab-II (0-0-3) 1.5	PE-2 (3-0-0) 3 or (2-0-2) 3	PE-3 (3-0-0) 3 or (2-0-2) 3	4	12-10	0	6-10	18-20	15
Summer	Major Project Part I (CEW)											0
III	CVD831 Major Project Part-I (0-0-12) 6			PE-4 (3-0-0) 3 or (2-0-2) 3	PE-5 (3-0-0) 3 or (2-0-2) 3		2	6-4	0	12-16	18-20	12
IV	CVD832 Major Project Part-II (0-0-24) 12						0	0	0	24	24	12

Total = 54

Master of Technology in Computer Science and Engineering

Department of Computer Science and Engineering

The overall credits structure

Category	PC	PE	OC	Total
Credits	21	27-33	Maximum of 4 Cr. in lieu of a PE (track B)	48-54

Program Core

COD891	Minor Project	0	0	6	3
COD892	M.Tech. Project Part-I	0	0	14	7
COL702	Advanced Data Structures	3	0	2	4
COL765	Logic & Functional Programming	3	0	2	4
COP701	Software Systems Laboratory	0	0	6	3
	Total Credits				***21***

Bridge Courses - *Min. 6 credits, this may be waived in exceptional cases on the recommendation by DRC. Please note that bridge course credits do not count towards the 48-54 credit requirement at in the credit structure table above Bridge Course credits should be considered an additional requirement over and above the 48-54 credit requirement.*

COL632	Introduction to Data Base Systems	3	0	2	4
COL633	Resources Management in Computer Systems	3	0	2	4
COL671	Artificial Intelligence	3	0	2	4
COL672	Computer Networks	3	0	2	4

Program Electives (PE)

COD893	Major Project Part-II	0	0	28	14
COP820	Processor Design Lab	0	0	8	4
COS799	Independent Study	0	3	0	3

Specialization Streams - *At least 6 credits from PE; Project work relevant to specialization*

1. Architecture & Embedded Systems (AES)

COL718	Architecture of High Performance Computers	3	0	2	4
COL719	Synthesis of Digital Systems	3	0	2	4
COL720	Real Time Systems	3	0	2	4
COL788	Embedded Computing	3	0	0	3
COL812	System Level Design and Modelling	3	0	0	3
COL818	Principles of Multiprocessor Systems	3	0	2	4
COL821	Reconfigurable Computing	3	0	0	3
COL861	Special Topics in Hardware Systems	3	0	0	3
COP745	Digital System Design Laboratory	0	0	6	3
COP820	Processor Design Lab	0	0	8	4
COV881	Special Module in Hardware Systems	1	0	0	1

2. Graphics & Vision (GV)

COL726	Numerical Algorithms	3	0	2	4
COL780	Computer Vision	3	0	2	4
COL781	Computer Graphics	3	0	3	4.5
COL783	Digital Image Analysis	3	0	3	4.5
COL785	Virtual and Augmented Reality	3	0	2	4
COL828	Advanced Computer Vision	3	0	2	4
COL829	Advanced Computer Graphics	3	0	2	4
COV877	Special Module on Visual Computing	1	0	0	1
SIL801	Special Topics in Multimedia Systems	3	0	0	3

3. Software Systems (SS)

COL720	Real Time Systems	3	0	2	4
COL724	Advanced Computer Networks	3	0	2	4
COL728	Compiler Design	3	0	3	4.5
COL729	Compiler Optimization	3	0	3	4.5
COL730	Parallel Programming	3	0	2	4
COL731	Advanced Compiler Techniques for Optimization, Safety and Security	3	0	2	4
COL732	Virtualization and Cloud Computing	3	0	2	4
COL733	Cloud Computing Technology Fundamentals	3	0	2	4
COL740	Software Engineering	3	0	2	4
COL750	Foundations of Automatic Verification	3	0	2	4
COL768	Wireless Networks	3	0	2	4
COL818	Principles of Multiprocessor Systems	3	0	2	4
COL819	Advanced Distributed Systems	3	0	2	4
COL851	Special Topics in Operating Systems	3	0	0	3
COL852	Special Topics in Compilers	3	0	0	3
COL860	Special Topics in Parallel Computation	3	0	0	3
COL862	Special Topics in Software Systems	3	0	0	3
COL867	Special Topics in High Speed Networks	3	0	0	3
COL869	Special Topics in Concurrency	3	0	0	3
COL871	Special Topics in Programming Languages	3	0	0	3
COL874	Special Topics in Compilers and Language Implementation	3	0	0	3
COL876	Special Topics in Formal Methods	3	0	0	3
COL886	Special Topics in Operating Systems	3	0	0	3
COV880	Special Module in Parallel Computation	1	0	0	1
COV882	Special Module in Software Systems	1	0	0	1
COV887	Special Module in High Speed Networks	1	0	0	1
COV889	Special Module in Concurrency	1	0	0	1
SIL765	Networks & System Security	3	0	2	4
SIL769	Internet Traffic - Measurement, Modeling & Analysis	3	0	2	4

4. Theoretical Computer Science (TH)

COL703	Logic for CS (LCS)	3	0	2	4
COL726	Numerical Algorithms	3	0	2	4
COL727	Rapid Mixing in Markov Chains	3	0	0	3
COL749	Computational Social Choice	3	0	0	3
COL750	Foundations of Automatic Verification	3	0	2	4
COL751	Algorithmic Graph Theory	3	0	0	3
COL752	Geometric Algorithms	3	0	2	4
COL753	Complexity Theory	3	0	0	3
COL754	Approximation Algorithms	3	0	0	3
COL755	Algorithmic Game Theory	3	0	0	3
COL756	Mathematical Programming	3	0	0	3
COL757	Model Centric Algorithm Design	3	0	2	4
COL758	Advanced Algorithms	3	0	2	4
COL759	Cryptography & Computer Security	3	0	0	3
COL787	Online Algorithms and Competitive Analysis	3	0	0	3
COL830	Distributed Computing	3	0	0	3
COL831	Semantics of Programming Languages	3	0	0	3
COL832	Proofs and Types	3	0	0	3
COL860	Special Topics in Parallel Computation	3	0	0	3
COL863	Special Topics in Theoretical Computer Science	3	0	0	3
COL866	Special Topics in Algorithms	3	0	0	3
COL869	Special Topics in Concurrency	3	0	0	3
COL871	Special Topics in Programming Languages	3	0	0	3
COL872	Special Topics in Cryptography	3	0	0	3
COL874	Special Topics in Compilers and Language Implementation	3	0	0	3
COL876	Special Topics in Formal Methods	3	0	0	3
COV879	Special Module in Financial Algorithms	2	0	0	2
COV883	Special Module in Theoretical Computer Science	1	0	0	1
COV886	Special Module in Algorithms	1	0	0	1
COV889	Special Module in Concurrency	1	0	0	1

5. Data Analytics & AI (DAAI)

COL726	Numerical Algorithms	3	0	2	4
COL760	Advanced Data Management	3	0	2	4
COL761	Data Mining	3	0	2	4
COL762	Database Implementation	3	0	2	4
COL764	Information Retrieval and Web Search	3	0	2	4
COL770	Advanced Artificial Intelligence	3	0	2	4
COL772	Natural Language Processing	3	0	2	4
COL774	Machine Learning	3	0	2	4
COL775	Deep Learning	3	0	2	4
COL776	Learning Probabilistic Graphical Models	3	0	2	4
COL777	Deep Reinforcement Learning	3	0	2	4
COL778	Principles of Autonomous Systems	3	0	2	4
COL786	Advanced Functional Brain Imaging	3	0	2	4
COL864	Special Topics in Artificial Intelligence	3	0	0	3
COL868	Special Topics in Database Systems	3	0	0	3

COL870	Special Topics in Machine Learning	3	0	0	3
COL873	Special Topics in Natural Language Processing	3	0	0	3
COV878	Special Module in Machine Learning	1	0	0	1
COV884	Special Module in Artificial Intelligence	1	0	0	1
COV888	Special Module in Database Systems	1	0	0	1

6. Applications & IT (ITA)

COL707	Introduction to Ethical Issues in Computer Science	3	0	2	4
COL722	Introduction to Compressed Sensing	3	0	0	3
COL757	Model Centric Algorithm Design	3	0	2	4
COL760	Advanced Data Management	3	0	2	4
COL761	Data Mining	3	0	2	4
COL762	Database Implementation	3	0	2	4
COL764	Information Retrieval and Web Search	3	0	2	4
COL770	Advanced Artificial Intelligence	3	0	2	4
COL786	Advanced Functional Brain Imaging	3	0	2	4
COL865	Special Topics in Computer Applications	3	0	0	3
COV885	Special Module in Computer Applications	1	0	0	1
COV888	Special Module in Database Systems	1	0	0	1
SIL761	Introduction to Information and Communication Technologies for Development	3	0	2	4
SIL763	Introduction to Blockchains	3	0	2	4
SIL769	Internet Traffic - Measurement, Modeling & Analysis	3	0	2	4
SIL801	Special Topics in Multimedia	3	0	0	3
SIL802	Special Topics in Web Based Computing	3	0	0	3
SIL861	Special Topics in Information & Communication Technologies for Development	3	0	0	3
SIV813	Applications of Computer in Medicines	1	0	0	1
SIV861	Information and Communication Technologies for Development	1	0	0	1
SIV864	Special Module on Media Processing Communication	1	0	0	1
SIV871	Special Module in Computational Neuroscience	1	0	0	1
SIV895	Special Module on Intelligent Information Processing	1	0	0	1

Sem.	Courses (Number, Abbreviated Title, L-T-P, credits)					Lecture courses	Contact h/week				Credits
							L	T	P	Total	
I	COL702 Advanced Data Structures (3-0-2) 4	Bridge Course-1 (3-4)	COL765 Logic and Functional Programming (3-0-2) 4	COP701 Software Lab (0-0-6) 3		2-3	6-9	0	10-12	16-21	11-15
II	PE-1 (3-4)	Bridge Course-2 (3-4)	COD891 Minor Project (0-0-6) 3	PE-2 (3-4)		2-3	6-9	0	10-12	16-21	9-15
Track A (Requires a CGPA of atleast 7.25 after completing at least 20 credits of course work, eligible for specializations)											
III	PE-3 (3-4)	PE-4 (3-4)	COD892 M.Tech. Project Part-I (0-0-14) 7			2	6	0	14-18	20-24	13-15
IV	COD893 M.Tech. Project Part-II (MTP-II) (0-0-28) 14 Continued in the summer					0	0	0	28	28	14
Track B (Student needs an approval from a commitee to enter this track if CGPA>= 7.25, not eligible for specializations)											
III	PE-3 (3-4)	PE-4 (3-4)	PE-5/OC (3-4)			3	9	0	0-6	9-15	9-12
IV	PE-6 (3-4)	PE-7 (3-4)	COD892 M.Tech. Project Part-I (0-0-14) 7			2	6	0	14-18	20-24	13-15

Total = 48-54

Master of Technology in Control and Automation

Department of Electrical Engineering

The overall credits structure

Category	PC	PE	OE	Total
Credits	24	18	6	48

Program Core

ELD801	Major Project Part-I	0	0	12	6
ELL700	Linear Systems Theory	3	0	0	3
ELL701	Mathematical Methods in Control	3	0	0	3
ELL702	Nonlinear Systems	3	0	0	3
ELL703	Optimal Control Theory	3	0	0	3
ELL705	Stochastic Filtering and Identification	3	0	0	3
ELP800	Control Systems Laboratory	0	0	2	1
ELP801	Advanced Control Laboratory	0	0	4	2
	Total Credits				***24***

Program Electives

ELD800	Minor Project (EEA)	0	0	6	3
ELD802	Major Project Part-II	0	0	24	12
ELL704	Advanced Robotics	3	0	0	3
MTL704	Numerical Optimization	3	0	0	3
ELL707	Systems Biology	3	0	0	3
ELL708	Selected Topics in Systems and Control	3	0	0	3
ELL709	Design Aspects in Control	3	0	0	3
DSL711	Sensors & Tranducers	3	0	0	3
ELL714	Basic Information Theory	3	0	0	3
ELL720	Advanced Digital Signal Processing	3	0	0	3
MTL731	Introduction to Chaotic Dynamical System	3	0	0	3
ELL762	Intelligent Motor Controllers	3	0	0	3
ELL765	Smart Grid Technology	3	0	0	3
ELL767	Mechatronics	3	0	0	3
ELL775	Power System Dynamics	3	0	0	3
ELL778	Dynamic Modelling And Control of Sustainable Energy Systems	3	0	0	3
MCL783	Automation Manufacturing	3	0	2	4
ELL784	Introduction to Machine Learning	3	0	0	3
ELL787	Embedded Systems and Applications	3	0	0	3
ELL789	Intelligent Systems	3	0	0	3
ELL791	Neural Systems and Learning Machines	3	0	2	4
ELL793	Computer Vision	3	0	0	3
ELL795	Swarm Intelligence	3	0	0	3
ELL796	Signals and Systems in Biology	3	0	0	3
ELL800	Numerical Linear Algebra and Optimization in Engineering	3	0	0	3
ELL801	Nonlinear Control	3	0	0	3
ELL802	Adaptive and Learning Control	3	0	0	3
ELL803	Model Reduction in Control	3	0	0	3
ELL804	Robust Control	3	0	0	3
ELL805	Networked and Multi-Agent Control Systems	3	0	0	3
ELL806	Modeling and Control of Distributed Parameter Systems	3	0	0	3
ELL807	Stochastic Control	3	0	0	3
ELL808	Advanced Topics in Systems and Control	3	0	0	3
MCL845	Advanced Robotics	2	0	2	3
ELL850	Digital Control of Power Electronics and Drive Systems	3	0	0	3
ELL883	Embedded Intelligence	3	0	0	3
ELL888	Advanced Machine Learning	3	0	0	3
ELL890	Computational Neuroscience	3	0	0	3
ELL891	Advances in Deep Learning	3	0	0	3
ELL893	Cyber-Physical Systems	3	0	0	3
ELV700	Special Module in Systems and Control	1	0	0	1

Sem.	Courses (Number, Abbreviated Title, L-T-P, Credits)					Lecture courses	Contact h/week				Credits
							L	T	P	Total	
I	ELL700 Linear Systems Theory (3-0-0)	ELL701 Mathematical Methods in Control (3-0-0)	ELL702 Nonlinear Systems (3-0-0)	ELP800 Control Systems Lab (0-0-2)	OE (3-0-0)	4	12	0	2	14	13
II	ELL703 Optimal Control Theory (3-0-0)	ELL705 Stochastic Filtering and Identification (3-0-0)	ELP801 Advanced Control Lab (0-0-4)	PE (3-0-0)		3	9	0	4	13	11
Summer											
III (Project based) OR	ELD801 Major Project Part-I (0-0-12)		PE (3-0-0)	OE (3-0-0)		2	6	0	12	18	12
III (Course based)	PE (3-0-0)	PE (3-0-0)	PE (3-0-0)	OE (3-0-0)		4	12	0	0	12	12
IV (Project based) OR	ELD802 Major Project Part-II (0-0-24)					0	0	0	24	24	12
IV (Course based)	ELD801 Major Project Part-I (0-0-12)		PE (3-0-0)	PE (3-0-0)		2	6	0	12	18	12

Total = 48

Master of Technology in Communication Engineering

Department of Electrical Engineering

The overall credits structure

Category	PC	PE	OE	Total
Credits	24	18	6	48

Program Core

ELD811	Major Project Part-I (Communication Engineering)	0	0	12	6
ELL711	Signal Theory	3	0	0	3
ELL712	Digital Communications	3	0	0	3
ELL713	Microwave Theory and Techniques	3	0	0	3
ELL719	Detection and Estimation Theory	3	0	0	3
ELP719	Microwave Laboratory	0	1	4	3
ELP725	Wireless Communication Laboratory	0	1	4	3
	Total Credits				***24***

Program Electives

BSP710	Communication & Signal Processing Tech. Lab.	0	1	4	3

Streamed Electives (EEE) in (Communication Systems)

BSP710	Communication & Signal Processing Tech. Lab.	0	1	4	3
ELD810	Minor Project (Communication Engineering)	0	0	6	3
ELD812	Major Project Part-II	0	0	24	12
ELL701	Mathematical Methods in Control	3	0	0	3
ELL710	Coding Theory	3	0	0	3
ELL714	Basic Information Theory	3	0	0	3
ELL716	Telecommunication Switching and Transmission	3	0	0	3
ELL717	Optical Communication Systems	3	0	0	3
ELL720	Advanced Digital Signal Processing	3	0	0	3
ELL722	Antenna Theory and Techniques	3	0	0	3
ELL723	Broadband Communication Systems	3	0	0	3
ELL724	Multichannel Signal Processing	3	0	0	3
ELL725	Wireless Communications	3	0	0	3
ELL730	I.C. Technology	3	0	0	3
ELL732	Micro and Nanoelectronics	3	0	0	3
ELL734	MOS VLSI design	3	0	0	3
ELL735	Analog Integrated Circuits	3	0	0	3
ELL785	Computer Communication Networks	3	0	0	3
ELL810	Cyber Security and Information Assurance	3	0	0	3
ELL812	Microwave Propagation and Systems	3	0	0	3
ELL813	Advanced Information Theory	3	0	0	3
ELL814	Wireless Optical Communications	3	0	0	3
ELL815	MIMO Wireless Communications	3	0	0	3
ELL816	Satellite Communication	3	0	0	3
ELL818	Telecommunication Technologies	3	0	0	3
ELL821	Selected Topics in Communication Systems and Networking-I	3	0	0	3
ELL822	Selected Topics in Communication Systems and Networking-II	3	0	0	3
ELL833	CMOS RF IC Design	3	0	0	3
ELL894	Network Performance Modeling and Analysis	3	0	0	3
ELP718	Telecommunication Software Laboratory	0	1	4	3
ELP721	Embedded Telecommunication Systems Laboratory	0	1	4	3
ELV710	Special Module in Cyber Security	1	0	0	1
ELV720	Special Module in Communication Systems and Networking-I	1	0	0	1
ELV821	Special Module in Communication Systems and Networking-II	1	0	0	1
CRL708	Sonar Systems Engineering	3	0	0	3
CRL709	Underwater Electronic Systems	3	0	0	3
CRL712	RF and Microwave Active Circuits	3	0	0	3
CRL715	Radiating Systems for RF Communication	3	0	0	3

Streamed Electives (EEE) in (Information Processing)

ELD810	Minor Project (Communication Engineering)	0	0	6	3
ELD812	Major Project Part-II	0	0	24	12
ELL701	Mathematical Methods in Control	3	0	0	3
ELL714	Basic Information Theory	3	0	0	3
ELL715	Digital Image Processing	3	0	2	4
ELL718	Statistical Signal Processing	3	0	0	3
ELL720	Advanced Digital Signal Processing	3	0	0	3
ELL724	Multichannel Signal Processing	3	0	0	3
ELL784	Introduction to Machine Learning	3	0	0	3
ELL786	Multimedia Systems	3	0	0	3
ELL792	Computer Graphics	3	0	0	3
ELL793	Computer Vision	3	0	0	3
ELL794	Human-Computer Interface	3	0	0	3
ELL823	Selected Topics in Information Processing-I	3	0	0	3
ELL824	Selected Topics in Information Processing-II	3	0	0	3
ELV781	Special Modules in Information Processing-I	1	0	0	1
ELV823	Special Modules in Information Processing-II	1	0	0	1
CRL704	Sensor Array Signal Processing	3	0	0	3
CRL707	Human & Machine Speech Communication	3	0	0	3

Sem.	Courses (Number, Abbreviated Title, L-T-P, credits)					Lecture courses	Contact h/week				Credits
							L	T	P	Total	
I	ELL 711 Signal theory (3-0-0)	ELL712 Digital Comm. (3-0-0)	ELL 713 Microwave Theory and Techniques (3-0-0)	ELP 719 Microwave Lab. (0-1-4)		3	9	1	4	14	12
II	ELL719 Detection and Estimation Theory (3-0-0)	ELP725 Wireless Comm. Lab. (0-1-4)	PE-1 (3-0-0)	PE-2 (3-0-0)		3	9	1	4	14	12
Summer											
III	ELD811 Major Project Part-I (0-0-12) 6		OE-1 (3-0-0)	OE-2 (3-0-0)		2	6	0	12	18	12
IV (Project based) OR	ELD812 Major Project Part-II (0-0-24) 12					0	0	0	24	24	12
IV (Course based)	PE-3 (3-0-0)	PE-4 (3-0-0)	PE-5 (3-0-0)	PE-6 (3-0-0)		4	12	0	0	12	12

Total = 48

Master of Technology in Integrated Electronics and Circuits

Department of Electrical Engineering

The overall credits structure

Category	PC	PE	OC	Total
Credits	24	18	6	48

Program Core

ELD831	Major Project Part-I (Integrated Electronic Circuits)	0	0	12	6
ELL730	I.C. Technology	3	0	0	3
ELL732	Micro and Nanoelectronics	3	0	0	3
ELL734	MOS VLSI design	3	0	0	3
ELL735	Analog Integrated Circuits	3	0	0	3
ELP831	IEC Laboratory-I	0	0	6	3
ELP832	IEC Laboratory-II	0	0	6	3
	Total Credits				***24***

Program Electives

BSP710	Communication & Signal Processing Tech. Lab.	0	1	4	3

Streamed Electives (EEN) in (VLSI Design)

