# DELHI TECHNOLOGICAL UNIVERSITY

# Minutes of 20th Meeting

# Academic Council

**held on 10.05.2019**

**Shahbad Daulatpur, Bawana Road, Delhi-110042**

# DELHI TECHNOLOGICAL UNIVERSITY

Established under Govt. of Delhi Act 6 of 2009
(Formerly Delhi College of Engineering)
BAWANA ROAD, SHAHBAD DAULATPUR, DELHI-110042

**No. F.DTU/Org/AC/Meeting/01(1)/10/Vol-IX/831-53** **Dated : 21/5/19**

**Minutes of the 20th meeting of the Academic Council held on 10.05.2019 at 11:00 a.m. in the Pragyan Hall, DTU.**

The following members were present:

1. Prof. Yogesh Singh, Vice Chancellor, DTU.
2. Prof. S.K. Garg, Pro Vice Chancellor, DTU
3. Prof. Smriti Srivastava, Head-Division of ICE, NSIT, Delhi
4. Sh. Lokesh Mehra, (FICCI nominee)
5. Prof. R.S. Mishra, Dean (Outreach & Extn. Activities)
6. Prof. Madhusudan Singh, Dean Academic (UG)
7. Prof. H.C. Taneja, Dean Academic (PG)
8. Prof. Ashutosh Trivedi, Dean (IRD)
9. Prof. Vishal Verma, Dean (International Affairs)
10. Prof. Samsher, Dean (SW) & Registrar, DTU
11. Prof. Pragati Kumar, Dean (Continuing Education)
12. Prof. Pravir Kumar, Dean (Alumni Affairs)
13. Prof. Narendra Kumar (II), Dean (Student Discipline & Chief Warden)
14. Prof. Nirendra Dev, HOD (Civil Engg. Deptt.)
15. Prof. Vipin, HOD, Mechanical Engg. Department
16. Prof. Rinku Sharma, HOD (Deptt. of Applied Physics)
17. Prof. Jai Gopal Sharma, HOD (Bio-Technology Deptt.)
18. Prof. Sangita Kansal (HOD- Applied Mathematics Deptt.)
19. Prof. S. Indu, HOD (E & C Deptt.)
20. Prof. S.K. Singh, HOD (Environmental Engg. Deptt.)
21. Prof. Kapil Sharma, HOD (Deptt. of I.T.)
22. Prof. Ranganath M.S., HOD (Deptt. Of Design)
23. Prof. A. Mookerjee, HOD (USME)
24. Prof. Rajni Jindal, HOD (Comp. Sc. Engg.)
25. Dr. Archana Rani, HOD (Applied Chem. Deptt.)
26. Dr. Nand Kumar, HOD (Humanities)
27. Dr. Rajan Yadav (HOD-DSM)
28. Dr. Rajesh Rohilla, HOD (T&P)
29. Prof. Narendra Kumar-I, Electrical Engg. Deptt.
30. Dr. Naokant Deo, In-charge, B.Tech (Eve.)
31. Dr. M. Jayasimhadri, Asstt. Prof. Applied Physics
32. Sh. Kamal Pathak, Controller of Examinations, DTU
33. Ms. Shubhi Sareen, Student Representative, Special invitee

Following persons have also been invited to attend the meeting:

1. Dr. Manoj Kr. Sharma, CEO, (DTU IIF)
2. Sh. R.K. Shukla, OSD, USME
3. Sh. D.P. Dwivedi, Consultant, Finance & Planning
4. Prof. Rajeshwari Pandey, Associate Dean (UG)
5. Prof. M.M. Tripathi, Director, IQAC
6. Sh. Anil Kumar, Deputy Registrar (PG/IRD)

Prof. Surendra S. Yadav, Professor of Management, IIT, Delhi; Sh. S.G. Deshmukh, Director – IIITM, Gwalior; Prof. Tarun Kumar Das, Registrar, University of Delhi; Dr. Bhim Singh, Dean, Academics, IIT, Delhi; Prof. Naveen Kumar, Prof. Rakesh Kumar and Sh. Neeraj Kumar Bhagat, Associate Professor could not attend the meeting due to their pre-occupation.

**Agenda 20.1 : Opening Remarks by the Chairperson.**

Hon'ble Vice Chancellor welcomed all the members of Academic Council in its 20th meeting held on 10.05.2019 in Pragyan Hall of DTU. He informed about the advice of Hon'ble Lt. Governor, Delhi about the frequency of meeting of Statutory Bodies as per the DTU Act and assured that Academic Council meeting will be conducted 04 times in a year. One, in the month of May for curriculum/admission related issues and the second, before the Convocation and remaining two in between as per requirement.

He informed the house that Peer Committee of NAAC is scheduled to visit DTU during 16-18 May, 2019 for accreditation of the University. He emphasized about the Strategy Plan (2019-2030) of DTU which is a road map for progression of DTU in next 11 years. Two M.Sc. Programmes (Applied Physics and Applied Mathematics), 02 MBA Programs (MBA in Family Business & Entrepreneurship and MBA in Entrepreneurship, Innovation and Venture Development) are scheduled to be started from the coming academic year.

He shared about starting of construction of two academic blocks and 03 hostels under stage-I of DTU Phase (II) project. The same is expected to be completed by mid of year 2020-21. All these facilities will be centrally air-conditioned and having next level of infrastructure. He further informed that Sewage Treatment Plant (STP) and Waste to Energy has been taken into operation. Now, DTU is a zero discharge campus. The discussion with Jal Board Authorities is in progress and we expect that the water supply from Jal Board will be started soon.

It is pride for DTU that the Pro Vice Chancellor, Prof. Anu Singh Lather has now being appointed by Delhi Govt. as Vice Chancellor of Ambedkar University, Delhi. He, further informed that ranking of DTU in NIRF has improved with the active support of all stake holders of DTU. Under the Engineering category, the ranking has improved from 41 to 34, under University category from 77 to 47 and under overall category from 100 to 71 and we expect that the DTU will improve in all categories in the years to come.

**Agenda 20.2 : Confirmation of the minutes of the 19th meeting of Academic Council held on 16.11.2018.**

The Minutes of the 19th meeting of the Academic Council held on 16.11.2018, were circulated among all the members vide Ref. No.DTU/ORG/ AC/Meeting/01(1)/2010/Vol-VIII/3464-86 dated 22.11.2018, no comments have been received from any of the members.

**Decision : The Academic Council confirmed the minutes of 19th AC meeting.**

**Agenda 20.3 : Action taken report on the decisions taken in the 19th meeting of the Academic Council.**

Action taken report was presented to the Academic Council. In item number 19.25 it was suggested that the Vice Chancellor, Ambedkar University, Delhi shall continue to be the chairperson of the committee. In item number 19.26 it was suggested that framing of guidelines be completed by the end of July, 2019.

**Decision : The Academic Council took the action taken report on record.**

**Agenda 20.4 : To apprise the Strategic Plan 2019-2030 of Delhi Technological University.**

It was submitted to the Academic Council that the University has envisaged to formulate its Strategic Plan 2019-2030 for the proper growth and development of the University. Accordingly, the Strategic Plan for 2019-2030 based on the future requirements was prepared indicating various activities to be implemented in the next ten years.

The matter was placed before the Planning Board which accepted the Strategic Plan 2019-2030 of DTU and recommended for placing before the Academic Council and then before the Board of Management with following observations:

i. A Strategic Plan Implementation Action Team shall be constituted by the Vice Chancellor to workout the strategy for achieving the targets.
ii. The above committee shall prepare five term plans of 02 years each with contigency planning of each quarter.
iii. The Planning Board will review the projects every 06 six months to ensure the implementation of resolutions, aims and actions. The Planning Board will submit its recommendations to the Board of Management for its approval.

The drafted Strategic Plan 2019-2030 is placed in ***Annexure at pages 01 to 27.***

**Decision : The Academic Council passed the Strategic Plan 2019-30 and recommended to the Board of Management for its consideration and approval.**

**Agenda 20.5 : Introduction of Entrepreneurship Track in UG curriculum in lieu of an elective course (DEC/GEC).**

The concept of "START UP" is relatively new in India. Both Central as well as State Governments are encouraging the startup culture in different educational Institutions of the country. The DTU proposes to introduce a formal Entrepreneurship track for UG students where the students can earn curricular credits in lieu of an Elective Course (DEC/GEC) being offered in V / VI Sem similar to the research and product development tracks introduced in 2018 in the B.Tech. programs of DTU. The students who opt for entrepreneurship program will be required to produce credible evidence of establishing enterprise / startup which has been conceptualized and started operation.

A group of maximum four (04) students can register for this elective at the beginning of V semester. The registered student/team should conceptualize a business idea and submit a proposal in the prescribed format (enclosed as annexure-II) in the office of Dean (UG) within 10 days of semester registration. An evaluation committee, comprising of (i) Dean UG (ii) A faculty member of relevant specializations and (iii) HOD of the concerned department will approve/reject proposals based on the merits and expected outcome of the proposal. The same committee may also assign the maximum possible grades for an approved project.

The student/team will be required to conceptualize a business idea and develop the idea into the form of a Startup/Enterprise/ Venture which comes into operation at the end of course with credible evidence of operation to earn the credits of the course. If the student /team is not able to develop idea into the form of a Startup/Enterprise/ Venture they will have to repeat the course in the form of a new project/register in some other departmental/generic elective course having equivalent credits. In case student /team wants to drop the subject equivalent credits may be earned by registering in any departmental/ generic elective course. The details of registration, method of conduct and evaluation, award of grades, etc. are given as under:

**'Entrepreneurship and Venture Development'**

**Course Objective**: The aim of the Entrepreneurship track is to help student to build-up entrepreneurial skills and encourage the startup culture in the University.

The students who opt for entrepreneurship program will be required to produce credible evidence of establishing enterprise / startup which has been conceptualized and started operation

## 1. COURSE CONTENT

The requirements of this course is to conceptualize a business idea and develop the idea into the form of a Start-up/Enterprise/ Venture which comes into operation at the end of course with credible evidence of operation.

The outcome of the Entrepreneurship course would be considered for the award of credits based upon the credible evidence of operation of the start-up.

The following is the nomenclature of the course:

| Paper Code | Paper Title | Credits | Semester | Type | Marks | |
|---|---|---|---|---|---|---|
| | | | | | MTE | ETE |
| XX 395<br>* "XX" is the departmental code | **Entrepreneurship and Venture development** | 4 | Fifth | DEC/GEC | 40 | 60 |

## 2. COURSE REGISTRATION:

a. The Entrepreneurship option will be offered to the students in the V semester as part of Departmental/General elective courses.
b. The duration of the course shall be 1-2 year. The examination for the course will be conducted at the end of the VI to VIII semester.
c. A maximum of four students can register as a team for the course.

## 3. PROCEDURE OF CONDUCT AND EVALUATION:

a. The registered student/team must submit a proposal detailing the enterprise being setup including innovative idea generation, planning, organizing, financing and marketing strategies of the proposed plan in the academic section within 10 days of registration, in the prescribed format.
b. An evaluation committee, comprising of (i) Chairperson(s) BOS of the respective department of the student/team (ii) Two faculty members and (iii) External expert; nominated by Vice chancellor will approve/reject proposals based on the merits and expected outcome of the proposals. The same committee may also assign the maximum possible grades for an approved proposal.
c. The duration of the course shall be 1-2 year. The examination for the course shall be conducted at the end of the VI to VIII semester.
d. The evaluation of the course will be based on mid-term and end term examination with a weightage of 40% and 60% respectively.
e. The mid-term evaluation will be held at the end of each semester till the proposal approaches its outcome. The mid-term evaluation will be based on progress reports submitted and presentation at the end of every semester, before final submission.

f. The end term examination will be carried out at the end of VI to VIII semester and not later than 10 days from the last theory paper examination. The examination will be conducted by the same committee which approved the proposal. However, in case of non-availability of any of the members the Vice Chancellor may nominate other examiners.

g. The student/team shall be required to submit a final detailed project report (DPR) at least 3 days before the scheduled date of end semester examination for this course.

h. The final evaluation will be based on the proposal outcome, report quality, presentation and viva voce.

i. Absolute grading system will be used for the course. The Grade Moderation Committee for the course will be the same as that for other courses of the class.

j. In case a student/team is awarded a failing grade in the course student/team shall have to repeat the course either in the form of a new project or register in some other departmental/generic elective course having equivalent credits as per their choice.

k. In case a student/team wants to drop this course the student/team shall have to register in some other departmental/generic elective course having equivalent credits.

l. Normal attendance regulations will not apply to this course.

**Proposal Format**

To be filled by student

| | | |
|---|---|---|
| Name | | |
| Roll Number | | |
| Department | | |
| Title of proposal | | |
| Aims of the Proposal | | |
| i | Abstract and specific aims | A one paragraph summary of the idea and summary of the proposal goals. |
| ii | Introduction | Justification for the need of the proposed idea, expected outcomes and its uses. (Approx. 01 page) |
| Iii | Project Design | Detailed description of the innovative idea generation, proposal planning, organizing finances and marketing strategies. (1 -2 pages) |
| iv | Proposal budget | Details of budgetary requirement and justification. (1-2 pages) |
| v | Proposal Timeline | Outline the anticipated dates of completion of various stages of the proposal |

**Decision : The Academic Council approved the proposal with following modification:**

**"A maximum of four students can register for this elective out of which not more than two from the specific department."**

**Agenda 20.6 : Approval for introducing of new Foundation Elective Course: Entrepreneurship Exploration in B.Tech. program.**

It is proposed to include a new Foundation Elective course with course code FEC-49 and title "Entrepreneurship Exploration" to the basket of already existing 48 foundation electives which are being offered to the students of B.Tech Programme from 2018 onwards.

A student who registers for this course will be given an initial seed amount upto Rs. 10,000/- to start a small profitable business. This will help students in realizing their potential for putting in practice the innovative ideas and reaping the benefits. Through this course the student will able to understand the concept and development of entrepreneurship and will acquire entrepreneurial quality and business competency.

| Teaching and Examination Scheme | | Credit | Hours/Week | | | Exam Duration (Hrs) | | Relative Weights (%) | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Subject Code | Course Title | | L | T | P | Theory | Practical | CWS | PRS | MTE | ETE | PRE |
| **FEC49** | **Entrepreneurship Exploration** | 2 | **0** | **0** | **4** | **0** | **3** | **0** | **50** | **0** | **0** | **50** |

**Syllabus**

**FEC 49 Entrepreneurship Exploration**

This course is designed as practical course and therefore no regular classes will be conducted. However, few classes will be conducted on following topics: Starting small business, planning, organizing, and managing human resources. Additionally, few motivational lectures in the form of success stories will be conducted for the students.

A group of maximum two students who registers for this course will be given an initial seed money upto Rs 10,000/- to start a small business. This will help students in realizing their entrepreneurship potential. The student will submit a Business Plan in the first week of the commencement of academic session. A group of maximum four (04) students can register for this elective at the beginning of I-III semester. The registered student/team should conceptualize a business idea and submit a proposal in the prescribed format in the office of Dean (UG) within 1st week of commencement of semester registration. A Mentor Committee, comprising of:

(i) Chairperson(s)
(ii) A faculty member/course coordinator and
(iii) External expert.

The above committee will approve/reject proposals based on the merits and expected outcome of the proposal.

The same committee may also assign the maximum possible grades for the course. The student shall submit a detailed project report at the end semester for evaluation.

**Reference book:**
**Small Business Management An Entrepreneur's Guidebook** by Byrd Megginson, McGraw-Hill, Irwin. ISBN 978-0-07-802909-7.

**Decision : The Academic Council approved the proposal subject to the condition that the University will not be responsible for loss beyond the seed money. However, the profit will be divided proportionally.**

**Agenda 20.7 : Approval for inclusion of new Foundation Elective: Extension and Outreach Activities for B.Tech (Full time).**

It was submitted to the Academic Council that Academic Branch of the University has forwarded a proposal to include a new foundation elective- Extension and Outreach Activities for B.Tech (Full time) programme. The details are as under:

| | |
|---|---|
| Subject Code | |
| Contact Hours | 04 hrs per week including week offs |
| Examination Duration | Practical only (04 hrs per week) |
| Credit | 02 |
| Semester | I to IV |
| Subject Area | Initially conductance of classes, surveying and other activities to be performed for the society in the adjacent areas of DTU. |
| Pre-requisite | NIL |
| Objective | The students shall be specifically working for "**Centre for Extension and Outreach Activities**". The registered students shall be working in the field of Training, Coaching, Teaching, Learning and any other activity in the nearby villages, schools and community. |
| Remarks | It is made clear that this FEC 50 and internship (USIP) shall be treated as two separate ways for participating in outreach program:<br>1. Students may opt the FEC 50 and earn credits for the same.<br>2. Students may opt Extension and Outreach Activity through USIP which leads to internship. Students under this category will not be awarded credits of FEC. |

**Decision : Academic Council approved for the inclusion of new foundation elective- Extension and Outreach Activities for B.Tech (Full Time).**

**Agenda 20.8 : Approval for Academic Calendar (2019-20).**

It was submitted to the Academic Council that the Academic Calendar (2019-20) has been prepared and given as under:

**ACADEMIC CALENDAR (2019-20)**
**ODD SEMESTER**

| | | |
|---|---|---|
| 26.04. 2019 (Fri) to 13.05. 2019 (Mon) | : | Filling of online registration forms by all students for **UG:** III, V and VII Semester regular courses and /or back papers / improvements/re-registration as applicable including all Ex-Students. **PG:** III/V Semester regular / part time back papers as applicable including all Ex- students **PhD:** Continuing PhD students/scholars |
| 01.08.2019 (Thu) | : | On campus registration in person by all UG and PG students (except I semester students), continuing PhD students/scholars & all Ex-Students (*for back papers, improvements, re- registration*). Teaching starts for UG: III, V and VII Semester courses; PG: III/V Semester courses. |
| 01.08.2019 (Thu) | : | Vice Chancellor's Address to newly admitted Students Orientation and on campus registration and Teaching starts from 02.08.2019 (Friday). |
| 16.08.2019 (Fri) | : | Last date of registration of the courses, addition/deletion of courses for all regular and Ex- students (*except those students whose admission is confirmed later to this date*). |

**Supplementary Examination/Make up Examinations: 19th August 2019 (Monday) onwards**

| | | |
|---|---|---|
| 20.09.2019 (Fri) | : | Mid Term notification of shortage of attendance. |

**MID Semester Examination: 23rd Sept-28th Sept 2019 (Monday-Saturday)**
**MID Semester Break: 7th Oct-11th Oct, 2019 (Monday - Friday)**
**(Only for UG/PG students)**
**Notification of Make up for MID Semester Examination: 14th Oct-18th Oct 2019 (Monday-Friday)**

| | | |
|---|---|---|
| 20.11.2019 (Wed) | : | Teaching ends for all classes; Display of marks and shortage of attendance |

**END Semester Theory & Practical Examination: 25.11.2019 (Monday) onwards**

| | | |
|---|---|---|
| 16.12.2019 (Mon) | : | Grade moderation and display of grades for UG/PG courses. |
| 17.12.2019 to 01.01.2020 | : | ***Winter Vacation*** |
| 30.12.2019 (Mon) | : | Declaration of End semester results |

**EVEN SEMESTER**

| | | |
|---|---|---|
| 26.12.2019 to 02.01.2020 | : | Filling of online registration forms by all UG, PG and Ph.D. students including Ex-Students (*for back papers, improvements re-registration*). |
| 02.01.2020 (Thu) | : | On campus registration in person by all students including Ex-Students (*for back papers, improvements, re-registration*) by submitting copy of online registration form & Teaching starts for all classes. |
| 17.01.2020 (Fri) | : | Last date of registration for all students, including Ex-students. |

**Supplementary /Makeup Examination: 13th Jan 2020 (Monday) onwards**

| | | |
|---|---|---|
| 28.02.2020 (Fri) | : | Mid Term notification of shortage of attendance |

**MID Semester Examination: 02nd March -07th March, 2020 (Monday-Saturday)**

**MID Semester Break: 09th March -13th March, 2020 (Monday-Saturday)**
**Only for UG/PG students**

**Notification of Make up for MID Semester Examination 23rd March-27th March, 2020 (Monday-Friday)**

| | | |
|---|---|---|
| 30.04.2020 (Thu) | : | Teaching ends for all classes; Display of sessional marks and shortage of attendance. |

**END Semester Theory & Practical Examination: 04.05.2020 (Monday) onwards**

| | | |
|---|---|---|
| 29.05.2020 (Fri) | : | Grade moderation & display of grades for II, IV and IV semester (UG) courses. |
| 08.06.2020 (Mon) | : | Summer Vacation, Workshop Training, Industrial Training |
| 15.06.2020 (Mon) | : | Declaration of End semester results *except Major Project*-II for PG program. |
| 20.07.2020 (Mon) | : | University reopens after summer vacation |

| | | |
|---|---|---|
| 1. | **Technical Fest** | **: 7th -9th Feb, 2020 (Friday to Sunday)** |
| 2. | **Engifest** | **: 14th -16th Feb, 2020 (Friday to Sunday)** |
| 3. | **Yuvaan Literary & Film Fest** | **: 23rd – 25th Jan, 2020 (Thursday to Saturday)** |
| 4. | **Sports Aahvaan** | **: 21st – 23rd Feb, 2020 (Friday to Sunday)** |

**Decision : Academic Council approved the Academic Calendar 2019-20 as above.**

**Agenda 20.9 : Shifting of Linear Integrated Circuits course from DEC to DCC in B.Tech EE Curriculum.**

At present the students of the B.Tech (EE) program study the course EE- 203 Electronic Devices and Circuit (EDC) in III semester. This course covers the basics of electronic devices like by pn-junction diodes, BJTs, MOSFETS, differential amplifiers and feedback amplifiers. In previous teaching scheme of EE, the topics like, operational amplifiers, filters, timers and oscillators were covered in another core course in IV semester i.e. Linear Integrated Circuit (LIC). In the revised scheme (2015) of B.Tech EE, these topics are covered in a V semester elective course entitled 'Linear Integrated circuit'. It has been observed that many students do not opt for this elective because of ignorance /misinformation, and as a result remain ignorant about important concepts of Analog Electronics such as opamp, oscillators and IC etc. It was thus decided that the elective course EE-313 (Linear integrated circuit) be moved to IV semester as a core course in place of Electromagnetic Field Theory (EE-202). The course Electromagnetic Field Theory which is at present being offered in the IV Semester be moved to III Sem. and the III semester course Engineering Analysis and Design (EAD) be moved to V semester as an elective. These changes will be applicable for the students admitted in 2018. The revised subject codes of these subjects are given below:

EE-202 Linear Integrated Circuit: (DCC)
EE- 207 Electromagnetic Field Theory: (DCC)
EE-313 Engineering Analysis and Design: (DEC)

The BOS of the Department of Electrical Engineering has already approved the above changes in its meeting held on 02.03.2019.

**Decision : The Academic Council approved for shifting of Linear Integrated Circuits course from DEC to DCC in B.Tech EE Curriculum.**

**Agenda 20.10 : Change in L T P breakup in r/o MC-261 Numerical and Engineering Optimization Method, course in B.Tech EE curriculum.**

It was submitted to the Academic Council that the Course MC-261 Numerical and Engineering Optimization Method is a 4 credit course with 3 lecture hours and 1 tutorial hours per week and is currently offered to the III Semester EE B.Tech Electrical Engineering students. It has been observed that there is a requirement of lab work in this course. It is therefore proposed to introduce a 2 hour per week laboratory contents in this course in place of 1 tutorial hour per week. The revised LTP breakup will now be 3 0 2.

**Decision : The Academic Council approved the change in L T P breakup in r/o MC-261 Numerical and Engineering Optimization Method, course in B.Tech EE curriculum.**

**Agenda 20.11 : Addition and shifting of elective course in B.Tech (IT) Curriculum.**

It was submitted to the Academic Council that the Department of Information Technology is offering B.Tech. in information Technology as per the course scheme approved by Academic council of the university. Presently, a course on Machine Learning is offered as Elective 3 and 4 in the 6th semester of B.Tech. (Information Technology).

Recently, development in the field of Machine Learning has been emerged as a "Deep Learning" which has wide applications in the field of Information Technology. Since 2006, Deep Learning has emerged as dominant concept in the field of Machine Learning.

Considering the need of present and future of Information Technology, the Board of Studies of IT department recommends (3/c) following changes in the present scheme of B.Tech. (IT).

- The course Machine Learning (IT-324) has to be introduced as Elective 1 and 2, which is currently running as Elective 3 and 4. The course code of "Machine Learning" can be IT-323. A detailed syllabus of "Machine Learning" is placed as ***Annexure at page 28.*** The credit of "Machine Learning" is 4 (L=3, T=0, P=2 Hours).

- A new course of "Deep Learning" has to be introduced as Elective 3 and 4 of B.Tech. 6th Semester. The course code of Deep Learning can be IT-324. A detailed syllabus of Deep Learning is placed as ***Annexure at page 29***. The credit of "Deep Learning" is 4 (L=3, T=1, P=0 Hours).

**Decision : The Academic Council approved the proposal. It was also suggested that a provision for laboratory for practical learning may also be made with L T P of 3 0 2.**

**Agenda 20.12 : Approval for minor modifications in Unit-6 (Semiconductor Physics) in AP 102 Applied Physics-II Course.**

It was submitted to the Academic Council that the Department of Applied Physics has proposed minor modifications in Unit-6 (Semiconductor Physics) in AP 102 Applied Physics II course as below:

| Existing | Proposed |
|---|---|
| **Semiconductor Physics:** Concept of intrinsic and extrinsic semiconductors. Fermi level, characteristics of PN Junction, static and dynamic resistance, zenar diode and LED, diode as a rectifier, transistor (PNP and NPN) characteristics, current and voltage gain. | **Semiconductor Physics:** Introduction to semiconductors; origin of Band theory of solids, Intrinsic and Extrinsic semiconductors. Fermi level variation with temperature, Statistics of holes and electrons, Law of mass action, Hall effect, Effect of temperature on conductivity and band gap, Life time, generation and recombination, drift and diffusion current, Einstein relation. |

The matter was also placed before the Board of Studies its meeting held on 22.04.2019 which approved the proposed modifications.

**Decision : The Academic Council approved the minor modifications in Unit-6 (Semiconductor Physics) in AP 102 Applied Physics-II Course.**

**Agenda 20.13 : Approval for modification in teaching and evaluation scheme for open elective courses.**

It was submitted to the Academic Council that in existing teaching and evaluation scheme for B.Tech. Program one open elective course (OEC UExxx) 3 credit is offered to the students. In this course different departments offer open elective courses which can be taken by the students from different disciplines /branches. The current teaching and evaluation scheme is as under:

| Teaching and Examination Scheme | | Credit | Hours/Week | | | Exam Duration (Hrs) | | Relative Weights (%) | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Subject Code | Course Title | | L | T | P | Theory | Practical | CWS | PRS | MTE | ETE | PRE |
| **UExxx** | **OEC** | 3 | 3 | 0 | 0 | 3 | 0 | 25 | 0 | 25 | 50 | 0 |

It has been observed that in some open elective courses there is a need for conducting laboratory/tutorial classes. It is therefore proposed to adopt the following generalised scheme of teaching and evaluation. This generalised scheme of teaching and evaluation will take into account the diverse nature of different types of open elective courses. The department offering the open elective course will decide the teaching and evaluation scheme to be used for the subject.

**Revised teaching and evaluation scheme for open elective courses**

| Teaching and Examination Scheme | | Credit | Hours/Week | | | Exam Duration (Hrs) | | Relative Weights (%) | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Subject Code | Course Title | | L | T | P | Theory | Practical | CWS | PRS | MTE | ETE | PRE |
| **UExxx** | **OEC** | 3 | **0** | **0** | **6** | **0** | **3** | **0** | **50** | **0** | **0** | **50** |

**Decision : The Academic Council approved the proposed modification in teaching and evaluation scheme for open elective courses.**

**Agenda 20.14 : Approval for introduction of an additional subject in the list of open elective courses.**

It was submitted to the Academic Council that the Academic Branch-UG has submitted a proposal for introduction of an additional subject in the list of open elective courses as below:

1. Subject Code : EC 361
2. Course Title : Analog circuits: Design to Layout
3. Credits : 3
4. Semester : V
5. Subject Area : OEC
6. Pre-requisite : Analog Electronics/Electronics devices and circuits
7. Objective : To impart knowledge of analog integrated circuit design concepts and analog design EDA tools to prepare students ready for VLSI Industry.

8. Syllabus:

| Unit | Content | Contact hours | |
|---|---|---|---|
| | | L | P |
| 1 | CMOS Physical design: MOS I/V Characteristics; MOS Device Model:-Small Signal Model, SPICE Models; Layout of basic devices- NMOS, PMOS, Resistor, Capacitor; Introduction to Physical verification (DRC) | 4 | 16 |
| 2 | Basic current mirror, Wilson current mirror, Cascode current mirror | 2 | 8 |
| 3 | Analysis and design of single stage amplifiers: Common sources amplifier (CS) - with resistive, diode connected and Current source load; CS amplifier with degeneration, source follower, common gate amplifier and cascode amplifier. | 4 | 16 |
| 4. | Analysis and design of differential amplifier, two stage operational amplifier. | 4 | 16 |

9. Reference books:

| S.No. | Name of Books / Authors/ Publishers | Year |
|---|---|---|
| 1. | CMOS Analog Circuit Design by P. Allen, D. R. Holberg; | 2009 |
| 2. | Design of Analog CMOS Integrated Circuits by B. Razavi; Tata McGraw Hill | 2002 |
| 3. | Microelectronics circuits by Sedra ,Smith; Oxford University Press | 2015 |
| 4. | VLSI Design Techniques for Analog and Digital Circuits by R.L.Geiger, P. Allen, Noel R.Strader; Tata McGraw Hill | 2013 |

**Decision : The Academic Council approved for introduction of an additional subject in the list of open elective courses with L T P of 2 0 4.**

**Agenda 20.15 : To consider the new proposed M. Tech. scheme of teaching and examination.**

It was submitted to the Academic Council that at present, DTU is offering 20 M.Tech. Programmes in its different departments. Earlier, M. Tech. scheme of teaching and examination was revised in 2010. To make more effective the scheme of teaching and examination for M.Tech. Programmes of DTU, a committee was constituted under the chairmanship of Prof. H.C. Taneja, Dean PG to give its recommendations. The constitution of the committee is as under:

1. Prof. H.C. Taneja, Dean (Acad.-PG) - Chairman
2. Prof. Pragati Kumar, Electrical Engg. – Co-Chairman
3. Prof. Nirender Dev, Civil Engg. - Member
4. Dr. Rinku Sharma, App Phy. - Member
5. Dr. Neeta Pandey, E&C Engg. - Member
6. Dr. R.K. Singh, Mech. Engg. - Member
7. Dr. Md. Rizwan, Elec. Engg. - Member
8. Dr. Ruchika Malhotra, COE Engg. - Member
9. Mr. Anil Kumar, Dy. Registrar- Member Secy.

After detailed discussion and going through the scheme of teaching and examination of M. Tech. programmes of various IITs, NITs and other reputed institutes, a new scheme has been drafted with the following salient features which are as under:

1. The M. Tech. program will be of two/ three years duration respectively for Full Time / Part Time.
2. A student will be awarded the degree of Master of Technology after earning total 58 credits in the end of 4th / 6th semester;
3. In each of first and second semester of all M.Tech. programs, there will be two 4 credit core courses, three elective courses (one each of 4 credit, 3 credit, 2 credit respectively);

4. For M.Tech Part Time Program student will study Group A (Program Core 1 & 2) in 1st semester, Group C (Program Core 3 & 4) in 2nd semester, Group B (Three electives courses one each of 4,3 and 2 credits) in 3rd Semester, Group D (Three elective courses one each of 4,3 & 2 Credits) in 4th semester, Group E in 5th semester and Group D in 6th semester.
5. In second year, there will be two parallel tracks, namely – (1) Research Track (2) Coursework track;

   **Research Track :** In Research track, the students will be required to publish research paper as per the approved research publication policy of the university. The student will be awarded 24 credits after publishing research paper.

   **Coursework Track :** In Course work track, the students will be required to take 1 core course (major project 1) and three elective courses (one each of 4 credit, 3 credit, 2 credit respectively) in third/ fifth semester. In fourth/ sixth semester, the students will be required to take 1 core course (major project 2).
6. A student must earn at least 08 credits from 04 credit elective courses and at least 06 credits from 03 credit elective courses from a basket of electives specific to that program. The remaining elective credits may be earned from electives offered for other programs including MOOCs. In case of MOOCs only 02 credits per MOOC course will be considered;
7. In first semester of every M.Tech. Program, a seminar has been offered as a two credit elective course;
8. In second semester of every M.Tech. program, a minor project has been offered as a three credit elective course;
9. Keeping in view the audit courses in the model PG curriculum of AICTE, 2 credit elective courses under Group B and Group D have been offered. These courses are general in nature and supposed to add value to the M. Tech. program. These courses will be called university electives and coordinated at the level of Dean (Acad-PG). A student may opt any one of these electives against 2 credits elective courses offered under Group B and Group D each;
10. The following alphanumeric coding scheme has been adopted:
    **Core Courses : XXXYMN**
    **Elective Courses : XXXYCMN**

    XXX abbreviates a particular M. Tech. program, Y – (5 for M. Tech. 1st year, 6 for M. Tech. 2nd year),
    C – credit of the course (4/3/2), MN – Subject code (Odd number for odd semester and even number for even semester courses.
11. To facilitate slow and fast learners a student can register minimum 12 credits and maximum 24 credits in a semester; out of these registered credits, core courses being offered in the specific programme must be registered.

**The proposed M. Tech. scheme is given below:**

**1. M.Tech. Scheme**

| SEMESTER I | | | | |
|---|---|---|---|---|
| | **COURSES** | **CREDITS** | **TYPE** | **TOTAL CREDITS** |
| Group A | Program Core- 1 | 4 | Core | 17 |
| | Program Core- 2 | 4 | Core | |
| Group B | Elective 1 | 4 | Elective | |
| | Elective 2 | 3 | Elective | |
| | Elective 3/ University Elective I | 2 | Elective | |
| **SEMESTER II** | | | | |
| | **COURSES** | **CREDITS** | **TYPE** | **TOTAL CREDITS** |
| Group C | Program Core- 3 | 4 | Core | 17 |
| | Program Core- 4 | 4 | Core | |
| Group D | Elective 4 | 4 | Elective | |
| | Elective 5 | 3 | Elective | |
| | Elective 6/ University Elective II | 2 | Elective | |
| **SEMESTER III** | | | | |
| Group E | **Track 1*** | | | 12 |
| | Research Project | 12 | Core | |
| | **Track 2** | | | |
| | Elective 7 | 4 | Elective | |
| | Elective 8 | 3 | Elective | |
| | Elective 9 | 2 | Elective | |
| | Project-1 | 3 | Core | |
| **SEMESTER IV** | | | | |
| Group F | **Track 1*** | | | 12 |
| | Research Project | 12 | Core | |
| | **Track 2** | | | |
| | Project 2 | 12 | Core | |
| Total Credits | | | | **58** |

**List of University Electives**

**University Elective I**

| | |
|---|---|
| UEC5201 | Entrepreneurship Development |
| UEC5203 | Stress Management by Yoga |
| UEC5205 | Research Writing |
| UEC5207 | Ethics and Human Values |
| UEC5209 | Research Methodology |
| UEC5211 | Engineering Economics |
| UEC5213 | Business communication and presentation skills |
| UEC5215 | Communication skills |
| UEC5217 | Ethics and Technology |

**University Elective II**

| | |
|---|---|
| UEC5200 | Research Methodology |
| UEC5202 | Financial Data Analytics |
| UEC5204 | Technical Report Writing |
| UEC5206 | Cost management of Engineering Projects |
| UEC5208 | Business Analytics |
| UEC5210 | Intellectual Property Rights |
| UEC5212 | Technical communication |
| UEC5214 | Logical Reasoning and Critical Thinking |
| UEC5216 | Multimedia Tools and Technology |
| UEC5218 | Data Analytics |

- Publication in category 1 or category 2 journal publication is mandatory outcome of the Track 1. In second year (i.e III and IV semester) Track 1 option is by research project. Candidate will be finally evaluated at the end of the semester IV out of 24 credits on the basis of his/her publication (Accepted or published in category 1 or 2 journals).

## 2. COURSE EVALUATION

Evaluation in each course is based on the weights assigned to the various components of the course curriculum. These components are designated as under.

| | |
|---|---|
| CWS | Class work sessional |
| MTE | Mid term examination |
| ETE | End term examination |
| PRS | Practical Sessional |
| PRE | Practical Examination |

## GRADING OF RESEARCH WORK

The candidate will be at least awarded A+ and A grade if published in category 1 and category 2 (as per the approved research policy of the university) respectively.

The detailed schemes of various departments are placed in ***Annexure at pages 30 to 97.***

**Decision : Academic Council considered the proposal as above and authorized the Vice Chancellor to accept the recommendations.**

**Agenda 20.16 : To consider the formal registration to following Ph.D. Students upon successful completion of course work and comprehensive examinations and approval of Research Plan by respective DRCs.**

It was submitted to the Academic Council that Dean Academic (PG) has forwarded a list of 56 candidates to consider their formal registration for Ph.D. candidature upon successful completion of course work and comprehensive examinations and sought approval for research plan by the respective DRCs. A list of the candidates (department-wise) is placed below:

**Department of Applied Chemistry**

| Sr. No. | Name of the Candidate | Roll No | Date of SRC |
|---|---|---|---|
| 1 | Ms. Reetu Yadav | 2K17/Ph.D/AC/01 | 23.10.2018 |
| 2 | Mr. Himansh Goel | 2K17/Ph.D/AC/02 | 22.02.2019 |
| 3 | Ms. Shikha Rana | 2K17/Ph.D/AC/04 | 02.03.2019 |

**Department of Applied Physics**

| Sr. No. | Name of the Candidate | Roll No | Date of SRC |
|---|---|---|---|
| 1 | Ms. Renu Kumari | 2K17/Ph.D/AP/08 | 26.10.2018 |
| 2 | Mr. Abhishek Bhardwaj | 2K16/Ph.D/AP/05 | 27.12.2018 |
| 3 | Mr. Rajesh Gupta | 2K18/Ph.D/AP/29 | 27.03.2019 |
| 4 | Ms. Yasha Tayal | 2K16/Ph.D/AP/11 | 18.03.2019 |

**Department of Applied Mathematics**

| Sr. No. | Name of the Candidate | Roll No | Date of SRC |
|---|---|---|---|
| 1 | Ms. Shagun Banga | 2K17/Ph.D/AM/05 | 03.12.2018 |
| 2 | Ms. Priyanka Goel | 2K17/Ph.D/AM/09 | 03.12.2018 |
| 3 | Mr. Luckshay Batra | 2K17/Ph.D/AM/10 | 21.01.2019 |
| 4 | Ms. Tanya Malhotra | 2K17/Ph.D/AM/03 | 30.01.2019 |

**Department of Civil Engineering**

| Sr. No. | Name of the Candidate | Roll No | Date of SRC |
|---|---|---|---|
| 1 | Ms. Archita Goyal | 2K16/Ph.D/CE/08 | 29.12.2018 |
| 2 | Mr. Saurabh Sah | 2K17/Ph.D/CE/02 | 27.12.2018 |
| 3 | Ms. Ruchika Dabas | 2K17/Ph.D/CE/30 | 27.12.2018 |
| 4 | Mr. Ankur Mudgal | 2K14/Ph.D/CE/04 | 25.07.2015 |
| 5 | Ms. Geeta Devi | 2K17/Ph.D/CE/09 | 21.01.2019 |

## Department of CSE

| Sr. No. | Name of the Candidate | Roll No | Date of SRC |
|---|---|---|---|
| 1 | Ms. Geetanjali Garg | 2K16/Ph.D/CO/05 | 23.03.2018 |

## Department of Delhi School of Management

| Sr. No. | Name of the Candidate | Roll No | Date of SRC |
|---|---|---|---|
| 1 | Mr. Jitesh Bhardwaj | 2K17/Ph.D/DSM/05 | 14.01.2019 |
| 2 | Ms. Vaishali Kaushal | 2K17/Ph.D/DSM/01 | 04.02.2019 |
| 3 | Ms. Niharika | 2K17/Ph.D/DSM/02 | 30.01.2019 |
| 4 | Mr. Mukesh Kumar Singh | 2K17/Ph.D/DSM/07 | 12.02.2019 |

## Department of Electronics & Communication Engineering

| Sr. No. | Name of the Candidate | Roll No | Date of SRC |
|---|---|---|---|
| 1 | Mr. Shashank | 2K17/Ph.D/EC/05 | 04.10.2018 |
| 2 | Mr. Enock Osoro Omayio | 2K17/Ph.D/EC/13 | 04.10.2018 |
| 3 | Ms. Lavi Tanwar | 2K17/Ph.D/EC/02 | 24.09.2018 |
| 4 | Mr. Praveen Kumar | 2K17/Ph.D/EC/07 | 04.12.2018 |

## Department of Electrical Engineering

| Sr. No. | Name of the Candidate | Roll No | Date of SRC |
|---|---|---|---|
| 1 | Mr. Manas Taneja | 2K17/Ph.D/EE/18 | 31.10.2018 |
| 2 | Mr. Saket Gupta | 2K17/Ph.D/EE/02 | 03.12.2018 |
| 3 | Ms. Snigdha Sharma | 2K17/Ph.D/EE/03 | 19.12.2018 |
| 4 | Mr. Aakash Kumar Seth | 2K17/Ph.D/EE/10 | 12.01.2019 |
| 5. | Mr. Dinanath Prasad | 2K16/Ph.D/EE/19 | 16.01.2019 |
| 6. | Mr. Mohd. Bilal | 2K17/Ph.D/EE/05 | 19.02.2019 |
| 7. | Mr. Lokesh Rana | 2K15/Ph.D/EE/06 | 05.11.2018 |
| 8. | Mr. Mohd Saquib Faraz | 2K16/Ph.D/EE/20 | 05.03.2019 |
| 9. | Mr. Atul Varshney | 2K17/Ph.D/EE/05 | 27.03.2019 |
| 10. | Ms. Bandana | 2K17/Ph.D/EE/11 | 28.03.2019 |

## Department of Mechanical Engineering

| Sr. No. | Name of the Candidate | Roll No | Date of SRC |
|---|---|---|---|
| 1 | Ms. Rashi Koul | 2K17/Ph.D/ME/17 | 26.10.2018 |
| 2 | Mr. S. Lalhriatpuia | 2K17/Ph.D/ME/07 | 26.10.2018 |
| 3 | Mr. Ankti Tyagi | 2K17/Ph.D/ME/39 | 09.11.2018 |
| 4 | Mr. Sanjeev Kumar | 2K16/Ph.D/ME/44 | 21.12.2018 |
| 5 | Mr. Md Nazeem Khan | 2K17/Ph.D/ME/08 | 21.12.2018 |
| 6 | Ms. Pooja Rani | 2K17/Ph.D/ME/58 | 24.12.2018 |
| 7 | Mr. Madhukar Chhimwal | 2K17/Ph.D/ME/46 | 11.01.2019 |
| 8 | Mr. Md. Jamil Akhtar | 2K17/Ph.D/ME/05 | 15.11.2018 |
| 9 | Mr. Sumit Chawla | 2K17/Ph.D/ME/21 | 12.11.2018 |

| | | | |
|---|---|---|---|
| 10 | Mr. Kumar Raju | 2K17/Ph.D/ME/15 | 26.12.2018 |
| 11 | Mr. Pradeep Kumar Moruia | 2K17/Ph.D/ME/34 | 12.11.2018 |
| 12 | Mr. Anshul Kumar | 2K17/Ph.D/ME/60 | 28.01.2019 |
| 13 | Mr. Hussam Saddique | 2K17/Ph.D/ME/03 | 10.01.2019 |
| 14 | Mr. Jayanta Ghosh Roy | 2K17/Ph.D/ME/37 | 29.01.2019 |
| 15 | Mr. Shrikant Vidya | 2K17/Ph.D/ME/29 | 24.01.2019 |
| 16 | Mr. Hari Shankar | 2K17/Ph.D/ME/28 | 14.02.2019 |
| 17 | Ms. Ankita Arora | 2K17/Ph.D/ME/14 | 28.01.2019 |
| 18 | Mr. Rakesh Chander Saini | 2K17/Ph.D/ME/26 | 13.02.2019 |
| 19 | Ms. Kalpana Gupta | 2K15/Ph.D/ME/11 | 10.12.2018 |
| 20 | Mr. Lalit Batra | 2K17/Ph.D/ME/12 | 10.04.2019 |
| 21 | Ms. Khushbu Yadav | 2K17/Ph.D/ME/27 | 24.01.2019 |

**Decision : The Academic Council approved the formal registration and confer their candidacy to 56 candidates for Ph.D. program**

**Agenda 20.17 : Cancellation/Withdrawal of Admission during Dec'18 to Apr'19 for Ph.D. and M.Tech programs.**

It was submitted to the Academic Council that 10 admissions have been withdrawn during the Academic Year 2018-19 for Ph.D. and M.Tech. programs. The list of the students is given below:

| | Cancellation/Withdrawn of Ph.D Registration | | |
|---|---|---|---|
| **Sr. No.** | **Name of the Candidate** | **Roll No** | **Name of the Department** |
| 1 | Mr. Rajesh Babbar | 2K17/Ph.D/ME/50 | Mech. Engg |
| 2 | Ms. Kamalika Gupta | 2K19/Ph.D/EN/01 | Env. Engg |
| 3 | Ms. Divya Khurana | 2K19/Ph.D/HU/04 | Humanities |
| 4 | Mr. Akash Gandhi | 2K19/Ph.D/AP/04 | Applied Physics |
| 5 | Ms. Ankita Rai | 2K18/Ph.D/BT/03 | Biotechnology |
| 6 | Ms. Trasha Gupta | 2K18/Ph.D/IT/03 | Info. Technology |
| 7 | Mr. Siddharth | 2K19/Ph.D/CO/504 | CSE |
| 8 | Mr. Rohan Gupta | 2K18/Ph.D/BT/05 | Biotechnology |
| 9 | Mr. Parveen Kumar | 2K18/Ph.D/AP/06 | Applied Physics |

| | Cancellation /Withdrawn of M.Tech Registration | | Deptt./ Programme |
|---|---|---|---|
| 1 | Mr. Narendra Kumar | 2K18/STE/505 | Civil Engg |

**Decision : The academic council approved the Cancellation/Withdrawal of Admission during Dec'18 to Apr'19 for Ph.D. and M.Tech programs.**

**Agenda 20.18 : Approval for introduction of M.Sc. courses in Applied Mathematics, Applied Physics and Biotechnology departments of DTU from the academic session 2019-20.**

It was submitted to the Academic Council that DTU is having full-fledged departments of Applied Mathematics, Applied Physics, Biotechnology and Applied Chemistry which are actively involved in research and teaching at the graduate and post graduate level to engineering students. To boost the teaching and research in sciences as being done by the IITs and NITs, it is proposed that the sciences departments of DTU may also introduce courses at M.Sc. level. This kind of requests have been made by four departments on various occasions and also is included in Strategic Plan 2030 of DTU. The introduction of M.Sc. programs will not only impart strong foundations for the development of sciences but will also provide an exposure to applied areas through various elective courses and laboratory training.

In this regard, a meeting of Head of departments was held with the Dean (PG) and in the meeting, it was decided to submit the formal proposal to introduce M.Sc. courses in the departments of Applied Mathematics, Applied Physics and Department of Biotechnology from the academic session 2019-20. The Applied Chemistry will start M.Sc. program at some later date though the proposal is being submitted.

The details of the proposed M.Sc. programmes are as under:

- In order to develop a strong foundation for the proposed M.Sc. programmes, the CBCS guidelines issued by UGC may be followed wherein the core courses will be given adequate weightage in terms of course content and depth of coverage. It is proposed to provide a Basket of 'Elective' courses as an integral component of curriculum, for catering to the varied interests of the students, so that students can develop 'specialization' in the areas of their interest.
- It is proposed that initially the M.Sc. may be introduced with a minimum of intake of 30 seats in each discipline.
- The eligibility for admission to the M.Sc. programme in Mathematics will be BA/B.Sc (General or Hons.) with 55% marks or equivalent grade with mathematics as one of the subject, and for admission to M.Sc. in Physics, Chemistry and Biotechnology will be B.Sc. (General or Hons.) with 55% marks or equivalent grade with respectively Physics, Chemistry, Biology as one of the subject.
- The admissions to M.Sc. Programme may be made on the basis of screening test conducted by the DTU.
- HoDs of Physics, Maths and Biotechnology have given consent to introduce the M.Sc. programme with the existing infrastructure and in case some additions are required will be done gradually.
- With a proposed intake of 30 students in the M.Sc. programme, the total number of students in 02 years shall be 60 and as per Student: Teacher Ratio of 10:1

(as per UGC), the each programme of M.Sc. needs 06 faculty members. Further considering cadre ratio of 1:2:6, the 06 posts can be divided as follows:

| | | |
|---|---|---|
| Professor | : | 0 |
| Associate Professor | : | 02 |
| Assistant Professor | : | 04 |

**Non Teaching Staff:** As per norms, the non-teaching to teaching staff ratio, 1.1:1, 6*1.1= 7. Further, out of which **04 is Technical** (7*06=4) and **03 is ministerial** (7*04=3).

- The fee for the students to be admitted in M.Sc. programme in the academic session 2019-20 will be Rs.28,000/- for the 1st year and Rs.32000/- for the 2nd year.
- The admission process may be initiated for the academic session 2019-20 for M.Sc. (Physics), M.Sc. (Mathematics) and M.Sc. (Biotechnology).

The detailed schemes of M.Sc. (Physics), M.Sc. (Mathematics) M.Sc. (Biotechnology) and M.Sc. (Chemistry) are ***placed in Annexure from 98 to 122 pages***.

**Decision : The academic council approved for introduction of M.Sc. courses in Applied Mathematics, Applied Physics and Biotechnology departments of DTU from the academic session 2019-20 as above.**

**Agenda 20.19 : Approval for Sanction of Teaching, Technical and Ministerial Staff for the newly proposed M.Sc. programme in Applied Physics, Applied Mathematics, Applied Chemistry and Biotechnology departments of DTU.**

It was submitted to the Academic Council that a proposal has been received for introduction of M.Sc. course in the Applied Physics, Applied Mathematics, Applied Chemistry and Biotechnology departments of DTU with an intake of 30 seats in each department. HoDs of Physics, Maths and Biotechnology have given consent to introduce the M.Sc. programme with the existing infrastructure and in case some additions are required will be done gradually. But, the Applied Chemistry will start the course at later stage. With a proposed intake of 30 students in the M.Sc. programme, the total number of students in 02 years shall be 60 and as per Student: Teacher Ratio of 10:1 (as per UGC), the each programme of M.Sc. needs 06 faculty members. Further considering cadre ratio of 1:2:6, the 06 posts can be divided as follows:

| | |
|---|---|
| Professors | : 0 |
| Associate Professors | : 02 |
| Assistant Professors | : 04 |

**Non Teaching Staff:** As per norms, the non-teaching to teaching staff ratio, 1.1:1, 6*1.1= 7. Further, out of which **04 is Technical** (7*06=4) and **03 is ministerial** (7*04=3).

As the requirement of staff (ministerial & technical) which has been calculated/projected above, it is proposed that the ministerial staff posts may be created at the level of Junior Office Assistant (JoA) and as far as technical staff is concerned, the HoD (Physics) & Biotechnology has given their requirement that the technical staff posts may be sanctioned/ created at the level of Junior technical Assistants (JTA). The RRs as proposed by the HoDs are placed in ***Annexure at page 123***.

**Decision : The Academic Council approved for proposal and recommended to place the matter before the Board of Management.**

**Agenda 20.20 : To introduce the 02 MBA Courses in USME, DTU East Delhi Campus i.e. 1. MBA- Family Business & Entrepreneurship [MBA (FBE)] 2. MBA- Entrepreneurship, Innovation and Venture Development [MBA (EIVD)].**

It was submitted to the Academic Council that a proposal has been received from HoD (USME) DTU, East Delhi Campus duly approved by their BOS for approval of the Academic Council. The detailed Syllabus and Scheme of both the programmes are as below:

1. **Masters of Business Administration - Family Business & Entrepreneurship (MBA-FBE)**

(i) To offer admissions to the MBA (FBE) in the academic year 2019-2020 with 30 seats.

(ii) Proposed eligibility of candidates is Graduation in any stream with at least 50% marks with 10% relaxation for SC/ST/PWD.

(iii) It was accepted that selection will be based on Graduation marks (40% weightage) + Case Study (20%) + Interview (30%) + Gender Diversity (5%) and Academic Diversity (5%). Criteria for marking in interview proposed as- Personal characteristics like creativity, divergent thinking, motivation and passion; General Awareness; Understanding of business and fitment with nature of program (quality of experience if any and understanding of family business issues).

(iv) Students may choose a total of seven elective courses equivalent to 28 credits. Specialization in Family Business may be made compulsory, and from this stream, three electives of total seven electives required must be chosen by each student. Students may be allowed to choose any of the four electives individually, from any of the other Entrepreneurship elective streams. The courses finally offered from the entrepreneurship elective basket would be determined by minimum number of students subscribing to an elective as per DTU norms.

(v) Given the nature of the program and stress on entrepreneurship, students would be encouraged to take forward their family business. They would also be encouraged and facilitated in their venture development if they wished to start a new venture. The corporate engagement resources would also be available for networking for those wishing to leverage these networks. Given the above they are not expected to seek placement and formal services of T and P department, which may not be required for their aspirations.

**2. Masters of Business Administration in Entrepreneurship, Innovation and Venture Development – MBA(EIVD)**

(i) To offer admission to the MBA (EIVD) in the academic year 2019-2020 with 30 seats.

(ii) Proposed eligibility of candidates is Graduation in any stream with at least 50% marks with 10% relaxation for SC/ST/PWD was accepted.

(iii) Selection will be based Graduation marks (30%); gender diversity (5%); academic diversity (basis the academic background of applicants in each batch; minority academic background would be awarded five percent as grace marks); Essay (10%) + Interview (50% of which 30% marks for business plan/idea and 20% for personal characteristics such as entrepreneurial motivation, passion, degree of engagement, creativity and quality of understanding of innovation, entrepreneurship etc.);

(iv) The syllabus and programmes' structure would follow the AICTE structure. There will be four semester with modular structure, with 2 modules in each semester. A practicum MBA program, it will require the achievement of outcomes related to formation of enterprise entity, and will be evaluated partly on achieving these outcomes, as detailed.

(v) Given the nature of the program and stress on entrepreneurship, students would be encouraged to take forward their venture development or find roles in incubation entities, leverage the network provided to establish their positions in some other venture. The corporate engagement resources would also be available for networking for those wishing to leverage these networks. Given the above they are not expected to seek placement and formal services of T and P department would not be required for their aspirations.

(vi) It was decided that the exact syllabi for each course will be decided by the committee of experts coordinated by the faculty who would deliver the course. This would be put up to the Board of Studies for giving any comments in the subsequent meeting.

The evaluation scheme for theory and projects will follow the DTU norms. For evaluation of outcome based capstone project, the evaluation scheme will be provided by the faculty coordinator after consultation with experts and finalised by the department.

**Decision : The Academic Council approved the proposal with some modifications:**

**"In MBA (FBE) program point number (iv)- "the specialization in family business be replaced with specialization in family business having a GST number firm."**

**However, other modifications have been incorporated.**

**Agenda 20.21 : Approval for extension of last date and revised admission schedule of MBA 2019-21.**

It was submitted to the Academic Council that the Common Management Admission Committee (CMAC) 2019 intends to extend the last date of submission of application for admission to MBA programme 2019-21 batch.

The extension of the last date is expected to further increase the total number of applications for the MBA programme of participating institutions.

The University Admission Committee in its 7th meeting approved the revised admission schedule of MBA programme 2019-21 which is placed in ***Annexure at page 147.***

**Decision : The Academic Council approved the proposal as above.**

**Agenda 20.22 : Proposal for infrastructural requirement for setting up of laboratory.**

It was submitted to the Academic Council that the University has envisaged Strategic Plan 2019-30 indicating different activities in terms of infrastructural growth, man power, research and development of the University.

In view of strategic plan 2019-30, many new laboratories are to be set up. Each laboratory need to be equipped with required machinery/ equipments and other facilities.

In order to standardize the requirement of the laboratories, the following is proposed :-

1. **Laboratory Infrastructure:**

**A. Equipments:**

- Furniture related to requirements of equipments.
- Chairs/ Stools/ any other similar item for students.
- Almirahs & similar storage furniture for equipments, tools & accessories.
- Bulletin Board
- White Board
- Projector/ LCD screen
- Air conditioning , if required
- Exhaust fan, if required
- If there is specific requirement, approval of the Competent Authority is required.

**B. Electrical Work :** Internet & Wifi, fans, lights and others as per laboratory requirement.

**C. Civil Work :**

- All walls with POP, duly painted with oil bound distemper.
- Flooring : Kota stone duly polished.
- False Ceiling will be permitted only if there is a scientific requirement.
- Partitioning with aluminium & glass.
- Blinds/ solar films/ curtains.

**2. Resources for Faculty and Staff :**

**A. Research Lab :**

**(i) Faculty:**

- Table : : 4'X2' / 5'X3'
- Executive Chair : 01
- Visitor Chairs: 2 to 4
- Almirah : Big/ small : 01
- Notice pinup board: 01
- White board: 01

**(ii) Research Scholars:**

- Table : (4' X 2') : 01
- Chairs : 01 to 03

**(iii) Technical Staff:**

- Table : (4' X 2'): 01
- Chairs : 01 to 03

**B. Instruction Laboratories :**

**(i) Lab Incharge:**

- Table : (4' X 2') / (5' X 3') : 01
- Chairs: 02 to 04
- Almirah : Big/ Small : 01

**(ii) Faculty for Lab:**

- Table : (4' X 2') : 01
- Chair: 02 to 04

**(iii) Technical Staff:**

- Table : (4' X 2') : 01
- Chair : 02 to 04

**(iv) Research Scholar:**

- Table : (4' X 2') : 01
- Chair : 01 to 03

3. Layout of all equipments/ space for faculty and staff in the laboratory should be approved by the Vice Chancellor on the recommendation of the following Committee:

| | | |
|---|---|---|
| (i) | HoD: | Chairperson |
| (ii) | Lab Incharge | Member |
| (iii) | Executive Engineer: | Member |
| (iv) | A professor of the Deptt. nominated by the HoD | Member |

**Decision : The Academic Council approved the proposal for infrastructural requirement for setting up of laboratory as proposed.**

**Agenda 20.23 : Proposal for infrastructural facility for Dean/HODs and faculty members.**

It was submitted to the Academic Council that as envisaged in the Strategic Plan 2019-30, the University has to become a leading university in term of research, training/ learning and outreach & extension and other student activities. Requisite support in terms of infrastructure is to be provided to the faculty mentors/ staff.

The physical infrastructure requirement for Deans/ HoDs has also been standardized and the following is proposed for approval of the Academic Council :

1. **Deans/ HoDs :**
   - (i) Executive Table : (8" X 4' or 6" X 4') : 01 with side table & back unit, table glass
   - (ii) Executive chair : 01
   - (iii) Visitor chairs : 04 - 06
   - (iv) Sofa : Maximum 07 seater
   - (v) Paper shredder
   - (vi) Centre table : 01
   - (vii) Corner table : 01
   - (viii) Almirah (Big/ Small) : 02
   - (ix) White board : 01
   - (x) Pinup board : 01
   - (xi) TV : 01
   - (xii) Computer, Printer, UPS : 01 each
   - (xiii) Computer table with chair : 01 each
   - (xiv) Wall Clock : 01
   - (xv) Room Heater : 01
   - (xvi) Air Conditioning
   - (xvii) Fridge : (Max. 100 ltrs): : 01
   - (xviii) Tea/ Coffee vending machine : 01
   - (xix) Curtains / blends / solar film

2. **Professors / Associate Professors**
   - (i) Executive Table: (6' X 4') / (5' X 3') : 01 with table glass
   - (ii) Executive chair: 01
   - (iii) Visitor Chairs : 01 - 06
   - (iv) White Board : 01

(v) Pinup Board : 01
(vi) Computer Table with chair : 01 each
(vii) Almirah/ Bookshelf : 01-02
(viii) Air Conditioning
(ix) Room Heater : 01
(x) Wall Clock : 01
(xi) Curtains / blends / solar film

**3. Assistant Professors**

(i) Executive Table : (5' X 3')/(4' X 2') : 01
(ii) Executive Chair: 01
(iii) Visiting Chairs : 03 - 04
(iv) White board : 01
(v) Pinup Board : 01
(vi) Computer table with chair : 01 each
(vii) Almirah/ Bookshelf : 01-02
(viii) Room Heater : 01
(ix) Wall Clock : 01
(x) Air Conditioning
(xi) Curtains / blends / solar film

**Civil/ Electrical Infrastructure**: Rooms of Faculty (Professor/ Associate Professor/ Assistant Professor) shall be painted with OBD after POP finish and fan/ lights/ wifi/ internet connection shall also be provided. Flooring of the room will be made of Kota Stone/ marble.

**Decision : The Academic Council approved the proposal for infrastructural facility for Dean/HODs and faculty members as above.**

**Agenda 20.24 : Approval for Teaching and Examination scheme for 3rd and 4th year of Bachelor of Design (B.Des) program.**

It was submitted to the Academic Council that the Department of Design proposed the teaching and examination scheme for the 3rd and 4th year of B.Des program which has already been approved by the Board of Studies of the department in its meeting held on 01.03.2019. The teaching and examination scheme for 3rd and 4th year is placed in ***Annexure pages from 148 to 186***.

**Decision : The Academic Council approved the Teaching and Examination scheme for 3rd and 4th year of Bachelor of Design (B.Des) program as proposed.**

**Agenda 20.25 : Matter for Ratification:**

i. **Admission Brochures for the academic year 2019-20 for all different courses.**

It was submitted to the Academic Council that the Admission Brochure for the academic year 2019-20 for the following courses were placed before the University Admission Committee in its 7th meeting held on 29.03.2019 which approved the brochures with minor modifications:

A. B.Tech (Full Time)
B. B.Tech (Lateral Entry)
C. B.Tech (Evening)
D. Bachelor of Design
E. BBA/BA Economics (H)
F. M.Tech (Full Time/Part Time)
G. MBA (Full Time)
H. MBA (Executive)
I. MBA (Business Analytics)
J. International Students
K. Ph.D (Full Time/Part Time)

It has been reported that the modifications have been incorporated in the revised brochures. The copy of the revised brochure was placed before the Academic Council on table.

**ii. Admissions in Ph.D programme January' 2019.**

It was submitted to the Academic Council that 126 Ph.D. admissions have been made in the month of January 2019.

**iii. Annual Fee for all programs for the students taking admission in the Academic Year 2019-20.**

It was submitted to the Academic Council that the Competent Authority has approved the Annual Fee structure of the following programs for the students taking admission in the Academic Session 2019-20:

A. Bachelor of Technology (B.Tech) (Full Time)
B. Bachelor of Technlogy (B.Tech) (Lateral Entry)
C. Bachelor of Technology (B.Tech) (Evening)
D. Bachelor of Design (B.Des)
E. Bachelor of Business Administration (BBA) & B.A. Economics (H)
F. Ph.D (Full Time/Part Time)
G. Master of Technology (M.Tech) (Full Time/Part Time))
H. Master of Business Administration (MBA) (Full Time)
I. Executive MBA
J. DASA Students
K. International Students
L. Withdrawal Policy

The notification in respect of fee structure for all above programs is placed as ***Annexure at pages 187 to 195.***

**iv. Seat matrix for B.Tech admissions 2019 in DTU.**

It was submitted to the Academic Council that the seat matrix for B.Tech Admissions (DTU) 2019 has been prepared and the same was placed before the University Admission Committee in its 7th meeting held on 29.03.2019. The committee after deliberations approved the seat matrix for B.Tech. admissions 2019. The seat matrix is placed as ***Annexure at page 196.***

**v. Seat matrix of MBA (Business Analytics) for 2019-21 batch.**

It was submitted to the Academic Council that the some modifications in selection criteria and seat matrix of MBA (Business Analytics) for 2019-21 batch has been done. The modified seat matrix and selection criteria was placed as below for consideration and approval. The Seat Matrix is as under:

| Category | No. of seats approved for admission 2018 (Same to be used for admission 2019) | Sub-Category | No. of seats approved in admission 2018 | No. of seats Proposed for admission 2019 |
|---|---|---|---|---|
| SC | 5 | PWD | 0.25 (0) | 0.25 (1) |
| | | Defence | 0.25 (1) | 0.25 (0) |
| ST | 2 | PWD | 0.10 (0) | 0.10 (0) |
| | | Defence | 0.10 (0) | 0.10 (0) |
| OBC | 8 | PWD | 0.40 (1) | 0.40 (0) |
| | | Defence | 0.40 (0) | 0.40 (1) |
| Gen | 15 | PWD | 0.75 (1) | 0.75 (1) |
| | | Defence | 0.75 (1) | 0.75 (1) |
| J&K migrant | 1 | - | - | - |
| **Total** | **31** | | | |

**Note :** In case, sufficient number of eligible candidates from the sub-categories are not available, the vacancies will be treated as reverted to the respective category.

