

NATIONAL INSTITUTE OF TECHNOLOGY KURUKSHETRA

AGENDA

For

59th MEETING OF SENATE



Venue of meeting: Senate Hall, NIT, Kurukshetra

Date & Time : June 11, 2026 at 10.30 a.m.

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S59.01 To confirm the minutes of 58th Senate meeting held on 13.02.2026 & 26.02.2026.

The minutes of the 58th meeting of the Senate held on 13.02.2026 & 26.02.2026 were circulated to all the members of the Senate through e-mail dated 09.03.2026. No comments have been received. The minutes are enclosed as Annexure S 59.01.

However, the minutes of agenda item no. S 58.06, S 58.08, S 58.18, S 58.19 and ST 58.01(ii & iii) were put in abeyance because these minutes could not be placed before the Board of Governors due to unavoidable administrative reasons. The nomenclature and seat matrix of UG and PG programs as already approved for academic year 2025 have been sent to JoSAA/CSAB and CCMT/CCMN 2026 respectively.

Further, the BoG in its 79th meeting held on 21.5.2026 vide agenda item no. BoG 79.17 decided to put the decision taken against the Senate agenda items no. S 58.06, S 58.08, S 58.18, S 58.19 and ST 58.01(ii & iii) in abeyance till further review. The Board also considered the Senate decision vide agenda item S 58.21 and resolved that the ongoing scholarships sponsored by NIT Kurukshetra Alumni Association be continued in the interest of the students.

The Senate may confirm the remaining minutes of 58th meeting of the Senate held on 13.02.2026 & 26.02.2026.

**NATIONAL INSTITUTE OF TECHNOLOGY
KURUKSHETRA**

MINUTES OF 58th MEETING OF THE SENATE

Minutes of the 58th meeting of the Senate, NIT, Kurukshetra held on 13th February 2026 (Friday) at 10.30 a.m. (Part-I) and on 26th February 2026 (Thursday) at 3.30 p.m. (Part-II) in the Senate Hall of the Institute.

MEMBERS PRESENT ON 13.02.2026 (Part-I)

- | | |
|---|----------|
| 1. Prof. B.V. Ramana Reddy
Director
National Institute of Technology
Kurukshetra | Chairman |
|---|----------|

The external members of the Senate had completed their term on 07.07.2025. Nomination of new members, as per provisions under Clause 14 (d) of NITSER Act, 2017 is under process.

Internal Members (Department wise & in alphabetical order)

Business Administration Department

2. Dr. Neeraj Kaushik, Associate Prof. & HoD

Civil Engineering Department

3. Prof. Arun Goel, Professor
4. Prof. Ashwani Jain, Professor
5. Prof. H.K. Sharma, Professor
6. Prof. Mahesh Pal, Professor
7. Prof. Parveen Aggarwal, Professor
8. Prof. Paratibha Aggarwal, Professor
9. Prof. S.K. Madan, Professor
10. Prof. S.K. Patidar, Professor
11. Prof. V.P. Singh, Professor
12. Prof. N.K. Tiwari, Professor

Chemistry Department

13. Prof. J.K. Kapoor, Professor





Computer Engineering Department

- 14. Prof. J.K. Chhabra, Professor
- 15. Prof. Mayank Dave, Professor
- 16. Prof. Sanjay Kumar Jain, Professor
- 17. Prof. R.K. Aggarwal, Professor

Electrical Engineering Department

- 18. Prof. Ashwani Kumar, Professor
- 19. Prof. G.L. Pahuja, Professor
- 20. Prof. Jagdeep Singh Lather, Professor
- 21. Prof. Jyoti Ohri, Professor
- 22. Prof. Lillie Dewan, Professor
- 23. Prof. Ratna Dahiya, Professor
- 24. Prof. Sathans, Professor
- 25. Prof. Yash Pal, Professor
- 26. Prof. Saurabh Chanana, Professor

Electronics & Communication Engineering Department

- 27. Prof. Brahmjit Singh, Professor
- 28. Prof. O.P. Sahu, Professor
- 29. Prof. Rajoo Pandey, Professor
- 30. Prof. R.K. Sharma, Professor
- 31. Prof. Umesh Ghanekar, Professor
- 32. Sh. Karan Sharma, Associate Professor & HoD

Humanities & Social Sciences Department

- 33. Prof. Kiran Mor, Professor
- 34. Prof. Vikas Choudhary, Professor

Mechanical Engineering Department

- 35. Prof. Dinesh Khanduja, Professor
- 36. Prof. Dixit Garg, Professor
- 37. Prof. Gian Bhushan, Professor
- 38. Prof. Hari Singh, Professor
- 39. Prof. Meenu, Professor
- 40. Prof. P.C. Tiwari, Professor
- 41. Prof. P.K. Saini, Professor
- 42. Prof. V.K. Bajpai, Professor



Physics Department

- 43. Prof. Ashavani Kumar, Professor
- 44. Prof. Neena Jaggi, Professor
- 45. Prof. R.P. Chauhan, Professor

The absence of following members to this meeting (Part-I) is noted:

Internal Members (Department wise & in alphabetical order)

Civil Engineering Department

- 1. Prof. Baldev Setia, Professor
- 2. Prof. K.K. Singh, Professor
- 3. Prof. Saraswati Setia, Professor
- 4. Prof. Surinder Deswal, Professor
- 5. Prof. Babita Saini, Professor

Chemistry Department

- 6. Prof. Minati Baral, Professor

Computer Applications Department

- 7. Dr. Sandeep Kumar Sood, Associate Prof. & HoD

Computer Engineering Department

- 8. Prof. A.K. Singh, Professor

Electrical Engineering Department

- 9. Prof. L.M. Saini, Professor

Mathematics Department

- 10. Prof. Paras Ram, Professor
- 11. Dr. A.S.V. Ravi Kanth, Professor

Mechanical Engineering Department

- 12. Prof. Ajai Jain, Professor
- 13. Prof. Pankaj Chandna, Professor
- 14. Prof. Puneet Kumar, Professor

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15. Prof. Vinod Kumar, Professor

BoG member as Special Invitee

16. Sh. Jaideep Gupta, Associate Prof. (MED)

MEMBERS PRESENT ON 26.02.2026 (Part-II)

1. Prof. B.V. Ramana Reddy
Director
National Institute of Technology
Kurukshetra

Chairman

Internal Members (Department wise & in alphabetical order)

Business Administration Department

2. Dr. Neeraj Kaushik, Associate Prof. & HoD

Civil Engineering Department

3. Prof. Arun Goel, Professor
4. Prof. Ashwani Jain, Professor
5. Prof. Baldev Setia, Professor
6. Prof. H.K. Sharma, Professor
7. Prof. K.K. Singh, Professor
8. Prof. Paratibha Aggarwal, Professor
9. Prof. Saraswati Setia, Professor
10. Prof. S.K. Madan, Professor
11. Prof. S.K. Patidar, Professor
12. Prof. V.P. Singh, Professor
13. Prof. N.K. Tiwari, Professor

Chemistry Department

14. Prof. J.K. Kapoor, Professor

Computer Applications Department

14. Dr. Sandeep Kumar Sood, Associate Prof. & HoD

Computer Engineering Department

15. Prof. A.K. Singh, Professor
16. Prof. Mayank Dave, Professor



Electrical Engineering Department

- 17. Prof. Ashwani Kumar, Professor
- 18. Prof. G.L. Pahuja, Professor
- 19. Prof. Jagdeep Singh Lather, Professor
- 20. Prof. Jyoti Ohri, Professor
- 21. Prof. Lillie Dewan, Professor
- 22. Prof. Ratna Dahiya, Professor
- 23. Prof. Sathans, Professor
- 24. Prof. Yash Pal, Professor
- 25. Prof. Saurabh Chanana, Professor

Electronics & Communication Engineering Department

- 26. Prof. Brahmjit Singh, Professor
- 27. Prof. O.P. Sahu, Professor
- 28. Prof. Rajoo Pandey, Professor
- 29. Prof. R.K. Sharma, Professor
- 30. Prof. Umesh Ghanekar, Professor
- 31. Sh. Karan Sharma, Associate Professor & HoD

Humanities & Social Sciences Department

- 32. Prof. Kiran Mor, Professor
- 33. Prof. Vikas Choudhary, Professor

Mathematics Department

- 34. Prof. Paras Ram, Professor
- 35. Dr. A.S.V. Ravi Kanth, Professor

Mechanical Engineering Department

- 36. Prof. Ajai Jain, Professor
- 37. Prof. Dixit Garg, Professor
- 38. Prof. Hari Singh, Professor
- 39. Prof. Puneet Kumar, Professor
- 40. Prof. V.K. Bajpai, Professor

Physics Department

- 41. Prof. R.P. Chauhan, Professor

Special Invitee

42. Dr. Sandeep Singhal, Associate Prof. Mech. Engg. Deptt.

43. Dr. Ranjeet Kumar, Asstt. Prof., Mech. Engg. Deptt.

The absence of following members to this meeting (Part-II) is noted:

Internal Members (Department wise & in alphabetical order)

Civil Engineering Department

1. Prof. Mahesh Pal, Professor
2. Prof. Parveen Aggarwal, Professor
3. Prof. Surinder Deswal, Professor
4. Prof. Babita Saini, Professor

Chemistry Department

5. Prof. Minati Baral, Professor

Computer Engineering Department

6. Prof. J.K. Chhabra, Professor
7. Prof. Sanjay Kumar Jain, Professor
8. Prof. R.K. Aggarwal, Professor

Electrical Engineering Department

9. Prof. L.M. Saini, Professor

Mechanical Engineering Department

10. Prof. Dinesh Khanduja, Professor
11. Prof. Gian Bhushan, Professor
12. Prof. Meenu, Professor
13. Prof. Pankaj Chandna, Professor
14. Prof. P.C. Tewari, Professor
15. Prof. P.K. Saini, Professor
16. Prof. Vinod Kumar, Professor

Physics Department

17. Prof. Ashavani Kumar, Professor
18. Prof. Neena Jaggi, Professor

Minutes of 58th meeting of Senate

BoG member as Special Invitee

19. Sh. Jaideep Gupta, Associate Prof. (MED)

A. Proceedings of Part-I (Agenda no. S 58.01 to S 58.10 and S 58.15 to S 58.20)

The Hon'ble Director and the Chairman of the Senate welcomed all members of the Senate. First of all, he expressed his deep concern over less participation of the Senators in the process of policy decisions related to academic affairs of the Institute. Then he shared his views about the implementation of NEP-2020. Since the last four years, efforts have been made. While revising the scheme and syllabus, many components of holistic personality development have also been incorporated. In addition, sustainability and Indian knowledge system components are needed to be included in each scheme and syllabus. The Chairman, Senate advised all HoDs to change the rules and regulations in 4th year scheme and syllabus. For this, a Committee will be constituted to ensure uniformity in scheme of all programmes. After this, the Chairman, Senate accorded permission to present the agenda of the meeting.

The agenda was presented and after detailed deliberations, the following decisions were taken in the meeting:

S 58.01 To confirm the minutes of 57th Senate meeting held on 27.10.2025.

The Senate confirmed the minutes of 57th Senate meeting held on 27.10.2025.

S 58.02 To note the minutes of 70th SCSA meeting held on 05.01.2026.

The Senate noted the minutes of 70th SCSA meeting held on 05.01.2026.

S 58.03 To note action taken report on the minutes of 57th Senate meeting held on 27.10.2025.

The Senate noted the action taken report on the minutes of 57th Senate meeting held on 27.10.2025.

Minutes of 58th meeting of Senate

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S 58.04 To ratify the approval of the Chairman, Senate for the following:

- (i) Inclusion of names in the list of students to be awarded degrees in 20th Convocation.
- (ii) Attendance relaxation to Ms. Yashika, B.Tech. student of Elect. Engg. and Mr. Ankit Kumar, M.Tech. student of Civil Engg. as special cases.
- (iii) Provision of two subjects through NPTEL during internship for 8th semester students (CSE & IT).

- (i) The Senate ratified the approval of the Chairman, Senate for inclusion of names in the list of students to be awarded degrees in 20th Convocation.
- (ii) The Senate ratified the approval of the Chairman, Senate for Attendance relaxation to Ms. Yashika, B.Tech. student of Elect. Engg. and Mr. Ankit Kumar, M.Tech. student of Civil Engg. as special cases.
- (iii) The Senate ratified the approval of the Chairman, Senate for Provision of two subjects through NPTEL during internship for 8th semester students (CSE & IT).

S 58.05 To consider and approve the minor modification in scheme & syllabus of B.Arch. 1st and 2nd year.

The Senate considered and approved the minor modification in scheme & syllabus of B.Arch. 1st and 2nd year.

S 58.06 To consider and approve the scheme and syllabus of M.Plan (Urban and Regional Planning) degree programme.

The Senate considered and approved the scheme and syllabus of M.Plan (Urban and Regional Planning) degree programme with 20 (regular) + 05 (sponsored) seats from academic year 2026-27.

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S 58.07 To consider and approve the 3rd & 4th year scheme & syllabus of the following four B.Tech. programmes started in AY 2024-25:

- (i) Robotics & Automation
- (ii) Sustainable Energy Technologies
- (iii) Microelectronics and VLSI Engg.
- (iv) Artificial Intelligence and Data Science

After long deliberations, the Senate considered and approved the scheme and syllabus of the following four B.Tech. programmes upto 3rd year i.e. 5th & 6th semester:

- (i) Robotics & Automation
- (ii) Sustainable Energy Technologies
- (iii) Microelectronics and VLSI Engg.
- (iv) Artificial Intelligence and Data Science

The scheme and syllabus of final year may be revisited after the decision of the Committee which will be constituted to look after the scheme and syllabus of all programmes looking into the internship prospective of the students during final year.

S 58.08 To consider the proposal of Department of Robotics & Industrial Engg. to start following UG & PG programmes alongwith scheme & syllabus from AY 2026-27.

- (i) B.Tech. in Production & Industrial Systems Engineering
- (ii) B.Tech. in Robotics & Artificial Intelligence
- (iii) M.Tech. in Robotics and Artificial Intelligence
- (iv) M.Tech. in Industrial Engg. and Data Analytics

(i) After long deliberations, the Senate was not agreed upon to change the name of the program B.Tech. in Production & Industrial Systems Engineering and decided that the name of B.Tech. course will remain same i.e. B.Tech. in Production & Industrial Engineering.