COL719	Synthesis of Digital Systems	3	0	2	4
ELD830	Minor Project	0	0	6	3
ELD832	Major Project Part-II	0	0	24	12
ELL720	Advanced Digital Signal Processing	3	0	0	3
ELL731	Mixed Signal Circuit Design	3	0	0	3
ELL733	Digital ASIC Design	3	0	2	4
ELL736	Solid State Imaging Sensors	3	0	0	3
ELL737	Flexible Electronics	3	0	0	3
ELL740	Compact Modeling of Semiconductor Devices	3	0	0	3
ELL741	Neuromorphic Engineering	3	0	0	3
ELL747	Active and Passive Filter Design	3	0	0	3
ELL748	System-on-Chip Design and Test	3	0	0	3
ELL749	Semiconductor Memory Design	3	0	0	3
ELL782	Computer Architecture	3	0	0	3
ELL791	Neural Systems and Learning Machines	3	0	2	4
ELL830	Issues in Deep Submicron VLSI Design	3	0	0	3
ELL831	CAD for VLSI, MEMS, and Nanoassembly	3	0	0	3
ELL832	Selected Topics in IEC-I	3	0	0	3
ELL833	CMOS RF IC Design	3	0	0	3
ELL834	Selected Topics in IEC-II	3	0	0	3
ELP830	Semiconductor Processing Laboratory	0	0	6	3
ELV734	Special Module in Scientific Writing for Research	1	0	0	1
ELV830	Special Module in Low Power IC Design	1	0	0	1
ELV831	Special Module in VLSI Testing	1	0	0	1
ELV832	Special Module in Machine Learning	1	0	0	1

Streamed Electives (EEN) in (Nanoelectronics and Photonics)

ELD830	Minor Project	0	0	6	3
ELD832	Major Project Part-II	0	0	24	12
ELL737	Flexible Electronics	3	0	0	3
ELL738	Micro and Nano Photonics	3	0	0	3
ELL739	Advanced Semiconductor Devices	3	0	0	3
ELL740	Compact Modeling of Semiconductor Devices	3	0	0	3
ELL741	Neuromorphic Engineering	3	0	0	3
ELL742	Introduction to MEMS Design	3	0	0	3
ELL743	Photovoltaics	3	0	0	3
ELL744	Electronic and Photonic Nanomaterials	3	0	0	3
ELL745	Quantum Electronics	3	0	0	3
ELL746	Biomedical Electronics	3	0	0	3
ELL749	Semiconductor Memory Design	3	0	0	3
ELL791	Neural Systems and Learning Machines	3	0	2	4
ELL830	Issues in Deep Submicron VLSI Design	3	0	0	3
ELL832	Selected Topics in IEC-I	3	0	0	3
ELL834	Selected Topics in IEC-II	3	0	0	3
ELP830	Semiconductor Processing Laboratory	0	0	6	3
ELP833	Device and Materials Characterization Lab.	0	0	6	3
ELV734	Special Module in Scientific Writing for Research	1	0	0	1
ELV833	Special Module in Semiconductor Business Management	1	0	0	1
ELV834	Special Module in Nanoelectronics	1	0	0	1

Streamed Electives (EEN) in (Embedded Intelligent Systems)

COL719	Synthesis of Digital Systems	3	0	2	4
COL788	Advanced Topics in Embedded Computing	3	0	0	3
ELD830	Minor Project	0	0	6	3
ELD832	Major Project Part-II	0	0	24	12
ELL720	Advanced Digital Signal Processing	3	0	0	3
ELL731	Mixed Signal Circuit Design	3	0	0	3
ELL733	Digital ASIC Design	3	0	2	4
ELL736	Solid State Imaging Sensors	3	0	0	3
ELL748	System-on-Chip Design and Test	3	0	0	3
ELL782	Computer Architecture	3	0	0	3
ELL784	Introduction to Machine Learning	3	0	0	3
ELL787	Embedded Systems and Applications	3	0	0	3
ELL789	Intelligent Systems	3	0	0	3
ELL791	Neural Systems and Learning Machines	3	0	2	4
ELL830	Issues in Deep Submicron VLSI Design	3	0	0	3
ELL831	CAD for VLSI, MEMS, and Nanoassembly	3	0	0	3
ELL832	Selected Topics in IEC-I	3	0	0	3
ELL834	Selected Topics in IEC-II	3	0	0	3
ELL883	Embedded Intelligence	3	0	0	3
ELV734	Special Module in Scientific Writing for Research	1	0	0	1
ELV831	Special Module in VLSI Testing	1	0	0	1
ELV832	Special Module in Machine Learning	1	0	0	1

Sem.	Courses (Number, Abbreviated Title, L-T-P, Credits)					Lecture courses	Contact h/week				Credits
							L	T	P	Total	
I	ELL732 Micro and Nanoelectronics (3-0-0)	ELL735 Analog Integrated Circuits (3-0-0)	ELL734 MOS VLSI Design (3-0-0)	ELP831 IEC Lab-I (0-0-6)		3	9	0	6	15	12
II	PE (3-0-0)	ELP832 IEC Lab-II (0-0-6)	ELL730 I.C. Technology (3-0-0)	PE / OE (3-0-0)		3	9	0	6	15	12
Summer											
III	ELD831 Major Project Part-I (0-0-12)		PE / OE (3-0-0)	PE / OE (3-0-0)		2	6	0	12	18	12
IV (Project based) OR	ELD832 Major Project Part-II (0-0-24)					0	0	0	24	24	12
IV (Course based)	PE / OE (3-0-0)	PE / OE (3-0-0)	PE / OE (3-0-0)	PE / OE (3-0-0)		4	12	0	0	12	12

Total = 48

Master of Technology in Power Electronics, Electrical Machines and Drives

Department of Electrical Engineering

The overall credits structure

Category	PC	PE	OC	Total
Credits	24	18	6	48

Program Core

ELD851	Major Project Part-I	0	0	12	6
ELL750	Modelling of Electrical Machines	3	0	0	3
ELL751	Power Electronic Converters	3	0	0	3
ELL752	Electric Drive System	3	0	0	3
ELL850	Digital Control of Power Electronics and Drive Systems	3	0	0	3
ELP850	Electrical Machines Laboratory	0	0	3	1.5
ELP851	Power Electronics Laboratory	0	0	3	1.5
ELP852	Electrical Drives Laboratory	0	0	3	1.5
ELP853	DSP Based Control of Power Electronics and Drives Laboratory	0	0	3	1.5
	Total Credits				***24***

Program Electives

ELD850	Minor Project	0	0	6	3
ELD852	Major Project Part-II	0	0	24	12
ELL700	Linear Systems Theory	3	0	0	3
ELL703	Optimal Control Theory	3	0	0	3
ELL704	Advanced Robotics	3	0	0	3
ELL706	Digital Control	3	0	0	3
ELL720	Advanced Digital Signal Processing	3	0	0	3
ELL753	Physical Phenomena in Electrical Machines	3	0	0	3
ELL754	Permanent Magnet Machines	3	0	0	3
ELL755	Variable Reluctance Machines	3	0	0	3
ELL756	Special Electrical Machines	3	0	0	3
ELL757	Energy Efficient Motors	3	0	0	3
ELL758	Power Quality	3	0	0	3
ELL759	Power Electronic Converters for Renewable Energy Systems	3	0	0	3
ELL760	Switched Mode Power Conversion	3	0	0	3
ELL761	Power Electronics for Utility Interface	3	0	0	3
ELL762	Intelligent Motor Controllers	3	0	0	3
ELL763	Advanced Electric Drives	3	0	0	3
ELL764	Electric Vehicles	3	0	0	3
ELL765	Smart Grid Technology	3	0	0	3
ELL766	Appliance Systems	3	0	0	3
ELL767	Mechatronics	3	0	0	3
ELL768	Computer Aided Design of Power Electronic Systems	3	0	0	3
ELL787	Embedded Systems and Applications	3	0	0	3
ELL791	Neural Systems and Learning Machines	3	0	2	4
ELL851	Computer Aided Design of Electrical Machines	3	0	0	3
ELL852	Condition Monitoring of Electrical Machines	3	0	0	3
ELL853	Advanced Topics in Electrical Machines	3	0	0	3
ELL854	Selected Topics in Electrical Machines	3	0	0	3
ELL855	High Power Converters	3	0	0	3
ELL856	Advanced Topics in Power Electronics	3	0	0	3
ELL857	Selected Topics in Power Electronics	3	0	0	3
ELL858	Advanced Topics in Electric Drives	3	0	0	3
ELL859	Selected Topics in Electric Drives	3	0	0	3
ELP854	Electrical Machines CAD Laboratory	0	1	4	3
ELP855	Smart Grids Laboratory	0	1	4	3
ELT850	Industrial Training and Seminar	0	0	6	3

Sem.	Courses (Number, Abbreviated Title, L-T-P, Credits)					Lecture courses	Contact h/week				Credits
							L	T	P	Total	
I	ELL750 Modelling of Electrical Machines (3-0-0)	ELL751 Power Electronic Converters (3-0-0)	ELP850 Electrical Machines Laboratory (0-0-3)	ELP851 Power Electronics Laboratory (0-0-3)	PE/OE (3-0-0)*	3	9	0	6	15	12
II	ELL752 Electric Drive System (3-0-0)	ELL850 Digital Control of Power Electronics and Drive Systems (3-0-0)	ELP852 Electrical Drives Laboratory (0-0-3)	ELP853 DSP Based Control of Power Electronics and Drives Laboratory (0-0-3)	PE/OE (3-0-0)*	3	9	0	6	15	12
Project Based											
III	ELD851 Major Project Part-I (0-0-12)	PE/OE (3-0-0)*	PE/OE (3-0-0)*			2	6	0	12	18	12
IV	ELD852 Major Project Part-II (0-0-24)					0	0	0	24	24	12
(OR) Course Based											
III	PE/OE (3-0-0)	PE/OE (3-0-0)	PE/OE (3-0-0)	PE/OE (3-0-0)		4	12	0	0	12	12
IV	ELD851 Major Project Part-I (0-0-12)	PE/OE (3-0-0)	PE/OE (3-0-0)			2	6	0	12	18	12

Total = 48

Master of Technology in Power Systems

Department of Electrical Engineering

The overall credits structure

Category	PC	PE	OC	Total
Credits	**24**	**18**	**6**	**48**

Program Core

ELD871	Major Project Part-I	0	0	12	6
ELL770	Power System Analysis	3	0	0	3
ELL771	Advanced Power System Protection	3	0	0	3
ELL775	Power System Dynamics	3	0	0	3
ELL776	Advanced Power System Optimization	3	0	0	3
ELP870	Power System Lab-I	0	1	4	3
ELP871	Power System Lab-II	0	1	4	3
	Total Credits				***24***

Program Electives

ELD870	Minor Project-I	0	0	6	3
ELD872	Major Project Part-II	0	0	24	12
ELL700	Linear Systems Theory	3	0	0	3
ELL712	Digital Communications	3	0	0	3
ELL758	Power Quality	3	0	0	3
ELL759	Power Electronic Converters for Renewable Energy Systems	3	0	0	3
ELL772	Planning and Operation of a Smart Grid	3	0	0	3
ELL773	High Voltage DC Transmission	3	0	0	3
ELL774	Flexible AC Transmission System	3	0	0	3
ELL777	Power System operation and control	3	0	0	3
ELL778	Dynamic Modelling And Control of Sustainable Energy Systems	3	0	0	3
ELL779	Forecasting Techniques for Power System	3	0	0	3
ELL870	Restructured Power System	3	0	0	3
ELL871	Distribution System Operation and Planning	3	0	0	3
ELL872	Selected Topics in Power System	3	0	0	3
ELL873	Power System Transient	3	0	0	3
ELL874	Power System Reliability	3	0	0	3

Sem.	Courses (number, Abbreviated Title, L-T-P, Credits)					Lecture courses	Contact h/week				Credits
							L	T	P	Total	
I	ELL 770 Power System Analysis (3-0-0)	ELL771 Advanced Power System Protection (3-0-0)	ELL775 Power System Dynamics (3-0-0)	ELP870 Power System Lab-I (0-1-4)		3	9	1	4	14	12
II	ELL776 Advanced Power System Optimization (3-0-0)	ELP871 Power System Lab-II (0-1-4)	PE/OE (3-0-0)	PE/OE (3-0-0)		3	9	1	4	14	12
Summer											
III	ELD871 Major Project Part-I (0-0-12)		PE/OE (3-0-0)	PE/OE (3-0-0)		2	6	0	12	18	12
IV (Project based) OR	ELD871 Major Project Part-II (0-0-24)					0	0	0	24	24	12
IV (Course based)	PE/OE (3-0-0)	PE/OE (3-0-0)	PE/OE (3-0-0)	PE/OE (3-0-0)		4	12	0	0	12	12

Total = 48

Master of Technology in Computer Technology

Department of Electrical Engineering

The overall credits structure

Category	PC	PE	OC	Total
Credits	21	24/27	3/6	51

Program Core

ELD780	Minor Project	0	0	4	2
ELD880	Major Project Part-I	0	0	12	6
ELL780	Mathematical Foundations of Computer Technology	3	0	0	3
ELL781	Software Fundamentals for Computer Technology	3	0	0	3
ELL782	Computer Architecture	3	0	0	3
ELL783	Operating Systems	3	0	2	4
	Total Credits				***21***

Program Electives

BSP710	Communication & Signal Processing Tech. Lab.	0	1	4	3
ELD881	Major Project Part-II	0	0	24	12
ELL880	Special Topics in Computers-I	3	0	0	3
ELL881	Special Topics in Computers-II	3	0	0	3
ELV752	Special Modules in EET-I	1	0	0	1
ELV780	Special Module in Computers	1	0	0	1

Streamed Electives (EET) in (Cognitive and Intelligent Systems)

Required Electives

ELL784	Introduction to Machine Learning	3	0	0	3
ELL786	Multimedia Systems	3	0	0	3

Other Electives

ELL704	Advanced Robotics	3	0	0	3
ELL707	Systems Biology	3	0	0	3
ELL715	Digital Image Processing	3	0	2	4
ELL724	Multichannel Signal Processing	3	0	0	3
ELL741	Neuromorphic Engineering	3	0	0	3
ELL785	Computer Communication Networks	3	0	0	3
ELL787	Embedded Systems and Applications	3	0	0	3
ELL788	Computational Perception and Cognition	3	0	0	3
ELL789	Intelligent Systems	3	0	0	3
ELL791	Neural Systems and Learning Machines	3	0	2	4
ELL793	Computer Vision	3	0	0	3
ELL794	Human-Computer Interface	3	0	0	3
ELL795	Swarm Intelligence	3	0	0	3
ELL796	Signals and Systems in Biology	3	0	0	3
ELL798	Agent Technologies	3	0	0	3
ELL799	Natural Computing	3	0	0	3
ELL882	Large-Scale Machine Learning	3	0	0	3
ELL883	Embedded Intelligence	3	0	0	3
ELL884	Deep Learning for Natural Language Processing	3	0	0	3
ELL885	Machine Learning for Computational Finance	3	0	0	3
ELL886	Big Data Systems	3	0	0	3
ELL887	Cloud Computing	3	0	0	3
ELL888	Advanced Machine Learning	3	0	0	3
ELL890	Computational Neuroscience	3	0	0	3
ELL891	Advances in Deep Learning	3	0	0	3
ELL893	Cyber-Physical Systems	3	0	0	3

Streamed Electives (EET) in (Embedded Intelligent Systems)

Required Electives

ELL784	Introduction to Machine Learning	3	0	0	3
ELL787	Embedded Systems and Applications	3	0	0	3

Other Electives

COL719	Synthesis of Digital Systems	3	0	2	4
COL812	System Level Design and Modelling	3	0	0	3
ELL704	Advanced Robotics	3	0	0	3
ELL710	Coding Theory	3	0	0	3
ELL720	Advanced Digital Signal Processing	3	0	0	3
ELL728	Optoelectronic Instrumentation	3	0	0	3
ELL731	Mixed Signal Circuit Design	3	0	0	3
ELL733	Digital ASIC Design	3	0	2	4
ELL734	MOS VLSI design	3	0	0	3
ELL735	Analog Integrated Circuits	3	0	0	3
ELL748	System-on-Chip Design and Test	3	0	0	3
ELL766	Appliance Systems	3	0	0	3
ELL767	Mechatronics	3	0	0	3
ELL785	Computer Communication Networks	3	0	0	3
ELL786	Multimedia Systems	3	0	0	3
ELL790	Digital Hardware Design	3	0	0	3
ELL791	Neural Systems and Learning Machines	3	0	2	4
ELL797	Energy-Efficient Computing	3	0	0	3
ELL802	Adaptive and Learning Control	3	0	0	3
ELL883	Embedded Intelligence	3	0	0	3
ELL887	Cloud Computing	3	0	0	3
ELL898	Pervasive Computing	3	0	0	3
ELL899	Testing and Fault Tolerance	3	0	0	3
ELP780	Software Lab	0	1	4	3
ELP781	Digital Systems Lab	0	1	4	3
ELP831	IEC Laboratory-I	0	0	6	3

Streamed Electives (EET) in (Computer Communication and Networks)

Required Electives

ELL785	Computer Communication Networks	3	0	0	3
ELL786	Multimedia Systems	3	0	0	3

Other Electives

ELL710	Coding Theory	3	0	0	3
ELL711	Signal Theory	3	0	0	3
ELL712	Digital Communications	3	0	0	3
ELL714	Basic Information Theory	3	0	0	3
ELL716	Telecommunication Switching and Transmission	3	0	0	3
ELL717	Optical Communication Systems	3	0	0	3
ELL723	Broadband Communication Systems	3	0	0	3
ELL725	Wireless Communications	3	0	0	3
ELL784	Introduction to Machine Learning	3	0	0	3
ELL787	Embedded Systems and Applications	3	0	0	3
ELL797	Energy-Efficient Computing	3	0	0	3
ELL813	Advanced Information Theory	3	0	0	3
ELL816	Satellite Communication	3	0	0	3
ELL817	Access Networks	3	0	0	3
ELL818	Telecommunication Technologies	3	0	0	3
ELL820	Photonic Switching and Networking	3	0	0	3
ELL887	Cloud Computing	3	0	0	3
ELL889	Protocol Engineering	3	0	0	3
ELL892	Internet Technologies	3	0	0	3
ELL894	Network Performance Modeling and Analysis	3	0	0	3
ELL895	Network Security	3	0	0	3
ELL896	Mobile Computing	3	0	0	3
ELL897	Network Management	3	0	0	3
ELL898	Pervasive Computing	3	0	0	3
ELP720	Telecommunication Networks Laboratory	0	1	4	3
ELP780	Software Lab	0	1	4	3
ELP781	Digital Systems Lab	0	1	4	3
ELP782	Computer Networks Lab	0	1	4	3
ELP821	Advanced Telecommunication Networks Laboratory	0	1	4	3
ELP822	Network Software Laboratory	0	1	4	3

Streamed Electives (EET) in (Multimedia Information Processing)

Required Electives

ELL786	Multimedia Systems	3	0	0	3
ELL787	Embedded Systems and Applications	3	0	0	3

Other Electives

ELL710	Coding Theory	3	0	0	3
ELL711	Signal Theory	3	0	0	3
ELL714	Basic Information Theory	3	0	0	3
ELL715	Digital Image Processing	3	0	2	4
ELL718	Statistical Signal Processing	3	0	0	3
ELL719	Detection and Estimation Theory	3	0	0	3
ELL720	Advanced Digital Signal Processing	3	0	0	3
ELL784	Introduction to Machine Learning	3	0	0	3
ELL785	Computer Communication Networks	3	0	0	3
ELL788	Computational Perception and Cognition	3	0	0	3
ELL792	Computer Graphics	3	0	0	3
ELL793	Computer Vision	3	0	0	3
ELL813	Advanced Information Theory	3	0	0	3
ELL882	Large-Scale Machine Learning	3	0	0	3
CRL707	Human & Machine Speech Communication	3	0	0	3

Streamed Electives (EET) in (Internet Technologies)

Required Electives

ELL784	Introduction to Machine Learning	3	0	0	3
ELL785	Computer Communication Networks	3	0	0	3

Other Electives

ELL723	Broadband Communication Systems	3	0	0	3
ELL765	Smart Grid Technology	3	0	0	3
ELL766	Appliance Systems	3	0	0	3
ELL772	Planning and Operation of a Smart Grid	3	0	0	3
ELL786	Multimedia Systems	3	0	0	3
ELL787	Embedded Systems and Applications	3	0	0	3
ELL797	Energy-Efficient Computing	3	0	0	3
ELL798	Agent Technologies	3	0	0	3
ELL884	Deep Learning for Natural Language Processing	3	0	0	3
ELL887	Cloud Computing	3	0	0	3
ELL892	Internet Technologies	3	0	0	3
ELL895	Network Security	3	0	0	3
ELL896	Mobile Computing	3	0	0	3
ELL898	Pervasive Computing	3	0	0	3
ELP721	Embedded Telecommunication Systems Laboratory	0	1	4	3
ELP780	Software Lab	0	1	4	3
ELP781	Digital Systems Lab	0	1	4	3
ELP782	Computer Networks Lab	0	1	4	3
ELP855	Smart Grids Laboratory	0	1	4	3