The matter was also placed before the University Admission Committee and the Committee approved the seat matrix of MBA (Business Analytics) for 2019-21 batch.

**vi. Provision of one seat for Kashmiri Migrant in each branch of B.Tech program in DTU.**

It was submitted to the Academic Council that Academic Section (UG) received an application regarding extension of seats in each branch of Bachelor of Technology (B.Tech) for Kashmiri Migrant students. Currently only one seat in B.Tech programmes is being offered to Kashmiri Migrant in the Delhi Technological University. The relevant extract of the brochure of year 2018-19 is placed as ***Annexure at page 197.***

The applicant requested that one seat in each branch of B.Tech. programmes should be offered to Kashmiri Migrant students.

The matter was also placed before the University Admission Committee which considered and decided that the status-quo shall be maintained.

vii. **Content about DTU for the Brochure of Joint Admission Committee Delhi 2019 being prepared by NSUT.**

It was submitted to the Academic Council that the content about DTU for the Joint Admission Committee (JAC) Delhi Brochure 2019 being prepared by NSUT was placed before the University Admission Committee in its 7th meeting held on 29.03.2019.

The University Admission Committee (UAC) considered and approved the content about DTU for the JAC Delhi Brochure 2019. A copy of the content about DTU in the brochure is placed as ***Annexure at page 198***.

**Decision : The Academic Council ratified the above actions of the University.**

**Agenda 20.26 : Any other matter with the permission of the Chair.**

Under any other item, with the permission of the Chair, Prof. S.K. Garg, Pro Vice Chancellor, DTU proposed two following items:

**1. Rationalization of Ph.D Fellowship**

He pointed out that at present DTU has 300 Ph.D fellowships which need to be further increased keeping in view (a) more faculty is/will be available to guide the Ph.D students and (b) to improve the ranking of the University in NIRF and other International rankings, research publications and number of Ph.D scholars has high weightage. It was proposed to the Academic Council to consider creating the Ph.D fellowship in proportion to the Faculty available to guide the Ph.D. It is proposed to create TWO Ph.D Fellowships per faculty available to guide Ph.D.

**Decision : The Academic Council considered the item and constituted the following Committee to work out the details and authorised the Vice Chancellor to accept the report for the consideration and approval of Board of Management:**

| | | | |
|---|---|---|---|
| **i)** | **Pro Vice Chancellor** | **:** | **Chairperson** |
| **ii)** | **Dean, Academic (UG)** | **:** | **Member** |
| **iii)** | **Dean, Academic (PG)** | **:** | **Member** |
| **iv)** | **Dean (IRD)** | **:** | **Member** |

**2. Creation of "Employee Welfare Fund" in Delhi Technological University.**

The Competent Authority while considering the request of Sh. Pardeep Rana, Sr. Machanic on contractual basis in the department of Electrical Engineering regarding financial assistance to meet the expenditure incurred due to his treatment of "Right Cervical Lymph Node Excision Biopsy" that leads to Cancer, approved the creation of "**Employee Welfare Fund**" with the objective to provide relief in case of distress or hardship owing to cronical diseases/accidents, amongst the Academic and Non-Academic Staff of DTU to render such financial assistance or relief as may be deemed necessary to them.

The revenue and expenditure guidelines mentioned as below :

**Revenue and Expenditure:**

(a) 5% of remuneration be deducted from examination payment.
(b) 2% of remuneration of PI & his team. The amount be transferred from Consultancy remuneration/honorarium.
(c) Any donation/contribution from any employee, society or any outside agency/organization.
(d) Two Lacs be transferred from NGF : Student Welfare Fund as Loan. This be paid back after having adequate funds in "Employee Welfare Fund".

The "Employee Welfare Fund" has been approved by the Competent Authority.

**Decision : The Academic Council recommended the matter to be placed before the Finance Committee and the Board of Management for their approval.**

**Suppl. Agenda 20.27 : Modification in the contents of the course EE-203 Electronics Devices and Circuits (EDC) in 3rd semester Electrical Engineering.**

It was submitted to the Academic Council that the syllabus of EE-203 (Electronics Devices and Circuits (EDC)) comprises of 6 units. Nine (09) contact hours have been assigned to the last unit entitled **FEEDBACK AMPLIFIERS AND OSCILLATORS.** The other 5 units in this course are very important and students build-up their concepts using the topics covered in these units. Based upon the feedback of the course teachers it has been observed that the 33 contact hours assigned to these topics are not adequate for a detailed coverage. Moreover, the same topic **(FEEDBACK AMPLIFIERS AND OSCILLATORS)** has also been prescribed in another course entitled **EE-202 linear Integrated Circuits (LIC)** which was earlier coming in the 5th semester as an elective course but now it will come in

the 4th semester w.e.f. the next academic session. It is thus proposed that the 6th units namely **FEEDBACK AMPLIFIERS AND OSCILLATORS** may be deleted from the prescribed syllabus of EE-203 **Electronics Devices and Circuits (EDC).**

The unit wise revised contact hours in the course EE-203 Electronics Devices and Circuits (EDC) are given below:

**Unit 1:** Contact Hours **06**

**Unit 2:** Contact Hours **10**

**Unit 3:** Contact Hours **10**

**Unit 4:** Contact Hours **06**

**Unit 5:** Contact Hours **10**

**Decision : The Academic Council approved the modification in the contents of the course EE-203 Electronics Devices and Circuits (EDC) in 3rd semester Electrical Engineering.**

**Suppl. Agenda 20.27 : Approval for introduction of an open elective course in 5th semester of Electronics and Communication Engineering.**

It was submitted to the Academic Council that for enhancing the skills of the students in using MATLAB based tools for doing good research projects, the department of Electronics and Communication Engineering proposed an open elective course to be introduced in 5th semester. This course is framed with a purpose of giving students an in-depth knowledge of signal generation, processing and its application in computer vision, image and video processing.

1. Subject Code : EC 363 Course Title: Signal Processing and design using MATLAB.
2. Contact Hours : L-1 T-0 P-4
3. Examination Duration (ETE) (Hrs.) : Theory :3 Practical :3
4. Relative Weightage : CWS:10 PRS:30 MTE:20 ETE:0 PRE:40
5. Credits : 3
6. Semester : V
7. Subject Area :
8. Pre requisite : Basic knowledge of MATLAB and SIMULINK
9. Objective: To develop a hands on experience of signal processing, Image Processing, signals and systems and digital design using MATLAB and SIMULINK tools.

10. Syllabus:

| UNIT | CONTENT | L (contact hours) | P (Contact Hours) |
|---|---|---|---|
| 1 | **MATLAB Basics**<br><br>Variable commands, vectors and matrices, indexing and modifying arrays, calling functions, plotting data | 3 | 12 |
| 2 | **Signal generation and transformation using MATLAB**<br><br>Impulse, step and ramp signals, arithmetic operations of signals, convolution of signals, Laplace transform, Discrete Fourier transform, z transform, inverse transforms. | 4 | 16 |
| 3 | **Image processing and computer vision using MATLAB**<br><br>Image models, Image Noises, Gaussian Filter , Histogram of gradients, Frame differencing, Background subtraction, Feature extraction, Pose estimation, SIFT. Fuzzy and Neural Network Tool Boxes | 3 | 12 |
| 4 | **Virtual instrumentation and Simulation using SIMULINK**<br><br>Amplitude modulation, frequency modulation, demodulation, low pass filter design, High pass filter design, band pass filter design, Butterworth filter design. | 4 | 16 |

11. Reference books:

| S.No. | Name of books/Authors/Publisher | Year |
|---|---|---|
| 1. | Getting started with MATLAB, Rudra Pratap. | 1996 |
| 2. | Signals and Systems with MATLAB, **Yang**, Won Young, Springer. | 2009 |
| 3. | MATLAB and SIMULINK for engineers, Agam kumar Tyagi, Oxford publications. | 2012 |
| 4. | Image processing and Computer vision in MATLAB, Abhishek Pandey, Prof. Neeraj Bhargava, and Ritu Bhargava, Google books. | 2016 |

**Decision : The Academic Council approved the proposal as above.**

The minutes are issued with the approval of the Chairman for circulation to Hon'ble Members.

(Prof. Samsher)
Registrar

**No. F.DTU/Org/AC/Meeting/01(1)/10/Vol-IX/831-53** **Dated :** 21/5/19

Copy to:

1. Pr. Secretary to Hon'ble Lt. Governor (Delhi), 6, Raj Niwas, Civil Lines, Delhi.
2. PA to V.C. for kind information of the Vice Chancellor, DTU.
3. Prof. S. K. Garg, Pro VC, DTU
4. All Deans, DTU.
5. Prof. Surendra S. Yadav, Professor of Management, IIT, Hauz Khas, Delhi
6. Sh. S.G. Deshmukh, Director – IIITM, Gwalior
7. Sh. Lokesh Mehra, A-166, Ground Floor, Sarita Vihar, Delhi 110076
8. Prof. Smriti Srivastava, Head-Division of ICE, NSUT, Delhi
9. Prof. Tarun Kumar Das, Prof. of Mathematics & Registrar, University of Delhi
10. Dr. Bhim Singh, Dean, Academics, IIT, Hauz Khas, Delhi
11. All HODs, DTU.
12. Prof. Rakesh Kumar, Civil Engg. Deptt.
13. Prof. Narendra Kumar-I, Elec. Engg. Deptt.
14. Prof. Naveen Kumar, Mech. Engg. Deptt.
15. Sh. Neeraj Kumar Bhagat, Associate Prof.,
16. Dr. M. Jayasimhadri, Assistant Prof., Applied Physics
17. Controller of Examinations.
18. Registrar, DTU
19. Prof. M.M. Tripathi, Director, IQAC
20. Dr. Manoj Kr. Sharma, CEO (DTU IIF)
21. Prof. Amit Mookerji, Head (USME)
22. Associate Dean, Acad.(UG)
23. Dy. Registrar, Acad.(PG)

(Prof. Samsher)
Registrar

# ANNEXURE

# For

# Minutes

## 20th Meeting of

## Academic Council

## DTU

## 10-05-2019

**DTU Campus, Shahbad Daulatpur, Bawana Road, Delhi-110042**

# STRATEGIC PLAN 2019-2030

## An Illustrious Journey Since 1941

"We pay our respect to people of Delhi, Hon'ble Chancellor of Delhi Technological University and Government of NCT of Delhi for providing us excellent students, outstanding teachers and human resources, state-of-the-art infrastructure and liberal grants."

# OUR VISIONARY LEADERS

## Principals

**Prof. W. W. Wood**
Jan. 1941 to Aug. 1946

**Prof. R. G. P. S. Fairbairn**
Sept. 1946 to Sept. 1949

**Prof. S.C. Sen**
Sept. 1949 to Dec. 1966

**Prof. J. N. Moudgil**
Feb. 1968 to April 1971

**Prof. R. C. Narayanan**
Feb. 1972 to May 1980

**Prof. M. L. Mandal**
June 1980 to July 1989

**Prof. N. L. Sachdeva**
Aug. 1999 to Feb. 2003

**Prof. D. Goldar**
Feb. 2003 to Aug. 2003 and
Oct. 2006 to Dec. 2007

# OUR VISIONARY LEADERS

## Principals

**Prof. Ashok Bhattacharyya**

Jan. 2008 to Aug. 2008

**Prof. P.B. Sharma**

Dec. 1990 to Aug. 1999

Aug. 2003 to Oct. 2006

Aug. 2008 to July 2009

# OUR VISIONARY LEADERS

## Hon'ble Chancellors

**Shri Tejendra Khanna**
July 2009 to July 2013

**Shri Najeeb Jung**
July 2013 to Dec. 2016

**Shri Anil Baijal**
Dec. 2016 to till date

# OUR VISIONARY LEADERS

## Vice Chancellors

**Prof. P.B. Sharma**
July 2009 to July 2014

**Prof. Pradeep Kumar**
Aug. 2014 to Sept. 2015

**Prof. Yogesh Singh**
September, 2015 to till date

# 1. Introduction

## 1.1 About the University

Delhi Technological University (DTU) is a non-affiliating, teaching and research university at Delhi to achieve excellence in Science, Engineering, Technology, Management and Allied areas and matters connected therewith or incidental thereto. The university enables students to face the wide-ranging changes taking place in the fields of Science, Technology, Environment and Management. This includes innovation, design, development, construction, production, managerial and entrepreneurial activities. The university lays great emphasis on assisting students in the development of national character, self-confidence, leadership and fostering an ecosystem for creativity and imagination.

This institution was initially established as Delhi Polytechnic in 1941 to cater to the needs of Indian industries for trained technical manpower with practical experience and sound theoretical knowledge. The same was renamed as Delhi College of Engineering in 1965 and was further reconstituted as Delhi Technological University by the Government of NCT of Delhi in 2009. The university was recognized under Sections 2(f) and 12(b) by University Grants Commission under UGC Act, 1956 on 10.07.2009 and 17.12.2012 respectively. The university was awarded ISO 9001:2015 certification on 27.11.2018. Five B. Tech. Programs (Bio Technology, Computer Engineering, Civil Engineering, Electrical Engineering, and Production and Industrial Engineering) were accredited by National Board of Accreditation (NBA) on 26-07-2017. In the Year 2018, DTU was ranked 5$^{th}$ by Times and 7$^{th}$ by India Today respectively among all engineering institutions in India. The university, in 2019, has been ranked 34$^{th}$, 47$^{th}$ and 71$^{st}$ in Engineering, University and Overall Categories respectively by National Institutional Ranking Framework (NIRF), Ministry of Human Resource Development (MHRD), Government of India.

This premier institution is globally well-known for its outstanding education, research, and innovations. The university currently offers various inter-disciplinary and industry relevant-programs in Science, Technology, Management, and Allied areas at both the undergraduate and postgraduate levels. The university has established a strong academia-industry interface and has collaborations with reputed research organizations, industries, and premier institutions.

## 1.2 Vision

"To be a world class university through Education, Innovation, and Research for the service of humanity."

## 1.3 Mission

1. To establish centres of excellence in emerging areas of Science, Engineering, Technology, Management and Allied areas.
2. To foster an ecosystem for incubation, product development, transfer of technology and entrepreneurship.
3. To create environment of collaboration, experimentation, imagination and creativity.
4. To develop human potential with analytical abilities, ethics and integrity.
5. To provide environment friendly, reasonable and sustainable solutions for local and global needs.

## 1.4 Core Values

- **Integrity –** We do what we say through trust, transparency and honesty.
- **Compassion** – We foster civilized mindset for kindness, consideration, and benevolence.
- **Commitment –** We dedicate ourselves completely to all our Endeavors.
- **Creativity –** We nurture innovation, imagination, and ideation.
- **Collaboration** – We promote team work through togetherness, harmony and acknowledgement.
- **Inclusion –** We embrace diversity with respect, acceptance and affirmation.

## 1.5 Quality Policy

The university is committed to achieving global standards of excellence in the field of Science, Technology, Management and Allied areas by disseminating knowledge through cutting-edge research, education and innovation. We adopt best practices to maintain high standards in the core and allied functions through continuous evaluation and improvement of our processes.

# AN ILLUSTRIOUS JOURNEY SINCE 1941

## Points of Pride

2 Campuses

11,019 students

Eminent Faculty

Research and Innovation

TEQIP TEQIP-III & GIAN

GIAN

DTU Innovation & Incubation Foundation

Placements in Top Companies


Community conscious societies & students

World recognized ALUMNI

## 2. DTU's Glorious Past

Delhi College of Engineering, (initially established with the name – Delhi Polytechnic) came into existence in the year 1941 to cater to the needs of Indian industries for trained technical manpower with practical experience and sound theoretical knowledge. The institution started its functioning at the historic Kashmere Gate campus as a follow up of the Wood and Abott Committee Report of 1938. It comprised of a multi-disciplinary and multi-level institution offering wide ranging programs in Engineering, Technology, Art and Sculpture, Architecture, Pharmacy and Commerce. The national diploma awarded by the institution was recognized as equivalent to degree level for the purpose of employment. In 1952, the college was affiliated with University of Delhi and started formal Degree level programs. The Department of Architecture later became the School of Planning and Architecture, now a Deemed University and Institution of National importance. The Department of Arts and Sculpture became College of Arts and the Departments of Chemical Technology and Textile Technology were shifted en-block to mark beginning of the IIT Delhi at its new campus at Hauz Khas. The Department of Commerce was later abolished and the faculty of Management studies of the University of Delhi was established by Prof. A. Das Gupta of Delhi College of Engineering (DCE). The institution (DCE) is thus, the mother institution of a number of national projects including Indian Institute of Technology, Delhi (IITD), School of Planning and Architecture (SPA), College of Arts and even the famous Faculty of Management Studies (FMS).

Till 1962, the college was under the direct control of Ministry of Education, Government of India. In 1963, the administration of the college was handed over to Delhi Administration. Delhi College of Engineering was under the administrative control of Department of Training and Technical Education, Govt. of NCT of Delhi. For academic purpose, the college was affiliated to University of Delhi since 1952. From July 2009, the DCE was reconstituted as Delhi Technological University vide Delhi Act 6 of 2009.

The erstwhile DCE functioned from its historic Kashmere Gate Campus for almost 55 years and was shifted to a lush green sprawling campus of 164 Acres at Bawana Road, adjoining Sector – 17, Rohini, Delhi in 1996.

## 3. DTU at a Glance

DTU has 164 acres of a lush green, tech-savvy main campus, with approximately 1,56,000 square meters of built up area, 15 academic departments, research centres, and residences for students, faculty, and staff. It is a zero discharge campus having Sewage Treatment Plant and Waste to Energy Plant in the campus itself. The University, as on date, has 11,019 students in its undergraduate, postgraduate, and Ph.D. programs. The library is a central place for academic and research activities. It has a well-equipped conference hall, reading rooms, and a rich collection of relevant books and journals. The university has a DTU Studio utilized for recording of lectures, events, and talks and has campus wide networking connecting the computer center, the academic wings, the administrative block and the hostels on a common platform. DTU is a Wi-Fi enabled Campus with state-of-the-art IT Infrastructure with advanced technological facilities. The students have access to high speed internet services round the clock.

The East Delhi Campus of DTU was established in 2017 primarily focusing on Management and Entrepreneurship programs. These programs are very important, as they help the nation in producing skilled managers and leaders thereby promoting innovations and in creating jobs and new ventures. The Campus offers Master of Business Administration (MBA) and MBA Business Analytics, Bachelors of Business Administration (BBA) and B.A. (Hons.) Economics.

The university offers 17 undergraduate, 22 postgraduates and 17 Ph. D. programs. The Engineering programs include conventional disciplines of Mechanical Engineering, Civil Engineering, Electrical Engineering and Applied Engineering disciplines, such as Electronics and Communication Engineering, Computer Engineering, Environmental Engineering, Software Engineering, Mathematics and Computing, Automobile Engineering, Polymer Science, and Chemical Technology. The postgraduate engineering programs cover VLSI design and embedded systems, Software Engineering, Computer Engineering, Microwave and Optical Communication, Polymer Technology, Power Systems, Signal Processing and Digital Design, Geotechnical Engineering, Structural Engineering, Nano Science Technology, and Bioinformatics. The university offers Bachelor of Design (B. Des.), BBA, BA (Economics) Honors, MBA and MBA Business Analytics.

DTU has a policy for recognition of excellence in teaching. Under this scheme, the teachers are awarded with cash prize and citation in teaching excellence. The university encourages teachers to ensure maximum class engagement by the teachers and attendance of students. Rigorous conditions are stipulated for the teachers to declare them eligible for the said award. This award may help teachers towards their promotion and career advancement and would also create more conducive environment for teaching and learning.

The course curricula have been developed with a view to integrate advancements in science and engineering, while also incorporating industry relevant technologies. The curriculum is structured such that it possesses 50 percent of the Core component, 20 percent Foundation Courses (Core and Elective) and covers 30 percent of Electives. Thus, a student will have the freedom to choose, as electives, nearly half the courses that he or she must complete to obtain a degree. A strategy of introducing curricular flexibility is adopted to sustain the interest of all students, both high performers and those with difficulties. The traditional emphasis at Delhi Technological University on hands-on laboratory training has been maintained. Undergraduate labs have been modernized and expanded in the last few years. This is an ongoing process and will continue in future also.

While the core courses define the stream opted for by the student at the time of admission, students can choose from a wide variety of courses for completing their degrees. Core courses address the widest possible audience and will not be specific to niche streams with small enrolment levels. A heterogeneous mix of students from various streams is considered desirable in the classroom. The electives, if properly chosen, define the specific domain knowledge and skills of the graduating student.

Further, the means by which undergraduate students could obtain research-based credits have been introduced in the university recently. These may take the form of hands-on learning and research projects. Undergraduate students may obtain specified credits through research oriented self-learning. Online teaching is used as an aid to classroom teaching. Contact hours in the classroom are not compromised.

There is a continuous focus on seamless integration of first-year (both undergraduate and postgraduate) students entering from diverse backgrounds. Students are assisted proactively in the first year so that they perform well. Postgraduate programs are tailored to enable customisation of job seekers, job providers in industry and future researchers.

The university students are placed in companies of high repute including multinational companies. DTU has strong focus on industry relevance for its education and research programs. DTU prepares students beyond the structured curriculum by encouraging industry interface at various levels through guest lectures, industrial visits, and project work, which bridge the gap between graduating and professional engineers. Some of the companies that have recruited students during the campus placements include Flipkart, Amazon, Microsoft, Google, Goldman Sachs, Texas Instruments, Indian Oil, Maruti, Yahoo, Oracle, Samsung, Deloitte, McKinsey, Adobe, and Larsen and Toubro. The highest annual salary package has gone up to ₹1.25 crores per annum. Students who have graduated from DTU are studying in various prestigious national and international universities such as IIMs, IITs, Carnegie Mellon University, Columbia University, Duke University, Purdue University, and University

of California. A major highlight of placements at DTU is that the leading companies not only make job offers to the final year students, but they also offer paid internships to third year students. This enhances the industry interface further, preparing them for the technological challenges of the industries and in turn assure better pre-placement jobs offers for the students.

DTU has provided the nation, as well as the world at large, with some of the best and finest engineering and technology professionals. They have, with distinction, led great enterprises and corporate houses in India and abroad, bringing immense glory to their alma-mater, all the while enhancing the pride of the engineering profession by their distinguished services performed with utmost sincerity and commitment.

## 3.1 Institutional Profile

| | |
|---|---|
| Established in | **2009, Non-affiliating University** |

| | | | |
|---|---|---|---|
| Departments | **15** | | |
| Students (On Roll) | **11019** | | |
| No. of Programs | **UG : 17** | **PG :22** | **Ph. D : 17** |
| No. of Teaching Staff | **273** | | |

## 3.2 Academic Departments

- Department of Applied Chemistry
- Department of Applied Mathematics
- Department of Applied Physics
- Department of Biotechnology
- Department of Civil Engineering
- Department of Computer Science and Engineering
- Department of Electronics and Communication Engineering
- Department of Environmental Engineering
- Department of Electrical Engineering
- Department of Information Technology
- Department of Mechanical Engineering
- Department of Humanities
- Delhi School of Management
- Department of Design
- University School of Management and Entrepreneurship (East Delhi Campus)

## 3.3 Programs

### 3.3.1 UG Programs (Main Campus)

| | | | |
|---|---|---|---|
| 1 | Mechanical Engineering | 8 | Computer Engineering |
| 2 | Electrical Engineering | 9 | Civil Engineering |
| 3 | Polymer Science and Chemical Technology | 10 | Electronics and Communication Engineering |
| 4 | Software Engineering | 11 | Environmental Engineering |
| 5 | Production and Industrial Engineering | 12 | Information Technology |
| 6 | Engineering Physics | 13 | Mathematics and Computing |
| 7 | Biotechnology | 14 | Mechanical Engineering with specialisation in Automobile Engineering |
| 15 | B. Des. (Bachelor of Design) | | |

### 3.3.2 UG Programs (East Campus)

| | | | |
|---|---|---|---|
| 1 | Bachelor of Business Administration (BBA) | 2 | B.A. Economics (Hons.) |

### 3.3.3 PG Programs (Main Campus)

| | | | |
|---|---|---|---|
| 1 | Software Engineering | 11 | Microwaves and Optical Communication |
| 2 | Information Systems | 12 | Computer Science and Engineering |
| 3 | Nano-Science and Technology | 13 | Structural Engineering |
| 4 | Bio-Informatics | 14 | Thermal Engineering |
| 5 | Polymer Technology | 15 | Power Systems |
| 6 | Environment Engineering | 16 | Hydraulics and Water Resources |
| 7 | Production Engineering | 17 | Signal Processing and Digital Design |
| 8 | VLSI Design and Embedded System | 18 | Industrial Bio Technology |
| 9 | Control and Instrumentation | 19 | Bio-Medical Engineering |
| 10 | Geotechnical Engineering | 20 | Computational Design |

MBA (Both at Main and East Campuses)

MBA (Business Analytics)

### 3.3.4 Ph.D. Programs

| | |
|---|---|
| Ph.D. in Computer Science and Engineering | Ph.D. in Civil Engineering |
| Ph.D. in Electronics and Communication Engineering | Ph.D. in Environmental Engineering |
| Ph.D. in Electrical Engineering | Ph.D. in Information Technology |
| Ph.D. in Mechanical Engineering | Ph.D. in Applied Chemistry |
| Ph.D. in Applied Mathematics | Ph.D. in Applied Physics |
| Ph.D. in Bio-technology | Ph.D. in English |
| Ph.D. in Economics from Humanities Department | Ph.D. in Management from Delhi School of Management |
| Ph.D. in Economics from University School of Management and Entrepreneurship | Ph.D. in Design |
| Ph.D. in Management University School of Management and Entrepreneurship | |

## 4. Governance, Leadership and Management

Section 19 of DTU Act, 2009 provides for following authorities of the university.

i. University Court
ii. Board of Management (BoM)
iii. Academic Council (AC)
iv. Planning Board
v. Finance Committee (FC), and
vi. Such other authorities as may be declared by the Statutes to be the authorities of the university.

The participation of all stakeholders has been ensured in the constitution of these committees through statutory provisions. In the University Court, which is chaired by the Chancellor/Lt. Governor of NCT of Delhi, in addition to, ex-officio members, persons in the discipline of basic and applied science, engineering, technology and management are there. Representative from University Grants Commission and All India Council for Technical Education are also there. Similarly, in the BoM, which is the principal decision making body of the university there is representation from academia, industry, government, regulatory bodies, teaching and non-teaching employees of the university. All decisions are generally taken with consensus but the DTU Act provides for majority decisions in case a consensus decision is not arrived at. The minutes of the BoM meeting are available in public domain at www.dtu.ac.in.

Academic council (AC) is the principal body in all the matters related to academic affairs of the university. In the Academic Council also the DTU Act provides for representation of all the stakeholders. Apart from external members from academia, industry and regulatory authorities all the HoDs and Deans of the university are members of the AC. In addition, one Associate Professor and One Assistant professor (on rotation basis) are also nominated in Academic Council. University, in its policy of following inclusiveness, has included two student representatives – One each from UG and PG programs as Member of the Council. Starting of new academic programs, changes in the ordinances and regulations related to examinations, approvals of the syllabi of different courses, approval of panel of experts for faculty recruitment, framing of the Recruitment Rules (RRs) for faculty positions and all other matters related to academic affairs of the university are done by the Academic Council.

In addition to above, there are other Committees like Admission Committee, Examination Committee and Board of Studies etc. in the university for different works of the university.

## 5. Strategic Plan 2019-30

The strategic plan 2019-30 aims to provide a roadmap in form of resolutions, aims and actions in line with the vision and mission of the university. This is a policy document that provides direction, dedication and discipline to every stakeholder of the university. It focuses on important pillars of the university such as education, research, innovation, entrepreneurship, faculty, staff, infrastructure and finance. The plan intends to guide the university leaders in their decision making and also pursue them to strategize the allocation of resources for the fulfilments of stated resolutions. Every resolution is a promise and commitment that will inspire, influence, ignite and intrigue to work hard and take every action as expected and specified.

### 5.1 Education

DTU will continue to provide quality education with continuous improvement in teaching pedagogy. We do understand the challenges and importance of imparting quality education comparable to the best in the world and will take necessary steps to address such challenges. Education is the most effective and powerful tool to empower students with values, skills, knowledge and wisdom. We will strive hard to produce such students who will prove to be an asset for society, nation and entire planet. Our students will inculcate our core values (integrity, compassion, commitment, creativity, collaboration, inclusion) and contribute with their knowledge and skills for the service of humanity.

**Resolution 1: To admit students from diverse backgrounds and countries through a competitive system and nurture their potential and capabilities.**

We will continue to admit students through a transparent and competitive system of examination. We will encourage diversity, gender equality and inclusion through policy initiatives. We will provide world class teaching and learning environment with a focus on research, innovation and entrepreneurship. We will strengthen and enhance outreach and extension activities. We will promote and encourage every student to be a part of student societies to enhance communication, collaboration, cooperation and coordination.

**Resolution 2: To improve teaching learning processes and provide open platforms for creativity and experimentation.**

We will continue to keep pace with the fast changing world and provide technologically enabled learning environment to energize, encourage and inspire faculty, students and staff of the university. We will provide various choices in curriculum to nurture creativity and experimentation, keeping students as the building block of every initiative. We will further enhance the flexibility in the curriculum. We will keep on promoting online education through MOOCs platforms like Edx, Coursera, Swayam and so on. We will facilitate students to learn beyond classrooms as part of their curriculum. We will further strengthen research, product and entrepreneurship tracks to promote innovation and research culture in the university.

**Actions**

DTU aims:

1. To increase student strength from 11000 to 20000 by 2030. Number of postgraduate and Ph.D. students will be increased gradually to 30% of the total students' strength. The ratio of undergraduate, postgraduate and Ph.D. students will be 70%, 15% and 15% respectively.

2. To increase undergraduate programs from 17 to 25 by 2030 in important areas including Architecture, Fashion Technology, Medical Engineering and Social Work.

3. To increase postgraduate programs from 22 to 40 by 2030 in important areas including Physics, Chemistry, Mathematics, Economics, Biotechnology, Design, Artificial Intelligence, Mathematics and Computing and MBA in Family Business and Entrepreneurship and MBA in Innovation, Entrepreneurship, Venture Development, Psychology, Transportation Engineering, Power Electronics, Electrical Energy System, Energy Studies, Advanced Communication Systems (5G), Earthquake Engineering, Construction Technology & Management, Internet of Things (IoT), and Flexible Electronics.

4. Strength of students will also be increased in the existing programs like Computer Engineering, Information Technology, Electronics and Communication Engineering, Software Engineering and Mathematics and Computing.

5. To increase DTU Ph.D. fellowships from 300 to 1000 by 2030. Efforts shall also be made to admit more number of Ph.D. students with fellowships funded by external agencies (like CSIR, UGC, DST-Inspire), sponsored projects and industry/alumni funded fellowships.

6. To increase, by 2030, the students' societies from 70 to 100 as per societal needs and expectations.

7. To increase university student internships from 200 to 1000 by 2030 to facilitate students to actively involve themselves in outreach and extension activities. This will

strengthen scheme of teaching in government schools, helping the unprivileged in the neighborhood.

8. To develop at least 10% courses for MOOCs platforms by 2030. Students shall also be encouraged to take 10% courses through such platforms.

9. To increase female students from 15% to 30% by 2030.

10. To increase foreign students from 2% to 10% by 2030.

11. To enhance fee waiver scheme from ₹4 crores each year to ₹25 crores each year by 2030.

12. To provide large number of choices to students and to implement total flexibility in the curriculum which will lead to minor and major specializations as decided by students by 2030.

13. To increase the number of classroom/laboratory on wheels for outreach and extension activities from 1 to 10 by 2030 to impart education to the under privileged children of nearby villages.

## 5.2 Research

DTU focuses on research in the emerging areas of technology, science, management and other related and/or interdisciplinary areas. It has enabling research environment to create knowledge for the service of humanity. We will continue to work hard to make DTU as a favorite destination for best minds to do research in their chosen areas. We would like to create centres of excellence in areas with potentially large societal impact. We also would like to increase number of intellectual properties including patents and publications. We would like to promote and facilitate every research initiative.

**Resolution 1: To establish centres for excellence in emerging areas to promote research.**

Technology has provided solutions to many problems in past and will continue to do so in future also. Our research culture and research centres will play significant role to create future technologies and scientific advancements. We will produce world class research and researchers for solving problems using science and technology.

**Resolution 2: To attract best minds to enrich research.**

We will continue to provide encouraging and enabling research environment to attract and nurture best minds of the world. State-of-the-art research infrastructure, facilities and support will be provided. More funding avenues will be explored from government agencies, private industries, alumni and society for this purpose.

**Actions**

DTU aims:

1. To establish ten new centres of excellence by 2030 in the areas of clean energy technologies, storage technologies, artificial intelligence and machine learning, cyber security, VLSI, Internet of Things (IoT), medical engineering, advanced analytics and space and atmospheric sciences.
2. To have a research laboratory and research project(s) for every faculty by 2030.
3. To have all faculty with Ph.D. degree and involve them in research by 2030.
4. To award 750 Ph.D. degrees to the scholars per year by 2030.
5. To produce 50 Intellectual Properties every year and 3000 publications every year in reputed Journals by 2030.
6. To achieve "h Index" of DTU "200" by 2030.
7. To produce at least 50 commercially sustainable products by 2030.
8. To invest 25% of revenue on research (including human resource, equipment, library, ICT and physical infrastructure) every year by 2030.
9. To establish 10 research laboratories by 2030 with support from industries.
10. To have 100 sponsored research projects from outside funding agencies.
11. To have 100 active Memoranda of Understanding (MoUs) with International and National Institutions and organizations.

## 5.3 Innovation and Entrepreneurship

DTU promotes innovation and entrepreneurship through policies and regulations. These innovation and entrepreneurship have become essential ingredients of academic and research life in DTU. We have a Technology Business Incubator (TBI), an independent entity of DTU and managed by DTU – Innovation and Incubation Foundation (IIF) (A non-profit Company, meant for promoting education in Science, Research etc. under Section 8 of Companies Act 2013). We also have a very active Entrepreneurship Development Cell (EDC) to inspire and energise students towards entrepreneurial path. We encourage faculty and students to take innovative projects and support them in the process.

**Resolution 1: To work towards a comprehensive engagement by innovative projects.**

The curriculum has many provisions for innovative projects. We will encourage students to take advantage of such provisions and take such projects which are full of challenges and ideas. The projects may be associated with industry/university or any other organization.

**Resolution 2: To establish a Technology Park.**

We would like to establish a Technology Park in addition to Technology Business Incubator. Both entities will provide numerous opportunities for students, scholars and faculty to experiment new ideas and will get exposure to advancement of science and technology.

**Resolution 3: To provide positive environment for consultancy and sponsored projects.**

We will continue to encourage faculty for consultancy and sponsored projects through policy and regulation.

**Actions**

DTU aims:

1. To increase number of start-up companies in Technology Business Incubator from 19 to 100 by 2030.
2. To establish a Technology Park of 50 companies by 2030.
3. To increase consultancy income from ₹10 crores to ₹50 crores by 2030.
4. To invest in innovative projects from ₹1 crore per year to ₹10 crores per year by 2030.
5. To have 10 successful companies from Incubator by 2030.

## 5.4 Faculty and Staff

DTU continuously strives for the quality of the faculty and staff. In order to become a world-class institution, it is necessary to continue attracting highly qualified and talented professionals and provide a healthy and encouraging environment that allows the faculty and staff to learn and grow. The university policies and frameworks are designed and developed to support and provide a wide range of opportunities to faculty and staff for professional and personal development.

**Resolution 1: To attract and retain best minds to enrich education, research and innovation.**

We will continue to recruit and retain the very best minds to ensure that the university remains world-leading. We will ensure that our recognitions and reward systems are strong, competitive and transparent. We will continue to ensure the wellbeing and welfare of our people in order to make them feel valued and respected.

**Resolution 2: To improve personal and professional development of faculty and staff.**

We will encourage faculty and staff in all possible ways to participate in personal and professional development programs, conferences, workshops, and seminars, regardless of the status of their employment. We will continue to support faculty and staff in their early career with grants and incentives and organize specialized capability enhancing programs for those having managerial and leadership responsibilities. We will keep the faculty and staff motivated to learn and adapt to new and changing technologies.

**Actions**

DTU aims:

1. To enhance faculty upto 1200 and staff upto 1300 by 2030.
2. To increase 10% of budget to support faculty projects and development programs by 2030.
3. To engage 5% international faculty by 2030.
4. To send 5% faculty for higher education and postdoctoral fellowships in the best institutions of the world by 2030.
5. To send 5% faculty every year to the industry by 2030.
6. To send 5% of the technical staff to industry/academia for training, skill development and higher education.
7. To send 5% of the ministerial staff for administrative enrichment.

## 5.5 Infrastructure

DTU has well-equipped and state-of-art classrooms, laboratories and research facilities. DTU has aesthetically designed centrally air-conditioned, Wi-Fi enabled library building and provides excellent ICT facilities. The Stage 1, Phase-II construction of DTU is under progress and is likely to be completed by 2021. DTU will continue to improve and maintain the infrastructure to provide an encouraging environment for teaching and learning.

**Resolution 1: To provide a world-class environment for enabling education, research and innovation.**

We will continue to build, develop and maintain the infrastructure of the university with improved space utilization and minimum impact on environment. Additional administrative building, classrooms, hostels and residential accommodation will be constructed in the campus as per requirement from time to time. In addition, a separate complex for providing various amenities like shopping complex, multi-storied parking, health centre, bank and post offices etc. will also be constructed.

**Resolution 2: To enhance the library resources.**

We have a three storied centrally air-conditioned building spread over and area of 5000 square meters, it is a central place for academic and research activities. The Library has a very rich collection of print as well as electronic books and journals satisfying the information needs of the students, staff and faculty. We will continue to enhance the library resources and infrastructure in the university.

**Resolution 3: To improve the ICT enabled services.**

We provide state-of-the-art computing facilities along with other devices, sufficient bandwidth so as to have uninterrupted connectivity and content delivery. To further supplement it we may deploy virtual lecture facility by providing high speed data networks. The students can interact with the experts across the world. We would like that more and more teachers act as subject experts/principal investigators to prepare the video lectures. In this regard, we would like to strengthen the DTU studio where recording of video lectures could be done so that the students across the country and world over can be benefitted. We will continue to enrich the content sharing and collaborations in research and development activities in house and through National Knowledge Network (NKN) would like to share across all higher education institutions to provide access of the high-quality content to all the students.

**Actions**

DTU aims:

1. To complete Phase-II, Stage-II construction of ₹1000 crores by 2030.
2. To invest in IT infrastructure from ₹1 crore to ₹10 crores every year by 2030.
3. To provide 100% ICT enabled services by 2030.
4. To invest ₹15 crores every year for library resources including electronic databases and digital books by 2030.
5. To construct 60 more ICT- enabled classrooms by 2030.
6. To increase the opportunities for students, faculty and staff to travel by eco-friendly mode of transport for benefiting the environment and strengthening the Green campus mission of the university.
7. To construct multi-storied parking by 2030.
8. To construct 15 bedded university health center by 2030.
9. To construct shopping complex in university premises.

## 5.6 Finance

DTU is financially strong and effectively manages both its income and expenditure. DTU funding mostly comes from Grant-in-Aid (GIA) from the Govt. of NCT of Delhi and University Generated Fund (UGF). In addition, some funds are also generated from contributions of the alumni of the university and sponsored and consultancy projects. The Phase-II, Stage-I construction of DTU has begun and Govt. of NCT of Delhi has separately provided funds for construction to the tune of ₹292 crores. There is approximately 1,56,000 square meters built up area in the university as on today. Another, approximately 60,000 square meters of built up area is being proposed in Phase-II, Stage-I. It is expected that there will be requirement of another approximately 75,000 square meters of the built up area by 2030. We will continue to manage funds to make the university ready and sustainable for the future.

**Resolution 1: To arrange funds for enhancing academic and research ambience.**

We will ensure that the talented students and faculty are well funded in their innovative, research, entrepreneurial and societal activities. We will continue to raise funds for creation of new resources and infrastructure.

**Resolution 2: To strengthen the audit system to ensure transparency and discipline in the management of finances**

We have three stages of audit system in the university. We will continue to strengthen the three stage audit process (1st stage audit by internal auditor, 2nd stage audit by Local Fund Audit team of Directorate of Audit, Government of NCT of Delhi, 3rd stage audit by Comptroller and Auditor General of India) and also introduce pre audit system in the university. We also will work very hard to adhere to provisions, rules and regulations during implementation of every process. This transparent and disciplined system will reduce the audit paras.

**Actions**

DTU aims:

1. To get ₹1000 crores grant from government of NCT of Delhi for Stage-II, Phase –II construction by 2030.
2. To increase the annual recurring expenditure on account of salary from ₹80 crores to ₹300 crores by 2030.

3. To increase the other annual recurring expenditure from 60 crores per annum to ₹180 crores by 2030.
4. To increase the annual expenditure of the university excluding non-recurring expenditure to ₹500 crores by 2030.
5. To implement pre-audit system in the university by 2030.
6. To maintain the expenditure (recurring) ratio i.e. 80% from University Generated Fund (UGF) and 20% from Grant-in-Aid (GIA).
7. To increase the contribution from alumni from ₹7 crores to ₹100 crores by 2030.

# Department of Information Technology
# Delhi Technological University, Delhi

**Annexure-I**

1. Subject Code: **IT323** Course Title: **Machine Learning**
2. Contact Hours: L: 3 T: 0 P: 2
3. Examination Duration (ETE) (Hrs.): Theory 3 Hrs Practical 0
4. Relative Weightage: CWS 15 PRS 25 MTE 20 ETE 40
5. Credits: 4
6. Semester: V
7. Subject Area: DEC
8. Pre-requisite: Mathematics/Algorithm Design
9. Objective: The student should be able to understand the different supervised, unsupervised and reinforcement learning algorithms and choose the appropriate machine learning tool for different real world examples.

**10.**Details of Course

| S.No. | Contents | Contact Hours |
|---|---|---|
| I. | **Introduction to Machine Learning**: Overview of different tasks: classification, regression, clustering, control, Concept learning, information theory and decision trees, data representation, diversity of data, data table, form of learning, Basic Linear Algebra in machine learning techniques. | 8 |
| II. | **Supervised Learning:** Decision trees, nearest neighbours, linear classifiers and kernels, neural networks, linear regression, logistic regression, Support Vector Machines. | 12 |
| III. | **Unsupervised Learning:** Clustering, Expectation Maximization, K-Mean clustering, Dimensionality Reduction, Feature Selection, PCA, factor analysis, manifold learning. | 10 |
| IV. | **Reinforcement Learning:** Element of Reinforcement learning, Basic of Dynamic Programming; fining optimal policies, value iteration; policy iteration; TD learning; Q learning; actor-critic. | 8 |
| V. | **Recent applications & Research Topics:** Applications in the fields of web and data mining, text recognition, speech recognition, finance. | 4 |
| **Total Contact Hours** | | 42 |

11.Suggested Books

**S.No. Name of Books / Authors/ Publishers/ Year of Publication/Reprint Text Books**

I. Introduction to Machine Learning, Alpaydin, E., MIT Press, 2004

II. Machine Learning, Tom Mitchell, McGraw Hill, 1997.

III. Elements of Machine Learning, Pat Langley Morgan Kaufmann Publishers, Inc. 1995. ISBN 1-55860-301-8

**Reference Book**

1. The elements of statistical learning, Friedman, Jerome, Trevor Hastie, and Robert Tibshirani. Vol. 1. Springer, Berlin: Springer series in statistics, 2001.

# Department of Information Technology
# Delhi Technological University, Delhi

**Annexure-II**

1. Subject Code: **IT324** Course Title: **Deep Learning**
2. Contact Hours: L: 3 T: 1 P: 0
3. Examination Duration (ETE) (Hrs.): Theory 3 Hrs Practical 0
4. Relative Weightage: CWS 25 PRS 0 MTE 25 ETE 50 PR 0
5. Credits: 4
6. Semester: VI
7. Subject Area: DEC
8. Pre-requisite: Algorithm Design/ Machine Learning
9. Objective: The student should be able to understand the different deep learning algorithms and choose the appropriate deep learning tool for different real world examples.

**10. Details of Course**

| S.No. | Contents | Contact Hours |
|---|---|---|
| I. | Introduction: Basics of deep learning, Importance of deep learning, Feature engineering, Overview of deep learning framework. | 8 |
| II. | Machine Learning Basics: Supervised learning algorithms, Hyper parameters and validation sets, overfitting, under fitting, Unsupervised learning algorithms, Stochastic Gradient Descent, Challenges motivating Deep Learning. | 8 |
| III. | Deep feed forward network: Artificial Neural Network, activation function, multi-layer neural network, Training Neural Network: Risk minimization, loss function, backpropagation, regularization, model selection, and optimization, Data Augmentation, Dropout. | 8 |
| IV. | Convolutional Networks (CNN): Motivation, The Convolution Operation, Pooling, Structured outputs, Kernels. | 6 |
| V. | Recurrent and Recursive Nets: Recurrent Neural Networks (RNN) , Bidirectional RNNs, Deep Recurrent Networks, Recursive Neural Networks, Long-Term Dependencies, Long-Short Term Memory, Gated RNNs. | 8 |
| VI. | Applications: Large scale deep learning, Computer vision, Speech Recognition, Natural Language Processing, Other applications, Deep Learning Tools and Libraries: Caffe, Theano, Keras. | 6 |

| SNo | Name of Books/Authors/Publisher |
|---|---|
| 1 | Goodfellow, I., Bengio,Y., and Courville, A., Deep Learning, MIT Press, 2016. |
| 2 | Chao Pan, Deep Learning Fundamentals: An Introduction for Beginners, AI Sciences, 2018 |
| 3 | Steven Cooper , Deep Learning for Beginners, data science, 2018 |
| 4 | Python Deep Learning, by Valentino Zocca, Gianmario Spacagna, Daniel Slater, and Peter Roelants, Packt Publishing Ltd, 2017. |
| 5 | Satish Kumar, Neural Networks: A Classroom Approach, Tata McGraw-Hill Education, 2004. |

DELHI TECHNOLOGICAL UNIVERSITY

SCHEME OF EXAMINATION

MASTER OF TECHNOLOGY IN POLYMER TECHNOLOGY ( PTE )

## Semester-I

| | S.No. | Course Code | Course Name | Type/Area | Cr | L | T | P | CWS | PRS | MTE | ETE | PRE | Total Credits |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Group A | 1 | PTE501 | Polymer Chemistry | Core | 4 | 3 | 0 | 2 | 15 | 25 | 20 | 40 | - | 17 |
| | 2 | PTE503 | Polymer Structure and Properties | Core | 4 | 3 | 0 | 2 | 15 | 25 | 20 | 40 | - | |
| Group B | 3 | PTE5401/5403/..... | Elective 1 | Elective | 4 | 3 | 0 | 2 | 15 | 25 | 20 | 40 | - | |
| | 4 | PTE5301/5303/..... | Elective 2 | Elective | 3 | 3/2 | 0 | 0/2 | 20/15 | 0/25 | 30/20 | 50/40 | - | |
| | 5 | PTE5201/5203/...../UEC5201/5203/ | Elective 3/ University Elective I | Elective | 2 | 2 | 0 | 0 | 20 | - | 30 | 50 | - | |

## Semester-II

| | S.No. | Course Code | Course Name | Type/Area | Cr | L | T | P | CWS | PRS | MTE | ETE | PRE | Total Credits |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Group C | 1 | PTE502 | Polymer Processing | Core | 4 | 3 | 0 | 2 | 15 | 25 | 20 | 40 | - | 17 |
| | 2 | PTE504 | Polymer Testing and Characterization | Core | 4 | 3 | 0 | 2 | 15 | 25 | 20 | 40 | - | |
| Group D | 3 | PTE5402/5404/..... | Elective 4 | Elective | 4 | 4 | 0 | 0 | 20 | - | 30 | 50 | - | |
| | 4 | PTE5302/5304/..... | Elective 5 | Elective | 3 | 3 | 0 | 0 | 20 | - | 30 | 50 | - | |
| | 5 | PTE5202/5204/...../UEC5202/5204/ | Elective 6/ University Elective II | Elective | 2 | 2 | 0 | 0 | 20 | - | 30 | 50 | - | |

## Semester-III

| | S.No. | Course Code | Course Name | Type/Area | Cr | L | T | P | CWS | PRS | MTE | ETE | PRE | Total Credits |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Track 1 | | | | | | | | | | | | | 12 |
| Group E | 1 | PTE651 | Research Project | Core | 12 | | | | | | 40 | 60 | | |
| | Track 2 | | | | | | | | | | | | | |
| | 1 | PTE601 | Major Project I | Core | 3 | | | | | | 40 | 60 | | |
| | 2 | PTE6401/6403/..... | Elective 7 | Elective | 4 | 3 | 0 | 2 | 15 | 25 | 20 | 40 | - | |
| | 3 | PTE6301/6303/..... | Elective 8 | Elective | 3 | 3 | 0 | 0 | 20 | - | 30 | 50 | - | |
| | 4 | PTE6201/6203/..... | Elective 9 | Elective | 2 | 2 | 0 | 0 | 20 | - | 30 | 50 | - | |

-30-

| Semester-IV | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | S.No. | Course Code | Course Name | Type/Area | Cr | L | T | P | CWS | PRS | MTE | ETE | PRE | Total Credits |
| Group F | Track 1 | | | | | | | | | | | | | 12 |
| | 1 | PTE652 | Research Project | Core | 12 | | | | | | 40 | 60 | | |
| | Track 2 | | | | | | | | | | | | | |
| | 1 | PTE602 | Major Project II | Core | 12 | | | | | | 40 | 60 | | |

## List of Elective Courses

| LIST OF ELECTIVES : | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | S.No. | Course Code | Course Name | Type/Area | Cr | L | T | P | CWS | PRS | MTE | ETE | PRE |
| Elective 1 | 1 | PTE5401 | Plastic Technology | Elective | 4 | 3 | 0 | 2 | 15 | 25 | 20 | 40 | - |
| | 2 | PTE5403 | Rubber Technology | | 4 | 3 | 0 | 2 | 15 | 25 | 20 | 40 | - |
| | 3 | PTE5405 | Fibre Technology | | 4 | 3 | 0 | 2 | 15 | 25 | 20 | 40 | - |
| | 4 | PTE5407 | Resin Technology | | 4 | 3 | 0 | 2 | 15 | 25 | 20 | 40 | - |
| | | | | | | | | | | | | | |
| | S.No. | Course Code | Course Name | Type/Area | Cr | L | T | P | CWS | PRS | MTE | ETE | PRE |
| Elective 2 | 1 | PTE5301 | Polymer Degradation | Elective | 3 | 2 | 0 | 2 | 15 | 25 | 20 | 40 | - |
| | 2 | PTE5303 | Polymer Recycling | | 3 | 3 | 0 | 0 | 20 | - | 30 | 50 | - |
| | 3 | PTE5305 | Environmental Impact Assessment of Polymers | | 3 | 3 | 0 | 0 | 20 | - | 30 | 50 | - |
| | 4 | PTE5307 | Green Polymers | | 3 | 3 | 0 | 0 | 20 | - | 30 | 50 | - |
| | | | | | | | | | | | | | |
| | S.No. | Course Code | Course Name | Type/Area | Cr | L | T | P | CWS | PRS | MTE | ETE | PRE |
| | 1 | PTE5201 | SEMINAR | | 2 | 2 | 0 | 0 | 2 | - | 100 | - | - |
| Elective 3 | 2 | PTE5203 | Engineering Concepts in Polymers (for Science students) | Elective | 2 | 2 | 0 | 0 | 20 | - | 30 | 50 | - |
| | 3 | PTE5205 | Chemical Concepts in Polymers (for Engineering Students) | | 2 | 2 | 0 | 0 | 20 | - | 30 | 50 | - |
| | | | | | | | | | | | | | |
| | S.No. | Course Code | Course Name | Type/Area | Cr | L | T | P | CWS | PRS | MTE | ETE | PRE |
| Elective 4 | 1 | PTE5402 | Polymer Blends and Composites | Elective | 4 | 4 | 0 | 0 | 20 | - | 30 | 50 | - |
| | 2 | PTE5404 | Membrane Technology | | 4 | 4 | 0 | 0 | 20 | - | 30 | 50 | - |
| | 3 | PTE5406 | Adhesives and Coating Technology | | 4 | 4 | 0 | 0 | 20 | - | 30 | 50 | - |
| | 4 | PTE5408 | Tyre Technology | | 4 | 4 | 0 | 0 | 20 | - | 30 | 50 | - |
| | 5 | PTE5410 | Paint Technology | | 4 | 4 | 0 | 0 | 20 | - | 30 | 50 | - |

| | S.No. | Course Code | Course Name | Type/Area | Cr | L | T | P | CWS | PRS | MTE | ETE | PRE |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Elective 5 | 1 | PTE5302 | MINOR PROJECT | Elective | 3 | 0 | 0 | - | - | 40 | - | - | 60 |
| | 2 | PTE5304 | Packaging Technology | | 3 | 3 | 0 | 0 | 20 | - | 30 | 50 | - |
| | 3 | PTE6306 | Biomedical Applications of Polymers | | 3 | 3 | 0 | 0 | 20 | - | 30 | 50 | - |
| | 4 | PTE6308 | Polymers in Food and Healthcare | | 3 | 3 | 0 | 0 | 20 | - | 30 | 50 | - |
| | | | | | | | | | | | | | |
| | | | | | | | | | | | | | |

| | S.No. | Course Code | Course Name | Type/Area | Cr | L | T | P | CWS | PRS | MTE | ETE | PRE |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Elective 6 | 1 | PTE5202 | Commercialization of Polymers and Chemical Technology Products | Elective | 2 | 2 | 0 | 0 | 20 | - | 30 | 50 | - |
| | 2 | PTE5204 | Engineering economics and Entrepreneurship | | 2 | 2 | 0 | 0 | 20 | - | 30 | 50 | - |
| | 3 | PTE5206 | Statistical Quality control | | 2 | 2 | 0 | 0 | 20 | - | 30 | 50 | - |
| | | | | | | | | | | | | | |

| | S.No. | Course Code | Course Name | Type/Area | Cr | L | T | P | CWS | PRS | MTE | ETE | PRE |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Elective 7 | 1 | PTE6401 | Rheology | Elective | 4 | 3 | 0 | 2 | 15 | 25 | 20 | 40 | - |
| | 2 | PTE6403 | Polymer product and Die Design | | 4 | 3 | 0 | 2 | 15 | 25 | 20 | 40 | - |
| | 3 | PTE6405 | Additives and Compounding | | 4 | 3 | 0 | 2 | 15 | 25 | 20 | 40 | - |
| | 4 | PTE6407 | Extrusion and Injection Molding | | 4 | 3 | 0 | 2 | 15 | 25 | 20 | 40 | - |
| | 5 | PTE6409 | Nonwoven Technology | | 4 | 3 | 0 | 2 | 15 | 25 | 20 | 40 | - |

| | S.No. | Course Code | Course Name | Type/Area | Cr | L | T | P | CWS | PRS | MTE | ETE | PRE |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Elective 8 | 1 | PTE6301 | Specialty Polymers | Elective | 3 | 3 | 0 | 0 | 20 | - | 30 | 50 | - |
| | 2 | PTE6303 | Application of nanomaterials in Polymers | | 3 | 3 | 0 | 0 | 20 | - | 30 | 50 | - |
| | 3 | PTE6305 | Inorganic polymers | | 3 | 3 | 0 | 0 | 20 | - | 30 | 50 | - |
| | 4 | PTE6307 | Biosensors | | 3 | 3 | 0 | 0 | 20 | - | 30 | 50 | - |
| | | | | | | | | | | | | | |

| | S.No. | Course Code | Course Name | Type/Area | Cr | L | T | P | CWS | PRS | MTE | ETE | PRE |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Elective 9 | 1 | PTE6201 | Practical Training in Industry# | Elective | 2 | 2 | 0 | 0 | 20 | - | 30 | 50 | - |
| | 2 | PTE6203 | Research Exploration | | 2 | 2 | 0 | 0 | 20 | - | 30 | 50 | - |
| | 3 | PTE6205 | Special Lectures in Polymers and Industrial Visits | | 2 | 2 | 0 | 0 | 20 | - | 30 | 50 | - |
| | | | | | | | | | | | | | |

DELHI TECHNOLOGICAL UNIVERSITY
SCHEME OF EXAMINATION
MASTER OF TECHNOLOGY IN THERMAL ENGINEERING ( THE )

## Semester-I

| | S.No. | Course Code | Course Name | Type/Area | Cr | L | T | P | CWS | PRS | MTE | ETE | PRE | Total Credits |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Group A | 1 | THE501 | Thermodynamics and Gas Dynamics | Core | 4 | 3 | 0 | 2 | 15 | 25 | 20 | 40 | 15 | 17 |
| | 2 | THE503 | Heat Transfer & Fluid Mechanics | Core | 4 | 3 | 0 | 2 | 15 | 25 | 20 | 40 | 15 | |
| Group B | 3 | THE5401/5403/..... | Elective 1 | Elective | 4 | 3/4 | 0 | 2/0 | 15/20 | 25/0 | 20/30 | 40/50 | - | |
| | 4 | THE5301/5303/..... | Elective 2 | Elective | 3 | 3 | 0 | 0 | 20 | - | 30 | 50 | - | |
| | 5 | THE5201/5203/...../ UEC5201/5203/ | Elective 3/University Elective I | Elective | 2 | 2 | 0 | 0 | 20 | - | 30 | 50 | - | |

## Semester-II

| | S.No. | Course Code | Course Name | Type/Area | Cr | L | T | P | CWS | PRS | MTE | ETE | PRE | Total Credits |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Group C | 1 | THE502 | Energy Systems | Core | 4 | 3 | 0 | 2 | 15 | 25 | 20 | 40 | - | 17 |
| | 2 | THE504 | Turbomachines | Core | 4 | 3 | 0 | 2 | 15 | 25 | 20 | 40 | - | |
| Group D | 3 | THE5402/5404/..... | Elective 4 | Elective | 4 | 3/4 | 0 | 2/0 | 15/20 | 25/0 | 20/30 | 40/50 | - | |
| | 4 | THE5302/5304/..... | Elective 5 | Elective | 3 | 3 | 0 | 0 | 20 | - | 30 | 50 | - | |
| | 5 | THE5202/5204/...../ UEC5202/5204/ | Elective 6/ University Elective II | Elective | 2 | 2 | 0 | 0 | 20 | - | 30 | 50 | - | |

## Semester-III

| | S.No. | Course Code | Course Name | Type/Area | Cr | L | T | P | CWS | PRS | MTE | ETE | PRE | Total Credits |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Track 1 | | | | | | | | | | | | | 12 |
| Group E | 1 | THE651 | Research Project | Core | 12 | 0 | 0 | 12 | 0 | - | 0 | 100 | - | |
| | Track 2 | | | | | | | | | | | | | |
| | 1 | THE601 | Major Project I | Core | 3 | | | | | | 40 | 60 | | |
| | 2 | THE6401/6403/..... | Elective 7 | Elective | 4 | 3/4 | 0 | 2/0 | 15/20 | 25/0 | 20/30 | 40/50 | - | |
| | 3 | THE6301/6303/..... | Elective 8 | Elective | 3 | 3 | 0 | 0 | 20 | - | 30 | 50 | - | |
| | 4 | THE6201/6203/..... | Elective 9 | Elective | 2 | 2 | 0 | 0 | 20 | - | 30 | 50 | - | |

| Semester-IV | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | S.No. | Course Code | Course Name | Type/Area | Cr | L | T | P | CWS | PRS | MTE | ETE | PRE | Total Credits |
| Group F | Track 1 | | | | | | | | | | | | | 12 |
| | 1 | THE652 | Research Project | Core | 12 | 0 | 0 | 12 | 0 | - | 0 | 100 | - | |
| | Track 2 | | | | | | | | | | | | | |
| | 1 | THE602 | Major Project II | Core | 12 | 0 | 0 | 12 | 0 | - | 0 | 100 | - | |

## List of Elective Courses

| LIST OF ELECTIVES : | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | S.No. | Course Code | Course Name | Type/Area | Cr | L | T | P | CWS | PRS | MTE | ETE | PRE |
| Elective 1 | 1 | THE5401 | Advanced Refrigeration Systems | Elective | 4 | 3/4 | 0 | 2/0 | 15/20 | 25/0 | 20/30 | 40/50 | - |
| | 2 | THE5403 | Advanced I C Engines | | 4 | 3/4 | 0 | 2/0 | 15/20 | 25/0 | 20/30 | 40/50 | - |
| | 3 | THE5405 | Power Plant Engg. | | 4 | 3/4 | 0 | 2/0 | 15/20 | 25/0 | 20/30 | 40/50 | - |
| | | | | | | | | | | | | | |
| | | | | | | | | | | | | | |
| | S.No. | Course Code | Course Name | Type/Area | Cr | L | T | P | CWS | PRS | MTE | ETE | PRE |
| Elective 2 | 1 | THE5301 | Computational Methods in Thermal & Fluid Engineering | Elective | 3 | 3 | 0 | 0 | 20 | - | 30 | 50 | - |
| | 2 | THE5303 | Optimization Techniques | | 3 | 3 | 0 | 0 | 20 | - | 30 | 50 | - |
| | 3 | THE5305 | Finite Element Methods | | 3 | 3 | 0 | 0 | 20 | - | 30 | 50 | - |
| | | | | | | | | | | | | | |
| | | | | | | | | | | | | | |
| | S.No. | Course Code | Course Name | Type/Area | Cr | L | T | P | CWS | PRS | MTE | ETE | PRE |
| Elective 3 | 1 | THE5201 | SEMINAR | Elective | 2 | 2 | 0 | 0 | 2 | - | 100 | - | - |
| | 2 | THE5203 | Renewable & Non-Conventional Energy Sources | | 2 | 2 | 0 | 0 | 20 | - | 30 | 50 | - |
| | 3 | THE5205 | Measurement & Control Techniques | | 2 | 2 | 0 | 0 | 20 | - | 30 | 50 | - |
| | | | | | | | | | | | | | |
| | | | | | | | | | | | | | |
| | S.No. | Course Code | Course Name | Type/Area | Cr | L | T | P | CWS | PRS | MTE | ETE | PRE |
| Elective 4 | 1 | THE5402 | Advanced Heat Transfer | Elective | 4 | 3/4 | 0 | 2/0 | 15/20 | 25/0 | 20/30 | 40/50 | - |
| | 2 | THE5404 | Advanced Fluid Dynamics | | 4 | 3/4 | 0 | 2/0 | 15/20 | 25/0 | 20/30 | 40/50 | - |
| | 3 | THE5406 | Advanced Air Conditioning Systems | | 4 | 3/4 | 0 | 2/0 | 15/20 | 25/0 | 20/30 | 40/50 | - |
| | | | | | | | | | | | | | |
| | | | | | | | | | | | | | |

| | S.No. | Course Code | Course Name | Type/Area | Cr | L | T | P | CWS | PRS | MTE | ETE | PRE |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Elective 5 | 1 | THE5302 | MINOR PROJECT | Elective | 3 | 0 | 0 | - | - | 40 | - | - | 60 |
| | 2 | THE5304 | Solar Engineering Thermal Processes | | 3 | 3 | 0 | 0 | 20 | - | 30 | 50 | - |
| | 3 | THE5306 | Thermal Energy Conservation | | 3 | 3 | 0 | 0 | 20 | - | 30 | 50 | - |
| | | | | | | | | | | | | | |
| | | | | | | | | | | | | | |
| | S.No. | Course Code | Course Name | Type/Area | Cr | L | T | P | CWS | PRS | MTE | ETE | PRE |
| Elective 6 | 1 | THE5202 | Steam and Gas Turbines | Elective | 2 | 2 | 0 | 0 | 20 | - | 30 | 50 | - |
| | 2 | THE5204 | Combustion & Emissions | | 2 | 2 | 0 | 0 | 20 | - | 30 | 50 | - |
| | 3 | THE5206 | Advanced Cryogenic systems | | 2 | 2 | 0 | 0 | 20 | - | 30 | 50 | - |
| | | | | | | | | | | | | | |
| | | | | | | | | | | | | | |
| | S.No. | Course Code | Course Name | Type/Area | Cr | L | T | P | CWS | PRS | MTE | ETE | PRE |
| Elective 7 | 1 | THE6401 | Advanced Power Generation Systems | Elective | 4 | 3/4 | 0 | 2/0 | 15/20 | 25/0 | 20/30 | 40/50 | - |
| | 2 | THE6403 | Micro / Nano scale Heat Transfer | | 4 | 3/4 | 0 | 2/0 | 15/20 | 25/0 | 20/30 | 40/50 | - |
| | 3 | THE6405 | Combustion Modeling | | 4 | 3/4 | 0 | 2/0 | 15/20 | 25/0 | 20/30 | 40/50 | - |
| | | | | | | | | | | | | | |
| | | | | | | | | | | | | | |
| | S.No. | Course Code | Course Name | Type/Area | Cr | L | T | P | CWS | PRS | MTE | ETE | PRE |
| Elective 8 | 1 | THE6301 | Advanced Heating Ventilation & Air Conditioning | Elective | 3 | 3 | 0 | 0 | 20 | - | 30 | 50 | - |
| | 2 | THE6303 | Two Phase Flow Heat Transfer | | 3 | 3 | 0 | 0 | 20 | - | 30 | 50 | - |
| | 3 | THE6305 | Exergy Analysis of Thermal Systems | | 3 | 3 | 0 | 0 | 20 | - | 30 | 50 | - |
| | | | | | | | | | | | | | |
| | | | | | | | | | | | | | |
| | S.No. | Course Code | Course Name | Type/Area | Cr | L | T | P | CWS | PRS | MTE | ETE | PRE |
| Elective 9 | 1 | THE6201 | Advanced Energy Systems | Elective | 2 | 2 | 0 | 0 | 20 | - | 30 | 50 | - |
| | 2 | THE6203 | Dynamics and Control of Mechanical Systems | | 2 | 2 | 0 | 0 | 20 | - | 30 | 50 | - |
| | 3 | THE6205 | Alternative Fuels | | 2 | 2 | 0 | 0 | 20 | - | 30 | 50 | - |
| | | | | | | | | | | | | | |
| | | | | | | | | | | | | | |