(ii) After long discussions, the Senate approved the first year scheme of B.Tech. in Robotics & Artificial Intelligence which is common to all B.Tech.





programmes. However, the remaining 2nd, 3rd & 4th year scheme and syllabus of B.Tech. in Robotics & Artificial Intelligence may be revisited.

- (iii) After detailed discussions, the Senate approved the proposal to start M.Tech. in Robotics & Artificial Intelligence with 10 regular seats and 5 self-finance seats. However, the following observations were made by the Senators:
 - a. Template should be followed.
 - b. Codes should be uniform.
- (iv) The Senate approved the proposal to start M.Tech. in Industrial Engg. and Data Analytics with 10 regular seats and 5 self-finance seats with same guidelines as in the case of M.Tech. in Robotics & Artificial Intelligence.

The HoD, Robotics & Industrial Engineering was asked to revise this agenda item after incorporating suggestions of the Senators in the scheme & syllabi of PG programmes to be discussed in next Senate meeting.

S 58.09 To consider the requests of Mr. Shivam, Sr. Technician, Computer Engg. Deptt. and Mr. Omendra Pal Singh, Sr. Technician, Civil Engg. Deptt. for pursuing Ph.D. as part-time candidate at NIT Kurukshetra.

The Senate considered the requests of Mr. Shivam, Sr. Technician, Computer Engg. Deptt. and Mr. Omendra Pal Singh, Sr. Technician, Civil Engg. Deptt. for pursuing Ph.D. as part-time candidate at NIT Kurukshetra and approved to allow them as part-time candidates. It was decided that the classes to complete mandatory course work for such candidates will be held in ninth hour i.e. after the duty or working hours. Accordingly, the modification will be incorporated in Ph.D. regulations.



S 58.10 To review the admission status of Ph.D. programmes in December 2025

While discussing the possibilities to increase admission in Ph.D. programmes, the following decisions were taken by the Senators:

- (i) The eligibility criteria for admission to Ph.D. programme may be 55% marks having Master Degree instead of 60% marks and 75% marks having Bachelor Degree instead of 80% marks. The same relaxation will be applicable to the candidates under reserved category.
- (ii) If students are available, then interdisciplinary programmes may be offered.
- (iii) Classes for mandatory course work for part time students will be conducted in ninth period/after duty timings.
- (iv) Advertisement for admission in Ph.D. programmes will be published in time.
- (v) Beyond 8 Ph.D. slot, it will be compulsory to have joint supervision from other department subject to maximum 12 Ph.D. slots.
- (vi) The Chairman, DRC will ensure allotment of eligible candidate to the supervisor by whom reference he/she appeared in the admission process of Ph.D. program.
- (vii) The Senate did not agree upon the Integrated programme- M.Tech./Ph.D. or M.Sc./Ph.D.
- (viii) The Senate agreed to continue Institute fellowship upto 5 years or upto viva exam. whichever is earlier in line with other fellowship offered by UGC/CSIR etc. During this period, the scholars will share teaching load upto 8 hrs.




S 58.15 To consider and approve the minor changes in the syllabi of M.Sc. Physics.

The Senate considered and approved the minor changes in the syllabi of M.Sc. Physics.

S 58.16 To consider and approve the scheme of following programs of Computer Engg. Deptt.:

- (i) B.Tech. AI & ML (7th & 8th semester)
- (ii) B.Tech. CSE (8th semester)
- (iii) B.Tech. IT (8th semester)
- (iv) NPTEL courses' list for B.Tech. CSE & IT (8th semester)
- (v) Minor adjustment in credit for Project-I in B.Tech. AI&ML (6th sem.)

The Senate considered the proposal of Computer Engg. Deptt. and approved as under:

The scheme and syllabus of final year may be revisited after the decision of the Committee which will be constituted to look after the scheme and syllabus of all programmes looking into the internship prospective of the students during final year. Further, the Senate approved the NPTEL courses' list for B.Tech. CSE & IT and minor adjustment in credit for Project-I in B.Tech. AI & ML (6th sem.).

S 58.17 To consider and approve the list of NPTEL courses for B.Tech. ECE 8th semester.

The Senate considered and approved the list of NPTEL courses for B.Tech. ECE 8th semester.

S 58.18 To consider the proposal to start Generic M.Tech. program in Civil Engg.

The Senate considered and approved the proposal to start Generic M.Tech. program in Civil Engg. with intake of 30 regular seats and 15 self finance seats.





S 58.19 To consider the proposal to start Generic M.Tech. in Mechanical Engineering.

The Senate considered and approved the proposal to start Generic M.Tech. program in Mechanical Engg. with intake of 10 regular seats and 05 self finance seats.

S 58.20 To consider and approve the change in the course code offered in 2nd semester in Mathematics & Computing Department.

The Senate considered and approved the change in the course code offered in 2nd semester in Mathematics & Computing Department.

Due to shortage of time and pre-scheduled programme on occasion of inaugural function of CITIUS 2026, the other agenda items could not be taken up in this Senate meeting. Therefore, it was decided to continue this meeting on 26th February 2026 to discuss remaining agenda items and some additional & revised agenda items of Robotics & Industrial Engg. Deptt. in detail.

B. Proceedings of Part-II (Agenda no. S 58.11 to S 58.14, S 58.21 to S 58.32 & ST 58.01 to ST 58.02).

Due to the shortage of time, all agenda items could not be discussed in 58th Senate. Therefore, meeting was again held on 26th February, 2026 to discuss remaining agenda items and some additional & revised agenda items of Robotics & Industrial Engg. Deptt. in detail. The Hon'ble Director and the Chairman of the Senate welcomed all members and accorded permission to present the remaining agenda items of the meeting. As Dr. Sandeep Singhal, Associate Prof. Mech. Engg. Deptt. and Dr. Ranjeet, Asstt. Prof. Mech. Engg. Deptt. were invited as special invitee to discuss the agenda item pertaining to the department of Robotics & Industrial Engg. Therefore, table agenda item no. ST 58.01 along with S 58.08 was discussed first.



ST 58.01 To consider the proposal of department of Robotics & Industrial Engg. for the following courses:

- (i) **B.Tech. in Production & Industrial Engineering (PIE) (1st to 6th Sem.)**
- (ii) **B.Tech. in Robotics & Artificial Intelligence (R&AI) (1st & 2nd Sem.)**
- (iii) **M.Tech. in Robotics & Industrial Engineering with the following specializations:**
 - a) **Industrial Engineering & Data Analytics (IEDA) (1st to 4th Sem. Scheme & Syllabus)**
 - b) **Robotics & Artificial Intelligence (R&AI) (1st to 4th Sem. Scheme & Syllabus of 1st Sem.).**
- (iv) **B.Tech. Robotics & Automation scheme & syllabus for 5th & 6th Semester.**

The HoD, Robotics & Industrial Engg. informed that the name of B.Tech. in Production & Industrial Engg. will remain same as per suggestions of the Senate in last meeting held on 13.02.2026 (part-I). He as well as special invitees also ensured that the scheme & syllabi of UG and PG programs of Robotics & Industrial Engg. Deptt. is designed on the inputs of industry experts. After detailed deliberations in the Senate, it was resolved:

- (i) The Senate approved the scheme and syllabus of B.Tech. in Production & Industrial Engg. (PIE) (1st to 6th sem.).
- (ii) The Senate approved the scheme and syllabus of B.Tech. in Robotics & Artificial Intelligence (R&AI) 1st & 2nd sem. It will replace the B.Tech. in Robotics & Automation.
- (iii) The Senate considered the proposal and approved the M.Tech. in Robotics & Industrial Engg. as a generic M.Tech. program with following specializations with minor modifications:
 - a) Industrial Engineering & Data Analytics (IEDA) (1st to 4th Sem. Scheme & Syllabus)
 - b) Robotics & Artificial Intelligence (R&AI) (1st to 4th Sem. Scheme & Syllabus of 1st Sem.).
 The intake of M.Tech. program will be 20 (regular) + 10 (self-financed) seats.

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- S 58.11 To consider the proposal of continuation of M.Tech. stipend from the first date of upcoming month after declaring the result of special examinations.**

The Senate considered and approved the proposal of continuation of M.Tech. stipend from the first date of upcoming month after declaring the result of special examinations.

- S 58.12 To consider the proposal to conduct odd and even semester examination simultaneously.**

After long deliberations, the Senate did not agree upon this proposal to conduct odd and even semester examination simultaneously. However, it was decided that special reappear examination for B.Tech. students will be conducted also after declaration of 6th semester result. Only those students will be allowed for special examinations who are having not more than five reappears in previous semesters. Internal reappear and external reappear in any course will be considered as one reappear only.

- S 58.13 To consider and decide the issue of fee of SII students.**

The Senate did not consider this proposal and deferred this agenda item. The Senators were of the opinion that this agenda item is not under the purview of the Senate. It is a matter of Finance and should be taken over as agenda item to the Finance Committee, if required.

- S 58.14 To consider and approve the syllabus of a course 'Principles of Management' for B.Tech. 6th semester in Humanities & Social Sciences Deptt.**

The Senate considered and approved the syllabus of a course 'Principles of Management' for B.Tech. 6th semester in Humanities & Social Sciences Deptt.

S 58.21 To discuss the status of all scholarships sponsored by Alumni.

After detailed discussions, the Senate decided to continue the following scholarship sponsored by Alumni for which the corpus is with the Institute:

- (i) Shyam Sunder Dhingra Award
- (ii) Manohar award of Excellence
- (iii) RECK-66

Other Alumni Scholarships approved by the Senate in previous meetings will be discontinued henceforth. Further, the alumni sponsorship for Best All Round – Male, Female & PwD will be withdrawn. Only medal and certificate will be awarded by the Institute to the Best All Round students in Male, Female & PwD category.

S 58.22 To consider minor change regarding security refund in fee structure.

After deliberations, the Senate decided that an amount of Rs. 2000/- will be non-refundable out of security deposit and it will be considered for consumables, breakage etc.. The remaining security deposit in the fee structure will be refundable. The amount of Rs. 2000/- will be marked as 'Other Equipment Maintenance Charges'. This amount will also be revised yearly along with the other charges of the fee as per approval of the FC/BOG. The Senate recommended to place this proposal in the next FC meeting as agenda item.

The Senate confirmed the minutes during the meeting itself.

S 58.23 To consider the proposal of Electrical Engg. Deptt. to start two new following M.Tech. programs:

- 1) System Automation and Machine Intelligence
- 2) Smart Grid & Vehicular Technology

The HoD, Electrical Engg. Deptt. through DAC minutes, conveyed the Senate to withdraw this agenda item and the Senate decided that the




existing M.Tech. programs in Electrical Engg. Deptt. will continue this academic year. The intake will be 10 (regular) + 05 (self-financed) seats for each M.Tech. program.

S 58.24 To consider the report of the Committee constituted to look into academic support framework for students with learning disabilities (LD).

After long deliberations, the Senate considered and approved the report of the Committee constituted to look into academic support framework for students with learning disabilities (LD). However, the Chairman, Senate had already approved the guidelines framed for students with learning disabilities in anticipation approval of the Senate which is also placed for ratification as separate table agenda item no. S 58.32.

S 58.25 To consider the report of the Committee constituted to look into the matter of availing the flexibility of extra course credits by the students.

The Senate considered and approved the report of the Committee constituted to look into the matter of availing the flexibility of extra course credits by the students.

S 58.26 To consider the proposal regarding leave of Ph.D. research scholars.

After long deliberations, the Senate considered and approved the proposal regarding leave of Ph.D. research scholars. The medical leave will be 16 days and 05 days leave will be non-medical in a year which can be availed by the research scholar for any purpose other than medical. Other leave rules will remain same.

S 58.27 To discuss the proposal for collaborative Ph.D. degree between NIT Kurukshetra and IIT Indore.

The Senate considered and approved the proposal in principle for collaborative Ph.D. degree between NIT Kurukshetra and IIT Indore. The



Senate decided that such scholars must follow the admission process of the Ph.D. in the Institute before registration in the Ph.D. programme. The Dean (R&C) will look into this proposal and take necessary follow up steps.

S 58.28 To consider and discuss a proposal for three months' internship for B.Tech. students.

The Senate considered and approved the proposal for three months' internship for B.Tech. students.

S 58.29 To consider the proposal to start minor degree courses from 3rd semester.

The Senate considered and approved the proposal to start minor degree courses from 3rd semester.

S 58.30 To consider the proposal to transfer the labs and office space.

After detailed deliberations, the Senate considered and approved the proposal to transfer the labs and office space of all other cases except ECE/VLSI. The same will be decided after due deliberations.

S 58.31 To consider the proposal to introduce Non-Conventional Institute Core (NCIC) course of 02 credits namely Bharat Knowledge System in Ph.D. program.

The Senate considered and approved to introduce new course of 2 credits namely Bharat Knowledge System in Ph.D. program. This will be additional Institute core course to be studied by the Ph.D. research scholars along with the other compulsory courses such as Research Methodology etc.

S 58.32 To ratify the approval of the Chairman, Senate regarding guidelines for the student admitted in academic session 2024-25 under the PwD, with specific learning disability (SLD) i.e. Dyslexia and Dyscalculia.

The Senate ratified the approval of the Chairman, Senate regarding guidelines for the student admitted in academic session 2024-25 under the PwD, with specific learning disability (SLD) i.e. Dyslexia and Dyscalculia.

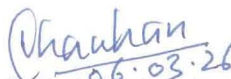
ST 58.02 To consider the proposal for establishment of four (04) scholarships in the name of "Pramod-Shanti Merit-cum-Means Scholarship".

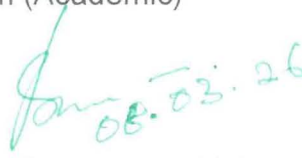
The Senate did not agree upon the proposal for establishment of four (04) scholarships in the name of "Pramod-Shanti Merit-cum-Means Scholarship".

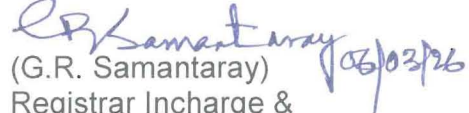
Any other Item

No any other item was taken up.

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


(R.P. Chauhan)
Dean (Academic)


(B.V. Ramana Reddy)
Director & Chairman Senate


(G.R. Samantaray)
Registrar Incharge &
Secretary, Senate

S 59.02 To ratify the minutes of 71st SCSA meeting held on 11.05.2026.

The minutes of 71st SCSA meeting held on 11.05.2026 were circulated through email dated 11.05.2026. No comments have been received from any member. The minutes are enclosed as Annexure S 59.02.