Sem.	Courses (Number, Abbreviated Title, L-T-P, Credits)					Lecture courses	Contact h/week				Credits
							L	T	P	Total	
I	ELL780 Mathematical Foundations of Computer Technology (3-0-0)	ELL781 Software Fundamentals for Computer Technology (3-0-0)	ELL782 Computer Architecture (3-0-0)	PE-1 (3-0-0)	PE-2 (3-0-0)	5	15	0	0	15	15
II	ELL783 Operating Systems (3-0-2)	ELD780 Minor Project (0-0-4)	PE-3 (3-0-0)	PE-4 (3-0-0)		4	9	0	6	15	12
Summer: [PC-6] ELD880 Major Project Part 1 (for M.Tech with Dissertation)											
III (M.Tech. with DIssertation) OR	ELD880 Major Project Part-I (0-0-12)	PE-5 (3-0-0)	OE-1 (3-0-0)			2	6	0	12	18	12
III (M.Tech. without Dissertation)	PE-5 (3-0-0)	PE-6 (3-0-0)	PE-7/OE-1 (3-0-0)	PE-8/OE-2 (3-0-0)		4	12	0	0	12	12
IV (M.Tech. with Dissertation) OR	ELD881 Major Project Part-II (0-0-24)					0	0	0	24	24	12
IV (M.Tech. without Dissertation)	ELD880 Major Project Part-I (0-0-12)	PE-7/OE-1 (3-0-0)	PE-8/OE-2 (3-0-0)			2	6	0	12	18	12

Total = 51

Master of Technology in Materials Engineering

Department of Materials Science and Engineering

The overall credits structure

Category	PC	PE	OE/PE	RE	Total
Credits	32	06	06	04	48

Program Core

MLL701	Structure and Characterization of Materials	3	0	0	3
MLL702	Thermodynamics of Materials	3	0	0	3
MLL703	Mathematical and Computational Methods in Materials	3	0	2	4
MLP704	Materials Processing and Characterization Lab	1	1	4	4
MLD801	M.Tech. Project-I	0	0	18	9
MLD802	M.Tech. Project-II	0	0	18	9
	Total Credits				***32***

Non-graded Core (NG)

MLN710	Research Seminar	0	0	2	1

Restricted Elective (RE) or Stream Core

MLV705	Special Topics in Materials	1	0	0	1
MLL711	Mechanical Behaviour of Materials	3	0	0	3

Program Electives (PE)

MLL712/ APL753	Materials Design and Selection	3	0	0	3
MLL713	Phase Transformations	3	0	0	3
MLL714	Fracture Mechanics	3	0	0	3
MLL715	Advanced Engineering Materials	3	0	0	3
MLL716/ APL767	Engineering Failure Analysis and Prevention	3	0	0	3
MLL717	Engineering and Specialty Polymers	3	0	0	3
MLL718	Polymeric Nanomaterials and Nanocomposites	3	0	0	3
MLL727	Smart Polymeric Materials	3	0	0	3
MLL730	Diffusion and Kinetics	3	0	0	3
MLL732	Porous Materials	3	0	0	3
MLL734	Texture and Grain Boundary Engineering in Metals and Alloys	3	0	0	3
MLL736	Tribology and Surface Engineering of Materials	3	0	0	3
MLL738	Electronic Devices and Characterization	3	0	0	3
MLL740	Nanostructures and Nanomaterials	3	0	0	3
MLL742	Micro and Nano Fabrication in Materials Engg.	3	0	0	3
MLL748	Solid State Diffusion and Kinetics	3	0	0	3
MLL744	Materials for Additive Manufacturing	3	0	0	3
MLL746	Crystals, Symmetry and Tensors	3	2	0	5
MLL750	Imperfections in Materials and Applications	3	0	0	3
MLL752	Creep and Superplasticity of Materials	3	0	0	3
MLL760	Materials Simulation Methods Using High Performance Computing	2	0	2	3

Sem.	Courses (Number, Abbreviated Title, L-T-P, credits)						Lecture courses	Contact h/week				Credits
								L	T	P	Total	
I	MLL701 Structure and Characterization of Materials (3-0-0) 3	MLL702 Thermodynamics of materials (3-0-0) 3	MLL703 Mathematical and Computational methods in Materials (3-0-2) 4	MLL704 Materials Processing and Characterization Lab (1-1-4) 4	MLV705 (RE–1) Special topics in Materials (1-0-0) 1		5	11	1	6	18	15
II	MLN710 (NG) Research Seminar (0-0-2) 1	MLL711 (RE) 2 Mechanical Behaviour of Materials (3-0-0) 3	PE-1 (3-0-0) 3	PE-2 (3-0-0) 3	OE-1 / PE-3 (3-0-0) 3	OE-2 / PE-4 (3-0-0) 3	6	15	0	2	17	15
Summer												
III	MLD801 (0-0-18) 9						0	0	0	0	18	9
IV	MLD802 (0-0-18) 9						0	0	0	0	18	9

Total = 48

Programme Code: **MSP**

Master of Technology in Polymer Science and Technology

Department of Materials Science and Engineering

The overall credits structure

Category	PC	PE	OE	Total
Credits	**42**	**12**	**0**	**54**

Program Core

MLL719	Polymer Chemistry	3	0	0	3
MLL720	Polymer Processing	3	0	0	3
MLL721	Polymer Physics	3	0	0	3
MLL722	Polymer Technology	3	0	0	3
MLL723	Polymer Characterization	3	0	0	3
MLL724	Polymer Engineering and Rheology	3	0	0	3
MLL725	Polymer Testing and Properties	3	0	0	3
MLP726	Polymer Synthesis and Characterization Laboratory	0	0	4	2
MLP728	Polymer Rheology and Processing Lab	0	0	2	1
MLD811	Major Project Part-I	0	0	12	6
MLD812	Major Project Part-II	0	0	24	12
	Total Credits				***42***

Program Electives

MLL717	Engineering and Specialty Polymers	3	0	0	3
MLL718	Polymeric Nanomaterials and Nanocomposites	3	0	0	3
MLL729	Polymer Blends and Composites	3	0	0	3
MLL731	Rubber Technology	3	0	0	3
MLL733	Polymer Reaction Engineering	3	0	0	3
MLL735	Polymer Product & Mould Design	3	0	0	3
MLL737	Polymer Degradation and Stabilization	3	0	0	3
MLL739	Polymer Coatings	3	0	0	3
MLL741	Biodegradable Polymeric Materials	3	0	0	3
MLS800	Independent Study	0	3	0	3
MLV700	Special Lectures in Polymers	1	0	0	1
MLD799	Minor Project	0	0	6	3

Sem.	Courses (Number, Abbreviated Title, L-T-P, Credits)						Lecture courses	Contact h/week				Credits
								L	T	P	Total	
I	MLL719 Polymer Chemistry (3-0-0) 3	MLL721 Polymer Physics (3-0-0) 3	MLL723 Polymer Characterization (3-0-0) 3	MLL724 Polymer Engineering and Rheology (3-0-0) 3	MLP726 Polymer Synthesis and Characterization Laboratory (0-0-4) 2		4	12	0	4	16	14
II	MLL720 Polymer Processing (3-0-0) 3	MLL722 Polymer Technology (3-0-0) 3	MLP728 Polymer Rheology and Processing Lab (0-0-2) 1	MLL725 Polymer Testing and Properties (3-0-0) 3	PE-1 (3-0-0) 3		4	12	0	2	14	13
Summer												
III	PE-2 (3-0-0) 3	PE-3 (3-0-0) 3	PE-4 (3-0-0) 3	MLD811 Major Project Part-I (0-0-12) 6			3	9	0	12	21	15
IV	MLD812 Major Project Part-II (0-0-24) 12						0	0	0	24	24	12

Total = 54

Master of Technology in Industrial Engineering

Department of Mechanical Engineering

The overall credits structure

Category	PC	PE	OE	Total
Credits	36	12	0	48

Program Core

MCD861	M.Tech. Project Part-I	0	0	24	12
MCD862	M.Tech. Project Part-II	0	0	24	12
MCL751	Industrial Engineering Systems	1	0	4	3
MCL754	Operations Planning and Control	3	0	0	3
MCL761	Probability and Statistics	3	0	0	3
MCL765	Operations Research	3	0	0	3
	Total Credits				***36***

Streamed Electives (MEE) in (Analytics and Optimization)

CTL729	Automotive Reliability and Life Testing	3	0	0	3
CTL732	Advanced Vehicle Propulsion	3	0	0	3
MCL753	Manufacturing Informatics	3	0	2	4
MCL758	Optimization	3	0	0	3
MCL770	Stochastic Modeling and Simulation	3	0	0	3
MCL865	Advanced Operations Research	3	0	0	3
COL702	Advanced Data Structures	3	0	2	4
COL770	Advanced Artificial Intelligence	3	0	2	4
COL772	Natural Language Processing	3	0	2	4
	or				
MTL785	Natural Language Processing	3	0	0	3
COL774	Machine Learning	3	0	2	4
	or				
ELL784	Introduction to Machine Learning	3	0	2	4
ELL791	Neural Systems and Learning Machines	3	0	0	3
MSL713	Information Systems Management	3	0	0	3
MSL717	Business Systems Analysis & Design	3	0	0	3
MTL763	Introduction to Game Theory	3	0	0	3

Streamed Electives (MEE) in (Product Life Cycle Management)

CTL729	Automotive Reliability and Life Testing	3	0	0	3
CTL732	Advanced Vehicle Propulsion	3	0	0	3
MCL771	Value Engineering and Life Cycle Costing	3	0	0	3
MCL772	Reliability Engineering	3	0	0	3
MCL773	Quality Systems	3	0	0	3
MSL841	Supply Chain Analytics	3	0	0	3
ITL709	Maintenance Planning and Control	3	0	0	3
ITL711	Reliability, Availability and Maintainability (RAM) Engineering	3	0	0	3
ITL702	Diagnostic Maintenance and Condition Monitoring	3	0	2	4

Streamed Electives (MEE) in (Operations Management)

CTL729	Automotive Reliability and Life Testing	3	0	0	3
CTL732	Advanced Vehicle Propulsion	3	0	0	3
MCL763	Network Models for Public Systems	3	0	0	3
MCL755	Service System Design	3	0	0	3
MCL756	Supply Chain Management	3	0	0	3
MCL757	Logistics	3	0	0	3
MCL759	Entrepreneurship	3	0	0	3
MCL760	Project Management	3	0	0	3
MCL775	Special Topics in IE	3	0	0	3
MCL866	Maintenance management	3	0	0	3
CVL746	Public Transportation Systems	3	0	0	3
CVL750	Intelligent Transportation Systems	3	0	0	3
MSL805	Services Operations Management	3	0	0	3
MSL704	Science & Technology Policy Systems	3	0	0	3
MSL877	Electronic Government	1.5	0	0	1.5

Sem.	Courses (Number, Abbreviated Title, L-T-P, Credits)				Lecture courses	Contact h/week				Credits
						L	T	P	Total	
I	MCL761 Probability and Statistics (3-0-0) 3	MCL765 Operations Research (3-0-0) 3	MCL751 Industrial Engineering Systems (1-0-4) 3	PE-1 (from PLM Stream) (3-0-0) 3	4	10	0	4	14	12
II	MCL754 Operations Planning and Control (3-0-0) 3	PE-2 (3-0-0) 3	PE-3 (3-0-0) 3	PE-4 (3-0-0) 3	4	12	0	0	12	12
	Professional Project Activity In Summer Vacation									
III	MCD861 Major Porject Part-I (0-0-24) 12				1	3	0	24	27	15
IV	MCD862 Major Porject Part-II (0-0-24) 12				0	0	0	24	24	12

Total = 48

Master of Technology in Mechanical Design

Department of Mechanical Engineering

The overall credits structure

Category	PC	PE	OE	Total
Credits	32	22	0	54

Program Core

APL701	Continuum Mechanics	3	0	0	3
MCD831	Major Project Part-I	0	0	12	6
MCD832	Major Project Part-II	0	0	24	12
MCL731	Analytical Dynamics	3	0	0	3
MCL735	CAD and Finite Element Analysis	3	0	2	4
MCL742	Design & Optimization	3	0	2	4
	Total Credits				***32***

Streamed Electives MEM - (A1) (atleast 12 credits)

MCL730	Designing with advanced materials	3	0	2	4
MCL733	Vibration and Noise	3	0	2	4
MCL736	Automotive Design	3	0	2	4
MCL741	Control Engineering	3	0	2	4
MCL745	Robotics	3	0	2	4
MCL748	Tribological Systems Design	3	0	2	4

Streamed Electives MEM - (A2) (atleast 10 credits)

MCL711	Fracture Mechanics in Design	2	0	2	3
MCL712	Engineering Acoustics	3	0	0	3
MCL713	Active Noise Control	3	0	0	3
MCL714	Orthopedic Biomechanics and Implant Design	2	0	2	3
MCL715	Design for Noise, Vibration and Harshness	2	0	2	3
MCL716	Mechatronics Product Design	2	0	2	3
MCL717	Machine Tool Design	2	0	2	3
MCL718	Design for Manufacture and Assembly	2	0	2	3
MCL723	Vehicle Dynamics	2	0	2	3
MCL728	Nanotribology	3	0	0	3
MCL729	Nanomechanics	2	0	2	3
MCL737	Biomechanics of Trauma and Automotive Design	3	0	0	3
MCL738	Dynamics of Multibody Systems	2	0	2	3
MCL740	Lubrication	3	0	0	3
MCL743	Plant Equipment Design	3	0	0	3
MCL747	Design of Precision Machines	2	0	2	3
MCL797	Freedom and Constraints in Design	3	0	0	3
MCL798	Medical Robotics	2	0	2	3
MCL834	Vibroacoustics	2	0	2	3
MCL837	Advanced Mechanisms	2	0	2	3
MCL839	Rotor Dynamics	2	0	2	3
MCL840	Experimental Modal Analysis and Dynamic Design	2	0	2	3
MCL845	Advanced Robotics	2	0	2	3
MCL848	Special topics in Systems Design-I	2	0	0	2
MCL849	Special topics in Systems Design-II	3	0	0	3
MCS830	Independent Study	0	3	0	3
MCV849	Special Module in Systems Design	1	0	0	1

Sem.	Courses (Number, Abbreviated Title, L-T-P, Credits)							Lecture courses	Contact h/week				Credits
									L	T	P	Total	
I	APL701 Continuum Mechanics (3-0-0) 3	MCL731 Analytical Dynamics (3-0-0) 3	MCL735 CAD and Finite Element Analysis (3-0-2) 4	MCL742 Design & Optimization (3-0-2) 4				4	12	0	4	16	14
II	PE-1 (3-0-2) 4	PE-2 (3-0-2) 4	PE-3 (3-0-2) 4	PE-4 (3-0-0) 3				4	12	0	6	18	15
Summer													
III	MCD831 Major Project Part-I (0-0-12) 6	PE-5 (3-0-2) 4	PE-6 (3-0-0) 3					2	6	0	14	0	13
IV	MCD832 Major Project Part-II (0-0-24) 12							0	0	0	24	24	12

Total = 54

Master of Technology in Production Engineering

Department of Mechanical Engineering

The overall credits structure

Category	PC	PE	OE	Total
Credits	31	18	0	49

Program Core

MCD881	Major Project Part-I	0	0	12	6
MCL705	Experimental Methods	3	0	2	4
MCL769	Metal Forming Analysis	3	0	2	4
MCL781	Machining Processes and Analysis	3	0	2	4
MCL782	Computational Methods	2	0	0	2
MCL784	Computer Aided Manufacturing	3	0	2	4
MCL786	Metrology	2	0	2	3
MCL787	Welding Science and Technology	3	0	2	4
	Total Credits				***31***

Program Electives

MCD882	Major Project Part-II	0	0	24	12
MCL718	Design for Manufacture and Assembly	2	0	2	3
MCL729	Nanomechanics	3	0	0	3
MCL749	Mechatronics Product Design	3	0	2	4
MCL750	Product Design and Manufacturing	1	0	4	3
MCL751	Industrial Engineering Systems	1	0	4	3
MCL753	Manufacturing Informatics	3	0	2	4
MCL754	Operations Planning and Control	3	0	0	3
MCL773	Quality Systems	3	0	0	3
MCL776	Advances in Metal Forming	3	0	0	3
MCL777	Machine Tool Design	3	0	2	4
MCL778	Design and Metallurgy of Welded Joints	3	0	2	4
MCL780	Casting Technology	3	0	2	4
MCL783	Automation in Manufacturing	3	0	2	4
MCL785	Advanced Machining Processes	3	0	0	3
MCL788	Surface Engineering	3	0	2	4
MCL791	Processing and Mechanics of Composite Materials	3	0	2	4
MCL792	Injection Molding and Mold Design	2	0	2	3
MCL795	Laser Processing of Materials	3	0	2	4
MCL796	Additive Manufacturing	3	0	2	4
MCP790	Process Engineering	2	0	4	4

Sem.	Courses (Number, Abbreviated Title, L-T-P, Credits)							Lecture courses	Contact h/week				Credits
									L	T	P	Total	
I	MCL781 Machining Processes and Analysis (3-0-2) 4	MCL787 Welding Science and Technology (3-0-2) 4	MCL769 Metal Forming Analysis (3-0-2) 4					3	9	0	6	15	12
II	MCL705 Experimental Methods (3-0-2) 4	MCL784 CAM (3-0-2) 4	MCL786 Metrology (2-0-2) 3	MCL782 Computational Methods (2-0-0) 3				4	10	0	6	16	13
Professional Project Activity In Summer Vacation													
III	MCD881 Major Project Part-I (Core) (0-0-12) 6	PE-1 (3-0-0) 3	PE-2 (3-0-0) 3					2	6	0	12	18	12
IV	MCD882 Major Project Part-II (PE) (0-0-24) 12							0	0	0	24	24	12

Total = 49

Master of Technology in Thermal Engineering

Department of Mechanical Engineering

The overall credits structure

Category	PC	PE	OE	Total
Credits	36	12	3	51

Non-graded Core

MCD800	Professional Project Activity	0	0	6	3

Program Core

MCD811	Major Project Part-I (Thermal Engineering)	0	0	16	8
MCD812	Major Project Part-II (Thermal Engineering)	0	0	24	12
MCL701	Advanced Thermodynamics	3	0	0	3
MCL702	Advanced Fluid Mechanics	3	0	0	3
MCL703	Advanced Heat and Mass Transfer	3	0	0	3
MCL704	Applied Mathematics for Thermofluids	3	0	0	3
MCL705	Experimental Methods	3	0	2	4
	Total Credits				***36***

Program Electives

MCL707	Thermal Turbomachines	3	0	0	3
MCL732	Air Pollution: Sources and Apportionment	3	0	0	3
MCL811	Advanced Power Generation Systems	3	0	0	3
MCL812	Combustion	3	0	0	3
MCL813	Computational Heat Transfer	3	0	2	4
MCL814	Convective Heat Transfer	3	0	0	3
MCL815	Fire Dynamics and Engineering	2	0	4	4
MCL816	Gas Dynamics	3	0	2	4
MCL817	Heat Exchangers	3	0	0	3
MCL818	Heating, Ventilating and Air-conditioning	3	0	2	3
MCL819	Lattice Boltzmann method	3	0	0	3
MCL820	Micro/nano Scale Heat Transfer	3	0	2	4
MCL821	Radiative Heat Transfer	3	0	0	3
MCL822	Steam and Gas Turbines	3	0	2	4
MCL823	Thermal Design	3	0	2	4
MCL824	Turbocompressors	3	0	0	3
MCL825	Design of Wind Power Farms	3	0	2	4

Sem.	Courses (Number, Abbreviated Title, L-T-P, Credits)						Lecture courses	Contact h/week				Credits
								L	T	P	Total	
I	MCL701 Adv. Thermodynamics (3-0-0) 3	MCL702 Adv. Fluid Mechanics (3-0-0) 3	MCL703 Adv. Heat & Mass Transfer (3-0-0) 3	MCL704 Applied Math. (3-0-0) 3			4	12	0	0	12	12
II	MCL705 Exptl Methods (3-0-2) 4	PE-1 (3-0-0) 3	PE-2 (3-0-0) 3	PE-3 (3-0-0) 3			4	12	0	2	14	13
Summer	Professional Project Activity (compulsory audit)						0					0
III	MED811 Major Project Part-I (MET) (0-0-16) 8	PE-4 (3-0-0) 3	OE-1 (3-0-0) 3				2	6	0	12	18	14
IV	MED812 Major Project Part-II (MET) (0-0-24) 12						0	0	0	24	24	12

Total = 51

Master of Technology in Applied Optics

Department of Physics

The overall credits structure

Category	PC	PE	OE	Total
Credits	39	9	3	51

Program Core

PYD851	Major Project Part-I	0	0	12	6
PYD852	Major Project Part-II	0	0	24	12
PYL751	Optical Sources, Photometry and Metrology	3	0	0	3
PYL752	Laser Systems and Applications	3	0	0	3
PYL753	Optical Systems Design	3	0	0	3
PYL755	Basic Optics and Optical Instrumentation	3	0	0	3
PYL756	Fourier Optics and Holography	3	0	0	3
PYP761	Optical Fabrication and Metrology Laboratory	0	0	6	3
PYP762	Advanced Optics Laboratory	0	0	6	3
	Total Credits				***39***

Program Electives

PYL757	Statistical and Quantum Optics	3	0	0	3
PYL758	Advanced Quantum Optics and Applications	3	0	0	3
PYL759	Computational Optical Imaging	3	0	0	3
PYL760	Biomedical Optics and Bio-photonics	3	0	0	3
PYL770	Ultra-fast Optics and Applications	3	0	0	3
PYL771	Green Photonics	3	0	0	3
PYL772	Plasmonic Sensors	3	0	0	3
PYL780	Diffractive and Micro Optics	3	0	0	3
PYL791	Fiber Optics	3	0	0	3
PYL792	Optical Electronics	3	0	0	3
PYL795	Optics and Lasers	3	0	0	3
PYL858	Advanced Holographic Techniques	3	0	0	3
PYL879	Selected Topics in Applied Optics	3	0	0	3
PYL881	Selected Topics – I	1	0	0	1
PYL882	Selected Topics – II	1	0	0	1
PYL883	Minor Project	0	0	6	3
PYL892	Guided Wave Photonic Sensors	3	0	0	3
PYP763	Computational Optics Laboratory	0	0	6	3
PYP764	Advanced Optical Workshop	0	0	6	3
PYS855	Independent Study	0	3	0	3
PYL747	Non-linear Optics	3	0	0	3
PYL774	Polarised Light and its Application	3	0	0	3