DELHI TECHNOLOGICAL UNIVERSITY

SCHEME OF EXAMINATION

MASTER OF TECHNOLOGY IN VLSI DESIGN & EMBEDDED SYSTEM ( VLS )

## Semester-I

| | S.No. | Course Code | Course Name | Type/Area | Cr | L | T | P | CWS | PRS | MTE | ETE | PRE | Total Credits |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Group A | 1 | VLS501 | Analog IC Design | Core | 4 | 3 | 0 | 2 | 15 | 25 | 20 | 40 | - | 17 |
| | 2 | VLS503 | Digital CMOS IC design | Core | 4 | 3 | 0 | 2 | 15 | 25 | 20 | 40 | - | |
| Group B | 3 | VLS5401/5403/..... | Elective 1 | Elective | 4 | 3 | 0 | 2 | 15 | 25 | 20 | 40 | - | |
| | 4 | VLS5301/5303/..... | Elective 2 | Elective | 3 | 3 | 0 | 0 | 20 | - | 30 | 50 | - | |
| | 5 | VLS5201/5203/...../ UEC5201/5203/ | Elective 3/ University Elective I | Elective | 2 | 2 | 0 | 0 | 20 | - | 30 | 50 | - | |

## Semester-II

| | S.No. | Course Code | Course Name | Type/Area | Cr | L | T | P | CWS | PRS | MTE | ETE | PRE | Total Credits |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Group C | 1 | VLS502 | Embedded System Design | Core | 4 | 3 | 0 | 2 | 15 | 25 | 20 | 40 | - | 17 |
| | 2 | VLS504 | Low power VLSI Design | Core | 4 | 3 | 0 | 2 | 15 | 25 | 20 | 40 | - | |
| Group D | 3 | VLS5402/5404/..... | Elective 4 | Elective | 4 | 3 | 0 | 2 | 15 | 25 | 20 | 40 | - | |
| | 4 | VLS5302/5304/..... | Elective 5 | Elective | 3 | 3 | 0 | 0 | 20 | - | 30 | 50 | - | |
| | 5 | VLS5202/5204/...../ UEC5202/5204/ | Elective 6/ University Elective II | Elective | 2 | 2 | 0 | 0 | 20 | - | 30 | 50 | - | |

## Semester-III

| | S.No. | Course Code | Course Name | Type/Area | Cr | L | T | P | CWS | PRS | MTE | ETE | PRE | Total Credits |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Track 1 | | | | | | | | | | | | | 12 |
| Group E | 1 | VLS651 | Research Project | Core | 12 | 0 | 0 | 12 | 0 | - | 0 | 100 | 0 | |
| | Track 2 | | | | | | | | | | | | | |
| | 1 | VLS601 | Major Project I | Core | 3 | | | | | | 40 | 60 | | |
| | 2 | VLS6401/6403/..... | Elective 7 | Elective | 4 | 3 | 0 | 2 | 15 | 25 | 20 | 40 | - | |
| | 3 | VLS6301/6303/..... | Elective 8 | Elective | 3 | 3 | 0 | 0 | 20 | - | 30 | 50 | - | |
| | 4 | VLS6201/6203/..... | Elective 9 | Elective | 2 | 2 | 0 | 0 | 20 | - | 30 | 50 | - | |

## Semester-IV

| | S.No. | Course Code | Course Name | Type/Area | Cr | L | T | P | CWS | PRS | MTE | ETE | PRE | Total Credits |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Group F | Track 1 | | | | | | | | | | | | | 12 |
| | 1 | VLS652 | Research Project | Core | 12 | 0 | 0 | 12 | 0 | - | 0 | 100 | 0 | |
| | Track 2 | | | | | | | | | | | | | |
| | 1 | VLS602 | Major Project II | Core | 12 | 0 | 0 | 12 | 0 | - | 0 | 100 | 0 | |

## List of Elective Courses

| LIST OF ELECTIVES : | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | S.No. | Course Code | Course Name | Type/Area | Cr | L | T | P | CWS | PRS | MTE | ETE | PRE |
| Elective 1 | 1 | VLS5401 | Digital Design with HDL (Verilog) | Elective | 4 | 3 | 0 | 2 | 15 | 25 | 20 | 40 | - |
| | 2 | VLS5403 | Digital Signal Processing | | 4 | 3 | 0 | 2 | 15 | 25 | 20 | 40 | - |
| | 3 | VLS5405 | Soft Computing | | 4 | 3 | 0 | 2 | 15 | 25 | 20 | 40 | - |
| | 4 | VLS5407 | IC technology | | 4 | 3 | 0 | 2 | 15 | 25 | 20 | 40 | - |
| | | | | | | | | | | | | | |
| | S.No. | Course Code | Course Name | Type/Area | Cr | L | T | P | CWS | PRS | MTE | ETE | PRE |
| Elective 2 | 1 | VLS5301 | Device modelling | Elective | 3 | 3 | 0 | 0 | 20 | - | 30 | 50 | - |
| | 2 | VLS5303 | Reconfigurable Computing | | 3 | 3 | 0 | 0 | 20 | - | 30 | 50 | - |
| | 3 | VLS5305 | Hardware software codesign | | 3 | 3 | 0 | 0 | 20 | - | 30 | 50 | - |
| | 4 | VLS5307 | Organic and Flexible Electronics | | 3 | 3 | 0 | 0 | 20 | - | 30 | 50 | - |
| | | | | | | | | | | | | | |
| | S.No. | Course Code | | Type/Area | Cr | L | T | P | CWS | PRS | MTE | ETE | PRE |
| | 1 | VLS5201 | SEMINAR | | 2 | 2 | 0 | 0 | 2 | - | 100 | - | - |
| Elective 3 | 2 | VLS5203 | Micro and Nanoelectronics | Elective | 2 | 2 | 0 | 0 | 20 | - | 30 | 50 | - |
| | 3 | VLS5205 | Micro and Nanofabrication | | 2 | 2 | 0 | 0 | 20 | - | 30 | 50 | - |
| | 4 | VLS5207 | Field Programmable Analog Arrays | | 2 | 2 | 0 | 0 | 20 | - | 30 | 50 | - |
| | | | | | | | | | | | | | |
| | S.No. | Course Code | Course Name | Type/Area | Cr | L | T | P | CWS | PRS | MTE | ETE | PRE |
| Elective 4 | 1 | VLS5402 | Analog Filter Design | Elective | 4 | 3 | 0 | 2 | 15 | 25 | 20 | 40 | - |
| | 2 | VLS5404 | Internet enabled embedded devices | | 4 | 3 | 0 | 2 | 15 | 25 | 20 | 40 | - |
| | 3 | VLS5406 | CAD for VLSI Systems | | 4 | 3 | 0 | 2 | 15 | 25 | 20 | 40 | - |
| | 4 | VLS5408 | CMOS RF Circuit Design | | 4 | 3 | 0 | 2 | 15 | 25 | 20 | 40 | - |
| | | | | | | | | | | | | | |
| | S.No. | Course Code | Course Name | Type/Area | Cr | L | T | P | CWS | PRS | MTE | ETE | PRE |
| Elective 5 | 1 | VLS5302 | MINOR PROJECT | Elective | 3 | 0 | 0 | - | - | 40 | - | - | 60 |
| | 2 | VLS5304 | FPGA based Digital Signal Processing | | 3 | 3 | 0 | 0 | 20 | - | 30 | 50 | - |
| | 3 | VLS5306 | Testing and Diagnosis of Digital System Design | | 3 | 3 | 0 | 0 | 20 | - | 30 | 50 | - |
| | 4 | VLS5308 | Memory Design and Testing | | 3 | 3 | 0 | 0 | 20 | - | 30 | 50 | - |
| | | | | | | | | | | | | | |

| | S.No. | Course Code | Course Name | Type/Area | Cr | L | T | P | CWS | PRS | MTE | ETE | PRE |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Elective 6 | 1 | VLS5202 | CMOS nano neuromorphic circuits | Elective | 2 | 2 | 0 | 0 | 20 | - | 30 | 50 | - |
| | 2 | VLS5204 | Real Time Operating Systems | | 2 | 2 | 0 | 0 | 20 | - | 30 | 50 | - |
| | 3 | VLS5206 | Clock Tree Synthesis | | 2 | 2 | 0 | 0 | 20 | - | 30 | 50 | - |
| | 4 | VLS5208 | Layout design and skills with analog perspective | | 2 | 0 | 0 | 4 | - | 40 | - | - | 60 |
| | | | | | | | | | | | | | |
| | S.No. | Course Code | Course Name | Type/Area | Cr | L | T | P | CWS | PRS | MTE | ETE | PRE |
| Elective 7 | 1 | VLS6401 | Mixed Signal Design | Elective | 4 | 3 | 0 | 2 | 15 | 25 | 20 | 40 | - |
| | 2 | VLS6403 | Embedded Signal Processing | | 4 | 3 | 0 | 2 | 15 | 25 | 20 | 40 | - |
| | 3 | VLS6405 | Biomedical Circuits | | 4 | 3 | 0 | 2 | 15 | 25 | 20 | 40 | - |
| | 4 | VLS6407 | Fault Tolerant computing | | 4 | 3 | 0 | 2 | 15 | 25 | 20 | 40 | - |
| | | | | | | | | | | | | | |
| | S.No. | Course Code | Course Name | Type/Area | Cr | L | T | P | CWS | PRS | MTE | ETE | PRE |
| Elective 8 | 1 | VLS6301 | Speech Processing | Elective | 3 | 3 | 0 | 0 | 20 | - | 30 | 50 | - |
| | 2 | VLS6303 | Embedded Automotive systems | | 3 | 3 | 0 | 0 | 20 | - | 30 | 50 | - |
| | 3 | VLS6305 | Machine Learning | | 3 | 3 | 0 | 0 | 20 | - | 30 | 50 | - |
| | 4 | VLS6307 | Advanced Computer Architecture | | 3 | 3 | 0 | 0 | 20 | - | 30 | 50 | - |
| | 5 | VLS6309 | Embedded Software | | 3 | 3 | 0 | 0 | 20 | - | 30 | 50 | - |
| | 6 | VLS6311 | Phase Locked Loop Design | | 3 | 3 | 0 | 0 | 20 | - | 30 | 50 | - |
| | | | | | | | | | | | | | |
| | | | | | | | | | | | | | |
| | S.No. | Course Code | Course Name | Type/Area | Cr | L | T | P | CWS | PRS | MTE | ETE | PRE |
| Elective 9 | 1 | VLS6201 | VLSI signal processing architecture | Elective | 2 | 2 | 0 | 0 | 20 | - | 30 | 50 | - |
| | 2 | VLS6203 | FPGA based soft computing | | 2 | 2 | 0 | 0 | 20 | - | 30 | 50 | - |
| | 3 | VLS6205 | Selected topics in embedded systems | | 2 | 2 | 0 | 0 | 20 | - | 30 | 50 | - |
| | 4 | VLS6207 | Selected topics in VLSI | | 2 | 2 | 0 | 0 | 20 | - | 30 | 50 | - |
| | | | | | | | | | | | | | |

DELHI TECHNOLOGICAL UNIVERSITY
SCHEME OF EXAMINATION
MASWER OF TECHNOLOGY IN SOFTWARE ENGINEERING ( SWE )

## Semester-I

| | S.No. | Course Code | Course Name | Type/Area | Cr | L | T | P | CWS | PRS | MTE | ETE | PRE | Total Credits |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Group A | 1 | SWE501 | Software Requirement | Core | 4 | 3 | 0 | 2 | 15 | 25 | 20 | 40 | - | 17(yoga) |
| | 2 | SWE503 | Object Oriented Software Engineering | Core | 4 | 3 | 0 | 2 | 15 | 25 | 20 | 40 | - | |
| Group B | 3 | SWE5401/5403/..... | Elective 1 | Elective | 4 | 3 | 0 | 2 | 15 | 25 | 20 | 40 | - | |
| | 4 | SWE5301/5303/..... | Elective 2 | Elective | 3 | 3 | 0 | 0 | 20 | - | 30 | 50 | - | |
| | 5 | SWE5201/5203/...../ UEC5201/5203/ | Elective 3/ University Elective I | Elective | 2 | 2 | 0 | 0 | 20 | - | 30 | 50 | - | |

## Semester-II

| | S.No. | Course Code | Course Name | Type/Area | Cr | L | T | P | CWS | PRS | MTE | ETE | PRE | Total Credits |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Group C | 1 | SWE502 | Software Testing | Core | 4 | 3 | 0 | 2 | 15 | 25 | 20 | 40 | - | 17 |
| | 2 | SWE504 | Empirical Software Engineering | Core | 4 | 3 | 0 | 2 | 15 | 25 | 20 | 40 | - | |
| Group D | 3 | SWE5402/5404/..... | Elective 4 | Elective | 4 | 3 | 0 | 2 | 15 | 25 | 20 | 40 | - | |
| | 4 | SWE5302/5304/..... | Elective 5 | Elective | 3 | 3 | 0 | 0 | 20 | - | 30 | 50 | - | |
| | 5 | SWE5202/5204/...../ UEC5202/5204/ | Elective 6/ University Elective II | Elective | 2 | 2 | 0 | 0 | 20 | - | 30 | 50 | - | |

## Semester-III

| | S.No. | Course Code | Course Name | Type/Area | Cr | L | T | P | CWS | PRS | MTE | ETE | PRE | Total Credits |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Track 1 | | | | | | | | | | | | | 12 |
| Group E | 1 | SWE651 | Research Project | Core | 12 | | | | | | 40 | 60 | | |
| | Track 2 | | | | | | | | | | | | | |
| | 1 | SWE601 | Major Project I | Core | 3 | | | | | | 40 | 60 | | |
| | 2 | SWE6401/6403/..... | Elective 7 | Elective | 4 | 3 | 0 | 2 | 10 | 15 | 25 | 50 | - | |
| | 3 | SWE6301/6303/..... | Elective 8 | Elective | 3 | 3 | 0 | 0 | 20 | - | 30 | 50 | - | |
| | 4 | SWE6201/6203/..... | Elective 9 | Elective | 2 | 2/0 | 0 | 0/4 | 20/0 | 0/40 | 30/0 | 50/0 | 0/60 | |

| Semester-IV | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | S.No. | Course Code | Course Name | Type/Area | Cr | L | T | P | CWS | PRS | MTE | ETE | PRE | Total Credits |
| Group F | Track 1 | | | | | | | | | | | | | 12 |
| | 1 | SWE652 | Research Project | Core | 12 | 0 | 0 | 12 | 0 | - | 0 | 100 | 0 | |
| | Track 2 | | | | | | | | | | | | | |
| | 1 | SWE602 | Major Project II | Core | 12 | | | | | | 40 | 60 | | |

## List of Elective Courses

| LIST OF ELECTIVES : | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | S.No. | Course Code | Course Name | Type/Area | Cr | L | T | P | CWS | PRS | MTE | ETE | PRE |
| Elective 1 | 1 | SWE5401 | Advanced Database Management Systems | Elective | 4 | 3 | 0 | 2 | 15 | 25 | 20 | 40 | - |
| | 2 | SWE5403 | Programming Languages | | 4 | 3 | 0 | 2 | 15 | 25 | 20 | 40 | - |
| | 3 | SWE5405 | Advanced Operating System | | 4 | 3 | 0 | 2 | 15 | 25 | 20 | 40 | - |
| | 4 | SWE5407 | Advanced Data Structures | | 4 | 3 | 0 | 2 | 15 | 25 | 20 | 40 | - |
| | 5 | SWE5409 | Data Warehousing Data Mining | | 4 | 3 | 0 | 2 | 15 | 25 | 20 | 40 | - |
| | S.No. | Course Code | Course Name | Type/Area | Cr | L | T | P | CWS | PRS | MTE | ETE | PRE |
| Elective 2 | 1 | SWE5301 | Project Work | Elective | 3 | 0 | 0 | - | - | 40 | - | - | 60 |
| | 2 | SWE5303 | Artificial Intelligence | | 3 | 3 | 0 | 0 | 20 | - | 30 | 50 | - |
| | 3 | SWE5305 | Information Retrieval | | 3 | 3 | 0 | 0 | 20 | - | 30 | 50 | - |
| | 4 | SWE5307 | Fuzzy Logic and Neural Networks | | 3 | 3 | 0 | 0 | 20 | - | 30 | 50 | - |
| | 5 | SWE5309 | Software Project Management | | 3 | 3 | 0 | 0 | 20 | - | 30 | 50 | - |
| | S.No. | Course Code | Course Name | Type/Area | Cr | L | T | P | CWS | PRS | MTE | ETE | PRE |
| Elective 3 | 1 | SWE5201 | SEMINAR | Elective | 2 | 2 | 0 | 0 | 2 | - | 100 | - | - |
| | 2 | SWE5203 | Probability and Statistics | | 2 | 2 | 0 | 0 | 20 | - | 30 | 50 | - |
| | S.No. | Course Code | Course Name | Type/Area | Cr | L | T | P | CWS | PRS | MTE | ETE | PRE |
| Elective 4 | 1 | SWE5402 | Software Design Patterns | Elective | 4 | 3 | 0 | 2 | 15 | 25 | 20 | 40 | - |
| | 2 | SWE5404 | Soft Computing | | 4 | 3 | 0 | 2 | 15 | 25 | 20 | 40 | - |
| | 3 | SWE5406 | Machine Learning | | 4 | 3 | 0 | 2 | 15 | 25 | 20 | 40 | - |
| | 4 | SWE5408 | Big Data Analytics | | 4 | 3 | 0 | 2 | 15 | 25 | 20 | 40 | - |
| | 5 | SWE5410 | Wireless and Mobile Computing | | 4 | 3 | 0 | 2 | 15 | 25 | 20 | 40 | - |

| | S.No. | Course Code | Course Name | Type/Area | Cr | L | T | P | CWS | PRS | MTE | ETE | PRE |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Elective 5 | 1 | SWE5302 | MINOR PROJECT | Elective | 3 | 0 | 0 | - | - | 40 | - | - | 60 |
| | 2 | SWE5304 | Optimization Techniques | | 3 | 3 | 0 | 0 | 20 | - | 30 | 50 | - |
| | 3 | SWE5306 | Pattern Recognition | | 3 | 3 | 0 | 0 | 20 | - | 30 | 50 | - |
| | 4 | SWE5308 | Distributed Systems | | 3 | 3 | 0 | 0 | 20 | - | 30 | 50 | - |
| | 5 | SWE5310 | Natural Language Processing | | 3 | 3 | 0 | 0 | 20 | - | 30 | 50 | - |
| | S.No. | Course Code | Course Name | Type/Area | Cr | L | T | P | CWS | PRS | MTE | ETE | PRE |
| Elective 6 | 1 | SWE5202 | Research Methodology | Elective | 2 | 2 | 0 | 0 | 20 | - | 30 | 50 | - |
| | 2 | SWE5204 | Predictive Modelling | | 2 | 2 | 0 | 0 | 20 | - | 30 | 50 | - |
| | 3 | SWE5206 | Operational Research | | 2 | 2 | 0 | 0 | 20 | - | 30 | 50 | - |
| | S.No. | Course Code | Course Name | Type/Area | Cr | L | T | P | CWS | PRS | MTE | ETE | PRE |
| Elective 7 | 1 | SWE6401 | Advances in Software Engineering | Elective | 4 | 3 | 0 | 2 | 15 | 25 | 20 | 40 | - |
| | 2 | SWE6403 | Cloud Computing | | 4 | 3 | 0 | 2 | 15 | 25 | 20 | 40 | - |
| | 3 | SWE6405 | Things of the Internet | | 4 | 3 | 0 | 2 | 15 | 25 | 20 | 40 | - |
| | 4 | SWE6407 | Multimedia Applications | | 4 | 3 | 0 | 2 | 15 | 25 | 20 | 40 | - |
| | 5 | SWE6409 | Information Theory and Coding | | 4 | 3 | 0 | 2 | 15 | 25 | 20 | 40 | - |
| | S.No. | Course Code | Course Name | Type/Area | Cr | L | T | P | CWS | PRS | MTE | ETE | PRE |
| Elective 8 | 1 | SWE6301 | Agile Methods | Elective | 3 | 3 | 0 | 0 | 20 | - | 30 | 50 | - |
| | 2 | SWE6303 | Software Reliability | | 3 | 3 | 0 | 0 | 20 | - | 30 | 50 | - |
| | 3 | SWE6305 | Cluster and Grid Computing | | 3 | 3 | 0 | 0 | 20 | - | 30 | 50 | - |
| | 4 | SWE6307 | Software Quality & Metrics | | 3 | 3 | 0 | 0 | 20 | - | 30 | 50 | - |
| | 5 | SWE6309 | Swarm and Evolutionary Computing | | 3 | 3 | 0 | 0 | 20 | - | 30 | 50 | - |
| | S.No. | Course Code | Course Name | Type/Area | Cr | L | T | P | CWS | PRS | MTE | ETE | PRE |
| Elective 9 | 1 | SWE6201 | Data Security & Privacy | Elective | 2 | 2 | 0 | 0 | 20 | - | 30 | 50 | - |
| | 3 | SWE6203 | Bio Informatics | | 2 | 2 | 0 | 0 | 20 | - | 30 | 50 | - |
| | 5 | SWE6205 | Statistical Tools | | 2 | 0 | 0 | 4 | - | 40 | - | - | 60 |

DELHI TECHNOLOGICAL UNIVERSITY

SCHEME OF EXAMINATION

MASTER OF TECHNOLOGY IN STRUCTURAL ENGINEERING ( STE )

## Semester-I

| | S.No. | Course Code | Course Name | Type/Area | Cr | L | T | P | CWS | PRS | MTE | ETE | PRE | Total Credits |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Group A | 1 | STE501 | Structural Dynamics | Core | 4 | 3 | 0 | 2 | 15 | 25 | 20 | 40 | - | 17 |
| | 2 | STE503 | Computational Methods in Structural Engineering | Core | 4 | 3 | 0 | 2 | 15 | 25 | 20 | 40 | - | |
| Group B | 3 | STE5401/5403/..... | Elective 1 | Elective | 4 | 3 | 0 | 2 | 15 | 25 | 20 | 40 | - | |
| | 4 | STE5301/5303/..... | Elective 2 | Elective | 3 | 3 | 0 | 2 | 15 | 25 | 20 | 40 | - | |
| | 5 | STE5201/5203/...../ UEC5201/5203/ | Elective 3/University Elective I | Elective | 2 | 2/1 | 0 | 0/2 | 20/15 | 0/25 | 30/20 | 50/40 | - | |

## Semester-II

| | S.No. | Course Code | Course Name | Type/Area | Cr | L | T | P | CWS | PRS | MTE | ETE | PRE | Total Credits |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Group C | 1 | STE502 | Advanced Theory of Structures | Core | 4 | 3 | 0 | 2 | 15 | 25 | 20 | 40 | - | 17 |
| | 2 | STE504 | Finite Element Method of Structural Analysis | Core | 4 | 3 | 0 | 2 | 15 | 25 | 20 | 40 | - | |
| Group D | 3 | STE5402/5404/..... | Elective 4 | Elective | 4 | 3 | 0 | 2 | 15 | 25 | 20 | 40 | - | |
| | 4 | STE5302/5304/..... | Elective 5 | Elective | 3 | 3 | 0 | 0 | 20 | 0 | 30 | 50 | - | |
| | 5 | STE5202/5204/..... | Elective 6 | Elective | 2 | 2/1 | 0 | 0/2 | 20/15 | 0/25 | 30/20 | 50/40 | - | |

## Semester-III

| | S.No. | Course Code | Course Name | Type/Area | Cr | L | T | P | CWS | PRS | MTE | ETE | PRE | Total Credits |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Track 1 | | | | | | | | | | | | | 12 |
| Group E | 1 | STE651 | Research Project | Core | 12 | 0 | 0 | 12 | 0 | - | 0 | 100 | 0 | |
| | Track 2 | | | | | | | | | | | | | |
| | 1 | STE601 | Major Project I | Core | 3 | 0 | 0 | 6 | 0 | - | 0 | 100 | 0 | |
| | 2 | STE6401/6403/..... | Elective 7 | Elective | 4 | 3 | 0 | 2 | 15 | 25 | 20 | 40 | - | |
| | 3 | STE6301/6303/..... | Elective 8 | Elective | 3 | 3/2 | 0 | 0/2 | 20/15 | 0/25 | 30/20 | 50/40 | - | |
| | 4 | STE6201/6203/..... | Elective 9 | Elective | 2 | 2 | 0 | 0 | 20 | - | 30 | 50 | - | |

| Semester-IV | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | S.No. | Course Code | Course Name | Type/Area | Cr | L | T | P | CWS | PRS | MTE | ETE | PRE | Total Credits |
| Group F | Track 1 | | | | | | | | | | | | | 12 |
| | 1 | STE652+B20 | Research Project | Core | 12 | 0 | 0 | 12 | 0 | - | 0 | 100 | 0 | |
| | Track 2 | | | | | | | | | | | | | |
| | 1 | STE602 | Major Project II | Core | 12 | | | | | | 40 | 60 | | |

## List of Elective Courses

| LIST OF ELECTIVES : | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | S.No. | Course Code | Course Name | Type/Area | Cr | L | T | P | CWS | PRS | MTE | ETE | PRE |
| Elective 1 | 1 | STE5401 | Design of Advanced Reinforced Concrete Structures | Elective | 4 | 3 | 0 | 2 | 15 | 25 | 20 | 40 | - |
| | 2 | STE5403 | Design of Advanced Steel Structures | | 4 | 3 | 0 | 2 | 15 | 25 | 20 | 40 | - |
| | 3 | STE5405 | Prestressed Concrete Design | | 4 | 3 | 0 | 2 | 15 | 25 | 20 | 40 | - |
| | 4 | STE5407 | Cyclone Risk and Hazard Assessment | | 4 | 3 | 0 | 2 | 15 | 25 | 20 | 40 | - |
| | | | | | | | | | | | | | |
| | S.No. | Course Code | Course Name | Type/Area | Cr | L | T | P | CWS | PRS | MTE | ETE | PRE |
| Elective 2 | 1 | STE5301 | Theory of Plates & Shells | Elective | 3 | 3 | 0 | 0 | 20 | 0 | 30 | 50 | - |
| | 2 | STE5303 | Theory of Elasticity & Plasticity | | 3 | 3 | 0 | 0 | 20 | 0 | 30 | 50 | - |
| | 3 | STE5305 | Stability Analysis of Structures | | 3 | 3 | 0 | 0 | 20 | 0 | 30 | 50 | - |
| | 4 | STE5307 | Advanced Building Construction and Management | | 3 | 3 | 0 | 0 | 20 | 0 | 30 | 50 | - |
| | | | | | | | | | | | | | |
| | S.No. | Course Code | Course Name | Type/Area | Cr | L | T | P | CWS | PRS | MTE | ETE | PRE |
| Elective 3 | 1 | STE5201 | Seminar | Elective | 2 | 0 | 0 | 2 | - | 100 | - | - | - |
| | 2 | STE5203 | Advanced Concrete Technology | | 2 | 2 | 0 | 0 | 20 | 0 | 30 | 50 | - |
| | 3 | STE5205 | Design of Fibre Reinforced Composite Structures | | 2 | 1 | 0 | 2 | 15 | 25 | 20 | 40 | - |
| | 4 | STE5207 | Low Cost Housing | | 2 | 2 | 0 | 0 | 20 | 0 | 30 | 50 | - |
| | | | | | | | | | | | | | |
| | S.No. | Course Code | Course Name | Type/Area | Cr | L | T | P | CWS | PRS | MTE | ETE | PRE |
| Elective 4 | 1 | STE5402 | Analysis and Design of Bridges | Elective | 4 | 3 | 0 | 2 | 15 | 25 | 20 | 40 | - |
| | 2 | STE5404 | Design of Tall Buildings | | 4 | 3 | 0 | 2 | 15 | 25 | 20 | 40 | - |
| | 3 | STE5406 | Wind Engineering | | 4 | 3 | 0 | 2 | 15 | 25 | 20 | 40 | - |
| | 4 | STE5408 | Earthquake Resistant Design of Structures | | 4 | 3 | 0 | 2 | 15 | 25 | 20 | 40 | - |
| | 5 | STE5410 | Reliability Analysis of Structures | | 4 | 3 | 0 | 2 | 15 | 25 | 20 | 40 | - |

| | S.No. | Course Code | Course Name | Type/Area | Cr | L | T | P | CWS | PRS | MTE | ETE | PRE |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Elective 5 | 1 | STE5302 | MINOR PROJECT | Elective | 3 | 0 | 0 | - | - | 40 | - | - | 60 |
| | 2 | STE5304 | Soil Structure Interaction | | 3 | 3 | 0 | 0 | 20 | 0 | 30 | 50 | - |
| | 3 | STE5306 | Design of Masonry Structures | | 3 | 3 | 0 | 0 | 20 | 0 | 30 | 50 | - |
| | 4 | STE5308 | Disaster Mitigation and Management | | 3 | 3 | 0 | 0 | 20 | 0 | 30 | 50 | - |
| | 5 | STE5310 | Random Vibration | | 3 | 3 | 0 | 0 | 20 | 0 | 30 | 50 | - |
| | S.No. | Course Code | Course Name | Type/Area | Cr | L | T | P | CWS | PRS | MTE | ETE | PRE |
| Elective 6 | 1 | STE5202 | Durability of Concrete Structures | Elective | 2 | 1 | 0 | 2 | 15 | 25 | 20 | 40 | - |
| | 2 | STE5204 | Building Services | | 2 | 2 | 0 | 0 | 20 | 0 | 30 | 50 | - |
| | 3 | STE5206 | Waste to Energy | | 2 | 2 | 0 | 0 | 20 | 0 | 30 | 50 | - |
| | 4 | STE5208 | Blast Resistant Design of Structures | | 2 | 2 | 0 | 0 | 20 | 0 | 30 | 50 | - |
| | | | | | | | | | | | | | |
| | S.No. | Course Code | Course Name | Type/Area | Cr | L | T | P | CWS | PRS | MTE | ETE | PRE |
| Elective 7 | 1 | STE6401 | Design of Hydraulic Structures | Elective | 4 | 3 | 0 | 2 | 15 | 25 | 20 | 40 | - |
| | 2 | STE6403 | Soil Dynamics | | 4 | 3 | 0 | 2 | 15 | 25 | 20 | 40 | - |
| | 3 | STE6405 | Seismic Hazard and Risk Assessment | | 4 | 3 | 0 | 2 | 15 | 25 | 20 | 40 | - |
| | 4 | STE6407 | Retrofitting of Structures | | 4 | 3 | 0 | 2 | 15 | 25 | 20 | 40 | - |
| | | | | | | | | | | | | | |
| | S.No. | Course Code | Course Name | Type/Area | Cr | L | T | P | CWS | PRS | MTE | ETE | PRE |
| Elective 8 | 1 | STE6301 | Instrumentation and Rehabilitation of Structures | Elective | 3 | 3 | 0 | 0 | 20 | 0 | 30 | 50 | - |
| | 2 | STE6303 | Structural Vibration Control | | 3 | 3 | 0 | 0 | 20 | 0 | 30 | 50 | - |
| | 3 | STE6305 | Ground Improvement Techniques | | 3 | 3 | 0 | 0 | 20 | 0 | 30 | 50 | - |
| | 4 | STE6307 | Probability & Statistical Methods in Engineering | | 3 | 2 | 0 | 2 | 15 | 25 | 20 | 40 | - |
| | | | | | | | | | | | | | |
| | S.No. | Course Code | Course Name | Type/Area | Cr | L | T | P | CWS | PRS | MTE | ETE | PRE |
| Elective 9 | 1 | STE6201 | Sustainable Building Technologies | Elective | 2 | 2 | 0 | 0 | 20 | 0 | 30 | 50 | - |
| | 2 | STE6203 | Pre-Fabricated Structures | | 2 | 2 | 0 | 0 | 20 | 0 | 30 | 50 | - |
| | 3 | STE6205 | Form Work for Concrete Structures | | 2 | 2 | 0 | 0 | 20 | 0 | 30 | 50 | - |
| | | | | | | | | | | | | | |

**DELHI TECHNOLOGICAL UNIVERSITY**
**SCHEME OF EXAMINATION**
**MASTER OF TECHNOLOGY IN SIGNAL PROCESSING & DIGITAL DESIGN ( SPD )**

## Semester-I

| | S.No. | Course Code | Course Name | Type/Area | Cr | L | T | P | CWS | PRS | MTE | ETE | PRE | Total Credits |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Group A | 1 | SPD501 | Advanced Digital Signal Processing | Core | 4 | 3 | 0 | 2 | 15 | 25 | 20 | 40 | 15 | 17 |
| | 2 | SPD503 | Image Analysis and Processing | Core | 4 | 3 | 0 | 2 | 15 | 25 | 20 | 40 | 15 | |
| Group B | 3 | SPD5401/5403/..... | Elective 1 | Elective | 4 | 3 | 0 | 0 | 15 | 25 | 20 | 40 | 15 | |
| | 4 | SPD5301/5303/..... | Elective 2 | Elective | 3 | 3 | 0 | 0 | 15 | 25 | 20 | 40 | - | |
| | 5 | SPD5201/5203/...../ UEC5201/5203/ | Elective 3/University Elective I | Elective | 2 | 2/0 | 0 | 0/4 | 20/0 | 0/40 | 30/0 | 50/0 | 0/60 | |

## Semester-II

| | S.No. | Course Code | Course Name | Type/Area | Cr | L | T | P | CWS | PRS | MTE | ETE | PRE | Total Credits |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Group C | 1 | SPD502 | Pattern Analysis and Machine Intelligence | Core | 4 | 3 | 0 | 2 | 15 | 25 | 20 | 40 | 15 | 17 |
| | 2 | SPD504 | Embedded System | Core | 4 | 3 | 0 | 2 | 15 | 25 | 20 | 40 | 15 | |
| Group D | 3 | SPD5402/5404/..... | Elective 4 | Elective | 4 | 3 | 0 | 2 | 15 | 25 | 20 | 40 | - | |
| | 4 | SPD5302/5304/..... | Elective 5 | Elective | 3 | 3 | 0 | 0 | 20 | - | 30 | 50 | - | |
| | 5 | SPD5202/5204/...../ UEC5202/5204/ | Elective 6/University Elective II | Elective | 2 | 2 | 0 | 0 | 20 | - | 30 | 50 | - | |

## Semester-III

| | S.No. | Course Code | Course Name | Type/Area | Cr | L | T | P | CWS | PRS | MTE | ETE | PRE | Total Credits |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Track 1 | | | | | | | | | | | | | 12 |
| Group E | 1 | SPD651 | Research Project | Core | 12 | 0 | 0 | 12 | 0 | - | 0 | 100 | 0 | |
| | Track 2 | | | | | | | | | | | | | |
| | 1 | SPD601 | Major Project I | Core | 3 | | | | | | 40 | 60 | | |
| | 2 | SPD6401/6403/..... | Elective 7 | Elective | 4 | 3 | 0 | 2 | 15 | 25 | 20 | 40 | - | |
| | 3 | SPD6301/6303/..... | Elective 8 | Elective | 3 | 3 | 0 | 0 | 20 | - | 30 | 50 | - | |
| | 4 | SPD6201/6203/..... | Elective 9 | Elective | 2 | 2 | 0 | 0 | 20 | - | 30 | 50 | - | |

| Semester-IV | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | S.No. | Course Code | Course Name | Type/Area | Cr | L | T | P | CWS | PRS | MTE | ETE | PRE | Total Credits |
| Group F | Track 1 | | | | | | | | | | | | | 12 |
| | 1 | SPD652 | Research Project | Core | 12 | 0 | 0 | 12 | 0 | - | 0 | 100 | 0 | |
| | Track 2 | | | | | | | | | | | | | |
| | 1 | SPD602 | Major Project II | Core | 12 | 0 | 0 | 12 | 0 | - | 0 | 100 | 0 | |

## List of Elective Courses

| LIST OF ELECTIVES : | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | S.No. | Course Code | Course Name | Type/Area | Cr | L | T | P | CWS | PRS | MTE | ETE | PRE |
| Elective 1 | 1 | SPD5401 | Wireless communication | Elective | 4 | 3 | 0 | 2 | 10 | 15 | 25 | 50 | - |
| | 2 | SPD5403 | Advanced Digital System Design+ (concepts of Fault Tolerance) | | 4 | 3 | 0 | 2 | 10 | 15 | 25 | 50 | - |
| | 3 | SPD5405 | Analog Signal Processing | | 4 | 3 | 0 | 2 | 10 | 15 | 25 | 50 | - |
| | 4 | SPD5407 | Soft Computing | | 4 | 3 | 0 | 2 | 10 | 15 | 25 | 50 | - |
| | | | | | | | | | | | | | |
| | S.No. | Course Code | Course Name | Type/Area | Cr | L | T | P | CWS | PRS | MTE | ETE | PRE |
| Elective 2 | 1 | SPD5301 | Digital Watermarking | Elective | 3 | 3 | 0 | 0 | 20 | - | 30 | 50 | - |
| | 2 | SPD5303 | Wavelets in Signal Processing | | 3 | 3 | 0 | 0 | 20 | - | 30 | 50 | - |
| | 3 | SPD5305 | Advanced Computer Architecture | | 3 | 3 | 0 | 0 | 20 | - | 30 | 50 | - |
| | 4 | SPD5307 | Network Security & Cryptography | | 3 | 3 | 0 | 0 | 20 | - | 30 | 50 | - |
| | | | | | | | | | | | | | |
| | S.No. | Course Code | Course Name | Type/Area | Cr | L | T | P | CWS | PRS | MTE | ETE | PRE |
| Elective 3 | 1 | SPD5201 | SEMINAR | Elective | 2 | 0 | 0 | 2 | - | 100 | - | - | - |
| | 2 | SPD5203 | Language Lab | | 2 | 0 | 0 | 4 | 20/0 | 0/40 | 30/0 | 50/0 | 0/60 |
| | 3 | SPD5205 | Statistical Signal Processing | | 2 | 2 | 0 | 0 | 20 | - | 30 | 50 | - |
| | 4 | SPD5207 | Wireless sensor networks | | 2 | 2 | 0 | 0 | 20 | - | 30 | 50 | - |
| | 5 | SPD5209 | Real Time Operating Systems | | 2 | 2 | 0 | 0 | 20 | - | 30 | 50 | - |
| | | | | | | | | | | | | | |
| | S.No. | Course Code | Course Name | Type/Area | Cr | L | T | P | CWS | PRS | MTE | ETE | PRE |
| Elective 4 | 1 | SPD5402 | Computer Vision | Elective | 4 | 3 | 0 | 2 | 15 | 25 | 20 | 40 | - |
| | 2 | SPD5404 | IOT & Applications | | 4 | 3 | 0 | 2 | 15 | 25 | 20 | 40 | - |
| | 3 | SPD5406 | Speech Processing | | 4 | 3 | 0 | 2 | 15 | 25 | 20 | 40 | - |
| | 4 | SPD5408 | Fractional Delay Filters | | 4 | 3 | 0 | 2 | 15 | 25 | 20 | 40 | - |
| | | | | | | | | | | | | | |

| | S.No. | Course Code | Course Name | Type/Area | Cr | L | T | P | CWS | PRS | MTE | ETE | PRE |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Elective 5 | 1 | SPD5302 | MINOR PROJECT | Elective | 3 | 0 | 0 | - | - | 40 | - | - | 60 |
| | 2 | SPD5304 | Biomedical Signal Modelling | | 3 | 3 | 0 | 0 | 20 | - | 30 | 50 | - |
| | 3 | SPD5306 | Object Tracking | | 3 | 3 | 0 | 0 | 20 | - | 30 | 50 | - |
| | 4 | SPD5308 | Optimization Techniques | | 3 | 3 | 0 | 0 | 20 | - | 30 | 50 | - |
| | 5 | SPD5310 | Artificial Intelligence | | 3 | 3 | 0 | 0 | 20 | - | 30 | 50 | - |
| | 6 | SPD5312 | Reconfigurable Computing | | 3 | 3 | 0 | 0 | 20 | - | 30 | 50 | - |
| | S.No. | Course Code | Course Name | Type/Area | Cr | L | T | P | CWS | PRS | MTE | ETE | PRE |
| Elective 6 | 1 | SPD5202 | Research Methodology & Report writing | Elective | 2 | 2 | 0 | 0 | 20 | - | 30 | 50 | - |
| | 4 | SPD5208 | VLSI Signal processing Architecture | | 2 | 2 | 0 | 0 | 20 | - | 30 | 50 | - |
| | | | | | | | | | | | | | |
| | S.No. | Course Code | Course Name | Type/Area | Cr | L | T | P | CWS | PRS | MTE | ETE | PRE |
| Elective 7 | 1 | SPD6401 | Multispectral signal Analysis | Elective | 4 | 3/2 | 0/0 | 2/4 | 10 | 15 | 25 | 50 | - |
| | 2 | SPD6403 | Testing and Diagnosis of Digital system design | | 4 | 3/2 | 0/0 | 2/4 | 10 | 15 | 25 | 50 | - |
| | 3 | SPD6405 | Detection and estimation theory | | 4 | 3/2 | 0/0 | 2/4 | 10 | 15 | 25 | 50 | - |
| | 4 | SPD6407 | Digital Design and verification | | 4 | 3/2 | 0/0 | 2/4 | 10 | 15 | 25 | 50 | - |
| | | | | | | | | | | | | | |
| | S.No. | Course Code | Course Name | Type/Area | Cr | L | T | P | CWS | PRS | MTE | ETE | PRE |
| Elective 8 | 1 | SPD6301 | Data Analytics | Elective | 3 | 3 | 0 | 0 | 20 | - | 30 | 50 | - |
| | 2 | SPD6303 | SOC Design testing and verification | | 3 | 3 | 0 | 0 | 20 | - | 30 | 50 | - |
| | 3 | SPD6305 | FPGA Based System Design | | 3 | 3 | 0 | 0 | 20 | - | 30 | 50 | - |
| | 4 | SPD6307 | Biomedical Signal & image processing | | 3 | 3 | 0 | 0 | 20 | - | 30 | 50 | - |
| | | | | | | | | | | | | | |
| | S.No. | Course Code | Course Name | Type/Area | Cr | L | T | P | CWS | PRS | MTE | ETE | PRE |
| Elective 9 | 1 | SPD6201 | Operation Research | Elective | 2 | 2 | 0 | 0 | 20 | - | 30 | 50 | - |
| | 2 | SPD6203 | Multirate signal processing | | 2 | 2 | 0 | 0 | 20 | - | 30 | 50 | - |
| | | | | | | | | | | | | | |

DELHI TECHNOLOGICAL UNIVERSITY

SCHEME OF EXAMINATION

MASTER OF TECHNOLOGY IN RENEWABLE ENERGY TECHNOLOGY ( RET )

## Semester-I

| | S.No. | Course Code | Course Name | Type/Area | Cr | L | T | P | CWS | PRS | MTE | ETE | PRE | Total Credits |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Group A | 1 | RET501 | | Core | 4 | | | | | | | | | 17 |
| | 2 | RET503 | | Core | 4 | | | | | | | | | |
| Group B | 3 | RET5401/5403/..... | Elective 1 | Elective | 4 | | | | | | | | | |
| | 4 | RET5301/5303/..... | Elective 2 | Elective | 3 | | | | | | | | | |
| | 5 | RET5201/5203/..... | Elective 3 | Elective | 2 | | | | | | | | | |

## Semester-II

| | S.No. | Course Code | Course Name | Type/Area | Cr | L | T | P | CWS | PRS | MTE | ETE | PRE | Total Credits |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Group C | 1 | RET502 | | Core | 4 | | | | | | | | | 17 |
| | 2 | RET504 | | Core | 4 | | | | | | | | | |
| Group D | 3 | RET5402/5404/..... | Elective 4 | Elective | 4 | | | | | | | | | |
| | 4 | RET5302/5304/..... | Elective 5 | Elective | 3 | | | | | | | | | |
| | 5 | RET5202/5204/..... | Elective 6 | Elective | 2 | | | | | | | | | |

## Semester-III

| | S.No. | Course Code | Course Name | Type/Area | Cr | L | T | P | CWS | PRS | MTE | ETE | PRE | Total Credits |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Track 1 | | | | | | | | | | | | | 12 |
| Group E | 1 | RET650 | Research Project | Core | 12 | | | | | | | | | |
| | Track 2 | | | | | | | | | | | | | |
| | 1 | RET601 | Major Project I | Core | 3 | | | | | | | | | |
| | 2 | RET6401/6403/..... | Elective 7 | Elective | 4 | | | | | | | | | |
| | 3 | RET6301/6303/..... | Elective 8 | Elective | 3 | | | | | | | | | |
| | 4 | RET6201/6203/..... | Elective 9 | Elective | 2 | | | | | | | | | |

| Semester-IV | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | S.No. | Course Code | Course Name | Type/Area | Cr | L | T | P | CWS | PRS | MTE | ETE | PRE | Total Credits |
| Group F | Track 1 | | | | | | | | | | | | | 12 |
| | 1 | RET650 | Research Project | Core | 12 | | | | | | | | | |
| | Track 2 | | | | | | | | | | | | | |
| | 1 | RET602 | Major Project II | Core | 12 | | | | | | | | | |

## List of Elective Courses

| LIST OF ELECTIVES : | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | S.No. | Course Code | Course Name | Type/Area | Cr | L | T | P | CWS | PRS | MTE | ETE | PRE |
| Elective 1 | | | | Elective | | | | | | | | | |
| | | | | | | | | | | | | | |
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| | S.No. | Course Code | Course Name | Type/Area | Cr | L | T | P | CWS | PRS | MTE | ETE | PRE |
| Elective 2 | | | | Elective | | | | | | | | | |
| | | | | | | | | | | | | | |
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| | S.No. | Course Code | Course Name | Type/Area | Cr | L | T | P | CWS | PRS | MTE | ETE | PRE |
| Elective 3 | 1 | RET5201 | SELF STUDY OPEN AREA SEMINAR | Elective | 2 | | | | | | | | |
| | | | | | | | | | | | | | |
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| | | | | | | | | | | | | | |
| | S.No. | Course Code | Course Name | Type/Area | Cr | L | T | P | CWS | PRS | MTE | ETE | PRE |
| Elective 4 | | | | Elective | | | | | | | | | |
| | | | | | | | | | | | | | |
| | | | | | | | | | | | | | |

| | S.No. | Course Code | Course Name | Type/Area | Cr | L | T | P | CWS | PRS | MTE | ETE | PRE |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Elective 5 | 1 | RET5302 | MINOR PROJECT | Elective | 3 | | | | | | | | |
| | S.No. | Course Code | Course Name | Type/Area | Cr | L | T | P | CWS | PRS | MTE | ETE | PRE |
| Elective 6 | | | | Elective | | | | | | | | | |
| | S.No. | Course Code | Course Name | Type/Area | Cr | L | T | P | CWS | PRS | MTE | ETE | PRE |
| Elective 7 | | | | Elective | | | | | | | | | |
| | S.No. | Course Code | Course Name | Type/Area | Cr | L | T | P | CWS | PRS | MTE | ETE | PRE |
| Elective 8 | | | | Elective | | | | | | | | | |
| | S.No. | Course Code | Course Name | Type/Area | Cr | L | T | P | CWS | PRS | MTE | ETE | PRE |
| Elective 9 | | | | Elective | | | | | | | | | |

DELHI TECHNOLOGICAL UNIVERSITY
SCHEME OF EXAMINATION
MASTER OF TECHNOLOGY IN POWER SYSTEM ( PSY )

## Semester-I

| | S.No. | Course Code | Course Name | Type/Area | Cr | L | T | P | CWS | PRS | MTE | ETE | PRE | Total Credits |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Group A | 1 | PSY501 | Advanced Power Electronics | Core | 4 | 3 | 0 | 2 | 15 | 25 | 20 | 40 | - | 17 |
| | 2 | PSY503 | Advanced Power System Analysis | Core | 4 | 3 | 0 | 2 | 15 | 25 | 20 | 40 | - | |
| Group B | 3 | PSY5401/5403/..... | Elective 1 | Elective | 4 | 3 | 0 | 2 | 15 | 25 | 20 | 40 | - | |
| | 4 | PSY5301/5303/..... | Elective 2 | Elective | 3 | 3 | 0 | 0 | 20 | - | 30 | 50 | - | |
| | 5 | PSY5201/5203/...../ UEC5201/5203/ | Elective 3/University Elective I | Elective | 2 | 2 | 0 | 0 | 20 | - | 30 | 50 | - | |

## Semester-II

| | S.No. | Course Code | Course Name | Type/Area | Cr | L | T | P | CWS | PRS | MTE | ETE | PRE | Total Credits |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Group C | 1 | PSY502 | Advanced Power System Protection | Core | 4 | 3 | 0 | 2 | 15 | 25 | 20 | 40 | - | 17 |
| | 2 | PSY504 | Power System Operation and Control | Core | 4 | 3 | 0 | 2 | 15 | 25 | 20 | 40 | - | |
| Group D | 3 | PSY5402/5404/..... | Elective 4 | Elective | 4 | 3 | 0 | 2 | 15 | 25 | 20 | 40 | - | |
| | 4 | PSY5302/5304/..... | Elective 5 | Elective | 3 | 3 | 0 | 0 | 20 | - | 30 | 50 | - | |
| | 5 | PSY5202/5204/...../ UEC5202/5204/ | Elective 6/University Elective II | Elective | 2 | 2 | 0 | 0 | 20 | - | 30 | 50 | - | |

## Semester-III

| | S.No. | Course Code | Course Name | Type/Area | Cr | L | T | P | CWS | PRS | MTE | ETE | PRE | Total Credits |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Track 1 | | | | | | | | | | | | | |
| Group E | 1 | PSY651 | Research Project | Core | 12 | 0 | 0 | 12 | 0 | - | 0 | 100 | 0 | 12 |
| | Track 2 | | | | | | | | | | | | | |
| | 1 | PSY601 | Major Project I | Core | 3 | 3 | 0 | 0 | | | 40 | 60 | | |
| | 2 | PSY6401/6403/..... | Elective 7 | Elective | 4 | 3 | 0 | 2 | 15 | 25 | 20 | 40 | - | |
| | 3 | PSY6301/6303/..... | Elective 8 | Elective | 3 | 3 | 0 | 0 | 20 | - | 30 | 50 | - | |
| | 4 | PSY6201/6203/..... | Elective 9 | Elective | 2 | 2 | 0 | 0 | 20 | - | 30 | 50 | - | |

| Semester-IV | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | S.No. | Course Code | Course Name | Type/Area | Cr | L | T | P | CWS | PRS | MTE | ETE | PRE | Total Credits |
| Group F | Track 1 | | | | | | | | | | | | | 12 |
| | 1 | PSY652+B22 | Research Project | Core | 12 | 0 | 0 | 12 | 0 | - | 0 | 100 | 0 | |
| | Track 2 | | | | | | | | | | | | | |
| | 1 | PSY602 | Major Project II | Core | 12 | | | | | | | | | |

## List of Elective Courses

| LIST OF ELECTIVES : | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | S.No. | Course Code | Course Name | Type/Area | Cr | L | T | P | CWS | PRS | MTE | ETE | PRE |
| Elective 1 | 1 | PSY5401 | Power System Dynamics & Stability | Elective | 4 | 3 | 0 | 2 | 15 | 25 | 20 | 40 | - |
| | 2 | PSY5403 | Advanced Control Systems | | 4 | 3 | 0 | 2 | 15 | 25 | 20 | 40 | - |
| | 3 | PSY5405 | Modelling of Electrical Machines | | 4 | 3 | 0 | 2 | 15 | 25 | 20 | 40 | - |
| | 4 | PSY5407 | Soft Computing Techniques | | 4 | 3 | 0 | 2 | 15 | 25 | 20 | 40 | - |
| | | | | | | | | | | | | | |
| | S.No. | Course Code | Course Name | Type/Area | Cr | L | T | P | CWS | PRS | MTE | ETE | PRE |
| Elective 2 | 1 | PSY5301 | Power System Instrumentation | Elective | 3 | 3 | 0 | 0 | 20 | - | 30 | 50 | - |
| | 2 | PSY5303 | Flexible AC Transmission systems | | 3 | 3 | 0 | 0 | 20 | - | 30 | 50 | - |
| | 3 | PSY5305 | Optimization Techniques for Power Systems | | 3 | 3 | 0 | 0 | 20 | - | 30 | 50 | - |
| | 4 | PSY5307 | Applied Mathematics | | 3 | 3 | 0 | 0 | 20 | - | 30 | 50 | - |
| | | | | | | | | | | | | | |
| | S.No. | Course Code | Course Name | Type/Area | Cr | L | T | P | CWS | PRS | MTE | ETE | PRE |
| Elective 3 | 1 | PSY5201 | SEMINAR | Elective | 2 | 0 | 0 | 2 | - | 100 | - | - | - |
| | 2 | PSY5203 | Nuclear Energy and Power | | 2 | 2 | 0 | 0 | 20 | - | 30 | 50 | - |
| | 3 | PSY5205 | Forecasting Techniques in Power Systems | | 2 | 2 | 0 | 0 | 20 | - | 30 | 50 | - |
| | 4 | PSY5207 | Switched Mode Power Supplies | | 2 | 2 | 0 | 0 | 20 | - | 30 | 50 | - |
| | | | | | | | | | | | | | |
| | S.No. | Course Code | Course Name | Type/Area | Cr | L | T | P | CWS | PRS | MTE | ETE | PRE |
| Elective 4 | 1 | PSY5402 | Renewable Energy Systems | Elective | 4 | 3 | 0 | 2 | 15 | 25 | 20 | 40 | - |
| | 2 | PSY5404 | High Voltage Engineering | | 4 | 3 | 0 | 2 | 15 | 25 | 20 | 40 | - |
| | 3 | PSY5406 | Power Quality | | 4 | 3 | 0 | 2 | 15 | 25 | 20 | 40 | - |
| | 4 | PSY5408 | Advanced Digital Signal Processing | | 4 | 3 | 0 | 2 | 15 | 25 | 20 | 40 | - |
| | 5 | PSY5410 | HVDC Transmission | | 4 | 3 | 0 | 2 | 15 | 25 | 20 | 40 | - |

| | S.No. | Course Code | Course Name | Type/Area | Cr | L | T | P | CWS | PRS | MTE | ETE | PRE |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Elective 5 | 1 | PSY5302 | MINOR PROJECT | Elective | 3 | 0 | 0 | - | - | 40 | - | - | 60 |
| | 2 | PSY5304 | Analog Filter Design | | 3 | 3 | 0 | 0 | 20 | - | 30 | 50 | - |
| | 3 | PSY5306 | Intelligent Control Techniques | | 3 | 3 | 0 | 0 | 20 | - | 30 | 50 | - |
| | 4 | PSY5308 | Dynamics of Synchronous Machines | | 3 | 3 | 0 | 0 | 20 | - | 30 | 50 | - |
| | 5 | PSY5310 | Smart Grid | | 3 | 3 | 0 | 0 | 20 | - | 30 | 50 | - |
| | S.No. | Course Code | Course Name | Type/Area | Cr | L | T | P | CWS | PRS | MTE | ETE | PRE |
| Elective 6 | 1 | PSY5202 | Restructured Power Systems | Elective | 2 | 2 | 0 | 0 | 20 | - | 30 | 50 | - |
| | 2 | PSY5204 | Power System Planning | | 2 | 2 | 0 | 0 | 20 | - | 30 | 50 | - |
| | 3 | PSY5206 | Machine learning | | 2 | 2 | 0 | 0 | 20 | - | 30 | 50 | - |
| | 4 | PSY5208 | PMU and Advanced Metering | | 2 | 2 | 0 | 0 | 20 | - | 30 | 50 | - |
| | 5 | PSY5210 | EHV AC Transmission | | 3 | 3 | 0 | 0 | 20 | - | 30 | 50 | - |
| | S.No. | Course Code | Course Name | Type/Area | Cr | L | T | P | CWS | PRS | MTE | ETE | PRE |
| Elective 7 | 1 | PSY6401 | SCADA & Energy Management | Elective | 4 | 3 | 0 | 2 | 15 | 25 | 20 | 40 | - |
| | 2 | PSY6403 | Computer Aided Power System Analysis | | 4 | 3 | 0 | 2 | 15 | 25 | 20 | 40 | - |
| | 3 | PSY6405 | Microcontroller & Embedded Systems | | 4 | 3 | 0 | 2 | 15 | 25 | 20 | 40 | - |
| | 4 | PSY6407 | Advanced Electric Drives | | 4 | 3 | 0 | 2 | 15 | 25 | 20 | 40 | - |
| | | | | | | | | | | | | | |
| | S.No. | Course Code | Course Name | Type/Area | Cr | L | T | P | CWS | PRS | MTE | ETE | PRE |
| Elective 8 | 1 | PSY6301 | Power System Reliability | Elective | 3 | 3 | 0 | 0 | 20 | - | 30 | 50 | - |
| | 2 | PSY6303 | Transients in Power Systems | | 3 | 3 | 0 | 0 | 20 | - | 30 | 50 | - |
| | 3 | PSY6305 | Advanced Distribution Systems | | 3 | 3 | 0 | 0 | 20 | - | 30 | 50 | - |
| | 4 | PSY6307 | Grid and Sub-Station Planning and Technologies | | 3 | 3 | 0 | 0 | 20 | - | 30 | 50 | - |
| | 5 | PSY6309 | Modern Electric Traction System | | 3 | 3 | 0 | 0 | 20 | - | 30 | 50 | - |
| | S.No. | Course Code | Course Name | Type/Area | Cr | L | T | P | CWS | PRS | MTE | ETE | PRE |
| Elective 9 | 1 | PSY6201 | Energy Auditing and Conservation | Elective | 2 | 2 | 0 | 0 | 20 | - | 30 | 50 | - |
| | 2 | PSY6203 | Electricity Market and Regulations | | 2 | 2 | 0 | 0 | 20 | - | 30 | 50 | - |
| | 3 | PSY6205 | Digital Communication | | 2 | 2 | 0 | 0 | 20 | - | 30 | 50 | - |
| | 4 | PSY6207 | Energy, Ecology and Environment | | 2 | 2 | 0 | 0 | 20 | - | 30 | 50 | - |
| | 5 | PSY6209 | Artificial Intelligence | | 2 | 2 | 0 | 0 | 20 | - | 30 | 50 | - |

DELHI TECHNOLOGICAL UNIVERSITY

SCHEME OF EXAMINATION

MASTER OF TECHNOLOGY IN PRODUCTION ENGINEERING ( PIE )

## Semester-I

| | S.No. | Course Code | Course Name | Type/Area | Cr | L | T | P | CWS | PRS | MTE | ETE | PRE | Total Credits |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Group A | 1 | PIE501 | Theory of Metal Cutting | Core | 4 | 3 | 0 | 2 | 15 | 25 | 20 | 40 | - | 17 |
| | 2 | PIE503 | Welding Processes & Metallurgy | Core | 4 | 3 | 0 | 2 | 15 | 25 | 20 | 40 | - | |
| Group B | 3 | PIE5401/5403/..... | Elective 1 | Elective | 4 | 3/4 | 0 | 2/0 | 15/20 | 25/0 | 20/30 | 40/50 | - | |
| | 4 | PIE5301/5303/..... | Elective 2 | Elective | 3 | 3 | 0 | 0 | 20 | - | 30 | 50 | - | |
| | 5 | PIE5201/5203/...../ UEC5201/5203/ | Elective 3/University Elective I | Elective | 2 | 2 | 0 | 0 | 20 | - | 30 | 50 | - | |

## Semester-II

| | S.No. | Course Code | Course Name | Type/Area | Cr | L | T | P | CWS | PRS | MTE | ETE | PRE | Total Credits |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Group C | 1 | PIE502 | Plasticity & Metal Forming | Core | 4 | 3/4 | 0 | 2/0 | 15/20 | 25/0 | 20/30 | 40/50 | - | 17 |
| | 2 | PIE504 | Casting Technology | Core | 4 | 3 | 0 | 2 | 15 | 25 | 20 | 40 | - | |
| Group D | 3 | PIE5402/5404/..... | Elective 4 | Elective | 4 | 3 | 0 | 2 | 15 | 25 | 20 | 40 | - | |
| | 4 | PIE5302/5304/..... | Elective 5 | Elective | 3 | 3 | 0 | 0 | 20 | - | 30 | 50 | - | |
| | 5 | PIE5202/5204/...../ UEC5202/5204/ | Elective 6/University Elective II | Elective | 2 | 2 | 0 | 0 | 20 | - | 30 | 50 | - | |

## Semester-III

| | S.No. | Course Code | Course Name | Type/Area | Cr | L | T | P | CWS | PRS | MTE | ETE | PRE | Total Credits |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Track 1 | | | | | | | | | | | | | 12 |
| Group E | 1 | PIE651 | Research Project | Core | 12 | 0 | 0 | 12 | 0 | - | 0 | 100 | 0 | |
| | Track 2 | | | | | | | | | | | | | |
| | 1 | PIE601 | Major Project I | Core | 3 | | | | | | | | | |
| | 2 | PIE6401/6403/..... | Elective 7 | Elective | 4 | 3/4 | 0 | 2/0 | 15/20 | 25/0 | 20/30 | 40/50 | - | |
| | 3 | PIE6301/6303/..... | Elective 8 | Elective | 3 | 3 | 0 | 0 | 20 | - | 30 | 50 | - | |
| | 4 | PIE6201/6203/..... | Elective 9 | Elective | 2 | 2 | 0 | 0 | 20 | - | 30 | 50 | - | |

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| Semester-IV | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | S.No. | Course Code | Course Name | Type/Area | Cr | L | T | P | CWS | PRS | MTE | ETE | PRE | Total Credits |
| Group F | Track 1 | | | | | | | | | | | | | 12 |
| | 1 | PIE652 | Research Project | Core | 12 | 0 | 0 | 12 | 0 | - | 0 | 100 | 0 | |
| | Track 2 | | | | | | | | | | | | | |
| | 1 | PIE602 | Major Project II | Core | 12 | 0 | 0 | 12 | 0 | - | 0 | 100 | 0 | |