However, the SCSA in its 71st meeting held on 11.05.2026 vide agenda item no. SCSA 71.01 decided that the evaluation criteria for B.Tech. final year projects, which is similar to the evaluation of practical examinations will be reconsidered by the Senate, therefore it is being placed as agenda item no. S 59.05.

While noting the minutes of 57th meeting of the Senate held on 27.10.2025, the BoG in its 79th meeting held on 21.5.2026 vide agenda item no. BoG 79.16 also noted the above decision of the SCSA taken vide agenda item no. SCSA 71.01 to keep the decision of Senate agenda item S 57.09 (revision of evaluation process for B.Tech. final year projects) in abeyance for the current academic year.

Further, vide agenda item no. SCSA 71.02, it was decided to rename the nomenclature of course on “Research & Publication Ethics’ as “Research Ethics & Bharat Knowledge System’ and the same will be placed in forthcoming Senate meeting for consideration. This scheme and syllabus of this course is also being placed before Senate as agenda item no. S 59.06

The Senate may ratify the minutes of 71st SCSA meeting held on 11.05.2026.

**NATIONAL INSTITUTE OF TECHNOLOGY
KURUKSHETRA**

No. Acad./2026/71st SCSA/776

Dated: 11.05.2026

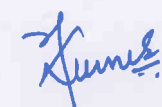
Subject: Minutes of the 71st SCSA meeting held on 11.05.2026 at 11.30 a.m. in the Board Room of the Institute.

The following members attended the 71st SCSA meeting held on 11.05.2026 at 11.30 a.m. in the Board Room of the Institute:

S.No.	Name & Designation Dr./Prof./Ms.
1.	Prof. Brahmjit Singh, Officiating Director & Chairman, SCSA
2.	Rajoo Pandey, Dean (P&D)
3.	Gian Bhushan, Dean (Academic)
4.	V.P. Singh, Dean (E&C)
5.	Lillie Dewan, Dean (SW)
6.	Mayank Dave, Dean (FW)
7.	Mahesh Pal, Dean (R&C)
8.	R.K. Sharma, HoD, VLSI & SE
9.	Pankaj Chandna, HOD Mechanical Engg.
10.	Sandeep Singhal, for HOD RIE
11.	S.K. Patidar, HOD Civil Engg.
12.	Jyoti Ohri, HOD Elect. Engg.
13.	Arvind Kumar, HOD ECE
14.	A.K. Singh, HOD Computer Engg.
15.	R.K. Aggarwal, HOD DSAI
16.	R.P. Chauhan, for HOD Physics
17.	J.K. Kapoor, HOD Chemistry
18.	Kiran Mor, HOD Humanities
19.	Sandeep Sood, HOD CA
20.	Neeraj Kaushik, HOD BA
21.	H.K. Sharma, HOD Arch. & Planning
22.	Vinod Kumar, Registrar I/c & Secretary SCSA

The HoDs, Mathematics and Energy Science & Engg. could not attend the meeting. At the outset, the Hon'ble Director and Chairman, SCSA welcomed all the members of SCSA and granted permission to take up the agenda items.

The following decisions were taken: -

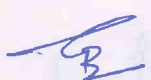
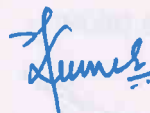
SCSA 71.01 To put in abeyance the decision of 57th Senate meeting held on 27.10.2025 vide agenda item no. S 57.09 regarding revision of evaluation process for B.Tech. final year projects on the pattern of M.Tech. projects.

After detailed deliberations, it was decided that the decision of 57th Senate meeting held on 27.10.2025 vide agenda item no. S 57.09 regarding revision of evaluation process for B.Tech. final year projects on the pattern of M.Tech. projects and notified vide no. Acad./2025/1598 dated 11.11.2025 be put in abeyance for the current academic year i.e. 2025-26. However, it may be reconsidered by the Senate in its forthcoming meeting for the academic year 2026-27 and onwards.

Further, the previous evaluation criteria for B.Tech. final year projects, which is similar to the evaluation of practical examinations, is to be followed in current academic year i.e. 2025-26.

SCSA 71.02 To reconsider the decision of 58th Senate meeting held on 13.02.2026 and 26.02.2026 vide agenda item no. S 58.31 regarding proposal to introduce Non-Conventional Institute Core (NCIC) course of 02 credits namely Bharat Knowledge System in Ph.D. program.

While reconsidering the decision of 58th Senate meeting held on 13.02.2026 and 26.02.2026 vide agenda item no. S 58.31 regarding proposal to introduce Non-Conventional Institute Core (NCIC) course of 02 credits namely Bharat Knowledge System in Ph.D. program, the SCSA was of unanimous opinion that contents of Bharat Knowledge System may be added to the already existing course of Research & Publication Ethics (2 credits) which is mandatory for all research scholars. Accordingly, there is no need to introduce new non-conventional institute core course of 02 credits namely Bharat Knowledge System in Ph.D. program. The minimum total credits to be earned by Ph.D. research scholars for Ph.D. course work will remain same i.e. 15 credits.

Further, it was decided to rename the nomenclature of course on "Research & Publication Ethics' as "Research Ethics & Bharat Knowledge System' and the same will be placed in forthcoming Senate meeting for consideration.

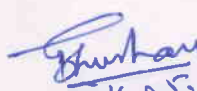
Any other item:

The SCSA reconsidered the decision taken in 68th meeting held on 19.12.2024 vide agenda item no. SCSA 68.04, duly noted by the Senate in 55th meeting held on 09.04.2025 vide agenda item no. S 55.02 regarding removal of 20 minutes breaks from the Institute's time table and to arrange classes of one hour each.

After detailed deliberations, the SCSA unanimously decided to adopt previous schedule of classes duration and interval. Accordingly,

- (i) Each class will be of 55 minutes' duration.
- (ii) The classes will commence from 8.30 a.m. onwards.
- (iii) There will be two tea breaks of 20 minutes each as per past practice.
- (iv) Lunch break for students will be 5th or 6th period.

The meeting ended with vote of thanks.


11.05.2026
Dean (Academic)


11.05.2026
Chairman, SCSA and
Director, NIT Kurukshetra


11.05.2026
Registrar I/C and
Secretary, SCSA
NIT Kurukshetra

S 59.03 To note action taken report on the minutes of 58th Senate meeting held on 13.02.2026 & 26.02.2026.

The action taken on the minutes of 58th Senate meeting held on 13.02.2026 & 26.02.2026 is as under: -

Action Taken Report on the minutes of 58th Senate meeting held on 13.02.2026 & 26.02.2026

Item No.	Agenda Item	Minutes of the Item	Action
S 58.01	To confirm the minutes of 57 th Senate meeting held on 27.10.2025.	The Senate confirmed the minutes of 57 th Senate meeting held on 27.10.2025.	The Senate confirmed the minutes.
S 58.02	To note the minutes of 70 th SCSA meeting held on 05.01.2026.	The Senate noted the minutes of 70 th SCSA meeting held on 05.01.2026.	The Senate noted the minutes.
S 58.03	To note action taken report on the minutes of 57 th Senate meeting held on 27.10.2025.	The Senate noted the action taken report on the minutes of 57 th Senate meeting held on 27.10.2025.	The Senate noted the action taken report.
S 58.04	To ratify the approval of the Chairman, Senate for the following: (i)Inclusion of names in the list of students to be awarded degrees in 20th Convocation. (ii)Attendance relaxation to Ms. Yashika, B.Tech. student of Elect. Engg. and Mr. Ankit Kumar, M.Tech. student of Civil Engg. as special cases. (iii)Provision of two subjects through NPTEL during internship for 8th semester students (CSE & IT).	(i)The Senate ratified the approval of the Chairman, Senate for inclusion of names in the list of students to be awarded degrees in 20th Convocation. (ii)The Senate ratified the approval of the Chairman, Senate for Attendance relaxation to Ms. Yashika, B.Tech. student of Elect. Engg. and Mr. Ankit Kumar, M.Tech. student of Civil Engg. as special cases. (iii)The Senate ratified the approval of the Chairman, Senate for Provision of two subjects through NPTEL during internship for 8th semester students (CSE & IT).	Action has been taken.
S 58.05	To consider and approve the minor modification in scheme & syllabus of B.Arch. 1 st and 2 nd year.	The Senate considered and approved the minor modification in scheme & syllabus of B.Arch. 1 st and 2 nd year.	Action has been taken. A letter no. Acad./2026/398 dt.13.3.26 has been sent to the department.
S 58.06	To consider and approve the scheme and syllabus of M.Plan (Urban and Regional Planning) degree programme.	The Senate considered and approved the scheme and syllabus of M.Plan (Urban and Regional Planning) degree programme with 20 (regular) + 05 (sponsored) seats from academic year 2026-27.	As this agenda item was not approved by the BoG, therefore, as per approval of the Competent Authority, this proposal has been put in abeyance.

S 58.07	To consider and approve the 3rd & 4th year scheme & syllabus of the following four B.Tech. programmes started in AY 2024-25: (i) Robotics & Automation (ii) Sustainable Energy Technologies (iii) Microelectronics and VLSI Engg. (iv) Artificial Intelligence and Data Science	After long deliberations, the Senate considered and approved the scheme and syllabus of the following four B.Tech. programmes upto 3rd year i.e. 5th & 6th semester: (i) Robotics & Automation (ii) Sustainable Energy Technologies (iii) Microelectronics and VLSI Engg. (iv) Artificial Intelligence and Data Science The scheme and syllabus of final year may be revisited after the decision of the Committee which will be constituted to look after the scheme and syllabus of all programmes looking into the internship prospective of the students during final year.	Action has been taken. A letter no. Acad./2026/397 dt.13.3.26 has been sent to the departments. To revisit the scheme and syllabus of final year, the following committee was constituted: 1. Dean (R&C) 2. HoD, Computer Engg. 3. HoD, Elect. Engg. 4. HoD, RIE 5. Prof. Ashwani Jain, Civil Engg. The report of the committee has been received and is being placed as separate agenda item S 59.09
S 58.08	To consider the proposal of Department of Robotics & Industrial Engg. to start following UG & PG programmes alongwith scheme & syllabus from AY 2026-27. (i) B.Tech. in Production & Industrial Systems Engineering (ii) B.Tech. in Robotics & Artificial Intelligence (iii) M.Tech. in Robotics and Artificial Intelligence (iv) M.Tech. in Industrial Engg. and Data Analytics	(i) After long deliberations, the Senate did not agree to change the name of the program B.Tech. in Production & Industrial Systems Engineering and decided that the name of B.Tech. course will remain same i.e. B.Tech. in Production & Industrial Engineering. (ii) After long discussions, the Senate approved the first year scheme of B.Tech. in Robotics & Artificial Intelligence which is common to all B.Tech. programmes. However, the remaining 2nd, 3rd & 4th year scheme and syllabus of B.Tech. in Robotics & Artificial Intelligence may be revisited. (iii) After detailed discussions, the Senate approved the proposal to start M.Tech. in Robotics & Artificial Intelligence with 10 regular seats and 5 self-finance seats. However, the following observations were made by the Senators: a. Template should be followed. b. Codes should be uniform. (iv) The Senate approved the proposal to start M.Tech. in Industrial Engg. and Data Analytics with 10 regular seats and 5 self-finance seats with same guidelines as in the case of M.Tech. in Robotics & Artificial Intelligence. The HoD, Robotics & Industrial Engineering was asked to revise this agenda item after incorporating	This agenda item, after minor revision, as suggested by senators was again placed before the Senate in 2nd part of the meeting held on 26.02.2026. as agenda item no. ST 58.01. Action was taken on agenda item no ST 58.01. A letter no. Acad./2026/388 dt.13.3.26 was sent to the concerned department. However, the agenda item no ST 58.01 (ii & iii) could not be placed before the Board of Governors due to unavoidable administrative reasons, so these agenda items have been put in abeyance.

		suggestions of the Senators in the scheme & syllabi of PG programmes to be discussed in next Senate meeting.	
S 58.09	To consider the requests of Mr. Shivam, Sr. Technician, Computer Engg. Deptt. and Mr. Omendra Pal Singh, Sr. Technician, Civil Engg. Deptt. for pursuing Ph.D. as part-time candidate at NIT Kurukshetra.	The Senate considered the requests of Mr. Shivam, Sr. Technician, Computer Engg. Deptt. and Mr. Omendra Pal Singh, Sr. Technician, Civil Engg. Deptt. for pursuing Ph.D. as part-time candidate at NIT Kurukshetra and approved to allow them as part-time candidates. It was decided that the classes to complete mandatory course work for such candidates will be held in ninth hour i.e. after the duty or working hours. Accordingly, the modification will be incorporated in Ph.D. regulations.	Action has been taken. In this regard, a letter no. Acad./2026/396 dt. 13.3.26 has been sent to concerned departments.
S 58.10	To review the admission status of Ph.D. programmes in December 2025	While discussing the possibilities to increase admission in Ph.D. programmes, the following decisions were taken by the Senators: (i)The eligibility criteria for admission to Ph.D. programme may be 55% marks having Master Degree instead of 60% marks and 75% marks having Bachelor Degree instead of 80% marks. The same relaxation will be applicable to the candidates under reserved category. (ii)If students are available, then interdisciplinary programmes may be offered. (iii)Classes for mandatory course work for part time students will be conducted in ninth period/after duty timings. (iv)Advertisement for admission in Ph.D. programmes will be published in time. (v)Beyond 8 Ph.D. slot, it will be compulsory to have joint supervision from other department subject to maximum 12 Ph.D. slots. (vi)The Chairman, DRC will ensure allotment of eligible candidate to the supervisor by whom reference he/she appeared in the admission process of Ph.D. program. (vii)The Senate did not agree upon the Integrated programme- M.Tech./Ph.D. or M.Sc./Ph.D. (viii)The Senate agreed to continue Institute fellowship upto 5 years or upto viva exam. whichever is earlier in line with other fellowship offered by	Action has been taken. In this regard, a notification no. Acad./2026/395 dt. 13.3.26 has been issued.