Sem.	Courses (Number, Abbreviated Title, L-T-P, Credits)						Lecture courses	Contact h/week				Credits
								L	T	P	Total	
I	PYL755 Basic Optics and Optical Instrumentation (3-0-0) 3	PYL751 Optical Sources, Photometry and Metrology (3-0-0) 3	PYL753 Optical Systems Design (3-0-0) 3	PYP761 Optical Fabrication and Metrology Laboratory (0-0-6) 3	PE-1 (3-0-0) 3		4	12	0	6	18	15
II	PYL752 Laser Systems and Application (3-0-0) 3	PYL756 Fourier Optics and Holography (3-0-0) 3	PYP762 Advanced Optics Laboratory (0-0-6) 3	PE-2 (3-0-0) 3	PE-3 (3-0-0) 3		4	12	0	6	18	15
Summer												
III	OE-1 (3-0-0) 3	PYD851 Maj. Proj. Part-I (0-0-12) 6					1	3	0	12	15	9
IV	PYD852 Maj. Proj. Part-II (0-0-24) 12						0	0	0	24	24	12

Total = 51

Programme Code: **PHM**

Master of Technology in Solid State Materials

Department of Physics

The overall credits structure

Category	PC	PE	OE	Total
Credits	**39**	**9**	**3**	**51**

Program Core

PYD801	Major Project Part-I	0	0	12	6
PYD802	Major Project Part-II	0	0	24	12
PYL701	Physical Foundations of Materials Science	3	0	0	3
PYL702	Physics of Semiconductor Devices	3	0	0	3
PYL703	Electronic Properties of Materials	3	0	0	3
PYL704	Science and Technology of Thin Films	3	0	0	3
PYL705	Nanostructured Materials	3	0	0	3
PYP701	Solid State Materials Laboratory-I	0	0	6	3
PYP702	Solid State Materials Laboratory-II	0	0	6	3
	Total Credits				***39***

Program Electives

PYL707	Characterization Techniques for Materials	3	0	0	3
PYL723	Vacuum Science and Cryogenics	3	0	0	3
PYL724	Advances in Spintronics	3	0	0	3
PYL725	Surface Physics and Analysis	3	0	0	3
PYL726	Semiconductor Device Technology	3	0	0	3
PYL727	Energy Materials and Devices	3	0	0	3
PYL728	Quantum Heterostructures	2	0	0	2
PYL729	Nanoprobe Techniques	1	0	0	1
PYL750	Topology in Condensed Matter Physics	3	0	0	3
PYV759	Selected Topics in Solid State Materials	1	0	0	1

Sem.	Courses (Number, Abbreviated Title, L-T-P, Credits)						Lecture courses	Contact h/week				Credits
								L	T	P	Total	
I	PYL701 Physical Foundations of Materials Science (3-0-0) 3	PYL702 Physics of Semiconductor Devices (3-0-0) 3	PYL703 Electronic Properties of Materials (3-0-0) 3	PYP701 Solid State Materials Laboratory-I (0-0-6) 3	PE-1 (3-0-0) 3		4	12	0	6	18	15
II	PYL704 Science and Technology of Thin Films (3-0-0) 3	PYL705 Nanostructured Materials (3-0-0) 3	PYP702 Solid State Materials Laboratory-II (0-0-6) 3	PE-2 (3-0-0) 3	PE-3 (3-0-0) 3		4	12	0	6	18	15
Summer												
III	OE-1 (3-0-0) 3	PYD801 Maj. Proj. Part-I (0-0-12) 6					1	3	0	12	15	9
IV	PYD802 Maj. Proj. Part-II + Report (0-0-24) 12						0	0	0	24	24	12

Total = 51

Master of Technology in Textile Engineering

Department of Textile and Fibre Engineering

The overall credits structure

Category	PC	PE	OE	Total
Credits	42	12	0	54

Program Core

TXD801	Major Project Part-I (TXE)	0	0	12	6
TXD803	Major Project Part-II (TXE)	0	0	24	12
TXL721	Theory of Yarn Structure	3	0	0	3
TXL722	Mechanics of Spinning Processes	3	0	0	3
TXL725	Mechanics of Spinning Machines	3	0	0	3
TXL731	Theory of Fabric Structure	3	0	0	3
TXL732	Advanced Fabric Manufacturing Systems	3	0	0	3
TXL775	Technical Textiles	3	0	0	3
TXL783	Design of Experiments and Statistical Techniques	3	0	0	3
TXP725	Mechanics of Textile Machines Laboratory	0	0	2	1
TXP761	Evaluation of Textile Materials	0	0	4	2
	Total Credits				***42***

Program Electives

TXD809	Mini Project (Textile Engineering)	0	0	8	4
TXL700	Modelling and Simulation in Fibrous Assemblies	2	0	2	3
TXL710	High Performance and Specialty Fiber	3	0	0	3
TXL712	Polymer and Fibre Physics	3	0	0	3
TXL719	Functional & Smart Textiles	3	0	0	3
TXL724	Textured Yarn Technology	3	0	0	3
TXL734	Nonwoven Processes and Products	3	0	0	3
TXL740	Science & App. of Nanotechnology in Textiles	3	0	0	3
TXL750	Science of Clothing Comfort	3	0	0	3
TXL751	Apparel Engineering and Quality Control	2	0	2	3
TXL752	Design of Functional Clothing	3	0	0	3
TXL766	Design and Manuf. of Textile Structural Composites	3	0	0	3
TXL771	Electronics and Controls for Textile Industry	3	0	2	4
TXL772	Computational Methods for Textiles	2	0	2	3
TXL773	Medical Textiles	3	0	0	3
TXL774	Process Control in Yarn & Fabric Manufacturing	3	0	0	3
TXL777	Product Design and Development	3	0	0	3
TXL780	Principles of Characterization of Functional and Technical Textiles	3	0	0	3
TXL781	Project Appraisal and Finance	3	0	0	3
TXL782	Production and Operations Management in Textile Industry	3	0	0	3
TXL784	Supply Chain Management in Textile Industry	3	0	0	3
TXL785	Heat and Mass Transport in Fibrous Materials	3	0	0	3
TXL786	Technology of Textile Coating and Lamination	2	0	2	3
TXL807	Seminar (Textile Engineering)	0	2	0	2
TXS805	Independent Study (Textile Engineering)	0	3	0	3
TXV702	Management of Textile Business	1	0	0	1
TXV703	Special Module in Textile Product Mgmt.	1	0	0	1
TXV704	Special Module in Yarn Manufacture	1	0	0	1
TXV705	Special Module in Fabric Manufacture	1	0	0	1

Sem.	Courses (Number, Abbreviated Title, L-T-P, Credits)							Lecture courses	Contact h/week				Credits
									L	T	P	Total	
I	TXL721 Theory of Yarn Structure (3-0-0) 3	TXL722 Mechanics of Spinning Processes (3-0-0) 3	TXL731 Theory of Fabric Structure (3-0-0) 3	TXL732 Advanced Fabric Manufacturing Systems (3-0-0) 3		PE-1 (3-0-0) 3		5	15	0	0	15	15
II	TXL775 Technical Textiles (3-0-0) 3	TXL725 Mechanics of Spinning Machines (3-0-0) 3	TXL783 Design of Expt. and Stat. Tech. (3-0-0) 3	TXP761 Evaluation of Textile Materials (0-0-4) 2	TXP725 Mechanics of Spinning Machines Lab. (0-0-2) 1	PE-2 (3-0-0) 3		4	12	0	6	18	15
Summer													
III	TXD801 Major Project Part-I (TXE) (0-0-12) 6	PE-3 (3-0-0) 3	PE-4 (3-0-0) 3					2	6	0	12	18	12
IV	TXD803 Major Project Part-II (TXE) (0-0-24) 12							0	0	0	24	24	12

Total = 54

Master of Technology in Textile Chemical Processing

Department of Textile and Fibre Engineering

The overall credits structure

Category	PC	PE	OE	Total
Credits	42	12	0	54

Program Core

TXD805	Major Project Part-I (TXC)	0	0	12	6
TXD806	Major Project Part-II (TXC)	0	0	24	12
TXL712	Polymer and Fibre Physics	3	0	0	3
TXL747	Colour Science	3	0	0	3
TXL748	Advances in Finishing of Textiles	3	0	0	3
TXL749	Theory and Practice of Dyeing	3	0	0	3
TXL753	Advanced Textile Printing Technology	2	0	0	2
TXL754	Sustainable Chemical Processing of Textiles	2	0	0	2
TXL783	Design of Experiments and Statistical Techniques	3	0	0	3
TXP748	Textile Preparation and Finishing Lab	0	0	2	1
TXP749	Textile Coloration Lab	0	0	2	1
TXP751	Characterization and Evaluation of Dyed and Finished Textiles Lab	0	0	2	1
TXS751	Research Seminar	0	0	2	1
TXR752	Professional Practices	0	0	2	1
TXT800	Industrial Summer Training	Non credit			
	Total Credits				***42***

Program Electives

MSL760	Marketing Management	2	0	2	3
MSL802	Management of Intellectual Property Rights	3	0	0	3
MSL816	Total Quality Management	2	0	2	3
TXD812	Mini Projects (TCP)	0	0	6	3
TXL711	Polymer and Fibre Chemistry	3	0	0	3
TXL713	Technology of Melt Spun Fibres	3	1	0	4
TXL714	Advanced Materials Characterization Techniques	1	0	0	1
TXL715	Technology of Solution Spun Fibres	3	0	0	3
TXL719	Functional and Smart Textiles	3	0	0	3
TXL724	Textured Yarn Technology	3	0	0	3
TXL740	Science and Application of Nanotechnology in Textiles	3	0	0	3
TXL750	Science of Clothing Comfort	3	0	0	3
TXL751	Apparel Engineering and Quality Control	2	0	2	3
TXL752	Design of Functional Clothing	3	0	0	3
TXL755	Textile Wet Processing Machines: Automation and Control*	3	0	0	3
TXL756	Textile Auxiliaries*	3	0	0	3
TXL766	Design and Manuf. of Textile Structural Composites	3	0	0	3
TXL773	Medical Textiles	3	0	0	3
TXL775	Technical Textiles	3	0	0	3
TXL777	Product Design and Development	3	0	0	3
TXL780	Principles of Characterization of Functional and Technical Textiles	3	0	0	3
TXL781	Project Appraisal and Finance	2	1	0	3
TXL782	Production and Operations Management in Textile Industry	3	0	0	3
TXL784	Supply Chain Mgmt. in Textile Industry	3	0	0	3
TXL785	Heat and Mass Transport in Fibrous Materials	3	0	0	3
TXL786	Technology of Textile Coating and Lamination	2	0	2	3
TXP711	Polymer and Fibre Chemistry Laboratory	0	2	0	1
TXP712	Polymer and Fibre Physics Laboratory	0	0	2	1
TXP716	Fibre Production and Post Spinning Operation Laboratory	0	0	4	2
TXP761	Evaluation of Textile Materials	0	0	4	2
TXS811	Independent Study	0	3	0	3
TXV703	Special Module in Textile Product Mgmt.	1	0	0	1
TXV707	Special Module-Textile Chemical Processing-1	1	0	0	1

** TCP PE Basket*

Sem.	Courses (Number, Abbreviated Title, L-T-P, credits)							Lecture courses	Contact h/week				Credits
									L	T	P	Total	
I	TXL712 Polymer & Fibre Physics (3-0-0) 3	TXL747 Colour Science (3-0-0) 3	TXL749 Theory and Practice of Dyeing (3-0-0) 3	TXL753 Advanced Textile Printing Technology (2-0-0) 2	TXP749 Textile Coloration Lab (0-0-2) 1	TXP751 Characterization of Chemicals and Finished Textiles Lab (0-0-2) 1	TXR752 Professional Practices (0-0-2) 1	4	11	0	6	17	14
II	TXL748 Advances in Finishing of Textiles (3-0-0) 3	TXL754 Sustainable Chemical Processing of Textiles (2-0-0) 2	TXL783 Design of Experiments and Statistical Techniques (3-0-0) 3	TXP748 Textile Preparation and Finishing Lab (0-0-2) 1		PE-1 (3-0-0) 3	PE-2 (3-0-3) 3	5	14	0	2	16	15
Summer	**TXT800 Industrial Summer Training**												
III	TXD805 Major Project Part-I (TCP) (0-0-12) 6			TXS751 Research Seminar (0-0-2) 1	PE-3* (3-0-0) 3	PE-4 (3-0-0) 3		2	6	0	14	18	13
IV	TXD806 Major Project Part-II (TCP) (0-0-24) 12							0	0	0	24	24	12

** From TCP PE Basket*

Total = 54

Master of Technology in Fibre Science and Technology

Department of Textile and Fibre Engineering

The overall credits structure

Category	PC	PE	OE	Total
Credits	42	12	0	54

Program Core

TXD802	Major Project Part-I	0	0	12	6
TXD804	Major Project Part-II	0	0	24	12
TXL711	Polymer and Fibre Chemistry	3	0	0	3
TXL712	Polymer and Fibre Physics	3	0	0	3
TXL713	Technology of Melt Spun Fibres	3	1	0	4
TXL714	Advanced Materials Characterization Techniques	1	0	0	1
TXL715	Technology of Solution Spun Fibres	3	0	0	3
TXL748	Advances in Finishing of Textiles	3	0	0	3
TXL749	Theory and Practice of Dyeing	3	0	0	3
TXP711	Polymer and Fibre Chemistry Laboratory	0	0	2	1
TXP712	Polymer and Fibre Physics Laboratory	0	0	2	1
TXP716	Fibre Production and Post Spinning Operation Laboratory	0	0	4	2
	Total Credits				***42***

Program Electives

TXL700	Modelling and Simulation in Fibrous Assemblies	2	0	2	3
TXL710	High Performance and Specialty Fiber	3	0	0	3
TXL719	Functional & Smart Textiles	3	0	0	3
TXL724	Textured Yarn Technology	3	0	0	3
TXL734	Nonwoven Processes and Products	3	0	0	3
TXL740	Science & App. of Nanotechnology in Textiles	3	0	0	3
TXL741	Env. Manag. in Textile and Allied Industries	3	0	0	3
TXL747	Colour Science	3	0	0	3
TXL750	Science of Clothing Comfort	3	0	0	3
TXL752	Design of Functional Clothing	3	0	0	3
TXL754	Sustainable Chemical Processing of Textiles	2	0	0	2
TXL772	Computational Methods for Textiles	2	0	2	3
TXL773	Medical Textiles	3	0	0	3
TXL775	Technical Textiles	3	0	0	3
TXL777	Product Design and Development	3	0	0	3
TXL780	Principles of Characterization of Functional and Technical Textiles	3	0	0	3
TXL781	Project Appraisal and Finance	3	0	0	3
TXL782	Production and Operations Management in Textile Industry	3	0	0	3
TXL783	Design of Experiments and Statistical Techniques	3	0	0	3
TXL784	Supply Chain Management in Textile Industry	3	0	0	3
TXL785	Heat and Mass Transport in Fibrous Materials	3	0	0	3
TXL786	Technology of Textile Coating and Lamination	2	0	2	3
TXS806	Independent Study (TTF)	0	3	0	3
TXV701	Process Cont. and Econ. in Manmade Fibre Prod.	1	0	0	1
TXV702	Management of Textile Business	1	0	0	1
TXV703	Special Module in Textile Product Mgmt.	1	0	0	1
TXV706	Special Module in Fibre Science	1	0	0	1
TXV707	Special Module in Textile Chemical Processing	1	0	0	1

Sem.	Courses (Number, Abbreviated Title, L-T-P, Credits)							Lecture courses	Contact h/week				Credits
									L	T	P	Total	
I	TXL711 Polymer & Chemistry (3-0-0) 3	TXP711 Polymer & Fibre Chemistry Lab (0-0-2) 1	TXL712 Polymer & Fibre Physics (3-0-0) 3	TXP712 Polymer & Fibre Physics Lab (0-0-2) 1	TXL713 Technology of Melt Spun Fibres (3-1-0) 4	TXL749 Theory and Practice of Dyeing (3-0-0) 3		4	12	1	4	17	15
II	TXL715 Technology of Soln Spun Fibres (3-0-0) 3	TXP716 Fibre Production & Post Spinning Operation Lab (0-0-4) 2	TXL748 Advances in Finishing of Textiles (3-0-0) 3	TXL714 Characterization of advanced materials (1-0-0) 1		PE-2 (3-0-0) 3	PE-1 (3-0-0) 3	5	12	0	6	18	15
Summer													
III	TXD802 Maj. Proj. Part-I (TTF) (0-0-12) 6				PE-3 (3-0-0) 3	PE-4 (3-0-0) 3		2	6	0	12	18	12
IV	TXD804 Maj. Proj. Part-II (TTF) (0-0-24) 12							0	0	0	24	24	12

Total = 54

Programme Code: **CRF**

Master of Technology in Radio Frequency Design and Technology

Centre for Applied Research and Electronics

The overall credits structure

	Core		Elective		Total
Category	**PC**	**BC**	**PE**	**OE**	**Total**
Credits	**24**	**3**	**24*/21****	**0*/3****	**51**

* For students with M.Tech Dissertation
** For students without M.Tech Dissertation

Program Core

CRD802	Minor Project	0	0	6	3
CRD811	Major Project-I	0	0	12	6
CRL702	Architectures and Algorithms for DSP Systems	2	0	4	4
CRL711	CAD of RF and Microwave Circuits	3	0	2	4
CRL724	RF and Microwave Measurements	3	0	0	3
CRP718	RF and Microwave Measurement Lab	1	0	6	4
	Total Credits				***24***

Bridge Course (Core)

CRL601	Basics of Statistical Signal Analysis	2	0	2	3
CRL611	Basics of RF and Microwaves	2	1	0	3
CRL621	Fundamentals of Semiconductor Devices	3	0	0	3

Program Electives

ELL711	Signal Theory	3	0	0	3
ELL712	Digital Communications	3	0	0	3
ELL714	Basic Information Theory	3	0	0	3
ELL718	Statistical Signal Processing	3	0	0	3
ELL719	Detection and Estimation Theory	3	0	0	3
ELL720	Advanced Digital Signal Processing	3	0	0	3
ELL725	Wireless Communications	3	0	0	3
ELL731	Mixed Signal Circuit Design	3	0	0	3
ELL734	MOS VLSI design	3	0	0	3
ELL735	Analog Integrated Circuits	3	0	0	3
ELL784	Introduction to Machine Learning	3	0	0	3
ELL815	MIMO Wireless Communications	3	0	0	3
ELL833	CMOS RF IC Design	3	0	0	3
ELP725	Wireless Communication Laboratory	0	1	4	3
CRD802	Minor Project	0	0	6	3
CRD812	Major Project-II	0	0	24	12
CRD814	Major Project-III	0	0	12	6
CRL704	Sensor Array Signal Processing	3	0	0	3
CRL706	Selected Topics in Radars and Sonars	3	0	0	3
CRL707	Human & Machine Speech Communication	3	0	0	3
CRL708	Sonar Systems Engineering	3	0	0	3
CRL709	Underwater Electronic Systems	3	0	0	3
CRL712	RF and Microwave Active Circuits	3	0	0	3
CRL715	Radiating Systems for RF Communication	3	0	0	3
CRL722	RF and Microwave Solid State Devices	3	0	0	3
CRL725	Technology of RF and Microwave Solid State Devices	3	0	0	3
CRL726	RF MEMS Design and Technology	3	0	0	3
CRL727	Introduction to Quantum Electron Devices	3	0	0	3
CRL729	Sensors and Transducers	3	0	0	3
CRL731	Selected Topics in RFDT-I	3	0	0	3
CRL732	Selected Topics in RFDT-II	3	0	0	3
CRL733	Selected Topics in RFDT-III	3	0	0	3
CRL734	Selected Topics in RFDT-IV	3	0	0	3
CRP723	Fabrication Techniques for RF and Microwave Devices	1	0	4	3
CRS735	Independent Study	0	3	0	3
CRV741	Acoustic Classification using Passive Sonar	1	0	0	1
CRV742	Special Module in Radio Frequency Design and Technology-I	1	0	0	1
CRV743	Special Module in Radio Frequency Design and Technology-II	1	0	0	1

Sem.	Courses (Number, Abbreviated Title, L-T-P, Credits)				Lecture courses	Contact h/week				Credits
						L	T	P	Total	
I	CRL711 CAD of RF and Microwave Circuits (3-0-2) 4	CRL718 RF and Microwave Measurement Lab (1-0-6) 4	PE-1 (3-0-0) 3	Bridge course : Any one of the following three : CRL601 Basics of Stat. Signal Analysis (2-0-2) 3/ CRL611 Basics of RF and Microwaves (2-1-0) 3/ CRL621 Fund. of Semiconductor Devices (3-0-0) 3	4	9-10	10	8-10	18-19	14
II	CRL724 RF and Microwave Measurements (3-0-0)	CRL702 Architectures and Algorithms for DSP Systems (2-0-4) 4	PE-2 (3-0-0) 3	CRD802 Minor Project (0-0-6) 3	3	8	0	10	18	13
Summer										
III	CRD811 Major Project-I (0-0-12)		PE-3 (3-0-0) 3	PE-4 (3-0-0) 3	2	6	0	12	18	12
IV Project Option OR			CRD812 (0-0-24)*		0	0	0	24	24	12
IV Course Option	PE-5 (3-0-0) 3		CRD814 Major Project-III (0-0-12) 6	OE-1 (3-0-0) 3	2	6	0	12	18	12

* **Note :** Minimum eligibility criterion for doing CRD812 (M.Tech. Project 2) in final semester leading to M.Tech. with Dissertation shall be B grade in CRD811. However, additional/higher criteria may be set CFB based on which CRC shall approve/disapprove this option for each student.