## List of Elective Courses

| LIST OF ELECTIVES : | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | S.No. | Course Code | Course Name | Type/Area | Cr | L | T | P | CWS | PRS | MTE | ETE | PRE |
| Elective 1 | 1 | PIE5401 | CAD/CAM | Elective | 4 | 3/4 | 0 | 2/0 | 15/20 | 25/0 | 20/30 | 40/50 | - |
| | 2 | PIE5403 | Computer Integrated Manufacturing Systems | | 4 | 3/4 | 0 | 2/0 | 15/20 | 25/0 | 20/30 | 40/50 | - |
| | 3 | PIE5405 | Mechatronics | | 4 | 3/4 | 0 | 2/0 | 15/20 | 25/0 | 20/30 | 40/50 | - |
| | | | | | | | | | | | | | |
| | | | | | | | | | | | | | |
| | S.No. | Course Code | Course Name | Type/Area | Cr | L | T | P | CWS | PRS | MTE | ETE | PRE |
| Elective 2 | 1 | PIE5301 | Principles of Machine Tools | Elective | 3 | 3 | 0 | 0 | 20 | - | 30 | 50 | - |
| | 2 | PIE5303 | Automation in Manufacturing | | 3 | 3 | 0 | 0 | 20 | - | 30 | 50 | - |
| | 3 | PIE5305 | Process Engineering | | 3 | 3 | 0 | 0 | 20 | - | 30 | 50 | - |
| | | | | | | | | | | | | | |
| | | | | | | | | | | | | | |
| | S.No. | Course Code | Course Name | Type/Area | Cr | L | T | P | CWS | PRS | MTE | ETE | PRE |
| Elective 3 | 1 | PIE5201 | SEMINAR | Elective | 2 | 0 | 0 | 2 | - | 100 | - | - | - |
| | 2 | PIE5205 | Operation Research | | 2 | 2 | 0 | 0 | 20 | - | 30 | 50 | - |
| | 3 | PIE5203 | Optimization Techniques | | 2 | 2 | 0 | 0 | 20 | - | 30 | 50 | - |
| | | | | | | | | | | | | | |
| | | | | | | | | | | | | | |
| | S.No. | Course Code | Course Name | Type/Area | Cr | L | T | P | CWS | PRS | MTE | ETE | PRE |
| Elective 4 | 1 | PIE5402 | Metrology | Elective | 4 | 3 | 0 | 2 | 15 | 25 | 20 | 40 | - |
| | 2 | PIE5404 | Methods Engineering and Ergonomics | | 4 | 3 | 0 | 2 | 15 | 25 | 20 | 40 | - |
| | 3 | PIE5406 | Composite Materials and Processing | | 4 | 3 | 0 | 2 | 15 | 25 | 20 | 40 | - |
| | | | | | | | | | | | | | |
| | | | | | | | | | | | | | |

| | S.No. | Course Code | Course Name | Type/Area | Cr | L | T | P | CWS | PRS | MTE | ETE | PRE |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Elective 5 | 1 | PIE5302 | Minor Project | Elective | 3 | 0 | 0 | - | - | 40 | - | - | 60 |
| | 2 | PIE5304 | Maintenance Management | | 3 | 3 | 0 | 0 | 20 | - | 30 | 50 | - |
| | 3 | PIE5306 | Managerial Concept & Organizational Behaviour | | 3 | 3 | 0 | 0 | 20 | - | 30 | 50 | - |
| | | | | | | | | | | | | | |
| | | | | | | | | | | | | | |
| | S.No. | Course Code | Course Name | Type/Area | Cr | L | T | P | CWS | PRS | MTE | ETE | PRE |
| Elective 6 | 1 | PIE5202 | Industrial Quality Control | Elective | 2 | 2 | 0 | 0 | 20 | - | 30 | 50 | - |
| | 2 | PIE5204 | Supply Chain Management | | 2 | 2 | 0 | 0 | 20 | - | 30 | 50 | - |
| | 3 | PIE5206 | Production & Operation Management | | 2 | 2 | 0 | 0 | 20 | - | 30 | 50 | - |
| | | | | | | | | | | | | | |
| | | | | | | | | | | | | | |
| | S.No. | Course Code | Course Name | Type/Area | Cr | L | T | P | CWS | PRS | MTE | ETE | PRE |
| Elective 7 | 1 | PIE6401 | Advanced Machining Processes | Elective | 4 | 3/4 | 0 | 2/0 | 15/20 | 25/0 | 20/30 | 40/50 | - |
| | 2 | PIE6403 | Precision Engineering | | 4 | 3/4 | 0 | 2/0 | 15/20 | 25/0 | 20/30 | 40/50 | - |
| | 3 | PIE6405 | Surface Engineering | | 4 | 3/4 | 0 | 2/0 | 15/20 | 25/0 | 20/30 | 40/50 | - |
| | | | | | | | | | | | | | |
| | | | | | | | | | | | | | |
| | S.No. | Course Code | Course Name | Type/Area | Cr | L | T | P | CWS | PRS | MTE | ETE | PRE |
| Elective 8 | 1 | PIE6301 | Robotics | Elective | 3 | 3 | 0 | 0 | 20 | - | 30 | 50 | - |
| | 2 | PIE6303 | Design for Manufacturing and Assembly | | 3 | 3 | 0 | 0 | 20 | - | 30 | 50 | - |
| | 3 | PIE6305 | Reliability Engineering | | 3 | 3 | 0 | 0 | 20 | - | 30 | 50 | - |
| | | | | | | | | | | | | | |
| | | | | | | | | | | | | | |
| | S.No. | Course Code | Course Name | Type/Area | Cr | L | T | P | CWS | PRS | MTE | ETE | PRE |
| Elective 9 | 1 | PIE6201 | IT in manufacturing Enterprise | Elective | 2 | 2 | 0 | 0 | 20 | - | 30 | 50 | - |
| | 2 | PIE6203 | Materials Management | | 2 | 2 | 0 | 0 | 20 | - | 30 | 50 | - |
| | 3 | PIE6205 | Project Management | | 2 | 2 | 0 | 0 | 20 | - | 30 | 50 | - |
| | | | | | | | | | | | | | |
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**DELHI TECHNOLOGICAL UNIVERSITY**

**SCHEME OF EXAMINATION**

**MASTER OF TECHNOLOGY IN NANO SCIENCE AND TECHNOLOGY ( NST )**

## Semester-I

| | S.No. | Course Code | Course Name | Type/Area | Cr | L | T | P | CWS | PRS | MTE | ETE | PRE | Total Credits |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Group A | 1 | NST501 | Physics of Nanomaterials | Core | 4 | 3 | 0 | 2 | 15 | 25 | 20 | 40 | - | 17 |
| | 2 | NST503 | Chemistry of Nanomaterials | Core | 4 | 3 | 0 | 2 | 15 | 25 | 20 | 40 | - | |
| Group B | 3 | NST5401/5403/..... | Elective 1 | Elective | 4 | 4 | 0 | 0 | 20 | 0 | 30 | 50 | - | |
| | 4 | NST5301/5303/..... | Elective 2 | Elective | 3 | 3 | 0 | 0 | 20 | 0 | 30 | 50 | - | |
| | 5 | NST5201/5203/...../ UEC5201/5203/ | Elective 3/University Elective I | Elective | 2 | 2 | 0 | 0 | 20 | - | 30 | 50 | - | |

## Semester-II

| | S.No. | Course Code | Course Name | Type/Area | Cr | L | T | P | CWS | PRS | MTE | ETE | PRE | Total Credits |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Group C | 1 | NST502 | Analytical Techniques | Core | 4 | 3 | 0 | 2 | 15 | 25 | 20 | 40 | - | 17 |
| | 2 | NST504 | Design and Synthesis of Nanostructures | Core | 4 | 3 | 0 | 2 | 15 | 25 | 20 | 40 | - | |
| Group D | 3 | NST5402/5404/..... | Elective 4 | Elective | 4 | 4 | 0 | 0 | 20 | 0 | 30 | 50 | - | |
| | 4 | NST5302/5304/..... | Elective 5 | Elective | 3 | 3 | 0 | 0 | 20 | 0 | 30 | 50 | - | |
| | 5 | NST5202/5204/...../ UEC5202/5204/ | Elective 6/University Elective II | Elective | 2 | 2 | 0 | 0 | 20 | - | 30 | 50 | - | |

## Semester-III

| | S.No. | Course Code | Course Name | Type/Area | Cr | L | T | P | CWS | PRS | MTE | ETE | PRE | Total Credits |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Track 1 | | | | | | | | | | | | | 12 |
| Group E | 1 | NST651 | Research Project | Core | 12 | | | | | | 40 | 60 | | |
| | Track 2 | | | | | | | | | | | | | |
| | 1 | NST601 | Major Project I | Core | 3 | | | | | | 40 | 60 | | |
| | 2 | NST6401/6403/..... | Elective 7 | Elective | 4 | 4 | 0 | 0 | 20 | 0 | 30 | 50 | - | |
| | 3 | NST6301/6303/..... | Elective 8 | Elective | 3 | 3 | 0 | 0 | 20 | 0 | 30 | 50 | - | |
| | 4 | NST6201/6203/..... | Elective 9 | Elective | 2 | 2 | 0 | 0 | 20 | 0 | 30 | 50 | - | |

| Semester-IV | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | S.No. | Course Code | Course Name | Type/Area | Cr | L | T | P | CWS | PRS | MTE | ETE | PRE | Total Credits |
| Group F | Track 1 | | | | | | | | | | | | | 12 |
| | 1 | NST652 | Research Project | Core | 12 | | | | | | 40 | 60 | | |
| | Track 2 | | | | | | | | | | | | | |
| | 1 | NST602 | Major Project II | Core | 12 | | | | | | 40 | 60 | | |

## List of Elective Courses

| LIST OF ELECTIVES : | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | S.No. | Course Code | Course Name | Type/Area | Cr | L | T | P | CWS | PRS | MTE | ETE | PRE |
| Elective 1 | 1 | NST5401 | Computational Physics and Programming | Elective | 4 | 4 | 0 | 0 | 20 | 0 | 30 | 50 | - |
| | 2 | NST5403 | Nanoscale Modeling | | 4 | 4 | 0 | 0 | 20 | 0 | 30 | 50 | - |
| | 3 | NST5405 | Simulation Environmental Nanotechnology | | 4 | 4 | 0 | 0 | 20 | 0 | 30 | 50 | - |
| | | | | | | | | | | | | | |
| | | | | | | | | | | | | | |
| | S.No. | Course Code | Course Name | Type/Area | Cr | L | T | P | CWS | PRS | MTE | ETE | PRE |
| Elective 2 | 1 | NST5301 | Thin Film Technology | Elective | 3 | 3 | 0 | 0 | 15 | 25 | 20 | 40 | - |
| | 2 | NST5303 | Functional Materials and Devices | | 3 | 3 | 0 | 0 | 15 | 25 | 20 | 40 | - |
| | 3 | NST5305 | Material Science at Nanoscale | | 3 | 3 | 0 | 0 | 15 | 25 | 20 | 40 | - |
| | | | | | | | | | | | | | |
| | | | | | | | | | | | | | |
| | S.No. | Course Code | Course Name | Type/Area | Cr | L | T | P | CWS | PRS | MTE | ETE | PRE |
| Elective 3 | 1 | NST5201 | SEMINAR | Elective | 2 | 0 | 0 | 2 | - | 100 | - | - | - |
| | 2 | NST5203 | Research Methodology | | 2 | 2 | 0 | 0 | 10 | 15 | 25 | 50 | - |
| | 3 | NST5205 | Micro Economics | | 2 | 2 | 0 | 0 | 10 | 15 | 25 | 50 | - |
| | | | | | | | | | | | | | |
| | | | | | | | | | | | | | |
| | S.No. | Course Code | Course Name | Type/Area | Cr | L | T | P | CWS | PRS | MTE | ETE | PRE |
| | 1 | NST5402 | Nanophotonics | | 4 | 4 | 0 | 0 | 20 | 0 | 30 | 50 | - |
| | 2 | NST5404 | Spectroscopic Techniques for Nanomaterials | | 4 | 4 | 0 | 0 | 20 | 0 | 30 | 50 | - |

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|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Elective 4 | 3 | NST5406 | Molecular Spectroscopy | Elective | 4 | 4 | 0 | 0 | 20 | 0 | 30 | 50 | - |
| | | | | | | | | | | | | | |
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| | S.No. | Course Code | Course Name | Type/Area | Cr | L | T | P | CWS | PRS | MTE | ETE | PRE |
| Elective 5 | 1 | NST5302 | MINOR PROJECT | Elective | 3 | 0 | 0 | - | - | 40 | - | - | 60 |
| | 2 | NST5304 | Renewable Energy Technology | | 3 | 3 | 0 | 0 | 20 | 0 | 30 | 50 | - |
| | 3 | NST5306 | Structural Nanomaterials Analysis | | 3 | 3 | 0 | 0 | 20 | 0 | 30 | 50 | - |
| | | | | | | | | | | | | | |
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| | S.No. | Course Code | Course Name | Type/Area | Cr | L | T | P | CWS | PRS | MTE | ETE | PRE |
| Elective 6 | 1 | NST5202 | Nano-Electronics and Devices | Elective | 2 | 2 | 0 | 0 | 20 | 0 | 30 | 50 | - |
| | 2 | NST5204 | Nanocomposites | | 2 | 2 | 0 | 0 | 20 | 0 | 30 | 50 | - |
| | 3 | | | | | | | | | | | | |
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| | S.No. | Course Code | Course Name | Type/Area | Cr | L | T | P | CWS | PRS | MTE | ETE | PRE |
| Elective 7 | 1 | NST6401 | Nanobiotechnology | Elective | 4 | 4 | 0 | 0 | 20 | 0 | 30 | 50 | - |
| | 2 | NST6403 | Nanosensors and Devices | | 4 | 4 | 0 | 0 | 20 | 0 | 30 | 50 | - |
| | 3 | NST6405 | Microelectromechanical Systems (MEMS) | | 4 | 4 | 0 | 0 | 20 | 0 | 30 | 50 | - |
| | | | | | | | | | | | | | |
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| | S.No. | Course Code | Course Name | Type/Area | Cr | L | T | P | CWS | PRS | MTE | ETE | PRE |
| Elective 8 | 1 | NST6301 | Nanolithography and Device Fabrication | Elective | 3 | 3 | 0 | 0 | 20 | 0 | 30 | 50 | - |
| | 2 | NST6303 | Plasma Technology | | 3 | 3 | 0 | 0 | 20 | 0 | 30 | 50 | - |
| | 3 | NST6305 | Nanotechnology for Medical Diagnostic and Therapy | | 3 | 3 | 0 | 0 | 20 | 0 | 30 | 50 | - |
| | | | | | | | | | | | | | |
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| | S.No. | Course Code | Course Name | Type/Area | Cr | L | T | P | CWS | PRS | MTE | ETE | PRE |
| Elective 9 | 1 | NST6201 | Spintronic | Elective | 2 | 2 | 0 | 0 | 20 | 0 | 30 | 50 | - |
| | 2 | NST6203 | Biophotonics | | 2 | 2 | 0 | 0 | 20 | 0 | 30 | 50 | - |
| | 3 | NST6205 | Logical Reasoning and Critical Thinking | | 2 | 2 | 0 | 0 | 20 | 0 | 30 | 50 | - |
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DELHI TECHNOLOGICAL UNIVERSITY

SCHEME OF EXAMINATION

MASTER OF TECHNOLOGY IN NUCLEAR SCIENCE & ENGINEERING ( NSE )

## Semester-I

| | S.No. | Course Code | Course Name | Type/Area | Cr | L | T | P | CWS | PRS | MTE | ETE | PRE | Total Credits |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Group A | 1 | NSE501 | | Core | 4 | | | | | | | | | 17 |
| | 2 | NSE503 | | Core | 4 | | | | | | | | | |
| Group B | 3 | NSE5401/5403/..... | Elective 1 | Elective | 4 | | | | | | | | | |
| | 4 | NSE5301/5303/..... | Elective 2 | Elective | 3 | | | | | | | | | |
| | 5 | NSE5201/5203/..... | Elective 3 | Elective | 2 | | | | | | | | | |

## Semester-II

| | S.No. | Course Code | Course Name | Type/Area | Cr | L | T | P | CWS | PRS | MTE | ETE | PRE | Total Credits |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Group C | 1 | NSE502 | | Core | 4 | | | | | | | | | 17 |
| | 2 | NSE504 | | Core | 4 | | | | | | | | | |
| Group D | 3 | NSE5402/5404/..... | Elective 4 | Elective | 4 | | | | | | | | | |
| | 4 | NSE5302/5304/..... | Elective 5 | Elective | 3 | | | | | | | | | |
| | 5 | NSE5202/5204/..... | Elective 6 | Elective | 2 | | | | | | | | | |

## Semester-III

| | S.No. | Course Code | Course Name | Type/Area | Cr | L | T | P | CWS | PRS | MTE | ETE | PRE | Total Credits |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Track 1 | | | | | | | | | | | | | 12 |
| Group E | 1 | NSE650 | Research Project | Core | 12 | | | | | | | | | |
| | Track 2 | | | | | | | | | | | | | |
| | 1 | NSE601 | Major Project I | Core | 3 | | | | | | | | | |
| | 2 | NSE6401/6403/..... | Elective 7 | Elective | 4 | | | | | | | | | |
| | 3 | NSE6301/6303/..... | Elective 8 | Elective | 3 | | | | | | | | | |
| | 4 | NSE6201/6203/..... | Elective 9 | Elective | 2 | | | | | | | | | |

| Semester-IV | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | S.No. | Course Code | Course Name | Type/Area | Cr | L | T | P | CWS | PRS | MTE | ETE | PRE | Total Credits |
| Group F | Track 1 | | | | | | | | | | | | | 12 |
| | 1 | NSE650 | Research Project | Core | 12 | | | | | | | | | |
| | Track 2 | | | | | | | | | | | | | |
| | 1 | NSE602 | Major Project II | Core | 12 | | | | | | | | | |

## List of Elective Courses

| LIST OF ELECTIVES : | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | S.No. | Course Code | Course Name | Type/Area | Cr | L | T | P | CWS | PRS | MTE | ETE | PRE |
| Elective 1 | | | | Elective | | | | | | | | | |
| | S.No. | Course Code | Course Name | Type/Area | Cr | L | T | P | CWS | PRS | MTE | ETE | PRE |
| Elective 2 | | | | Elective | | | | | | | | | |
| | S.No. | Course Code | Course Name | Type/Area | Cr | L | T | P | CWS | PRS | MTE | ETE | PRE |
| Elective 3 | 1 | NSE5201 | SELF STUDY OPEN AREA SEMINAR | Elective | 2 | | | | | | | | |
| | S.No. | Course Code | Course Name | Type/Area | Cr | L | T | P | CWS | PRS | MTE | ETE | PRE |
| Elective 4 | | | | Elective | | | | | | | | | |

| | S.No. | Course Code | Course Name | Type/Area | Cr | L | T | P | CWS | PRS | MTE | ETE | PRE |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Elective 5 | 1 | NSE5302 | MINOR PROJECT | Elective | 3 | | | | | | | | |
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| | S.No. | Course Code | Course Name | Type/Area | Cr | L | T | P | CWS | PRS | MTE | ETE | PRE |
| Elective 6 | | | | Elective | | | | | | | | | |
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| | S.No. | Course Code | Course Name | Type/Area | Cr | L | T | P | CWS | PRS | MTE | ETE | PRE |
| Elective 7 | | | | Elective | | | | | | | | | |
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| | S.No. | Course Code | Course Name | Type/Area | Cr | L | T | P | CWS | PRS | MTE | ETE | PRE |
| Elective 8 | | | | Elective | | | | | | | | | |
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| | S.No. | Course Code | Course Name | Type/Area | Cr | L | T | P | CWS | PRS | MTE | ETE | PRE |
| Elective 9 | | | | Elective | | | | | | | | | |
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DELHI TECHNOLOGICAL UNIVERSITY
SCHEME OF EXAMINATION
MASTER OF TECHNOLOGY IN MICROWAVE & OPTICAL COMMUNICATION ( MOC )

## Semester-I

| | S.No. | Course Code | Course Name | Type/Area | Cr | L | T | P | CWS | PRS | MTE | ETE | PRE | Total Credits |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Group A | 1 | MOC501 | Advance Electromagnetic Theory | Core | 4 | 3 | 0 | 2 | 15 | 25 | 20 | 40 | - | 17 |
| | 2 | MOC503 | Optical Communication Systems | Core | 4 | 3 | 0 | 2 | 15 | 25 | 20 | 40 | - | |
| Group B | 3 | MOC5401/5403/..... | Elective 1 | Elective | 4 | 3 | 0 | 2 | 15 | 25 | 20 | 40 | - | |
| | 4 | MOC5301/5303/..... | Elective 2 | Elective | 3 | 3 | 0 | 0 | 20 | - | 30 | 50 | - | |
| | 5 | MOC5201/5203/...../ UEC5201/5203/ | Elective 3/University Elective I | Elective | 2 | 2/0 | 0 | 0/4 | 20/0 | 0/40 | 30/0 | 50/0 | 0/60 | |

## Semester-II

| | S.No. | Course Code | Course Name | Type/Area | Cr | L | T | P | CWS | PRS | MTE | ETE | PRE | Total Credits |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Group C | 1 | MOC502 | Digital Microwave Engineering | Core | 4 | 3 | 0 | 2 | 15 | 25 | 20 | 40 | - | 17 |
| | 2 | MOC504 | Optical Networks | Core | 4 | 3 | 0 | 2 | 15 | 25 | 20 | 40 | - | |
| Group D | 3 | MOC5402/5404/..... | Elective 4 | Elective | 4 | 3 | 0 | 2 | 15 | 25 | 20 | 40 | - | |
| | 4 | MOC5302/5304/..... | Elective 5 | Elective | 3 | 3 | 0 | 0 | 20 | - | 30 | 50 | - | |
| | 5 | MOC5202/5204/...../ UEC5202/5204/ | Elective 6/University Elective II | Elective | 2 | 2 | 0 | 0 | 20 | - | 30 | 50 | - | |

## Semester-III

| | S.No. | Course Code | Course Name | Type/Area | Cr | L | T | P | CWS | PRS | MTE | ETE | PRE | Total Credits |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Track 1 | | | | | | | | | | | | | 12 |
| Group E | 1 | MOC651 | Research Project | Core | 12 | 0 | 0 | 12 | 0 | - | 0 | 100 | - | |
| | Track 2 | | | | | | | | | | | | | |
| | 1 | MOC601 | Major Project I | Core | 3 | | | | | | 40 | 60 | | |
| | 2 | MOC6401/6403/..... | Elective 7 | Elective | 4 | 3 | 0 | 2 | 15 | 25 | 20 | 40 | - | |
| | 3 | MOC6301/6303/..... | Elective 8 | Elective | 3 | 3 | 0 | 0 | 20 | - | 30 | 50 | - | |
| | 4 | MOC6201/6203/..... | Elective 9 | Elective | 2 | 2 | 0 | 0 | 20 | - | 30 | 50 | - | |

| Semester-IV | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | S.No. | Course Code | Course Name | Type/Area | Cr | L | T | P | CWS | PRS | MTE | ETE | PRE | Total Credits |
| Group F | Track 1 | | | | | | | | | | | | | 12 |
| | 1 | MOC652 | Research Project | Core | 12 | 0 | 0 | 12 | 0 | - | 0 | 100 | 0 | |
| | Track 2 | | | | | | | | | | | | | |
| | 1 | MOC602 | Major Project II | Core | 12 | | | | | | 40 | 60 | | |

## List of Elective Courses

| LIST OF ELECTIVES : | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | S.No. | Course Code | Course Name | Type/Area | Cr | L | T | P | CWS | PRS | MTE | ETE | PRE |
| Elective 1 | 1 | MOC5401 | Advanced Microwave Devices & Circuits | Elective | 4 | 3 | 0 | 2 | 15 | 25 | 20 | 40 | - |
| | 2 | MOC5403 | Photonic switching & Networks | | 4 | 3 | 0 | 2 | 15 | 25 | 20 | 40 | - |
| | 3 | MOC5405 | Wireless Communications | | 4 | 3 | 0 | 2 | 15 | 25 | 20 | 40 | - |
| | 4 | MOC5407 | Optics & Lasers | | 4 | 3 | 0 | 2 | 15 | 25 | 20 | 40 | - |
| | 5 | MOC5409 | Quantum Computing | | 4 | 3 | 0 | 2 | 15 | 25 | 20 | 40 | - |
| | S.No. | Course Code | Course Name | Type/Area | Cr | L | T | P | CWS | PRS | MTE | ETE | PRE |
| Elective 2 | 1 | MOC5301 | Communication Networks | Elective | 3 | 3 | 0 | 0 | 20 | - | 30 | 50 | - |
| | 2 | MOC5303 | RF Microwave & Millimeter circuits | | 3 | 3 | 0 | 0 | 20 | - | 30 | 50 | - |
| | 3 | MOC5305 | Nano photonics &Plasmonics | | 3 | 3 | 0 | 0 | 20 | - | 30 | 50 | - |
| | 4 | MOC5307 | Optical Electronics | | 3 | 3 | 0 | 0 | 20 | - | 30 | 50 | - |
| | 5 | MOC5309 | Soft Computing in Microwave Engineering | | 3 | 3 | 0 | 0 | 20 | - | 30 | 50 | - |
| | S.No. | Course Code | Course Name | Type/Area | Cr | L | T | P | CWS | PRS | MTE | ETE | PRE |
| Elective 3 | 1 | MOC5201 | SEMINAR | Elective | 2 | 0 | 0 | 2 | - | 100 | - | - | - |
| | 2 | MOC5203 | Optical Interconnects | | 2 | 2 | 0 | 0 | 20 | - | 30 | 50 | - |
| | 3 | MOC5205 | Radar Engineering | | 2 | 2 | 0 | 0 | 20 | - | 30 | 50 | - |
| | 4 | MOC5207 | Information Theory | | 2 | 2 | 0 | 0 | 20 | - | 30 | 50 | - |
| | 5 | MOC5209 | Language Lab | | 2 | 0 | 0 | 4 | - | 40 | - | - | 60 |
| | S.No. | Course Code | Course Name | Type/Area | Cr | L | T | P | CWS | PRS | MTE | ETE | PRE |
| Elective 4 | 1 | MOC5402 | Antenna Design | Elective | 4 | 3 | 0 | 2 | 15 | 25 | 20 | 40 | - |
| | 2 | MOC5404 | Communication Protocol Design | | 4 | 3 | 0 | 2 | 15 | 25 | 20 | 40 | - |
| | 3 | MOC5406 | Optoelectronic Devices and Circuits | | 4 | 3 | 0 | 2 | 15 | 25 | 20 | 40 | - |
| | 4 | MOC5408 | Optical Sensors | | 4 | 3 | 0 | 2 | 15 | 25 | 20 | 40 | - |
| | 5 | MOC5410 | Satellite Communications | | 4 | 3 | 0 | 2 | 15 | 25 | 20 | 40 | - |

| | S.No. | Course Code | Course Name | Type/Area | Cr | L | T | P | CWS | PRS | MTE | ETE | PRE |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Elective 5 | 1 | MOC5302 | Minor Project | Elective | 3 | 0 | 0 | - | - | 40 | - | - | 60 |
| | 2 | MOC5304 | Numerical Techniques in Electromagnetics | | 3 | 3 | 0 | 0 | 20 | - | 30 | 50 | - |
| | 3 | MOC5306 | EMI/EMC | | 3 | 3 | 0 | 0 | 20 | - | 30 | 50 | - |
| | 4 | MOC5308 | Radar Signal Processing | | 3 | 3 | 0 | 0 | 20 | - | 30 | 50 | - |
| | 5 | MOC5310 | Radiating Systems in RF Communications | | 3 | 3 | 0 | 0 | 20 | - | 30 | 50 | - |
| | S.No. | Course Code | Course Name | Type/Area | Cr | L | T | P | CWS | PRS | MTE | ETE | PRE |
| Elective 6 | 1 | MOC5202 | Photo voltaics | Elective | 2 | 2 | 0 | 0 | 20 | - | 30 | 50 | - |
| | 2 | MOC5204 | Bio-Photonics | | 2 | 2 | 0 | 0 | 20 | - | 30 | 50 | - |
| | 3 | MOC5206 | MIMO Wireless Communication | | 2 | 2 | 0 | 0 | 20 | - | 30 | 50 | - |
| | | | | | | | | | | | | | |
| | S.No. | Course Code | Course Name | Type/Area | Cr | L | T | P | CWS | PRS | MTE | ETE | PRE |
| Elective 7 | 1 | MOC6401 | Smart Antenna | Elective | 4 | 3 | 0 | 2 | 15 | 25 | 20 | 40 | - |
| | 2 | MOC6403 | Fiber optic Components | | 4 | 3 | 0 | 2 | 15 | 25 | 20 | 40 | - |
| | 3 | MOC6405 | Wireless Optical Communication | | 4 | 3 | 0 | 2 | 15 | 25 | 20 | 40 | - |
| | 4 | MOC6407 | Biological Effects of Electromagnetic Fields | | 4 | 3 | 0 | 2 | 15 | 25 | 20 | 40 | - |
| | 5 | MOC6309 | Broadband Communication Systems | | 4 | 3 | 0 | 2 | 15 | 25 | 20 | 40 | - |
| | | | | | | | | | | | | | |
| | S.No. | Course Code | Course Name | Type/Area | Cr | L | T | P | CWS | PRS | MTE | ETE | PRE |
| Elective 8 | 1 | MOC6301 | Statistical Mathematics | Elective | 3 | 3 | 0 | 0 | 20 | - | 30 | 50 | - |
| | 2 | MOC6303 | Integrated Optics | | 3 | 3 | 0 | 0 | 20 | - | 30 | 50 | - |
| | 3 | MOC6305 | Quantum Electronics | | 3 | 3 | 0 | 0 | 20 | - | 30 | 50 | - |
| | 4 | MOC6307 | Optical Computing | | 3 | 3 | 0 | 0 | 20 | - | 30 | 50 | - |
| | 5 | MOC6309 | Optical Signal Processing | | 3 | 3 | 0 | 0 | 20 | - | 30 | 50 | - |
| | 6 | MOC6311 | Spread Spectrum Communication | | 3 | 3 | 0 | 0 | 20 | - | 30 | 50 | - |
| | S.No. | Course Code | Course Name | Type/Area | Cr | L | T | P | CWS | PRS | MTE | ETE | PRE |
| Elective 9 | 1 | MOC6201 | Wireless Sensor Networks | Elective | 2 | 2 | 0 | 0 | 20 | - | 30 | 50 | - |
| | 2 | MOC6203 | Special Topics on Optical Communications | | 2 | 2 | 0 | 0 | 20 | - | 30 | 50 | - |
| | 3 | MOC6205 | Special Topics on Microwave communication | | 2 | 2 | 0 | 0 | 20 | - | 30 | 50 | - |
| | 4 | MOC6207 | Neuromorphic Engineering | | 2 | 2 | 0 | 0 | 20 | - | 30 | 50 | - |
| | | | | | | | | | | | | | |

DELHI TECHNOLOGICAL UNIVERSITY
SCHEME OF EXAMINATION
MASTER OF TECHNOLOGY IN INFORMATION SYSTEMS ( ISY )

## Semester-I

| | S.No. | Course Code | Course Name | Type/Area | Cr | L | T | P | CWS | PRS | MTE | ETE | PRE | Total Credits |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Group A | 1 | ISY501 | Linear Algebra and Probability | Core | 4 | 3 | 0 | 2 | 15 | 25 | 20 | 40 | - | 17 |
| | 2 | ISY503 | Data Structure and Algorithm | Core | 4 | 3 | 0 | 2 | 15 | 25 | 20 | 40 | - | |
| Group B | 3 | ISY5401/5403/..... | Elective 1 | Elective | 4 | 3 | 0 | 2 | 15 | 25 | 20 | 40 | - | |
| | 4 | ISY5301/5303/..... | Elective 2 | Elective | 3 | 3/2 | 0 | 0/2 | 20/15 | 0/25 | 30/20 | 50/40 | - | |
| | 5 | ISY5201/5203/...../ UEC5201/5203/ | Elective 3/University Elective I | Elective | 2 | 2 | 0 | 0 | 20 | - | 30 | 50 | - | |

## Semester-II

| | S.No. | Course Code | Course Name | Type/Area | Cr | L | T | P | CWS | PRS | MTE | ETE | PRE | Total Credits |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Group C | 1 | ISY502 | High Performance Computing system | Core | 4 | 3 | 0 | 2 | 15 | 25 | 20 | 40 | 15 | 17 |
| | 2 | ISY504 | Computer Network and Application | Core | 4 | 3 | 0 | 2 | 15 | 25 | 20 | 40 | 15 | |
| Group D | 3 | ISY5402/5404/..... | Elective 4 | Elective | 4 | 3 | 0 | 2 | 15 | 25 | 20 | 40 | - | |
| | 4 | ISY5302/5304/..... | Elective 5 | Elective | 3 | 3/2 | 0 | 0/2 | 20/15 | 0/25 | 30/20 | 50/40 | - | |
| | 5 | ISY5202/5204/...../ UEC5202/5204/ | Elective 6/University Elective II | Elective | 2 | 2 | 0 | 0 | 20 | - | 30 | 50 | - | |

## Semester-III

| | S.No. | Course Code | Course Name | Type/Area | Cr | L | T | P | CWS | PRS | MTE | ETE | PRE | Total Credits |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Track 1 | | | | | | | | | | | | | |
| Group E | 1 | ISY651 | Research Project | Core | 12 | 0 | 0 | 12 | 0 | - | 0 | 100 | 0 | 12 |
| | Track 2 | | | | | | | | | | | | | |
| | 1 | ISY601 | Major Project I | Core | 3 | | | | | | 40 | 60 | | |
| | 2 | ISY6401/6403/..... | Elective 7 | Elective | 4 | 3 | 0 | 2 | 15 | 25 | 20 | 40 | - | |
| | 3 | ISY6301/6303/..... | Elective 8 | Elective | 3 | 3/2 | 0 | 0/2 | 20/15 | 0/25 | 30/20 | 50/40 | - | |
| | 4 | ISY6201/6203/..... | Elective 9 | Elective | 2 | 2 | 0 | 0 | 20 | - | 30 | 50 | - | |

| Semester-IV | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | S.No. | Course Code | Course Name | Type/Area | Cr | L | T | P | CWS | PRS | MTE | ETE | PRE | Total Credits |
| Group F | Track 1 | | | | | | | | | | | | | 12 |
| | 1 | ISY652 | Research Project | Core | 12 | 0 | 0 | 12 | 0 | - | 0 | 100 | 0 | |
| | Track 2 | | | | | | | | | | | | | |
| | 1 | ISY602 | Major Project II | Core | 12 | | | | | | 40 | 60 | | |

## List of Elective Courses

| LIST OF ELECTIVES : | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | S.No. | Course Code | Course Name | Type/Area | Cr | L | T | P | CWS | PRS | MTE | ETE | PRE |
| Elective 1 | 1 | ISY5401 | Advanced Computer Graphics | Elective | 4 | 3 | 0 | 2 | 15 | 25 | 20 | 40 | - |
| | 2 | ISY5403 | Artificial Neural network | | 4 | 3 | 0 | 2 | 15 | 25 | 20 | 40 | - |
| | 3 | ISY5405 | Big Data Analytics | | 4 | 3 | 0 | 2 | 15 | 25 | 20 | 40 | - |
| | 4 | ISY5407 | Data System Implementation | | 4 | 3 | 0 | 2 | 15 | 25 | 20 | 40 | - |
| | 5 | ISY5409 | Image Analysis | | 4 | 3 | 0 | 2 | 15 | 25 | 20 | 40 | - |
| | 6 | ISY5411 | Privacy and Security in Online Social Media | | 4 | 3 | 0 | 2 | 15 | 25 | 20 | 40 | - |
| | 7 | ISY5413 | Embedded System | | 4 | 3 | 0 | 2 | 15 | 25 | 20 | 40 | - |
| | 8 | ISY5415 | Digital and Cyber Forensics | | 4 | 3 | 0 | 2 | 15 | 25 | 20 | 40 | - |
| | | | | | | | | | | | | | |
| | S.No. | Course Code | Course Name | Type/Area | Cr | L | T | P | CWS | PRS | MTE | ETE | PRE |
| Elective 2 | 1 | ISY5301 | Artificial Intelligence | Elective | 3 | 3 | 0 | 0 | 20 | 0 | 30 | 50 | - |
| | 2 | ISY5303 | Pattern analysis | | 3 | 2 | 0 | 2 | 15 | 25 | 20 | 40 | - |
| | 3 | ISY5305 | Business Intelligence and data warehousing | | 3 | 3 | 0 | 0 | 20 | 0 | 30 | 50 | - |
| | 4 | ISY5307 | Edge computing | | 3 | 3 | 0 | 0 | 20 | 0 | 30 | 50 | - |
| | 5 | ISY5309 | Financial data analytics | | 3 | 3 | 0 | 0 | 20 | 0 | 30 | 50 | - |
| | 6 | ISY5311 | Foundation to computer security | | 3 | 3 | 0 | 0 | 20 | 0 | 30 | 50 | - |
| | 7 | ISY5313 | Information Audit | | 3 | 3 | 0 | 0 | 20 | 0 | 30 | 50 | - |
| | 8 | ISY5315 | Information Integration and Data Analytics | | 3 | 2 | 0 | 2 | 15 | 25 | 20 | 40 | - |
| | 9 | ISY5317 | Linear Optimization | | 3 | 3 | 0 | 0 | 20 | 0 | 30 | 50 | - |
| | 10 | ISY5319 | Management Information System | | 3 | 3 | 0 | 0 | 20 | 0 | 30 | 50 | - |
| | 11 | ISY5321 | Multi agent system | | 3 | 3 | 0 | 0 | 20 | 0 | 30 | 50 | - |
| | 12 | ISY5323 | Privacy in location based services | | 3 | 3 | 0 | 0 | 20 | 0 | 30 | 50 | - |
| | 13 | ISY5325 | Probabilistic Graphical Models | | 3 | 2 | 0 | 2 | 15 | 25 | 20 | 40 | - |
| | 14 | ISY5327 | Software Engineering | | 3 | 2 | 0 | 2 | 15 | 25 | 20 | 40 | - |
| | 15 | ISY5329 | Theory of modern cryptography | | 3 | 2 | 0 | 2 | 15 | 25 | 20 | 40 | - |
| | | | | | | | | | | | | | |
| | | | | | | | | | | | | | |

| | S.No. | Course Code | Course Name | Type/Area | Cr | L | T | P | CWS | PRS | MTE | ETE | PRE |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Elective 3 | 1 | ISY5201 | SEMINAR | Elective | 2 | 0 | 0 | 2 | - | 100 | - | - | - |
| | 2 | ISY5203 | Latest Research in information technology | | 2 | 2 | 0 | 0 | 20 | 0 | 30 | 50 | - |
| | 3 | ISY5205 | Optimization tools | | 2 | 2 | 0 | 0 | 20 | 0 | 30 | 50 | - |
| | 4 | ISY5207 | Technical communication | | 2 | 2 | 0 | 0 | 20 | 0 | 30 | 50 | - |
| | | | | | | | | | | | | | |
| | S.No. | Course Code | Course Name | Type/Area | Cr | L | T | P | CWS | PRS | MTE | ETE | PRE |
| Elective 4 | 1 | ISY5402 | Advanced operating system | Elective | 4 | 3 | 0 | 2 | 15 | 25 | 20 | 40 | - |
| | 2 | ISY5404 | Cloud computing and virtualization | | 4 | 3 | 0 | 2 | 15 | 25 | 20 | 40 | - |
| | 3 | ISY5406 | Foundation of information theory and coding | | 4 | 3 | 0 | 2 | 15 | 25 | 20 | 40 | - |
| | 4 | ISY5408 | Internet security and privacy | | 4 | 3 | 0 | 2 | 15 | 25 | 20 | 40 | - |
| | 5 | ISY5410 | Machine learning | | 4 | 3 | 0 | 2 | 15 | 25 | 20 | 40 | - |
| | 6 | ISY5412 | Mobile application | | 4 | 3 | 0 | 2 | 15 | 25 | 20 | 40 | - |
| | 7 | ISY5414 | Semantic web | | 4 | 3 | 0 | 2 | 15 | 25 | 20 | 40 | - |
| | 8 | ISY5416 | Smart sensing for Internet of things | | 4 | 3 | 0 | 2 | 15 | 25 | 20 | 40 | - |
| | S.No. | Course Code | Course Name | Type/Area | Cr | L | T | P | CWS | PRS | MTE | ETE | PRE |
| Elective 5 | 1 | ISY5302 | MINOR PROJECT | Elective | 3 | 0 | 0 | - | - | 40 | - | - | 60 |
| | 2 | ISY5304 | Advanced computer vision | | 3 | 3 | 0 | 0 | 20 | 0 | 30 | 50 | - |
| | 3 | ISY5306 | ADhoc wireless network | | 3 | 3 | 0 | 0 | 20 | 0 | 30 | 50 | - |
| | 4 | ISY5308 | Advanced topic in mobile computing | | 3 | 3 | 0 | 0 | 20 | 0 | 30 | 50 | - |
| | 5 | ISY5310 | Applied cryptography | | 3 | 3 | 0 | 0 | 20 | 0 | 30 | 50 | - |
| | 6 | ISY5312 | Collaborative filtering | | 3 | 3 | 0 | 0 | 20 | 0 | 30 | 50 | - |
| | 7 | ISY5314 | Cyber security and law | | 3 | 3 | 0 | 0 | 20 | 0 | 30 | 50 | - |
| | 8 | ISY5316 | Deep learning | | 3 | 2 | 0 | 2 | 15 | 25 | 20 | 40 | - |
| | 9 | ISY5318 | Digital watermarking and Steganalysis | | 3 | 3 | 0 | 0 | 20 | 0 | 30 | 50 | - |
| | 10 | ISY5320 | Distributed Data Mining | | 3 | 3 | 0 | 0 | 20 | 0 | 30 | 50 | - |
| | 11 | ISY5322 | Graph Theory | | 3 | 3 | 0 | 0 | 20 | 0 | 30 | 50 | - |
| | 12 | ISY5324 | Network anonymity and privacy | | 3 | 3 | 0 | 0 | 20 | 0 | 30 | 50 | - |
| | 13 | ISY5326 | Topics in computer security | | 3 | 3 | 0 | 0 | 20 | 0 | 30 | 50 | - |
| | | | | | | | | | | | | | |
| | S.No. | Course Code | Course Name | Type/Area | Cr | L | T | P | CWS | PRS | MTE | ETE | PRE |
| Elective 6 | 1 | ISY5202 | Research problem formulation | Elective | 2 | 0 | 0 | 4 | - | 30 | - | - | 70 |
| | 2 | ISY5204 | Laboratory on advanced topics | | 2 | 0 | 0 | 4 | - | 30 | - | - | 70 |
| | | | | | | | | | | | | | |

| | S.No. | Course Code | Course Name | Type/Area | Cr | L | T | P | CWS | PRS | MTE | ETE | PRE |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Elective 7 | 1 | ISY6401 | Biometrics Systems | Elective | 4 | 3 | 0 | 2 | 15 | 25 | 20 | 40 | - |
| | 2 | ISY6403 | Natural Language Processing | | 4 | 3 | 0 | 2 | 15 | 25 | 20 | 40 | - |
| | 3 | ISY6405 | Network security | | 4 | 3 | 0 | 2 | 15 | 25 | 20 | 40 | - |
| | 4 | ISY6407 | Robotics | | 4 | 3 | 0 | 2 | 15 | 25 | 20 | 40 | - |
| | 5 | ISY6409 | Ethical Hacking | | 4 | 3 | 0 | 2 | 15 | 25 | 20 | 40 | - |
| | 6 | ISY6411 | Secure Coding | | 4 | 3 | 0 | 2 | 15 | 25 | 20 | 40 | - |
| | 7 | ISY6413 | Mobile Computing. | | 4 | 3 | 0 | 2 | 15 | 25 | 20 | 40 | - |
| | | | | | | | | | | | | | |
| | S.No. | Course Code | Course Name | Type/Area | Cr | L | T | P | CWS | PRS | MTE | ETE | PRE |
| Elective 8 | 1 | ISY6301 | Bioinformatics | Elective | 3 | 3 | 0 | 0 | 20 | 0 | 30 | 50 | - |
| | 2 | ISY6303 | Data Mining | | 3 | 3 | 0 | 0 | 20 | 0 | 30 | 50 | - |
| | 3 | ISY6305 | Data Warehousing | | 3 | 3 | 0 | 0 | 20 | 0 | 30 | 50 | - |
| | 4 | ISY6307 | Dev-Ops | | 3 | 3 | 0 | 0 | 20 | 0 | 30 | 50 | - |
| | 5 | ISY6309 | Evolutionary computing | | 3 | 3 | 0 | 0 | 20 | 0 | 30 | 50 | - |
| | 6 | ISY6311 | GPU computing | | 3 | 3 | 0 | 0 | 20 | 0 | 30 | 50 | - |
| | 7 | ISY6313 | Information Retrieval | | 3 | 3 | 0 | 0 | 20 | 0 | 30 | 50 | - |
| | 8 | ISY6315 | Intelligent system and interface | | 3 | 2 | 0 | 2 | 15 | 25 | 20 | 40 | - |
| | 9 | ISY6317 | Introduction to cognitive science | | 3 | 2 | 0 | 2 | 15 | 25 | 20 | 40 | - |
| | 10 | ISY6319 | Introduction to spatial computing | | 3 | 3 | 0 | 0 | 15 | 25 | 20 | 40 | - |
| | 11 | ISY6321 | Malware Analysis | | 3 | 2 | 0 | 2 | 15 | 25 | 20 | 40 | - |
| | 12 | ISY6323 | Real time operating system | | 3 | 2 | 0 | 2 | 15 | 25 | 20 | 40 | - |
| | 13 | ISY6325 | Soft computing | | 3 | 2 | 0 | 2 | 15 | 25 | 20 | 40 | - |
| | 14 | ISY6327 | Statistical machine learning | | 3 | 3 | 0 | 0 | 20 | 0 | 30 | 50 | - |
| | 15 | ISY6329 | Web intelligence and big data analytics | | 3 | 2 | 0 | 2 | 15 | 25 | 20 | 40 | - |
| | 16 | ISY6331 | Quantum computing | | 3 | 3 | 0 | 0 | 20 | 0 | 30 | 50 | - |
| | 17 | ISY6333 | Intrusion detection and prevention | | 3 | 3 | 0 | 0 | 20 | 0 | 30 | 50 | - |
| | | | | | | | | | | | | | |
| | | | | | | | | | | | | | |
| | S.No. | | Course Name | Type/Area | Cr | L | T | P | CWS | PRS | MTE | ETE | PRE |
| Elective 9 | 1 | ISY6201 | Open Area Research Seminar | Elective | 2 | 0 | 0 | 2 | - | 100 | - | - | - |
| | | | | | | | | | | | | | |

DELHI TECHNOLOGICAL UNIVERSITY

SCHEME OF EXAMINATION

MASTER OF TECHNOLOGY IN GEOTECHNICAL ENGINEERING ( GTE )

## Semester-I

| | S.No. | Course Code | Course Name | Type/Area | Cr | L | T | P | CWS | PRS | MTE | ETE | PRE | Total Credits |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Group A | 1 | GTE501 | Advanced Soil mechanics | Core | 4 | 3 | 0 | 2 | 15 | 25 | 20 | 40 | – | 17 |
| | 2 | GTE503 | Advance Foundation Engineering | Core | 4 | 3 | 0 | 2 | 15 | 25 | 20 | 40 | – | |
| Group B | 3 | GTE5401/5403/..... | Elective 1 | Elective | 4 | 3 | 0 | 2 | 15 | 25 | 20 | 40 | – | |
| | 4 | GTE5301/5303/..... | Elective 2 | Elective | 3 | 3 | 0 | 0 | 20 | - | 30 | 50 | – | |
| | 5 | GTE5201/5203/...../ UEC5201/5203/ | Elective 3/University Elective I | Elective | 2 | 2 | 0 | 0 | 20 | - | 30 | 50 | – | |

## Semester-II

| | S.No. | Course Code | Course Name | Type/Area | Cr | L | T | P | CWS | PRS | MTE | ETE | PRE | Total Credits |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Group C | 1 | GTE502 | Rock Mechanics | Core | 4 | 3 | 0 | 2 | 15 | 25 | 20 | 40 | – | 17 |
| | 2 | GTE504 | Soil dynamics and machine foundation | Core | 4 | 3 | 0 | 2 | 15 | 25 | 20 | 40 | – | |
| Group D | 3 | GTE5402/5404/..... | Elective 4 | Elective | 4 | 3 | 0 | 2 | 15 | 25 | 20 | 40 | – | |
| | 4 | GTE5302/5304/..... | Elective 5 | Elective | 3 | 3 | 0 | 0 | 20 | - | 30 | 50 | – | |
| | 5 | GTE5202/5204/...../ UEC5202/5204/ | Elective 6/University Elective II | Elective | 2 | 2 | 0 | 0 | 20 | - | 30 | 50 | – | |

## Semester-III

| | S.No. | Course Code | Course Name | Type/Area | Cr | L | T | P | CWS | PRS | MTE | ETE | PRE | Total Credits |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Track 1 | | | | | | | | | | | | | 12 |
| Group E | 1 | GTE651 | Research Project | Core | 12 | 0 | 0 | 12 | 0 | - | 0 | 100 | 0 | |
| | Track 2 | | | | | | | | | | | | | |
| | 1 | GTE601 | Major Project I | Core | 3 | | | | | | 40 | 60 | | |
| | 2 | GTE6401/6403/..... | Elective 7 | Elective | 4 | 3 | 0 | 2 | 15 | 25 | 20 | 40 | 15 | |
| | 3 | GTE6301/6303/..... | Elective 8 | Elective | 3 | 3 | 0 | 0 | 20 | - | 30 | 50 | – | |
| | 4 | GTE6201/6203/..... | Elective 9 | Elective | 2 | 2/0 | 0 | 0/4 | 20/0 | 0/30 | 30/0 | 50/0 | 0/70 | |

| Semester-IV | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | S.No. | Course Code | Course Name | Type/Area | Cr | L | T | P | CWS | PRS | MTE | ETE | PRE | Total Credits |
| Group F | Track 1 | | | | | | | | | | | | | 12 |
| | 1 | GTE652+C21 | Research Project | Core | 12 | 0 | 0 | 12 | 0 | - | 0 | 100 | 0 | |
| | Track 2 | | | | | | | | | | | | | |
| | 1 | GTE602 | Major Project II | Core | 12 | 0 | 0 | 12 | 0 | - | 0 | 100 | 0 | |

## List of Elective Courses

| LIST OF ELECTIVES : | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | S.No. | Course Code | Course Name | Type/Area | Cr | L | T | P | CWS | PRS | MTE | ETE | PRE |
| Elective 1 | 1 | GTE5401 | Geo-environmental Engineering | Elective | 4 | 3 | 0 | 2 | 15 | 25 | 20 | 40 | - |
| | 2 | GTE5403 | Geotechnical Exploration | | 4 | 3 | 0 | 2 | 15 | 25 | 20 | 40 | - |
| | 3 | GTE5405 | Application of remote sensing and GIS in Geotechnical Engineering | | 4 | 3 | 0 | 2 | 15 | 25 | 20 | 40 | - |
| | 4 | GTE5407 | Cost Management of Engineering Proj | | 4 | 3 | 0 | 2 | 15 | 25 | 20 | 40 | - |
| | | | | | | | | | | | | | |
| | S.No. | Course Code | Course Name | Type/Area | Cr | L | T | P | CWS | PRS | MTE | ETE | PRE |
| Elective 2 | 1 | GTE5301 | Geotechnical Earthquake Engineering | Elective | 3 | 3 | 0 | 0 | 20 | 0 | 30 | 50 | - |
| | 2 | GTE5303 | Stability Analysis of Slopes | | 3 | 3 | 0 | 0 | 20 | 0 | 30 | 50 | - |
| | 3 | GTE5305 | Earth Pressure & Earth Retaining Str | | 3 | 3 | 0 | 0 | 20 | 0 | 30 | 50 | - |
| | 4 | GTE5307 | Pavement analysis and Design | | 3 | 3 | 0 | 0 | 20 | 0 | 30 | 50 | - |
| | | | | | | | | | | | | | |
| | S.No. | Course Code | Course Name | Type/Area | Cr | L | T | P | CWS | PRS | MTE | ETE | PRE |
| Elective 3 | 1 | GTE5201 | Seminar | Elective | 2 | 0 | 0 | 2 | - | 100 | - | - | - |
| | 2 | GTE5203 | FEM in Geotechnical Engineering | | 2 | 2 | 0 | 0 | 20 | 0 | 30 | 50 | - |
| | 3 | GTE5205 | Offshore Geotechnical Engineering | | 2 | 2 | 0 | 0 | 20 | 0 | 30 | 50 | - |
| | 4 | GTE5207 | Composite Material | | 2 | 2 | 0 | 0 | 20 | 0 | 30 | 50 | - |
| | | | | | | | | | | | | | |

| | S.No. | Course Code | Course Name | Type/Area | Cr | L | T | P | CWS | PRS | MTE | ETE | PRE |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Elective 4 | 1 | GTE5402 | Theoretical Soil Mechanics | Elective | 4 | 3 | 0 | 2 | 15 | 25 | 20 | 40 | 15 |
| | 2 | GTE5404 | Unsaturated Soil Mechanics | | 4 | 3 | 0 | 2 | 15 | 25 | 20 | 40 | 15 |
| | 3 | GTE5406 | Critical State Soil Mechanics | | 4 | 3 | 0 | 2 | 15 | 25 | 20 | 40 | 15 |
| | 4 | GTE5408 | Operational Research | | 4 | 3 | 0 | 2 | 15 | 25 | 20 | 40 | 15 |
| | | | | | | | | | | | | | |
| | S.No. | Course Code | Course Name | Type/Area | Cr | L | T | P | CWS | PRS | MTE | ETE | PRE |
| Elective 5 | 1 | GTE5302 | MINOR PROJECT | Elective | 3 | 0 | 0 | - | - | 40 | - | - | 60 |
| | 2 | GTE5304 | Soil Structure Interaction | | 3 | 3 | 0 | 0 | 20 | 0 | 30 | 50 | - |
| | 3 | GTE5306 | Disaster Mitigation and Management | | 3 | 3 | 0 | 0 | 20 | 0 | 30 | 50 | - |
| | 4 | GTE5308 | Uncertainties, risk and reliability in Geote | | 3 | 3 | 0 | 0 | 20 | 0 | 30 | 50 | - |
| | | | | | | | | | | | | | |
| | S.No. | Course Code | Course Name | Type/Area | Cr | L | T | P | CWS | PRS | MTE | ETE | PRE |
| Elective 6 | 1 | GTE5202 | Ground Water Hydrology | Elective | 2 | 2 | 0 | 0 | 20 | 0 | 30 | 50 | - |
| | 2 | GTE5204 | Physical Modelling in Geomechanics | | 2 | 2 | 0 | 0 | 20 | 0 | 30 | 50 | - |
| | 3 | GTE5206 | Numerical and Analytical Method in Geor | | 2 | 2 | 0 | 0 | 20 | 0 | 30 | 50 | - |
| | 4 | GTE5208 | Waste to Energy | | 2 | 2 | 0 | 0 | 20 | 0 | 30 | 50 | - |
| | | | | | | | | | | | | | |
| | S.No. | Course Code | Course Name | Type/Area | Cr | L | T | P | CWS | PRS | MTE | ETE | PRE |
| Elective 7 | 1 | GTE6401 | Plasticity & Fracture Mechanics in Rock St | Elective | 4 | 3 | 0 | 2 | 15 | 25 | 20 | 40 | - |
| | 2 | GTE6403 | Theory of Elasticity and Plasticity in Geom | | 4 | 3 | 0 | 2 | 15 | 25 | 20 | 40 | - |
| | 3 | GTE6405 | Design of Underground/Sub Structures | | 4 | 3 | 0 | 2 | 15 | 25 | 20 | 40 | - |
| | 4 | GTE6407 | Structural Geology | | 4 | 3 | 0 | 2 | 15 | 25 | 20 | 40 | - |
| | | | | | | | | | | | | | |
| | S.No. | Course Code | Course Name | Type/Area | Cr | L | T | P | CWS | PRS | MTE | ETE | PRE |
| Elective 8 | 1 | GTE6301 | Geosynthetics | Elective | 3 | 3 | 0 | 0 | 20 | 0 | 30 | 50 | - |
| | 2 | GTE6303 | Ground Improvement Techniques | | 3 | 3 | 0 | 0 | 20 | 0 | 30 | 50 | - |
| | 3 | GTE6305 | Excavation Technology | | 3 | 3 | 0 | 0 | 20 | 0 | 30 | 50 | - |
| | 4 | GTE6307 | Probability and Statistical Methods in Eng | | 3 | 3 | 0 | 0 | 20 | 0 | 30 | 50 | - |
| | | | | | | | | | | | | | |
| | S.No. | Course Code | Course Name | Type/Area | Cr | L | T | P | CWS | PRS | MTE | ETE | PRE |
| | 2 | GTE6201 | Design of Underground Excavations | | 2 | 2 | 0 | 0 | 20 | 0 | 30 | 50 | 0 |
| | 3 | GTE6203 | Foundations on Weak Rocks | | 2 | 2 | 0 | 0 | 20 | 0 | 30 | 50 | 0 |
| | 4 | GTE6205 | Geotechnical Design Studio | | 2 | 0 | 0 | 4 | - | 40 | - | - | 60 |
| | | | | | | | | | | | | | |

DELHI TECHNOLOGICAL UNIVERSITY

SCHEME OF EXAMINATION

MASTER OF TECHNOLOGY IN INDUSTRIAL BIO-TECHNOLOGY ( IBT )

## Semester-I

| | S.No. | Course Code | Course Name | Type/Area | Cr | L | T | P | CWS | PRS | MTE | ETE | PRE | Total Credits |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Group A | 1 | IBT501 | Bioenergy | Core | 4 | 3 | 0 | 2 | 15 | 25 | 20 | 40 | - | 17 |
| | 2 | IBT503 | Industrial Plant Biotechnology | Core | 4 | 3 | 0 | 2 | 15 | 25 | 20 | 40 | - | |
| Group B | 3 | IBT5401/5403/..... | Elective 1 | Elective | 4 | 3/4 | 0/0 | 2/0 | 15/20 | 25/0 | 20/30 | 40/50 | - | |
| | 4 | IBT5301/5303/..... | Elective 2 | Elective | 3 | 3 | 0 | 0 | 20 | - | 30 | 50 | - | |
| | 5 | IBT5201/5203/...../ UEC5201/5203/ | Elective 3/University Elective I | Elective | 2 | 2 | 0 | 0 | 20 | - | 30 | 50 | - | |

## Semester-II

| | S.No. | Course Code | Course Name | Type/Area | Cr | L | T | P | CWS | PRS | MTE | ETE | PRE | Total Credits |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Group C | 1 | IBT502 | Funtional Genomics and proteomics | Core | 4 | 4 | 0 | 0 | 15 | 25 | 20 | 40 | - | 17 |
| | 2 | IBT504 | Bioprocess engineering and reactor design | Core | 4 | 3 | 0 | 2 | 15 | 25 | 20 | 40 | - | |
| Group D | 3 | IBT5402/5404/..... | Elective 4 | Elective | 4 | 3/4 | 0/0 | 2/0 | 15/20 | 25/0 | 20/30 | 40/50 | - | |
| | 4 | IBT5302/5304/..... | Elective 5 | Elective | 3 | 3 | 0 | 0 | 20 | - | 30 | 50 | - | |
| | 5 | IBT5202/5204/...../ UEC5202/5204/ | Elective 6/University Elective II | Elective | 2 | 2 | 0 | 0 | 20 | - | 30 | 50 | - | |

## Semester-III

| | S.No. | Course Code | Course Name | Type/Area | Cr | L | T | P | CWS | PRS | MTE | ETE | PRE | Total Credits |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Track 1 | | | | | | | | | | | | | |
| Group E | 1 | IBT651 | Research Project | Core | 12 | | | | | | | | | 12 |
| | Track 2 | | | | | | | | | | | | | |
| | 1 | IBT601 | Major Project I | Core | 3 | | | | | | 40 | 60 | | |
| | 2 | IBT6401/6403/..... | Elective 7 | Elective | 4 | 3/4 | 0/0 | 2/0 | 15/20 | 25/0 | 20/30 | 40/50 | - | |
| | 3 | IBT6301/6303/..... | Elective 8 | Elective | 3 | 3 | 0 | 0 | 20 | - | 30 | 50 | - | |
| | 4 | IBT6201/6203/..... | Elective 9 | Elective | 2 | 2 | 0 | 0 | 20 | - | 30 | 50 | - | |

## Semester-IV

| | S.No. | Course Code | Course Name | Type/Area | Cr | L | T | P | CWS | PRS | MTE | ETE | PRE | Total Credits |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Group F | Track 1 | | | | | | | | | | | | | |
| | 1 | IBT652 | Research Project | Core | 12 | | | | | | 40 | 60 | | 82 |
| | Track 2 | | | | | | | | | | | | | |
| | 1 | IBT602 | Major Project II | Core | 12 | | | | | | 40 | 60 | | |

## List of Elective Courses

LIST OF ELECTIVES :

| | S.No. | Course Code | Course Name | Type/Area | Cr | L | T | P | CWS | PRS | MTE | ETE | PRE |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Elective 1 | 1 | IBT5401 | Bioinstrumentation | Elective | 4 | 3 | 0 | 2 | 15 | 25 | 20 | 40 | 15 |
| | 2 | IBT5403 | Bioseparation Technology | | 4 | 4 | 0 | 0 | 20 | - | 30 | 50 | - |
| | 3 | IBT5405 | Nutraceuticals and Functional Foods | | 4 | 4 | 0 | 0 | 20 | - | 30 | 50 | - |
| | 4 | IBT5407 | Recombinant DNA Technology | | 4 | 4 | 0 | 0 | 20 | - | 30 | 50 | - |
| | | | | | | | | | | | | | |
| | S.No. | Course Code | Course Name | Type/Area | Cr | L | T | P | CWS | PRS | MTE | ETE | PRE |
| Elective 2 | 1 | IBT5301 | Industrial Microbiology and Fermentation Technology | Elective | 3 | 3 | 0 | 0 | 20 | - | 30 | 50 | - |
| | 2 | IBT5303 | Food Engineering & Biotechnology | | 3 | 3 | 0 | 0 | 20 | - | 30 | 50 | - |
| | 3 | IBT5305 | Green Energy | | 3 | 3 | 0 | 0 | 20 | - | 30 | 50 | - |
| | 4 | IBT5307 | Medical Biotechnology and Health Care | | 3 | 3 | 0 | 0 | 20 | - | 30 | 50 | - |
| | | | | | | | | | | | | | |
| | S.No. | Course Code | Course Name | Type/Area | Cr | L | T | P | CWS | PRS | MTE | ETE | PRE |
| Elective 3 | 1 | IBT5201 | SEMINAR | Elective | 2 | 0 | 0 | 2 | - | 100 | - | - | - |
| | 2 | IBT5203 | Nutritional biochemistry | | 2 | 2 | 0 | 0 | 20 | - | 30 | 50 | - |
| | 3 | IBT5205 | Algal Biotechnology | | 2 | 2 | 0 | 0 | 20 | - | 30 | 50 | - |
| | 4 | IBT5207 | Applied molecular biology and genetics engineering | | 2 | 2 | 0 | 0 | 20 | - | 30 | 50 | - |
| | | | | | | | | | | | | | |
| | S.No. | Course Code | Course Name | Type/Area | Cr | L | T | P | CWS | PRS | MTE | ETE | PRE |
| Elective 4 | 1 | IBT5402 | Advanced Genetic Engineering | Elective | 4 | 3 | 0 | 2 | 15 | 25 | 20 | 40 | 15 |
| | 2 | IBT5404 | Biopolymer Technology | | 4 | 4 | 0 | 0 | 20 | - | 30 | 50 | - |
| | 3 | IBT5406 | Quality Management | | 4 | 4 | 0 | 0 | 20 | - | 30 | 50 | - |
| | 4 | IBT5408 | Plant Molecular Farming | | 4 | 4 | 0 | 0 | 20 | - | 30 | 50 | - |
| | | | | | | | | | | | | | |

| | S.No. | Course Code | Course Name | Type/Area | Cr | L | T | P | CWS | PRS | MTE | ETE | PRE |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Elective 5 | 1 | IBT5302 | Minor Project | Elective | 3 | 0 | 0 | - | - | 40 | - | - | 60 |
| | 2 | IBT5304 | Biopharmaceuticals | | 3 | 3 | 0 | 0 | 20 | - | 30 | 50 | - |
| | 3 | IBT5306 | Biochemical Thermodynamics | | 3 | 3 | 0 | 0 | 20 | - | 30 | 50 | - |
| | 4 | IBT5308 | Transport Phenomenon | | 3 | 3 | 0 | 0 | 20 | - | 30 | 50 | - |
| | | | | | | | | | | | | | |
| | S.No. | Course Code | Course Name | Type/Area | Cr | L | T | P | CWS | PRS | MTE | ETE | PRE |
| Elective 6 | 1 | IBT5202 | Nanobiotechnology | Elective | 2 | 2 | 0 | 0 | 20 | - | 30 | 50 | - |
| | 2 | IBT5204 | Biosensor Technology | | 2 | 2 | 0 | 0 | 20 | - | 30 | 50 | - |
| | 3 | IBT5206 | Advanced Computational Genomics | | 2 | 2 | 0 | 0 | 20 | - | 30 | 50 | - |
| | 4 | IBT5208 | Food Microbiology | | 2 | 2 | 0 | 0 | 20 | - | 30 | 50 | - |
| | | | | | | | | | | | | | |
| | S.No. | Course Code | Course Name | Type/Area | Cr | L | T | P | CWS | PRS | MTE | ETE | PRE |
| Elective 7 | 1 | IBT6401 | Enzyme Technology and Industrial Applications | Elective | 4 | 3 | 0 | 2 | 15 | 25 | 20 | 40 | - |
| | 2 | IBT6403 | Metabolic Engineering | | 4 | 4 | 0 | 0 | 20 | - | 30 | 50 | - |
| | 3 | IBT6405 | Vaccine Technology Advanced Biochemistry | | 4 | 4 | 0 | 0 | 20 | - | 30 | 50 | - |
| | 4 | IBT6407 | Advanced Biochemistry | | 4 | 4 | 0 | 0 | 20 | - | 30 | 50 | - |
| | | | | | | | | | | | | | |
| | S.No. | Course Code | Course Name | Type/Area | Cr | L | T | P | CWS | PRS | MTE | ETE | PRE |
| Elective 8 | 1 | IBT6301 | Industrial waste water treatment | Elective | 3 | 3 | 0 | 0 | 20 | - | 30 | 50 | - |
| | 2 | IBT6303 | Metagenomics | | 3 | 3 | 0 | 0 | 20 | - | 30 | 50 | - |
| | 3 | IBT6305 | Transgenic Technology | | 3 | 3 | 0 | 0 | 20 | - | 30 | 50 | - |
| | 4 | IBT6307 | Biomaterials | | 3 | 3 | 0 | 0 | 20 | - | 30 | 50 | - |
| | | | | | | | | | | | | | |
| | S.No. | Course Code | Course Name | Type/Area | Cr | L | T | P | CWS | PRS | MTE | ETE | PRE |
| Elective 9 | 1 | IBT6201 | Bioethics, Biosafety and IPR | Elective | 2 | 2 | 0 | 0 | 20 | - | 30 | 50 | - |
| | 2 | IBT6203 | Bioprocess Plant Design | | 2 | 2 | 0 | 0 | 20 | - | 30 | 50 | - |
| | 3 | IBT6205 | Advanced Animal Biotechnology | | 2 | 2 | 0 | 0 | 20 | - | 30 | 50 | - |
| | 4 | IBT6207 | Microbial Biotechnology | | 2 | 2 | 0 | 0 | 20 | - | 30 | 50 | - |
| | | | | | | | | | | | | | |