		UGC/CSIR etc. During this period, the scholars will share teaching load upto 8 hrs.	
S 58.11	To consider the proposal of continuation of M.Tech. stipend from the first date of upcoming month after declaring the result of special examinations.	The Senate considered and approved the proposal of continuation of M.Tech. stipend from the first date of upcoming month after declaring the result of special examinations.	Action has been taken. In this regard, a letter no. Acad./2026/387 dt. 13.3.26 has been issued.
S 58.12	To consider the proposal to conduct odd and even semester examination simultaneously.	After long deliberations, the Senate did not agree upon this proposal to conduct odd and even semester examination simultaneously. However, it was decided that special reappear examination for B.Tech. students will be conducted also after declaration of 6 th semester result. Only those students will be allowed for special examinations who are having not more than five reappears in previous semesters. Internal reappear and external reappear in any course will be considered as one reappear only.	Action has been taken. In this regard, a letter no. Acad./2026/386 dt. 13.3.26 has been issued.
S 58.13	To consider and decide the issue of fee of SII students.	The Senate did not consider this proposal and deferred this agenda item. The Senators were of the opinion that this agenda item is not under the purview of the Senate. It is a matter of Finance and should be taken over as agenda item to the Finance Committee, if required.	Action has been taken. In this regard, a letter no. Acad./2026/385 dt. 13.3.26 has been issued.
S 58.14	To consider and approve the syllabus of a course 'Principles of Management' for B.Tech. 6 th semester in Humanities & Social Sciences Deptt.	The Senate considered and approved the syllabus of a course 'Principles of Management' for B.Tech. 6 th semester in Humanities & Social Sciences Deptt.	Action has been taken. In this regard, a letter no. Acad./2026/384 dt. 13.3.26 has been issued.
S 58.15	To consider and approve the minor changes in the syllabi of M.Sc. Physics.	The Senate considered and approved the minor changes in the syllabi of M.Sc. Physics.	Action has been taken. In this regard, a letter no. Acad./2026/394 dt. 13.3.26 has been issued.
S 58.16	To consider and approve the scheme of following programs of Computer Engg. Deptt.: (i) B.Tech. AI & ML (7 th & 8 th semester) (ii) B.Tech. CSE (8 th semester) (iii) B.Tech. IT (8 th semester) (iv) NPTEL courses' list for B.Tech. CSE & IT (8 th semester) (v) Minor adjustment in credit for Project-I in B.Tech. AI&ML (6 th sem.)	The Senate considered the proposal of Computer Engg. Deptt. and approved NPTEL courses' list and minor adjustment in credit for Project-I I B.Tech. AI & ML (6 th sem.) The scheme and syllabus of final year may be revisited after the decision of the Committee which will be constituted to look after the scheme and syllabus of all programmes looking into the internship prospective of the students during final year. Further, the Senate approved the NPTEL courses' list for	Action has been taken. A letter no. Acad./2026/393 dt.13.3.26 has been sent to the department. To revisit the scheme and syllabus of final year, the following committee was constituted: 1. Dean (R&C) 2. HoD, Computer Engg. 3. HoD, Elect. Engg. 4. HoD, RIE

		B.Tech. CSE & IT and minor adjustment in credit for Project-I in B.Tech. AI & ML (6th sem.).	5.Prof. Ashwani Jain, Civil Engg. The report of the committee has been received and is being placed as separate agenda item S 59.09
S 58.17	To consider and approve the list of NPTEL courses for B.Tech. ECE 8 th semester.	The Senate considered and approved the list of NPTEL courses for B.Tech. ECE 8 th semester.	Action was taken. A letter no. Acad./2026/392 dt. 13.3.26 has been issued.
S 58.18	To consider the proposal to start Generic M.Tech. program in Civil Engg.	The Senate considered and approved the proposal to start Generic M.Tech. program in Civil Engg. with intake of 30 regular seats and 15 self finance seats.	As this agenda item was not approved by the BoG, therefore, as per approval of the Competent Authority, this proposal has been put in abeyance.
S 58.19	To consider the proposal to start Generic M.Tech. in Mechanical Engineering.	The Senate considered and approved the proposal to start Generic M.Tech. program in Mechanical Engg. with intake of 10 regular seats and 05 self finance seats.	As this agenda item was not approved by the BoG, therefore, as per approval of the Competent Authority, this proposal has been put in abeyance
S 58.20	To consider and approve the change in the course code offered in 2 nd semester in Mathematics & Computing Department.	The Senate considered and approved the change in the course code offered in 2 nd semester in Mathematics & Computing Department.	Action was taken. In this regard, a letter no. Acad./2026/389 dt. 13.3.26 has been sent to the concerned department.
S 58.21	To discuss the status of all scholarships sponsored by Alumni.	After detailed discussions, the Senate decided to continue the following scholarship sponsored by Alumni for which the corpus is with the Institute: (i)Shyam Sunder Dhingra Award (ii)Manohar award of Excellence (iii)RECK-66 Other Alumni Scholarships approved by the Senate in previous meetings will be discontinued henceforth. Further, the alumni sponsorship for Best All Round – Male, Female & PwD will be withdrawn. Only medal and certificate will be awarded by the Institute to the Best All Round students in Male, Female & PwD category.	In this regard, a letter no. Acad./2026/383 dt. 13.3.26 has been sent to the all concerned. <i>Subsequently, the BoG in its 79th meeting held on 21.5.2026 vide agenda item no. BoG 79.17 considered the decision of this agenda item and resolved that the ongoing scholarships sponsored by NIT Kurukshetra Alumni Association be continued in the interest of the students. The Board emphasized the need of more scholarships for the students, and advised to explore scholarships from industry, and other organizations.</i>

S 58.22	To consider minor change regarding security refund in fee structure.	After deliberations, the Senate decided that an amount of Rs. 2000/- will be non-refundable out of security deposit and it will be considered for consumables, breakage etc. The remaining security deposit in the fee structure will be refundable. The amount of Rs. 2000/- will be marked as 'Other Equipment Maintenance Charges'. This amount will also be revised yearly along with the other charges of the fee as per approval of the FC/BOG. The Senate recommended to place this proposal in the next FC meeting as agenda item. The Senate confirmed the minutes during the meeting itself.	Action was taken. In this regard, a letter no. Acad./2026/382 dt. 13.3.26 has been sent to the all concerned.
S 58.23	To consider the proposal of Electrical Engg. Deptt. to start two new following M.Tech. programs: 1)System Automation and Machine Intelligence 2)Smart Grid & Vehicular Technology	The HoD, Electrical Engg. Deptt. through DAC minutes, conveyed the Senate to withdraw this agenda item and the Senate decided that the existing M.Tech. programs in Electrical Engg. Deptt. will continue this academic year. The intake will be 10 (regular) + 05 (self-financed) seats for each M.Tech. program.	No action is required.
S 58.24	To consider the report of the Committee constituted to look into academic support framework for students with learning disabilities (LD).	After long deliberations, the Senate considered and approved the report of the Committee constituted to look into academic support framework for students with learning disabilities (LD). However, the Chairman, Senate had already approved the guidelines framed for students with learning disabilities in anticipation approval of the Senate which is also placed for ratification as separate table agenda item no. S 58.32.	Action was taken. In this regard, a letter no. Acad./2026/377 dt. 13.3.26 has been issued.
S 58.25	To consider the report of the Committee constituted to look into the matter of availing the flexibility of extra course credits by the students.	The Senate considered and approved the report of the Committee constituted to look into the matter of availing the flexibility of extra course credits by the students.	Action has been taken. In this regard, a notification no. Acad./2026/616 dt. 15.4.2026 has been issued.
S 58.26	To consider the proposal regarding leave of Ph.D. research scholars.	After long deliberations, the Senate considered and approved the proposal regarding leave of Ph.D. research scholars. The medical leave will be 16 days and 05 days leave will be non-medical in a year which can be availed by the research scholar for any purpose other than medical. Other leave rules will remain same.	Action was taken. In this regard, a letter no. Acad./2026/381 dt. 13.3.26 has been issued.
S 58.27	To discuss the proposal for collaborative Ph.D. degree between NIT Kurukshetra and IIT Indore.	The Senate considered and approved the proposal in principle for collaborative Ph.D. degree between NIT Kurukshetra and IIT Indore. The Senate decided that	In this regard, a letter no. Acad./2026/380 dt. 13.3.26 has been sent to the all concerned.

		such scholars must follow the admission process of the Ph.D. in the Institute before registration in the Ph.D. programme. The Dean (R&C) will look into this proposal and take necessary follow up steps.	The response from dean (R & C) office regarding the same is awaited.
S 58.28	To consider and discuss a proposal for three months' internship for B.Tech. students.	The Senate considered and approved the proposal for three months' internship for B.Tech. students.	Accordingly the students were permitted for three months internship.
S 58.29	To consider the proposal to start minor degree courses from 3 rd semester.	The Senate considered and approved the proposal to start minor degree courses from 3 rd semester.	Action was taken. In this regard, a letter no. Acad./2026/379 dt. 13.3.26 has been issued.
S 58.30	To consider the proposal to transfer the labs and office space.	After detailed deliberations, the Senate considered and approved the proposal to transfer the labs and office space of all other cases except ECE/VLSI. The same will be decided after due deliberations.	Action was taken. In this regard, a letter no. Acad./2026/378 dt. 13.3.26 has been sent to concerned departments.
S 58.31	To consider the proposal to introduce Non-Conventional Institute Core (NCIC) course of 02 credits namely Bharat Knowledge System in Ph.D. program.	The Senate considered and approved to introduce new course of 2 credits namely Bharat Knowledge System in Ph.D. program. This will be additional Institute core course to be studied by the Ph.D. research scholars along with the other compulsory courses such as Research Methodology etc.	This agenda item was reconsidered by SCSA in its 71 st meeting held on 11.05.2026 vide agenda item no. SCSA 71.02. It is being taken as agenda item no. S 59.06
S 58.32	To ratify the approval of the Chairman, Senate regarding guidelines for the student admitted in academic session 2024-25 under the PwD, with specific learning disability (SLD) i.e. Dyslexia and Dyscalculia.	The Senate ratified the approval of the Chairman, Senate regarding guidelines for the student admitted in academic session 2024-25 under the PwD, with specific learning disability (SLD) i.e. Dyslexia and Dyscalculia.	Action was taken. In this regard, a letter no. Acad./2026/377 dt. 13.3.26 has been issued.
ST 58.01	To consider the proposal of department of Robotics & Industrial Engg. for the following courses: (i) B.Tech. in Production & Industrial Engineering (PIE) (1st to 6th Sem.) (ii) B.Tech. in Robotics & Artificial Intelligence (R&AI) (1st & 2nd Sem.) (iii) M.Tech. in Robotics & Industrial Engineering with the following specializations: a) Industrial Engineering & Data Analytics (IEDA) (1st to 4th Sem. Scheme & Syllabus) b) Robotics & Artificial Intelligence (R&AI) (1st to 4th Sem. Scheme & Syllabus of 1st Sem.) (iv) B.Tech. Robotics & Automation scheme & syllabus for 5th & 6th Semester.	The HoD, Robotics & Industrial Engg. informed that the name of B.Tech. in Production & Industrial Engg. will remain same as per suggestions of the Senate in last meeting held on 13.02.2026 (part-I). He as well as special invitees also ensured that the scheme & syllabi of UG and PG programs of Robotics & Industrial Engg. Deptt. is designed on the inputs of industry experts. After detailed deliberations in the Senate, it was resolved: (i) The Senate approved the scheme and syllabus of B.Tech. in Production & Industrial Engg. (PIE) (1st to 6th sem.). (ii) The Senate approved the scheme and syllabus of B.Tech. in Robotics & Artificial Intelligence (R&AI) 1st & 2nd sem. It will replace the B.Tech. in Robotics & Automation.	Action was taken. A letter no. Acad./2026/388 dt. 13.3.26 was sent to the concerned department. However, the agenda item no ST 58.01 (ii & iii) could not be placed before the Board of Governors due to unavoidable administrative reasons, so these agenda items have been put in abeyance.

		(iii)The Senate considered the proposal and approved the M.Tech. in Robotics & Industrial Engg. as a generic M.Tech. program with following specializations with minor modifications: a) Industrial Engineering & Data Analytics (IEDA) (1st to 4th Sem. Scheme & Syllabus) b) Robotics & Artificial intelligence (R&AI) (1st to 4th Sem. Scheme & Syllabus of 1st Sem.). The intake of M.Tech. program will be 20 (regular) + 10 (self-financed) seats.	
ST 58.02	To consider the proposal for establishment of four (04) scholarships in the name of "Pramod-Shanti Merit-cum-Means Scholarship".	The Senate did not agree upon the proposal for establishment of four (04) scholarships in the name of "Pramod-Shanti Merit-cum-Means Scholarship".	No action is required.

The Senate may note the action taken report.

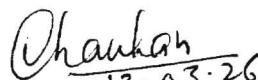
NATIONAL INSTITUTE OF TECHNOLOGY
KURUKSHETRA

No. Acad./2026/ 398

Dated: 13/03/2026

The Senate in its 58th meeting held on 13.2.2026 (Part-I) vide agenda item no. S 58.05 approved the minor modification in the scheme & syllabus of B.Arch. 1st and 2nd year. Further, vide agenda item no. S 58.06, the Senate approved the scheme and syllabus of M. Plan (Urban and Regional Planning) degree programme with 20 (regular) + 05 (sponsored) seats from academic year 2026-27.

This is for kind information and further necessary action.


13.03.26
Dean (Academic)

HoD, Arch. & Planning

Copy to:

1. Jr.Asstt. to Director for kind information of the Director.
2. Sr. Asstt. to Registrar for kind information of the Registrar.
3. Dy. Registrar (Acad.)
4. Faculty I/C (Exam.)

**NATIONAL INSTITUTE OF TECHNOLOGY
KURUKSHETRA**

No. Acad./2026/847

Dated: 19.5.2026

This is in continuation to this office letter no. Acad./2026/398 dated 13.3.2026 vide which the approval of the Senate in its 58th meeting held on 13.2.2026 (Part-I) vide agenda item no. S 58.06 regarding the scheme and syllabus of M. Plan (Urban and Regional Planning) degree programme with 20 (regular) + 05 (sponsored) seats from academic year 2026-27 was conveyed.

This agenda item could not be placed before the Board of Governors due to the unavoidable administrative reasons. The nomenclature and seat matrix of all PG programs were to be sent to CCMT/CCMN 2026 urgently and time bound, therefore, with the approval of the Competent Authority, this agenda item was put in abeyance.

This is for kind information and further necessary action.



Dean (Academic)

HoD, Arch.& Planning

**NATIONAL INSTITUTE OF TECHNOLOGY
KURUKSHETRA**

No. Acad./2026/397

Dated: 13/03/2026

The Senate in its 58th meeting held on 13.2.2026 (Part-I) vide agenda item no. S 58.07 approved the scheme and syllabus of the following four B.Tech. programmes upto 3rd year i.e. 5th & 6th semester:

- (i) Robotics & Automation
- (ii) Sustainable Energy Technologies
- (iii) Microelectronics and VLSI Engg.
- (iv) Artificial Intelligence and Data Science

However, the scheme and syllabus of final year will be revisited after the decision of the Committee which will be constituted to look after the scheme and syllabus of all programmes looking into the internship prospective of the students during final year.