Total = 51

Programme Code: **AST**

Master of Technology in *Atmospheric-Oceanic Science and Technology*

Centre for Atmospheric Sciences

The overall credits structure

Category	PC	PE	OE	Total
Credits	33	21	0	54

Program Core

ASD881	Project-I	0	0	12	6
ASL730	Introduction to Weather, Climate and Air Pollution	1	0	0	1
ASL732	Mathematical and Computational Methods for Atmospheric and Oceanic Sciences	2	0	2	3
ASL733	Physics of the Atmosphere	3	0	0	3
ASL734	Dynamics of the Atmosphere	3	0	0	3
ASL735	Atmospheric Chemistry and Air Pollution	3	0	0	3
ASL736	Science of Climate Change	3	0	0	3
ASL737	Physical and Dynamical Oceanography	3	0	0	3
ASL738	Numerical Modeling of the Atmosphere and Ocean	2	0	2	3
ASP731	Data Analysis Methods for Atmospheric and Oceanic Sciences	0	0	4	2
ASP820	Advanced Data Analysis for Weather and Climate	1	0	4	3
	Total Credits				***33***

Program Electives

ASC869	Atmospheric and Oceanic Science Colloquium	0	1	0	1
ASD882	Project-II	0	0	24	12
ASL750	Boundary Layer Meteorology	3	0	0	3
ASL751	Dispersion of Air Pollutants	3	0	0	3
ASL752	Mesoscale Meteorology	3	0	0	3
ASL753	Atmospheric Aerosols	3	0	0	3
ASL754	Cloud Physics	3	0	0	3
ASL755	Remote Sensing of the Atmosphere and Ocean	3	0	0	3
ASL756	Synoptic Meteorology	3	0	0	3
ASL757	Tropical Weather and Climate	3	0	0	3
ASL758	General Circulation of the Atmosphere	3	0	0	3
ASL759	Land-Atmosphere Interactions	3	0	0	3
ASL760	Renewable Energy Meteorology	3	0	0	3
ASL761	Earth System Modeling	3	0	0	3
ASL762	Air-Sea Interaction	3	0	0	3
ASL763	Coastal Ocean and Estuarine Processes	3	0	0	3
ASL765	Impacts of Climate Change and Air Pollution on Human Health	3	0	0	3
ASL821	Advanced Dynamic Meteorology	3	0	0	3
ASL822	Climate Variability	3	0	0	3
ASL823	Geophysical Fluid Dynamics	3	0	0	3
ASL824	Parameterization of Physical Processes	3	0	0	3
ASL826	Ocean Modeling	2	0	2	3
ASL827	Advanced Dynamic Oceanography	3	0	0	3
ASL851	Special Topics in Climate	3	0	0	3
ASL852	Special Topics in Oceans	3	0	0	3
ASL853	Special Topics in Atmosphere	3	0	0	3
ASL854	Special Topics in Air Pollution Studies	3	0	0	3
ASL856	Special Topics in Atmospheric and Oceanic Observations	2	0	2	3
ASP766	Atmospheric Measurements and Analysis Hands-on	1	0	4	3
ASP825	Mesoscale Modeling	0	0	6	3
ASP855	Special Topics in Atmosphere and Ocean	1	0	4	3
ASP867	Special Module in Weather Forecasting	0	0	2	1
ASP868	Special Module in Atmospheric and Oceanic Observations	0	0	2	1
ASS800	Independent Study	0	3	0	3
ASV862	Special Module in Climate	1	0	0	1
ASV863	Special Module in Oceans	1	0	0	1
ASV864	Special Module in Atmosphere	1	0	0	1
ASV865	Special Module in Air Pollution Studies	1	0	0	1
ASV866	Special Module in Atmosphere and Ocean	1	0	0	1
ASV892	An Introduction to Renewable Energy Meteorology	1	0	0	1

Sem.	Courses (Number, Abbreviated Title, L-T-P, Credits)						Lecture courses	Contact h/week				Credits
								L	T	P	Total	
I	ASL730 Introduction to Weather, Climate and Air Pollution (1-0-0) 1	ASP731 Data Analysis Methods for Atmospheric and Oceanic Sciences (0-0-4) 2	ASL732 Mathematical and Computational Methods for Atmospheric and Oceanic Sciences (2-0-2) 3	ASL733 Physics of the Atmosphere (3-0-0) 3	ASL734 Dynamics of the Atmosphere (3-0-0) 3	ASL735 Atmospheric Chemistry and Air Pollution (3-0-0) 3	5	12	0	6	18	15
II	ASL736 Science of Climate Change (3-0-0) 3	ASL737 Physical and Dynamical Oceanography (3-0-0) 3	ASL738 Numerical Modeling of the Atmosphere and Ocean (2-0-2) 3	ASP820 Advanced Data Analysis for Weather and Climate (1-0-4) 3	PE-1 (3-0-0) 3		5	12	0	6	18	15
Summer												
III	ASD881 Project-I (Core) (0-0-12) 6	PE-2 (3-0-0) 3	PE-3 (3-0-0) 3				2	6	0	12	18	12
IV Project Option OR	ASD882 Project-II (0-0-24) 12						0	0	0	24	24	12
IV Course Option	PE-4 (3-0-0) 3	PE-5 (3-0-0) 3	PE-6 (3-0-0) 3	PE-7 (3-0-0) 3			4	12	0	0	12	12

Total = 54

Master of Technology in Electric Mobility

Centre for Automotive Research and Tribology

The overall credits structure

Category	PC	PE	OE	Total
Credits	24	18	6	48

Program Core

CTL703	Introduction to Electric Vehicles	3	0	0	3
CTL705	Engineering of Electric Vehicles	3	0	0	3
CTL707	Batteries for Electric Vehicles: Multidisciplinary Perspectives	3	0	0	3
CTL717	Power Electronics and Drives for Electric Vehicles	3	0	0	3
CTP702	Electric Vehicle Laboratory-I	1	0	4	3
CTP704	Electric Vehicle Laboratory-II	1	0	4	3
CTD 801	M.Tech. Major Project Part-I	0	0	12	6
	Total Credits				***24***

Program Electives

CTL704	Electrical Engineering and Tribology	3	0	0	3
CTL709	Charging Infrastructure for EVs	3	0	0	3
CTL711	Embedded Systems for Automotive Sector	3	0	0	3
CTL719	Energy Storage Systems for EVs	3	0	0	3
CTL720	Vehicle System Dynamics and Control	3	0	0	3
CTL725	Recycling, Reusability and Remanufacturing	3	0	0	3
CTL727	Materials for Electric Vehicle Applications	3	0	0	3
CTL729	Automotive Reliability and Life Testing	3	0	0	3
CTL731	Automotive Noise and Condition Monitoring	3	0	0	3
CTL732	Advanced Vehicle Propulsion	3	0	0	3
CTL717	Electric Energy Storage Systems	3	0	0	3
CTL735	Computer Aided Analysis of Power Electronics	3	0	0	3
CTL713	Connected and Autonomous Vehicles	3	0	0	3
CTL736	Design of Motors for Automotive Application	3	0	0	3
CTL741	Advanced Motors for Electric Mobility	3	0	2	4
CTD802	M.Tech. Major Project Part-II	0	0	24	12
	Minor Project	0	0	6	3

Sem.	Courses (Number, Abbreviated Title, L-T-P, Credits)				Lecture courses	Contact h/week				Credits
						L	T	P	Total	
I	CTL703 Introduction to Electric Vehicles (3-0-0) 3	CTL705 Engineering of Electric Vehicles (3-0-0) 3	CTP702 Electric Vehicle Laboratory-I (1-0-4) 3	PE-1 (3-0-0) 3	3	10	0	4	14	12
II	CTL707 Batteries for Electric Vehicles: Multidisciplinary Perspectives 3-0-0) 3	CTL717 Power Electronics and Drives for Electric Vehicles (3-0-0) 3	CTP704 Electric Vehicle Laboratory-II (1-0-4) 3	PE-2 (3-0-0) 3	3	10	0	4	14	12
III	CTD801 Major Project Part-I (0-0-12) 6	OE-1 (3-0-0) 3	OE-2 (3-0-0) 3		2	6	0	12	18	12
M.Tech. Option I (With Major project Part – II with a Thesis Submission*)										
IV	CTD802 Major Project Part-II (0-0-24) 12				0	0	0	24	24	12
OR										
IV	PE-3 (3-0-0) 3	PE-4 (3-0-0) 3	PE-5 (3-0-0) 3	PE-6 (3-0-0) 3	4	12	0	0	12	12

*** Note :** Major Project Part - II option has a requirement of Min. CGPA 8 at the end 3rd Sem and B Grade in Major Project Part - I. In exceptional cases CRC may waive the CGPA requirement

Total = 48

Master of Technology in *Biomedical Engineering*

Centre for Biomedical Engineering

The overall credits structure

	Core			Elective		Total
Category	**BC**	**CC**	**CP**	**PE**	**OE**	**Total**
Credits	**02**	**18**	**21**	**09**	**03**	**53**

Bridge Courses (Core)

BMV701	Basic Electronics	1	0	0	1
BMV702	Basic Mathematics for Biologists	1	0	0	1
BMV703	Basic Biology & Physiology	1	0	0	1
BMV705	Mechanics of Biomaterials	1	0	0	1
	Total Credits				***2***[!]

[!]Students shall take any two core bridge courses based on their background (Engg./ Biology) on suggestion of the program adviser.

Program Core

BML770	Fundamentals of Biomechanics	3	0	0	3
BML710	Industrial Biomaterial Technology	3	0	0	3
BML720	Medical Imaging	3	0	0	3
BML737	Application of Mathematics in Biomedical Engineering	2	0	0	2
BML760	Biomedical Ethics, Safety and Regulatory Affairs	2	0	0	2
BML740	Biomedical Instrumentation	3	0	0	3
BMP743	Basic Biomedical Laboratory	0	0	4	2
BMD801	Major Project-I	0	0	0	9
BMD802	Major Project-II	0	0	0	12
	Total Credits				***39***

Program Electives

BVQ706	Graduate Students Sesearch Seminar	0	0	2	1
BML707	Molecular Bioengineering for Human Health	3	0	0	3
BML713	Pharmaceuticals, Efficacy and Delivery	3	0	0	3
BML714	Advanced Neuromechanics	3	0	2	4
BML734	Physiological Signal Processing	3	0	0	3
BML735	Biomedical Image and Signal Processing	2	0	2	3
BML741	Medical Device Design	2	0	4	4
BML774	Soft Tissue Characterization and Applications	3	0	2	4
BML750	Point of Care Medical Diagnostic Devices	3	0	0	3
BML771	Orthopaedic Device Design	2	0	0	2
BML772	Biofabrication	2	0	2	3
	Computational Physiology	2	0	2	3
BML781	Orthopedic Device Design and Prototyping	2	0	2	3
BML790	Modern Medicine: An Engg. Perspective	2	1	0	3
BML800	Research Techniques in Biomedical Engg.	3	0	0	3
BML810	Tissue Engineering	3	0	0	3
BML815	Selected Topics in Biomedical Engineering	2	0	0	2
BML820	Biomaterials	3	0	0	3
BML860	Nanomedicine	3	0	0	3
BML830	Biosensor Technology	3	0	2	4
BML850	Cancer: Diagnosis and Therapy	3	0	0	3
BML880	Healthcare Wearables: Design and Applications	2	0	2	3
BMV704	Fundamentals of Neuromechanics	1	0	0	1

Sem.	Courses (Number, Abbreviated Title, L-T-P, credits)						Lecture courses	Contact h/week				Credits
								L	T	P	Total	
I	BML770 Fundamentals of Biomechanics (3-0-0) 3	BML710 Industrial Biomaterial Technology (3-0-0) 3	BML720 Medical Imaging (3-0-0) 3	PE-1# (2-4)	BC-1 (1)	BC-2 (1)	6	13-15	0	0	13-15	13-15[!]
II	BML737 Application of Mathematics in Biomedical Engineering (2-0-0) 2	BML760 Ethics, Safety and Regulatory Affairs (2-0-0) 2	BML740 Biomedical Instrumentation (3-0-0) 3	BMP743 Basic Biomedical Laboratory (0-0-4) 2	PE-2# (2-4)	PE-3# (2-4)	5	11-13	0	4	15-17	13-15[!]
Summer												
III	BMD801 Major Project-I (0-0-18) 9			OE-1 (2-4)			2	2-4	0	18	20-22	11-13
IV	BMD802 Major Project-II (0-0-24) 12						0	0	0	24	24	12

\# PE-1, 2 & 3; OE-1: Minimum 2 to maximum 4 credits can be taken by students towards each program or open elective courses. Total credits for three program electives and one open electives should be a minimum of 12.

! Total course credits for students in each semester should not exceed 15 for the first two semesters.

Total = 53

Programme Code: **AIB**

Master of Technology in Machine Intelligence and Data Science (MINDS)

Yardi School of Artificial Intelligence

The overall credits structure for the balanced stream (AIB)

Category	PC	CB	Project (Core)	PE	Total
Credits	12	4	18	20	54

Bridge Core

COL671*	Principles of Artificial Intelligence	3	0	2	4

* *May be waived on the recommendations of the programme co-ordinator.*

Program Core

AIL701	Mathematical Foundations of MINDS/	3	0	0	3
ELL780	Mathematical Foundations of Computer Technology	3	0	0	3
COL774	Machine Learning/	3	0	2	4
ELL784	Introduction to Machine Learning +	3	0	0	3
AIP701	Machine Learning Lab-I	0	0	2	1
COL761	Data Mining	3	0	2	4
AIV790	Ethical Considerations in MINDS	1	0	0	1
AID891	M.Tech. Project Part-I	0	0	12	6
AID892	M.Tech. Project Part-II	0	0	24	12

Note: *A combination of EE's introduction to machine learning course ELL784 (3-0-0) with a machine learning practical course, AIP701 (0-0-2) will be considered equivalent to COL774.*

Program Electives (Mathematics)

ELL706	Optimization for Electrical Engineers	3	0	0	3
MTL851	Applied Numerical Analysis	3	0	0	3
AIL711	Numerical Optimization	3	0	0	3
AIL712	Multivariate Statistics	3	0	0	3
ELL711	Signal Theory	3	0	0	3
ELL719	Detection and Estimation Theory	3	0	0	3
MTL704	Numerical Optimization	3	0	0	3
MAL717	Fuzzy Sets and Applications	3	0	0	3
MAL725	Stochastic Proceses and Applications	3	0	0	3
MTL757	Introduction to Algebraic topology	3	0	0	3
MTL763	Introduction to Game theory	3	0	0	3
MTL799	Mathematical Analysis in Learning Theory	3	0	0	3
AIL801	Intro. to the Mathematics of Machine Learning	3	0	0	3

Program Electives (Learning)

ELL882	Large-Scale Machine Learning	3	0	0	3
ELL888	Advanced Machine learning	3	0	0	3
COL775	Deep Learning	3	0	2	4
AIL721	Deep Learning	3	0	2	4
AIL722	Reinforcement Learning	3	0	0	3
AIL723	Graph Machine Learning	3	0	2	4
COL775	Deep Learning	3	0	2	4
COL777	Deep Reinforcement Learning	3	0	2	4
COL776	Learning Probabilistic Graphical Models	3	0	0	3
ELL729	Stochastic Control and Reinforcement Learning	3	0	0	3
ELL880	Computational Learning Theory and the Mind	3	0	0	3
ELL791	Neural Systems and Learning Machines	3	0	0	3
ELL795	Swarm Intelligence	3	0	0	3
ELL799	Natural Computing	3	0	0	3
AIL821	Special Topics in Machine Learning-I	3	0	0	3
AIL822	Selected Topics in Machine Learning-II (Proposed)	3	0	0	3
COL870	Special Topics in Machine Learning	3	0	0	3

Program Electives (Data Science)

ELL880	Special Topics in Computers - I*	3	0	0	3
MTL717	Fuzzy Sets and its Applications	3	0	0	3
ELL718	Statistical Signal Processing	3	0	0	3
BML738	Biomedical data analysis	3	0	0	3
COL764	Information Retrieval and Web Search	3	0	2	4
COL760	Advanced Data Management	3	0	2	4
AIL741	Querying and Mining Graph Data	3	0	2	4
AIL742	Scalable Data Handling for ML	3	0	2	4
AIL763	Artificial Intelligence for Earth Observation	3	0	2	4
COL877	Special Topics in Data Mining	3	0	0	3
COL868	Special Topics in Database Systems	3	0	0	3
AIL841	Special Topics in Data Science	3	0	0	3

Program Electives (AI Applications)

APL744	Probabilistic Machine Learning for Mechanics	3	0	2	4
APL745	Deep Learning for Mechanics	3	0	2	4
BML815	Deep Learning for Medical Image Analysis	2	0	0	2
BML735	Biomedical signal and image processing	2	0	2	3
COL727	Rapid Mixing in Markov Chains	3	0	0	3
COL772	Natural Language Processing	3	0	2	4

Sem.	Courses (Number, Abbreviated Title, L-T-P, Credits)				Lecture courses	Contact h/week				Credits
						L	T	P	Total	
I	AIL701 Numerical Optimization/ ELL780 Mathematical Foundations of Computer Technology (3-0-0) 3	Bridge 1: COL671 Artificial Intelligence (3-0-2) 4	COL774 Machine Learning/ ELL784 Intro. to Machine Learning + AIP701 Machine Learning Lab-I (3-0-2) 4	COL761 Data Mining (3-0-2) 4	-	12	0	6	18	15
II	PE1 (3-0-2) 4	AIV790 Ethical Considerations in MINDS (1-0-0) 1	PE-2 (3-0-2) 4	PE-3 (3-0-0) 3	-	10	0	4	14	12
III	PE-4 (3-0-0) 3	PE-5 (3-0-0) 3	AID891 M.Tech. Project Part-I (0-0-12) 6	PE-6 (3-0-0) 3	-	9	0	12	21	15
IV	AID891 Major Project Part-II (0-0-24) 12				-	0	0	24	24	12

Note: *A combination of EE's introduction to machine learning course ELL784 (3-0-0) with a machine learning practical course, equivalent to COL774*

Total = 50-54*

COL770	Advanced Artificial Intelligence	3	0	2	4
COL786	Advanced Functional Brain Imaging	3	0	2	4
ELL718	Statistical Signal Processing	3	0	0	3
ELL793	Computer Vision	3	0	0	3
COL780	Computer Vision	3	0	0	3
COL778	Principles of Autonomous Systems	3	0	2	4
ELL881	Special Topics in Computers - II*	3	0	0	3
ELL883	Embedded Intelligence	3	0	0	3
ELL885	Machine Learning for Computational Finance	3	0	0	3
ELL890	Computational Neuroscience	3	0	0	3
ELL891	Advances in Deep Learning	3	0	0	3
MTL733	Stochastic of Finance	3	0	0	3
MTL785	Natural Language Processing	3	0	0	3
AIL861	Special Topics in AI Applications	3	0	0	3
COL864	Special Topics in Artificial Intelligence	3	0	0	3
COL873	Special Topics in Natural Language Processing	3	0	0	3
AIL862	Special Topics in Computer Vision	3	0	0	3
COL878	Special Topics in AI-based Robotics	3	0	0	3

Program Electives (Other)

AID799	Minor Project	0	0	6	3
AID710	Mini Project in Artificial Intelligence	0	0	6	3
AIS710	Independent Study in Artificial Intelligence	0	3	0	3

*Subject to approval of topic/specialization in a particular semester by the School Research Committee (ScRC).

Master of Technology in Cyber Security

Interdisciplinary Programme

The overall credits structure

Category	PC	PE	OE	Total
Credits	32	16-24	00	48-56

Program Core

JCD891	Minor Project	0	0	6	3	
JCD892	M.Tech. Project Part-I	0	0	12	6	
JCD893	M.Tech Project Part-II	0	0	24	12	
COL702	Advanced Data Structures/ ELL781 Software Fundamentals for Computer Tech**	3	0	2	4*	
COL759	Cryptography & Computer Security/ MTL730 Cryptography	3	0	0	3	
SIL765	Network and System Security/ ELL810 Cyber Security and Information Assurance	3	0	2	4*	

** Note the CSE background students will do COL702 and non-CS background students will do ELL781 or as instructed by PEC.

* Note that since ELL781 & ELL810 being 3-0-0 courses the lab component will be made up with registering for JCP781(0-0-2)1 & JCP810 (0-0-2)1 respectively.

Total Credits ***32***

Bridge Courses

Min. 6 credits, may be waived in exceptional cases on recommendation by PEC

SIL618	Computer Architecture	3	0	2	4
COL633	Resources Mgmt. in Computer Systems	3	0	2	4
COL671	Artificial Intelligence	3	0	2	4
COL672	Computer Networks	3	0	2	4

Streamed Program Electives (PE)

*Program Electives can be added on the recommendation by PEC

*Note - Students are required to do three electives in their respective streams and one each in the other two streams to ensure breadth.