DELHI TECHNOLOGICAL UNIVERSITY

SCHEME OF EXAMINATION

MASTER OF TECHNOLOGY IN ENVIRONMENTAL ENGINEERING ( ENE )

## Semester-I

| | S.No. | Course Code | Course Name | Type/Area | Cr | L | T | P | CWS | PRS | MTE | ETE | PRE | Total Credits |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Group A | 1 | ENE501 | Water Pollution | Core | 4 | 3 | 0 | 2 | 15 | 25 | 20 | 40 | - | 17 |
| | 2 | ENE503 | Air Pollution & Control | Core | 4 | 3 | 0 | 2 | 15 | 25 | 20 | 40 | - | |
| Group B | 3 | ENE5401/5403/..... | Elective 1 | Elective | 4 | 3/4 | 0 | 2/0 | 15/20 | 25/0 | 20/30 | 40/50 | - | |
| | 4 | ENE5301/5303/..... | Elective 2 | Elective | 3 | 3/2 | 0 | 0/2 | 20/15 | 0/25 | 30/20 | 50/40 | - | |
| | 5 | ENE5201/5203/...../ UEC5201/5203/ | Elective 3/University Elective I | Elective | 2 | 2 | 0 | 0 | 20 | - | 30 | 50 | - | |

## Semester-II

| | S.No. | Course Code | Course Name | Type/Area | Cr | L | T | P | CWS | PRS | MTE | ETE | PRE | Total Credits |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Group C | 1 | ENE502 | Water Engineering Design | Core | 4 | 3 | 0 | 2 | 15 | 25 | 20 | 40 | - | 17 |
| | 2 | ENE504 | Solid Waste Management | Core | 4 | 3 | 0 | 2 | 15 | 25 | 20 | 40 | - | |
| Group D | 3 | ENE5402/5404/..... | Elective 4 | Elective | 4 | 3/4 | 0 | 2/0 | 15/20 | 25/0 | 20/30 | 40/50 | - | |
| | 4 | ENE5302/5304/..... | Elective 5 | Elective | 3 | 3 | 0 | 0 | 20 | - | 30 | 50 | - | |
| | 5 | ENE5202/5204/...../ UEC5202/5204/ | Elective 6/University Elective II | Elective | 2 | 2 | 0 | 0 | 20 | - | 30 | 50 | - | |

## Semester-III

| | S.No. | Course Code | Course Name | Type/Area | Cr | L | T | P | CWS | PRS | MTE | ETE | PRE | Total Credits |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Track 1 | | | | | | | | | | | | | 12 |
| Group E | 1 | ENE651 | Research Project | Core | 12 | | | | | | | | | |
| | Track 2 | | | | | | | | | | | | | |
| | 1 | ENE601 | Major Project I | Core | 3 | | | | | | 40 | 60 | | |
| | 2 | ENE6401/6403/..... | Elective 7 | Elective | 4 | 3/4 | 0 | 2/0 | 15/20 | 25/0 | 20/30 | 40/50 | - | |
| | 3 | ENE6301/6303/..... | Elective 8 | Elective | 3 | 3/2 | 0 | 0/2 | 20/15 | 0/25 | 30/20 | 50/40 | - | |
| | 4 | ENE6201/6203/..... | Elective 9 | Elective | 2 | 2 | 0 | 0 | 20 | - | 30 | 50 | - | |

| Semester-IV | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | S.No. | Course Code | Course Name | Type/Area | Cr | L | T | P | CWS | PRS | MTE | ETE | PRE | Total Credits |
| Group F | Track 1 | | | | | | | | | | | | | 12 |
| | 1 | ENE652 | Research Project | Core | 12 | 0 | 0 | 12 | 0 | - | 0 | 100 | - | |
| | Track 2 | | | | | | | | | | | | | |
| | 1 | ENE602 | Major Project II | Core | 12 | 0 | 0 | 12 | 0 | - | 0 | 100 | - | |

## List of Elective Courses

| LIST OF ELECTIVES : | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | S.No. | Course Code | Course Name | Type/Area | Cr | L | T | P | CWS | PRS | MTE | ETE | PRE |
| Elective 1 | 1 | ENE5401 | Industrial Wastewater Treatment | Elective | 4 | 3 | 0 | 2 | 15 | 25 | 20 | 40 | - |
| | 2 | ENE5403 | Planning & Design of Environmental Services | | 4 | 4 | 0 | 0 | 20 | - | 30 | 50 | - |
| | 3 | ENE5405 | Groundwater & Seepage | | 4 | 4 | 0 | 0 | 20 | - | 30 | 50 | - |
| | | | | | | | | | | | | | |
| | | | | | | | | | | | | | |
| | S.No. | Course Code | Course Name | Type/Area | Cr | L | T | P | CWS | PRS | MTE | ETE | PRE |
| Elective 2 | 1 | ENE5301 | Environmental Chemistry & Microbiology | Elective | 3 | 2 | 0 | 2 | 15 | 25 | 20 | 40 | - |
| | 2 | ENE5303 | Occupational Safety & Health | | 3 | 3 | 0 | 0 | 20 | - | 30 | 50 | - |
| | 3 | ENE5305 | Instrumentation | | 3 | 2 | 0 | 2 | 15 | 25 | 20 | 40 | - |
| | | | | | | | | | | | | | |
| | | | | | | | | | | | | | |
| | S.No. | Course Code | Course Name | Type/Area | Cr | L | T | P | CWS | PRS | MTE | ETE | PRE |
| Elective 3 | 1 | ENE5201 | SEMINAR | Elective | 2 | 0 | 0 | 2 | - | 100 | - | - | - |
| | 2 | ENE5203 | Advanced Mathematics & Statistics | | 2 | 2 | 0 | 0 | 20 | - | 30 | 50 | - |
| | 3 | ENE5205 | Design of Hydraulic Structures | | 2 | 2 | 0 | 0 | 20 | - | 30 | 50 | - |
| | | | | | | | | | | | | | |
| | | | | | | | | | | | | | |

| | S.No. | Course Code | Course Name | Type/Area | Cr | L | T | P | CWS | PRS | MTE | ETE | PRE |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Elective 4 | 1 | ENE5402 | Global Warming & Climate Change | Elective | 4 | 4 | 0 | 0 | 20 | - | 30 | 50 | - |
| | 2 | ENE5404 | Waste Containment & Remediation Technology | | 4 | 3 | 0 | 2 | 15 | 25 | 20 | 40 | - |
| | 3 | ENE5406 | Environmental Planning & Management | | 4 | 4 | 0 | 0 | 20 | - | 30 | 50 | - |
| | | | | | | | | | | | | | |
| | | | | | | | | | | | | | |
| | S.No. | Course Code | Course Name | Type/Area | Cr | L | T | P | CWS | PRS | MTE | ETE | PRE |
| Elective 5 | 1 | ENE5302 | MINOR PROJECT | Elective | 3 | 0 | 0 | - | - | 40 | - | - | 60 |
| | 2 | ENE5304 | Environmental Monitoring & Assessment | | 3 | 3 | 0 | 0 | 20 | - | 30 | 50 | - |
| | 3 | ENE5306 | Green Technology & Sustainability | | 3 | 3 | 0 | 0 | 20 | - | 30 | 50 | - |
| | | | | | | | | | | | | | |
| | | | | | | | | | | | | | |
| | S.No. | Course Code | Course Name | Type/Area | Cr | L | T | P | CWS | PRS | MTE | ETE | PRE |
| Elective 6 | 1 | ENE5202 | Environmental Policy & Law | Elective | 2 | 2 | 0 | 0 | 20 | - | 30 | 50 | - |
| | 2 | ENE5204 | Human Values & Ethics | | 2 | 2 | 0 | 0 | 20 | - | 30 | 50 | - |
| | | | | | | | | | | | | | |
| | | | | | | | | | | | | | |
| | | | | | | | | | | | | | |
| | S.No. | Course Code | Course Name | Type/Area | Cr | L | T | P | CWS | PRS | MTE | ETE | PRE |
| Elective 7 | 1 | ENE6401 | Environment Impact Assessment &Audit | Elective | 4 | 4 | 0 | 0 | 20 | - | 30 | 50 | - |
| | 2 | ENE6403 | Remote Sensing & GIS | | 4 | 3 | 0 | 2 | 15 | 25 | 20 | 40 | - |
| | | | | | | | | | | | | | |
| | | | | | | | | | | | | | |
| | | | | | | | | | | | | | |
| | S.No. | Course Code | Course Name | Type/Area | Cr | L | T | P | CWS | PRS | MTE | ETE | PRE |
| Elective 8 | 1 | ENE6301 | Air Quality Modeling | Elective | 3 | 2 | 0 | 2 | 15 | 25 | 20 | 40 | - |
| | 2 | ENE6303 | Life Cycle Assessment | | 3 | 3 | 0 | 0 | 20 | - | 30 | 50 | - |
| | | | | | | | | | | | | | |
| | | | | | | | | | | | | | |
| | | | | | | | | | | | | | |
| | S.No. | Course Code | Course Name | Type/Area | Cr | L | T | P | CWS | PRS | MTE | ETE | PRE |
| Elective 9 | 1 | ENE6201 | Hazardous Waste Management | Elective | 2 | 2 | 0 | 0 | 20 | - | 30 | 50 | - |
| | 2 | ENE6203 | Bioremediation | | 2 | 2 | 0 | 0 | 20 | - | 30 | 50 | - |
| | | | | | | | | | | | | | |
| | | | | | | | | | | | | | |
| | | | | | | | | | | | | | |

**DELHI TECHNOLOGICAL UNIVERSITY**
**SCHEME OF EXAMINATION**
**MASTER OF TECHNOLOGY IN HYDRAULICS & WATER RESOURCES ENGINEERING ( HFE )**

## Semester-I

| | S.No. | Course Code | Course Name | Type/Area | Cr | L | T | P | CWS | PRS | MTE | ETE | PRE | Total Credits |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Group A | 1 | HFE501 | Computational Hydraulics | Core | 4 | 3 | 0 | 2 | 15 | 25 | 20 | 40 | - | |
| | 2 | HFE503 | Advanceed fluid Mechanics | Core | 4 | 3 | 0 | 2 | 15 | 25 | 20 | 40 | - | |
| Group B | 3 | HFE5401/5403/..... | Elective 1 | Elective | 4 | 3 | 0 | 2 | 15 | 25 | 20 | 40 | - | 17 |
| | 4 | HFE5301/5303/..... | Elective 2 | Elective | 3 | 2 | 0 | 0 | 20 | - | 30 | 50 | - | |
| | 5 | HFE5201/5203/...../ UEC5201/5203/ | Elective 3/University Elective I | Elective | 2 | 2 | 0 | 0 | 20 | - | 30 | 50 | - | |

## Semester-II

| | S.No. | Course Code | Course Name | Type/Area | Cr | L | T | P | CWS | PRS | MTE | ETE | PRE | Total Credits |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Group C | 1 | HFE502 | Water Resources Systems Planning and management | Core | 4 | 3 | 0 | 2 | 15 | 25 | 20 | 40 | - | |
| | 2 | HFE504 | Advanced open channel Hydraulics | Core | 4 | 3 | 0 | 2 | 15 | 25 | 20 | 40 | - | |
| Group D | 3 | HFE5402/5404/..... | Elective 4 | Elective | 4 | 3 | 0 | 2 | 15 | 25 | 20 | 40 | - | 17 |
| | 4 | HFE5302/5304/..... | Elective 5 | Elective | 3 | 3 | 0 | 0 | 20 | - | 30 | 50 | - | |
| | 5 | HFE5202/5204/...../ UEC5202/5204/ | Elective 6/University Elective II | Elective | 2 | 2 | 0 | 0 | 20 | - | 30 | 50 | - | |

## Semester-III

| | S.No. | Course Code | Course Name | Type/Area | Cr | L | T | P | CWS | PRS | MTE | ETE | PRE | Total Credits |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Track 1 | | | | | | | | | | | | | |
| Group E | 1 | HFE651 | Research Project | Core | 12 | 0 | 0 | 12 | 0 | - | 0 | 100 | 0 | |
| | Track 2 | | | | | | | | | | | | | |
| | 1 | HFE601 | Major Project I | Core | 3 | 0 | 0 | 6 | 0 | - | 0 | 100 | 0 | 12 |
| | 2 | HFE6401/6403/..... | Elective 7 | Elective | 4 | 3 | 0 | 2 | 15 | 25 | 20 | 40 | - | |
| | 3 | HFE6301/6303/..... | Elective 8 | Elective | 3 | 3 | 0 | 0 | 20 | - | 30 | 50 | - | |
| | 4 | HFE6201/6203/..... | Elective 9 | Elective | 2 | 2 | 0 | 0 | 20 | - | 30 | 50 | - | |

## Semester-IV

| | S.No. | Course Code | Course Name | Type/Area | Cr | L | T | P | CWS | PRS | MTE | ETE | PRE | Total Credits |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Group F | Track 1 | | | | | | | | | | | | | |
| | 1 | HFE652 | Research Project | Core | 12 | 0 | 0 | 12 | 0 | - | 0 | 100 | 0 | 12 |
| | Track 2 | | | | | | | | | | | | | |
| | 1 | HFE602 | Major Project II | Core | 12 | | | | | | 40 | 60 | | |

## List of Elective Courses

| LIST OF ELECTIVES : | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | S.No. | Course Code | Course Name | Type/Area | Cr | L | T | P | CWS | PRS | MTE | ETE | PRE |
| Elective 1 | 1 | HFE5401 | Advanced Hydrology | Elective | 4 | 3 | 0 | 2 | 15 | 25 | 20 | 40 | - |
| | 2 | HFE5403 | Environmental Hydraulics | | 4 | 3 | 0 | 2 | 15 | 25 | 20 | 40 | - |
| | 3 | HFE5405 | Coastal Engineering | | 4 | 3 | 0 | 2 | 15 | 25 | 20 | 40 | - |
| | 4 | HFE5407 | Systems Engineering | | 4 | 3 | 0 | 2 | 15 | 25 | 20 | 40 | - |
| | | | | | | | | | | | | | |
| | S.No. | Course Code | Course Name | Type/Area | Cr | L | T | P | CWS | PRS | MTE | ETE | PRE |
| Elective 2 | 1 | HFE5301 | Water Power Engineering | Elective | 3 | 3 | 0 | 0 | 20 | 0 | 30 | 50 | - |
| | 2 | HFE5303 | Geotechnical Earthquake Engineering | | 3 | 3 | 0 | 0 | 20 | 0 | 30 | 50 | - |
| | 3 | HFE5305 | Sediment Transport | | 3 | 3 | 0 | 0 | 20 | 0 | 30 | 50 | - |
| | 4 | HFE5307 | Water and Soil Conservation Engineering | | 3 | 3 | 0 | 0 | 20 | 0 | 30 | 50 | - |
| | | | | | | | | | | | | | |
| | S.No. | Course Code | Course Name | Type/Area | Cr | L | T | P | CWS | PRS | MTE | ETE | PRE |
| Elective 3 | 1 | HFE5201 | Seminar | Elective | 2 | 0 | 0 | 2 | - | 100 | - | - | - |
| | 2 | HFE5203 | Environmental System Modelling | | 2 | 2 | 0 | 0 | 20 | 0 | 30 | 50 | 0 |
| | 3 | HFE5205 | Engineering Risk Analysis | | 2 | 2 | 0 | 0 | 20 | 0 | 30 | 50 | 0 |
| | 4 | HFE5207 | Urban Water Infrastructure | | 2 | 2 | 0 | 0 | 20 | 0 | 30 | 50 | 0 |
| | | | | | | | | | | | | | |
| | S.No. | Course Code | Course Name | Type/Area | Cr | L | T | P | CWS | PRS | MTE | ETE | PRE |
| Elective 4 | 1 | HFE5402 | Design of Flood Control and River Training Works | Elective | 4 | 3 | 0 | 2 | 15 | 25 | 20 | 40 | - |
| | 2 | HFE5404 | Irrigation and Drainage Engineering | | 4 | 3 | 0 | 2 | 15 | 25 | 20 | 40 | - |
| | 3 | HFE5406 | Hydrometeorology | | 4 | 3 | 0 | 2 | 15 | 25 | 20 | 40 | - |
| | 4 | HFE5408 | Hydro-Informatics and Simulations | | 4 | 3 | 0 | 2 | 15 | 25 | 20 | 40 | - |
| | | | | | | | | | | | | | |
| | S.No. | Course Code | Course Name | Type/Area | Cr | L | T | P | CWS | PRS | MTE | ETE | PRE |
| Elective 5 | 1 | HFE5302 | MINOR PROJECT | Elective | 3 | 0 | 0 | - | - | 40 | - | - | 60 |
| | 2 | HFE5304 | Applications of GIS and Remote Sensing in Water Res | | 3 | 3 | 0 | 0 | 20 | - | 30 | 50 | - |
| | 3 | HFE5306 | Soil Structure Interaction | | 3 | 3 | 0 | 0 | 20 | - | 30 | 50 | - |
| | 4 | HFE5308 | Disaster Mitigation and Management | | 3 | 3 | 0 | 0 | 20 | - | 30 | 50 | - |
| | | | | | | | | | | | | | |

| | S.No. | Course Code | Course Name | Type/Area | Cr | L | T | P | CWS | PRS | MTE | ETE | PRE |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Elective 6 | 1 | HFE5202 | Ground Water Hydrology | Elective | 2 | 2 | 0 | 0 | 20 | 0 | 30 | 50 | - |
| | 2 | HFE5204 | Transients in Pipes | | 2 | 2 | 0 | 0 | 20 | 0 | 30 | 50 | - |
| | 3 | HFE5206 | Offshore Geotechnical Engineering | | 2 | 2 | 0 | 0 | 20 | 0 | 30 | 50 | - |
| | 4 | HFE5208 | Waste to Energy | | 2 | 2 | 0 | 0 | 20 | 0 | 30 | 50 | - |
| | | | | | | | | | | | | | |
| | S.No. | Course Code | Course Name | Type/Area | Cr | L | T | P | CWS | PRS | MTE | ETE | PRE |
| Elective 7 | 1 | HFE6401 | Design of Hydraulic Structures | Elective | 4 | 3 | 0 | 2 | 15 | 25 | 20 | 40 | - |
| | 2 | HFE6403 | Environmental Impact Assessment | | 4 | 3 | 0 | 2 | 15 | 25 | 20 | 40 | - |
| | 3 | HFE6405 | Water pollution control and stream Sanitation | | 4 | 3 | 0 | 2 | 15 | 25 | 20 | 40 | - |
| | 4 | HFE6407 | Stability Analysisof Slopes | | 4 | 3 | 0 | 2 | 15 | 25 | 20 | 40 | - |
| | | | | | | | | | | | | | |
| | S.No. | Course Code | Course Name | Type/Area | Cr | L | T | P | CWS | PRS | MTE | ETE | PRE |
| Elective 8 | 1 | HFE6301 | Water Resources Economics | Elective | 3 | 3 | 0 | 0 | 20 | - | 30 | 50 | - |
| | 2 | HFE6303 | An Introduction to Sustainable development | | 3 | 3 | 0 | 0 | 20 | - | 30 | 50 | - |
| | 3 | HFE6305 | Ground Improvement Techniques | | 3 | 3 | 0 | 0 | 20 | - | 30 | 50 | - |
| | 4 | HFE6307 | Probability and Statistical Methods in Engineering | | 3 | 2 | 0 | 2 | 15 | 25 | 20 | 40 | - |
| | | | | | | | | | | | | | |
| | S.No. | Course Code | Course Name | Type/Area | Cr | L | T | P | CWS | PRS | MTE | ETE | PRE |
| Elective 9 | 1 | HFE6201 | Subsurface Investigations | Elective | 2 | 2 | 0 | 0 | 20 | - | 30 | 50 | - |
| | 2 | HFE6203 | Introduction to AI Techniques | | 2 | 2 | 0 | 0 | 20 | - | 30 | 50 | - |
| | 3 | HFE6205 | Geotechnical Practice for Waste Management Syster | | 2 | 2 | 0 | 0 | 20 | - | 30 | 50 | - |
| | | | | | | | | | | | | | |
| | | | | | | | | | | | | | |

DELHI TECHNOLOGICAL UNIVERSITY
SCHEME OF EXAMINATION
MASTER OF TECHNOLOGY IN COMPUTATIONAL DESIGN ( CDN )

## Semester-I

| | S.No. | Course Code | Course Name | Type/Area | Cr | L | T | P | CWS | PRS | MTE | ETE | PRE | Total Credits |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Group A | 1 | CDN501 | System Modelling ,Simulation and Analysis | Core | 4 | 3 | 0 | 2 | 15 | 25 | 20 | 40 | - | 17 |
| | 2 | CDN503 | Computational Mechanics of Materials | Core | 4 | 4 | 0 | 0 | 20 | - | 25 | 50 | - | |
| Group B | 3 | CDN5401/5403/..... | Elective 1 | Elective | 4 | 3 | 0 | 2 | 15 | 25 | 20 | 40 | - | |
| | 4 | CDN5301/5303/..... | Elective 2 | Elective | 3 | 3 | 0 | 0 | 20 | - | 30 | 50 | - | |
| | 5 | CDN5201/5203/...../ UECS201/5203/ | Elective 3/University Elective I | Elective | 2 | 2 | 0 | 0 | 20 | - | 30 | 50 | - | |

## Semester-II

| | S.No. | Course Code | Course Name | Type/Area | Cr | L | T | P | CWS | PRS | MTE | ETE | PRE | Total Credits |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Group C | 1 | CDN502 | Finite Element Method | Core | 4 | 3 | 0 | 2 | 15 | 25 | 20 | 40 | - | 17 |
| | 2 | CDN504 | Robotics | Core | 4 | 3 | 0 | 2 | 15 | 25 | 20 | 40 | - | |
| Group D | 3 | CDN5402/5404/..... | Elective 4 | Elective | 4 | 3 | 0 | 2 | 15 | 25 | 20 | 40 | - | |
| | 4 | CDN5302/5304/..... | Elective 5 | Elective | 3 | 3 | 0 | 0 | 20 | - | 30 | 50 | - | |
| | 5 | CDN5202/5204/...../ UECS202/5204/ | Elective 6/University Elective II | Elective | 2 | 2 | 0 | 0 | 20 | - | 30 | 50 | - | |

## Semester-III

| | S.No. | Course Code | Course Name | Type/Area | Cr | L | T | P | CWS | PRS | MTE | ETE | PRE | Total Credits |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Track 1 | | | | | | | | | | | | | 12 |
| Group E | 1 | CDN651 | Research Project | Core | 12 | 0 | 0 | 12 | 0 | - | 0 | 100 | 0 | |
| | Track 2 | | | | | | | | | | | | | |
| | 1 | CDN601 | Major Project I | Core | 3 | | | | | | 40 | 60 | | |
| | 2 | CDN6401/6403/..... | Elective 7 | Elective | 4 | 3 | 0 | 2 | 15 | 25 | 20 | 40 | - | |
| | 3 | CDN6301/6303/..... | Elective 8 | Elective | 3 | 3 | 0 | 0 | 20 | - | 30 | 50 | - | |
| | 4 | CDN6201/6203/..... | Elective 9 | Elective | 2 | 2 | 0 | 0 | 20 | - | 30 | 50 | - | |

## Semester-IV

| | S.No. | Course Code | Course Name | Type/Area | Cr | L | T | P | CWS | PRS | MTE | ETE | PRE | Total Credits |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Group F | Track 1 | | | | | | | | | | | | | 12 |
| | 1 | CDN652 | Research Project | Core | 12 | 0 | 0 | 12 | 0 | - | 0 | 100 | 0 | |
| | Track 2 | | | | | | | | | | | | | |
| | 1 | CDN602 | Major Project II | Core | 12 | 0 | 0 | 12 | 0 | - | 0 | 100 | 0 | |

## List of Elective Courses

| LIST OF ELECTIVES : | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | S.No. | Course Code | Course Name | Type/Area | Cr | L | T | P | CWS | PRS | MTE | ETE | PRE |
| Elective 1 | 1 | CDN5401 | Advanced theory of Vibration and Cor | Elective | 4 | 3 | 0 | 2 | 15 | 25 | 20 | 40 | - |
| | 2 | CDN5403 | Fracture Mechanics | | 4 | 3 | 0 | 2 | 15 | 25 | 20 | 40 | - |
| | 3 | CDN5405 | Theory of elasticity and plasticity | | 4 | 3 | 0 | 2 | 15 | 25 | 20 | 40 | - |
| | | | | | | | | | | | | | |
| | | | | | | | | | | | | | |
| | S.No. | Course Code | Course Name | Type/Area | Cr | L | T | P | CWS | PRS | MTE | ETE | PRE |
| Elective 2 | 1 | CDN5301 | Optimization Techniques in Design | Elective | 3 | 3 | 0 | 0 | 20 | - | 30 | 50 | - |
| | 2 | CDN5303 | Numerical Methods in Engineering | | 3 | 3 | 0 | 0 | 20 | - | 30 | 50 | - |
| | 3 | CDN5305 | Design of Experiments | | 3 | 3 | 0 | 0 | 20 | - | 30 | 50 | - |
| | | | | | | | | | | | | | |
| | | | | | | | | | | | | | |
| | S.No. | Course Code | Course Name | Type/Area | Cr | L | T | P | CWS | PRS | MTE | ETE | PRE |
| Elective 3 | 1 | CDN5201 | Seminar | Elective | 2 | 0 | 0 | 2 | - | 100 | - | - | - |
| | 2 | CDN5203 | Smart Structures and Materials | | 2 | 2 | 0 | 0 | 20 | - | 30 | 50 | - |
| | 3 | CDN5205 | Human Factors in Engineering and Biochemical Design | | 2 | 2 | 0 | 0 | 20 | - | 30 | 50 | - |
| | 4 | CDN5307 | Design for Manufacture | | 2 | 2 | 0 | 0 | 20 | - | 30 | 50 | - |
| | | | | | | | | | | | | | |
| | S.No. | Course Code | Course Name | Type/Area | Cr | L | T | P | CWS | PRS | MTE | ETE | PRE |
| Elective 4 | 1 | CDN5402 | Engineering Tribology and Bearing De | Elective | 4 | 3 | 0 | 2 | 15 | 25 | 20 | 40 | - |
| | 2 | CDN5404 | Rapid Prototyping and Tooling | | 4 | 3 | 0 | 2 | 15 | 25 | 20 | 40 | - |
| | 3 | CDN5406 | Innovative Engineering Design | | 4 | 3 | 0 | 2 | 15 | 25 | 20 | 40 | - |
| | | | | | | | | | | | | | |
| | | | | | | | | | | | | | |
| | S.No. | Course Code | Course Name | Type/Area | Cr | L | T | P | CWS | PRS | MTE | ETE | PRE |
| Elective 5 | 1 | CDN5302 | MINOR PROJECT | Elective | 3 | 0 | 0 | - | - | 40 | - | - | 60 |
| | 2 | CDN5304 | Rotor Dynamics | | 3 | 3 | 0 | 0 | 20 | - | 30 | 50 | - |
| | 3 | CDN5306 | Product Design and Development | | 3 | 3 | 0 | 0 | 20 | - | 30 | 50 | - |
| | | | | | | | | | | | | | |
| | | | | | | | | | | | | | |

| | S.No. | Course Code | Course Name | Type/Area | Cr | L | T | P | CWS | PRS | MTE | ETE | PRE |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Elective 6 | 1 | CDN5202 | Reliability Engineering | Elective | 2 | 2 | 0 | 0 | 20 | - | 30 | 50 | - |
| | 2 | CDN5204 | Product Life Cycle Management | | 2 | 2 | 0 | 0 | 20 | - | 30 | 50 | - |
| | 3 | CDN5206 | Noise and Acoustics Design | | 2 | 2 | 0 | 0 | 20 | - | 30 | 50 | - |
| | | | | | | | | | | | | | |
| | | | | | | | | | | | | | |
| | S.No. | Course Code | Course Name | Type/Area | Cr | L | T | P | CWS | PRS | MTE | ETE | PRE |
| Elective 7 | 1 | CDN6401 | Computational Fluid Dynamics | Elective | 4 | 3 | 0 | 2 | 15 | 25 | 20 | 40 | - |
| | 2 | CDN6403 | Machine Tool Design | | 4 | 3 | 0 | 2 | 15 | 25 | 20 | 40 | - |
| | 3 | CDN6405 | Pressure Vessels and Piping Design | | 4 | 3 | 0 | 2 | 15 | 25 | 20 | 40 | - |
| | | | | | | | | | | | | | |
| | | | | | | | | | | | | | |
| | S.No. | Course Code | Course Name | Type/Area | Cr | L | T | P | CWS | PRS | MTE | ETE | PRE |
| Elective 8 | 1 | CDN6301 | Composite Material Technology | Elective | 3 | 3 | 0 | 0 | 20 | - | 30 | 50 | - |
| | 2 | CDN6303 | Mechatronic System Design | | 3 | 3 | 0 | 0 | 20 | - | 30 | 50 | - |
| | 3 | CDN6305 | Instrumentation and Control Systems | | 3 | 3 | 0 | 0 | 20 | - | 30 | 50 | - |
| | | | | | | | | | | | | | |
| | | | | | | | | | | | | | |
| | S.No. | Course Code | Course Name | Type/Area | Cr | L | T | P | CWS | PRS | MTE | ETE | PRE |
| Elective 9 | 1 | CDN6201 | Computer Aided Design | Elective | 2 | 2 | 0 | 0 | 20 | - | 30 | 50 | - |
| | 2 | CDN6203 | Surface Engineering | | 2 | 2 | 0 | 0 | 20 | - | 30 | 50 | - |
| | 3 | CDN6205 | Automotive System Design | | 2 | 2 | 0 | 0 | 20 | - | 30 | 50 | - |
| | | | | | | | | | | | | | |
| | | | | | | | | | | | | | |

DELHI TECHNOLOGICAL UNIVERSITY

SCHEME OF EXAMINATION

MASTER OF TECHNOLOGY IN COMPUTER SCIENCE & ENGINEERING ( CSE )

## Semester-I

| | S.No. | Course Code | Course Name | Type/Area | Cr | L | T | P | CWS | PRS | MTE | ETE | PRE | Total Credits |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Group A | 1 | CSE501 | Advanced Database Management Systems | Core | 4 | 3 | 0 | 2 | 15 | 25 | 20 | 40 | - | 17 |
| | 2 | CSE503 | Advanced Algorithms and Data Structures | Core | 4 | 3 | 0 | 2 | 15 | 25 | 20 | 40 | - | |
| Group B | 3 | CSE5401/5403/..... | Elective 1 | Elective | 4 | 3 | 0 | 2 | 15 | 25 | 20 | 40 | - | |
| | 4 | CSE5301/5303/..... | Elective 2 | Elective | 3 | 3 | 0 | 0 | 20 | - | 30 | 50 | - | |
| | 5 | CSE5201/5203/...../ UEC5201/5203/ | Elective 3/University Elective I | Elective | 2 | 2 | 0 | 0 | 20 | - | 30 | 50 | - | |

## Semester-II

| | S.No. | Course Code | Course Name | Type/Area | Cr | L | T | P | CWS | PRS | MTE | ETE | PRE | Total Credits |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Group C | 1 | CSE502 | Distributed Systems | Core | 4 | 3 | 0 | 2 | 15 | 25 | 20 | 40 | - | 17 |
| | 2 | CSE504 | Advanced Computer Networks | Core | 4 | 3 | 0 | 2 | 15 | 25 | 20 | 40 | - | |
| Group D | 3 | CSE5402/5404/..... | Elective 4 | Elective | 4 | 3 | 0 | 2 | 15 | 25 | 20 | 40 | - | |
| | 4 | CSE5302/5304/..... | Elective 5 | Elective | 3 | 3 | 0 | 0 | 20 | - | 30 | 50 | - | |
| | 5 | CSE5202/5204/...../ UEC5202/5204/ | Elective 6/University Elective II | Elective | 2 | 2 | 0 | 0 | 20 | - | 30 | 50 | - | |

## Semester-III

| | S.No. | Course Code | Course Name | Type/Area | Cr | L | T | P | CWS | PRS | MTE | ETE | PRE | Total Credits |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Track 1 | | | | | | | | | | | | | |
| Group E | 1 | CSE651 | Research Project | Core | 12 | 0 | 0 | 12 | 0 | - | 0 | 100 | 0 | 12 |
| | Track 2 | | | | | | | | | | | | | |
| | 1 | CSE601 | Major Project I | Core | 3 | | | | | | 40 | 60 | | |
| | 2 | CSE6401/6403/..... | Elective 7 | Elective | 4 | 3/2 | 0 | 2/4 | 10+A34 | 15 | 25 | 50 | - | |
| | 3 | CSE6301/6303/..... | Elective 8 | Elective | 3 | 3/2 | 0 | 0/2 | 20/10 | 15 | 30/25 | 50 | - | |
| | 4 | CSE6201/6203/..... | Elective 9 | Elective | 2 | 2/1 | 0 | 0/2 | 20/10 | 0/15 | 30/25 | 50 | - | |

| Semester-IV | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | S.No. | Course Code | Course Name | Type/Area | Cr | L | T | P | CWS | PRS | MTE | ETE | PRE | Total Credits |
| Group F | Track 1 | | | | | | | | | | | | | 12 |
| | 1 | CSE652 | Research Project | Core | 12 | 0 | 0 | 12 | 0 | - | 0 | 100 | 0 | |
| | Track 2 | | | | | | | | | | | | | |
| | 1 | CSE602 | Major Project II | Core | 12 | | | | | | 40 | 60 | | |

## List of Elective Courses

| LIST OF ELECTIVES : | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | S.No. | Course Code | Course Name | Type/Area | Cr | L | T | P | CWS | PRS | MTE | ETE | PRE |
| Elective 1 | 1 | CSE5401 | Artificial Intelligence and Expert Systems | Elective | 4 | 3 | 0 | 2 | 15 | 25 | 20 | 40 | - |
| | 2 | CSE5403 | Data warehousing and Data Mining | | 4 | 3 | 0 | 2 | 15 | 25 | 20 | 40 | - |
| | 3 | CSE5405 | Design of Embedded Systems | | 4 | 2 | 0 | 4 | 15 | 25 | 20 | 40 | - |
| | 4 | CSE5407 | Information Retrieval | | 4 | 3 | 0 | 2 | 15 | 25 | 20 | 40 | - |
| | 5 | CSE5409 | Soft Computing | | 4 | 3 | 0 | 2 | 15 | 25 | 20 | 40 | - |
| | 6 | CSE5411 | Semantic Web | | 4 | 3 | 0 | 2 | 15 | 25 | 20 | 40 | - |
| | 7 | CSE5413 | Machine Learning | | 4 | 3 | 0 | 2 | 15 | 25 | 20 | 40 | - |
| | | Course Code | Course Name | Type/Area | Cr | L | T | P | CWS | PRS | MTE | ETE | PRE |
| Elective 2 | 1 | CSE5301 | Advanced Computer Graphics. | Elective | 3 | 2 | 0 | 2 | 15 | 25 | 20 | 40 | - |
| | 2 | CSE5303 | Fault Tolerant and testable Systems. | | 3 | 3 | 0 | 0 | 20 | - | 30 | 50 | - |
| | 3 | CSE5305 | VLSI Design | | 3 | 2 | 0 | 2 | 15 | 25 | 20 | 40 | - |
| | 4 | CSE5307 | Parallel Computer Architecture | | 3 | 3 | 0 | 0 | 20 | - | 30 | 50 | - |
| | 5 | CSE5309 | Social Media and Online Marketing | | 3 | 3 | 0 | 0 | 20 | - | 30 | 50 | - |
| | 6 | CSE5311 | Reliable System Design | | 3 | 3 | 0 | 0 | 20 | - | 30 | 50 | - |
| | 7 | CSE5313 | Robotics Engineering | | 3 | 2 | 0 | 2 | 15 | 25 | 20 | 40 | - |
| | | | | | | | | | | | | | |
| | S.No. | Course Code | Course Name | Type/Area | Cr | L | T | P | CWS | PRS | MTE | ETE | PRE |
| Elective 3 | 1 | CSE5201 | SEMINAR | Elective | 2 | 0 | 0 | 2 | - | 100 | - | - | - |
| | 2 | CSE5203 | Distributed Algorithms | | 2 | 2 | 0 | 0 | 20 | - | 30 | 50 | |
| | 3 | CSE5205 | Modeling & Simulation | | 2 | 1 | 0 | 2 | 10 | 15 | 25 | 50 | - |
| | 4 | CSE5207 | Multivariate Calculus | | 2 | 2 | 0 | 0 | 20 | - | 30 | 50 | - |
| | 5 | CSE5209 | Ethical Hacking | | 2 | 2 | 0 | 0 | 20 | - | 30 | 50 | - |

| | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 6 | CSE5211 | Software Lab | | 2 | 1 | 0 | 2 | 10 | 15 | 25 | 50 | - |
| | | | | | | | | | | | | | |
| | S.No. | Course Code | Course Name | Type/Area | Cr | L | T | P | CWS | PRS | MTE | ETE | PRE |
| Elective 4 | 1 | CSE5402 | Wireless & Mobile Communication | Elective | 4 | 3 | 0 | 2 | 15 | 25 | 20 | 40 | - |
| | 2 | CSE5404 | Digital Image Processing | | 4 | 3 | 0 | 2 | 15 | 25 | 20 | 40 | - |
| | 3 | CSE5406 | Software Testing | | 4 | 3 | 0 | 2 | 15 | 25 | 20 | 40 | - |
| | 4 | CSE5408 | Computer Vision | | 4 | 2 | 0 | 4 | 15 | 25 | 20 | 40 | - |
| | 5 | CSE5410 | Applied Cryptography | | 4 | 3 | 0 | 2 | 15 | 25 | 20 | 40 | - |
| | 6 | CSE5412 | Optical Networks | | 4 | 3 | 0 | 2 | 15 | 25 | 20 | 40 | - |
| | S.No. | Course Code | Course Name | Type/Area | Cr | L | T | P | CWS | PRS | MTE | ETE | PRE |
| Elective 5 | 1 | CSE5302 | MINOR PROJECT | Elective | 3 | - | - | - | - | 40 | - | - | 60 |
| | 2 | CSE5304 | Information and Network Security | | 3 | 2 | 0 | 2 | 15 | 25 | 20 | 40 | - |
| | 3 | CSE5306 | Bioinformatics | | 3 | 3 | 0 | 0 | 20 | - | 30 | 50 | - |
| | 4 | CSE5308 | Big Data Analytics | | 3 | 2 | 0 | 2 | 15 | 25 | 20 | 40 | - |
| | 5 | CSE5310 | Security and Privacy in Social Networks | | 3 | 3 | 0 | 0 | 20 | - | 30 | 50 | - |
| | 6 | CSE5312 | Probability and Statistical Theory | | 3 | 3 | 0 | 0 | 20 | - | 30 | 50 | - |
| | 7 | CSE5314 | Business Intelligence | | 3 | 3 | 0 | 0 | 20 | - | 30 | 50 | - |
| | 8 | CSE5316 | Mobile and Cellular Network Security | | 3 | 3 | 0 | 0 | 20 | - | 30 | 50 | - |
| | | | | | | | | | | | | | |
| | S.No. | Course Code | Course Name | Type/Area | Cr | L | T | P | CWS | PRS | MTE | ETE | PRE |
| Elective 6 | 1 | CSE5202 | Optimization Tools | Elective | 2 | 2 | 0 | 0 | 20 | - | 30 | 50 | - |
| | 2 | CSE5204 | Statistical Tools | | 2 | 2 | 0 | 0 | 20 | - | 30 | 50 | - |
| | 3 | CSE5206 | Geo-Informatics | | 2 | 2 | 0 | 0 | 20 | - | 30 | 50 | - |
| | 4 | CSE5208 | Security Tools and Applications | | 2 | 2 | 0 | 0 | 20 | - | 30 | 50 | - |
| | 5 | CSE5210 | Secure Coding | | 2 | 2 | 0 | 0 | 20 | - | 30 | 50 | - |
| | 6 | CSE5212 | Linear Optimization | | 2 | 2 | 0 | 0 | 20 | - | 30 | 50 | - |
| | 7 | CSE5214 | Advances in Multimedia Technology | | 2 | 2 | 0 | 0 | 20 | - | 30 | 50 | - |
| | | | | | | | | | | | | | |

| | S.No. | Course Code | Course Name | Type/Area | Cr | L | T | P | CWS | PRS | MTE | ETE | PRE |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Elective 7 | 1 | CSE6401 | Pattern Recognition | Elective | 4 | 3 | 0 | 2 | 15 | 25 | 20 | 40 | - |
| | 2 | CSE6403 | Software Project Management | | 4 | 3 | 0 | 2 | 15 | 25 | 20 | 40 | - |
| | 3 | CSE6405 | Cluster & Grid Computing | | 4 | 3 | 0 | 2 | 15 | 25 | 20 | 40 | - |
| | 4 | CSE6407 | Internet of Things | | 4 | 3 | 0 | 2 | 15 | 25 | 20 | 40 | - |
| | 5 | CSE6409 | Nanotechnology | | 4 | 2 | 0 | 4 | 15 | 25 | 20 | 40 | - |
| | | | | | | | | | | | | | |
| | S.No. | Course Code | Course Name | Type/Area | Cr | L | T | P | CWS | PRS | MTE | ETE | PRE |
| Elective 8 | 1 | CSE6301 | Natural Language Processing | Elective | 3 | 3 | 0 | 0 | 20 | - | 30 | 50 | - |
| | 2 | CSE6303 | Digital Forensics | | 3 | 3 | 0 | 0 | 20 | - | 30 | 50 | - |
| | 3 | CSE6305 | Game Theory | | 3 | 3 | 0 | 0 | 20 | - | 30 | 50 | - |
| | 4 | CSE6307 | Deep Learning | | 3 | 3 | 0 | 0 | 20 | - | 30 | 50 | - |
| | 5 | CSE6309 | Blockchain and applications | | 3 | 3 | 0 | 0 | 20 | - | 30 | 50 | - |
| | 6 | CSE6311 | Real Time Systems | | 3 | 2 | 0 | 2 | 15 | 25 | 20 | 40 | - |
| | 7 | CSE6313 | Quantum Computing | | 3 | 2 | 0 | 2 | 15 | 25 | 20 | 40 | - |
| | | | | | | | | | | | | | |
| | | | | | | | | | | | | | |
| | S.No. | Course Code | Course Name | Type/Area | Cr | L | T | P | CWS | PRS | MTE | ETE | PRE |
| | 1 | CSE6201 | Research Methodology | | 2 | 2 | 0 | 0 | 20 | - | 30 | 50 | - |
| | 2 | CSE6203 | Enterprise Computing in JAVA | | 2 | 1 | 0 | 2 | 10 | 15 | 25 | 50 | - |
| | 3 | CSE6205 | Advances in Internet & Web Technology | | 2 | 2 | 0 | 0 | 20 | - | 30 | 50 | - |
| | | | | | | | | | | | | | |

DELHI TECHNOLOGICAL UNIVERSITY

SCHEME OF EXAMINATION

MASTER OF TECHNOLOGY IN CONTROL & INSTRUMENTATION ( C&I )

## Semester-I

| | S.No. | Course Code | Course Name | Type/Area | Cr | L | T | P | CWS | PRS | MTE | ETE | PRE | Total Credits |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Group A | 1 | C&I501 | System Theory | Core | 4 | 3 | 0 | 2 | 15 | 25 | 20 | 40 | - | 17 |
| | 2 | C&I503 | Measurement & Instrumentation | Core | 4 | 3 | 0 | 2 | 15 | 25 | 20 | 40 | - | |
| Group B | 3 | C&I5401/5403/..... | Elective 1 | Elective | 4 | 3 | 0 | 2 | 15 | 25 | 20 | 40 | - | |
| | 4 | C&I5301/5303/..... | Elective 2 | Elective | 3 | 3 | 0 | 0 | 20 | - | 30 | 50 | - | |
| | 5 | C&I5201/5203/...../ UEC5201/5203/ | Elective 3/University Elective I | Elective | 2 | 2 | 0 | 0 | 20 | - | 30 | 50 | - | |

## Semester-II

| | S.No. | Course Code | Course Name | Type/Area | Cr | L | T | P | CWS | PRS | MTE | ETE | PRE | Total Credits |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Group C | 1 | C&I502 | Intelligent Control | Core | 4 | 3 | 0 | 2 | 15 | 25 | 20 | 40 | - | 17 |
| | 2 | C&I504 | Process Control | Core | 4 | 3 | 0 | 2 | 15 | 25 | 20 | 40 | - | |
| Group D | 3 | C&I5402/5404/..... | Elective 4 | Elective | 4 | 3 | 0 | 2 | 15 | 25 | 20 | 40 | - | |
| | 4 | C&I5302/5304/..... | Elective 5 | Elective | 3 | 3 | 0 | 0 | 20 | - | 30 | 50 | - | |
| | 5 | C&I5202/5204/...../ UEC5202/5204/ | Elective 6/University Elective II | Elective | 2 | 2 | 0 | 0 | 20 | - | 30 | 50 | - | |

## Semester-III

| | S.No. | Course Code | Course Name | Type/Area | Cr | L | T | P | CWS | PRS | MTE | ETE | PRE | Total Credits |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Track 1 | | | | | | | | | | | | | 12 |
| Group E | 1 | C&I651 | Research Project | Core | 12 | 0 | 0 | 12 | 0 | - | 0 | 100 | 0 | |
| | Track 2 | | | | | | | | | | | | | |
| | 1 | C&I601 | Major Project I | Core | 3 | | | | | | 40 | 60 | | |
| | 2 | C&I6401/6403/..... | Elective 7 | Elective | 4 | 3 | 0 | 2 | 15 | 25 | 20 | 40 | - | |
| | 3 | C&I6301/6303/..... | Elective 8 | Elective | 3 | 3 | 0 | 0 | 20 | - | 30 | 50 | - | |
| | 4 | C&I6201/6203/..... | Elective 9 | Elective | 2 | 2 | 0 | 0 | 20 | - | 30 | 50 | - | |

| Semester-IV | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | S.No. | Course Code | Course Name | Type/Area | Cr | L | T | P | CWS | PRS | MTE | ETE | PRE | Total Credits |
| Group F | Track 1 | | | | | | | | | | | | | 12 |
| | 1 | C&I652 | Research Project | Core | 12 | 0 | 0 | 12 | 0 | - | 0 | 100 | 0 | |
| | Track 2 | | | | | | | | | | | | | |
| | 1 | C&I602 | Major Project II | Core | 12 | 0 | 0 | 12 | 0 | - | 0 | 100 | 0 | |

## List of Elective Courses

| LIST OF ELECTIVES : | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | S.No. | Course Code | Course Name | Type/Area | Cr | L | T | P | CWS | PRS | MTE | ETE | PRE |
| Elective 1 | 1 | C&I5401 | Analog and Digital Electronics | Elective | 4 | 3 | 0 | 2 | 15 | 25 | 20 | 40 | - |
| | 2 | C&I5403 | Manufacturing, Automation & Control | | 4 | 3 | 0 | 2 | 15 | 25 | 20 | 40 | - |
| | 3 | C&I5405 | Biomedical Instrumentation | | 4 | 3 | 0 | 2 | 15 | 25 | 20 | 40 | - |
| | 4 | C&I5407 | Soft Computing Techniques | | 4 | 3 | 0 | 2 | 15 | 25 | 20 | 40 | - |
| | | | | | | | | | | | | | |
| | S.No. | Course Code | Course Name | Type/Area | Cr | L | T | P | CWS | PRS | MTE | ETE | PRE |
| Elective 2 | 1 | C&I5301 | Random Processes in Control & Estimation | Elective | 3 | 3 | 0 | 0 | 20 | - | 30 | 50 | - |
| | 2 | C&I5303 | Nonlinear Control Theory | | 3 | 3 | 0 | 0 | 20 | - | 30 | 50 | - |
| | 3 | C&I5305 | Design of Fractional Order Systems | | 3 | 2 | 0 | 2 | 20 | - | 30 | 50 | - |
| | 4 | C&I5307 | Optimization Techniques | | 3 | 3 | 0 | 0 | 20 | - | 30 | 50 | - |
| | 5 | C&I5309 | Applied Mathematics | | 3 | 3 | 0 | 0 | 20 | - | 30 | 50 | - |
| | S.No. | Course Code | Course Name | Type/Area | Cr | L | T | P | CWS | PRS | MTE | ETE | PRE |
| Elective 3 | 1 | C&I5201 | SEMINAR | Elective | 2 | 0 | 0 | 2 | - | 100 | - | - | - |
| | 2 | C&I5203 | Bio Engineering & Control | | 2 | 2 | 0 | 0 | 20 | - | 30 | 50 | - |
| | 3 | C&I5205 | Networked Control System | | 2 | 2 | 0 | 0 | 20 | - | 30 | 50 | - |
| | 4 | C&I5207 | Robust Control | | 2 | 2 | 0 | 0 | 20 | - | 30 | 50 | - |
| | | | | | | | | | | | | | |
| | S.No. | Course Code | Course Name | Type/Area | Cr | L | T | P | CWS | PRS | MTE | ETE | PRE |
| Elective 4 | 1 | C&I5402 | Intelligent Instrumentation | Elective | 4 | 3 | 0 | 2 | 15 | 25 | 20 | 40 | - |
| | 2 | C&I5404 | Digital Signal Processing | | 4 | 3 | 0 | 2 | 15 | 25 | 20 | 40 | - |
| | 3 | C&I5406 | Modelling, Identification and Control | | 4 | 3 | 0 | 2 | 15 | 25 | 20 | 40 | - |
| | 4 | C&I5408 | Power Quality | | 4 | 3 | 0 | 2 | 15 | 25 | 20 | 40 | - |
| | | | | | | | | | | | | | |

| | S.No. | Course Code | Course Name | Type/Area | Cr | L | T | P | CWS | PRS | MTE | ETE | PRE |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Elective 5 | 1 | C&I5302 | MINOR PROJECT | Elective | 3 | 0 | 0 | - | - | 40 | - | - | 60 |
| | 2 | C&I5304 | Computer Communication & Control | | 3 | 3 | 0 | 0 | 20 | - | 30 | 50 | - |
| | 3 | C&I5306 | Analog Filter Design | | 3 | 3 | 0 | 0 | 20 | - | 30 | 50 | - |
| | 4 | C&I5308 | Optimal Control Theory | | 3 | 3 | 0 | 0 | 20 | - | 30 | 50 | - |
| | 5 | C&I5310 | Digital Image Processing | | 3 | 3 | 0 | 0 | 20 | - | 30 | 50 | - |
| | S.No. | Course Code | Course Name | Type/Area | Cr | L | T | P | CWS | PRS | MTE | ETE | PRE |
| Elective 6 | 1 | C&I5202 | Nature Inspired Algorithms | Elective | 2 | 2 | 0 | 0 | 20 | - | 30 | 50 | - |
| | 2 | C&I5204 | Machine Learning | | 2 | 2 | 0 | 0 | 20 | - | 30 | 50 | - |
| | 3 | C&I5206 | Adaptive Signal Processing | | 2 | 2 | 0 | 0 | 20 | - | 30 | 50 | - |
| | 4 | C&I5208 | Special Topics in Control Systems | | 2 | 2 | 0 | 0 | 20 | - | 30 | 50 | - |
| | | | | | | | | | | | | | |
| | S.No. | Course Code | Course Name | Type/Area | Cr | L | T | P | CWS | PRS | MTE | ETE | PRE |
| Elective 7 | 1 | C&I6401 | SCADA & Energy Management | Elective | 4 | 3 | 0 | 2 | 15 | 25 | 20 | 40 | - |
| | 2 | C&I6403 | Applications of Control in Power Electronic Systems | | 4 | 3 | 0 | 2 | 15 | 25 | 20 | 40 | - |
| | 3 | C&I6405 | Microcontroller & Embedded Systems | | 4 | 3 | 0 | 2 | 15 | 25 | 20 | 40 | - |
| | 4 | C&I6407 | Digital Instrumentation | | 4 | 3 | 0 | 2 | 15 | 25 | 20 | 40 | - |
| | | | | | | | | | | | | | |
| | S.No. | Course Code | Course Name | Type/Area | Cr | L | T | P | CWS | PRS | MTE | ETE | PRE |
| Elective 8 | 1 | C&I6301 | Robot Dynamics & Control | Elective | 3 | 3 | 0 | 0 | 20 | - | 30 | 50 | - |
| | 2 | C&I6303 | Stochastic Control | | 3 | 3 | 0 | 0 | 20 | - | 30 | 50 | - |
| | 3 | C&I6305 | Adaptive Control | | 3 | 3 | 0 | 0 | 20 | - | 30 | 50 | - |
| | 4 | C&I6307 | Instrumentation Transducers | | 3 | 3 | 0 | 0 | 20 | - | 30 | 50 | - |
| | 5 | C&I6309 | Advanced Control System Design | | 3 | 3 | 0 | 0 | 20 | - | 30 | 50 | - |
| | S.No. | Course Code | Course Name | Type/Area | Cr | L | T | P | CWS | PRS | MTE | ETE | PRE |
| Elective 9 | 1 | C&I6201 | Special Topics in Instrumentation | Elective | 2 | 2 | 0 | 0 | 20 | - | 30 | 50 | - |
| | 2 | C&I6203 | Special Topics in Signal Processing | | 2 | 2 | 0 | 0 | 20 | - | 30 | 50 | - |
| | 3 | C&I6205 | Artificial Intelligence | | 2 | 2 | 0 | 0 | 20 | - | 30 | 50 | - |
| | 4 | C&I6207 | Pattern Recognition | | 2 | 2 | 0 | 0 | 20 | - | 30 | 50 | - |
| | 5 | C&I6209 | Energy Auditing and Conservation | | 2 | 2 | 0 | 0 | 20 | - | 30 | 50 | - |

DELHI TECHNOLOGICAL UNIVERSITY
SCHEME OF EXAMINATION
MASTER OF TECHNOLOGY IN BIOINFORMATICS ( BIO )

## Semester-I

| | S.No. | Course Code | Course Name | Type/Area | Cr | L | T | P | CWS | PRS | MTE | ETE | PRE | Total Credits |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Group A | 1 | BIO501 | Bioinformatics I | Core | 4 | 3 | 0 | 2 | 15 | 25 | 20 | 40 | - | 17 |
| | 2 | BIO503 | Advanced Proteomics | Core | 4 | 3 | 0 | 2 | 15 | 25 | 20 | 40 | - | |
| Group B | 3 | BIO5401/5403/..... | Elective 1 | Elective | 4 | 3 | 0 | 2 | 15 | 25 | 20 | 40 | - | |
| | 4 | BIO5301/5303/..... | Elective 2 | Elective | 3 | 3 | 0 | 0 | 20 | - | 30 | 50 | - | |
| | 5 | BIO5201/5203/...../ UEC5201/5203/ | Elective 3/University Elective I | Elective | 2 | 2 | 0 | 0 | 20 | - | 30 | 50 | - | |

## Semester-II

| | S.No. | Course Code | Course Name | Type/Area | Cr | L | T | P | CWS | PRS | MTE | ETE | PRE | Total Credits |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Group C | 1 | BIO502 | Bioinformatics II | Core | 4 | 3 | 0 | 2 | 15 | 25 | 20 | 40 | - | 17 |
| | 2 | BIO504 | High-throughput structural biology | Core | 4 | 3 | 0 | 2 | 15 | 25 | 20 | 40 | - | |
| Group D | 3 | BIO5402/5404/..... | Elective 4 | Elective | 4 | 3 | 0 | 2 | 15 | 25 | 20 | 40 | - | |
| | 4 | BIO5302/5304/..... | Elective 5 | Elective | 3 | 3 | 0 | 0 | 20 | - | 30 | 50 | - | |
| | 5 | BIO5202/5204/...../ UEC5202/5204/ | Elective 6/University Elective II | Elective | 2 | 2 | 0 | 0 | 20 | - | 30 | 50 | - | |

## Semester-III

| | S.No. | Course Code | Course Name | Type/Area | Cr | L | T | P | CWS | PRS | MTE | ETE | PRE | Total Credits |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Track 1 | | | | | | | | | | | | | 12 |
| Group E | 1 | BIO651 | Research Project | Core | 12 | 0 | 0 | 12 | 0 | - | 0 | 100 | 0 | |
| | Track 2 | | | | | | | | | | | | | |
| | 1 | BIO601 | Major Project I | Core | 3 | | | | | | 40 | 60 | | |
| | 2 | BIO6401/6403/..... | Elective 7 | Elective | 4 | 3 | 0 | 2 | 15 | 25 | 20 | 40 | - | |
| | 3 | BIO6301/6303/..... | Elective 8 | Elective | 3 | 3 | 0 | 0 | 20 | - | 30 | 50 | - | |
| | 4 | BIO6201/6203/..... | Elective 9 | Elective | 2 | 2 | 0 | 0 | 20 | - | 30 | 50 | - | |

| Semester-IV | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | S.No. | Course Code | Course Name | Type/Area | Cr | L | T | P | CWS | PRS | MTE | ETE | PRE | Total Credits |
| Group F | Track 1 | | | | | | | | | | | | | 12 |
| | 1 | BIO652 | Research Project | Core | 12 | 0 | 0 | 12 | 0 | - | 0 | 100 | 0 | |
| | Track 2 | | | | | | | | | | | | | |
| | 1 | BIO602 | Major Project II | Core | 12 | 0 | 0 | 12 | 0 | - | 0 | 100 | 0 | |

## List of Elective Courses

| LIST OF ELECTIVES : | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | S.No. | Course Code | Course Name | Type/Area | Cr | L | T | P | CWS | PRS | MTE | ETE | PRE |
| Elective 1 | 1 | BIO5401 | Computer Graphics | Elective | 4 | 3 | 0 | 2 | 15 | 25 | 20 | 40 | 0 |
| | 2 | BIO5403 | Computer Aided Drug Design | | 4 | 3 | 0 | 2 | 15 | 25 | 20 | 40 | 0 |
| | 3 | BIO5405 | Pharmacogenomics and Personalized Medicine | | 4 | 3 | 0 | 2 | 15 | 25 | 20 | 40 | 0 |
| | 4 | BIO5407 | OMICS in Medicine | | 4 | 3 | 0 | 2 | 15 | 25 | 20 | 40 | 0 |
| | | | | | | | | | | | | | |
| | S.No. | Course Code | Course Name | Type/Area | Cr | L | T | P | CWS | PRS | MTE | ETE | PRE |
| Elective 2 | 1 | BIO5301 | Data Warehousing and Data mining | Elective | 3 | 3 | 0 | 0 | 20 | - | 30 | 50 | - |
| | 2 | BIO5303 | Genomics: From Human Genome Project to Medical Applications | | 3 | 3 | 0 | 0 | 20 | - | 30 | 50 | - |
| | 3 | BIO5305 | Combinatorial Methods in Biopharmaceuticals | | 3 | 3 | 0 | 0 | 20 | - | 30 | 50 | - |
| | 4 | BIO5307 | Microarray Technology | | 3 | 3 | 0 | 0 | 20 | - | 30 | 50 | - |
| | | | | | | | | | | | | | |
| | S.No. | Course Code | Course Name | Type/Area | Cr | L | T | P | CWS | PRS | MTE | ETE | PRE |
| Elective 3 | 1 | BIO5201 | SEMINAR | Elective | 2 | 0 | 0 | 2 | - | 100 | - | - | - |
| | 2 | BIO5203 | Database management system | | 2 | 1 | 0 | 2 | 20 | - | 30 | 50 | - |
| | 3 | BIO5205 | Analysis of Biological Networks | | 2 | 2 | 0 | 0 | 20 | - | 30 | 50 | - |
| | 4 | BIO5207 | Plant Bioinformatics | | 2 | 2 | 0 | 0 | 20 | - | 30 | 50 | - |
| | | | | | | | | | | | | | |
| | S.No. | Course Code | Course Name | Type/Area | Cr | L | T | P | CWS | PRS | MTE | ETE | PRE |
| | 1 | BIO5402 | Advanced Genetic Engineering | | 4 | 3 | 0 | 2 | 15 | 25 | 20 | 40 | - |

| | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Elective 4 | 2 | BIO5404 | Systems Biology | Elective | 4 | 3 | 0 | 2 | 15 | 25 | 20 | 40 | - |
| | 3 | BIO5406 | Web Application Development | | 4 | 3 | 0 | 2 | 15 | 25 | 20 | 40 | - |
| | 4 | BIO5408 | Image Processing in Medicine | | 4 | 3 | 0 | 2 | 15 | 25 | 20 | 40 | - |
| | | | | | | | | | | | | | |
| | **S.No.** | **Course Code** | **Course Name** | **Type/Area** | **Cr** | **L** | **T** | **P** | **CWS** | **PRS** | **MTE** | **ETE** | **PRE** |
| Elective 5 | 1 | BIO5302 | MINOR PROJECT | Elective | 3 | 0 | 0 | - | - | 40 | - | - | 60 |
| | 2 | BIO5304 | Immunoinformatics | | 3 | 3 | 0 | 0 | 20 | - | 30 | 50 | - |
| | 3 | BIO5306 | Medical Bioinformatics | | 3 | 3 | 0 | 0 | 20 | - | 30 | 50 | - |
| | 4 | BIO5308 | Pharmacoinformatics | | 3 | 3 | 0 | 0 | 20 | - | 30 | 50 | - |
| | | | | | | | | | | | | | |
| | **S.No.** | **Course Code** | **Course Name** | **Type/Area** | **Cr** | **L** | **T** | **P** | **CWS** | **PRS** | **MTE** | **ETE** | **PRE** |
| Elective 6 | 1 | BIO5202 | Perl Programming for Bioinformatics | Elective | 2 | 0 | 0 | 4 | - | 40 | - | - | 60 |
| | 2 | BIO5204 | Python Programming for Bioinformatics | | 2 | 0 | 0 | 4 | - | 40 | - | - | 60 |
| | 3 | BIO5206 | Bioethics and IPR | | 2 | 2 | 0 | 0 | 20 | - | 30 | 50 | - |
| | 4 | BIO5208 | Seminar - II | | 2 | 0 | 0 | 2 | - | 100 | - | - | - |
| | | | | | | | | | | | | | |
| | **S.No.** | **Course Code** | **Course Name** | **Type/Area** | **Cr** | **L** | **T** | **P** | **CWS** | **PRS** | **MTE** | **ETE** | **PRE** |
| Elective 7 | 1 | BIO6401 | Drug Design and Discovery | Elective | 4 | 3 | 0 | 2 | 15 | 25 | 20 | 40 | - |
| | 2 | BIO6403 | Neurobiology | | 4 | 3 | 0 | 2 | 15 | 25 | 20 | 40 | - |
| | 3 | BIO6405 | Cell and Molecular Biology | | 4 | 3 | 0 | 2 | 15 | 25 | 20 | 40 | - |
| | 4 | BIO6407 | Biostatistics | | 4 | 3 | 0 | 2 | 15 | 25 | 20 | 40 | - |
| | | | | | | | | | | | | | |
| | **S.No.** | **Course Code** | **Course Name** | **Type/Area** | **Cr** | **L** | **T** | **P** | **CWS** | **PRS** | **MTE** | **ETE** | **PRE** |
| Elective 8 | 1 | BIO6301 | Nanotechnology in Health Care | Elective | 3 | 3 | 0 | 0 | 20 | - | 30 | 50 | - |
| | 2 | BIO6303 | Resource Planning & Management in Bioinformatics | | 3 | 3 | 0 | 0 | 20 | - | 30 | 50 | - |
| | 3 | BIO6305 | Advanced Drug Delivery Systems | | 3 | 3 | 0 | 0 | 20 | - | 30 | 50 | - |
| | 4 | BIO6307 | Artificial Intelligence | | 3 | 3 | 0 | 0 | 20 | - | 30 | 50 | - |
| | | | | | | | | | | | | | |
| | **S.No.** | **Course Code** | **Course Name** | **Type/Area** | **Cr** | **L** | **T** | **P** | **CWS** | **PRS** | **MTE** | **ETE** | **PRE** |
| Elective 9 | 1 | BIO6201 | Design and Analysis of algorithms | Elective | 2 | 0 | 0 | 2 | 20 | - | 30 | 50 | - |
| | 2 | BIO6203 | Molecular Evolution | | 2 | 2 | 0 | 0 | 20 | - | 30 | 50 | - |
| | 3 | BIO6205 | Molecular and Cellular Biophysics | | 2 | 2 | 0 | 0 | 20 | - | 30 | 50 | - |
| | | | | | | | | | | | | | |