This is for kind information and further necessary action.


13.03.26
Dean (Academic)

HoDs -

- (i) Robotics & Industrial Engg.
- (ii) Energy Science & Engg.
- (iii) VLSI Design & Systems Engg.
- (iv) Data Science & Artificial Intelligence

Copy to:

1. Jr.Asstt. to Director for kind information of the Director.
2. Sr. Asstt. to Registrar for kind information of the Registrar.
3. Dy. Registrar (Acad.)
4. Faculty I/C (Exam.)

**NATIONAL INSTITUTE OF TECHNOLOGY
KURUKSHETRA**

No. Acad./2026/ 388

Dated: 13/3/2026

The Senate in its 58th meeting held on 26.2.2026 (part-II) vide agenda item no. ST 58.01, keeping in view the suggestions of the Senators taken in last meeting on 13.2.2026 (part-I) in agenda item no. S 58.08, approved as under from the academic year 2026-27:

- (i) The scheme and syllabus of B.Tech. in Production & Industrial Engg. (PIE) (1st to 6th sem.).
- (ii) The scheme and syllabus of B.Tech. in Robotics & Artificial Intelligence (R&AI) 1st & 2nd sem. It will replace the B.Tech. in Robotics & Automation.
- (iii) M.Tech. in Robotics & Industrial Engg. as a generic M.Tech. program with following specializations with minor modifications:
 - a) Industrial Engineering & Data Analytics (IEDA) (1st to 4th Sem. Scheme & Syllabus)
 - b) Robotics & Artificial intelligence (R&AI) (1st to 4th Sem. Scheme & Syllabus of 1st Sem.).

The intake of M.Tech. program will be 20 (regular) + 10 (self-financed) seats.

This is for kind information and further necessary action.


13.03.26
Dean (Academic)

HoD, Robotics & Industrial Engg.

Copy to:

- 1. Jr. Asstt. to Director for kind information of the Director.
- 2. Sr. Asstt. to Registrar for kind information of the Registrar.
- 3. Dy. Registrar (Acad.)
- 4. Faculty I/C (Exam.)
- 5. Faculty I/C (PG)
- 6. Faculty I/C (UG)

NATIONAL INSTITUTE OF TECHNOLOGY
KURUKSHETRA

No. Acad./2026/680

Dated: 27.4.2026

The change of name of "B.Tech. in Robotics & Automation" as "B.Tech. in Robotics & Artificial Intelligence" approved by the Senate in its 58th meeting held on 13.2.2026 and 26.2.2026 cannot not be implemented from this academic year 2026-27 as this agenda item has not been approved by the Board of Governors.

Therefore, it has been decided that the nomenclature of B.Tech. in Robotics & Automation will not change. It will remain same.

This issues with the approval of the Competent Authority.

This is for your kind information and further necessary action.


27.04.2026
Dean (Academic)

HoD, RIE

**NATIONAL INSTITUTE OF TECHNOLOGY
KURUKSHETRA**

No. Acad./2026/671

Dated: 24.4.2026

The Competent Authority has approved that some new PG programs and redistribution of seats approved by the Senate in its 58th meeting held on 13.2.2026 and 26.2.2026 could not be implemented from this academic year 2026-27 as these PG programs have not been approved by the Board of Governors.

The admission process of M.Tech. programs have been started through CCMT/CCMN 2026. Therefore, it has been decided that the nomenclature and seat matrix of all PG programs in Engineering will remain same according to previous year (2025).

In view of above, you are requested to revise the qualifying degree and GATE mapping, if required. If the same is revised, the revised qualifying degree and GATE mapping should be sent to this office by 2.00 pm on 27.4.2026 positively. If no revised list is received by this office, then the qualifying degree and GATE mapping of previous year will be considered for this year also.

This is for your kind information and further necessary action.


24/4/26
Dean (Academic)

All HoDs (Engg.)

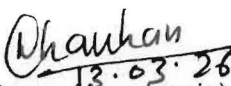
**NATIONAL INSTITUTE OF TECHNOLOGY
KURUKSHETRA**

No. Acad./2026/396

Dated: 13/03/2026

The Senate in its 58th meeting held on 13.2.2026 (Part-I) vide agenda item no. S 58.09 decided to allow Mr. Shivam, Sr. Technician, Computer Engg. Deptt. and Mr. Omendra Pal Singh, Sr. Technician, Civil Engg. Deptt. for pursuing Ph.D. as part-time candidate at NIT Kurukshetra. It was also decided that the classes to complete mandatory course work for such candidates will be held in ninth hour i.e. after the duty or working hours. This modification will be incorporated in Ph.D. regulations.

This is for kind information and further necessary action.


13.03.26
Dean (Academic)

HoDs – (i) Computer Engg.
(ii) Civil Engg.

Copy to:

1. Jr.Asstt. to Director for kind information of the Director.
2. Sr. Asstt. to Registrar for kind information of the Registrar.
3. Faculty I/C (Ph.D.) with a request to incorporate modification in the Ph.D. regulations.
4. JR (GA & L)
5. Dy. Registrar (Acad.)
6. Prof. I/C (Time table)

**NATIONAL INSTITUTE OF TECHNOLOGY
KURUKSHETRA**

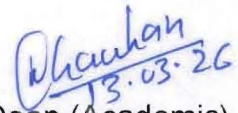
No. Acad./2026/395

Dated: 13/03/26

The Senate in its 58th meeting held on 13.2.2026 (Part-I) vide agenda item no. S 58.10, while discussing the possibilities to increase admission in Ph.D. programmes, decided as under:

- (i) The eligibility criteria for admission to Ph.D. programme will be 55% marks having Master Degree instead of 60% marks and 75% marks having Bachelor Degree instead of 80% marks. The same relaxation will be applicable to the candidates under reserved category.
- (ii) If students are available, then interdisciplinary programmes will be offered.
- (iii) Classes for mandatory course work for part time students will be conducted in ninth period/after duty timings.
- (iv) Beyond 8 Ph.D. slot, it will be compulsory to have joint supervision from other department subject to maximum 12 Ph.D. slots.
- (v) The Chairman, DRC will ensure allotment of eligible candidate to the supervisor by whom reference he/she appeared in the admission process of Ph.D. program.
- (vi) The Institute fellowship will continue upto 5 years or upto viva exam. whichever is earlier in line with other fellowship offered by UGC/CSIR etc. During this period, the scholars will share teaching load upto 8 hrs.

This is for kind information and further necessary action.


Dean (Academic)

All HoDs/Chairman, DRC (all departments)

Copy to:

1. Jr.Asstt. to Director for kind information of the Director.
2. Sr. Asstt. to Registrar for kind information of the Registrar.
3. Faculty I/C (Ph.D.) with a request to incorporate modification in the Ph.D. regulations.
4. Dy. Registrar (Acad.)

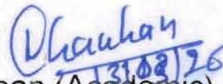
**NATIONAL INSTITUTE OF TECHNOLOGY
KURUKSHETRA**

No. Acad./2026/ 387

Dated: 13/03/2026

The Senate in its 58th meeting held on 26.2.2026 (part-II) vide agenda item no. S 58.11 approved the proposal of continuation of M.Tech. stipend from the first date of upcoming month after declaring the result of special examinations.

This is for kind information and further necessary action.


Dean (Academic)

All HoDs

Copy to:

1. Jr. Asstt. to Director for kind information of the Director.
2. Sr. Asstt. to Registrar for kind information of the Registrar.
3. Dy. Registrar (Acad.)
4. Faculty I/C (Exam.)
5. Faculty I/C (PG) with a request to incorporate changes in the PG regulations.
6. Faculty I/C (Accounts)

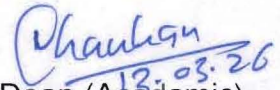
**NATIONAL INSTITUTE OF TECHNOLOGY
KURUKSHETRA**

No. Acad./2026/ 386

Dated: 13/03/2026

The Senate in its 58th meeting held on 26.2.2026 (part-II) vide agenda item no. S 58.12 did not agree upon the proposal to conduct odd and even semester examinations simultaneous for the B.Tech. 2023 batch onwards and decided that special reappear examination for all B.Tech. students will be conducted also after declaration of 6th semester result. Only those students will be allowed for special examinations who are having not more than five reappears in previous semesters. Internal reappear and external reappear in any course will be considered as one reappear only.

This is for kind information and further necessary action.


Dean (Academic)

All HoDs

Copy to:

1. Jr. Asstt. to Director for kind information of the Director.
2. Sr. Asstt. to Registrar for kind information of the Registrar.
3. Dy. Registrar (Acad.)
4. Faculty I/C (Exam.)
5. Faculty I/C (UG) with a request to incorporate changes in the UG regulations.

**NATIONAL INSTITUTE OF TECHNOLOGY
KURUKSHETRA**

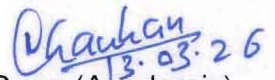
No. Acad./2026/ 385

Dated: 13/03/2026

The Senate in its 58th meeting held on 26.2.2026 (part-II) vide agenda item no. S 58.13 did not consider the proposal for issue of fees of SII students. The Senators were of the opinion that this agenda item is not under the purview of the Senate. It is a matter of Finance and should be taken over as agenda item to the Finance Committee, if required.

In view of above, the matter may be placed in the upcoming Finance Committee meeting.

This is for information and further necessary action.


Dean (Academic)

Dy. Registrar (Acad.)

Copy to:

1. Jr. Asstt. to Director for kind information of the Director.
2. Sr. Asstt. to Registrar for kind information of the Registrar.

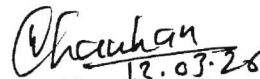
**NATIONAL INSTITUTE OF TECHNOLOGY
KURUKSHETRA**

No. Acad./2026/384

Dated: 13/03/2026

The Senate in its 58th meeting held on 26.2.2026 (part-II) vide agenda item no. S 58.14 approved the syllabus of a course 'Principles of Management' for B.Tech. 6th semester in Humanities & Social Sciences Deptt.

This is for kind information and further necessary action.


13.03.26
Dean (Academic)

HoD, Humanities & Social Sciences & Computer Engg.

Copy to:

1. Jr. Asstt. to Director for kind information of the Director.
2. Sr. Asstt. to Registrar for kind information of the Registrar.
3. Faculty I/C (Exam.)
4. Dy. Registrar (Acad.)

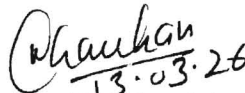
**NATIONAL INSTITUTE OF TECHNOLOGY
KURUKSHETRA**

No. Acad./2026/394

Dated: 13/03/26

The Senate in its 58th meeting held on 13.2.2026 (Part-I) vide agenda item no. S 58.15 approved the minor changes in the syllabi of M.Sc. Physics.

This is for kind information and further necessary action.


13.03.26
Dean (Academic)

HoD, Physics

Copy to:

1. Jr.Asstt. to Director for kind information of the Director.
2. Sr. Asstt. to Registrar for kind information of the Registrar.
3. Faculty I/C (Exam.)
4. Dy. Registrar (Acad.)

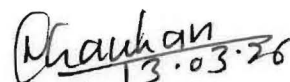
**NATIONAL INSTITUTE OF TECHNOLOGY
KURUKSHETRA**

No. Acad./2026/393

Dated: 13/03/2026

The Senate in its 58th meeting held on 13.2.2026 (Part-I) vide agenda item no. S 58.16 approved the NPTEL courses' list for B.Tech. CSE & IT and minor adjustment in credit for Project-I in B.Tech. AI & ML (6th sem.). However, the scheme and syllabus of final year will be revisited after the decision of the Committee which will be constituted to look after the scheme and syllabus of all programmes looking into the internship prospective of the students during final year.

This is for kind information and further necessary action.


13.03.26
Dean (Academic)

HoD, Computer Engg.

Copy to:

1. Jr. Asstt. to Director for kind information of the Director.
2. Sr. Asstt. to Registrar for kind information of the Registrar.

**NATIONAL INSTITUTE OF TECHNOLOGY
KURUKSHETRA**

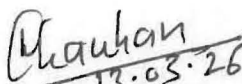
No. Acad./2026/ 392

Dated: 13/3/2026

The Senate in its 58th meeting held on 13.2.2026 (Part-I) vide agenda item no. S 58.17 approved the NPTEL courses' list for B.Tech. ECE 8th semester.

Further, the Senate vide agenda item no. S 58.28 approved the proposal for three months' internship for B.Tech. students. The students who will get three months' internship through T & P Cell will be allowed for internship upto 28th Feb. 2026. Such students are required to study courses of 8th semester in self-study mode and the evaluation of these courses will be done as per last year pattern.

This is for kind information and further necessary action.


13.03.26
Dean (Academic)

HoD, Electronics & Comm. Engg.

Copy to:

1. Jr. Asstt. to Director for kind information of the Director.
2. Sr. Asstt. to Registrar for kind information of the Registrar.
3. Dy. Registrar (Acad.)
4. Faculty I/C (Exam.)
5. Faculty I/C (T&P)

**NATIONAL INSTITUTE OF TECHNOLOGY
KURUKSHETRA**

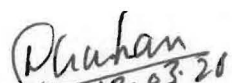
No. Acad./2026/389

Dated: 13/03/2026

The Senate in its 58th meeting held on 13.2.2026 (Part-I) vide agenda item no. S 58.20 approved the following change in the course code offered in 2nd semester in Mathematics & Computing Department from academic year 2026-27:

Existing course code	Proposed course code
CSIC-104– Programming using Python	MAIC-104 – Programming using Python

This is for kind information and further necessary action.


13.03.26
Dean (Academic)

HoD, Mathematics & Computing

Copy to:

1. Jr. Asstt. to Director for kind information of the Director.
2. Sr. Asstt. to Registrar for kind information of the Registrar.
3. Faculty I/C (Exam.)
4. Dy. Registrar (Acad.)