Streamed Electives(JCS) in System Security and Cyber Forensics

JCS816	Independent Study	0	3	0	3
COL731	Advanced Compiler Techniques for Optimization, Safety and Security	3	0	2	4
COL718	Architecture of high performance Computers	3	0	2	4
COL724	Advanced Computer Networks	3	0	2	4
COL728	Compiler Design	3	0	3	4.5
COL729	Compiler Optimisation	3	0	3	4.5
COL732	Virtualization and Cloud Computing	3	0	2	4
COL733	Cloud Computing Technology Fundamental	3	0	2	4
COL768	Wireless Networks	3	0	2	4
COL851	Special Topics in Operating Systems	3	0	0	3
COL861	Special Topics in Hardware Systems	3	0	0	3
COL864	Special Topics in Artificial Intelligence	3	0	0	3
COL865	Special Topics in Computer Applications	3	0	0	3
COL867	Special Topics in High Speed Networks	3	0	0	3
COL870	Special Topics in Machine Learning	3	0	0	3
COL871	Special Topics in Programming Language	3	0	0	3
COL874	Special Topics in Compiler and Lang Impl	3	0	0	3

Sem.	Courses (Number, Abbreviated Title, L-T-P, Credits)					Lecture courses	Contact h/week				Credits
							L	T	P	Total	
I	COL702/ ELL781+JCP781 Advanced Data Structures/Software Fundamentals for Computer Tech (3-0-2) 4/(3-0-0)3+ (0-0-2)1	Bridge-1 (3-0-2)4	COL759/MTL730 Cryptography & Computer Security/ Cryptography (3-0-0) 3	PE-1 (3-4)		3-4	9-12	0	2-6	11-18	10-15
II	JCD891 Minor Project (0-0-6) 3	Bridge-1 (3-0-2)4	SIL765/ELL810 +JCP810 Cyber Security and Information Assurance/Network and System Security (3-0-2) 4/(3-0-0)3+ (0-0-2)1	PE-2 (3-4)		2-3	6-9	0	8-12	14-21	10-15
III	JCD892 MTP-I (0-0-12) 6	PE-3 (3-4)	PE-4 (3-4)			2	6	0	12-16	18-24	12-15
IV	JCD893 MTP-II (0-0-24) 12	PE-5 (3)				1	3	0	20-22	23-25	15

NOTE: 1. Registration for MTP-II has a requirement of Min. CGPA 7.5 at the end 3rd sem and B Grade in JCD892. In exceptional cases PEC may waive the CGPA requirement

2. MTP – II can also be done in a collaborative manner with Industry/University.

In future joint degree programmes with other institutes/universities can be considered.

We are proposing M. Tech in Cyber security with 20 seats with additional Full-time/Part-time sponsored candidates from Industry/Government.The admissions will be done through GATE in CS/EC/MA/EE as per Institute norms for other interdisciplinary programs.

Total = 48-56

COL876	Special Topics in Formal Methods	3	0	0	3
COV881	Special Module in Hardware Systems	1	0	0	1
COV882	Special Module in Software Systems	1	0	0	1
COV887	Special Module in High Speed Networks	1	0	0	1
COL886	Special Topics in Operating Systems	3	0	0	3
ELV710	Special Module in Cyber Security	1	0	0	1
ELL714	Basic Information Theory	3	0	0	3
ELL785	Computer Communication Networks	3	0	0	3
ELL800	Numerical Linear Algebra and Optimization in Engineering	3	0	0	3
ELL880	Special Topics in Computers-I	3	0	0	3
ELL881	Special Topics in Computers-II	3	0	0	3
ELL892	Internet Technologies	3	0	0	3
ELL893	Cyber-Physical Systems	3	0	0	3
ELL895	Network Security	3	0	0	3
ELL897	Network Management	3	0	0	3
MDL804	Behavioral Finance	1.5	0	0	1.5
MSL852	Network System: Applications and Mgmt.	3	0	0	3
MSL855	Electronic Commerce	3	0	0	3
MSL878	Electronic Payments	1.5	0	0	1.5
MTL744	Mathematical Theory of Coding	3	0	0	3
SIL771	Special Topics in Cyber Security	3	0	0	3
SIL773	Digital Watermarking and Steganography	3	0	0	3
SIL775	Biometric Security	3	0	0	3
SIL777	Secure Programming Methodologies	3	0	2	4
SIL779	Data Privacy	3	0	0	3
SIV810	Special Module in Cyber Security	1	0	1	1.5
SIV812	Special Module in Computer Forensics	1	0	1	1.5
SIV814	Special Module in Application Security	1	0	1	1.5
SIV895	Special Module on Intelligent Information Processing	1	0	0	1

Streamed Electives(JCS) in Cryptography and Cryptanalysis

JCS816	Independent Study	0	3	0	3
COL730	Parallel Programming	3	0	2	4
COL774	Machine Learning	3	0	2	4
COL864	Special Topics in Artificial Intelligence	3	0	0	3
COL865	Special Topics in Computer Applications	3	0	0	3
COL870	Special Topics in Machine Learning	3	0	0	3
COL872	Special Topics in Cryptography	3	0	0	3
COV878	Special Module in Machine Learning	1	0	0	1
COV884	Special Module in Artificial Intelligence	1	0	0	1
ELL710	Coding Theory	3	0	0	3
ELL712	Digital Communications	3	0	0	3
ELL711	Signal Theory	3	0	0	3
ELL718	Statistical Signal Processing	3	0	0	3
ELL720	Advanced Digital Signal Processing	3	0	0	3
ELL800	Numerical Linear Algebra and Optimization in Engineering	3	0	0	3
ELL880	Special Topics in Computers-I	3	0	0	3
ELL881	Special Topics in Computers-II	3	0	0	3
MTL729	Comp. Algebra & its Applications	3	0	0	3
MTL735	Advanced Number Theory	3	0	0	3
MTL744	Mathematical Theory of Coding	3	0	0	3
MTL782	Data Mining	3	0	2	4
MTL811	Mathematical Foundation of AI	3	0	0	3
SIL771	Special Topics in Cyber Security	3	0	0	3
SIL773	Digital Watermarking and Steganography	3	0	0	3
SIL775	Biometric Security	3	0	0	3
SIL779	Data Privacy	3	0	0	3
SIV810	Special Module in Cyber Security	1	0	1	1.5
SIV812	Special Module in Computer Forensics	1	0	1	1.5
SIV814	Special Module in Application Security	1	0	1	1.5
SIL763	Introduction to Blockchains, Cryptocurrencies and Smart contracts	3	0	2	4

Streamed Electives(JCS) in Embedded System and Hardware Security

JCS816	Independent Study	0	3	0	3
COL718	Architecture of High-Performance Computer	3	0	2	4
COL719	Synthesis of Digital Systems	3	0	2	4
COL720	Real Time Systems	3	0	2	4
COL750	Foundations of Automatic Verification	3	0	2	4
COL788	Advanced Topics in Embedded Computing	3	0	0	3
COL861	Special Topics in Hardware Systems	3	0	0	3
COL862	Special Topics in Software Systems	3	0	0	3
COV889	Special Module in Concurrency	1	0	0	1
COL812	System Level Design and Modelling	3	0	0	3
ELV710	Special Module in Cyber Security	1	0	0	1
ELL720	Advanced Digital Signal Processing	3	0	0	3
ELL733	Digital ASIC Design	3	0	2	4
ELL748	System-on-Chip Design and Test	3	0	0	3
ELL765	Smart Grid Technology	3	0	0	3
ELL772	Planning and Operation of Smart Grid	3	0	0	3
ELL787	Embedded Systems and Applications	3	0	0	3
ELL880	Special Topics in Computers-I	3	0	0	3
ELL881	Special Topics in Computers-II	3	0	0	3
ELL883	Embedded Intelligence	3	0	0	3
MSL855	Electronic Commerce	3	0	0	3
MSL878	Electronic Payments	1.5	0	0	1.5
MDL804	Behavioral Finance	1.5	0	0	1.5
SIV810	Special Module in Cyber Security	1	0	1	1.5
SIV814	Special Module in Application Security	1	0	1	1.5
SIL771	Special Topics in Cyber Security	3	0	0	3
SIL773	Digital Watermarking and Steganography	3	0	0	3
SIL775	Biometric Security	3	0	0	3
SIL777	Secure Programming Methodologies	3	0	2	4
SIL781	Secure Hardware-based Systems Design	3	0	2	4
SIL763	Introduction to Blockchains, Cryptocurrencies and Smart Contracts	3	0	2	4

Master of Technology in Energy Studies

Interdisciplinary Programme

The overall credits structure

Category	PC	PE	OE	Total
Credits	30	18	06	54

Program Core

ESL710	Energy, Ecology and Environment	3	0	0	3
ESL711	Fuel Technology	3	0	0	3
ESL720	Energy Conservation	3	0	0	3
ESL730	Direct Energy Conversion	3	0	0	3
ESL740	Non-conventional Sources of Energy	3	0	0	3
ESL750	Economics and Planning of Energy Systems	3	0	0	3
ESL760	Heat Transfer	3	0	0	3
ESP713	Energy Laboratory	0	0	6	3
JSD801	Major Project Part-I (JES)	0	0	12	6
	Total Credits				***30***

Program Electives

ESL714	Power Plant Engineering	3	0	0	3
ESL718	Power Generation, Transmission and Distribution	3	0	0	3
ESL722	Integrated Energy Systems	3	0	0	3
ESL732	Bioconversion and Processing of Waste	3	0	0	3
ESL734	Nuclear Energy	3	0	0	3
ESL737	Plasma Based Materials Processing	3	0	0	3
ESL746	Hydrogen Energy	3	0	0	3
ESL755	Solar Photovoltaic Devices and Systems	3	0	0	3
ESL768	Wind Energy and Hydro Power Systems	3	0	0	3
ESL770	Solar Energy Utilization	3	0	0	3
ESL779	Li-ion Batteries: Technology and Thermal Management	3	0	0	3
ESL796	Operation and Control of Electrical Energy Systems	3	0	0	3
ESL810	MHD Power Generation	3	0	0	3
ESL840	Solar Architecture	3	0	0	3
ESL850	Solar Refrigeration and Air Conditioning	3	0	0	3
ESL860	Electrical Power Systems Analysis	3	0	0	3
ESL870	Fusion Energy	3	0	0	3
ESL871	Advanced Fusion Energy	3	0	0	3
ESL880	Solar Thermal Power Generation	3	0	0	3
JSD799	Minor Project (JES)	0	0	6	3
JSD802	Major Project Part-II (JES)	0	0	24	12
JSS801	Independent Study (JES)	0	3	0	3

Program Electives (other Departments)

MEL815	Applied Combustion	2	0	2	4
MEL816	Analysis of I.C. Engine Processes	3	0	2	4
EEL748	Power Quality	3	0	0	3
EEL899	Distribution Automation	3	0	0	3
CHL722	Fundamentals of Fuel Cell Technology	3	0	2	4

Sem.	Courses (Number, Abbreviated Title, L-T-P, Credits)					Lecture courses	Contact h/week				Credits
							L	T	P	Total	
I	ESL740 Non-conventional Sources of Energy (3-0-0) 3	ESL711 Fuel Technology (3-0-0) 3	ESL760 Heat Transfer (3-0-0) 3	ESL720 Energy Conservation (3-0-0) 3	PE-1 (3-0-0) 3	5	15	0	0	15	15
II	ESL750 Economics and Planning of Energy Systems (3-0-0) 3	ESL710 Energy, Ecology and Environment (3-0-0) 3	ESP713 Energy Laboratory (0-0-6) 3	ESL730 Direct Energy Conversion (3-0-0) 3	PE-2 (3-0-0) 3	4	12	0	6	18	15
Summer	JSD801 Major Project Part-1 (JES)					0					
III	JSD801 Major Project Part-I (JES) (0-0-12) 6	OE-1 (3-0-0) 3		OE-2 (3-0-0) 3		2	6	0	12	18	12
IV	JSD802 Major Project Part-II (JES) (0-0-24) 12					0	0	0	24	24	12
	PE-3 (3-0-0) 3	PE-4 (3-0-0) 3	PE-5 (3-0-0) 3	PE-6 (3-0-0) 3		4	12	0	0	12	

NOTE: for part time students, the above credits would be completed over 6 semesters with the Major Project Part I & II being offered in the 5th and 6th semesters respectively

Total = 54

Programme Code: **ESN**

Master of Technology in Energy & Environment Technologies and Management

Interdisciplinary Programme

The overall credits structure

Category	PC	PE	OE	Total
Credits	30	18	06	54
Bridge (Audit) Courses	1	0	0	1

Program Core

ESL711	Fuel Technology	3	0	0	3
ESL715	Electrical Energy Management Systems	3	0	0	3
ESL727	Energy and Environment	3	0	0	3
ESL740	Non-conventional Sources of Energy	3	0	0	3
ESL774	Quantitative Methods for Energy Management and Planning	3	0	0	3
ESL776	Industrial Energy and Environment Analysis	3	0	0	3
ESL784	Cogeneration and Energy Efficiency	3	0	0	3
ESP728	Energy & Environment Laboratory	0	0	6	3
ESD801	Major Project Part-I (ESN)	0	0	12	6

Compulsory (Audit) Courses (CA)

ESN704	Basic Thermal Engineering	1	0	0	0
ESN712	Basic Electrical Engineering	1	0	0	0
	Total Credits				***30***

Program Electives

ESL721	Pulse Width Modulation Techniques and AC Motor Drives	3	0	0	3
ESL724	Energy Audit	3	0	0	3
ESL733	Organic Waste to Energy Conversion Technology	3	0	0	3
ESL735	Hazardous Waste Management	3	0	0	3
ESL738	Power System Planning and Operation	3	0	0	3
ESL742	Economics and Financing of Renewable Energy Systems	3	0	0	3
ESL743	Optimal Design of Energy Systems	3	0	0	3
ESL744	Plasmas for Energy and Environment	3	0	0	3
ESL745	Environmental Audit and Impact Assessment	3	0	0	3
ESL749	Developing Energy Efficiency and Renewable Energy Projects	3	0	0	3
ESL752	Carbon Audit and Management	3	0	0	3
ESL754	Nanomaterials for Energy Applications	3	0	0	3
ESL756	Energy Policy and Planning	3	0	0	3
ESL758	Carbon Capture and Storage	3	0	0	3
ESL764	Environmental Economics	3	0	0	3
ESL766	Environmental Regulations	3	0	0	3
ESL771	Instrumentation and Control in Energy Systems	3	0	0	3
ESL772	Energy Storage	3	0	0	3
ESL775	Liquid Sprays for Energy Sector and Industrial Applications	3	0	0	3
ESL779	Li-ion Batteries: Technology and Thermal Management	3	0	0	3
ESL781	Alternative Fuels for Aircraft and Rocket Propulsion	3	0	0	3

Program Electives/Open Electives

ESL773	Battery Storage	3	0	0	3
ESL778	Industrial Waste Management and Recycling	3	0	0	3
ESL780	Zero Emission Vehicles	3	0	0	3
ESL782	Emission Control in Internal Combustion Engines	3	0	0	3
ESL796	Operation & Control of Electrical Energy Systems	3	0	0	3
ESL797	Operation of Electrical Energy Systems with Large Scale Integration of Renewable Energy Sources.	3	0	2	4
ESL798	Distributed and Decentralized Energy Systems	3	0	0	3
ESL804	Pollution Control in Power Plants	3	0	0	3
ESL875	Alternative Fuels for Transportation	3	0	0	3
ESV891	Special Topics on Emerging Trends in Energy and Environmental Technologies	1	0	0	1
ESD799	Minor Project (ESN)	0	0	6	3
ESS801	Independent Study (ESN)	0	3	0	3
ESD802	Major Project Part-II (ESN)	0	0	24	12

Program Electives (other Departments)

CLL723	Hydrogen energy and Fuel Cell Technology	3	0	0	3
CLL724	Environmental Engg. and Waste Mgmt.	3	0	0	3
CLL725	Air Pollution Control Engineering	3	0	0	3
CLL706	Petroleum Production Engineering	3	0	0	3
CLL794	Petroleum Refinery Engineering	3	0	0	3
CVL820	Environmental Impact Assessment	3	0	0	3
CVL822	Emerging Technologies for Environmental Mgmt.	3	0	0	3
CVL823	Thermal Techniques for Waste Mgmt.	3	0	0	3
CVL824	Life Cycle Analysis & Design for Environment	3	0	0	3
CVL721	Solid Waste Engineering	3	0	0	3
CVL720	Air Pollution and control	3	0	0	3
CVL847	Transportation Economics	3	0	0	3
ELL765	Smart Grid Technology	3	0	0	3
MCL812	Combustion	3	0	0	3
MCL825	Design of Wind Power Farms	3	0	0	3
PYL727	Energy Materials and Devices	3	0	0	3

Sem.	Courses (Number, Abbreviated Title, L-T-P, credits)						Lecture courses	Contact h/week				Credits
								L	T	P	Total	
I	ESL740 Non-conventional Sources of Energy (3-0-0) 3	ESL711 Fuel Technology (3-0-0) 3	ESL715 Electrical Energy Mgmt. Systems (3-0-0) 3	ESL727 Energy and Environment (3-0-0) 3	PE-1 (3-0-0) 3	ESN704 Basic Thermal Engineering / ESN712 Basic Electrical Engineering (1-0-0) 0	6	16	0	0	16	15
II	ESL776 Industrial Energy and Environment Analysis (3-0-0) 3	ESL784 Cogeneration and Energy Efficiency (3-0-0) 3	ESP728 Energy & Environment Laboratory (0-0-6) 3	ESL774 Quantitative Methods for Energy Mgmt. and Planning (3-0-0) 3	PE-2 (3-0-0) 3		4	12	0	6	18	15
Summer	ESD801 Major Project Part-I											
III	ESD801 Major Project Part-I (0-0-12) 6	OE-1 (3-0-0) 3	OE-2 (3-0-0) 3				2	6	0	12	18	12
IV	ESD802 Major Project Part-II (0-0-24) 12						0	0	0	24	24	12
	PE-3 (3-0-0) 3	PE-4 (3-0-0) 3	PE-5 (3-0-0) 3	PE-6 (3-0-0) 3			4	12	0	0	12	

NOTE: for part time students, the above credits would be completed over 6 semesters with the Major Project Part I & II being offered in the 5th and 6th semesters respectively

Total = 54

Programme Code: **ESR**

Master of Technology in Renewable Energy Technologies and Management

Interdisciplinary Programme

The overall credits structure

Category	PC	PE	OE	Total
Credits	27	24	0	51
Bridge (Audit) Courses	0-4	0	0	0-4

Program Core

ESL739	Bio-energy : Resources, Technologies and Applications	3	0	0	3
ESL742	Economics and Financing of Renewable Energy Systems	3	0	0	3
ESL753	Solar Thermal Technologies and Systems	3	0	0	3
ESL755	Solar Photovoltaic Devices and Systems	3	0	0	3
ESL768	Wind Energy and Hydro Power Systems	3	0	0	3
ESP705	Renewable Energy Laboratory	0	0	6	3
ESD798	Minor Project (ESR)	0	0	6	3
ESD851	Major Project-I (ESR)	0	0	12	6

Bridge (Audit) Courses (BA): *(Based on Student's background and preparedness)*

ESN702	Introduction to Project Management	1	0	0	0
ESN703	Technical Writing	1	0	0	0
ESN704	Basic Thermal Engineering (for Non-mechanical Students)	1	0	0	0
ESN712	Basic Electrical Engineering (for Non-electrical Students)	1	0	0	0
ESN791	Applied Mathematics and Computational Methods	1	0	0	0
	Total Credits				***27***

Program Electives

ESL718	Power Generation, Transmission and Distribution	3	0	0	3
ESL721	Pulse Width Modulation Techniques and AC Motor Drives	3	0	0	3
ESL729	Renewable Energy and Environment	3	0	0	3
ESL730	Direct Energy Conversion	3	0	0	3
ESL732	Bioconversion and Processing of Waste	3	0	0	3
ESL737	Plasma Based Materials Processing	3	0	0	3
ESL744	Plasma for Energy and Environment	3	0	0	3
ESL746	Hydrogen Energy	3	0	0	3
ESL749	Developing Energy Efficiency and Renewable Energy Projects	3	0	0	3
ESL751	Renewable Energy Resource Assessment and Forecasting	3	0	0	3
ESL752	Carbon Audit and Management	3	0	0	3
ESL756	Energy Policy and Management	3	0	0	3
ESL757	Energy Policy and Planning	3	0	0	3
ESL771	Instrumentation and Control in Energy Systems	3	0	0	3
ESL772	Energy Storage	3	0	0	3
ESL773	Battery Storage	3	0	0	3
ESL774	Quantitative Methods for Energy Mgmt. & Planning	3	0	0	3
ESL775	Liquid Sprays for Energy Sector and Industrial Applications	3	0	0	3
ESL779	Li-ion Batteries: Technology and Thermal Management	3	0	0	3
ESL780	Zero Emission Vehicles	3	0	0	3
ESL781	Alternative Fuels for Aircraft and Rocket Propulsion	3	0	0	3
ESL790	Policy and Regulatory Aspects of Power System Operation with Increasing Renewable Energy Share	3	0	0	3
ESL791	Renewable energy Integration and Power Systems	3	0	0	3
ESL796	Operation and Control of Electrical Energy Systems	3	0	0	3
ESL797	Operation of Electrical Energy Systems with Large Scale Integration of Renewable Energy Sources	3	0	2	4
ESL798	Distributed and Decentralized Energy Systems	3	0	0	3
ESL799	Essentials of Electrical Power Generation by Renewable Energy Sources	2	0	2	3
ESL840	Solar Architecture	3	0	0	3
ESL842	Negative CO_2 Emission Technologies	3	0	0	3