DELHI TECHNOLOGICAL UNIVERSITY

SCHEME OF EXAMINATION

MASTER OF TECHNOLOGY IN BME MEDICAL ENGINEERING ( BME )

## Semester-I

| | S.No. | Course Code | Course Name | Type/Area | Cr | L | T | P | CWS | PRS | MTE | ETE | PRE | Total Credits |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Group A | 1 | BME501 | Human Anatomy and Physiology | Core | 4 | 3 | 0 | 2 | 15 | 25 | 20 | 40 | - | |
| | 2 | BME503 | Biomaterials and Clinical Devices | Core | 4 | 4 | 0 | 0 | 20 | - | 30 | 50 | - | |
| Group B | 3 | BME5401/5403/..... | Elective I | Elective | 4 | 3/4 | 0 | 2/0 | 15/20 | 25/0 | 20/30 | 40/50 | - | 17 |
| | 4 | BME5301/5303/..... | Elective 2 | Elective | 3 | 3 | 0 | 0 | 20 | - | 30 | 50 | - | |
| | 5 | BME5201/5203/...../ UEC5201/5203/ | Elective 3/University Elective I | Elective | 2 | 2 | 0 | 0 | 20 | - | 30 | 50 | - | |

## Semester-II

| | S.No. | Course Code | Course Name | Type/Area | Cr | L | T | P | CWS | PRS | MTE | ETE | PRE | Total Credits |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Group C | 1 | BME502 | Tissue Engineering and Artificial Organs | Core | 4 | 3 | 0 | 2 | 15 | 25 | 20 | 40 | - | |
| | 2 | BME504 | Immuno-diagnostics and Therapeutics | Core | 4 | 3 | 0 | 2 | 15 | 25 | 20 | 40 | - | |
| Group D | 3 | BME5402/5404/..... | Elective 4 | Elective | 4 | 4 | 0 | 0 | 20 | - | 30 | 50 | - | 17 |
| | 4 | BME5302/5304/..... | Elective 5 | Elective | 3 | 3 | 0 | 0 | 20 | - | 30 | 50 | - | |
| | 5 | BME2/5204/...../ UEC5202/5204/ | Elective 6/University Elective II | Elective | 2 | 2 | 0 | 0 | 20 | - | 30 | 50 | - | |

## Semester-III

| | S.No. | Course Code | Course Name | Type/Area | Cr | L | T | P | CWS | PRS | MTE | ETE | PRE | Total Credits |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Track 1 | | | | | | | | | | | | | |
| Group E | 1 | BME651 | Research Project | Core | 12 | 0 | 0 | 12 | 0 | - | 0 | 100 | 0 | 12 |
| | Track 2 | | | | | | | | | | | | | |
| | 1 | BME601 | Major Project I | Core | 3 | | | | | | 40 | 60 | - | |
| | 2 | BME6401/6403/..... | Elective 7 | Elective | 4 | 3/4 | 0 | 2/0 | 15/20 | 25/0 | 20/30 | 40/50 | - | |
| | 3 | BME6301/6303/..... | Elective 8 | Elective | 3 | 3 | 0 | 0 | 20 | - | 30 | 50 | - | |
| | 4 | BME6201/6203/..... | Elective 9 | Elective | 2 | 2 | 0 | 0 | 20 | - | 30 | 50 | - | |

| Semester-IV | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | S.No. | Course Code | Course Name | Type/Area | Cr | L | T | P | CWS | PRS | MTE | ETE | PRE | Total Credits |
| Group F | Track 1 | | | | | | | | | | | | | |
| | 1 | BME652 | Research Project | Core | 12 | 0 | 0 | 12 | 0 | - | 0 | 100 | 0 | 12 |
| | Track 2 | | | | | | | | | | | | | |
| | 1 | BME602 | Major Project II | Core | 12 | 0 | 0 | 12 | 0 | - | 0 | 100 | 0 | |

## List of Elective Courses

| LIST OF ELECTIVES : | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | S.No. | Course Code | Course Name | Type/Area | Cr | L | T | P | CWS | PRS | MTE | ETE | PRE |
| Elective 1 | 1 | BME5401 | Medical Physics and Biochemistry | Elective | 4 | 3 | 0 | 2 | 15 | 25 | 20 | 40 | - |
| | 2 | BME5403 | Instrumentation in Biomedical Engineering | | 4 | 4 | 0 | 0 | 20 | - | 30 | 50 | - |
| | 3 | BME5405 | Rehabilitation Engineering | | 4 | 4 | 0 | 0 | 20 | - | 30 | 50 | - |
| | 4 | BME5407 | Biopolymer Technology | | 4 | 4 | 0 | 0 | 20 | - | 30 | 50 | - |
| | | | | | | | | | | | | | |
| | S.No. | Course Code | Course Name | Type/Area | Cr | L | T | P | CWS | PRS | MTE | ETE | PRE |
| Elective 2 | 1 | BME5301 | Nanobiotechnology & Nanomedicine | Elective | 3 | 3 | 0 | 0 | 20 | - | 30 | 50 | - |
| | 2 | BME5303 | Infection and Disease | | 3 | 3 | 0 | 0 | 20 | - | 30 | 50 | - |
| | 3 | BME5305 | Molecular Basis of Metabolic Disorders | | 3 | 3 | 0 | 0 | 20 | - | 30 | 50 | - |
| | 4 | BME5307 | Pharmacology and Toxicology | | 3 | 3 | 0 | 0 | 20 | - | 30 | 50 | - |
| | | | | | | | | | | | | | |
| | S.No. | Course Code | Course Name | Type/Area | Cr | L | T | P | CWS | PRS | MTE | ETE | PRE |
| Elective 3 | 1 | BME5201 | SEMINAR | Elective | 2 | 0 | 0 | 2 | - | 100 | - | - | - |
| | 2 | BME5203 | Research Methodology | | 2 | 2 | 0 | 0 | 20 | - | 30 | 50 | - |
| | 3 | BME5205 | Advanced Human Genetics | | 2 | 2 | 0 | 0 | 20 | - | 30 | 50 | - |
| | 4 | BME5207 | Protein Engineering | | 2 | 2 | 0 | 0 | 20 | - | 30 | 50 | - |
| | | | | | | | | | | | | | |
| | S.No. | Course Code | Course Name | Type/Area | Cr | L | T | P | CWS | PRS | MTE | ETE | PRE |
| Elective 4 | 1 | BME5402 | Biophysical System and Signal Simulations | Elective | 4 | 4 | 0 | 0 | 20 | - | 30 | 50 | - |
| | 2 | BME5404 | OMICS in Medicine | | 4 | 4 | 0 | 0 | 20 | - | 30 | 50 | - |
| | 3 | BME5406 | Image Processing in Medicine | | 4 | 4 | 0 | 0 | 20 | - | 30 | 50 | - |
| | 4 | BME5408 | Industrial Biotechnology | | 4 | 4 | 0 | 0 | 20 | - | 30 | 50 | - |
| | | | | | | | | | | | | | |

| | S.No. | Course Code | Course Name | Type/Area | Cr | L | T | P | CWS | PRS | MTE | ETE | PRE |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Elective 5 | 1 | BME5302 | MINOR PROJECT | Elective | 3 | 0 | 0 | - | - | 40 | - | - | 60 |
| | 2 | BME5304 | Drug Design and Development | | 3 | 3 | 0 | 0 | 20 | - | 30 | 50 | - |
| | 3 | BME5306 | Neurobiology | | 3 | 3 | 0 | 0 | 20 | - | 30 | 50 | - |
| | 4 | BME5308 | Oncology | | 3 | 3 | 0 | 0 | 20 | - | 30 | 50 | - |
| | | | | | | | | | | | | | |
| | S.No. | Course Code | Course Name | Type/Area | Cr | L | T | P | CWS | PRS | MTE | ETE | PRE |
| Elective 6 | 1 | BME5202 | Microarray Technology | Elective | 2 | 2 | 0 | 0 | 20 | - | 30 | 50 | - |
| | 2 | BME5204 | Genetic Manipulation in Medicine | | 2 | 2 | 0 | 0 | 20 | - | 30 | 50 | - |
| | 3 | BME5206 | Hospital Management | | 2 | 2 | 0 | 0 | 20 | - | 30 | 50 | - |
| | 4 | BME5208 | Seminar II | | 2 | 2 | 0 | 0 | 20 | - | 30 | 50 | - |
| | | | | | | | | | | | | | |
| | S.No. | Course Code | Course Name | Type/Area | Cr | L | T | P | CWS | PRS | MTE | ETE | PRE |
| Elective 7 | 1 | BME6401 | Bioinformatics | Elective | 4 | 3 | 0 | 2 | 15 | 25 | 20 | 40 | - |
| | 2 | BME6403 | Biopharmaceuticals | | 4 | 4 | 0 | 0 | 20 | - | 30 | 50 | - |
| | 3 | BME6405 | Biostatistics | | 4 | 4 | 0 | 0 | 20 | - | 30 | 50 | - |
| | 4 | BME6407 | Molecular and Cellular Biophysics | | 4 | 4 | 0 | 0 | 20 | - | 30 | 50 | - |
| | | | | | | | | | | | | | |
| | S.No. | Course Code | Course Name | Type/Area | Cr | L | T | P | CWS | PRS | MTE | ETE | PRE |
| Elective 8 | 1 | BME6301 | Bioethics and IPR | Elective | 3 | 3 | 0 | 0 | 20 | - | 30 | 50 | - |
| | 2 | BME6303 | Population Genetics | | 3 | 3 | 0 | 0 | 20 | - | 30 | 50 | - |
| | 3 | BME6305 | Artificial Intelligence | | 3 | 3 | 0 | 0 | 20 | - | 30 | 50 | - |
| | 4 | BME6307 | Biosensors | | 3 | 3 | 0 | 0 | 20 | - | 30 | 50 | - |
| | | | | | | | | | | | | | |
| | S.No. | Course Code | Course Name | Type/Area | Cr | L | T | P | CWS | PRS | MTE | ETE | PRE |
| Elective 9 | 1 | BME6201 | Gene Therapy | Elective | 2 | 2 | 0 | 0 | 20 | - | 30 | 50 | - |
| | 2 | BME6203 | Entrepreneurship | | 2 | 2 | 0 | 0 | 20 | - | 30 | 50 | - |
| | 3 | BME6205 | Biomechanics | | 2 | 2 | 0 | 0 | 20 | - | 30 | 50 | - |
| | 4 | BME6207 | Alternative Medicine | | 2 | 2 | 0 | 0 | 20 | - | 30 | 50 | - |
| | | | | | | | | | | | | | |

# Master of Science (M. Sc.)

# 2019-2021

## DELHI TECHNOLOGICAL UNIVERSITY

(Estd. by Govt. of NCT of Delhi vide Act 6 of 2009)
Shahbad Daulatpur, Bawana Road, Delhi-110042
www.dtu.ac.in



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## M.Sc. Program

## Preamble

The University offers following M.Sc. programs in Mathematics, Physics, Chemistry and Biotechnology leading to Master degree in different disciplines. Academic curricula are so devised that a student of one discipline can take some courses of other disciplines offering choice based credit system (CBCS). Such flexibility helps a student to develop his core competence together with the interdisciplinary skills in the area of his/her interest.

### Structure of two year M.Sc. program

The two year M.Sc. program comprises of courses divided in five distinct areas, namely: Departmental Core Course (DCC), Ability Enhancement Course (AEC), Skill Enhancement Course (SEC), Department Specific Elective (DSE), General Elective (GE). Credits assigned to various components of the M.Sc. curriculum are given in **Table-2** and the broad structure of the program is given in **Table-3**.

**Table-1: M.Sc Programs**

| S. No. | Department | Academic Program | Code |
|---|---|---|---|
| 1. | Applied Mathematics | M.Sc (Mathematics) | MA |
| 2. | Applied Physics | M.Sc (Physics) | PH |
| 3. | Applied Chemistry | M.Sc (Chemistry) | CH |
| 4. | Biotechnology | M.Sc (Biotechnology) | BT |

**Table-2: Credits of Different Curricular Components**

| CURRICULAR COMPONENTS | | Credits |
|---|---|---|
| **(a) Foundation Course (Common Courses)** | | |
| i. | Communication English (AEC) | 4 |
| ii. | Fundamentals of Computers (SEC) | 4 |
| | **Total** | **8** |
| **(b) Departmental Core Courses (DCC)** | | |
| i. | Core Courses | 54 |
| ii. | Dissertation | 12 |
| | **Total** | **66** |
| **(c) Departmental Elective Courses (DSE) / Track-I /Generic Elective (GE)** | | 24 |
| **Grand Total** | | **98** |



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## Table-3: Course Structure for M.Sc. Program (Maths/Physics)

### FIRST YEAR

| First Semester | | | | |
|---|---|---|---|---|
| S. No. | Subject Code | Course Title | Credits | Category |
| 1. | MSMA 101 | Core-1 | 4 | DCC |
| 2. | MSMA 103 | Core-2 | 4 | DCC |
| 3. | MSMA 105 | Core-3 | 4 | DCC |
| 4. | MSMA 107 | Core-4 | 4 | DCC |
| 5. | MSMA 109 | Core-5 | 4 | DCC |
| 6. | MSMA 111 | Lab-I | 2 | DCC |
| | | Total | 22 | |
| 7. | MSHu 113* | Communicative English | 4 | AEC |
| *Non CGPA Mandatory Course<br>For M.Sc. ( Physics ) Please read Course code as MSPH 101, etc. | | | | |

| Second Semester | | | | |
|---|---|---|---|---|
| S. No. | Subject Code | Course Title | Credit | Category |
| 1. | MSMA 102 | Core-6 | 4 | DCC |
| 2. | MSMA 104 | Core-7 | 4 | DCC |
| 3. | MSMA 106 | Core-8 | 4 | DCC |
| 4. | MSMA 108 | Core-9 | 4 | DCC |
| 5. | MSMA 110 | Core-10 | 4 | DCC |
| 6. | MSMA 112 | Lab-2 | 2 | DCC |
| | | Total | 22 | |
| 7. | MSMA 114* | Fundamentals of Computers | 4 | SEC |
| *Non CGPA Mandatory Course<br>For M.Sc. (Physics) Please read Course code as MSPH 102, etc. | | | | |

## SECOND YEAR

| Third Semester | | | | |
|---|---|---|---|---|
| S. No. | Subject Code | Course Title | Credit | Category |
| 1. | MSMA 201 | Core-11 | 4 | DCC |
| 2. | MSMA 203 | Core-12 | 4 | DCC |
| 3. | MSMA 205 | Dissertation-I | 2 | DCC |
| 4. | MSMA xxx | DSE-1/Track-I | 4 | DSE |
| 5. | MSXX xxx | GE-1 | 4 | GE |
| 6. | MSMA xxx | DSE-2 | 4 | DSE |
| | | Total | 22 | |
| *For M.Sc. (Physics) Please read Course code as MSPH 201, etc.* | | | | |

| Fourth Semester | | | | |
|---|---|---|---|---|
| S. No. | Subject Code | Course Title | Credit | Category |
| 1. | MSMA 202 | Core-13 | 4 | DCC |
| 2. | MSMA 204 | Dissertation-II | 8 | DCC |
| 3. | MSMA xxx | DSE-3/Track-I | 4 | DSE |
| 4. | MSXX xxx | GE-2 | 4 | GE |
| 5. | MSMA xxx | DSE-4 | 4 | DSE |
| | | Total | 24 | |
| *For M.Sc. (Physics) Please read Course code as MSPH 202, etc.* | | | | |

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## Course Coding

A course is identified by a course code designated by a string of alphanumeric characters and a course title. In a course code, first two letters of the string indicate the Academic Program & next two letters indicate the department offering the course and the last three numbers designate particular course.

## Course Number

For all the courses, the first digit corresponds to the level (year) at which a course is normally offered. The last two digits denote the number of the course, which will usually be odd for courses offered in the Odd Semester and even for courses in the Even Semester.

## Teaching Engagements

Every course maintains a teaching schedule for which weekly contact hours are decided for delivering lectures (L), engaging tutorials (T) and/or performing practicals (P) to make learning in a course more effective. In the syllabi, the information regarding number of course credits and contact hours per week is denoted as: Credits (L – T – P); 4 (3 – 1–0) and options are tabulated below:

| Credits | L | T | P |
|---|---|---|---|
| 4 | 3 | 1 | 0 |
| 4 | 4 | 0 | 0 |
| 4 | 3 | 0 | 2 |
| 4 | 2 | 1 | 2 |
| 4 | 2 | 0 | 4 |
| 4 | 0 | 0 | 8 |

| S. No. | Course Type | | | Examination | | Relative Weights | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | L | T | P | Theory | Practical | CWS | PRS | MTE | ETE | PRE |
| 1. | 3 | 1 | 0 | Yes | - | 25 | - | 25 | 100 | - |
| 2. | 4 | 0 | 0 | Yes | 0 | 25 | - | 25 | 100 | - |
| 3. | 3 | 0 | 2 | Yes | Yes | 25 | 25 | 25 | 75 | - |
| 4. | 2 | 1 | 2 | Yes | Yes | 25 | 25 | 25 | 75 | - |
| 5. | 2 | 0 | 4 | Yes | Yes | 25 | 50 | 25 | 50 | - |
| 6. | 0 | 0 | 8 | - | Yes | - | 50 | - | - | 100 |

In general, the relative weights assigned to different components of the entire course are as given in subsequent tables.

| | |
|---|---|
| CWS | Class Work Sessional |
| MTE | Mid Term Examination |
| PRE | Practical Examination |
| PRS | Practical Sessional |
| ETE | End Term Examination |

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# MASTER OF SCIENCE

## Mathematics

### I YEAR: First Semester

| Teaching Scheme | | | | | Contact Hours/Week | | | Exam Duration | | Relative Weights (%) | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| S. No | Subject Code | Course Title | Subject Area | Credit | L | T | P | Theory | Practical | CWS | PRS | MTE | ETE | PRE |
| 1 | MSMA-101 | Abstract Algebra | DCC | 4 | 3 | 1 | 0 | 3 | 0 | 25 | - | 25 | 100 | - |
| 2 | MSMA-103 | Real Analysis | DCC | 4 | 3 | 1 | 0 | 3 | 0 | 25 | - | 25 | 100 | - |
| 3 | MSMA-105 | Ordinary Differential Equations | DCC | 4 | 3 | 1 | 0 | 3 | 0 | 25 | - | 25 | 100 | - |
| 4 | MSMA-107 | Discrete Mathematics | DCC | 4 | 3 | 1 | 0 | 3 | 0 | 25 | - | 25 | 100 | - |
| 5 | MSMA-109 | Mathematical Statistics | DCC | 4 | 3 | 0 | 2 | 3 | 0 | 25 | 25 | 25 | 75 | - |
| 6 | MSMA-111 | Programming Lab- I | DCC | 2 | 0 | 0 | 4 | 0 | 2 | - | 25 | - | - | 50 |
| Total | | | | 22 | 15 | 4 | 6 | | | | | | | |
| 7. | MSHu-113 | Communicative English* | AEC | 4 | 3 | 1 | 0 | 3 | 0 | 25 | | 25 | 100 | |

*Non CGPA mandatory course (AEC- Ability Enhancement course).

### I YEAR: Second Semester

| Teaching Scheme | | | | | Contact Hours/Week | | | Exam Duration | | Relative Weights (%) | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| S. No | Subject Code | Course Title | Subject Area | Credit | L | T | P | Theory | Practical | CWS | PRS | MTE | ETE | PRE |
| 1 | MSMA-102 | Complex Analysis | DCC | 4 | 3 | 1 | 0 | 3 | 0 | 25 | - | 25 | 100 | - |
| 2 | MSMA-104 | Partial Differential Equations | DCC | 4 | 3 | 1 | 0 | 3 | 0 | 25 | - | 25 | 100 | - |
| 3 | MSMA-106 | Topology | DCC | 4 | 3 | 1 | 0 | 3 | 0 | 25 | - | 25 | 100 | - |
| 4 | MSMA-108 | Linear Algebra | DCC | 4 | 3 | 1 | 0 | 3 | 0 | 25 | - | 25 | 100 | - |
| 5 | MSMA-110 | Numerical Analysis | DCC | 4 | 3 | 0 | 2 | 3 | 0 | 25 | 25 | 25 | 75 | - |
| 6 | MSMA-112 | Programming Lab- II | DCC | 2 | 0 | 0 | 4 | - | 2 | - | 25 | - | - | 50 |
| Total | | | | 22 | 15 | 4 | 6 | | | | | | | |
| 7. | MSMA-114 | Fundamentals of Computer * | SEC | 4 | 3 | 0 | 2 | 3 | 0 | 25 | 25 | 25 | 75 | |

*Non CGPA mandatory course (SEC- Skill Enhancement course).



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## II YEAR: Third Semester

| Teaching Scheme | | | | | Contact Hours/Week | | | Exam Duration | | Relative Weights (%) | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| S. No | Subject Code | Course Title | Subject Area | Credit | L | T | P | Theory | Practical | CWS | PRS | MTE | ETE | PRE |
| 1 | MSMA-201 | Functional Analysis | DCC | 4 | 3 | 1 | 0 | 3 | 0 | 25 | - | 25 | 100 | - |
| 2 | MSMA-203 | Operation Research | DCC | 4 | 3 | 1 | 0 | 3 | 0 | 25 | - | 25 | 100 | - |
| 3 | MSMA-205 | Dissertation-1 | DCC | 2 | | | | | | | | | | |
| 4 | MSMA xxx | DSE-1/ Track-I | DSE | 4 | 3 | 1/0 | 0/2 | 3 | 0 | 25 | 0/25 | 25 | 100/75 | - |
| 5 | MSMA xxx | DSE-2 | DSE | 4 | 3 | 1/0 | 0/2 | 3 | 0 | 25 | 0/25 | 25 | 100/75 | - |
| 6 | MSXX xxx | GE-1 | GE | 4 | 3 | 1/0 | 0/2 | 3 | 0 | 25 | 0/25 | 25 | 100/75 | |
| | | **Total** | | 22 | 17 | 5/2 | 0/6 | | | | | | | |

*DSE- Department Specific Elective*
*GE- Generic Elective*

## II YEAR: Fourth Semester

| Teaching Scheme | | | | | Contact Hours/Week | | | Exam Duration | | Relative Weights (%) | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| S. No | Subject Code | Course Title | Subject Area | Credit | L | T | P | Theory | Practical | CWS | PRS | MTE | ETE | PRE |
| 1 | MSMA-202 | Measure and Integration | DCC | 4 | 3 | 1 | 0 | 3 | 0 | 25 | - | 25 | 100 | - |
| 2. | MSMA-204 | Dissertation-II | DCC | 8 | | | | | | | | | | |
| 3. | MSMA xxx | DSE 3/Track-I | DSE | 4 | 3 | 1/0 | 0/2 | 3 | 0 | 25 | 0/25 | 25 | 100/75 | - |
| 4. | MSMA xxx | DSE 4 | DSE | 4 | 3 | 1/0 | 0/2 | 3 | 0 | 25 | 0/25 | 25 | 100/75 | - |
| 5. | MSXX xxx | GE2 | GE | 4 | 3 | 1/0 | 0/2 | 3 | 0 | 25 | 0/25 | 25 | 100/75 | - |
| | | **Total** | | 24 | 20 | 4/1 | 0/6 | | | | | | | |

***In addition to the above scheme***
***Elective Courses / Activities:*** *These are part of Co and Extra-Curricular Activities and must opt for a minimum of 2 to 6Credits in entire duration of the program.*
*The Identified MOOC's subjects or any other On-line Courses offered by the Recognized Accredited University enlisted by the University.*
*OR*
*The Approved Co and Extra-Curricular Activities as defined by the University.*
*Publication in category 1 or category 2 journal publication is mandatory outcome of the Track 1. In second year (i.e., III and IV Semesters) Track 1 option is by research work. Candidate will be finally evaluated at the end of the semester IV on the basis of his/her publication (accepted or published in category 1 or 2 journals).*





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# List of Electives

| S. No. | Course Code | Course Title | DSE Details |
|---|---|---|---|
| 1. | MSMA- 207 | Stochastic process | DSE 1 |
| 2. | MSMA- 209 | Analysis and Design of Algorithms | |
| 3. | MSMA-211 | Number theory | |
| 4. | MSMA-213 | Mathematical Modeling and Simulation | |
| 5. | MSMA-215 | Calculus of Variation and Optimal Control | |
| 6. | MSMA-217 | Graph Theory | DSE 2 |
| 7. | MSMA-219 | Database Management System | |
| 8. | MSMA-221 | Integral Transforms & Equations | |
| 9. | MSMA-223 | Cryptography and Coding Theory | |
| 10. | MSMA-225 | Classical Mechanics | |
| 11. | MSMA-206 | Financial Mathematics | DSE 3 |
| 12. | MSMA-208 | Data Mining | |
| 13. | MSMA-210 | Optimization Techniques | |
| 14. | MSMA-212 | Approximation Theory | |
| 15. | MSMA-214 | General Relativity and Cosmology | |
| 16. | MSMA-216 | Finite Element Method | DSE 4 |
| 17. | MSMA-218 | Machine Learning | |
| 18. | MSMA-220 | Econometrics | |
| 19. | MSMA-222 | Univalent Function Theory | |
| 20. | MSMA-224 | Fuzzy Sets and Logic | |

## Credits in Four Semesters

| Total | Core | Generic Electives (GE) | Department Specific Electives (DSE) | Ability Enhancement Courses (AEC) | Skill Enhancement Courses (SEC) |
|---|---|---|---|---|---|
| 90 | 66 | 8 | 16 | 4 | 4 |



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# MASTER OF SCIENCE

## Physics

### I YEAR: First Semester

| Teaching Scheme | | | | | Contact Hours/ Week | | | Exam Duration | | Relative Weightage % | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| S. No. | Subject Code | Course Title | Course Type | Credit | L | T | P | Theory | Practical | CWS | PRS | MTE | ETE | PRE |
| 1. | MSPH 101 | Mathematical Physics | DCC | 4 | 3 | 1 | 0 | 3 | 0 | 25 | - | 25 | 100 | - |
| 2. | MSPH 103 | Classical Mechanics | DCC | 4 | 3 | 1 | 0 | 3 | 0 | 25 | - | 25 | 100 | - |
| 3. | MSPH 105 | Quantum Mechanics | DCC | 4 | 3 | 1 | 0 | 3 | 0 | 25 | - | 25 | 100 | - |
| 4. | MSPH 107 | Applied Optics | DCC | 4 | 3 | 1 | 0 | 3 | 0 | 25 | - | 25 | 100 | - |
| 5. | MSPH 109 | Electronics | DCC | 4 | 3 | 1 | 0 | 3 | 0 | 25 | - | 25 | 100 | - |
| 6. | MSPH 111 | Physics Lab-I | DCC | 2 | 0 | 0 | 4 | 0 | 2 | - | 25 | - | - | 50 |
| | | Total | | 22 | 15 | 5 | 4 | | | | | | | |
| 7. | MSHu 113 | Communicative English* | AEC | 4 | 3 | 1 | 0 | 3 | 0 | 25 | - | 25 | 100 | - |

**Non CGP Mandatory Course (AEC – Ability Enhancement Course)*

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## I YEAR: Second Semester

| Teaching Scheme | | | | | Contact Hours/ Week | | | Exam Duration | | Relative Weightage % | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| S. No. | Subject Code | Course Title | Course Type | Credit | L | T | P | Theory | Practical | CWS | PRS | MTE | ETE | PRE |
| 1. | MSPH 102 | Advanced Quantum Mechanics | DCC | 4 | 3 | 1 | 0 | 3 | 0 | 25 | - | 25 | 100 | - |
| 2. | MSPH 104 | Statistical Mechanics | DCC | 4 | 3 | 1 | 0 | 3 | 0 | 25 | - | 25 | 100 | - |
| 3. | MSPH 106 | Computational Methods | DCC | 4 | 3 | 1 | 0 | 3 | 0 | 25 | - | 25 | 100 | - |
| 4. | MSPH 108 | Electrodynamics | DCC | 4 | 3 | 1 | 0 | 3 | 0 | 25 | - | 25 | 100 | - |
| 5. | MSPH 110 | Solid State Physics | DCC | 4 | 3 | 1 | 0 | 3 | 0 | 25 | - | 25 | 100 | - |
| 6. | MSPH 112 | Physics Lab-II | DCC | 2 | 0 | 0 | 4 | 0 | 2 | - | 25 | - | - | 50 |
| | | Total | | 22 | 15 | 5 | 4 | | | | | | | |
| 7. | MSMA 114 | Fundamentals of Computer* | SEC | 4 | 3 | 1 | 0 | 3 | 0 | 25 | - | 25 | 100 | - |

**Non CGP Mandatory Course (SEC – Skill Enhancement Course)*



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## II YEAR: Third Semester

| Teaching Scheme | | | | | Contact Hours/ Week | | | Exam Duration | | Relative Weightage % | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| S. No. | Subject Code | Course Title | Course Type | Credit | L | T | P | Theory | Practical | CWS | PRS | MTE | ETE | PRE |
| 1. | MSPH 201 | Atomic and Molecular Physics | DCC | 4 | 3 | 1 | 0 | 3 | 0 | 25 | - | 25 | 100 | - |
| 2. | MSPH 203 | Nuclear and Particle Physics | DCC | 4 | 3 | 1 | 0 | 3 | 0 | 25 | - | 25 | 100 | - |
| 3. | MSPH 205 | Dissertation-I | DCC | 2 | | | | | | | | | | |
| 4. | MSPH xxx | DSE-I/ Track-1 | DSE | 4 | 3 | 1 | 0 | 3 | 0 | 25 | - | 25 | 100 | - |
| 5. | MSXX xxx | GE-1 | GE | 4 | 3 | 1 | 0 | 3 | 0 | 25 | - | 25 | 100 | - |
| 6. | MSPH 211 | Advanced Physics Lab -I | DSE | 4 | 0 | 1 | 6 | 0 | 3 | 0 | 50 | 0 | 0 | 100 |
| | | Total | | 22 | 12 | 7 | 6 | | | | | | | |



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## II YEAR: Fourth Semester

| Teaching Scheme | | | | | Contact Hours/ Week | | | Exam Duration | | Relative Weightage % | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| S. No. | Subject Code | Course Title | Course Type | Credit | L | T | P | Theory | Practical | CWS | PRS | MTE | ETE | PRE |
| 1. | MSPH 202 | Semiconductor Devices | DCC | 4 | 3 | 1 | 0 | 3 | 0 | 25 | - | 25 | 100 | - |
| 2. | MSPH xxx | DSE-II / Track -I | DSE | 4 | 3 | 1 | 0 | 3 | 0 | 25 | - | 25 | 100 | - |
| 3. | MSXX xxx | GE-2 | GE | 4 | 3 | 1 | 0 | 3 | 0 | 25 | - | 25 | 100 | - |
| 4. | MSPH 208 | Advanced Physics Lab -II | DSE | 4 | 0 | 1 | 6 | 0 | 3 | 0 | 50 | 0 | 0 | 100 |
| 5. | MSPH 210 | Dissertation-II | DCC | 8 | | | | | | | | | | |
| | | Total | | 24 | 9 | 12 | 6 | | | | | | | |

***In addition to the above scheme***
***Elective Courses / Activities:*** *These are part of Co and Extra-Curricular Activities and must opt for a minimum of 2 to 6Credits in entire duration of the program.*
*The Identified MOOC's subjects or any other On-line Courses offered by the Recognized Accredited University enlisted by the University.*
*OR*
*The Approved Co and Extra-Curricular Activities as defined by the University.*
*Publication in category 1 or category 2 journal publication is mandatory outcome of the Track 1. In second year (i.e., III and IV Semesters)* ***Track 1 option*** *is by research work. Candidate will be finally evaluated at the end of*
*the semester IV on the basis of his/her publication (accepted or published in category 1 or 2 journals).*

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# List of Electives

| S.No. | Course Code | Course Title | DSE Details |
|---|---|---|---|
| 1. | MSPH 207 | Fibre and Integrated Optics | DSE-I |
| 2. | MSPH 209 | Advanced Condensed Matter Physics | |
| 3. | MSPH 213 | Advanced Numerical Physics | |
| 4. | MSPH 215 | Spintronics | |
| 5. | MSPH 217 | Characterization Techniques | |
| 6. | MSPH 204 | Space and Atmospheric Science | DSE-II |
| 7. | MSPH 206 | Laser Spectroscopy | |
| 8. | MSPH 212 | Plasma Physics | |
| 9. | MSPH 214 | Advanced Electronics | |
| 10. | MSPH 216 | Advanced Functional Materials | |

## Credits in Four Semesters

| Total | Core | Generic Electives (GE) | Department Specific Electives (DSE) | Ability Enhancement Courses (AEC) | Skill Enhancement Courses (SEC) |
|---|---|---|---|---|---|
| 90 | 66 | 8 | 16 | 4 | 4 |

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# MASTER OF SCIENCE

## Chemistry

### I YEAR: First Semester

| Teaching Scheme | | | | | Contact Hours/ Week | | | Exam Duration | | Relative Weightage % | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| S. No. | Subject Code | Course Title | Course Type | Credit | L | T | P | Theory | Practical | CWS | PRS | MTE | ETE | PRE |
| 1. | MSCH101 | Inorganic Chemistry-I | DCC | 4 | 3 | 1 | 0 | 3 | 0 | 25 | - | 25 | 100 | - |
| 2. | MSCH103 | Organic Chemistry-I | DCC | 4 | 3 | 1 | 0 | 3 | 0 | 25 | - | 25 | 100 | - |
| 3. | MSCH105 | Physical Chemistry-I | DCC | 4 | 3 | 1 | 0 | 3 | 0 | 25 | - | 25 | 100 | - |
| 4. | MSCH107 | # | DCC | 4 | 4 | 0 | 0 | 3 | 0 | 25 | - | 25 | 100 | - |
| 5. | MSCH109 | Lab-I | DCC | 6 | 0 | 0 | 12 | 0 | 12 | - | - | 75 | - | 150 |
| | | Total | | 22 | 12 | 4 | 12 | | | | | | | |
| 6. | MSHu 111 | Communicative English * | AEC | 4 | 3 | 1 | 0 | 3 | 0 | 25 | - | 25 | 100 | - |

**Non CGPA Mandatory Course (AEC – Ability Enhancement Course)*
*# a. Mathematics for Chemists or Biology for Chemists*
*b. Computers for Chemists*

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## I YEAR: Second Semester

| Teaching Scheme | | | | | Contact Hours/ Week | | | Exam Duration | | Relative Weightage % | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| S. No. | Subject Code | Course Title | Course Type | Credit | L | T | P | Theory | Practical | CWS | PRS | MTE | ETE | PRE |
| 1. | MSCH 102 | Inorganic Chemistry-2 | DCC | 4 | 3 | 1 | 0 | 3 | 0 | 25 | - | 25 | 100 | - |
| 2. | MSCH 104 | Organic Chemistry-2 | DCC | 4 | 3 | 1 | 0 | 3 | 0 | 25 | - | 25 | 100 | - |
| 3. | MSCH 106 | Physical Chemistry-2 | DCC | 4 | 3 | 1 | 0 | 3 | 0 | 25 | - | 25 | 100 | - |
| 4. | MSXX xxx | GE-1 | GE | 4 | 3 | 1 | 0 | 3 | 0 | 25 | - | 25 | 100 | - |
| 5. | MSCH 108 | Lab-2 | DCC | 6 | 0 | 0 | 12 | 0 | 12 | - | - | 25 | - | 150 |
| | | Total | | 22 | 12 | 4 | 12 | | | | | | | |
| 6. | MSMA 114 | Fundamentals of Computer* | SEC | 4 | 3 | 1 | 0 | 3 | 0 | 25 | - | 25 | 100 | - |

*Non CGPA Mandatory Course (SEC – Skill Enhancement Course)*



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## II YEAR: Third Semester

| Teaching Scheme | | | | | Contact Hours/ Week | | | Exam Duration | | Relative Weightage % | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| S. No. | Subject Code | Course Title | Course Type | Credit | L | T | P | Theory | Practical | CWS | PRS | MTE | ETE | PRE |
| 1. | MSCH201 | Core-8 | DCC | 4 | 3 | 1 | 0 | 3 | 0 | 25 | - | 25 | 100 | - |
| 2. | MSCH203 | Core-9 | DCC | 4 | 3 | 1 | 0 | 3 | 0 | 25 | - | 25 | 100 | - |
| 3. | MSCH205 | Lab-3 | DCC | 6 | 0 | 0 | 12 | 0 | 12 | - | - | 75 | - | 150 |
| 4. | MSCHXXX | DSE-1/ Track-I | DSE | 4 | 3 | 1 | 0 | 3 | 0 | 25 | - | 25 | 100 | - |
| 5. | MSCHXXX | DSE-2 | DSE | 4 | 3 | 1 | 0 | 3 | 0 | 25 | - | 25 | 100 | - |
| | | Total | | 22 | 12 | 4 | 12 | | | | | | | |

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## II YEAR: Fourth Semester

| Teaching Scheme | | | | | Contact Hours/ Week | | | Exam Duration | | Relative Weightage % | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| S. No. | Subject Code | Course Title | Course Type | Credit | L | T | P | Theory | Practical | CWS | PRS | MTE | ETE | PRE |
| 1. | MSCH 202 | Core-11 | DCC | 4 | 3 | 1 | 0 | 3 | 0 | 25 | - | 25 | 100 | - |
| 2. | MSCH 204 | Lab-4 | DCC | 4 | 0 | 0 | 8 | 0 | 8 | - | - | 50 | - | 100 |
| 3. | MSXX xxx | GE-2 | GE | 4 | 3 | 1 | 0 | 3 | 0 | 25 | - | 25 | 100 | - |
| 4. | MSCH xxx | DSE-3/ Track-I | DSE | 4 | 3 | 1 | 0 | 3 | 0 | 25 | - | 25 | 100 | - |
| 5. | MSCH 206 | Dissertation | DCC | 8 | | | | | - | - | 100 | - | - | 200 |
| | | Total | | 24 | 17 | 3 | 8 | | | | | | | |

## Credits for four Semesters

| Total | Core | Generic Electives (GE) | Department Specific Electives (DSE) | Ability Enhancement Courses (AEC) | Skill Enhancement Courses (SEC) |
|---|---|---|---|---|---|
| 90 | 70 | 8 | 12 | 4 | 4 |

*In addition to the above scheme*
*Elective Courses / Activities: These are part of Co and Extra-Curricular Activities and must opt for a minimum of 2 to 6Credits in entire duration of the program.*
*The Identified MOOC's subjects or any other On-line Courses offered by the Recognized Accredited University enlisted by the University.*
*OR*
*The Approved Co and Extra-Curricular Activities as defined by the University.*
*Publication in category 1 or category 2 journal publication is mandatory outcome of the Track 1. In second year (i.e., III and IV Semesters) Track 1 option is by research work. Candidate will be finally evaluated at the end of the semester IV on the basis of his/her publication (accepted or published in category 1 or 2 journals).*

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# MASTER OF SCIENCE

## Biotechnology

### I Year: First Semester

| Teaching Scheme | | | | | Contact Hours/ Week | | | Exam Duration | | Relative Weightage % | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| S. No. | Subject Code | Course Title | Course Type | Credit | L | T | P | Theory | Practical | CWS | PRS | MTE | ETE | PRE |
| 1 | MSBT 101 | Biochemistry | DCC | 4 | 3 | 0 | 2 | YES | YES | 25 | 25 | 25 | 75 | - |
| 2 | MSBT 103 | Cell and Developmental Biology | DCC | 4 | 3 | 1 | 0 | YES | NO | 25 | - | 25 | 100 | - |
| 4 | MSBT 105 | Molecular Biology | DCC | 4 | 3 | 0 | 2 | YES | YES | 25 | 25 | 25 | 75 | - |
| 4 | MSBT 107 | Analytical Techniques | DCC | 4 | 3 | 0 | 2 | YES | YES | 25 | 25 | 25 | 75 | - |
| 5 | MSBT 109 | Biostatistics and Computer Applications | DCC | 4 | 3 | 1 | 0 | YES | NO | 25 | - | 25 | 100 | - |
| 6 | MSBT 111 | Seminar | DSE | 2 | 0 | 0 | 4 | NO | YES | | 25 | | | 50 |
| | | **TOTAL** | | 22 | | | | | | | | | | |
| 8 | MSHu 113 | Communicative English | AEC* | 4 | 3 | 1 | 0 | YES | NO | 25 | - | 25 | 100 | - |

*Non CGPA Mandatory course *(AEC – Ability Enhancement Course)*

### I Year: Second Semester

| Teaching Scheme | | | | | Contact Hours/ Week | | | Exam Duration | | Relative Weightage % | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| S. No. | Subject Code | Course Title | Course Type | Cr | L | T | P | Theory | Practical | CWS | PRS | MTE | ETE | PRE |
| 1 | MSBT 102 | Immunology | DCC | 4 | 3 | 0 | 2 | YES | YES | 25 | 25 | 25 | 75 | - |
| 2 | MSBT 104 | Microbiology and Industrial Applications | DCC | 4 | 3 | 0 | 2 | YES | YES | 25 | 25 | 25 | 75 | - |
| 3 | MSBT 106 | Genetic Engineering | DCC | 4 | 3 | 0 | 2 | YES | YES | 25 | 25 | 25 | 75 | - |
| 4 | MSBT 108 | Genetics | DCC | 4 | 3 | 1 | 0 | YES | NO | 25 | - | 25 | 100 | - |
| 5 | MSBT 110 | Genomics and Proteomics | DCC | 4 | 3 | 1 | 0 | YES | NO | 25 | - | 25 | 100 | - |
| 6 | MSBT 112 | Project Proposal Presentation | DCC | 2 | | | | | | | | | | 75 |
| | | **TOTAL** | | 22 | | | | | | | | | | |
| 7 | MSMA 114 | Fundamentals of Computer* | SEC | 4 | 3 | 0 | 2 | 3 | 0 | 25 | 25 | 25 | 75 | |

*Non CGPA Mandatory course *(SEC – Skill Enhancement Course)*





25/04/2019

25/04/19

24/4/19

24/4/19

## II Year: Third Semester

| Teaching Scheme | | | | | Contact Hours/ Week | | | Exam Duration | | Relative Weightage % | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| S. No. | Subject Code | Course Title | Course Type | Credit | L | T | P | Theory | Practical | CWS | PRS | MTE | ETE | PRE |
| 1 | MSBT 201 | Bioprocess Engineering & Technology | DCC | 4 | 3 | 0 | 2 | YES | YES | 25 | 25 | 25 | 75 | - |
| 2 | MSBT 203 | Immunotechnology and Molecular Virology | DCC | 4 | 3 | 1 | 0 | YES | NO | 25 | - | 25 | 100 | - |
| 3 | MSBT 205 | IPR & Biosafety | DCC | 4 | 3 | 1 | 0 | YES | NO | 25 | - | 25 | 100 | - |
| 4 | MSBT xxx | DSE-I | DSE | 4 | 3 | 1 | 0 | YES | NO | 25 | - | 25 | 100 | - |
| 5 | MSBT xxx | DSE-II | DSE | 4 | 3 | 1 | 0 | YES | NO | 25 | - | 25 | 100 | - |
| 7 | MSBT 243 | Lab Based on Elective | DSE | 2 | 0 | 0 | 4 | NO | YES | - | 25 | - | - | 50 |
| | | TOTAL | | 22 | | | | | | | | | | |

## II Year: Fourth Semester

| Teaching Scheme | | | | | Contact Hours/ Week | | | Exam Duration | | Relative Weightage % | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| S. No. | Subject Code | Course Title | Course Type | Credit | L | T | P | Theory | Practical | CWS | PRS | MTE | ETE | PRE |
| 1. | MSBT 202 | Project Work | DCC | 16 | | | | | | | | | | |
| 2. | MSXX xxx | GE-1 | GE | 4 | 3 | 1 | 0 | YES | NO | 25 | - | 25 | 100 | - |
| | | | | | | | | | | | | | | |
| 3. | MSXX xxx | GE-2 | GE | 4 | 3 | 1 | 0 | YES | NO | 25 | - | 25 | 100 | - |
| | | TOTAL | | 24 | | | | | | | | | | |

## Credits for four Semesters

| Total | Core | Generic Electives (GE) | Department Specific Electives (DSE) | Ability Enhancement Courses (AEC) | Skill Enhancement Courses (SEC) |
|---|---|---|---|---|---|
| 90 | 70 | 8 | 12 | 4 | 4 |





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# List of Electives

| S. No. | Course Code | Course Title | DSE Details |
|---|---|---|---|
| 1 | MSBT207 | Microbial Technology | DSE-1 |
| 2 | MSBT209 | Computational Biology | |
| 3 | MSBT211 | Animal Biotechnology | |
| 4 | MSBT213 | Plant Biotechnology | |
| 5 | MSBT215 | Environmental Biotechnology | |
| 6 | MSBT217 | Nanobiotechnology | |
| 7 | MSBT219 | Protein Engineering | |
| 8 | MSBT221 | Molecular Virology | |
| 9 | MSBT223 | Industrial & Food Biotechnology | |
| 10 | MSBT225 | Diagnostics | DSE-2 |
| 11 | MSBT227 | Cancer Genetics | |
| 12 | MSBT229 | Evolutionary Genetics | |
| 13 | MSBT231 | Model Genetic Systems | |
| 14 | MSBT233 | Pharmacogenomics | |
| 15 | MSBT235 | Stem Cell Biology | |
| 16 | MSBT237 | Vaccines | |
| 17 | MSBT239 | Metabolic Engineering | |
| 18 | MSBT241 | Molecular Therapeutics | |

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24/4/19

# DEPARTMENT OF BIOTECHNOLOGY

## M.Sc. BIOTECHNOLOGY

## SCHEME

**I Year: Odd Semester**

| S. No. | Code | Title | Type | Cr | L | T | P | TH | PR | CWS | PRS | MTE | ETE | PRE |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | MSBT 101 | Biochemistry | DCC | 4 | 3 | 0 | 2 | YES | YES | 25 | 25 | 25 | 75 | - |
| 2 | MSBT 103 | Cell and Developmental Biology | DCC | 4 | 3 | 1 | 0 | YES | NO | 25 | - | 25 | 100 | - |
| 4 | MSBT 105 | Molecular Biology | DCC | 4 | 3 | 0 | 2 | YES | YES | 25 | 25 | 25 | 75 | - |
| 4 | MSBT 107 | Analytical Techniques | DCC | 4 | 3 | 0 | 2 | YES | YES | 25 | 25 | 25 | 75 | - |
| 5 | MSBT 109 | Biostatistics and Computer Applications | DCC | 4 | 3 | 1 | 0 | YES | NO | 25 | - | 25 | 100 | - |
| 6 | MSBT 111 | Lab-1 | DCC | 2 | 0 | 0 | 4 | NO | YES | | 25 | | | 50 |
| | | **TOTAL** | | **22** | | | | | | | | | | |
| 8 | MSBT 115/ MSMA115 | Introductory Biology/ Introductory Mathematics | GEC* | 4 | 3 | 1 | 0 | YES | NO | 25 | - | 25 | 100 | - |
| 9 | MSHu 117 | Communication Skills | AEC* | 4 | 3 | 1 | 0 | YES | NO | 25 | - | 25 | 100 | - |
| | | ***Non CGPA Mandatory course** | | | | | | | | | | | | |

**I Year: Even Semester**

| S. No. | Code | Title | Type | Cr | L | T | P | TH | PR | CWS | PRS | MTE | ETE | PRE |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | MSBT 102 | Immunology | DCC | 4 | 3 | 0 | 2 | YES | YES | 25 | 25 | 25 | 75 | - |
| 2 | MSBT 104 | Microbiology and Industrial Applications | DCC | 4 | 3 | 0 | 2 | YES | YES | 25 | 25 | 25 | 75 | - |
| 3 | MSBT 106 | Genetic Engineering | DCC | 4 | 3 | 0 | 2 | YES | YES | 25 | 25 | 25 | 75 | - |
| 4 | MSBT 108 | Genetics | DCC | 4 | 3 | 1 | 0 | YES | NO | 25 | - | 25 | 100 | - |
| 5 | MSBT 110 | Genomics and Proteomics | DCC | 4 | 3 | 1 | 0 | YES | NO | 25 | - | 25 | 100 | - |
| 6 | MSBT 112 | Project Proposal Presentation (SEC) | SEC | 2 | | | | | | | | | | 75 |
| | | **TOTAL** | | 22 | | | | | | | | | | |

**II Year: Odd Semester**

| S. No. | Code | Title | Type | Cr | L | T | P | TH | PR | CWS | PRS | MTE | ETE | PRE |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | MSBT 201 | Bioprocess Engineering & Technology | DCC | 4 | 3 | 0 | 2 | YES | YES | 25 | 25 | 25 | 75 | - |
| 2 | MSBT 203 | Immunotechnology and Molecular Virology | DCC | 4 | 3 | 1 | 0 | YES | NO | 25 | - | 25 | 100 | - |
| 3 | MSBT 205 | IPR & Biosafety | DCC | 4 | 3 | 1 | 0 | YES | NO | 25 | - | 25 | 100 | - |
| 4 | MSBT XXX | DSE-I | DSE | 4 | 3 | 1 | 0 | YES | NO | 25 | - | 25 | 100 | - |
| 5 | MSBT XXX | DSE-II | DSE | 4 | 3 | 1 | 0 | YES | NO | 25 | - | 25 | 100 | - |
| 7 | MSBT 213 | Lab VII-Based on Elective | DSE | 2 | 0 | 0 | 4 | NO | YES | - | 25 | - | - | 50 |
| | | **TOTAL** | | 22 | | | | | | | | | | |

II Year: Even Semester

| S. No. | Code | Title | Type | Cr | L | T | P | TH | PR | CWS | PRS | MTE | ETE | PRE |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | MSBT 202 | Bioentrepreneurship (SEC) | SEC | 4 | 3 | 1 | 0 | YES | NO | 25 | - | 25 | 100 | - |
| 2 | MSBT 204 | Project Work | 20 | 20 | | | | | | | | | | |
| | | TOTAL | | 24 | | | | | | | | | | |

## Credits of Different Curricular Components (Biotechnology)

| CURRICULAR COMPONENTS | | Credits |
|---|---|---|
| (a) Foundation Course (Common Courses) | | Non CGPA Mandatory course |
| i. | Communication English (AEC) | 4 |
| ii. | Fundamentals Courses (GEC) | 4 |
| | Total | 8 |
| (b) Departmental Core Courses (DCC) | | CGPA Mandatory courses |
| i. | Core Courses | 56 |
| ii | SEC | 04 |
| ii. | Dissertation | 20 |
| (c) Departmental Elective Courses (DSE) | | 10 |
| Grand Total | | 98 |

List of Electives

| S. No. | Code | Title | Cr | L | T | P | TH | PR | CWS | PRS | MTE | ETE | PRE |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | MSBT 207 | Microbial Technology | 3 | 3 | 0 | 0 | YES | NO | 25 | - | 25 | 100 | - |
| 2 | MSBT 209 | Computational Biology | 3 | 3 | 0 | 0 | YES | NO | 25 | - | 25 | 100 | - |
| 3 | MSBT 211 | Animal Biotechnology | 3 | 3 | 0 | 0 | YES | NO | 25 | - | 25 | 100 | - |
| 4 | MSBT 213 | Plant Biotechnology | 3 | 3 | 0 | 0 | YES | NO | 25 | - | 25 | 100 | - |
| 5 | MSBT 215 | Environmental Biotechnology | 3 | 3 | 0 | 0 | YES | NO | 25 | - | 25 | 100 | - |
| 6 | MSBT 217 | Nanobiotechnology | 3 | 3 | 0 | 0 | YES | NO | 25 | - | 25 | 100 | - |
| 7 | MSBT 219 | Protein Engineering | 3 | 3 | 0 | 0 | YES | NO | 25 | - | 25 | 100 | - |
| 8 | MSBT 221 | Molecular Virology | 3 | 3 | 0 | 0 | YES | NO | 25 | - | 25 | 100 | - |
| 9 | MSBT 223 | Industrial & Food Biotechnology | 3 | 3 | 0 | 0 | YES | NO | 25 | - | 25 | 100 | - |
| 10 | MSBT 225 | Diagnostics | 3 | 3 | 0 | 0 | YES | NO | 25 | - | 25 | 100 | - |
| 11 | MSBT 227 | Cancer Genetics | 3 | 3 | 0 | 0 | YES | NO | 25 | - | 25 | 100 | - |
| 12 | MSBT 229 | Evolutionary Genetics | 3 | 3 | 0 | 0 | YES | NO | 25 | - | 25 | 100 | |
| 13 | MSBT 231 | Model Genetic Systems | 3 | 3 | 0 | 0 | YES | NO | 25 | - | 25 | 100 | |
| 14 | MSBT 233 | Pharmacogenomics | 3 | 3 | 0 | 0 | YES | NO | 25 | - | 25 | 100 | |
| 15 | MSBT 235 | Stem Cell Biology | 3 | 3 | 0 | 0 | YES | NO | 25 | - | 25 | 100 | |
| 16 | MSBT 237 | Vaccines | 3 | 3 | 0 | 0 | YES | NO | 25 | - | 25 | 100 | - |
| 17 | MSBT 239 | Metabolic Engineering | 3 | 3 | 0 | 0 | YES | NO | 25 | - | 25 | 100 | - |
| 18 | MSBT 241 | Molecular Therapeutics | 3 | 3 | 0 | 0 | YES | NO | 25 | - | 25 | 100 | - |

**Junior Technical Assistant (PB-1, Rs.5200-20200 Grade Pay Rs.2400/- (6th CPC) Level-4, Entry Pay Rs.25500/- (7th CPC)**

**For direct recruitment:**

10th pass with science with ITI Certificate/National Trade Certificate/National Apprenticeship Certificate or equivalent in the relevant (or an allied) subject field with five (05) years Industrial/Laboratory Experience in the desired trade.

OR

Three years State Board Diploma (or equivalent) in the relevant (or an allied) subject/ field with two (02) years Industrial/Laboratory Experience in the desired trade.

OR

Senior Secondary (or equivalent) with science subjects in the relevant (or an allied) subject field with five (05) years Industrial/Lab experience in the desired trade.

OR

Bachelor of Science Degree in relevant field or equivalent with one (01) year Industrial/Lab experience in the desired trade.

OR

Bachelor of Computer Applications (BCA) with one (01) year Industrial/Lab experience in the desired trade.

**Age limit: 35 years**

# MBA

## Entrepreneurship, Innovation and Venture Development

The University School of Management and Entrepreneurship (USME), East Delhi Campus of DTU, which has entrepreneurship as a focus area, has as part of its mission, the delivery of a portfolio of professionally designed courses in entrepreneurship. With an aspiration to be recognized a world class practice based school, it would like to offer practicum mode learning programs in entrepreneurship which are experiential and outcome based in nature. It is in this context that the following course is being proposed by the department for consideration.

**Background:**

The AICTE in its start-up policy in 2016 announced the need and design for an experiential learning cum outcome based MBA program in entrepreneurship. It was to be focused on outcome based evaluation, with a curriculum divided over components such as knowledge (30%), attitude and behavioral element (30%) and skills (40%). In line with the policy, a framework has been designed, and is being put up for consideration. The intention is that the AICTE syllabus for this program will eventually be offered as per its suggested detailed contents, after further consideration of the merits and USME capabilities, discussion in the department, experts and its Board of Studies, in terms of specific course plans.

### MBA Entrepreneurship, Innovation and Venture Development

**Introduction :**

Syllabus of two years MBA in Entrepreneurship, Innovation and Venture Development comprises of core and elective courses, skill certification, capstone projects and Action Learning segments. With an objective to connecting theory of innovation and entrepreneurship with practice and enabling students to acquire skills, this outcome oriented program is designed to deliver in phases and modules. The program is focused on learning grounded in all stages of the new venture development process. It will require that students create their own venture in their chosen area within the first semester, and go through the stages of entrepreneurial activity, while learning about these through knowledge and experiential courses. They will simultaneously apply their entrepreneurial skills in real life situations, validate ideas, test market and build a successful venture out of it, and these outcomes will be both guided by mentors/faculty as well as evaluated on an outcome basis, where success for each Capstone project around their venture are defined beforehand as an evaluative criterion.

This course has five Modules, two Action Learning Segments and three Capstone Projects to enable students to learn to recognize, create and shape a business opportunity, develop leadership and build a start-up team, assess market feasibility for launching new start-ups and construct a business model.

In terms of the structure, the semester and module structure will closely follow the recommended AICTE structure and policy.

This is given as below:

| Tracks/Phase | Year | Semester | Modules Capstone Projects and Action Learning Segments. |
|---|---|---|---|
| **Foundation of Management & Entrepreneurship Track** | 1st Year | 1st Semester | • **Module-1: Introduction to Innovation & Entrepreneurial Idea Generation & Identifying Business Opportunities.**<br>  • **Capstone Project-1** : Development of an Innovative Business Idea into a Proof-of-Concept.<br>• **Module-II : Management Skills for Entrepreneurs and Managing for Value Creation.**<br>  • **Capstone Project-II**<br>  • Development of Business Idea into working Prototype |
| | | 2nd Semester | • **Module-III : Creating & Sustaining Enterprise Model & Organizational Effectiveness.**<br>  • Capstone Project-III : Development of Minimum Viable Business Model of Innovation. |
| **Start-up Experiential Learning Track** | | | • Action Learning : Segment-1: **Start-up/Incubation Residency Learning Program.** |
| **Entrepreneurship Intensity Track (Immersion into Incubation Facility and Resource Access)** | 2nd Year | 3rd Semester | • **Module- IV : Advancing Entrepreneurial Skill & Venture Planning**<br>• **Module-V : Creating and Growing New Venture and National & Global Business Environment.** |
| **Start-up Establishment Track** | | 4th Semester | • **Action Learning Segment-II: Venture Establishment Phase at Incubators/Accelerators.** |
| **Final Exit** | | **Completion of "MBA/PGDM in Innovation, Entrepreneurship and Venture Development" Degree** | |

**Induction Module :** The program would begin with a 5 days orientation session on **"Know, Recognize and manage your Entrepreneurial Talent"** that aims at measuring entrepreneurial instincts, assessment of students and development of a venture development plan through a self-assessment, reflection, feedback mechanism and possible outcomes when starting a venture etc. This session intends to discover innovative and entrepreneurial talent at the beginning of course. This component may include field exposure to startups. Students will get exposed to motivational sessions by successful startup founders, along with an exercise in expectation mapping of students from this course and expectation from students throughout this program. This will also include an experience through immersion into real time problem scenario with close interaction sessions with incubatees sharing their own challenges they have experienced at the various stages of enterprise development. All these will be achieved through a structured program on the lines of ideathon/hackathon/bootcamp/business canvas etc.

**The Foundation of Management and Entrepreneurship Track:** This comprises of mix of classroom and experiential learning modules (I, II and III). Teaching components offers in the form of core and elective courses blended with educational activities, capstone projects and Incubator Twinning program in which students while working in teams on real life venture related problems faced by incubatees, learn and develop creative problem solving skills, manage innovative ideas, and validate business opportunity potential. This will be done while working with mentors, expert and incubatees of the IIC based at USME, and managed and evaluated by the

USME allocated faculty coordinators as per the directions of the department. Along the way, student also study and acquire skill on entrepreneurial approaches (concepts, process and scope) and management skills such as marketing of innovations, financial, strategy, business ethics and social responsibility, entrepreneurial management decision making.

**The Entrepreneurship Intensity Track :** This comprises of Module-IV and V, mostly designed to deliver during 3rd Semester of program. Through these modules, incumbent will acquire specialized skills and build-up risk taking and other competencies towards venture establishment. This will advance the actual stage of venture planning, testing and tapping of opportunities for students as they are pursuing a venture and expect to launch shortly as part of the Action Learning-II Segment.

**Three Capstone Projects:** Three capstone projects are designed as a part of first three modules (I, II and III) designed to be delivered during 1st and 2nd Semester. These capstone projects are Experiential Learning Segments where students apply their classroom learning throughout the semester into practice of innovation & Entrepreneurship. They will be required to create a business opportunity map, and create an entity related to their chosen area of entrepreneurial activity. They would receive an initial seed funding from the University for their venture. The University would not have any equity or stake in their venture, or any kind of return from this funding, however. The venture would have to be taken to the stage of commercialization by the last semester, as part of their experiential learning and also outcome evaluation. Each capstone project will be an independent project/assignment to be accomplished under the guidance of mentor experts. A faculty guide from amongst the regular faculty at USME will also be assigned as Faculty Coordinator for the project for each student.

**Credit Requirement:** As per the AICTE model curriculum guideline, for awarding the master degree (MBA), total credit of 102 is required to be completed over two years. The credit allocations for this proposed new MBA in IEV degree is a total of 104 credits which can be earned as following:-

- **Classroom Credits – Total 44 (20+24) Credits :** Out of 104 credit requirement over four semesters, incumbent need to earn total of 44 credits from class room sessions which includes core courses (20) and Elective Courses (24) spread over 4 semesters. The classroom credit distribution is designed in such a way that, the load of class room credits will be reduced during 3rd semester compared to 1st and 2nd semesters and with provision of more elective credits. This make this MBA more flexible and leaves the student to choose appropriate courses and get more time to work towards venture planning, to meet customers and validate innovations and test business model assumptions in the real market scenario. Furthermore, especially during 3rd semester, students have also option to earn elective credits, up to 8 credits, by opting courses offered online/MOOC or from any other MBA program on Campus that suits their entrepreneurial needs, such as analytics, IOT, retailing, etc.
- **Outside Classroom Credits – Total 14 Credits:** Incumbents also can earn up to 14 credits from outside classroom programs by enrolling/participating in training and workshops programs/ achievement in competitions/presenting in seminars/exhibitions of subject of relevant to innovation and entrepreneurship, start-up skill building and venture development etc. This will based on approval of the Department, and may also include workshops being organized for students by USME, and some

offered particularly for this MBA program, such as in entreprenuerial finance, workshops on institutional funding environment and schemes-ups, Business Law, workshops with overseas collaborations, etc.

- **Capstone Projects (CP) Credits – Total 12 Credits:** Incumbents would earn up to 12 credits on successful completions of three capstone projects during 1st and 2nd Semesters. These are required to be accomplished by students independently under the guidance of expert mentors, and under the coordination of the allotted USME Department. This three capstone projects will make students to work on their idea to convert innovation and further development of business model out of it. Faculty/Industry/Start-up experts will guide students to do independent projects or guide students to build advancement of one idea into Low Fidelity Wireframes and High Fidelity Wireframes based upon the domain students are working on.
- **Integrated educational learning activities, through Experiential Learning Component (EL):** This is a Non Credit Compulsory course which involves simulations, case studies, Guest/leadership talk series sessions, etc., where attendance is mandatory. In every module where it is offered, it comprises a series of learning interventions of experiential nature on topics suggested in the program structure or as otherwise deemed fit by the Faculty Mentor for specific cases of student enterprise. If a student does not meet University norms of minimum attendance in experiential sessions, student will need to repeat/engage in experiential learning sessions/tasks, as mandated by the Department of the Experiential Learning Module.
- **Action Learning Segments (AL) Credits – Total 34 Credits (14+20):** Incumbent has to go through two action learning segments; one is designed during 2nd Semester and second is designed during 4th semester and up to total 34 credits can be earned on successful completion. The first learning segment is more focus on experiential learning through a Start-up Residency Program (SRP) in a start-up or in an incubation Unit. Whereas, the second action learning segment is focusing on establishing venture either in self or with support of incubation unit based on the innovation and business model developed as part of capstone projects.