**NATIONAL INSTITUTE OF TECHNOLOGY
KURUKSHETRA**

No. Acad./2026/383

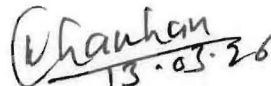
Dated: 13/03/2026

The Senate in its 58th meeting held on 26.2.2026 (part-II) vide agenda item no. S 58.21 decided to continue the following three scholarship sponsored by Alumni for which the corpus is with the Institute:

- (i) Shyam Sunder Dhingra Award
- (ii) Manohar award of Excellence
- (iii) RECK-66

Other Alumni Scholarships approved by the Senate in previous meetings will be discontinued henceforth. Further, the alumni sponsorship for Best All Round – Male, Female & PwD will be withdrawn. Only medal and certificate will be awarded by the Institute to the Best All Round students in Male, Female & PwD category.

This is for kind information and further necessary action.


13.03.26
Dean (Academic)

Prof. I/C (Alumni Affairs)

Copy to:

1. Jr. Asstt. to Director for kind information of the Director.
2. Sr. Asstt. to Registrar for kind information of the Registrar.
3. Dean (SW)
4. President, NITKAA
5. Faculty I/C (Accounts)
6. Dy. Registrar (Acad.)

**NATIONAL INSTITUTE OF TECHNOLOGY
KURUKSHETRA – 136 119**

No. NITK/79th BoG /2412

Dated: 03.06.2026

The Board of Governors of the Institute in its 79th meeting held on 21.05.2026 has decided as under:

BoG 79.17 **To consider the abeyance of some decisions taken by the Senate in its 58th Meeting of the Institute held on 13.02.2026 (Part-I) & 26.02.2026 (Part-II).**

Resolution

The Board was apprised that the Senate agenda items S 58.06, S 58.08(ii), S 58.18, S 58.19 and ST 58.01 related to the modified seat matrix for UG and PG programmes could not be placed for approval of the Board timely. In view of the urgency and time-bound submission of seat matrix to the JOSAA 2026 and CCMT/CCMN 2026 admissions, the Senate decision on these items were kept in abeyance, and the already approved seat matrix of the previous year has been sent to the Coordinator of respective agencies for the admissions in the academic year 2026-27.

The Board was also apprised of the Senate decision (S 58.21) to discontinue the ongoing Alumni Sponsored Scholarships (19 nos.) already being approved by the Senate and ratified by the Board in their previous meetings.

The Board considered the Senate decisions vide items No. S 58.06, S 58.08(ii), S 58.18, S 58.19, and ST 58.01 and decided to put the decisions taken against these items in abeyance till further review and consideration by the Senate of the Institute in its next meeting.

The Board considered the Senate decision vide agenda item S 58.21 and resolved that the ongoing scholarships sponsored by NIT Kurukshetra Alumni Association (NITKKRAA) be continued in the interest of the students. The Board emphasized the need of more scholarships for the students, and advised to explore scholarships from industry, and other organizations.

This is for your reference, record and further necessary action.

Encl: Agenda Item


03.06.2026
Registrar Incharge

Dean (Academic)

Copy to: Assistant Registrar (Establishment)

**NATIONAL INSTITUTE OF TECHNOLOGY
KURUKSHETRA**

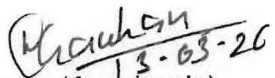
No. Acad./2026/382

Dated: 13/03/2026

The Senate in its 58th meeting held on 26.2.2026 (part-II) vide agenda item no. S 58.22 decided that an amount of Rs. 2000/- will be non-refundable out of security deposit and it will be considered for consumables, breakage etc.. The remaining security deposit in the fee structure will be refundable. The amount of Rs. 2000/- will be marked as 'Other Equipment Maintenance Charges'. This amount will also be revised yearly along with the other charges of the fee as per approval of the FC/BOG.

The Senate recommended to place this proposal in the next FC meeting as agenda item. Therefore, you are requested to place this agenda in the next forthcoming FC meeting.

This is for kind information and further necessary action.


Dean (Academic)

Faculty I/C (Acs.)
Dy. Registrar (Acad.)

Copy to:

1. Jr. Asstt. to Director for kind information of the Director.
2. Sr. Asstt. to Registrar for kind information of the Registrar.
3. All HoDs

**NATIONAL INSTITUTE OF TECHNOLOGY
KURUKSHETRA**

No. Acad./2026/ 377

Dated: 13/03/2026

The Senate in its 58th meeting held on 26.2.2026 (part-II) vide agenda items no. S 58.24 and S 58.32 approved the report of the Committee constituted to look into academic support framework for students with learning disabilities (LD) under the provisions of Rights of Persons with Disabilities (RPwD) Act 2016.

As per the recommendations of the Committee, the HoD, Mech. Engg. will formulate Individual Educational Plan (IEP) for Mr. Vinayak, B.Tech. 2nd year student, Mech. Engg. as per guidelines of RPwD ACT 2016.

1. At the Institute level, all stakeholders (faculty, staff, hostel staff, library staff, etc.) shall be sensitized to specific disabilities, Le. Dyslexia and Dyscalculia, by external experts for implementing appropriate practices.
2. At the concerned department level, authorities such as Head of Department, DAC, etc, must take measures at periodic level to ensure the effective implementation of extended pedagogical facilities for the student.
3. The reasonable accommodation in the pedagogical aspect of teaching-learning to be made considering specific disabilities.
 - The arrangement of teaching assistance of every course (Theory and Lab), in addition to classroom/lab delivery.
 - Additional teaching assistant beyond working hours to strengthen student self-paced learning must be allocated at the department level.
 - Course coordinator to ensure additional material, such as classroom notes, audio material, video lectures, etc. must be provided.
 - Requisite space and facility in concerned Department or Institute must be extended for the additional learning for the requested duration.
4. The guidelines for formation of the question paper (QP) of the courses must accommodate to meet the needs of disabilities.

Questions of simple complexity and questions of average complexity are to be formalized, for example a simple complexity question can include, short brief question, computation, definition based, etc. Average complexity question can include comprehension, small numerical, graphical representations, etc.

In view of above, it is requested to strictly adhere to the above guidelines framed for the student admitted under SLD (PwD) category.

This is for kind information and further necessary action.

Phaulan
13.03.26
Dean (Academic)
H.C.

HoD, Mech. Engg.

Copy to:

1. Jr. Asstt. to Director for kind information of the Director.
2. Sr. Asstt. to Registrar for kind information of the Registrar.
3. DR (Acad)

**NATIONAL INSTITUTE OF TECHNOLOGY
KURUKSHETRA**

No. Acad./2026/ 616

Dated: 15-4-26

The Senate in its 58th meeting held on 26.2.2026 (part-II) vide agenda item no. S 58.25 approved the report of the Committee constituted to look into the matter of availing the flexibility of extra course credits by the students. The recommendations of the Committee are as follows:

1. The students can take the benefit of flexibility in total credit count (160+6) for UG programmes (2022 batch onwards) for the award of degree from B.Tech. 5th semester onwards. This flexibility would be limited to leaving elective courses only of 5th to 8th semesters.
2. The students can take the benefit of flexibility in total credit count (80+3) for PG programmes (2025 batch onwards) for the award of degree from M.Tech./M.Sc. 1st semester onwards. This flexibility would be limited to leaving elective courses only.

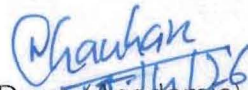
To earn more credits, the students may opt any of the value added courses in any semester from the proposed basket, provided a sufficient number of students opt for a particular course.

Further, the Senate also approved the following suggestions to be incorporated as a part of flexibility of extra course credits for above Batches.

1. Incorporate rules to allow bartering of value added courses with non-core papers of the discipline being studied.
2. Additional 6 credits (value added) if earned, over & above 160 credits will be reflected in the DMCs.
3. These courses being offered should be advertised every semester.
4. Registration process should be adopted at the end of each semester before the commencement of next semester.

The same committee will frame the rules for bartering of value added courses with non-core papers of the discipline being studied.

This is for kind information and further necessary action.


Dean (Academic)

All HoDs

Copy to:

1. Jr. Asstt. to Director for kind information of the Director.
2. Sr. Asstt. to Registrar for kind information of the Registrar.
3. Dy. Registrar (Acad.)
4. Faculty I/C (UG)
5. Faculty I/C (PG)

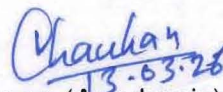
**NATIONAL INSTITUTE OF TECHNOLOGY
KURUKSHETRA**

No. Acad./2026/ 381

Dated: 13/03/2026

The Senate in its 58th meeting held on 26.2.2026 (part-II) vide agenda item no. S 58.26 approved the proposal regarding leave of Ph.D. research scholars. The medical leave of Ph.D. research scholars will be 16 days and 05 days leave will be non-medical in a year which can be availed by the research scholar for any purpose other than medical in the same year. Other leave rules will remain same. This will be incorporated in Ph.D. regulations.

This is for kind information and further necessary action.


13.03.26
Dean (Academic)

All HoDs

Copy to:

1. Jr. Asstt. to Director for kind information of the Director.
2. Sr. Asstt. to Registrar for kind information of the Registrar.
3. Dy. Registrar (Acad.)
4. Faculty I/C (Ph.D.) with a request to incorporate changes in the Ph.D. regulations.

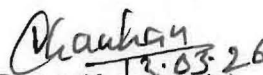
**NATIONAL INSTITUTE OF TECHNOLOGY
KURUKSHETRA**

No. Acad./2026/380

Dated: 13/03/2026

The Senate in its 58th meeting held on 26.2.2026 (part-II) vide agenda item no. S 58.27 approved the proposal in principle for collaborative Ph.D. degree between NIT Kurukshetra and IIT Indore. The Senate decided that such scholars must follow the admission process of the Ph.D. in the Institute before registration in the Ph.D. programme. The Dean (R&C) will look into this proposal and take necessary follow up steps. You are requested to look into this proposal.

This is for kind information and further necessary action.


Dean (Academic)

Dean (R&C)

Copy to:

1. Jr. Asstt. to Director for kind information of the Director.
2. Sr. Asstt. to Registrar for kind information of the Registrar.
3. Faculty I/C (Ph.D.)
4. Dy. Registrar (Acad.)

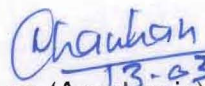
**NATIONAL INSTITUTE OF TECHNOLOGY
KURUKSHETRA**

No. Acad./2026/ 379

Dated: 13/03/2026

The Senate in its 58th meeting held on 26.2.2026 (part-II) vide agenda item no. S 58.29 approved the proposal to start minor degree courses from 3rd semester from academic year 2026-27 for the batch of B.Tech. 2025 onwards.

This is for kind information and further necessary action.


13.03.26
Dean (Academic)

All HoDs

Copy to:

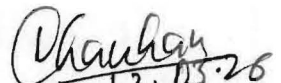
1. Jr. Asstt. to Director for kind information of the Director.
2. Sr. Asstt. to Registrar for kind information of the Registrar.
3. Dy. Registrar (Acad.)
4. Faculty I/C (UG) with a request to incorporate changes in the UG regulations.
5. Faculty I/C (Exam.)

**NATIONAL INSTITUTE OF TECHNOLOGY
KURUKSHETRA**

No. Acad./2026/ 378

Dated: 13/03/2026

The Senate in its 58th meeting held on 26.2.2026 (part-II) vide agenda item no. S 58.30 approved the proposal to transfer the labs and office space of all other cases except ECE/VLSI. The same will be decided after due deliberations.


Dean (Academic)

HoDs- ECE & VDSE

Copy to:

1. Jr. Asstt. to Director for kind information of the Director.
2. Sr. Asstt. to Registrar for kind information of the Registrar.
3. Dy. Registrar (Acad.)

S 59.04 To ratify the approval of the Chairman, Senate for the following:

- (i) Nomenclature & seat matrix of PG programs already approved for CCMT/CCMN 2025 to be sent for CCMT/CCMN 2026.**
- (ii) Nomenclature of B.Tech. program 'Robotics & Automation'.**

- (i) Nomenclature & seat matrix of PG programs already approved for CCMT/CCMN 2025 to be sent for CCMT/CCMN 2026.**

The process of admission in PG programs had already been started through CCMT/CCMN 2026. For this, the nomenclature & seat matrix of all PG programs were required to be sent to Coordinator, CCMT/CCMN 2026 by the end of April 2026. The Senate in its 58th meeting held on 13.2.2026 and 26.2.2026 considered and approved the following PG programs:

Sr.No.	Name of PG program	Seat Matrix	Agenda item no.
1.	Generic M.Tech. program in Civil Engg.	30 (Regular) 15 (Self-finance)	S 58.18
2.	Generic M.Tech. program in Mechanical Engg.	10 (Regular) 05 (Self-finance)	S 58.19
3.	M.Tech. in Robotics & Industrial Engineering with following specializations: a) Industrial Engineering & Data Analytics b) Robotics & Artificial Intelligence	20 (Regular) 10 (Self-finance)	ST 58.01
4.	M.Plan (Urban and Regional Planning)	20 (Regular) 05 (Sponsored)	S 58.06

The above minutes of 58th Senate could not be placed before the Board of Governors due to unavoidable administrative reasons.

In view of above and urgency of the matter, the Chairman, Senate accorded the approval to put the above minutes of 58th Senate meeting in abeyance and the existing nomenclature and seat matrix of PG programs already approved for CCMT/CCMN 2025 to be sent to Coordinator, CCMT/CCMN 2026.

The Senate may ratify the approval of the Chairman, Senate.

(ii) Nomenclature of B.Tech. program 'Robotics & Automation'.

The Senate in its 58th meeting held on 13.2.2026 and 26.2.2026 vide agenda item no. S 58.08 (ii) approved the change of name of B.Tech. program 'Robotics & Automation' as Robotics & Artificial Intelligence. Due to administrative reasons, this agenda item could not be approved by the Board of Governors.

In view of above, Senate accorded the approval to put the above minutes of 58th Senate meeting in abeyance and the existing nomenclature of UG programs to be sent to JoSAA/CSAB 2026.

The Senate may ratify the approval of the Chairman, Senate.

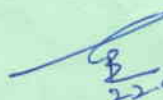
The process of admission in PG programs have been started through CCMT/CCMN 2026. For this, the nomenclature & seat matrix of all PG programs are required to be sent to Coordinator, CCMT/CCMN 2026 by the end of April 2026. The Senate in its 58th meeting held on 13.2.2026 and 26.2.2026 considered and approved the following PG programs:

Sr.No.	Name of PG program	Seat Matrix	Agenda item no.
1.	Generic M.Tech. program in Civil Engg.	30 (Regular) 15 (Self-finance)	S 58.18
2.	Generic M.Tech. program in Mechanical Engg.	10 (Regular) 05 (Self-finance)	S 58.19
3.	M.Tech. in Robotics & Industrial Engineering with following specializations: a) Industrial Engineering & Data Analytics b) Robotics & Artificial Intelligence	20 (Regular) 10 (Self-finance)	ST 58.01
4.	M.Plan (Urban and Regional Planning)	20 (Regular) 05 (Sponsored)	S 58.06

The minutes of the Senate are to be noted and/or approved by the Board of Governors. However, the above minutes of 58th Senate could not be placed before the Board of Governors due to unavoidable administrative reasons. The provisional approval for PG program, M.Plan (Urban & Regional Planning) from Institute of Town Planners (ITPI) is still awaited.