FULL TIME (4-Semester Schedule)

Sem.	Courses (Number, Abbreviated Title, L-T-P, credits)							Lecture courses	Contact h/week				Credits
									L	T	P	Total	
I	ESL739 Bio-energy : Resources, Technologies & Applications (3-0-0) 3	ESL742 Economics and Financing of Renewable Energy Systems (3-0-0) 3	ESL755 Solar Photovoltaic Devices and Systems (3-0-0) 3	ESL753 Solar Thermal Technologies and Systems (3-0-0) 3	PE-1 (3-0-0) 3	BA-1 (1-0-0) 0 [If required]	BA-2 (1-0-0) 0 [If required]	5-7	15-17	0	0	15-17	15
II	ESP705 Renewable Energy Laboratory (3-0-0) 3	ESL768 Wind Energy and Hydro Power Systems (3-0-0) 3	PE-2 (3-0-0) 3	PE-3 (3-0-0) 3	PE-4 (3-0-0) 3	BA-3 (1-0-0) 0 [If required]	BA-4 (1-0-0) 0 [If required]	4-6	12-14	0	6	18-20	15
Summer	Internship and ESD801 [Major Project Part-I (0-0-12) 6]												
III	ESD851 Major Project Part-I (ESR) (0-0-12) 6 [and Internship]					ESD798 Minor Project (ESR) (0-0-6) 3		0	0	0	18	18	09
IV	ESD852 Major Project Part-II (ESR) (0-0-24) 12 [with option to carry out in the home country for a foreign national student with provision for presentations through video conference]							0 or 4	0 or 12	0	0 or 24	12 or 24	12
	PE-5 (3-0-0) 3	PE-6 (3-0-0) 3		PE-7 (3-0-0) 3		PE-8 (3-0-0) 3							

* Possibility of inviting foreign students about a month in advance to take bridge courses is being explored

Total = 51

ESL845	Net Zero Energy Buildings	3	0	0	3
ESL850	Solar Refrigeration and Air-conditioning	3	0	0	3
ESL852	Emerging Materials for Next Generation Photovaltaic Applications	3	0	0	3
ESL855	Solar Photovoltaic Power Generation	3	0	0	3
ESL875	Alternative Fuels for Transportation	3	0	0	3
ESL880	Solar Thermal Power Generation	3	0	0	3
ESL885	Solar Industrial Process Heating	3	0	0	3
ESP706	Renewable Energy Simulation Laboratory	0	0	6	3
ESV891	Special Topics on Emerging Trends in Energy and Environmental Technologies	1	0	0	1

ESS851	Independent Study (ESR)	0	3	0	3
ESD852	Major Project Part – 2 (ESR)	0	0	24	12

Program Electives (From outside Centre)

ASL760	Renewable Energy Meteorology	3	0	0	3
CLL723	Hydrogen Energy and Fuel Cell Technology	3	0	0	3
EEL758	Power Quality	3	0	0	3
EEL765	Smart Grid Technology	3	0	0	3
MCL825	Design of Wind Power Farms	3	0	2	4
PYL727	Energy Materials and Devices	3	0	0	3

PART TIME (6-Semester Schedule)

<table>
<tr><th rowspan="2">Sem.</th><th rowspan="2" colspan="4">Courses
(Number, Abbreviated Title, L-T-P, credits)</th><th rowspan="2">Lecture courses</th><th colspan="4">Contact h/week</th><th rowspan="2">Credits</th></tr>
<tr><th>L</th><th>T</th><th>P</th><th>Total</th></tr>
<tr><td>I</td><td>ESL739
Bio-energy : Resources, Technologies & Applications
(3-0-0) 3</td><td>ESL742
Economics and Financing of Renewable Energy Systems
(3-0-0) 3</td><td>ESL753
Solar Thermal Technologies and Systems
(3-0-0) 3</td><td>BA-1
(1-0-0) 0
[If required]</td><td>3-4</td><td>9-10</td><td>0</td><td>0</td><td>9-10</td><td>9</td></tr>
<tr><td>II</td><td>ESL768
Wind Energy and Hydro Power Systems
(3-0-0) 3</td><td>ESP705
Renewable Energy Laboratory
(0-0-6) 3</td><td>ESL755
Solar Photovoltaic Devices and Systems
(3-0-0) 3</td><td>BA-2
(1-0-0) 0
[If required]</td><td>2-3</td><td>6-7</td><td>0</td><td>6</td><td>9-10</td><td>9</td></tr>
<tr><td>Summer</td><td colspan="4"></td><td colspan="6"></td></tr>
<tr><td>III</td><td>PE-1
(3-0-0) 3</td><td>PE-2
(3-0-0) 3</td><td colspan="2">BA-3
(1-0-0) 0
[If required]</td><td>2-3</td><td>6-7</td><td>0</td><td>0</td><td>6-7</td><td>6</td></tr>
<tr><td>IV</td><td>PE-3
(3-0-0) 3</td><td>PE-4
(3-0-0) 3</td><td colspan="2">BA-4
(1-0-0) 0
[If required]</td><td>2-3</td><td>6-7</td><td>0</td><td>6</td><td>6-7</td><td>6</td></tr>
<tr><td>Summer</td><td colspan="4">Internship and ESD851
[Major Project Part-I (0-0-12) 6]</td><td colspan="6"></td></tr>
<tr><td>V</td><td colspan="3">ESD851
Major Project Part-I
(0-0-12) 6 [and Internship]</td><td>ESD798
Minor Project
(0-0-6) 3</td><td>0</td><td>0</td><td>0</td><td>18</td><td>18</td><td>9</td></tr>
<tr><td rowspan="2">VI</td><td colspan="4">ESD852
Major Project Part
(0-0-24) 12</td><td rowspan="2">0 or 4</td><td rowspan="2">0 or 12</td><td rowspan="2">0</td><td rowspan="2">0 or 24</td><td rowspan="2">12 or 24</td><td rowspan="2">12</td></tr>
<tr><td>PE-5
(3-0-0) 3</td><td>PE-6
(3-0-0) 3</td><td>PE-7
(3-0-0) 3</td><td>PE-8
(3-0-0) 3</td></tr>
</table>

Total = 51

Programme Code: **JIT**

Master of Technology in Industrial Tribology and Maintenance Engineering

Interdisciplinary Programme

The overall credits structure

Category	PC	PE	OE	Total
Credits	**33**	**09**	**06**	**48**

Program Core

ITL702	Diagnostic Maintenance and Condition Monitoring	3	0	2	4
ITL703	Fundamentals of Tribology	3	0	2	4
ITL705	Materials for Tribological Applications	3	0	0	3
ITL714	Failure Analysis and Repair	3	0	2	4
JIT801	Major Project Part-I (JIT)	0	0	12	6
JIT802	Major Project Part-II (JIT)	0	0	24	12
	Total Credits				***33***

Program Electives

ITL709	Maintenance Planning and Control	3	0	0	3
ITL710	Design of Tribological Elements	3	0	0	3
ITL711	Reliability, Availability and Maintainability (RAM) Engineering	3	0	0	3
ITL717	Corrosion and its Control	3	0	0	3
ITL730	Lubricants	2	0	2	3
ITL740	Risk Analysis and Safety	2	1	0	3
ITL752	Bulk Materials Handling	2	0	2	3
ITL760	Noise Monitoring and Control	2	0	2	3
ITL810	Bearing Lubrication	3	0	0	3
JIS800	Independent Study	0	3	0	3
JID800	Minor Project	0	0	6	3

Sem.	Courses (Number, Abbreviated Title, L-T-P, Credits)							Lecture courses	Contact h/week				Credits
									L	T	P	Total	
I	ITL703 Fundamentals of Tribology (3-0-2) 4	ITL705 Materials for Tribological Applications (3-0-0) 3				PE-1 (3-0-0) 3	OE-1 (3-0-0) 3	4	12	0	2	14	13
II	ITL702 Diagnostic Maintenance & Condition Monitoring (3-0-2) 4	ITL714 Failure Analysis & Repair (3-0-2) 4				PE-2 (3-0-0) 3	PE-3 (3-0-0) 3	4	12	0	4	16	14
III	JID801 Major Project Part-I (JIT) (0-0-12) 6					OE-2 (3-0-0) 3		1	3	0	12	15	9
IV	JID802 Major Project Part-II (JIT) (0-0-24) 12							0	0	0	24	24	12

Total = 48

Master of Technology in *Instrument Technology*

Interdisciplinary Programme

The overall credits structure

Category	PC	PE	OE	Total
Credits	39	15	0	54

Program Core

DSD801	Major Project Part-I	0	0	12	6
DSD802	Major Project Part-II	0	0	24	12
DSL711	Sensors and Transducers	3	0	0	3
DSL712	Electronic Techniques for Signal Conditioning and Interfacing	3	0	0	3
DSL714	Instrument Design and Simulations	2	0	2	3
DSL731	Optical Components and Basic Instruments	3	0	0	3
DSL734	Laser Based Instrumentation	3	0	0	3
DSP703	Instrument Technology Laboratory-I	0	0	6	3
DSP704	Instrument Technology Laboratory-II	0	0	6	3
	Total Credits				***39***

Program Electives

ELL746	Biomedical Electronics	3	0	0	3
ELL783	Operating System	3	0	2	4
ELL787	Embedded Systems and Applications	3	0	0	3
ELL735	Analog Integrated Circuits	3	0	0	3
ELL734	MOS VLSI design	3	0	0	3
ELL784	Introduction to Machine Learning	3	0	0	3
ELL883	Embedded Intelligence	3	0	0	3
MCL705	Experimental Methods	3	0	2	4
MCL749	Mechatronic Product Design	3	0	2	4
MCL781	Machining Processes and Analysis	3	0	2	4
MCL783	Automation in Manufacturing	3	0	2	4
PYL755	Basic optics and optical instrumentation	3	0	0	3
PYL780	Diffractive and micro optics	3	0	0	3
PYL790	Integrated Optics	3	0	0	3
PYL792	Optical Electronics	3	0	0	3
PYL793	Photonic Devices	3	0	0	3
PYP761	Optical fabrication and Metrology Laboratory	0	0	6	3
CRL725	Technology of RF and Microwave Solid State Devices	3	0	0	3
DSC812	Term Paper and Seminar	0	3	0	3
DSL601	Electronic Components and Circuits (for Non-electrical Students only)	3	0	0	3
DSL603	Material and Mechanical Design (for electrical students only)	3	0	0	3
DSL722	Precision Measurement Systems	3	0	0	3
DSL733	Optical Material and Optical Techniques in Instrumentation	2	0	2	3
DSL737	Display Devices and Technology	3	0	0	3
DSL740	Instrument Organization and Ergonomics	2	0	2	3
DSL742	Integrated Quantum Photonics	3	0	0	3
DSL750	Opto-electronic Detectors and Image Sensors	3	0	0	3
DSL755	Sensing and Imaging Techniques	3	0	0	3
DSL811	Selected Topics in Instrumentation-I	3	0	0	3
DSL814	Selected Topics in Instrumentation-II	3	0	0	3
DSL815	Special Topics in Instrumentation	1	0	0	1
DSP705	Advanced Instrument Technology Lab	0	0	6	3
DSS720	Independent Study	0	3	0	3

Sem.	Courses (Number, Abbreviated Title, L-T-P, Credits)						Lecture courses	Contact h/week				Credits
								L	T	P	Total	
I	DSP703 Instrument Technology Laboratory-I (0-0-6) 3	DSL711 Sensors and Transducers (3-0-0) 3	DSL731 Optical Components and Basic Instruments (3-0-0) 3	DSL601*/ DSL603** Electronic Components and Circuits/Material and Mechanical Design (3-0-0) 3	PE-1 (3-0-0) 3		4	12	0	6	18	15
II	DSP704 Instrument Technology Laboratory-II (0-0-6) 3	DSL712 Electronic Techniques for Signal Conditioning and Interfacing (3-0-0) 3	DSL714 Instrument Design and Simulations (2-0-2) 3	DSL734 Laser Based Instrumentation (3-0-0) 3	PE-2 (3-0-0) 3		4	11	0	8	19	15
Summer												
III	DSD801 (0-0-12) 6	PE-3 (3-0-0) 3	PE-4 (3-0-0) 3				2	6	0	12	18	12
IV	DSD802 (0-0-24) 12						0	0	0	24	24	12

*For students with non-electrical Engineering, Electronics, Instrumentation, Electronics and Communication background.
**For students with Electrical Engineering, Electronics, Instrumentation, Electronics and Communication background.

Total = 54

Programme Code: **JOP**

Master of Technology in Optoelectronics and Optical Communication

Interdisciplinary Programme

The overall credits structure

Category	PC	PE	OE	Total
Credits	24	27	0	51

Program Core

ELL717	Optical Communication Systems	3	0	0	3
ELL727	Digital Communication & Information Systems	3	0	0	3
JOD801	Major Project Part-I	0	0	12	6
JOP791	Laboratory-I (Fiber Optics Lab/Opt. Comm. Lab)	0	0	6	3
JOP792	Laboratory-II (Fiber Optics Lab/Opt. Comm. Lab)	0	0	6	3
PYL791	Fiber Optics	3	0	0	3
PYL792	Optical Electronics	3	0	0	3
	Total Credits				***24***

Program Electives

ELL716	Telecommunication Switching and Transmission	3	0	0	3
ELL720	Advanced Digital Signal Processing	3	0	0	3
ELL723	Broadband Communication Systems	3	0	0	3
ELL726	Nano-Photonics and Plasmonics	3	0	0	3
ELL728	Optoelectronic Instrumentation	3	0	0	3
ELL738	Micro and Nano Photonics	3	0	0	3
ELL785	Computer Communication Networks	3	0	0	3
ELL814	Wireless Optical Communications	3	0	0	3
ELL817	Access Networks	3	0	0	3
ELL819	Introduction to Plasmonics	3	0	0	3
ELL820	Photonic Switching and Networking	3	0	0	3
JOD802	Major Project Part-II	0	0	24	12
JOL793	Selected Topics-I	3	0	0	3
JOL794	Selected Topics-II	3	0	0	3
JOS795	Independent Study	0	3	0	3
JOV796	Selected Topics in Photonics	1	0	0	1
PYL748	Quantum Optics	3	0	0	3
PYL749	Quantum Information and Computation	3	0	0	3
PYL756	Fourier Optics and Holography	3	0	0	3
PYL757	Statistical and Quantum Optics	3	0	0	3
PYL758	Advanced Quantum optics and application	3	0	0	3
PYL760	Biomedical optics and Bio-photonics	3	0	0	3
PYL770	Ultra-fast Optics and Applications	3	0	0	3
PYL771	Green Photonics	3	0	0	3
PYL790	Integrated Optics	3	0	0	3
PYL793	Photonic Devices	3	0	0	3
PYL795	Optics and Lasers	3	0	0	3
PYL891	Fiber Optic Components and Devices	3	0	0	3
PYL892	Guided Wave Photonic Sensors	3	0	0	3

Sem.	Courses (Number, Abbreviated Title, L-T-P, Credits)						Lecture courses	Contact h/week				Credits
								L	T	P	Total	
I	PYL791 Fibre Optics (3-0-0) 3	ELL727 Ditigal Comm. & Information Systems (3-0-0) 3	JOP791 Laboratory-I (Fibre Optics Lab/Opt. Comm. Lab) (0-0-6) 3	PYL/ELL PE-1 (3-0-0) 3	PYL/ELL PE-2 (3-0-0) 3		4	12	0	6	18	15
II	PYL792 Optical Electronics (3-0-0) 3	ELL717 Optical Communication System (3-0-0) 3	JOP792 Laboratory-II (Fibre Optics Lab/Opt. Comm. Lab) (0-0-6) 3	PYL/ELL PE-3 (3-0-0) 3	PYL/ELL PE-4 (3-0-0) 3		4	12	0	6	18	15
Summer												
III	PYL/ELL PE-5 (3-0-0) 3	JOD801 Major Project Part-I (0-0-12) 6					1	3	0	12	15	9
IV	JOD802 Major Project Part-II Or 12 Credits PE Courses in lieu of Major Project Part-II) (0-0-24) 12						0	0	0	24	24	12

Total = 51

Programme Code: **JTM**

Master of Technology in *Telecommunication Technology & Management*

Interdisciplinary Programme

The overall credits structure

Category	PC	PE	OE	Total
Credits	36	12	0	48

Program Core

ELL711	Signal Theory	3	0	0	3
ELL712	Digital Communications	3	0	0	3
ELL785	Computer Communication Networks	3	0	0	3
BSP710	Communication & Signal Processing Tech. Lab.	0	1	4	3
ELP725	Wireless Communication Laboratory	0	1	4	3
MSL723	Telecommunications Systems Management	3	0	0	3
JTD801	Major Project-I	0	0	12	6
JTD802	Major Project-II	0	0	24	12
	Total Credits				***36***

Program Electives

Streamed Electives (JTM) in (Signal and Information Processing)

CRL707	Human & Machine Speech Communication	3	0	0	3
ELL706	Optimization for Electrical Engineers	3	0	0	3
ELL715	Digital Image Processing	3	0	2	4
ELL718	Statistical Signal Processing	3	0	0	3
ELL719	Detection and Estimation Theory	3	0	0	3
ELL720	Advanced Digital Signal Processing	3	0	0	3
ELL724	Multichannel Signal Processing	3	0	0	3
ELL729	Stochastic Control and Reinforcement Learning	3	0	0	3
ELL784	Introduction to Machine Learning	3	0	0	3
ELL786	Multimedia Systems	3	0	0	3
ELL792	Computer Graphics	3	0	0	3
ELL793	Computer Vision	3	0	0	3
ELL823	Selected Topics in Information Processing-I	3	0	0	3
JTD792/ SMD792	Minor Project	0	0	6	3

Streamed Electives (JTM) in (Communication Systems and Networks)

COL724	Advanced Computer Networks	3	0	2	4
ELL706	Optimization for Electrical Engineers	3	0	0	3
ELL710	Coding Theory	3	0	0	3
ELL714	Basic Information Theory	3	0	0	3
ELL716	Telecommunication Switching & Transmission	3	0	0	3
ELL717	Optical Communication Systems	3	0	0	3
ELL718	Statistical Signal Processing	3	0	0	3
ELL719	Detection and Estimation Theory	3	0	0	3
ELL720	Advanced Digital Signal Processing	3	0	0	3
ELL723	Broadband Communication Systems	3	0	0	3
ELL729	Stochastic Control and Reinforcement Learning	3	0	0	3
ELL813	Advanced Information Theory	3	0	0	3
ELL814	Wireless Optical Communications	3	0	0	3
ELL815	MIMO Wireless Communications	3	0	0	3
ELL816	Satellite Communication	3	0	0	3
ELL817	Access Networks	3	0	0	3
ELL818	Telecommunication Technologies	3	0	0	3
ELL820	Photonic Switching and Networking	3	0	0	3
ELL824	Selected Topics in Information Processing-II	3	0	0	3
ELL894	Network Performance Modeling and Analysis	3	0	0	3
ELL895	Network Security	3	0	0	3
ELL896	Mobile Computing	3	0	0	3
JTD792/ SMD792	Minor Project	0	0	6	3

Streamed Electives (JTM) in (Artificial Intelligence and Machine Learning)

COL761	Data Mining	3	0	0	4
COL762	Database Implementation	3	0	0	4
COL770	Advanced Artificial Intelligence	3	0	0	4
COL776	Learning Probabilistic Graphical	3	0	0	4
ELL706	Optimization for Electrical Engineers	3	0	0	3
ELL729	Stochastic Control and Reinforcement Learning	3	0	0	3
ELL784/ COL774	Introduction to Machine Learning	3	0	0	3
ELL791	Neural Systems and Learning Machines	3	0	0	4
ELL795	Swarm Intelligence	3	0	0	3
ELL882	Large-Scale Machine Learning	3	0	0	3
ELL886	Big Data Systems	3	0	0	3
ELL888	Advanced Machine Learning	3	0	0	3
JTD792/ SMD792	Minor Project	0	0	6	3

Streamed Electives (JTM) in (Embedded Systems)

COL718	Architecture of High Performance Computers	3	0	2	4
COL719	Synthesis of Digital Systems	3	0	2	4
ELL766	Appliance Systems	3	0	0	3
ELL787	Embedded Systems and Applications	3	0	0	3
ELL790	Digital Hardware Design	3	0	0	3
ELL887	Cloud Computing	3	0	0	3
ELL898	Pervasive Computing	3	0	0	3
ELL899	Testing and Fault Tolerance	3	0	0	3
ELP721	Embedded Telecommunication Systems Laboratory	0	1	4	3
ELP781	Digital Systems Lab	0	1	4	3
JTD792/ SMD792	Minor Project	0	0	6	3

Streamed Electives (JTM) in (Telecom Management)

MSL700	Fundamentals of Management of Technology	3	0	0	3
MSL701	Strategic Technology Management	2	0	2	3
MSL707	Management Accounting	3	0	0	3
MSL713	Information Systems Management	2	0	2	3
MSL726	Telecom Systems Analysis, Planning and Design	3	0	0	3
MSL728	International Telecommunication Management	3	0	0	3
MSL760	Marketing Management	2	0	2	3
MSL814	Data Visualization	1.5	0	0	1.5
MSL815	Decision Support and Expert Systems	2	0	2	3
MSL850	Management of Information Technology	3	0	0	3
MSL878	Electronic Payments	1.5	0	0	1.5
MSL883	ICTs Development and Business	1.5	0	0	1.5
MSL886	IT Consulting and Practice	3	0	0	3
MSL888	Data Warehousing for Business Decisions	1.5	0	0	1.5
MSL893	Public Policy Issues in the Information Age	1.5	0	0	1.5
MSL894	Social Media and Business Practices	3	0	0	3
JTD792/ SMD792	Minor Project	0	0	6	3