**Credit Distribution across and throughout the semester as below :-**

| Year | Semester | Credit Core (Class Room) | Credit Elective (Class Room) | Credit-Outside Classroom Learning/ Certification /Competitions | Credit Capstone | Credit Action Learning Segment | Total |
|---|---|---|---|---|---|---|---|
| 1st Year | 1st Sem. | 8 | 8 | 4 | 4+4 | | 28 |
| | 2nd Sem. | 4 | 4 | 2 | 4 | 14 | 28 |
| 2nd Year | 3rd Sem. | 8 | 12 | 4 | | | 24 |
| | 4th Sem. | | | 4 | | 20 | 24 |
| **Total** | | **20** | **24** | **14** | **12** | **34** | **104** |

**Learning Outcomes:** By the end of the program, students will have a knowledge and understanding of

- Key concepts of entrepreneurship, innovation and new venture development

- How to take an idea, build a prototype and launch to early customers in the market.
- Demonstrate how to Market and idea/Prototype to early customers.
- Knowledge of scale up of ventures
- Knowledge of venture growth strategies
- Knowledge of Business Models and Fund Raising
- Knowledge of Hiring and Talent Management
- Knowledge of International Start-up Ecosystem

DTU has a strong innovation and start-up ecosystem in campus with existence of an established incubation Centre (DTU Innovation and Incubation Foundation- DTUIIF and the USME's Innovation and Incubation Centre – IIC). The advanced labs with workspace for incubation, would be leveraged for the program, wherein few incubatees of DTU-IIF will be resident in the USME premises. The two Centres of Innovation and Incubation, and of Entrepreneurship Development, including business services of DTU-IIF, will be provided as resource to these students. The mentoring and other experiential elements will be offered under the direct supervision of incubation unit of institute and under administrative control of institute. Hard and soft resource of incubation unit and department, both, will be used to deliver the program. Institute/incubation unit will draw the expertise within and outside such as incubates/ start-ups, successful graduate start-ups, mentor-experts, industry-investment practitioners, IP and regulatory expert, design experts to teach and deliver the program. For this purpose, institute may engage competent faculties drawing from interdisciplinary departments available internally and or drawing external experts from industry/ market to teach the course in a way similar to the adjunct/guest faculty program at DTU.

**Eligibility & Selection of Candidate: -** The minimum academic eligibility for a candidate to apply for this program should be a graduate having at least three years degree program recognized nationally, with at least 50% percent marks in graduation. Reservation as norms followed by DTU would apply in all cases to this program.

The selection will be based on graduation marks (30%) 5% gender diversity; 5% academic diversity; Essay (10%) + Interview (50% of which 30% marks for business plan/idea and 20% for personal characteristics such as entrepreneurial motivation, passion, degree of engagement, creativity and quality of understanding of innovation, entrepreneurship etc.).

**Exit options:** Course is designed to offer incumbent an opportunity to exit after successful completion of the first year. First year is generally focusing on Entrepreneurial motivation and venture foundation development and experiential learning making candidate to exit with an innovation and entrepreneurial abilities with management capability to manage incubation and start-up environments. 2nd year (3rd and 4th Semester) is focusing on advancement of entrepreneurial skill and validates the enterprising skill by setting up real ventures with incubation support as part of the 2nd Action Learning Segment.

**Awarding of Degree: -** Upon successful completion of 2 years, award as 'MBA in Entrepreneurship, Innovation and Venture Development'. USME/DTU may issue certificate to student who wish to discontinue the program after successful completion of 1st Year, titled "Certificate in Entrepreneurship, Innovation and Venture

Development" based on successful completion of the academic requirements of the First Year of MBA Entrepreneurship, Innovation and Venture Development.

**Career and Employment Opportunity: -** The objective of this program is to prepare young minds towards self-employment and create employment opportunity for others through enterprise development. It is expected that, more job creators will come out and most of the graduates of this program will start and thrive with their own start-ups launched during the study period.

Moreover, graduates from this program also will find lots of opportunities to get placed in start-ups because of their close understanding and working experience in innovation and entrepreneurship throughout their study period. Furthermore, these graduates will be preferred candidates to get the assignment to coordinate and lead pre-incubation centers in academics such as Entrepreneurship Development Cells (EDC), IEDC, New Gen IEDC, Start-up Cell, Innovation Cell etc. with their experience and interest, further job opportunities to get absorbed with incubation units, acceleration unit, angel and VC firms etc. Even, these graduates will find preferential space to work with CSR arm, social enterprise arm and spin off arm of corporate, NGOs, social enterprises.

However, the USME or DTU will not facilitate their Placement with companies in this regard, and they would be encouraged to become entrepreneurs, and enhance the job creation. If they would wish to work in the incubator space, they would be given a lot of networking opportunity in this period, to create such opportunities for themselves in the spirit of the program.

**Semester wise Expectation from students**

**Semester-1**

Students are expected to gain foundation and deep knowledge on development of right problem statement based on which affordable solution and business plan will be developed. They will acquire knowledge on the process of developing a proof of concept (PoC) involving an introduction to the innovation process that defines creativity. They will also learn human-centered design & achieving deep customer understanding that will enable them to identify and understand what customers need and want in a product, service, or process-based on observation, not date alone is at the core a human-centered innovation process. Students will learn to develop an actionable point of view that addresses questions such as: Who are the target users? What do they need? How do you know? Students will practice several techniques for achieving deep customer understanding, both in and outside of the classroom, and will then synthesize research findings in an effort to home in on key insights. Identifying opportunity areas problem framing, idea generation through systematic inventive thinking (SIT) Concept Development will be key take home with focus on the critical role that prototyping, experimenting, and iteration play in the development of ideas, its implementation and management.

**Semester-2**

Students are expected to learn business processes involved in creating startups and its growth. They must get hands on training in a startups/incubator and monitor the health of startups. With such deep training, it is desirable that candidates will further refine their business plan. Special focus on entrepreneurial finance will

be designed for students who plan to get involved with a new venture at some point in their career—as a founder, early employee, advisor or investor. They are expected to gain a broader view of the financing landscape for young firms, going beyond the basics of venture capital and angel financing to look at venture debt, bank finance, corporate venture capital and receivables financing.

Students can expect to:

- Summarize and critique their existing business, its strengths and weaknesses, and set priorities for moving the business forward, including the most pressing priorities to be addressed during the course itself;
- Develop a strategy for taking the business to the next level, including a plan for funding, and a plan and timeline for reaching scale.
- Give and receive feedback from other highly motivated student teams, the incubatees with whom they attached, the mentors and exerts they would network with and the external experts delivering workshops for them.
- Meet frequently as a team, and individually for capstone projects, with the faculty advisor/Coordinator and Faculty Mentor.
- Receive feedback and counsel from outside business advisors.
- Have opportunities to pitch their work to angel, seed, and venture capital investors.

The main deliverable will be the individual/team's final presentation and the supporting slide deck and report. There will also be intermediate deliverables building up to that point. Further there would be outcomes decided on by Departments, based on entrepreneurship success such getting buy in for proof of concept by target customer, achieving initial funding, employing personnel of certain level, or creating business agreements with value chain partners.

**Semester-3**

Candidates are expected to have fixed their business plan and the idea and start incubating in the incubator. They should gain fair understanding of angel funding, venture capital and private equity funds. Special focus will be given on experiential inputs designed for students who plan to join rapidly growing ventures in technology or other areas, who are preparing to scale their own ventures, or who plan to evaluate such ventures through the lens of principal investing.

Through case discussions, these programs/inputs will examine executive leadership and functional management challenges in scaling startups after the "search and discovery" stage of startup evolution. These challenges include:

- **Strategy Formulation :** At what pace and in what directions should a new venture grow, balancing the trade-offs across market and competitive dynamics, financing options, product and operational readiness, talent availability, and customers?
- **Executive Leadership :** When and why should scaling ventures replace a founder-CEO? How do professional CEOs differ in their approach when they "inherit' a scaling venture?

- **Organizational Design :** When and how should a rapidly scaling startup – especially one with a strong, product-oriented founder- introduce more formal organizational structure, systems, and processes?
- **Sales & Marketing :** When should a startup venture shift from expeditionary to process-oriented sales? What are best practices for bringing professional sales people into an organization with a startup culture, and for scaling a direct sales force?
- **Product & Service Engineering :** How should new ventures balance market demands for offer customization versus operational efficiency? When should a venture pay down technical debt? What are best practices for product management as an organization scales?
- **Business Development:** How does a business development team prioritize at what point does the founder pull back from a role in bus development activities? How to manage negotiating asymmetries, such as dealing with firms much larger than themselves?
- **Institutional and angel financing, and financial/business models:** How does one obtain funding and from where? What is the financial model? What is the capital structure appropriate for one's venture looking at the domain, own situation, and place in value chain in that industry.

In lieu of a final exam, for action courses, students will also complete a project that applies course concepts, alone or in teams (at the direction of the department through the Faculty Coordinators), and draft a short essay, about what they learned. This is in addition to the business outcomes that their ventures achieve.

Performance progress of Student participants will thus be monitored and evaluated by institute using set of KPIs and measurement indicators prescribed by department and proposed and executed by Faculty Coordinators in close connection with their specific start-up domain and scale. This will be in line with AICTE Start-up Policy/Atal Ranking of Institution on Innovation Achievement (ARIIA) Ranking Framework evaluation criterion.

Further detail of semesters and modules and indicative list of courses are elaborated separately as Annexure -1.

**Semester-4**

It is expected that the student, who has registered a start-up and start building the enterprise with support from incubator/accelerator earlier, now takes it to a stage where it is starting the commercial success phase. It is also desirable that at the end of the 4th semester, candidate will avail a fellowship program/prototyping fund/angel fund to take the enterprise development mission further to establish it outside of the Campus premises, or in its formal incubator program. Enterprise may be established by one student with members from outside or a group of students from the same batch with complimentary expertise. In any case, it is expected that students should have minimum 20% share in a company, by this stage. It is expected that perhaps IP shall be filed by the candidate or she should raise any of the entrepreneurial fellowships (EIR of DST, SIIP of BIRAC), Innovation/startup fellowships of state Government or Corporate or should raise competitive prototyping grants such as PRAYAS of DST, MSME incubate fund, BIG of BIRAC or any innovation grant amounting 5.0 Lakhs or avail of angel or institutional funding of the same amount at least. This will lead to the highest level of grading achievable in the existing system of evaluation. Other specific outcomes in a gradient of success will be formulated for each student by the Faculty Coordinator appointed by the Department, in context of the specific start-up.

By this semester there will be an opportunity for each team to present their business to investors through a form of demo day. This will enable the above outcome based performance evaluation, as well as assessment on qualitative parameters.

**Annexure -1**

**Master of Business Administration**

**Entrepreneurship, Innovation and Venture Development**



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## Appendix One: Detailed Structure and Academic Milestones for Implementation of MBA-EIV Program

| Tracks/Phase | Year | Semester | Modules Capstone Projects and Action Learning Segments. | Assessment for Students & Key Performance Indicators (KPIs) |
|---|---|---|---|---|
| **Foundation of Management & Entrepreneurship Track** | **1st Year** | **1st Semester** | • **Module-1 : Introduction to Innovation & Entrepreneurial Idea Generation & Identifying Business Opportunities.**<br>  • **Capstone Project-1:** Development of an Innovative Business Idea into a Proof-of-Concept.<br>• **Module-II : Management Skills for Entrepreneurs and Managing for Value Creation.**<br>  • **Capstone Project-II :** Locating prospective customers, development of Business Idea into working Prototype | Internal Assessment for Taught Subjects (Core & Elective) and Practical Sessions (Theory + Practical).<br><br>Group/Individual Project – Proof of Concept (PoC) – Organizing Demo Day.<br><br>Credit Points Earned from outside classroom Skill Certifications/Award in Events/competitions held at repute national and international Agencies.<br><br>Access to Pre-incubation facilities at Institute.<br><br>Internal Assessment for Taught Subjects (Core & Elective) and Practical Sessions (Theory+Practical).<br><br>Credit Points Earned from outside classroom Skill Certifications/Award in Events/competitions held at repute national and international agencies.<br><br>Group/Individual Project – Market Research Plan/Potential Customer Acceptance Plan – Organizing Demo Day. |
| **Start-up Experiential Learning Track : (Co-Learning & Contribution)** | | **2nd Semester** | • **Module-III : Creating & Sustaining Enterprising Model & Organizational Effectiveness.**<br>  • **Capstone Project-III :** Development of Minimum Viable Business Model of Innovation/Solution. | Internal Assessment for Taught Subjects (core and Elective) and Practical Sessions (Theory + Practical).<br><br>Credit Points Earned from outside classroom Skill Certifications /Up gradations and Recognition/Award in Events/competitions held at repute national and international agencies.<br><br>Access to co-working space at Incubation Unit.<br><br>Group/Individual Project – Business/Enterprise Model – Organizing Demo Day. |
| | | | • **Action Learning : Segment-1: Start-up/Incubation Residency Learning Program.** | Selection & Placement in Startups and incubation Units.<br><br>Reports Submission for Startup Residency Program. |
| **Entrepreneur-ship Intensity Track (Immersion into Incubation Facility and Resource Access)** | **2nd Year** | **3rd Semester** | • **Module- IV : Advancing Entrepreneurial Skill & Venture Planning.**<br>• **Module-V : Creating and Growing New Venture and National & Global Business Environment.** | Internal Assessment for Taught Subjects (Core & Elective) and Practical Sessions (Theory+Practical)<br><br>Credit Points Earned from outside classroom Skill Certifications /Up gradations and Recognition/Award in Events/competitions held at repute national and international agencies.<br><br>Access to incubation space and schemes at incubation unit.<br><br>Group/Individual Project – Preparation & Checklist for Venture Setup – organizing Demo Day. |
| **Start-up Establishment Track** | | **4th Semester** | • **Action Learning Segment-II: Venture Establishment Phase at Incubators/Accelerators.** | Internal Assessment for Taught Subjects (Core & Elective) and Practical Sessions (Theory+Practical) |

| | | | | |
|---|---|---|---|---|
| | | | | Credit Points Earned from outside classroom Skill Certifications /Upgradations and Recognition/Award in Events/competitions held at repute national and international agencies.<br><br>Access to incubation space and schemes at incubation unit.<br><br>Venture Establishment and resource planning and Operation. |
| **Final Exit** | **Completion of "MBA in Entrepreneurship, Innovation and Venture Development" Degree** | | | |

| Academic Phase | | Year | Semester | Academic Modules (M) | Course Length | Credit Breakup | Tentative Academic Streams /Courses | Integrated with Educational Learning Activities |
|---|---|---|---|---|---|---|---|---|
| A | Foundation of Management and Entrepreneur-ship Track : (Immersion into incubation Facility and Resource) | 1st Year | 1st Semester | Induction | 15-21 Days (2-3 Week) | Mandatory | Know & Manage your Entrepreneurial Talent : Vision and Mission Building | Tools to tests Entrepreneurial Ability-Self Assessment, Reflection, Feedback & finally a create a career development plan |
| | | | | **M-1: Innovation Entrepreneurial** | 2-2.5 months (8-10 weeks) | 14 Credits (Class Room Core Credit-4, Elective-4, Skill Certification-2, Capstone Project-4) | Principles of Technology-Innovation-Management.<br>Theories & Models of Techno-Entrepreneur-ship.<br>Opportunities Mapping-Sector & Competitive Analysis of Start-up Ecosystem of Region & Nation.<br>Research Methods-Data, Models & Decisions<br>**Skill Development Programs :** Participate in Trainings on Ideation, Business Model Canvas, Design Innovation, Technological Innovation & Designing, Entrepreneurship, Data Analytic etc. | Exercise/Simulations that Challenge students to apply Business Skill for Real Problem Solving, Practice Leadership, Team Work Skills, Idea Feasibility Analysis, Apply Ethical and Social Responsible Reasoning, Examine Decisions etc. |
| | | | | | | | **Capstone Course/Project-1 :** Creative Problem Solving/Idea-Proof-of-Concept and Submission. | Work on Idea and Develop Proof-of-Concept |
| | | | | **Idea/POC Project Evaluation Followed by a Week Break** | | | | |
| | | | | **M-II : Management Skill for Entrepreneurs and Managing for Value Creation** | 2-25 months (8-10 weeks) | 14 credits (Class Room Core Credit-4, Elective-4 Skill Certification - 2, Capstone Project – 4) | Innovation Development and Management.<br>Managerial Economics for Entrepreneurs.<br>Entrepreneurial Finance : Concept & Management.<br>Start-up Law, Ethics and Environment in India.<br>Start-up Ecosystem Management-1 : Concept and Best Practices of Pre-incubation Services Facilities.<br>**Skill Development Programs :** Participate in Trainings on Enterprise Development, Management, Negotiation, Marketing & Research, Lean Start-up Models etc.<br>**Capstone Course/Project-II :** Development of Innovation/Prototype & Submission. | Exposure, Familiar and Hands on Activities and Trainings on Analytical Tools (Case Studies, Exercises, and other Action Learning Methodologies) and Perspective Essentials to value creation : Demand and Forecast, Market Segmentation, Pricing Strategy, Budgeting, Social Responsible Managerial Decision Making. |
| | | | | **Innovation/Prototype Evaluation Week followed by a Semester Break (2 weeks)** | | | | |
| | | | 2nd Semester | **M-III : Creating & Sustaining Enterprise Model & Organizational Effectiveness** | 2.5 months (10 weeks) | 14 credits (Class Room core credit-4, Elective-4, Skill Certification-2, Capstone Project-4) | Entrepreneurial Leadership – Org Behaviour.<br>Corporate and Social Entrepreneurship<br>New Venture Establishment & Management<br>Measuring and Managing Strategic Performance of Existing and New Ventures<br>Innovation, Technology & Operation Management in Start-ups.<br>Start-up Ecosystem Management –II : Concept and Best Practices of Incubation and Acceleration Services Management for Start-ups<br>**Skill Development Programs :** Participate in Trainings on Leadership, Learn Start-up, Venture Planning & Management, Operation Management, Performance Management etc. | Exercise, Training and Simulation focus on building and implementing competitive capabilities and developing high performance organizations. |
| | | | | | | | **Capstone Course/Project-III :** Development of Business Model for the Innovation & Submission. | Developing a Minimum Viable Product & Business Model to get into the Market. |
| | | | | **Start-up Business Model/Enterprise Model Evaluation Followed by a Week Break.** | | | | |

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|---|---|---|---|---|---|---|---|---|
| B | **Experiential Learning Track : (Co-learning & Contributing to Incubation Unit/incubated Start-ups)** | | | **Action Learning Segment-1** | 2 months (8 weeks) | 14 credits | **Start-up/Incubation/Acceleration Residency Learning Program : Action Based Learning on** <Market Research & Customer Feedback> <Innovation and Business Model Validation> <Dummy Business & Service Portfolio Build> <Fund & Resource Generation Strategy> <Managing Resources in Start-up Environment> | In addition to get work with other Start-ups, the Candidates will also get access to Co-working Space in Pre-Incubation & Incubation/acceleration Unit of Institute for Working on their own Business Model Validation. |
| | **1st Year Final Evaluation Week** | | | | | | **Business Case Presentation and Demonstration** | |
| | **Candidates have option to rejoin the program to complete MBA within maximum year gap of two years.** | | | | | | | |
| | **Annual Break (2 weeks)** | | | | | | | |
| C | **Entrepreneurship Intensity Track (Immersion into Acceleration/Incubation Facility and Resource)** | **2nd Year** | **3rd Semester** | **Orientation** | 1 Week | Mandatory | Intensify and Manage Your Entrepreneurial Talent : Revisit Vision and Mission Statement | Tools to Tests Entrepreneurial Ability, Self assessment, Reflection, Feedback & Review Career Development Plan |
| | | | | **M-IV : Advanced Start-up Skill Competency Development** | 2.5 months (10 weeks) | 14 Credits (Core-4, Electives-6+Skill Certification-4) | Venture Financing : M&A, Funding Stages, Mechanism, Tools & Techniques etc.<br>Digital Marketing of Innovations<br>Venture Growth Strategies<br>Buying/selling a Small Business – M&A<br>Talent & Team Management, HR Management | Exercise, Training & Simulation focus on building and implementing competitive capabilities and developing high performance organizations |
| | | | | **Test of Entrepreneurial Competency Evaluation** | | | | |
| | | | | **M-V : Creating & Growing New Venture and National & Global Business Environment** | 2.5 months (10 weeks) | 14 Credits (Core-4, Elective-6+Skill Certification-4) | Government Strategies & Policies and International Economy<br>Technology & Global Business Linkage Opportunities<br>Global Start-up Exchange Incubation Program<br>IPR Management, Training on Advance Competency Development etc. | Exercise, Training and Simulation focus on building and implementing competitive capabilities and developing high performance organizations. |
| | | | | **Business Model/Enterprise Model Evaluation Week Followed by a Week Break** | | | | |
| D | **Start-up Establishment Track : (Access to Incubation Space)** | | **4th Semester** | **Action Learning Segment-II : (Venture Establishment Phase)** | 6 Months (24 weeks) | 20 Credits + Skill Certification 4 | Real Time Venture Establishment and Management in Incubation/Acceleration Unit : Action Based Learning on <Establish Enterprise & Registration><Undertake Product Customer Validation><Raise Seed Fund and Investment Readiness><Partnership and Stakeholder Management> | Receive Incubation Support in Incubation/Acceleration Unit |
| | **2nd Year Final Evaluation Week (2 weeks)** | | | | | | **Start-up Evaluation & Demonstration Week** | |
| | **Final Exit** | | | | | | **Completion of "MBA/PGDM in Innovation, Entrepreneurship & Venture Development" Degree** | |

**Total Credit Summary :**

| Year | Semester | Core Credit (Class Room) | Elective Credit (Class Room) | Credit through Acquiring Relevant Skill Programs outside Classroom Learning | Capstone Credit | Action Learning Credit | Total |
|---|---|---|---|---|---|---|---|
| 1st Year | 1st Semester | 8 | 8 | 4 | 4+4 | - | 28 |
| | 2nd Semester | 4 | 4 | 2 | 4 | 14 | 28 |
| 2nd Year | 3rd Semester | 8 | 12 | 4 | - | - | 24 |
| | 4th Semester | - | - | 4 | - | 20 | 24 |
| | Total | 20 | 24 | 14 | 12 | 34 | 104 |

**Course may be of 2-3 Credits and One credit equal to 10 hours for in-class coursework – Core, Elective). Capstone Project is 6 Credit. AL is a total of 34 Credits.**

**Assessment and Key Performance Indicators for Students**

| Tracks/Phase | Year | Semester | Syllabus Capstone Projects and Action Learning Segments. | Assessment for Students & Key Performance Indicators (KPIs) |
|---|---|---|---|---|
| Foundation of Management & Entrepreneurship Track | 1st Year | 1st Semester | • **Module-1 : Introduction to Innovation & Entrepreneurial Idea Generation & Identifying Business Opportunities.**<br>• **Capstone Project-1** : Development of an Innovative Business Idea into a Proof-of-Concept.<br><br>• **Module-II : Management Skills for Entrepreneurs and Managing for Value Creation.**<br>• **Capstone Project-II** : Locating prospective customers, development of Business Idea into working Prototype | Internal Assessment for Taught Subjects (Core & Elective) and Practical Sessions (Theory + Practical).<br><br>Group/Individual Project –<br>Proof of Concept (PoC) – Organizing Demo Day.<br><br>Credit Points Earned from outside classroom Skill Certifications/Up gradations and Recognition/Award in Events/competitions held at repute national and international Agencies.<br><br>Access to Pre-incubation facilities at Institute.<br><br>Internal Assessment for Taught Subjects (Core & Elective) and Practical Sessions (Theory + Practical).<br><br>Credit Points Earned from outside classroom Skill Certifications/Up gradations and Recognition/Award in Events/competitions held at repute national and international agencies.<br><br>Group/Individual Project – Market Research Plan/Potential Customer Acceptance Plan – Organizing Demo Day. |
| Start-up Experiential Learning Track : (Co-Learning & Contribution) | | 2nd Semester | • **Module-III : Creating & Sustaining Enterprising Model & Organizational Effectiveness.**<br>• **Capstone Project-III** : Development of Minimum Viable Business Model of Innovation/Solution. | Internal Assessment for Taught Subjects (core and Elective) and Practical Sessions (Theory + Practical).<br><br>Credit Points Earned from outside classroom Skill Certifications /Up gradations and Recognition/Award in Events/competitions held at repute national and international agencies.<br><br>Access to co-working space at Incubation Unit.<br><br>Group/Individual Project – Business/Enterprise Model – Organizing Demo Day. |
| | | | • **Action Learning : Segment-1: Start-up/Incubation Residency Learning Program.** | Selection & Placement in Startups and incubation Units.<br><br>Reports Submission for Startup Residency Program. |
| Entrepreneur-ship Intensity Track (Immersion into Incubation Facility and Resource Access) | 2nd Year | 3rd Semester | • **Module- IV : Advancing Entrepreneurial Skill & Venture Planning.**<br><br>• **Module-V : Creating and Growing New Venture and National & Global Business Environment.** | Internal Assessment for Taught Subjects (Core & Elective) and Practical Sessions (Theory + Practical)<br><br>Credit Points Earned from outside classroom Skill Certifications /Up gradations and Recognition/Award in Events/competitions held at repute national and international agencies.<br><br>Access to incubation space and schemes at incubation unit.<br><br>Group/Individual Project – Preparation & Checklist for Venture Setup – organizing Demo Day. |

| | | | | |
|---|---|---|---|---|
| **Start-up Establishment Track** | | **4th Semester** | • **Action Learning Segment-II: Venture Establishment Phase at outside Incubators/Accelerators or starting work from own workspace arrangements outside Campus** | Internal Assessment for Taught Subjects (Core & Elective) and Practical Sessions (Theory+Practical)<br><br>Credit Points Earned from outside classroom Skill Certifications /Up gradations and Recognition/Award in Events/competitions held at repute national and international agencies.<br><br>Access to incubation space and schemes at incubation unit.<br><br>Venture Establishment and resource planning and Operation. |
| **Final Exit** | | **Completion of "MBA in Entrepreneurship, Innovation and Venture Development" Degree** | | |

Adoption of Techniques of Design Innovation, Business Canvas, Lean Startup, Bootstrapping, Customer, Society and Market oriented Startup Strategic Model, Market Research and Marketing Innovation techniques, techniques of "Forming-storming-norming-performing model" of group development etc for the team to grow, face up to challenges, tackle problems, find solutions, plan work, and deliver results.

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# Detailed Semester Wise Credits and Learning and Evaluation Module Structure

### 1.1 Teaching and Evaluation Scheme: Semester I Module I – Innovation, Entreprenurial Skill and Opportunity Identification

| Semester | Module | Course Type | Course Code | Course Title/Workshop | Learning Mode - Hours (L,T, P:Total) 1 Credit: 10 hours total | | | | Evaluation PRS+IA+ESE |
|---|---|---|---|---|---|---|---|---|---|
| I | | | | | L | T | P | TOTAL | |
| | INDUCTION | Workshop | MBE I 101 | Know/Manage Entreprenuerial Talent | 0,0,1 | | | 1: Non Credit | Self Assessment and Feedback |
| | Module I (10 WEEKS) | | | | | | | | |
| | 1. | Core Course | | | | | | | |
| | | 1 | MBE C111 | Theories and Models of Entrepreneurship | 1 | 1 | 0 | 2 | 20+20+60 |
| | | 2 | MBE C112 | Research Methods-Data, Models & Decisions | 1 | 1 | 0 | 2 | 20+20+60 |
| | 2. | Elective Credit (Class Room) | | | | | | | |
| | | 1 | MBE DEC 111 | Principles of Technology-Innovation-Management. | 1 | 0 | 2 | 2 | 20+40_40 |
| | | 2 | MBE DEC 112 | Opportunities Mapping-Sector & Competitive Analysis of Start-up Ecosystem of Region & Nation. (Focus on Sector) | 1 | 0 | 2 | 2 | 20+40+40 |
| | | Or | MBE MOOC 113 | Or, Choice of any MOOC, or Course of Independent Study under industry/entrepreneur mentor/faculty approved by DEPARTMENT as of equivalent credit and desired content. | 1 | 0 | 2 | 2 | As determined by guide and approved by DEPARTMENT. |
| | 3. | Skill Certification Programs/Workshops/outside Classroom Learning | | | | | | | |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | 1. | MBE SC 111 | Workshops/certification/awards in areas like:<br>Ideation, Business Model Canvas, Design Innovation, Technological Innovation & Designing, Entrepreneurship, Data Analytic etc. | 2 | | | | 50+50+0 |
| | 4. | Capstone Project | MBE CP1 | Creative Problem Solving/Idea-Proof-of-Concept Submission<br>*(A candidate is expected to work at least sixteen hours in a week) | 0 | 0 | (16)* | 4 | 50 +0+0+ 50 for POC to Prototype outcome evaluation as specified by DEPARTMENT (Faculty Coordinator) |
| | 5. | Experiential Learning* | MBE EL1 | Feasibility Analysis, Leadership, Teamwork, Decisionmaking, Ethics and socially conscious decisions, etc. | 0 | 0 | 2 | 1 | 0+0+0 – Compulsory, Non Credit |

Learning Mode: L – Lecture; T- Tutorial; P – Workshop/Practical/Experiential Case research or analysis etc.
Credit: L – one hour per week for ten week = 1 credit; T/P – two hours per week for ten weeks = 1 credit; Project: 4 hrs per week=1 cr
IA – Integrated assessment basis department approved assessment methodology for specific course and component of pedagogy.

### 1.2 Teaching and Evaluation Scheme Semester I Module II – Management Skill for Entrepreneurs and Managing Value Creation

| Semester | Module | Course Type | Course Code | Course Title/Workshop | Learning Mode Hours (L,T, P:Total) 1 Credit: 10 hours total | | | | Evaluation PRS+IA+ESE |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | L | T | P | TOTAL | |
| 1 | | | | | | | | | |
| | Module II (10 WEEKS) | | | | | | | | |
| | 1. | Core Course | | | | | | | |
| | | 1 | MBE C121 | Innovation/Development and Managing Customer Value | 1 | 1 | 0 | 2 | 20+20+60 |
| | | 2 | MBE C122 | Entrepreneurial Finance : Concept & Management. | 1 | 1 | 0 | 2 | 20+20+60 |
| | 2. | Elective Credit (Class Room) | | | | | | | |
| | | 1 | MBE DEC 111 | Managerial Economics and Environment in India for Entrepreneurs. | 1 | 0 | 2 | 2 | 20+40_40 |
| | | 2 | MBE DEC 112 | Start up Law, Company Act and Sector Regulatory Environment (Focus on Sector) | 1 | 0 | 2 | 2 | 20+40+40 |
| | | Or 1 | MBE DEC 113 | Or, Choice of any MOOC, or Course of Independent Study nder industry/entrepreneur mentor approved by DEPARTMENT as of equivalent credit and desired content. | 1 | 0 | 2 | 2 | As determined by guide and approved by DEPARTMENT. |
| | 3. | Skill Certification Programs/Workshops/outside Classroom Learning | | | | | | | |
| | | 1. | MBE SC 121 | Workshops/certification/awards in areas like:<br>1. Start-up Ecosystem Management: Concept and Best Practices of Pre-incubation Services Facilities - Mandatory<br>2. Enterprise Development, Management, Negotiation, Marketing & Research, Lean Start-up Models etc. As guided by Faculty Coordinator | 2 | | | | 50+50+0 or as advised by Faculty Coordinator; Pass is mandatory, basis DEPARTMENT evaluation. |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | 4. | Capstone Project II | MBE CP2 | Development of Innovation/Prototype & Submission.<br>*(A candidate is expected to work at least sixteen hours in a week) | 0 | 0 | (16)* | 4 | 50 +0+0+ 50 for Customer POC validation as specified by DEPARTMENT (Faculty Coordinator) |
| | 5. | Experiential Learning* | MBE EL 2 | Perspective Essentials to value creation: Demand and Forecast, Market Segmentation, Pricing Strategy, Budgeting, Social Responsible Managerial Decision Making. Positioning and Value Proposition to all stakeholders in Value chain | 0 | 0 | 2 | 1 | 0+0+0 |
| **Innovation/Prototype/Concept Evaluation week.**<br>**After the Second Module of First Semester, a one week event will be held as above.**<br>**The Capstone Project should lead to performance evaluation of Venture Development progress on outcomes related to above, and as designed by Faculty Coordinator.**<br>**Two Week Semester Break** | | | | | | | | | |

## 1.3 : Teaching and Evaluation Scheme: Semester II Module III – Creating Sustaining Enterprise Model and Organisational Effectiveness

| Semester | Module | Course Type | Course Code | Course Title/Workshop | Learning Mode Hours (L,T, P:Total) 1 Credit: 10 hours total | | | | Evaluation PRS+IA+ESE |
|---|---|---|---|---|---|---|---|---|---|
| II | | | | | L | T | P | TOTAL | |
| | Module III (10 WEEKS) | | | | | | | | |
| | 1. | Core Course | | | | | | | |
| | | 1 | MBE C231 | Entrepreneurial Leadership – Org Behaviour | 1 | 1 | 0 | 2 | 20+20+60 |
| | | 2 | MBE C232 | New Venture Establishment & Management | 1 | 1 | 0 | 2 | 20+20+60 |
| | 2. | Elective Credit (Class Room) | | | | | | | |
| | | 1 | MBE DEC 231 | Measuring and Managing Strategic Performance of Existing and New Ventures | 1 | 0 | 2 | 2 | 20+40_40 |
| | | 2 | MBE DEC 232 | Corporate and Social Entrepreneurship | 1 | 0 | 2 | 2 | 20+40+40 |
| | | Or 1 | MBE DEC 113 | Or, Choice of any MOOC, or Course of Independent Study nder industry/entrepreneur mentor approved by DEPARTMENT as of equivalent credit and desired content. | 1 | 0 | 2 | 2 | As determined by guide and approved by DEPARTMENT. |
| | 3. | Skill Certification Programs/Workshops/outside Classroom Learning | | | | | | | |
| | | 1. | MBE SC 231 | Workshops/certification/awards in areas like:<br>1. Start-up Ecosystem Management II : Concept and Best Practices of Incubation & Acceleration Services Management for Start-ups<br>2. Learn Start-up, Venture Planning & Management, Operation Management, Performance Management etc. | 2 | | | | 50+50+0 or as advised by Faculty Coordinator; Pass is mandatory, basis DEPARTMENT evaluation. |
| | 4. | Capstone Project III | MBE CP3 | Development of Business Model for the Innovation. | 0 | 0 | 16 * | 4 | 50 +0+0+ 50 for Business Model |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | Developing a Minimum Viable Product & Business Model to get into the Market.<br>*(A candidate is expected to work at least sixteen hours in a week) | | | | | evaluation as specified by DEPARTMENT (Faculty Coordinator) |
| | 5. | Experiential Learning | MBE EL 2 | Building and implementing competitive capabilities and developing high performance organizations | 0 | 0 | 2 | 1 | 0+0+0 Compulsory Non Credit |
| Start up Business Model/Enterprise Model Evaluation<br>One week event for evaluation as determined by DEPARTMENT | | | | | | | | | |
| One Week Semester Break | | | | | | | | | |
| Action Learning Segment –I | | | | | | | | | |
| | 6. | 8 weeks | MBE ALS 1 | **Action Based Learning on** <Market Research & Customer Feedback> <Innovation and Business Model Validation> <Dummy Business & Service Portfolio Build> <Fund & Resource Generation Strategy> <Managing Resources in Start-up Environment><br><br>** A student is expected to devote full working day every day of working week, as per organisational norms of internship start-up/company , during this phase, for action learning in above areas. | 0 | 0 | ** | 14 | As determined by DEPARTMENT, basis Business Model Validation, Business Case presentation, acceptance by investor, Value chain creation. |

## 1.4: Teaching and Evaluation Scheme: Semester III Module IV – Advanced Start up Skill Competency Development

| Semester | Module | Course Type | Course Code | Course Title/Workshop | Learning Mode Hours (L,T, P:Total) 1 Credit: 10 hours total | | | | Evaluation PRS+IA+ESE |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | L | T | P | TOTAL | |
| II | | | | | | | | | |
| | Module IV (10 WEEKS) | | | | | | | | |
| | 1. | Core Course | | | | | | | |
| | | 1 | MBE C341 | Venture Financing: Funding, M&A, Valuation Techniques | 1 | 0 | 0 | 1 | 20+20+60 |
| | | 2 | MBE C342 | Venture Growth Strategies | 1 | 0 | 0 | 1 | 20+20+60 |
| | 2. | Elective Credit | | | | | | | |
| | | 1 | MBE DEC 341, 342 | Digital Marketing<br>Talent and Team Management<br>Buying Selling a Small Business<br>HR Management: Performance and Competence mapping | 1 | 0 | 2 | 2 *2 courses = 4 credits | 20+40+40 |
| | | | MBE DEC 343 | Choice of any MOOC, or Course of Independent Study under industry/entrepreneur mentor approved by DEPARTMENT as of equivalent credit and desired content. | 1 | | 2 | 2 credits | As determined by guide and approved by DEPARTMENT. |
| | 3. | Skill Certification Programs/Workshops/outside Classroom Learning | | | | | | | |
| | | 1. | MBE SC 341 | Workshops/certification/awards in areas like Venture funding, Government support for star-ups, building value chains and value proposition and valuation, supply chain and vendor selection/management, developing sales channel. | 4 | | | | 50+50+0 or as advised by Faculty Coordinator; Pass is mandatory, basis |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | DEPARTMENT evaluation. |
| | 5. | Experiential Learning | MBE EL 2 | Building and implementing competitive capabilities and developing high performance organizations | 0 | 0 | 2 | 1 | 0+0+0 |

## 1.5: Semester III Module V: Growing New Venture

| Semester | Module | Course Type | Course Code | Course Title/Workshop | Learning Mode Hours (L,T, P:Total) 1 Credit: 10 hours total | | | | Evaluation PRS+IA+ESE |
|---|---|---|---|---|---|---|---|---|---|
| II | | | | | L | T | P | TOTAL | |
| | Module V (10 WEEKS) | | | | | | | | |
| | 1. | Core Course | | | | | | | |
| | | 1 | MBE C351 | High performance organisations | 1 | 1 | 0 | 2 | 20+20+60 |
| | | 2 | MBE C352 | Strategies for competition and quality | 1 | 1 | 0 | 2 | 20+20+60 |
| | 2. | Elective Credit – 6 credit | | | | | | | |
| | | 1 | MBE DEC 351, 352 | Government Strategies & Policies and International Economy<br>Technology & Global Business Linkage Opportunities<br>Global Start-up Exchange Incubation Program<br>IPR Management | 1 | 0 | 2 | 2 *2 courses = 4 credits | 20+40+40 |
| | | 2. | MBE DEC 353 | Choice of any MOOC, or Course of Independent Study nder industry/entrepreneur mentor approved by DEPARTMENT as of equivalent credit and desired content | 1 | 0 | 2 | 2 credits | As determined by guide and approved by DEPARTMENT. |
| | 3. | Skill Certification/Workshops/outside Classroom Learning | | | | | | | |
| | | 1. | MBE SC 351 | Workshops/certification/awards in areas like: Learn Start-up, Venture Planning & Management, Operation Management, Performance Management etc. | 2 | | | | 50+50+0 or as advised by Faculty Coordinator; Pass is mandatory, basis DEPARTMENT evaluation. |
| | 5. | Experiential Learning | MBE EL 2 | Building and implementing competitive capabilities and developing high performance organizations | 0 | 0 | 2 | 1 | 0+0+0 Non Credit Compulsory |
| Enterprise/Business Evaluation<br>One week Evaluation Event as determined by DEPARTMENT<br>One week Semester Break | | | | | | | | | |

## 1.6: Semester IV –Venture Establishment Phase

| Semester | Module | Course Type | Course Code | Course Title/Workshop | Learning Mode (L,T, P:Total) 1 Credit: 10 hours total | | | | Evaluation PRS+IA+ESE |
|---|---|---|---|---|---|---|---|---|---|
| II | | | | | L | T | P | TOTAL | |
| | Action Learning Segment II: Venture Development | | | | | | | | |

| | | | | | | |
|---|---|---|---|---|---|---|
| | **(24 Weeks/ Six Months)** | | | | | |
| | **1.** | **Skill Certification/Workshops/outside Classroom Learning** | | | | |
| | | **1.** | **MBE SC 461** | Workshops/certification/awards in areas like:<br>Learn Start-up, Venture Planning & Management, Operation Management, Performance Management etc. | **4** | 50+50+0 or as advised by Faculty Coordinator; Pass is mandatory, basis DEPARTMENT evaluation. |
| | **2.** | **Action Learning** | **MBE AL 2** | Raise funding, Evaluation Readiness, Customer Base development Partnerships and Stakeholder management, Value chain partnerships and development of supply and forward chains, Credit and operations scale up.<br>Work hours expected as in AL1 | **20** | Outcome based evaluation as determined by DEPARTMENT. |
| **Enterprise/Business Evaluation**<br>**Two week Evaluation Event as determined by DEPARTMENT** | | | | | | |

# Syllabus MBA Entrepreneurship Innovation and Venture Development

**Core Courses**

| | |
|---|---|
| MBE C111 | **Title: Theories and Models of Entrepreneurship Credit - 2**<br>After the course the student should be able to describe the various theories of entrepreneurship, emulate the entrepreneur's personal characteristics, assimilate the decisionmaking typical of entrepreneurs informed risk taking behavior, and identify the models of entrepreneurial activity and venture development, decisionmaking styles, develop skills which enable entrepreneurial initiatives. The course will cover the characteristics of entrepreneurial profiles, theories of entrepreneurship, development of ventures, models of entrepreneurial activity, enablers of entrepreneurial initiatives, mindset, resources and their mobilization. |
| MBE C112 | **Research Methods-Data, Models & Decisions Credit - 2**<br>After the course the student must be able to use various research approaches, to aid decisionmaking in management of new venture, and researching technology development, customer value, us value chains and market opportunities using various tools and techniques.<br>The coverage shall include research types: qualitative and quantitative, exploratory, descriptive, survey and desk research, open sources of data, cluster, factor, regression and decision trees, building models using statistical and enterprise software. |
| MBE C121 | **Innovation Development and Managing Value Credit - 2**<br>The course prepares the students for developing processes and ensuring commercially successful outcomes of the innovation process, new product development, creating and managing a continuous innovation system, mapping customer value insights that help guide innovation around customer painpoints and unmet needs.<br>Coverage includes the concepts of innovation, product/service concept, product life cycle, new product development process, service blueprint and servicescape, mapping and managing customer value, value add process and innovation cycle, financial and market feasibility and market testing, segmenting targeting and positioning new products, managing diffusion of innovation. |
| MBE C122 | **Entrepreneurial Finance: Concept & Management. Credit - 2**<br>The course prepares students for managing the financial resource mobilization, financial systems, feasibility and business financial models, cost management and accounting for profitability, financial ratios and performance management, investment and financing options, financial institutions. The coverage includes the basic accounting and financial concepts for running an enterprise, such as credit and debt, cost concepts, balance sheet, journal and accounting practices, inventory accounting, financial ratios, capital structure, working capital, assets and basic profit and valuation calculations, financial management systems, investment analysis, ROI, IRR, etc. Basics of project accounting and project financing. |
| MBE C231 | **Entrepreneurial Leadership – Organisational Behaviour and Human Resource Management Credit -2**<br>Student face one of the biggest challenges in new ventures in the form of people issues, and creating and leading a team of start-up partners and employees effectively, providing leadership to the organization. The course prepares students to face the challenge of managing people and organizational leadership issues. The course prepares the HR processes: mapping roles recruiting, selecting, compensation, training, placement, line and staff functions, leadership concept, role and styles, fit with personality, employee motivation, perception of equity, interpersonal and group dynamics, organics and matrix organisations. |

| | |
|---|---|
| MBE C232 | **New Venture Establishment & Management Credit - 2**<br>The course enables students to create and run a new venture, managing various aspects of the venture such as financial and legal compliance, people issues and structure, leading the venture towards achieving its goals, managing different stages of development by knowing and tackling the challenges with the help of a clear strategy.<br>Stages in venture development, establishing a new venture, forms of business/social organisations, creating and organistion, challenges in each stage development, role of entrepreneur, setting up systems and processes, structure of organisations, scaling, managing growth challenges, leadership and empowering teams. Managing the nascent organization, creating the right culture, structure. Financial and legal systems and compliance for start ups. |
| MBE C341 | **Venture Financing: Funding, M&A, Valuation Techniques Credit - 2**<br>The student would be able to determine the structure of capital and other funding requirements, and prepare themselves for seed funding, start-up stage series B etc., by analyzing their won and investor's gains and draw from this perspective. The course covers the various sources of funding, instruments, equity, debt, IPO, funds, angel investing, PE funding, mergers and acquisitions, valuation techniques for various enterprise forms and stages, risk assessment and management, etc.<br>Suggested Textbook:<br>• Aswath Damodaran, Investment Valuation: Tools and Techniques for Determining the Value of any Asset, 3rd Edition, Wiley Finance Series: New Delhi<br>• Alex Wilmerding Term Sheets & Valuations: A Line by Line Look at the Intricacies of Term Sheets & Valutions, Aspatore Books Staff |
| MBE C342 | **Venture Growth Strategies Credit -2**<br>Planning for Growth: Disruptive and Growth Models; Acquisition; Collaborations and networks of innovation and scaling; License to grow; Franchising; International Expansions; Leadership for Performance; Growth Capabilities; Innovate to compete; Digital innovators; Brand Building: Marketing Enterprises across platforms; Online Selling; Social media leverage; People and Performance: Inspiring Teams; Recruitments and Maximising human performance. Cash flow and expansion: Trade financing; Credit Control; Digital Next Gen Workplace; Business automation;: Growth capital: Raising capital; Access to funds. |
| MBE C351 | **High Performance Organisations Credit -2**<br>The course prepares students for creating ventures that achieve significant organizational growth and excellence milestones and enables them to create high performance organisations that may achieve scale and commercial success.<br>The coverage of the course includes the characteristics of high performance organisations, performance metrics, goal setting, key challenges in achieving vision, organizational goals, mission, organizing for high performance, competence mapping and capability models, balanced score card approach, milestones in organizational excellence. |
| MBE C352 | **Strategies For Competition And Quality Credit - 2**<br>The course focusses on enabling students to map and benchmark competition, create relevant organsiational mission and goals, develop competitive advantage and nurture their new ventures culture, build systems in terms of total quality and ensure monitoring of key aspects of venture development.<br>Coverage includes the concepts of competition, competitive advantage and competitive forces, analyzing industry and key stakeholders including competitors, customers and substitutes, investors; strategic frameworks for market evaluation and strategy development, the BCG and other models; value chain analysis; concept of total quality management, six sigma, service quality, relative customer value (RCV) mapping and benchmarking, NPS system. |

## Common Management Admission Committee

(DELHI TECHNOLOGICAL UNIVERSITY & NETAJI SUBHAS UNIVERSITY OF TECHNOLOGY)

## MBA Programme Batch 2019-21

## Revised Admission Schedule

| S. No. | Events | Revised dates |
|---|---|---|
| 1. | Uploading of Information bulletin and Application form on DTU website | 12/02/2019 (Tuesday) |
| 2. | Last date of submitting the completely filled application form | 28 /04/2019 (Sunday) |
| 3. | Date of release of short-listed candidates for GD and Interview | 02/05/2019 (Thursday) |
| 4. | GD and Interview of short listed candidates | From 06/05/2019 (Monday) |
| 5. | Release of the list I of selected and waitlisted candidates | 17/05/2019 (Friday) |
| 6. | Reporting of candidates for First Counselling | 25/05/2019 ( Saturday ) - 26/05/2019 (Sunday) |
| 7. | Release of List II for admission from the waitlisted candidates against vacant/withdrawal seats | 31/05/2019 (Friday) |
| 8. | Reporting of candidates for Second Counselling | 06/06/2019 (Thursday) |
| 9. | Release of List III for admission from the waitlisted candidates against vacant/withdrawal seats | 12/06/2019 (Wednesday) |
| 10. | Reporting of candidates for Third Counselling | 19/06/2019 (Wednesday) |
| 11. | Release of list IV of selected candidates against vacant/withdrawal of seats | 03/07/2019 (Wednesday) |
| 12. | Reporting of candidates for Fourth Counselling | 10/07/2019 (Wednesday) |
| 13 | Release of List V for admission from the waitlisted candidates against vacant/withdrawal seats | 17/07/2019 (Wednesday) |
| 14 | Reporting of candidates for Fifth Counselling | 24/07/2019 (Wednesday) |
| 15 | LAST DATE OF ADMISSION | 30/07/2019 ( Tuesday) |
| 16 | Notification of Spot Round (if required) | 08/08/2019 (Thursday) |
| 17 | Spot round | 14/08/2019 (Wednesday) |

**DELHI TECHNOLOGICAL UNIVERSITY**
**DEPARTMENT OF DESIGN**
Bachelor of Design: Scheme of Teaching & Examination

**Third Year 5th SEMESTER** **CREDITS: 22**

| S No. | Code | Course Title | Credit | Contact Hours/Week | | | |
|---|---|---|---|---|---|---|---|
| | | | | L | T | S | Total |
| 1 | DD301 | Universal Design | 4 | 1 | 0 | 6 | 7 |
| 2 | DD303 | Design Thinking | 4 | 2 | 0 | 4 | 6 |
| 3 | DD3XX | Elective-3 | 4 | 1 | 0 | 6 | 7 |
| 4 | OEXXX | Open Elective | 4 | - | - | - | - |
| 5 | DD311 | Design Project-5 | 4 | 1 | 0 | 6 | 7 |
| 6 | DD313 | Internship - 1 | 2 | | | | |

**Third Year 6th SEMESTER** **CREDITS: 22**

| S No. | Code | Course Title | Credit | Contact Hours/Week | | | |
|---|---|---|---|---|---|---|---|
| | | | | L | T | S | Total |
| 1 | DD302 | Sustainable Design | 4 | 2 | 0 | 4 | 6 |
| 2 | DD3XX | Design Management | 4 | 2 | 0 | 4 | 6 |
| 3 | DD3XX | Elective-4 | 4 | 1 | 0 | 6 | 7 |
| 4 | DD3XX | Elective-5 | 4 | 1 | 0 | 6 | 7 |
| 5 | DD312 | Design Project-6 | 4 | | | 8 | 8 |
| 6 | DD314 | Internship - 2 | 2 | | | | |

**Weights for Course Evaluation**

| S. No. | Course Type | | | Examination | | Relative Weight | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | L | T | S | TH | ST | CWS | STS | MTE | ETE | STE |
| 1 | 1 | 0 | 2 | Yes | Yes | 10 | 40 | 10 | 20 | 20 |
| 2 | 1 | 0 | 6 | Yes | Yes | 10 | 40 | 10 | 20 | 20 |
| 3 | 0 | 1 | 6 | Yes | Yes | 10 | 40 | 10 | 20 | 20 |

STE: Students semester work to be presented before jury.
CWS: Assignment based on lectures
STS: work done in studios
MTE / ETE: Written test based on lecture-6
*Note: Field Study will be a part of Design Project 5 & System Design Project.*

**DELHI TECHNOLOGICAL UNIVERSITY**
**DEPARTMENT OF DESIGN**
Bachelor of Design: Scheme of Teaching & Examination

**Fourth Year 7th SEMESTER** **CREDITS:22**

| S No. | Code | Course Title | Credit | Contact Hours/Week | | | |
|---|---|---|---|---|---|---|---|
| | | | | L | T | S | Total |
| 1 | DD401 | Design Research | 4 | 2 | 0 | 4 | 6 |
| 2 | DD4XX | Elective - 6 | 4 | 1 | 0 | 6 | 7 |
| 3 | DD4XX | Elective - 7 | 4 | 1 | 0 | 6 | 7 |
| 4 | DD4XX | Elective - 8 | 4 | 1 | 0 | 6 | 7 |
| 5 | DD4XX | Elective - 9 | 4 | 1 | 0 | 6 | - |
| 6 | DD413 | Internship - 3 | 2 | | | | |

**Fourth Year 8th SEMESTER** **CREDITS:22**

| S No. | Code | Course Title | Credit | Contact Hours/Week | | | |
|---|---|---|---|---|---|---|---|
| | | | | L | T | S | Total |
| 1 | DDXXX | Design Seminar | 2 | - | - | - | |
| 2 | DDXXX | Design Degree Show | 4 | - | - | - | |
| 3 | DD412 | B Des Project | 16 | 0 | 0 | 32 | 32 |

**Weights for Course Evaluation**

| S. No. | Course Type | | | Examination | | Relative Weight | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | L | T | S | TH | ST | CWS | STS | MTE | ETE | STE |
| 1 | 1 | 0 | 2 | Yes | Yes | 10 | 40 | 10 | 20 | 20 |
| 2 | 1 | 0 | 6 | Yes | Yes | 10 | 40 | 10 | 20 | 20 |
| 3 | 0 | 1 | 6 | Yes | Yes | 10 | 40 | 10 | 20 | 20 |

STE: Students semester work to be presented before jury.
CWS: Assignment based on lectures
STS: work done in studios
MTE / ETE: Written test based on lecture

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**DELHI TECHNOLOGICAL UNIVERSITY**
**DEPARTMENT OF DESIGN**
Bachelor of Design: Scheme of Teaching & Examination
**Electives**

**Third Year 5th SEMESTER**
**Elective- 3**

| S No. | Code | Course Title | Credit | Contact Hours/Week | | | |
|---|---|---|---|---|---|---|---|
| | | | | L | T | S | Total |
| 1 | DD321 | Research Techniques in Cognition, Perception and Creativity | 4 | 1 | 0 | 6 | 7 |
| 2 | DD331 | Typography - 2 | 4 | 1 | 0 | 6 | 7 |
| 3 | DD341 | Animation - 2 | 4 | 1 | 0 | 6 | 7 |
| 4 | DD351 | Taxonomy of Product Design | 4 | 1 | 0 | 6 | 7 |

**Third Year 6th SEMESTER**
**Elective- 4**

| S No. | Code | Course Title | Credit | Contact Hours/Week | | | |
|---|---|---|---|---|---|---|---|
| | | | | L | T | S | Total |
| 1 | DD323 | Psychology and Behaviour Science | 4 | 1 | 0 | 6 | 7 |
| 2 | DD333 | Photography - 2 | 4 | 1 | 0 | 6 | 7 |
| 3 | DD343 | Usability Insights | 4 | 1 | 0 | 6 | 7 |

**Elective- 5**

| S No. | Code | Course Title | Credit | Contact Hours/Week | | | |
|---|---|---|---|---|---|---|---|
| | | | | L | T | S | Total |
| 1 | DD325 | Data Visualization | 4 | 1 | 0 | 6 | 7 |
| 2 | DD335 | Visual Narratives and Storytelling | 4 | 1 | 0 | 6 | 7 |
| 3 | DD345 | Design and Programming | 4 | 1 | 0 | 6 | 7 |

**Fourth Year 7th SEMESTER**

**Elective- 6**

| S No. | Code | Course Title | Credit | Contact Hours/Week | | | |
|---|---|---|---|---|---|---|---|
| | | | | L | T | S | Total |
| 1 | DD322 | Model Making and Prototyping | 4 | 1 | 0 | 6 | 7 |
| 2 | DD332 | Graphic Design | 4 | 1 | 0 | 6 | 7 |
| 3 | DD342 | Augmented and Virtual Reality | 4 | 1 | 0 | 6 | 7 |

**Elective- 7**

| S No. | Code | Course Title | Credit | Contact Hours/Week | | | |
|---|---|---|---|---|---|---|---|
| | | | | L | T | S | Total |
| 1 | DD324 | Mobility Design | 4 | 1 | 0 | 6 | 7 |
| 2 | DD334 | New Media Studies | 4 | 1 | 0 | 6 | 7 |
| 3 | DD344 | Advanced Material Processes and Finishes | 4 | 1 | 0 | 6 | 7 |

**Elective- 8**

| S No. | Code | Course Title | Credit | Contact Hours/Week | | | |
|---|---|---|---|---|---|---|---|
| | | | | L | T | S | Total |
| 1 | DD326 | Applied Ergonomics | 4 | 1 | 0 | 6 | 7 |
| 2 | DD336 | Advance Animation and Moving Image Design | 4 | 1 | 0 | 6 | 7 |
| 3 | DD346 | Design for UX | 4 | 1 | 0 | 6 | 7 |

**Elective- 9**

| S No. | Code | Course Title | Credit | Contact Hours/Week | | | |
|---|---|---|---|---|---|---|---|
| | | | | L | T | S | Total |
| 1 | DD328 | Medical Equipment Design | 4 | 1 | 0 | 6 | 7 |
| 2 | DD338 | Branding - 2 | 4 | 1 | 0 | 6 | 7 |
| 3 | DD348 | Service Design | 4 | 1 | 0 | 6 | 7 |

**Weights for Course Evaluation**

| S. No. | Course Type | | | Examination | | Relative Weight | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | L | T | S | TH | ST | CWS | STS | MTE | ETE | STE |
| 1 | 1 | 0 | 2 | Yes | Yes | 10 | 40 | 10 | 20 | 20 |
| 2 | 1 | 0 | 6 | Yes | Yes | 10 | 40 | 10 | 20 | 20 |
| 3 | 0 | 1 | 6 | Yes | Yes | 10 | 40 | 10 | 20 | 20 |

STE: Students semester work to be presented before jury.
CWS: Assignment based on lectures
STS: work done in studios
MTE / ETE: Written test based on lecture

# Semester 5
# Scheme of Teaching & Examination
# (Core Subjects)

**Subject Code: DD301** **Course Title: Universal Design**
**Contact Hours:** **L: 1 T: 0 S: 6**
**Examination Duration (Hrs.)** **Studio: 4**
**Relative Weight:** **CWS-10 STS-40 MTE-10 ETE-20 STE-20**
**Credit: 4**
**Semester: 5th**

**Aim:** To understand the requirement of all set of users with and without disabilities

**Details of the Course**

| S. No. | Contents | Contact weeks |
|---|---|---|
| 1 | Overview of universal design- timeline of UD, definition, Objectives, and its principles | 2 |
| 2 | Introduction of different terms associated with universal design i.e., barrier free design, inclusive design, assistive technology, design for all etc. | 2 |
| 3 | Identification of user requirements, user inclusion, types of needs, framework to extract needs from user study, various frameworks & application of Universal Design. | 5 |
| 4 | Integration of sustainability, frugality with universal design to develop true universal products. | 5 |
| | Total | 14 |

**Outcome:** Students will understand and solve the problems associated with the diverse set of users in various domains like public & private space etc.

**Books Recommended**

| S.No. | Name of Authors / Books / Publishers | Year |
|---|---|---|
| 1 | Preiser, Wolfgang F E, Ostroff, Elaine, Universal Design Handbook , McGraw Hill Professional | 2011 |
| 2 | Levine, Danise, Universal Design New york, IDEA Publication | 2003 |
| 3 | Steinfeld Edward and Maisel Jordana, Universal Design: Creating Inclusive environments | 2012 |
| 4 | Hekkert, Paul, Product experience, Elsevier | 2008 |

**Subject Code: DD303** **Course Title: Design Thinking**
**Contact Hours:** **L: 2 T: 0 S: 4**
**Examination Duration (Hrs.)** **Studio: 4**
**Relative Weight:** **CWS-10 STS-40 MTE-10 ETE-20 STE-20**
**Credit: 4**
**Semester: 5th**

**Aim:** To understand and differentiate design thinking form other technical and conventional thinking.

**Details of the Course**

| S. No. | Contents | Contact weeks |
|---|---|---|
| 1 | Understanding how Design thinking is different from technical thinking Empathy, user stories, interpretive research, user journey | 2 |
| 2 | Visual representation of problem statements; contextualization and validation of a problem set. | 3 |
| 3 | Mapping solutions; partial solutions; incremental solutions | 3 |
| 4 | Brainstorming; Differential Discussion; group methods to generate ideas; solitary methods to generate ideas; Lateral Thinking | 3 |
| 5 | User Journey maps; User stories; activity mapping; feature matrix | 3 |
| | Total | 14 |

**Outcome:** Ability to comprehend large scale problems and to come up with radical solution in relatively short time.

**Books Recommended**

| S.No. | Name of Authors / Books / Publishers | Year |
|---|---|---|
| 1 | John Thackara, In the Bubble: Designing in a Complex World, The MIT Press | 2005 |
| 2 | Bruce Hanington, Bella Martin, Universal Methods of Design: 100 Ways to Research Complex Problems, Develop Innovative Ideas, and Design Effective Solutions, Rockport Publishers | 2012 |
| 3 | Donald A. Norman, Living with Complexity, MIT Press | 2010 |
| 4 | Jeffrey Whitten and Lonnie Bentley, Systems Analysis and Design Method. | 2005 |

# Semester 5
# Scheme of Teaching & Examination
# (Elective - 3)

**Subject Code: DD321** | **Course Title: Research Techniques in Cognition, Perception and Creativity**

**Contact Hours:** **L: 1 T: 0 S: 6**
**Examination Duration (Hrs.)** **Studio: 4**
**Relative Weight:** **CWS-10 STS-40 MTE-10 ETE-20 STE-20**
**Credit: 4**
**Semester: 5th**

**Aim:** To develop an analytical approach in understanding the User and use various tools to creatively arrive at user centered design solutions.

**Details of the Course**

| S. No. | Contents | Contact weeks |
|---|---|---|
| 1. | Different Methods of understanding the user; Interviews, Questionnaires, Observation, Physiological Observation etc | 3 |
| 2. | Measuring human behaviour and activity at behavioural and neural levels | 3 |
| 3. | Interdisciplinary Approach for Cognitive Science and Experimental studies using Eye Tracking, EEG data for measuring Brainwave, Physiological responses like Blood Pressure, GSR, breathing in context of perception cognition and creativity and problem solving | 4 |
| 4. | Research Investigation on a specific problem, Analysis and correlation of Data from various experiments with particular emphasis on understanding how to approach design research questions using scientific tools. | 4 |
| | Total | 14 |

**Outcome:** Students will develop an interdisciplinary attitude towards problem solving.

**Books Recommended**

| S.No. | Name of Authors / Books / Publishers | Year |
|---|---|---|
| 1 | Susan Weinschenk, Neuro Web Design, What makes them click? | 2009 |
| 2 | V. S. Ramachandran, The Tell-Tale Brain: A Neuroscientist's Quest for What Makes Us Human | 2010 |
| 3 | John Kounios and Mark Beeman, The Eureka Factor: Aha Moments, Creative Insight, and the Brain | 2015 |
| 4 | IMotions Academy Monographs | |

**Subject Code: DD331**
**Contact Hours:**
**Examination Duration (Hrs.)**
**Relative Weight:**
**Credit: 4**
**Semester: 5th**

**Course Title: Typography - 2**
**L: 1 T: 0 S: 6**
**Studio: 4**
**CWS-10 STS-40 MTE-10 ETE-20 STE-20**

**Aim:** To understand how to design text across a broad range of technologies, media, and context, thereby furthering education about the historical, technical and aesthetic aspects of text and typography.

**Details of the Course**

| S. No. | Contents | Contact weeks |
|---|---|---|
| 1 | Type forms based on the research of typographic design history. | 2 |
| 2 | Typography usage to conceptualize and visualize complex bodies of information for a variety of communicative purposes, Expressive and communicative qualities of typographic forms using a variety of approaches and media, type and color, selection and arrangement of type for effective legibility and readability, Typography as a primary visual and illustrative element | 4 |
| 3 | Develop software skills to style, format and design professional type, explore using type in three dimensions—digitally and physically, technical aspects of organizing and formatting type as part of the production process for all media. | 4 |
| 4 | Developing, composing, and producing extended typographic project, Typography as personal æsthetic, expression, motivation and inspiration. | 4 |
| | Total | 14 |

**Outcome:** Appreciate the nuances and apply the techniques involved in professional typesetting so as to understand how type can be used as a primary method of visual design and communication.

**Books Recommended**

| S.No. | Name of Authors / Books / Publishers | Year |
|---|---|---|
| 1 | Thinking with Type: A Critical Guide for Designers, Writers, Editors and Students by Ellen Lupton | 2010 |
| 2 | Type on Screen: A Critical Guide for Designers, Writers, Developers, and Students (Design Briefs) | 2014 |
| 3 | Grid systems in graphic design: A visual communication manual for graphic designers, typographers and three dimensional designers (English edition) by Josef Müller-Brockmann (Author) | 1996 |

**Subject Code: DD341** **Course Title: Animation - 2**
**Contact Hours:** **L: 1 T: 0 S: 6**
**Examination Duration (Hrs.)** **Studio: 4**
**Relative Weight:** **CWS-10 STS-40 MTE-10 ETE-20 STE-20**
**Credit: 4**
**Semester: 5th**

**Aim:** To understand how key visual communication design elements, design principles, media, materials, and manual and digital methods contribute to the creation of their own visual language.