In view of above and urgency of the matter, it is proposed that the above minutes of 58th Senate meeting may be put in abeyance and the existing nomenclature and seat matrix of PG programs already approved for CCMT/CCMN 2025 (copy attached) may be sent to Coordinator, CCMT/CCMN 2026. If approved, the matter will be placed before the next Senate for ratification.

Submitted for kind consideration and approval please.


23/04/26
Dean (Academic)


23/04/2026
Registrar Incharge


Director/Chairman, Senate


23/04/2026
Dean (Academic)


23/04/26
Dean (Academic)


23/04/2026
Dean (Academic)

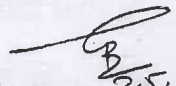
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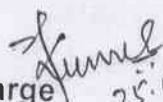
The process of admission in B. Tech programs has been started through JOSAA 2026. For this, the nomenclature & seat matrix of B. Tech programs has been sent to Coordinator, JOSAA 2026. However the same has not been uploaded and can be updated till the last date of freezing of seat matrix on JOSAA 2026 portal. The Senate in its 58th meeting held on 13.2.2026 and 26.2.2026 considered and approved the change of name of following B. Tech program:

Name of B. Tech program (existing)	Approved Name of B. Tech program from 58 th Senate meeting for AY 2026-27	Agenda item no.
B. Tech. in Robotics & Automation	B.Tech. in Robotics & Artificial Intelligence	S 58.08 (ii)

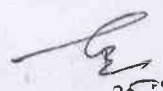
The minutes of the Senate are to be noted and/or approved by the Board of Governors. However, the above minutes of 58th Senate could not be placed before the Board of Governors due to unavoidable administrative reasons. In view of above and urgency of the matter, it is proposed that the above minute of 58th Senate meeting (S 58.08 (ii)) may be put in abeyance and the existing nomenclature and seat matrix of B. Tech programs already approved for JOSAA (copy attached) may be sent to Coordinator, JOSAA 2026. If approved, the matter will be placed before the next Senate for ratification.

Submitted for kind consideration and approval please.


25.04.2026
Dean (Academic)


25.04.2026
Registrar Incharge


25.04.2026
Director/Chairman, Senate


25.04.2026
Dean (Acad)

DR (Acad)

S 59.05 To consider the evaluation criteria for B.Tech. final year projects.

The SCSA in its 71st meeting held on 11.05.2026 vide agenda item no. SCSA 71.01 reconsidered the decision of 57th Senate meeting held on 27.10.2025 vide agenda item no. S 57.09 regarding revision of evaluation process for B.Tech. final year projects on the pattern of M.Tech. projects and notified vide no. Acad./2025/1598 dated 11.11.2025. The SCSA decided that it will be put in abeyance for the current academic year i.e. 2025-26. The previous evaluation criteria for B.Tech. final year projects, which is similar to the evaluation of practical examinations will be followed in current academic year i.e. 2025-26. Further, it will be reconsidered by the Senate in its forthcoming meeting for the academic year 2026-27 and onwards.

The Senate may discuss and decide the evaluation criteria for B.Tech. final year projects.

NATIONAL INSTITUTE OF TECHNOLOGY
KURUKSHETRA

No. Acad./2025/1598

Dated: 11.11.2025

The Senate in its 57th meeting held on 27.10.2025 vide agenda item no. S 57.09 considered the proposal for revision of evaluation process for B.Tech. final year projects and approved the following criteria of Evaluation:

- A) Final Evaluation Components (Maximum 80 marks)
- i) Content of Report (Maximum 30 marks)
 - ii) Presentation (Maximum 30 marks)
 - iii) Answer to examiner's queries (Maximum 20 marks)

- B) Paper presented in conferences (Maximum 10 marks)

Marks for paper presented in conferences organized at IITs/ NITs/ IIITs/ IISc/ IISERs/ conferences sponsored by reputed professional societies

Note: 05 marks per paper

- C) Paper published/accepted in journal (Maximum 10 marks) Paper published/accepted in non-paid paper in peer reviewed journals in Scopus/SCI/SCIE OR

Patent accepted/Best Project Award received (Maximum 10 marks)

Patent accepted from the project work or Best Project Award received from any recognized agency

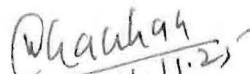
Note: 10 marks per Paper/Patent/Award

Final evaluation: The final grade of the eighth semester project (major project) will be evaluated based on grand total of Marks (A+B+C) out of 100 as per institute norms.

Recommendation:

Marks _____ / 100 Grade _____ as per clause UG.19.1.

This is for kind information and necessary action of all concerned.


Dean (Academic)

All HoDs

Copy to:

- 1. Faculty I/C (Acad.) & (Exam.)
- 2. Jr. Asstt. to Registrar Incharge
- 3. AR to Director for kind information of the Director

S 59.06 To consider and approve the proposal to rename the nomenclature of course on “Research & Publication Ethics’ as “Research Ethics & Bharat Knowledge System’ with scheme & syllabus of this course.

The SCSA in its 71st meeting held on 11.05.2026 vide agenda item no. SCSA 71.02, while reconsidering the decision of 58th Senate meeting held on 13.02.2026 and 26.02.2026 vide agenda item no. S 58.31 regarding proposal to introduce Non-Conventional Institute Core (NCIC) course of 02 credits namely Bharat Knowledge System in Ph.D. program, decided that contents of Bharat Knowledge System may be added to the already existing course of Research & Publication Ethics (2 credits) which is mandatory for all research scholars. Accordingly, there is no need to introduce new non-conventional institute core course of 02 credits namely Bharat Knowledge System in Ph.D. program. The minimum total credits to be earned by Ph.D. research scholars for Ph.D. course work will remain same i.e. 15 credits. Further, it was decided to rename the nomenclature of course on “Research & Publication Ethics’ as “Research Ethics & Bharat Knowledge System’ and the same will be placed in forthcoming Senate meeting for consideration.

Accordingly, the scheme and syllabus of this course has been prepared. This course has been renamed as “Research Ethics & Bharat Knowledge System’. The proposal received from department of Business Administration is enclosed as Annexure S 59.06.

The Senate may consider and approve.

**DEPARTMENT OF BUSINESS ADMINISTRATION
NATIONAL INSTITUTE OF TECHNOLOGY
KURUKSHETRA – 136119**

No. DBA/2026/520-A

Date: 03.06.2026

Senate Agenda Item for the Senate Meeting Scheduled on June 11, 2026

Item: To consider and approve the renaming and syllabus revision of the mandatory Ph.D. course "Research & Publication Ethics" to "Research Ethics & Bharat Knowledge System".

Background: The Standing Committee of Academic Affairs (SCSA), in its 71st meeting held on May 11, 2026, resolved that the contents of the Bharat Knowledge System (BKS) should be incorporated into the existing mandatory course "Research & Publication Ethics" (2 Credits) offered to all research scholars.

In compliance with this decision, the Board of Studies (BoS) of the Department of Business Administration, in its online meeting held on 03-06-2026, considered and approved the integration of relevant BKS components into the syllabus. To accurately reflect the updated curriculum and its objectives, the BoS also approved renaming the course.

Recommendation of the Board of Studies: The Board of Studies recommends the following modifications for approval by the Senate:

1. **Course Renaming:** Changing the course title from "Research & Publication Ethics (MBA-705)" to "Research Ethics & Bharat Knowledge System (MBA-705)" (Credits: 2).
2. **Syllabus Revision:** Incorporation of the following Bharat Knowledge System (BKS) topics into the existing curriculum:
 - *Introduction to Bharat Knowledge System (BKS):* Overview of the ancient and modern Indian Knowledge Tradition and its interdisciplinary nature.
 - *Integration of BKS perspectives* in contemporary research design and scholarly inquiry.

I kindly request you to include this item in the agenda for the upcoming meeting of the Senate for its formal consideration and final approval.

Dean (Academic)

Neeraj
03/06/26

Head

**Head of Department
Department of Business Administration
National Institute of Technology
Kurukshetra-136119**

change
in
Title [**RESEARCH ETHICS & BHARAT KNOWLEDGE SYSTEM (REBKS)****Course Title:**

- **Research Ethics & Bharat Knowledge System (REBKS)**-Course for awareness about the publication ethics and publication misconducts.

Course Level:

- 2 Credit course (30 hrs.)

Eligibility:

- Pre-Ph.D. students

Faculty:

- Interdisciplinary Studies

About the course**Course Code: MBA-705****Overview**

- This course has total 7 modules focusing on basics of philosophy of science and ethics, research integrity, publication ethics. Hands-on-sessions are designed to identify research misconduct and predatory publications. Indexing and citation databases, open access publications, research metrics (citations, h-index, Impact Factor, etc.) and plagiarism tools will be introduced in this course. It also introduces the philosophical foundations, scientific contributions, and contemporary relevance of the Bharat Knowledge System, highlighting indigenous perspectives on knowledge creation, sustainability, governance, education, and innovation.

Pedagogy:

- Class room teaching, guest lectures, group discussions, and practical sessions

Evaluation

- Continuous assessment will be done through Tutorials, assignments, quizzes and group discussions. Weightage will be given for active participation. Final examination will be conducted at the end of the course.

Course Structure

- The course comprises of seven modules listed in table below. Each module has 4-5 topics.

Modules	Unit title	Teaching Hours
Theory		
REBKS 01	Philosophy and Ethics	3
REBKS 02	Scientific Conduct	5
REBKS 03	Publication Ethics	5
REBKS 04	Bharat Knowledge System	2
Practice		
REBKS 05	Open Access Publishing	4
REBKS 06	Publication Misconduct	4
REBKS 07	Databases and Research Metrics	7
Total		30

Syllabus in detail

THEORY

- REBKS 01: PHILOSOPHY AND ETHICS (3 hrs.)**
 - Introduction to philosophy: definition, nature and scope, concept, branches
 - Ethics: definition, moral philosophy, nature of moral judgements and reactions
- REBKS 02: SCIENTIFIC CONDUCT (5hrs.)**
 - Ethics with respect to science and research
 - Intellectual honesty and research integrity
 - Scientific misconducts: Falsification, Fabrication, and Plagiarism (FFP)
 - Redundant publications: duplicate and overlapping publications, salami slicing
 - Selective reporting and misrepresentation of data

- **REBKS 03: PUBLICATION ETHICS (5 hrs.)**

1. Publication ethics: definition, introduction and importance
2. Best practices / standards setting initiatives and guidelines: COPE, WAME, etc.
3. Conflicts of interest
4. Publication misconduct: definition, concept, problems that lead to unethical behavior and vice versa, types
5. Violation of publication ethics, authorship and contributorship
6. Identification of publication misconduct, complaints and appeals
7. Predatory publishers and journals

- **REBKS 04: Bharat Knowledge System (2 hrs.)**

1. Introduction to Bharat Knowledge System (BKS): Overview of the ancient and modern Indian Knowledge Tradition and its interdisciplinary nature.
2. Integration of BKS perspectives in contemporary research design and scholarly inquiry.

PRACTICE

- **REBKS 05: OPEN ACCESS PUBLISHING (4 hrs.)**

1. Open access publications and initiatives
2. SHERPA/RoMEO online resource to check publisher copyright & self-archiving policies
3. Software tool to identify predatory publications developed by SPPU
4. Journal finder / journal suggestion tools viz. JANE, Elsevier Journal Finder, Springer Journal Suggester, etc.

- **REBKS 06: PUBLICATION MISCONDUCT (4hrs.)**

A. Group Discussions (2 hrs.)

1. Subject specific ethical issues, FFP, authorship
2. Conflicts of interest
3. Complaints and appeals: examples and fraud from India and abroad

B. Software tools (2 hrs.)

Use of plagiarism software like Turnitin, Urkund and other open source software tools

• **REBKS 07: DATABASES AND RESEARCH METRICS (7hrs.)**

A. Databases (4 hrs.)

1. Indexing databases
2. Citation databases: Web of Science, Scopus, etc.

B. Research Metrics (3 hrs.)

1. Impact Factor of journal as per Journal Citation Report, SNIP, SJR, IPP, Cite Score
2. Metrics: h-index, g index, i10 index, altmetrics

References

- Bird, A. (2006). Philosophy of Science. Routledge.
- MacIntyre, Alasdair (1967) A Short History of Ethics. London
- P. Chaddah, (2018) Ethics in Competitive Research: Do not get scooped, do not get plagiarized, ISBN:978- 9387480865
- National Academy of Sciences, National Academy of Engineering and Institute of Medicine. (2009). *On Being a Scientist: A Guide to Responsible Conduct in Research. Third Edition*. National Academies Press.
- Resnik, D. B. (2011, May 1). *What is ethics in research & why is it important?* National Institute of Environmental Health Sciences, 1-10 Retrieved from: <https://www.niehs.nih.gov/research/resources/bioethics/whatis/index.cfm>
- Beall, J. (2012). Predatory publishers are corrupting open access. Nature, 489(7415), 179-179. <https://doi.org/10.1038/489179a>
- Indian National Science Academy (INSA), Ethics in Science Education, Research and Governance(2019). ISBN:978-81-939482-1-7. E-Book – Indian National Science Academy

ANNEXURE

Course Title:

- Research and Publication Ethics (RPE)-Course for awareness about the publication ethics and publication misconducts.

Course Level:

- 2 Credit course (30 hrs)

Eligibility:

- M.Phil., Ph.D. students and interested faculty members (It will be made available to post graduate students at later date)

Fees:

- As per University Rules

Faculty:

- Interdisciplinary Studies

Qualifications of faculty members of the course:

- Ph.D. in relevant subject areas having more than 10 years' of teaching experience

About the course

Course Code: CPE- RPE

Overview

- This course has total 6 units focusing on basics of philosophy of science and ethics, research integrity, publication ethics. Hands-on-sessions are designed to identify research misconduct and predatory publications. Indexing and citation databases, open access publications, research metrics (citations, h-index, Impact Factor, etc.) and plagiarism tools will be introduced in this course.