Sem.	Courses (Number, Abbreviated Title, L-T-P, Credits)				Lecture courses	Contact h/week				Credits
						L	T	P	Total	
I	ELL711 Signal Theory (3-0-0) 3	ELL712 Digital Communication (3-0-0) 3	ELL785 Computer Comm. Networks (3-0-0) 3	BSP710 Communication & Signal Processing Technologies (0-1-4) 3	3	9	1	4	14	12
II	ELP725 Wireless Comm. Lab (0-1-4) 3	JTD792 Minor Project (0-0-6) 3 / PE-1 (3-0-0) 3	MSL723 Telecom Syst. Mgmt. (3-0-0) 3	PE-2 (3-0-0) 3	3/2	6/9	1	10/4	17/13	12
Summer										
III	JTD801 Major Project Part-I (0-0-12) 6	PE-3 (3-0-0) 3	PE-4 (3-0-0) 3		2	6	0	12	18	12
IV	JTD802 Major Project Part-II (0-0-24) 12				0	0	0	24	24	12

Total = 48

Master of Technology in VLSI Design Tools and Technology

Interdisciplinary Programme

The overall credits structure

Category	PC	PE	OC	Total
Credits	18	30	0	48

Program Core

ELL734	MOS VLSI design	3	0	0	3
ELP736	Physical Design Laboratory	0	0	6	3
JVD811	Major Project-I	0	0	24	12
	Total Credits				***18***

Program Electives

BSP710	Communication & Signal Processing Tech. Lab.	0	1	4	3
COL702	Advanced Data Structures	3	0	2	4
COL718	Architecture of High Performance Computers	3	0	2	4
COP820	Processor Design Lab	0	0	8	4
ELL712	Digital Communications	3	0	0	3
ELL737	Flexible Electronics	3	0	0	3
ELL742	Introduction to MEMS Design	3	0	0	3
ELL743	Photovoltaics	3	0	0	3
ELL745	Quantum Electronics	3	0	0	3
ELL746	Biomedical Electronics	3	0	0	3
ELL747	Active and Passive Filter Design	3	0	0	3
ELL830	Issues in Deep Submicron VLSI Design	3	0	0	3
ELL831	CAD for VLSI, MEMS, and Nanoassembly	3	0	0	3
ELL832	Selected Topics in IEC-I	3	0	0	3
ELL833	CMOS RF IC Design	3	0	0	3
ELL883	Embedded Intelligence	3	0	0	3
ELP831	IEC Laboratory-I	0	0	6	3
ELV830	Special Module in Low Power IC Design	1	0	0	1
ELV831	Special Module in VLSI Testing	1	0	0	1
JVD799	Minor Project	0	0	12	6
JVD812	Major Project-II	0	0	24	12
JVS801	Independent Study	0	3	0	3
MTL704	Numerical Optimization	3	0	0	3
CRL702	Architectures and Algorithms for DSP Systems	2	0	4	4
CRL711	CAD of RF and Microwave Circuits	3	0	2	4
CRL712	RF and Microwave Active Circuits	3	0	0	3

Streamed Electives (JVL) in (ASIC and SoC Design)

COL719	Synthesis of Digital Systems	3	0	2	4
COL812	System Level Design and Modelling	3	0	0	3
COP745	Digital System Design Laboratory	0	0	6	3
ELL731	Mixed Signal Circuit Design	3	0	0	3
ELL735	Analog Integrated Circuits	3	0	0	3
ELL749	Semiconductor Memory Design	3	0	0	3

Streamed Electives (JVL) in (Micro and Nano Devices)

ELL730	I.C. Technology	3	0	0	3
ELL732	Micro and Nanoelectronics	3	0	0	3
ELL738	Micro and Nano Photonics	3	0	0	3
ELL739	Advanced Semiconductor Devices	3	0	0	3
ELL740	Compact Modeling of Semiconductor Devices	3	0	0	3
ELL744	Electronic and Photonic Nanomaterials	3	0	0	3

Streamed Electives (JVL) in (Embedded Intelligent Systems)

COL788	Advanced Topics in Embedded Computing	3	0	0	3
COL821	Reconfigurable Computing	3	0	0	3
ELL720	Advanced Digital Signal Processing	3	0	0	3
ELL741	Neuromorphic Engineering	3	0	0	3
ELL784	Introduction to Machine Learning	3	0	0	3
ELL797	Energy-Efficient Computing	3	0	0	3

Sem.	Courses (Number, Abbreviated Title, L-T-P, Credits)				Lecture courses	Contact h/week				Credits
						L	T	P	Total	
I	ELP736 Physical Design Laboratory (0-0-6) 3	ELL734 MOS VLSI Design (3-0-0) 3	PE-1 (3-0-0) 3	PE-2 (3-0-0) 3	3	9	0	6	14	12
II	PE-3 (3-0-0) 3	PE-4 (3-0-0) 3	PE-5 (3-0-0) 3	PE-6 (3-0-0) 3	4	12	0	0	12	12
Summer										
III (OR)	JVD811 Major Project-I (0-0-24) 12				0	0	0	24	24	12
IV	JVD812 Major Project-II (0-0-24) 12				0	0	0	24	24	
III (OR)	PE-7 (3-0-0) 3	PE-8 (3-0-0) 3	JVD799 Minor Project (0-0-12) 6		2	6	0	12	18	
IV	JVD811 Major Project-I (0-0-24) 12				0	0	0	24	24	
III (OR)	JVD811 Major Project-I (0-0-24) 12				0	0	0	24	24	
IV	PE-7 (3-0-0) 3	PE-8 (3-0-0) 3	PE-9 (3-0-0) 3	PE-10 (3-0-0) 3	4	12	0	0	12	12

Total = 48

Master of Technology in Robotics

Interdisciplinary Programme

The overall credits structure

Category	PC	PE	OC	Total
Credits	42	6	3	51+ Bridge

Program Core

Foundational Concepts

JRL704	Robotics Lab	1	0	4	3
ELL701	Mathematical Methods Incontrol	3	0	0	3

Dynamics and Control

MCL799	Mechanics and Control of Robots	3	0	0	3
JRL747	Degrees of Freedom and Constraints in Devices	2	0	0	2

Reasoning/Cognition (any one)

COL778	Principles of Autonomous Systems	3	0	2	4
COL770	Advanced Artificial Intellegence	3	0	2	4

Sensing and Perception

JRL780	Computer Vision	3	0	2	4
ELL705	Stochastic Filtering and Identification	3	0	0	3

Project

JRD891	Minor Project	0	0	4	2
JRD892	Major Project Part-I	0	0	12	6
JRD893	Major Project Part-II	0	0	24	12

Bridge *(BR: At least one of the following two, but waived for people with preparation in both)*

COL671	Artificial Intelligence	3	0	2	4
ELL225/	Control Engineering-I	3	1	0	4
MCL212	Control Theory and Applications	3	0	2	4
	Total Credits				***42***

Program Electives

JRL880	Special Topics in Robotics-I	3	0	0	3
JRL882	Special Topics in Robotics-II	2	0	0	2
JRV880	Special Module in Robotics-I	1	0	0	1
JRS799	Independent Study	0	3	0	3
ELL893	Cyber-Physical Systems	3	0	0	3
ELL794	Human-Computer Interface	3	0	0	3
ELL800	Numerical Linear Algebra and Optimization in Engineering	3	0	0	3
ELL706	Optimization for Electrical Engineers	3	0	0	3
MTL704	Numerical Optimization	3	0	0	3
MTL729	Computational Algebra and its Applications	3	0	0	3
ELL788	Computational Perception and Cognition	3	0	0	3
COL783	Digital Image Analysis	3	0	3	4.5
ELL715	Digital Image Processing	3	0	2	4
COL772	Natural Language Processing	3	0	2	4
MTL785	Natural Language Processing	3	0	0	3
ELL720	Advanced Digital Signal Processing	3	0	0	3
DSL711	Sensors & Transducers	3	0	0	3
MCL731	Analytical Dynamics	3	0	0	3
MCL738	Dynamics of Multibody Systems	2	0	2	3
MCL749	Mechatronics Product Design	3	0	2	3
MCL837	Advanced Mechanisms	2	0	2	3
MCL845	Advanced Robotics	2	0	2	3
ELL700	Linear Systems Theory	3	0	0	3
MCL741	Control Engineering	3	0	2	3
ELL702	Nonlinear Systems	3	0	0	3
ELL703	Optimal Control Theory	3	0	0	3
ELL704	Advanced Robotics	3	0	0	3
ELL729	Stochastic Control and Reinforcement Learning	3	0	0	3
ELL767	Mechatronics	3	0	0	3
ELL801	Nonlinear Control	3	0	0	3
ELL802	Adaptive and Learning Control	3	0	0	3
ELL803	Model Reduction in Control	3	0	0	3
ELL804	Robust Control	3	0	0	3
ELL805	Networked and Multi-Agent Control Systems	3	0	0	3
ELL806	Modeling and Control of Distributed Parameter Systems	3	0	0	3
ELL807	Stochastic Control	3	0	0	3

Sem.	Courses (Number, Abbreviated Title, L-T-P, credits)					Lecture courses	Contact h/week				Credits
							L	T	P	Total	
I	JRL704 Robotics Lab (1-0-4) 3	ELL701 Mathematical Methods Incontrol (3-0-0) 3	MCL799 Mechanics and Control of Robots (3-0-0) 3	COL671 or ELL225/ MCL212 (3-0-2) 4		4	10	0	6	16	13
II	COL778 or COL770 (3-0-2) 4	JRL780 Computer Vision (3-0-2) 4	ELL705 Stochastic Filtering and Identification (3-0-0) 3	JR891 Minor Project (0-0-4) 2		3	9	0	8	17	13
III	PE-1 (3-0-0) 3	PE-2 (3-0-0) 3	JRD892 Major Project-I (0-0-12) 6	JRL747 Degrees of Freedom and Constraints in Devices (2-0-0) 2	OC (3-0-0) 3	5	11	0	12	23	17
IV	RD893 Major Project-II (0-0-24) 12					0	0	0	24	24	12

Total = 51 + 4 (Bridge Course)

ELL808	Advanced Topics in Systems and Control	3	0	0	3
MTL811	Mathematical Foundation of Artificial Intelligence	3	0	0	3
COL770	Advanced Artificial Intelligence	3	0	2	4
ELL792	Computer Graphics	3	0	0	3
COL781	Computer Graphics	3	0	3	4.5
COL774	Machine Learning	3	0	2	4
ELL784	Introduction to Machine Learning	3	0	0	3
COL864	Special Topics in Artificial Intelligence	3	0	0	3
COL870	Special Topics in Machine Learning	3	0	0	3
ELL789	Intelligent Systems	3	0	0	3
ELL791	Neural Systems and Learning Machines	3	0	2	4
ELL795	Swarm Intelligence	3	0	0	3
ELL882	Large-Scale Machine Learning	3	0	0	3
ELL888	Advanced Machine Learning	3	0	0	3
ELL729	Stochastic Control and Reinforcement Learning	3	0	0	3
ELL787	Embedded Systems and Applications	3	0	0	3
COL788	Advanced Topics in Embedded Computing	3	0	0	3
ELL883	Embedded Intelligence	3	0	0	3
COL702	Advanced Data Structures	3	0	2	4
COL758	Advanced Algorithms	3	0	2	4
COL726	Numerical Algorithms	3	0	2	4
AIL721	Deep Learning	3	0	0	3
AIL722	Reinforcement Learning	3	0	0	3
COL785	Virtual and Augmented Reality	3	0	2	4
MCL709	Programming Robots with ROS	2	0	2	3
MCL798	Medical Robotics	2	0	2	3

Specialization Electives

Collaborative Robotics

MTL768	Graph Theory	3	0	0	3
MTL763	Introduction to Game Theory	3	0	0	3
ELL805	Networked and Multi-Agent Control Systems	3	0	0	3
DSL782	Design for Usability	2	0	2	3
COL785	Virtual and Augmented Reality	3	0	0	3

Industrial Robotics

MCL783	Automation in Manufacturing	3	0	2	4
MCL710	Robotic Automation in Manufacturing	2	0	2	3

Rehabilitation and Medical Robotics

MCL798	Medical Robotics	2	0	2	3
BML830	Biosensor Technology	3	0	2	4
BML741	Medical Device Design	2	0	4	4
ELL794	Human-Computer Interface	3	0	0	3

Autonomous and Intelligent Vehicles

JRD891	Minor Project	0	0	4	2
JRD892	Major Project Part-I	0	0	12	6
JRD893	Major Project Part-II	0	0	24	12
MCL845	Advanced Robotics	3	0	2	4
ELL704	Advanced Robotics	3	0	0	3
CTL713	Connected and Autonomous Vehicles	3	0	0	3
CTLxxxx	Vehicle Telematics	3	0	0	3
JRL732	Aerial Robotics	3	0	0	3

Master of Public Policy

Schools of Public Policy

The overall credits structure

Category	PC	PE	OE	Total
Credits	39	9	6	54

Program Core

SPL703	Research Methods for Public Policy	3	0	0	3
SPL704	Introduction to Public Policy and STI	3	0	0	3
SPL705	Public Institutions in India: Theory and Practice	3	0	0	3
SPL706	STI and Sustainable Development	3	0	0	3
SPL707	Tools for Policy Analysis	3	0	0	3
SPL708	Statistics for Public Policy	3	0	0	3
SPL709	Principles of Economics for Public Policy	3	0	0	3
SPL779	Thesis-I	0	0	8	4
SPL780	Thesis-II	0	0	28	14
	Total Credits				***39***

Program Electives

SPL711	Modelling Complex Adaptive Systems for Policy Analysis	3	0	0	3
SPL712	Comparative Industrial Policy	3	0	0	3
SPL719	Public Interest Technologies	3	0	0	3
SPL720	Energy and Infrastructure Finance: A Public Policy Lens	3	0	0	3
SPL721	Perspective on Climate Change: Implications for Policy	3	0	0	3
SPL 722	Governance Challenges in Energy Systems in Transition	3	0	0	3
SPL723	Understanding Public Policy Making through Case Studies	3	0	0	3
SPL724	Electricity Sector Reforms in the Renewables Era	3	0	0	3
SPL730	Science, Technology & Innovation Policy and Agriculture	3	0	0	3
SPL740	Casual Interfence and Impact Assessment	3	0	0	3
SPL741	Socio-Economic Data Analysis	3	0	0	3
SPL750	Qualitative Research Methods for Public Policy	3	0	0	3
SPL752	Techs and the City - An urban policy perspective	3	0	0	3
SPL753	Urban Planning Practicum	2	0	4	3
SPL754	Geographical Information Systems (GIS) for Public Policy	2	0	2	3
SPL781	Special Topics in Climate Change Policy	3	0	0	3
SPL783	Special Topics in Natural Resource Management Policy	3	0	0	3
HSL781	Potential and Perils of the Digital Welfare	3	0	0	3
SPV791	Special Module on Ethics in Policy Making	1	0	0	1
SPV792	Inclusive City and Accessibility Audit	1	0	0	1
SPV793	Special Module on Public Policy in Management of Natural Resources	1	0	0	1
SPV794	Special Module on Public Policy in Data, Communication and Computation	1	0	0	1
SPV795	Special Module on Public Policy for Technical Higher Education	1	0	0	1
SPV796	Special Module on Public Policy for Sustainable Habits and Livelihoods	1	0	0	1
SPV797	Scenario Design for Managing Uncertainty	1	0	0	1
SPV798	Special Module on Public Policy in Transport and Infrastructure	1	0	0	1
SPV799	Special Module is Policy Studies	1	0	0	1
SPL810	Selected Topics in Policy Studies	3	0	0	3

Sem.	Courses (Number, Abbreviated Title, L-T-P, Credits)				Lecture courses	Contact h/week				Credits
						L	T	P	Total	
I	SPL704 Introduction to Public Policy and STI (3-0-0) 3	SPL706 STI and Sustainable Development (3-0-0) 3	SPL708 Statistics for Public Policy (3-0-0) 3	SPL709 Principles of Economics for Public Policy (3-0-0) 3	4	12	0	0	12	12
II	SPL703 Research Methods for Public Policy (3-0-0) 3	SPL705 Public Institutions in India: Theory and practice (3-0-0) 3	SPL707 Tools for Policy Analysis (3-0-0-0) 3	PE-1 (3-0-0) 3	4	12	0	0	12	12
Summer										
III	PE-2 (3-0-0) 3	PE-3 (3-0-0) 3	OE-1 (3-0-0) 3	Thesis-I (0-0-8) 4	3	9	0	8	17	13
IV	OE-1 (3-0-0) 3	Thesis-II (0-0-28) 14			1	3	0	28	31	17

Total = 54

INDIAN INSTITUTE OF TECHNOLOGY DELHI

THE HONOUR CODE

I ....., Entry No..... do hereby undertake that as a student at IIT Delhi :

1) I will not give or receive aid in examinations; that I will not give or receive unpermitted aid in class work, in preparation of reports, or in any other work that is to be used by the instructor as the basis of grading; and

2) I will do my share and take an active part in seeing to it that others as well as myself uphold the spirit and letter of the Honour Code.

I realise that some examples of misconduct which are regarded as being in violation of the Honour Code include :

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

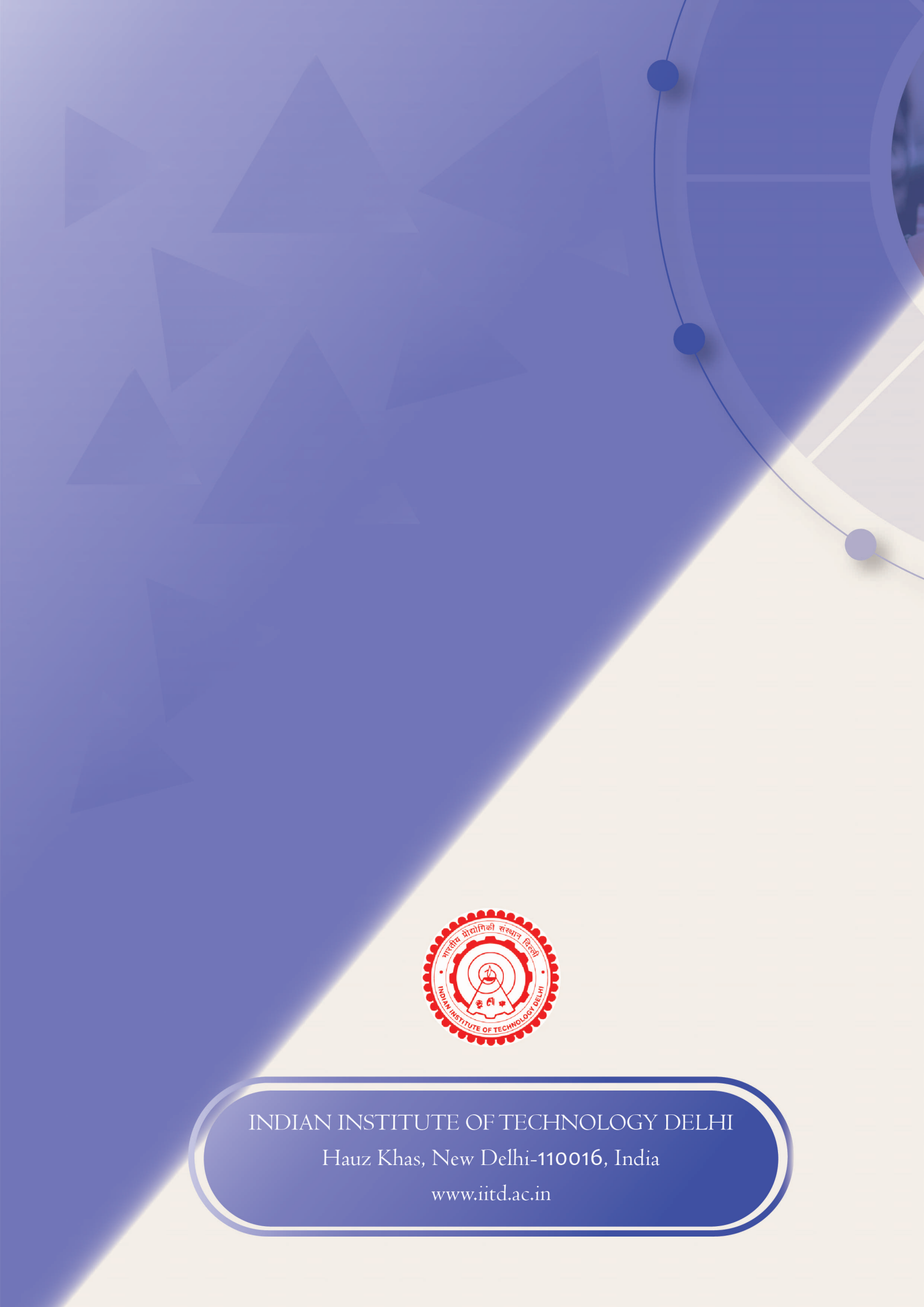
I accept that any act of mine that can be considered to be an Honour Code violation will invite disciplinary action.

Date.....

Student's Signature.....

Name.....

Entry No.....



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