**Details of the Course**

| S. No. | Contents | Contact weeks |
|---|---|---|
| 1 | Understanding contemporary trends in animation making in terms of content. | 14 |
| 2 | Character animation- mechanics of biped walks, run, gestures etc. | |
| 3 | Creating special effects | |
| | | |
| | Total | 14 |

**Outcome:** Students will be able to demonstrate short animation movie.

**Books Recommended**

| S.No. | Name of Authors / Books / Publishers | Year |
|---|---|---|
| 1 | Harold Whitaker and John Halas, Timing for Animation, Focal Press; 2 edition | 2009 |
| 2 | Preston Blair, Cartoon Animation, Walter Foster Publishing Inc. | 1995 |
| 3 | John Culhane, Disney's Aladdin – The Making of an Animated Film Hyperion, Disney Editions; Reprint edition (2 September 1993) | 1993 |

**Subject Code: DD313**
**Contact Hours:**
**Examination Duration (Hrs.)**
**Relative Weight:**
**Credit: 4**
**Semester: 5th**

**Course Title: Exploring the Taxonomy of Product Design**
**L: 1 T: 0 S: 6**
**Studio: 4**
**CWS-10 STS-40 MTE-10 ETE-20 STE-20**

**Aim:** To advance knowledge and develop scholarship in design thinking and design methodology.

**Details of the Course**

| S. No. | Contents | Contact weeks |
|---|---|---|
| 1 | Exploring systems of classification, morphology and Taxonomy. Advantages in managing change and evolution. | 2 |
| 2 | Products we operate: personal products, appliances, hand tools, machine tools, etc<br>Products we play with: toys, sports equipment, reconfigurable products, etc | 2 |
| 3 | Products we live in: ladies bag, tool box, refrigerator, operation theater, kitchen,etc<br>Products that are slaves: robots, etc | 2 |
| 4 | Products that collaborate with user: Deep learning products, AI based products, etc<br>Products that enfold with time: Self sustaining growth oriented products, transformer products, movies, etc | 2 |
| 5 | Products that augment reality: Products that enhance senses, perception, feelings, understanding and experience, etc | 2 |
| 6 | Term Paper presentation | 2 |
| | Total | 14 |

**Outcome:** A scholarly approach. Ability to advance knowledge in design.

**Books Recommended**

| S.No. | Name of Authors / Books / Publishers | Year |
|---|---|---|
| 1 | Taxonomy: The Classification of Biological Organisms (Heredity and Genetics) by Kristi Lew | 2000 |
| 2 | On Growth and Form: The Complete Revised Edition Paperback – by D'Arcy Wentworth Thomson | 1992 |
| 3 | Organising Knowledge: Taxonomies, Knowledge and Organisational Effectiveness (Chandos Knowledge Management) by Patrick Lambe | 2014 |
| 4 | Design Thinking Process & Methods 4th Edition by Robert A Curedale | 2017 |

# Semester 6
# Scheme of Teaching & Examination
# (Core Subjects)

**Subject Code: DD303**
**Contact Hours:**
**Examination Duration (Hrs.)**
**Relative Weight:**
**Credit: 4**
**Semester: 6th**

**Course Title: Sustainable Design**
**L: 2 T: 0 S: 4**
**Studio: 4**
**CWS-10 STS-40 MTE-10 ETE-20 STE-20**

**Aim:** To understand the concerns with human and environment care and achieving these in a sustained manner.

**Details of the Course**

| S. No. | Contents | Contact weeks |
|---|---|---|
| 1 | What makes the biological Ecosystem so creative and sustainable? Creativity & Care. Self-reliant, dependence and interdependence, Symbiosis in nature. Optimal use of material, energy and information. Optimized growth. Compatibility between form and function. Self-recovery. Upgradability. Enhancing propensity for growth. Technical design for functionality, emotional design for interactivity. Understanding design sophistication in nature. | 4 |
| 2 | Concept of wellness in nature. Independence, dependence and interdependence, Symbiosis in nature. 3P Diagram and beyond. Life-cycle analysis, Cradle-to-Cradle, Frugal Design Through Sustainability, Production, unfolding wholeness, Sustainability matrices. Material / Process / Design Trends, Assessment Tools & Techniques. System Design, networks and optimization. | 4 |
| 3 | Individual / group project exploring sustainability challenges and finding solutions. Student presentations. | 6 |
| | Total | 14 |

**Outcome:** Students will develop an understanding of the different concerns pertaining to the environment and their role as a designer in achieving

**Books Recommended**

| S.No. | Name of Authors / Books / Publishers | Year |
|---|---|---|
| 1. | Documentaries on ecology, man-made world. | |
| 2. | Bhamra, T, & Lofthouse, V, Design for sustainability, Grover Publication | 2007 |
| 3. | Williams, D. E., Sustainable design: ecology, architecture, and planning. John Wiley & Sons | 2007 |

**Subject Code: DD3XX** **Course Title: Design Management**
**Contact Hours:** **L: 2 T: 0 S: 4**
**Examination Duration (Hrs.)** **Studio: 4**
**Relative Weight:** **CWS-10 STS-40 MTE-10 ETE-20 STE-20**
**Credit: 4**
**Semester: 5th**

**Aim:** To develop an Entrepreneurial attitude of handling Design Projects and applying Design Management for an innovative environment in a company, process or consultancy.

**Details of the Course**

| S. No. | Contents | Contact weeks |
|---|---|---|
| 1 | Perspectives on innovation and design management in companies, product & services; Creation of an innovative environment in a company, Market Oriented Innovation; Product Planning for the future, Disruptive Innovation; Briefs, Detailed Briefs and Concept Notes | 3 |
| 2 | Systems for innovation processes design management as an integrating tool in the company; Managing projects, clients and payments | 3 |
| 3 | Running a consultancy account for the role of innovation and design in society; apply approaches in design management to further develop the competitiveness of businesses with help from theories and models taken from design management | 4 |
| 4 | Design and Design management from an ethical perspective; critically discuss design management in relation to different ethical aspects such as gender and sustainability | 4 |
| | Total | 14 |

**Outcome:**
Learning methodology of managing resources and opportunities for design improvements and innovations in companies, startups and consultancies.

**Books Recommended**

| S.No. | Name of Authors / Books / Publishers | Year |
|---|---|---|
| 1 | Best, K. Design management: managing design strategy, process and implementation, AVA publishing | 2006 |
| 2 | Cooper, R., Junginger, S., & Lockwood, T. (Eds.). The handbook of design management. A&C Black | 2013 |
| 3 | Martin, R. L, The design of business: Why design thinking is the next competitive advantage. Harvard Business Press. | 2009 |

# Semester 6
# Scheme of Teaching & Examination
# (Elective - 4)

**Subject Code: DD323** **Course Title: Psychology and Behaviour Science**
**Contact Hours:** **L: 1 T: 0 S: 6**
**Examination Duration (Hrs.)** **Studio: 4**
**Relative Weight:** **CWS-10 STS-40 MTE-10 ETE-20 STE-20**
**Credit: 4**
**Semester: 6th**

**Aim:** To develop an understanding about the Psychology and its importance in Design Process.

**Details of the Course**

| S. No. | Contents | Contact weeks |
|---|---|---|
| 1. | Introduction to Psychology and Behaviour Science, Research Methods in Psychology | 3 |
| 2. | Thinking form the view of Societal Structure, Social Life use of various tools such as Empathy Mapping, Application of Cognitive ease, Norms, surprises, and causes How judgments happen Heuristics and biases. The law of small numbers etc | 3 |
| 3. | Application of different principles such as: Anchors, The outside view, Prospect theory, The Endowment effect, Rare events, Risk policies, Keeping score Reversals, Positive Reinforcement etc | 3 |
| 4 | Applying Behavioural Science and Psychology in Design Process in small projects; Development of Products, Services, Experiences etc | 5 |
| | Total | 14 |

**Outcome:** Students will be able to come up with Design Solutions and Interventions by practical application of Psychology and Cognitive Sciences

**Books Recommended**

| S.No. | Name of Authors / Books / Publishers | Year |
|---|---|---|
| 1 | Daniel Kahneman, Thinking Fast and Slow | 2013 |
| 2 | Dan Ariely, Predictably Irrational: The Hidden Forces That Shape Our Decisions | 2010 |
| 3 | Richard Thaler, Cass Sunstein Nudge: Improving Decisions about Health, Wealth, and Happiness | 2008 |

**Subject Code: DD333**
**Contact Hours:**
**Examination Duration (Hrs.)**
**Relative Weight:**
**Credit: 4**
**Semester: 6th**

**Course Title: Photography - 2**
**L: 1 T: 0 S: 6**
**Studio: 4**
**CWS-10 STS-40 MTE-10 ETE-20 STE-20**

**Aim:** To learn the advance techniques of photography

**Details of the Course**

| S. No. | Contents | Contact weeks |
|---|---|---|
| 1 | Focus beyond the basics i.e. advanced technical aspects, such as advanced camera settings and lens techniques. Enhance your photographic knowledge and mastery of subjects such as visual language, advanced composition and lighting.<br><br>Utilise digital workflow processes to ensure maximum accuracy and output quality. high and slow speed photography, Image processing for various application- Satellite images, medical related images etc | 14 |
| | Total | 14 |

**Outcome:** Develop technical skills and become familiar with the functions of the visual elements.

**Books Recommended**

| S.No. | Name of Authors / Books / Publishers | Year |
|---|---|---|
| 1 | Spencer, D A (1973). The Focal Dictionary of Photographic Technologies. Focal Press. p. 454. ISBN 978-0133227192. | 1973 |
| 2 | Ascher, Steven & Pincus, Edward, The Filmmaker's Handbook: A Comprehensive Guide for the Digital Age, Plume; 4 Rev Upd edition (27 Nov. 2012) | 2012 |
| 3 | Wade, Nicholas J.; Finger, Stanley (2001). "The eye as an optical instrument: from camera obscura to Helmholtz's perspective". Perception 30 (10): 1157–77 | 2001 |
| 4 | Tom Porter ,Design Drawing techniques for architects, graphic designers and artists, Oxford Architectural Press,1991 Terence ed .Dalley, The complete guide to illustration & design, Phaidon, Oxford | 1980 |
| 5 | T. C. Wang, Pencil Sketching, John Wiley & Sons,1997 | 1997 |

**Subject Code: DD343** **Course Title: Usability Insights**
**Contact Hours:** **L: 1 T: 0 S: 6**
**Examination Duration (Hrs.)** **Studio: 4**
**Relative Weight:** **CWS-10 STS-40 MTE-10 ETE-20 STE-20**
**Credit: 4**
**Semester: 6th**

**Aim:** To develop an understanding of the different usability aspects related to Design

**Details of the Course**

| S. No. | Contents | Contact weeks |
|---|---|---|
| 1 | History of product increase in complexity and usability since WW-2. Story of transition in human society form Man-Machine Interaction to Human-Computer Interaction. Relationship between product complexity and mental workload. | 3 |
| 2 | Subjective and objective measurements of product complexity and mental workload. User centered design process for usable product design. Understanding users' mental models. Creation of Personas and scenarios. | 3 |
| 3 | Conduct of task analysis. Operational definitions of usability. Measurement of ease of use, efficiency and effectiveness of digital products. Design of interactive products from usability perspective. Development of user screeners, testing protocols and conduct of usability tests. | 4 |
| 4 | Usability Testing by creation of paper prototypes, wireframes, information architecture. Conduct of low fidelity tests, card sorting, reverse card sorting, affordance tests, high fidelity testing and brand testing. | 4 |
| | Total | 14 |

**Outcome:** Students will be able to conduct various usability studies and experiments required for the Desgin and development of Products, Services, Experiences etc.

**Books Recommended**

| S.No. | Name of Authors / Books / Publishers | Year |
|---|---|---|
| 1 | William Lidwill, Jill Butler, Kritina Holden, Universal Principles of Design: 100 Ways to Enhance Usability, Influence Perception, Increase Appeal, Make Better Design Decisions, and Teach Through Design, Rockport Publisher | 2003 |
| 2 | Susan M. Weinschenk, 100 Things Every Designer Needs to Know about People, New Riders Publisher | 2011 |
| 3 | Jef Raskin, The Humane Interface: New Directions for Designing Interactive Systems, Addison Wesley Professional | 2000 |
| 4 | Steve Krug, Don't Make Me Think, Revisited: A Common Sense Approach to Web Usability | 2003 |

# Semester 6
# Scheme of Teaching & Examination
# (Elective - 5)

**Subject Code: DD325** **Course Title: Data Visualization**
**Contact Hours:** **L: 1 T: 0 S: 6**
**Examination Duration (Hrs.)** **Studio: 4**
**Relative Weight:** **CWS-10 STS-40 MTE-10 ETE-20 STE-20**
**Credit: 4**
**Semester: 6th**

**Aim:** To understand techniques and methods for creating effective visualisation based on on principles from graphic design, visual art, perceptual psychology, and cognitive science

**Details of the Course**

| S. No. | Contents | Contact weeks |
|---|---|---|
| 1 | Importance of data visualisation; Data and image models; Visualisation Design; | 3 |
| 2 | Color; Space; Data Analysis; Multi Dimensional data; Graphical Perception; | 4 |
| 3 | Visualisation Software; Interactive Visualisation; Animation in Visualisation | 4 |
| 4 | Mapping and cartography; Narrative; Text Visualisation | 3 |
| | Total | 14 |

**Outcome:** Students will be able to visualise different types of complex data in effective ways through exercises

**Books Recommended**

| S.No. | Name of Authors / Books / Publishers | Year |
|---|---|---|
| 1 | Envisioning Information, E. Tufte. Graphics Press | 1990 |
| 2 | The Visual Display of Quantitative Information (2nd Edition). E. Tufte. Graphics Press, | 2001 |
| 3 | Data Visualisation: A Handbook for Data Driven Design, SAGE Publications | 2019 |
| 4 | Murray, Scott. Interactive Data Visualization for the Web: An Introduction to Designing with, "O'Reilly Media, Inc." | |

**Subject Code: DD335**
**Contact Hours:**
**Examination Duration (Hrs.)**
**Relative Weight:**
**Credit: 4**
**Semester: 6th**

**Course Title: Visual Narratives and Storytelling**
**L: 1 T: 0 S: 6**
**Studio: 4**
**CWS-10 STS-40 MTE-10 ETE-20 STE-20**

**Aim:** Understanding the art of visual narrative and storytelling in order to communicate effectively and resonate with the audience

**Details of the Course**

| S. No. | Contents | Contact weeks |
|---|---|---|
| 1 | Exploring Design possibilities design concerns, problems and solutions. | 3 |
| 2 | characters in visual storytelling; Story structure | 4 |
| 3 | visual language; use of metaphors; Storyboard | 3 |
| 4 | Different media for storytelling- ads, films, poster, comics etc.; Grammar and language for different media | 4 |
| | Total | 14 |

**Outcome:** Exploring various media and various types of visual narratives and storytelling through exercises

**Books Recommended**

| S.No. | Name of Authors / Books / Publishers | Year |
|---|---|---|
| 1 | Visual Storytelling and Narrative Structure by Stuart poynitz;Open Learning Agency, 2000 | |
| 2 | The Photographer's Story: The Art of Visual Narrative<br>By Michael Freeman | |
| 3 | Storytelling in Video Games: The Art of the Digital Narrative<br>By Amy M. Green | |
| 4 | Digital Storytelling: The Narrative Power of Visual Effects in Film<br>By Shilo T. McClean | |

**Subject Code: DD345** **Course Title: Design and Programming**
**Contact Hours:** **L: 1 T: 0 S: 6**
**Examination Duration (Hrs.)** **Studio: 4**
**Relative Weight:** **CWS-10 STS-40 MTE-10 ETE-20 STE-20**
**Credit: 4**
**Semester: 6th**

**Aim:** To develop Hardware and Software Prototyping skills in students keeping in mind the requirements for Design

**Details of the Course**

| S. No. | Contents | Contact weeks |
|---|---|---|
| 1. | Introduction to the fundamentals of computational thinking as well as skills in the design and implementation of software for creative expression and prototyping. | 2 |
| 2. | Introduction to tools for building interactive design applications through programming assignments; knowledge of programming concepts; and knowledge of various programming languages for applying variables, functions, control flows, and algorithmic thinking etc. | 2 |
| 3. | Tools for Hardware and Electronic Prototyping. Arduino, Raspberry Pie etc | 4 |
| 4. | Use of the Prototyping skills for Development of Small Projects. | 6 |
| | Total | 14 |

**Outcome:** Students will develop an understanding to design through the development of code and use of hardware, allowing them to incorporate programming into their own design projects.

**Books Recommended**

| S.No. | Name of Authors / Books / Publishers | Year |
|---|---|---|
| 1 | Simon Monk, Programming the Raspberry Pi: Getting Started with Python | 2012 |
| 2 | Massimo Banzi, Getting Started with Arduino | 2008 |
| 3 | Narasimha Karumanchi, Data Structure and Algorithmic Thinking with Python | 2015 |

# Semester 7
# Scheme of Teaching & Examination
# (Elective - 6)

**Subject Code: DD322** **Course Title: Model Making and Prototyping**
**Contact Hours:** **L: 1 T: 0 S: 6**
**Examination Duration (Hrs.)** **Studio: 4**
**Relative Weight:** **CWS-10 STS-40 MTE-10 ETE-20 STE-20**
**Credit: 4**
**Semester: 6th**

**Aim:** To develop an understanding of prototyping and material knowledge

**Details of the Course**

| S. No. | Contents | Contact weeks |
|---|---|---|
| 1 | Emphasis on the skills of workshop methods, hands on techniques, Characteristics of prototyping, How prototypes are used | 3 |
| 2 | Model making- principles and choices for model making, safety associated with model making | 3 |
| 3 | space and setup, workflow, tools | 4 |
| 4 | hands on with different materials | 4 |
| | Total | 14 |

**Outcome:** To understanding of the behaviour and properties of various prototyping materials to convert idea into manufacturable standards

**Books Recommended**

| S.No. | Name of Authors / Books / Publishers | Year |
|---|---|---|
| 1 | J. Garratt, Design and Technology, Cambridge University Press, UK | 2004 |
| 2 | R. Thompson, Manufacturing Processes for Design Professional, Thames & Hudson, London | 2007 |
| 3 | Michael Ashby and Kara Johnson, Material and design, The Art and Science of Material Selection in Product Design, Butterworth Heinemann, | 2002 |

**Subject Code: DD332**
**Contact Hours:**
**Examination Duration (Hrs.)**
**Relative Weight:**
**Credit: 4**
**Semester: 6th**

**Course Title: Graphic Design**
**L: 1 T: 0 S: 6**
**Studio: 4**
**CWS-10 STS-40 MTE-10 ETE-20 STE-20**

**Aim:** To develop an understanding of the basics of Graphic design

**Details of the Course**

| S. No. | Contents | Contact weeks |
|---|---|---|
| 1 | Introduction to Graphic design; Elements of Graphic design; Space;Unity; Text and Image; | 3 |
| 2 | Concepts of graphic design- layout, grid, composition, form, content, figure and ground, gestalt laws | 4 |
| 3 | Fonts and their properties- typeface anatomy, x-height, ascenders, descenders, kerning, tracking and leading | 3 |
| 4 | Integrating type and image, type as a visual identity, techniques of realising graphic design | 4 |
| | Total | 14 |

**Outcome:** Students will be able to understand and apply fundamentals of Graphic design in challenging and unique design problems

**Books Recommended**

| S.No. | Name of Authors / Books / Publishers | Year |
|---|---|---|
| 1 | A. Darley, Visual Degital Culture, Routledge, 2000 | |
| 2 | M. A. Muser and D. Macleon, Art and Visual Environments, MIT Press, 1996 | |
| 3 | R. Hollis, Concise History of Graphic Design, Thames & Hudson, 1994 | |
| 4 | P. B. Meggs, Type and Image: the language of graphic Design, VNR, 1992 | |

**Subject Code: DD342** **Course Title: Augmented and Virtual Reality**
**Contact Hours:** **L: 1 T: 0 S: 6**
**Examination Duration (Hrs.)** **Studio: 4**
**Relative Weight:** **CWS-10 STS-40 MTE-10 ETE-20 STE-20**
**Credit: 4**
**Semester: 6th**

**Aim:** To bring into light an understanding of Augmented and Virtual Reality based devices and systems, design concerns, problems and solutions.

**Details of the Course**

| S. No. | Contents | Contact weeks |
|---|---|---|
| 1 | Augmented and Virtual reality- Technology, platforms and their principles | 3 |
| 2 | AR and VR as a design medium. | 3 |
| 3 | Introduction to applicable concepts in optics, displays- head mounts and others, tracking, psychology and human factors | 4 |
| 4 | Review of existing designs using case-studies. | 4 |
| | Total | 14 |

**Outcome:** Students will develop an understanding about different Augmented / Virtual Reality Devices.

**Books Recommended**

| S.No. | Name of Authors / Books / Publishers | Year |
|---|---|---|
| 1 | Jerald, J. The VR Book: Human-Centered Design for Virtual Reality | 2011 |
| 2 | Sherman, W.R., Craig, A.B. Understanding Virtual Reality: Interface, Application, and Design | 2011 |
| 3 | Sherman, W.R., Craig, A.B., Will, J.D. Developing Virtual Reality Applications: Foundations of Effective Design | 2003 |
| 4 | Paul Mealy, Virtual & Augmented Reality For Dummies | 2018 |

# Semester 7
# Scheme of Teaching & Examination
# (Elective - 7)

**Subject Code: DD324** | **Course Title: Mobility Design**
**Contact Hours:** | **L: 1 T: 0 S: 6**
**Examination Duration (Hrs.)** | **Studio: 4**
**Relative Weight:** | **CWS-10 STS-40 MTE-10 ETE-20 STE-20**
**Credit: 4**
**Semester: 7th**

Aim: To develop an understanding of space around us and enhance accessibility and usability.

**Details of the Course**

| S. No. | Contents | Contact weeks |
|---|---|---|
| 1 | History of transportation, technology trends in transportation and futuristic predictions. Types of personal vehicles, mass transportation vehicles, their benefits and challenges in design. Trends and styling of two wheelers and four wheelers. | 3 |
| 2 | Material and finish considerations in styling. Use of mood boards and cultural trends in transportation design. Vehicle design for rural India. Design projects and exercises. | 3 |
| 3 | Understanding different segments of design practice in transportation. Different role of designers in Automobile Industry. Design of human powered vehicles, Two wheelers design, | 4 |
| 4 | Design of four wheelers, future of transportation, Styling, Professional practice: CAS and Clay. | 4 |
| | Total | 14 |

**Outcome:** Understanding the need to analyze and utilize spaces i.e. moving as well as stationary

**Books Recommended**

| S.No. | Name of Authors / Books / Publishers | Year |
|---|---|---|
| 1 | John Whitelegg, Mobility: A new urban design and transport planning philosophy for a sustainable future | 2016 |
| 2 | Michael Jhon Gorman, Buckminster Fuller: Designing for Mobility | 2005 |
| 3 | Everly R. Kimes; Pioneers, Engineers, and Scoundrels: The Dawn of the Automobile in America. Publisher: SAE International. | 2004 |
| 4 | L. J. K Setrigh: The designers: Great automobiles and the men who made them. Publisher: Follett Pub. C0. | 1976 |
| 5 | Michael Lamm, Dave Holls: A Century of Automotive Style: 100 Years of American Car Design Publisher: Lamm-Morada Pub Co; 2nd edition, Dec. | 1996 |

**Subject Code: DD334**
**Contact Hours:**
**Examination Duration (Hrs.)**
**Relative Weight:**
**Credit: 4**
**Semester: 7th**

**Course Title: New Media Studies**
**L: 1 T: 0 S: 6**
**Studio: 4**
**CWS-10 STS-40 MTE-10 ETE-20 STE-20**

**Aim:** To understand New Media in Design, the issues and impact on society.

**Details of the Course**

| S. No. | Contents | Contact weeks |
|---|---|---|
| 1 | Introduction to New Media; Relationship with old media and other cultural forms like cinema and visual cultures.Techniques from old Media relevant to new Media- Frame, Collage, Viewpoints, etc. | 3 |
| 2 | Principles of New Media; Interface and Culture Specific Interface; Inter communicative aspects; New Media Object; Digital Dialectic | 4 |
| 3 | Representation in New Media; Variability; Automation; Discrete Representation; Numerical Representation; Database; Remediation; | 4 |
| 4 | Forms of New media; | 3 |
| | Total | 14 |

**Outcome:**Exploring design possibilities, design concerns, problems and solutions in new media

**Books Recommended**

| S.No. | Name of Authors / Books / Publishers | Year |
|---|---|---|
| 1 | L. Manovich, The Language of New Media, MIT Press, 2001. | 2001 |
| 2 | Lister, M., New Media: A Critical Introduction, Routledge, 2003 | 2003 |
| 3 | M. Hansen, New Philosophy for New Media, MIT Press, 2004 | 2004 |
| 4 | P. Lunenfeld (ed.), The Digital Dialectic: New Essays on New Media, MIT Press, 1999. | 1999 |

**Subject Code: DD344** | **Course Title: Advanced Material Processes and Finishes**
**Contact Hours:** | **L: 1 T: 0 S: 6**
**Examination Duration (Hrs.)** | **Studio: 4**
**Relative Weight:** | **CWS-10 STS-40 MTE-10 ETE-20 STE-20**
**Credit: 4**
**Semester: 7th**

**Aim:** To understand the other important techniques to develop idea into realization

**Details of the Course**

| S. No. | Contents | Contact weeks |
|---|---|---|
| 1 | Understanding properties and selection of natural and manmade materials including metals, plastics, ceramics, composites and natural materials. | 3 |
| 2 | Understanding various manufacturing and prototyping methods including digital manufacturing/ prototyping. Hands on product realization exercises involving selection of materials and manufacturing processes. | 3 |
| 3 | Additive and Subtractive Processes, Die and mould manufacturing methods including surface treatment and finishing processes. | 4 |
| 4 | Prototyping projects involving CNC, 3D Printing, Vacuum forming, etc. | 4 |
| | Total | 14 |

**Outcome:** Ability to design products which are seemingly hard to manufacture using other new tools and techniques of manufacturing processes.

**Books Recommended**

| S.No. | Name of Authors / Books / Publishers | Year |
|---|---|---|
| 1 | Vijay K. Jain, Advanced Machining Processes. Allied Publishers, New Delhi. | 2007 |
| 2 | P. C. Pandey and H.S. Shan, Modern Machining Processes, Tata McGraw-Hill, New Delhi. | 2007 |
| 3 | G.F. Benedict, Nontraditional Manufacturing Processes, Marcel Dekker Inc., New York. | 1987 |
| 4 | McGeough, Advanced Methods of Machining, Chapman and Hall, London. | 1998 |
| 5 | Paul De Garmo, J.T. Black, and Ronald A. Kohser, Material and Processes in Manufacturing, Prentice Hall India. | 2001 |

# Semester 7
# Scheme of Teaching & Examination
# (Elective - 8)

**Subject Code: DD326** **Course Title: Applied Ergonomics**
**Contact Hours:** **L: 1 T: 0 S: 6**
**Examination Duration (Hrs.)** **Studio: 4**
**Relative Weight:** **CWS-10 STS-40 MTE-10 ETE-20 STE-20**
**Credit: 4**
**Semester: 7th**

**Aim:** To understand how users handle objects physically as well as mentally

**Details of the Course**

| S. No. | Contents | Contact weeks |
|---|---|---|
| 1 | Definition, origin, scope and goals of ergonomics as a field of study.Examples of applications of ergonomics in design. | 2 |
| 2 | Types of data from human at physical, physiological, cognitive and affective levels. Data gathering and analysis techniques. | 2 |
| 3 | Use of descriptive and inferential statistics in ergonomic data. Applications of mean, median, mode and percentile in anthropometry. Use of anthropometry in workstation design. | 3 |
| 4 | Human physiological potentials and limitations in terms of load carrying capacity. Concept of comfort, fatigue and stress. | 3 |
| 5 | Design for the cognitive user. Concept of mental workload. Cognitive perspective in control panel design and graphical user interface design. | 4 |
| | Total | 14 |

**Outcome:** Understanding how humans physically interact with product and their mental model

**Books Recommended**

| S.No. | Name of Authors / Books / Publishers | Year |
|---|---|---|
| 1 | Dr. Debkumar Chakraborty, Indian Anthropometric Dimensions For Ergonomic Design Practice, National Institute of Design | 1997 |
| 2 | J. Dul, and B. Weerdmeester, Ergonomics for beginners, a quick reference guide, Taylor & Francis | 1993 |
| 3 | C. D. Wicknes, S. E. Gordon, and Y. Liu, An Introduction to Human Factors Engineering, Longman, New York | 1997 |
| 4 | P.W. Jordan and W.S.Green, Human Factors in Product Design: current practice and future trends, Taylor & Francis, London | 1999 |

**Subject Code: DD336**
**Contact Hours:**
**Examination Duration (Hrs.)**
**Relative Weight:**
**Credit: 4**
**Semester: 7th**

**Course Title: Advance Animation and Moving Image Design**
**L: 1 T: 0 S: 6**
**Studio: 4**
**CWS-10 STS-40 MTE-10 ETE-20 STE-20**

**Aim:** Experiment with a range of techniques and approaches to animation

**Details of the Course**

| S. No. | Contents | Contact weeks |
|---|---|---|
| 1 | Creating dramatic flow, planing, pacing, sequencing, organizing visula flow anmd continuity in storyboards | 14 |
| 2 | Coordinating character, scene length, pace of action, Stop-motion animation production | |
| 3 | post production techniques | |
| | Total | 14 |

**Outcome:** Demonstrate an understanding of a range of animation techniques

**Books Recommended**

| S.No. | Name of Authors / Books / Publishers | Year |
|---|---|---|
| 1 | Robert Russett and Cecile Starr, Experimental Animation, Origins of a New Art A Da Capo Paperback, NY | 1998 |
| 2 | Michael Frierson, Clay Animation: American Highlights 1908 to Present, Twayne Publishers | 1994 |
| 3 | Jeffrey Scott, How to Write for Animation, Overlook Press | 2002 |
| 4 | Chris Patmore; The Complete Animation Course: The Principles, Practice, and Techniques of Successful Animation, Barron's Educational Series, 1st | 2003 |

**Subject Code: DD346** **Course Title: Design for UX**
**Contact Hours:** **L: 1 T: 0 S: 6**
**Examination Duration (Hrs.)** **Studio: 4**
**Relative Weight:** **CWS-10 STS-40 MTE-10 ETE-20 STE-20**
**Credit: 4**
**Semester: 7th**

**Aim:** To develop an understanding about the various User Experience Techniques and Principles

**Details of the Course**

| S.No. | Contents | Contact weeks |
|---|---|---|
| 1 | Importance of user experience approach in design. | 2 |
| 2 | Methods to understand users' experiences. Modeling of user behaviors. Cognitive, affective and cultural perspectives in experiences. | 2 |
| 3 | Consideration for human experiences in interaction design. Methods of direct, indirect, subjective and objective measurements of human experience. Issues of reliability and validity in experience measurement. | 3 |
| | Qualitative interview techniques for gathering user motivations and emotions. Analysis of qualitative experiential data from users. Gender and cultural biases in experience measurements. | 3 |
| 4 | Management of psychological space in user experience testing setups. Development of user experience strategy, creation of user interfaces and testing of digital products from experiential perspective. | 4 |
| | Total | 14 |

**Outcome:** Application of UX Design for solving Practical probelms.

**Books Recommended**

| S.No. | Name of Authors / Books / Publishers | Year |
|---|---|---|
| 1 | Daniel Kahneman, Thinking Fast and Slow | 2011 |
| 2 | Mike Kuniavsky, Observing the User Experience: A Practitioner's Guide to User Research, Morgan Kaufmann Publisher | 2003 |
| 3 | Dan Ariely, Predictably Irrational | 2008 |
| 4 | Susan M. Weinschenk, 100 Things Every Designer Needs to Know about People, New Riders Publisher | 2011 |

# Semester 7
# Scheme of Teaching & Examination
# (Elective - 9)

**Subject Code: DD328** **Course Title: Medical Equipment Design**
**Contact Hours:** **L: 1 T: 0 S: 6**
**Examination Duration (Hrs.)** **Studio: 4**
**Relative Weight:** **CWS-10 STS-40 MTE-10 ETE-20 STE-20**
**Credit: 4**
**Semester: 7th**

**Aim:** The course gives glimpse of innovating in the space of healthcare with hands on approach to identification of unmet clinical needs, invention and implementation of such technologies and also inculcate the entrepreneurial character in the students.

**Details of the Course**

| S. No. | Contents | Contact weeks |
|---|---|---|
| 1 | Introduction to Medical Equipment Design. Various design principles and tools that builds foundation for understanding real meaning of user centric design process. | 3 |
| 2 | (Identify) Needs Finding, Observation and Problem Identification and Need Statement development Treatment options, Competitive landscape, Market Analysis. Case Study. | 3 |
| 3 | (Invent) Concept Generation, Ideation and Brainstorming, Concept Screening, Concept Selection, Basics of IP. Prototyping, Business Model, Case Study. | 4 |
| 4 | (Implement) Moving forward, R&D strategies, Funding Resources, Business Plan Development, Clinical Strategy. Case Study. | 4 |
| | Total | 14 |

**Outcome:** Ability to identify clinical needs and move in a stepwise approach through inventing and planning the implementation of a marketable solution.

**Books Recommended**

| S.No. | Name of Authors / Books / Publishers | Year |
|---|---|---|
| 1 | Paul G. Yock, Biodesign: The Process of Innovating Medical Technologies, Second Edition | NA |
| 2 | Peter J. Ogrodnik, Medical Device Design: Innovation from Concept to Market, First edition | NA |
| 3 | Badnjevic. A, Inspection of Medical Devices for Regulatory purpose, Springer | 2018 |
| 4 | Becker Karen M, Clinical Evaluation of Medical Devices, Humana Press | NA |

**Subject Code: DD338**
**Contact Hours:**
**Examination Duration (Hrs.)**
**Relative Weight:**
**Credit: 4**
**Semester: 7th**

**Course Title: Branding - 2**
**L: 1 T: 0 S: 6**
**Studio: 4**
**CWS-10 STS-40 MTE-10 ETE-20 STE-20**

**Aim:** To understand why branding is important and essential for any firm to market the goods

**Details of the Course**

| S. No. | Contents | Contact weeks |
|---|---|---|
| 1 | To identify visual design problem specifically in branding | 3 |
| 2 | Structure of branding, communicable message for audience through various mediums | 3 |
| 3 | brand positioning, case studies | 4 |
| 4 | Human perception related to branding | 4 |
| | Total | 14 |

**Outcome:** Understanding of why organizations invest in maintaining their identity
Knowledge of Branding and Identity design process

**Books Recommended**

| S.No. | Name of Authors / Books / Publishers | Year |
|---|---|---|
| 1 | Paul M., Visual Communication: Images with Messages | 2006 |
| 2 | Margaret Mark, Carol Pearson, the Hero and the Outlaw: Building Extraordinary Brands through the Power of Archetypes, McGraw Hill, | 2001 |
| 3 | John Murphy , (1988) "BRANDING", Marketing Intelligence & Planning, Vol. 6 Issue: 4,pp.4-8 | 1988 |
| 4 | Colin Jevons , (2005) "Names, brands, branding: beyond the signs, symbols, products andservices", Journal of Product & Brand Management, Vol. 14 Issue: 2, pp.117-118 | 2005 |

**Subject Code: DD348** **Course Title: Service Design**
**Contact Hours:** **L: 1 T: 0 S: 6**
**Examination Duration (Hrs.)** **Studio: 4**
**Relative Weight:** **CWS-10 STS-40 MTE-10 ETE-20 STE-20**
**Credit: 4**
**Semester: 7th**

**Aim:** To understand about Service Design and application in Design Projects.

**Details of the Course**

| S. No. | Contents | Contact weeks |
|---|---|---|
| 1 | Introduction to Services; tying together humans, digital, and physical interactions | 3 |
| 2 | Stakeholder Analysis; Providing insights into the relationships between people, technology and design; Learning from different case studies. | 3 |
| 3 | Delivering Services form the view of design thinking; understanding people's needs from a holistic view. Systems approach to service design. | 4 |
| 4 | Small projects for intervention from the view point of Service Design | 6 |
| | Total | 14 |

**Outcome:** Use of Service Design principles for applied problem solving

**Books Recommended**

| S.No. | Name of Authors / Books / Publishers | Year |
|---|---|---|
| 1 | Robert Curedale, Service Design: 250 Essential Methods | 2013 |
| 2 | Robert Curedale, Design Research Methods: 150 Ways to Inform Design | 2013 |
| 3 | Lucy Kimbell, The Service Innovation Handbook: Action-oriented Creative Thinking Toolkit for Service Organizations | 2015 |

# DELHI TECHNOLOGICAL UNIVERSITY

(Formerly Delhi College of Engineering)
Shahbad Daulatpur,Main Bawana Road, Delhi-42

F.No. DTU/Reg/Notification/2017-18/4503 Dated: 21.01.2019

## Notification

**Subject: Annual Fee of all the programs for the students taking admission in the Academic Session 2019-20.**

The Competent Authority has approved the Annual Fee structure of the following programs for the students taking admission in the Academic Session 2019-20 :-

A. Bachelor of Technology (B.Tech) (Full Time)
B. Bachelor of Technology (B.Tech) (Lateral Entry)
C. Bachelor of Technology (B.Tech) (Evening)
D. Bachelor of Design (B.Des)
E. Bachelor of Business Administration (BBA) & B.A Economics (H)
F. Ph.D (Full Time / Part Time)
G. Master of Technology (M.Tech) (Full Time)
H. Master of Technology (M.Tech) (Part Time)
I. Master of Business Administration (Full Time)
J. Executive MBA
K. DASA Students
L. International Students
M. Withdrawal Policy

## (A). Bachelor of Technology (B.Tech) (Full Time)

| S.No. | Particulars | Fee in AY2019-20 (in Rs.) | Fee in AY2020-21 (in Rs.) | Fee in AY2021-22 (in Rs.) | Fee in AY2022-23 (in Rs) |
|---|---|---|---|---|---|
| 1. | Tuition Fee | 99,500 | 1,14,500 | 1,30,500 | 1,40,300 |
| 2. | **Non Govt. Component** | | | | |
| 2.1 | Student Welfare fee (Co-curricular Activities, Training & Placement, Extra Curricular Activities, Annual Gathering, Students welfare, Institutional Development, Outsourcing, conference, seminar, workshop, innovative projects, skill development activities and Misc. Expenditure on unspecified items) | 20,000 | 20,000 | 20,000 | 20,000 |
| 2.2 | Facilities & Services Charges (Research initiatives, training programmes, Awards, automation, facilities, entrepreneurship activities and any misc. expenditure on unspecified items) | 28,000 | 35,000 | 35,000 | 36,000 |
| 2.3 | Economically weaker section fund | 5,000 | 5,000 | 5,000 | 7,000 |
| 2.4 | Examination fee (Examination Infrastructure strengthening, expenditure on examination activities, confidential printing etc.) | 13,000 | 15,000 | 15,000 | 15,000 |
| 2.5 | Premium amount for medi-claim of student (per annum) | 500 | 500 | 500 | 700 |
| | **Total** | **1,66,000** | **1,90,000** | **2,06,000** | **2,19,000** |

## (B). Bachelor of Technology (B.Tech) (Lateral Entry)

| S.No. | Particulars | Fee in AY2019-20 (in Rs.) | Fee in AY2020-21 (in Rs.) | Fee in AY2021-22 (in Rs.) |
|---|---|---|---|---|
| 1. | Tuition Fee | 99,500 | 1,23,500 | 1,30,500 |
| 2. | **Non Govt. Component** | | | |
| 2.1 | Student Welfare fee (Co-curricular Activities, Training & Placement, Extra Curricular Activities, Annual Gathering, Students welfare, Institutional Development, Outsourcing, conference, seminar, workshop, innovative projects, skill development activities and Misc. Expenditure on unspecified items) | 20,000 | 20,000 | 20,000 |
| 2.2 | Facilities & Services Charges (Research initiatives, training programmes, Awards, automation, facilities, entrepreneurship activities and any misc. expenditure on unspecified items) | 28,000 | 28,000 | 35,000 |
| 2.3 | Economically weaker section fund | 5,000 | 5,000 | 5,000 |
| 2.4 | Examination fee (Examination Infrastructure strengthening, expenditure on examination activities, confidential printing etc.) | 13,000 | 13,000 | 15,000 |
| 2.5 | Premium amount for medi-claim of student (per annum) | 500 | 500 | 500 |
| | **Total** | **1,66,000** | **1,90,000** | **2,06,000** |

## (C). Bachelor of Technology (B.Tech) (Evening)

| S.No. | Particulars | Fee in AY2019-20 (in Rs.) | Fee in AY2020-21 (in Rs.) | Fee in AY2021-22 (in Rs.) | Fee in AY2022-23 (in Rs.) |
|---|---|---|---|---|---|
| 1. | Tuition Fee | 86,500 | 90,000 | 98,500 | 1,00,000 |
| 2. | **Non Govt. Component** | | | | |
| 2.1 | Student Welfare fee (Co-curricular Activities, Extra Curricular Activities, Annual Gathering, Students welfare, Institutional Development, Outsourcing, conference, seminar, workshop, innovative projects, skill development activities and Misc. Expenditure on unspecified items) | 16,000 | 16,000 | 16,000 | 16,000 |
| 2.2 | Facilities & Services Charges (Research initiatives, training programmes, Awards, automation, facilities, entrepreneurship activities and any misc. expenditure on unspecified items) | 16,000 | 21,000 | 21,000 | 21,000 |
| 2.3 | Economically weaker section fund | 500 | 500 | 500 | 500 |
| 2.4 | Examination fee (Examination Infrastructure strengthening, expenditure on examination activities, confidential printing etc.) | 11,000 | 12,000 | 12,000 | 12,000 |
| 2.5 | Premium amount for medi-claim of student (per annum) | 500 | 500 | 500 | 500 |
| **Total** | | **1,30,500** | **1,40,000** | **1,48,500** | **1,50,000** |

## (D). Bachelor of Design (B.Des)

| S.No. | Particulars | Fee in AY2019-20 (in Rs.) | Fee in AY2020-21 (in Rs.) | Fee in AY2021-22 (in Rs.) | Fee in AY2022-23 (in Rs) |
|---|---|---|---|---|---|
| 1. | Tuition Fee | 99,500 | 1,14,500 | 1,30,500 | 1,40,300 |
| 2. | **Non Govt. Component** | | | | |
| 2.1 | Student Welfare fee (Co-curricular Activities, Training & Placement, Extra Curricular Activities, Annual Gathering, Students welfare, Institutional Development, Outsourcing, conference, seminar, workshop, innovative projects, skill development activities and Misc. Expenditure on unspecified items) | 20,000 | 20,000 | 20,000 | 20,000 |
| 2.2 | Facilities & Services Charges (Research initiatives, training programmes, Awards, automation, facilities, entrepreneurship activities and any misc. expenditure on unspecified items) | 28,000 | 35,000 | 35,000 | 36,000 |
| 2.3 | Economically weaker section fund | 5,000 | 5,000 | 5,000 | 7,000 |
| 2.4 | Examination fee (Examination Infrastructure strengthening, expenditure on examination activities, confidential printing etc.) | 13,000 | 15,000 | 15,000 | 15,000 |
| 2.5 | Premium amount for medi-claim of student (per annum) | 500 | 500 | 500 | 700 |
| **Total** | | **1,66,000** | **1,90,000** | **2,06,000** | **2,19,000** |

## (E). Bachelor of Business Administration (BBA) & B.A Economics (H)

| S.No. | Particulars | Fee in AY 2019-20 (Rs.) | Fee in AY 2020-21 (Rs.) | Fee in AY 2021-22 (Rs.) |
|---|---|---|---|---|
| 1. | Tuition Fee | 33,500 | 41,500 | 45,000 |
| 2. | **Non Govt. Component** | | | |
| 2.1 | Student Welfare Fee (Co-curricular activities, Training & placement, Extra Curricular Activities, Annual Gathering, Students welfare, Institutional Development, outsourcing, conference, seminar, workshop, innovative projects, skill development activities and, Misc. Expenditure on Unspecified Items) | 15,000 | 15,000 | 15,000 |
| 2.2 | Facilities & Services Charges (Research initiatives, training programmes, Awards, automation, facilities, entrepreneurship activities and any misc. expenditure on unspecified items) | 15,000 | 15,000 | 15,000 |
| 2.3 | Economically weaker section fund | 5,000 | 5,000 | 5,000 |
| 2.4 | Examination fee (Examination Infrastructure strengthening, expenditure on examination activities, confidential printing etc. | 13,000 | 13,000 | 13,000 |
| 2.5 | Premium amount for mediclaim of student (per-annum) | 500 | 500 | 500 |
| | **GRAND TOTAL** | **82,000** | **90,000** | **93,500** |

## (F). Ph.D (Full Time / Part Time)

| S.No. | Particulars | Fee in AY 2019-20 (Rs.) | Fee in AY 2020-21 and onwards (Rs.) |
|---|---|---|---|
| 1. | The academic staff of DTU DCE staff (R.19.1) and Project staff pursuing Ph.D as in R.19.11 | 15,000 | 5,000 |
| 2. | Other Full Time / Part Time candidates | 25,000 | 10,000 |



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## (G). Master of Technology (M.Tech) (Full Time)

| S.No. | Particulars | Fee in AY 2019-20 (Rs.) | Fee in AY 2020-21 (Rs.) |
|---|---|---|---|
| 1. | Tuition Fee | 1,05,500 | 1,05,000 |
| 2. | **Non Govt. Component** | | |
| 2.1 | Student Welfare Fee (Co-curricular activities, Training & placement, Extra Curricular Activities, Annual Gathering, Students welfare, Institutional Development, outsourcing, conference, seminar, workshop, innovative projects, skill development activities and, Misc. Expenditure on Unspecified Items) | 18,000 | 18,000 |
| 2.2 | Facilities & Services Charges (Research initiatives, training programmes, Awards, automation, facilities, entrepreneurship activities and any misc. expenditure on unspecified items) | 25,000 | 25,000 |
| 2.3 | Economically weaker section fund | 5,000 | 5,000 |
| 2.4 | Examination fee (Examination Infrastructure strengthening, expenditure on examination activities, confidential printing etc. | 12,000 | 12,000 |
| 2.5 | Premium amount for mediclaim of student (per-annum) | 500 | 500 |
| | **GRAND TOTAL** | **1,66,000** | **1,66,000** |

## (H). Master of Technology (Part Time)

| S.No. | Particulars | Fee in AY 2019-20 (Rs.) | Fee in AY 2020-21 (Rs.) | Fee in AY 2021-22 (Rs.) |
|---|---|---|---|---|
| 1. | Tuition Fee | 99,500 | 99,500 | 99,500 |
| 2. | **Non Govt. Component** | | | |
| 2.1 | Student Welfare Fee (Co-curricular activities, Training & placement, Extra Curricular Activities, Annual Gathering, Students welfare, Institutional Development, outsourcing, conference, seminar, workshop, innovative projects, skill development activities and, Misc. Expenditure on Unspecified Items) | 20,000 | 20,000 | 20,000 |
| 2.2 | Facilities & Services Charges (Research initiatives, training programmes, Awards, automation, facilities, entrepreneurship activities and any misc. expenditure on unspecified items) | 28,000 | 28,000 | 28,000 |
| 2.3 | Economically weaker section fund | 5,000 | 5,000 | 5,000 |
| 2.4 | Examination fee (Examination Infrastructure strengthening, expenditure on examination activities, confidential printing etc. | 13,000 | 13,000 | 13,000 |
| 2.5 | Premium amount for mediclaim of student (per-annum) | 500 | 500 | 500 |
| | **GRAND TOTAL** | **1,66,000** | **1,66,000** | **1,66,000** |

## (I). Master of Business Administration (MBA) (Full Time)

| S.No. | Particulars | Fee in AY 2019-20 (Rs.) | Fee in AY 2020-21 (Rs.) |
|---|---|---|---|
| 1. | Tuition Fee | 1,03,500 | 1,19,500 |
| 2. | **Non Govt. Component** | | |
| 2.1 | Student Welfare Fee (Co-curricular activities, Training & placement, Extra Curricular Activities, Annual Gathering, Students welfare, Institutional Development, outsourcing, conference, seminar, workshop, innovative projects, skill development activities and, Misc. Expenditure on Unspecified Items) | 20,000 | 20,000 |
| 2.2 | Facilities & Services Charges (Research initiatives, training programmes, Awards, automation, facilities, entrepreneurship activities and any misc. expenditure on unspecified items) | 25,000 | 30,000 |
| 2.3 | Economically weaker section fund | 5,000 | 5,000 |
| 2.4 | Examination fee (Examination Infrastructure strengthening, expenditure on examination activities, confidential printing etc. | 12,000 | 15,000 |
| 2.5 | Premium amount for mediclaim of student (per-annum) | 500 | 500 |
| | **GRAND TOTAL** | **1,66,000** | **1,90,000** |

## (J). Executive MBA (EMBA)

| S.No. | Particulars | Fee in AY 2019-20 (Rs.) | Fee in AY 2020-21 (Rs.) |
|---|---|---|---|
| 1. | Tuition Fee | 1,70,000 | 1,75,000 |
| 2. | **Non Govt. Component** | | |
| 2.1 | Student Welfare Fee (Co-curricular activities, Extra Curricular Activities, Annual Gathering, Students welfare, Institutional Development, outsourcing, conference, seminar, workshop, innovative projects, skill development activities and, Misc. Expenditure on Unspecified Items) | 22,000 | 22,000 |
| 2.2 | Facilities & Services Charges (Research initiatives, training programmes, Awards, automation, facilities, entrepreneurship activities and any misc. expenditure on unspecified items) | 22,000 | 22,000 |
| 2.4 | Examination fee (Examination Infrastructure strengthening, expenditure on examination activities, confidential printing etc. | 12,000 | 12,000 |
| 2.5 | Premium amount for mediclaim of student (per-annum) | 500 | 500 |
| | GRAND TOTAL | 2,26,500 | 2,31,500 |



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## (K) DASA Students

| S.No | Particulars | Fee in AY 2019-20 | Fee in AY 2020-21 | Fee in AY 2021-22 | Fee in AY 2022-23 |
|---|---|---|---|---|---|
| A. 1. | **Tuition Fee** | | | | |
| | (a) Foreign Nationals except from SAARC and ASEAN countries | $ 8000 | $ 8000 | $ 8000 | $ 8000 |
| | (b) Foreign Nationals from SAARC and ASEAN Countries (The candidates from Nepal and Bhutan can submit their fees in equivalent Indian Rupees. However, they will be required to get Exchange Rate Certificate from the bankers and submit the same) | $ 4000 | $ 4000 | $ 4000 | $ 4000 |
| | (c) Children of Indians workers in Gulf Countries (CIWG) through DASA | Rs. 99,500 | Rs. 1,14,500 | Rs. 1,30,500 | Rs. 1,40,30( |
| 2. | **Non Govt. Component for 1(a), 1(b) & 1 (c)** | | | | |
| 2.1 | Student Welfare fee (Co-curricular Activities, Training & Placement, Extra Curricular Activities, Annual Gathering, Students welfare, Institutional Development, Outsourcing, conference, seminar, workshop, innovative projects, skill development activities and Misc. Expenditure on unspecified items) | Rs.20,000 | Rs.20,000 | Rs.20,000 | Rs, 20,000 |
| 2.2 | Facilities & Services Charges (Research initiatives, training programmes, Awards, automation, facilities, entrepreneurship activities and any misc. expenditure on unspecified items) | Rs.28,000 | Rs.35,000 | Rs.35,000 | Rs, 36,000 |
| 2.3 | Economically weaker section fund | Rs.5,000 | Rs.5,000 | Rs.5,000 | Rs.7,000 |
| 2.4 | Examination fee (Examination Infrastructure strengthening, expenditure on examination activities, confidential printing etc.) | Rs.13,000 | Rs.15,000 | Rs.15,000 | Rs.15,000 |
| 2.5 | Premium amount for medi-claim of student (per annum) | Rs.500 | Rs.500 | Rs. 500 | Rs. 700 |
| | **Sub Total (2.1 to 2.5)** | **Rs.66,500** | **Rs.75,500** | **Rs.75,500** | **Rs.78,700** |
| **B.** | **Grand Total (1 & 2) :** | | | | |
| | (a) Foreign Nationals except from SAARC and ASEAN countries | **$ 8000 + Rs. 66,500** | **$ 8000 + Rs.75,500** | **$ 8000 + Rs.75,500** | **$ 8000 + Rs.78,700** |
| | (b) Foreign Nationals from SAARC and ASEAN Countries (The candidates from Nepal and Bhutan can submit their fees in equivalent Indian Rupees. However, they will be required to get Exchange Rate Certificate from the bankers and submit the same) | **$ 4000 + Rs. 66,500** | **$ 4000 + Rs.75,500** | **$ 4000 + Rs.75,500** | **$ 4000 + Rs.78,700** |
| | (c) Children of Indians working in Gulf Countries (CIWG) through DASA | **Rs. 1,66,000** | **Rs. 1,90,000** | **Rs. 2,06,000** | **Rs. 2,19,000** |

## (L) International Students

### (i) Annual Tuition Fee for UG Students

| S.No | Particulars | Fee in AY 2019-20 | Fee in AY 2020-21 | Fee in AY 2021-22 | Fee in AY 2022-23 |
|---|---|---|---|---|---|
| 1. | Direct Admission for Foreign Nationals: Applications routed through Govt. of India agencies | USD 5000 | USD 5000 | USD 5000 | USD 5000 |
| | Foreign Nationals from SAARC and ASEAN Countries (routed through Govt. of India Agencies) | USD 2500 | USD 2500 | USD 2500 | USD 2500 |
| 2. | Direct Admission for Foreign Nationals – Directly applied to DTU | USD 5000 | USD 5000 | USD 5000 | USD 5000 |
| | Foreign Nationals from SAARC and ASEAN Countries (directly applied to DTU) | USD 2500 | USD 2500 | USD 2500 | USD 2500 |

### (ii) Annual Tuition Fee for PG Students

| S.No | Particulars | Fee in AY 2019-20 | Fee in AY 2020-21 |
|---|---|---|---|
| 1. | Direct Admission for Foreign Nationals: Applications routed through Govt. of India agencies | USD 5000 | USD 5000 |
| | Foreign Nationals from SAARC and ASEAN Countries (routed through Govt. of India Agencies) | USD 2500 | USD 2500 |
| 2. | Direct Admission for Foreign Nationals – Directly applied to DTU | USD 5000 | USD 5000 |
| | Foreign Nationals from SAARC and ASEAN Countries (directly applied to DTU) | USD 2500 | USD 2500 |

### (iii) Annual Tuition Fee for Ph.D Students

| | Fee in AY 2019-20 | Fee in AY 2020-21 and onwards |
|---|---|---|
| Ph.D | USD 2500 | USD 1000 |

**(M) Withdrawal Policy (For A to J)**

| S.No. | Percentage of Refund of aggregate fee * | Point of Time when Notice of withdrawal of admission is served to HEI |
|---|---|---|
| 1. | 100% | 15 days before the formally notified last date of admission. |
| 2. | 80% | Not more than 15 days after the formally notified last date of admission |
| 3. | 50% | More than 15 days but less than 30 days after formally notified last date of admission. |
| 4. | 00% | More than 30 days after formally notified last date of admission. |

***(Inclusive of Tuition fees and Non Govt. Component).**

**Student permitted for semester/year withdrawal as per ordinance has to pay the fees for the semester/year for which he/she has been granted withdrawal. However, he/she will not be charged the fees when he/she is completing his/her semester/year.**

This issues with the prior approval of the Competent Authority.

**(Prof. Samsher)**
Registrar

F.No. DTU/Reg/Notifications/2017-18/4503 Dated: 21.01.2019

Copy to the :

1. PA to VC for kind information of the Hon'ble Vice Chancellor.
2. PA to Pro VC (I) for kind information of the Pro Vice Chancellor
3. PA to Pro VC (II) for kind information of the Pro Vice Chancellor
4. All the Deans & Heads of the Academic Department of DTU
5. All Associate Deans/ Associate Heads
6. Controller of Examination
7. OSDs, East Delhi Campus, DTU.
8. All Branch In-charges
9. Head (Computer Center): with a request to upload on the University website.

**(Prof. Samsher)**
Registrar

## 3.4.2 Delhi Technological University

| Branch → Category ↓ | ECE | COE | ME | EE | PIE | CE | ENE | PCT | IT | BT | SE | MAM | EP | MCE | Total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| GNGND | 70 | 139 | 93 | 93 | 23 | 46 | 23 | 23 | 47 | 23 | 47 | 23 | 36 | 46 | **732** |
| GNCWD | 4 | 7 | 5 | 5 | 2 | 3 | 2 | 1 | 2 | 1 | 3 | 2 | 2 | 2 | **41** |
| GNPDD | 4 | 8 | 5 | 5 | 1 | 2 | 1 | 2 | 3 | 2 | 2 | 1 | 2 | 3 | **41** |
| SCGND | 21 | 41 | 28 | 27 | 8 | 14 | 7 | 8 | 13 | 7 | 13 | 7 | 11 | 13 | **218** |
| SCCWD | 1 | 2 | 2 | 1 | 0 | 0 | 1 | 0 | 1 | 1 | 1 | 0 | 1 | 1 | **12** |
| SCPDD | 1 | 3 | 1 | 2 | 0 | 1 | 0 | 0 | 1 | 0 | 1 | 1 | 0 | 1 | **12** |
| STGND | 11 | 21 | 13 | 13 | 3 | 7 | 3 | 4 | 7 | 4 | 7 | 3 | 6 | 7 | **109** |
| STCWD | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | **6** |
| STPDD | 0 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | **6** |
| OBGND | 38 | 75 | 50 | 49 | 12 | 25 | 13 | 12 | 24 | 12 | 25 | 12 | 19 | 25 | **391** |
| OBCWD | 2 | 4 | 3 | 3 | 1 | 1 | 1 | 0 | 1 | 1 | 2 | 1 | 1 | 1 | **22** |
| OBPDD | 2 | 4 | 2 | 3 | 1 | 2 | 0 | 1 | 2 | 1 | 1 | 1 | 1 | 1 | **22** |
| GNGNO | 12 | 25 | 16 | 16 | 4 | 8 | 4 | 4 | 9 | 4 | 8 | 4 | 6 | 9 | **129** |
| GNCWO | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | **7** |
| GNPDO | 1 | 1 | 1 | 1 | 0 | 1 | 1 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | **7** |
| SCGNO | 4 | 7 | 5 | 5 | 1 | 3 | 1 | 2 | 2 | 1 | 2 | 1 | 2 | 3 | **39** |
| SCCWO | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | **2** |
| SCPDO | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | **2** |
| STGNO | 2 | 3 | 2 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 1 | 2 | **19** |
| STCWO | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | **1** |
| STPDO | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | **1** |
| OBGNO | 7 | 14 | 9 | 8 | 2 | 4 | 2 | 2 | 5 | 2 | 4 | 2 | 4 | 4 | **69** |
| OBCWO | 0 | 0 | 1 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | **4** |
| OBPDO | 1 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | **4** |
| GNSGD | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | **14** |
| GNTPO | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | **14** |
| KM | | | | | | | | | | | | | | | **1** |
| TOTAL | **185** | **362** | **242** | **242** | **62** | **122** | **62** | **62** | **122** | **62** | **122** | **62** | **95** | **122** | **1925** |

'D'

## Delhi Technological University (DTU) (2018–19) (JAE)

| Branch → / Category↓ | ECE | COE | ME | EE | PIE | CE | ENE | PCT | IT | BT | SE | MAM | EP | MCE | Total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| GNGND | 70 | 139 | 93 | 93 | 23 | 46 | 23 | 23 | 47 | 23 | 47 | 23 | 36 | 46 | 732 |
| GNCWD | 4 | 7 | 5 | 5 | 2 | 3 | 2 | 1 | 2 | 1 | 3 | 2 | 2 | 2 | 41 |
| GNPDD | 4 | 8 | 5 | 5 | 1 | 2 | 1 | 2 | 3 | 2 | 2 | 1 | 2 | 3 | 41 |
| SCGND | 21 | 41 | 28 | 27 | 8 | 14 | 7 | 8 | 13 | 7 | 13 | 7 | 11 | 13 | 218 |
| SCCWD | 1 | 2 | 2 | 1 | 0 | 0 | 1 | 0 | 1 | 1 | 1 | 0 | 1 | 1 | 12 |
| SCPDD | 1 | 3 | 1 | 2 | 0 | 1 | 0 | 0 | 1 | 0 | 1 | 1 | 0 | 1 | 12 |
| STGND | 11 | 21 | 13 | 13 | 3 | 7 | 3 | 4 | 7 | 4 | 7 | 3 | 6 | 7 | 109 |
| STCWD | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 6 |
| STPDD | 0 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 6 |
| OBGND | 38 | 75 | 50 | 49 | 12 | 25 | 13 | 12 | 24 | 12 | 25 | 12 | 19 | 25 | 391 |
| OBCWD | 2 | 4 | 3 | 3 | 1 | 1 | 1 | 0 | 1 | 1 | 2 | 1 | 1 | 1 | 22 |
| OBPDD | 2 | 4 | 2 | 3 | 1 | 2 | 0 | 1 | 2 | 1 | 1 | 1 | 1 | 1 | 22 |
| GNGNO | 12 | 25 | 16 | 16 | 4 | 8 | 4 | 4 | 9 | 4 | 8 | 4 | 6 | 9 | 129 |
| GNCWO | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 7 |
| GNPDO | 1 | 1 | 1 | 1 | 0 | 1 | 1 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 7 |
| SCGNO | 4 | 7 | 5 | 5 | 1 | 3 | 1 | 2 | 2 | 1 | 2 | 1 | 2 | 3 | 39 |
| SCCWO | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 |
| SCPDO | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 2 |
| STGNO | 2 | 3 | 2 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 1 | 2 | 19 |
| STCWO | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 |
| STPDO | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 |
| OBGNO | 7 | 14 | 9 | 8 | 2 | 4 | 2 | 2 | 5 | 2 | 4 | 2 | 4 | 4 | 69 |
| OBCWO | 0 | 0 | 1 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 4 |
| OBPDO | 1 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 4 |
| GNSGD | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 14 |
| GNTPO | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 14 |
| KM | | | | | | | | | | | | | | | 01 |
| TOTAL | 185 | 362 | 242 | 242 | 62 | 122 | 62 | 62 | 122 | 62 | 122 | 62 | 95 | 122 | 1925 |

## Seat Matrix

### Seat Matrix for International Admission (UG Programmes)

| | Discipline | ECE | COE | ME | EE | PIE | CE | ENE | PCT | IT | BT | SE | MAM | EP | MCE | To |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| M1 | DASA (5%) | 9 | 18 | 12 | 12 | 3 | 6 | 3 | 3 | 6 | 3 | 6 | 3 | 4 | 6 | 9 |
| M2 | ICCR (3%) | 6 | 11 | 7 | 07 | 2 | 4 | 2 | 2 | 4 | 2 | 4 | 2 | 3 | 4 | 5 |
| | a)SAARC/ASEAN (4%) | 7 | 15 | 10 | 10 | 2 | 5 | 2 | 2 | 5 | 2 | 5 | 2 | 3 | 5 | 7 |
| M3 | b)Excluding (SAARC/ASEAN) (3%) | 6 | 11 | 7 | 7 | 2 | 4 | 2 | 2 | 4 | 2 | 4 | 2 | 3 | 4 | 5 |



Total Seats: 285

'C'

## Delhi Technological University
*(Formerly Delhi College of Engineering)*

(Estd. by the Government of NCT of Delhi vide Delhi Act 6 of 2009)

**Vision**

To be a world class university through education, innovation and research for the service of humanity.

**Mission**

- To establish centres of excellence in emerging areas of science, engineering, technology, management and allied areas.
- To foster an ecosystem for incubation, product development, transfer of technology and entrepreneurship.
- To create environment of collaboration, experimentation, imagination and creativity.
- To develop human potential with analytical abilities, ethics and integrity.
- To provide environment friendly, reasonable and sustainable solutions for local & global needs.

**About Institute**

Delhi Technological University (formerly known as Delhi College of Engineering) is one of the most well-known engineering institutions of India, with over 75 years of glorious tradition behind it. A non-affiliating, teaching and research University, DTU is poised to create an environment of synergetic partnership between academia and industry. It aims to cause a major departure from the conventional system of education and research and aspires to imbibe a culture of scientific research and education by providing a seamless environment for integration of science and engineering. The University also endeavours to provide the thrill of a corporate R & D environment with a planned focus on industrially relevant projects and technology incubation.

The University lays great emphasis on assisting students in the development of character on self-confidence with management traits. To achieve these goals the curriculum stresses upon self-learning, creative thinking, critical evaluation, spirit of inquiry and imbibing the culture of lifelong learning. Students are encouraged to undertake design, development, construction, production, managerial and entrepreneurial activities, and higher studies in their chosen or allied interdisciplinary fields of study.DTU has consistently been ranked among the top engineering institutions of the country in reputed surveys.

**Fee Concession for Students Belonging to Economically Weaker Sections**

Fee concession is available to all the desirous and eligible students of DTU. The students whose family income from all sources is less than Rs.4,50,000/- per annum are eligible for fee concession. In the year ~~2017-18,~~ 2018-19 fee concession of more than ~~Rs.1Crore~~ ~~Rs 1.75 Crore~~ Rs. 3 Crores (three Crores) was extended to the economically weaker section students.

More information about DTU can be accessed at www.dtu.ac.in.

Rlaudp