Pedagogy:

- Class room teaching, guest lectures, group discussions, and practical sessions

Evaluation

- Continuous assessment will be done through tutorials, assignments, quizzes, and group discussions. Weightage will be given for active participation. Final written examination will be conducted at the end of the course.

Course structure

- The course comprises of six modules listed in table below. Each module has 4-5 units.

Modules	Unit title	Teaching hours
Theory		
RPE 01	Philosophy and Ethics	4
RPE 02	Scientific Conduct	4
RPE 03	Publication Ethics	7
Practice		
RPE 04	Open Access Publishing	4
RPE 05	Publication Misconduct	4
RPE 06	Databases and Research Metrics	7
	Total	30

Syllabus in detail

THEORY

- RPE 01: PHILOSOPHY AND ETHICS (3 hrs.)**
 - Introduction to philosophy: definition, nature and scope, concept, branches
 - Ethics: definition, moral philosophy, nature of moral judgements and reactions
- RPE 02: SCIENTIFIC CONDUCT (5hrs.)**
 - Ethics with respect to science and research
 - Intellectual honesty and research integrity
 - Scientific misconducts: Falsification, Fabrication, and Plagiarism (FFP)
 - Redundant publications: duplicate and overlapping publications, salami slicing
 - Selective reporting and misrepresentation of data
- RPE 03: PUBLICATION ETHICS (7 hrs.)**
 - Publication ethics: definition, introduction and importance
 - Best practices / standards setting initiatives and guidelines: COPE, WAME, etc.
 - Conflicts of interest
 - Publication misconduct: definition, concept, problems that lead to unethical behavior and vice versa, types
 - Violation of publication ethics, authorship and contributors
 - Identification of publication misconduct, complaints and appeals
 - Predatory publishers and journals

PRACTICE

- RPE 04: OPEN ACCESS PUBLISHING (4 hrs.)**

1. Open access publications and initiatives
2. SHERPA/RoMEO online resource to check publisher copyright & self-archiving policies
3. Software tool to identify predatory publications developed by SPPU
4. Journal finder / journal suggestion tools viz. JANE, Elsevier Journal Finder, Springer Journal Suggester, etc.

• **RPE 05: PUBLICATION MISCONDUCT (4hrs.)**

A. Group Discussions (2 hrs.)

1. Subject specific ethical issues, FFP, authorship
2. Conflicts of interest
3. Complaints and appeals: examples and fraud from India and abroad

B. Software tools (2 hrs.)

Use of plagiarism software like Turnitin, Urkund and other open source software tools

• **RPE 06: DATABASES AND RESEARCH METRICS (7hrs.)**

A. Databases (4 hrs.)

1. Indexing databases
2. Citation databases: Web of Science, Scopus, etc.

B. Research Metrics (3 hrs.)

1. Impact Factor of journal as per Journal Citation Report, SNIP, SJR, IPP, Cite Score
2. Metrics: h-index, g index, i10 index, altmetrics

References

- Bird, A. (2006). *Philosophy of Science*. Routledge
- MacIntyre, Alasdair (1967) *A Short History of Ethics*. London
- P. Chaddah, (2018) *Ethics in Competitive Research: Do not get scooped, do not get plagiarized*, ISBN-978-9387480865
- National Academy of Sciences, National Academy of Engineering and Institute of Medicine. (2009). *On Being a Scientist: A Guide to Responsible Conduct in Research. Third Edition*. National Academies Press.
- Resnik, D. B. (2011). What is ethics in research & why is it important. *National Institute of Environmental Health Sciences*, 1–10. Retrieved from <https://www.niehs.nih.gov/research/resources/bioethics/whatis/index.cfm>
- Beall, J. (2012). Predatory publishers are corrupting open access. *Nature*, 489(7415), 179–179. <https://doi.org/10.1038/489179a>
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DEPARTMENT OF BUSINESS ADMINISTRATION
NATIONAL INSTITUTE OF TECHNOLOGY
KURUKSHETRA – 136119

No. DBA/2026/520

Date: 03.06.2026

MINUTES OF THE BOARD OF STUDIES (BOS) MEETING

A meeting of the Board of Studies (BOS) was held on June 3rd, 2026 at 03:00 PM in online mode through Google Meeting. Following members attended the meeting:

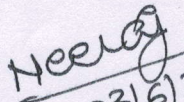
1. Dr. Neeraj Kaushik	Chairman
2. Prof Prashant Gupta	External Expert
3. Prof Sanjeev Verma	External Expert
4. Dr Mohd Firoz	Member
5. Dr Chandra Sekhar	Member
6. Dr Priyanka Sihag	Special invitee
7. Dr Mohit Ojha	Special invitee

The meeting commenced with a warm welcome by the Head of the Department.

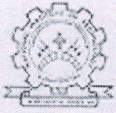
Agenda Discussion: Following agenda items were discussed in the meeting:

Agenda Item 1: To consider the incorporation of Bharat Knowledge System (BKS) content in the existing course "Research & Publication Ethics", (2 Credits) and renaming of the course as "Research Ethics & Bharat Knowledge System".

1. After detailed deliberation, the Board of Studies (BoS) of the Department of Business Administration, considered and approved the integration of relevant BKS components into the syllabus. To accurately reflect the updated curriculum and its objectives, the BoS also approved renaming the course from "**Research & Publication Ethics (MBA-705)**" to "**Research Ethics & Bharat Knowledge System (MBA-705)**" (Credits: 2).
2. **Syllabus Revision:** Incorporation of the following Bharat Knowledge System (BKS) topics into the existing curriculum:
 1. *Introduction to Bharat Knowledge System (BKS):* Overview of the ancient and modern Indian Knowledge Tradition and its interdisciplinary nature.
 2. *Integration of BKS perspectives* in contemporary research design and scholarly inquiry.


03/06/26
(Neeraj Kaushik)
Chairman, BOS

Copy to All Members



Invitation for Online BOS Meeting on June 03, 2026 (Wednesday)

Prof. Sanjeev Verma <sanjeev@iimmumbai.ac.in>
To: Neeraj Kaushik <neeraj.kaushik@nitkkr.ac.in>

Thu, Jun 4, 2026 at 11:32 AM

Yes, I approve.

With Regards,

.....
Dr. Sanjeev Verma
Professor (Marketing) and Chair, PhD Program
Indian Institute of Management (IIM)
Mumbai 400087
.....

From: Neeraj Kaushik <neeraj.kaushik@nitkkr.ac.in>
Sent: Wednesday, June 3, 2026 3:17 PM
To: Prof. Sanjeev Verma <sanjeev@iimmumbai.ac.in>
Subject: Re: Invitation for Online BOS Meeting on June 03, 2026 (Wednesday)

Respected Sir

Thanks a lot for taking out time to join this meeting and provide your valuable inputs.
Please find attached the **Minutes of the Board of Studies Meeting** for your kind approval.

Thank & Regards
Neeraj

On Tue, Jun 2, 2026 at 4:48 PM Neeraj Kaushik <neeraj.kaushik@nitkkr.ac.in> wrote:
Dear Sir

Meeting Details:

DBA NITKKR -BOS Meeting 03-06-2026
Wednesday, June 3 · 3:00 – 4:00pm
Time zone: Asia/Kolkata
Google Meet joining info
Meeting link: <https://meet.google.com/xqd-khyr-mmk>
Or dial: (US) +1 336-701-0068 PIN: 383 061 093#

On Tue, Jun 2, 2026 at 4:37 PM Neeraj Kaushik <neeraj.kaushik@nitkkr.ac.in> wrote:
Respected Sir

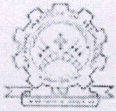
It is my privilege to inform you that the Department of Business Administration is planning to organize an online **Meeting of the Board of Studies**, Department of Business Administration, NIT Kurukshetra on **June 03, 2026 (Thursday) at 3:00 PM**.

Since you're a member of our Board of Studies, we request you to kindly confirm your availability on this date and time.
A line of confirmation in this regard shall be appreciated.

--

Thanks and Regards

Dr. Neeraj Kaushik
Associate Professor & Head



NEERAJ KAUSHIK <neeraj.kaushik@nitkkr.ac.in>

Invitation for Online BOS Meeting on June 04, 2026 (Thursday)

Prof. Prashant Gupta <prashant@iimnagpur.ac.in>
To: Neeraj Kaushik <neeraj.kaushik@nitkkr.ac.in>

Thu, Jun 4, 2026 at 12:15 PM

Approved from my side

Regards,

Dr. Prashant Gupta
Professor-Finance and Dean Faculty & Academics,
Indian Institute of Management (IIM), Nagpur,
Mob: 9818580158 Landline: 0712 2870533
Email: prashant@iimnagpur.ac.in

“सतर्कता: हमारी साझा जिम्मेदारी” “Vigilance: Our Shared Responsibility”

On Wed, 3 Jun, 2026, 15:18 Neeraj Kaushik, <neeraj.kaushik@nitkkr.ac.in> wrote:
Respected Sir

Thanks a lot for taking out time to join this meeting and provide your valuable inputs.
Please find attached the **Minutes of the Board of Studies Meeting** for your kind approval.

Thank & Regards
Neeraj

On Tue, Jun 2, 2026 at 4:47 PM Neeraj Kaushik <neeraj.kaushik@nitkkr.ac.in> wrote:
Dear Sir

Regrets for the mistake in the Date of the meeting as mentioned in Subject

Correct Details:

DBA NITKKR -BOS Meeting 03-06-2026
Wednesday, June 3 · 3:00 – 4:00pm
Time zone: Asia/Kolkata
Google Meet joining info
Meeting link: <https://meet.google.com/xqd-khyr-mmk>
Or dial: (US) +1 336-701-0068 PIN: 383 061 093#

On Tue, Jun 2, 2026 at 4:35 PM Neeraj Kaushik <neeraj.kaushik@nitkkr.ac.in> wrote:
Respected Sir

It is my privilege to inform you that the Department of Business Administration is planning to organize an online **Meeting of the Board of Studies**, Department of Business Administration, NIT Kurukshetra on **June 03, 2026 (Thursday) at 3:00 PM.**

Since you're a member of our Board of Studies, we request you to kindly confirm your availability on this date and time.

A line of confirmation in this regard shall be appreciated.

--

Thanks and Regards

Dr. Neeraj Kaushik
Associate Professor & Head
Department of Business Administration
National Institute of Technology
Kurukshetra-136119
Haryana (INDIA)

Website: <http://nitkkr.ac.in>
Office: +91-1744-233525

S 59.07 To consider the proposal to conduct special reappear examinations for students of 2023 batch before declaration of 6th semester result.

The Senate in its 58th meeting held on 26.2.2026 (part-II), vide. agenda item no. S 58.12, decided that special reappear examination for B. Tech. 6th semester students will be conducted after declaration of 6th semester result. Only those students will be allowed for special reappear examination who are having not more than five reappears in previous semesters. Internal reappear and external reappear in any course will be considered as one reappear only.

This provision of special reappear examination was made so that the students, having up to 5 reappears in the subjects of 1st to 6th semester, would have a chance to pass these courses before the start of next session, and become eligible to appear in placement drives of the several companies at the commencement of placement season.

Under normal circumstances, this special examination could have been conducted, after completion of regular end semester examination of the even semester of a session by the end of month of May/June and immediately after declaration of 6th semester results.

Under the prevailing situation, regular examination of 2nd, 4th and 6th semesters were postponed and have been scheduled from 1st to 20th August 2026, and immediately after that next session would start. It would take some time for the declaration of results also. Therefore, it would be difficult to schedule the special examination of all the semesters as classes for the next session would already have started.

In view of above, it is proposed to conduct the special reappear examination of 1st, 3rd & 5th semester from July 20 to July 31, 2026. The special reappear exams for 6th semester may be conducted after declaration of 6th semester result. Instead of limiting the chance to appear in special examination to the students having up to 5 reappears only, the students of 2023 batch may be allowed to appear in examination for maximum 5 reappears. For example, if a student has attempted 4 reappears of 1st, 3rd & 5th semester during July 2026 reappear examination, he/she can appear only for 1 (5 - 4), reappear of 6th semester. This would be taken as one time measure only.

The students would also appear for 2nd and 4th semester reappears along with regular examination of 2nd and 4th semesters during August 1 to August 13, 2026, following N + 6 reappears rule, as per Institute rules.

The Senate may discuss the matter and decide.

S 59.08 To consider the report of the Committee constituted to look into the issue of multiplying factor for conversion of CGPA to percentage.

After receiving many requests of students regarding multiplying factor to convert CGPA to percentage, the following Committee was constituted as per approval of the Competent Authority:

- | | |
|--|----------|
| 1. Prof. Ashwani Jain, Prof. Civil Engg. | Chairman |
| 2. Prof. Jyoti Ohri, Prof. Elect. Engg. | Member |
| 3. Prof. J.K. Kapoor, Prof. Chemistry | Convener |

Now, the Committee has submitted its recommendations which are enclosed as Annexure S 59.08.

The Senate may consider and decide.

DEPARTMENT OF CIVIL ENGINEERING
N I T KURUKSHETRA - 136119

No. CED/2026/ 477

Date: 19.05.2026

Subject: To look into the issue of multiplying factor for conversion of CGPA to percentage.

Reference: Letter No. Acad./2026/766, dated 08.05.2026 of Dean (Academic) related to constitution of a committee on the matter cited in the subject above

The Competent Authority approved constitution of a committee, as referred above, to look into the issue of multiplying factor for conversion of CGPA to percentage.

A meeting of the committee was held on 19.05.2026. The matter was deliberated upon and is reported as follows:

Scope of reference:

To explore the possibility of increasing the multiplying factor of CGPA for calculation of percentage of marks.

Documents referred:

1. Agenda and minutes of 51st meeting of the Senate - Tabled Agenda S 51.14.
2. Agenda and minutes of 52nd meeting of the Senate - S 52.02.
3. Minutes of 54th meeting of the Senate - S 54.03.
4. Ordinances and Regulations of Undergraduate Programmes - UG.19.1.

Main Observations:

After close examination of the above documents, the following are the key observations of the committee:

- a) The Senate in its 51st meeting, vide. S 51.14, considered the proposal regarding multiplying factor to convert CGPA to percentage. The proposal was discussed in detail. The multiplying factors used to convert CGPA to percentage in some other institutes including NITs and IITs were considered with respect to their evaluation and grading system. **The Senate observed that the grading system needs to be revised alongwith the CGPA conversion formula.** Further, a committee was also constituted to look into the issue.

The Senate in its 52nd meeting vide. S 52.02 noted the action taken on S 51.14 that the committee was notified and the report is awaited.



- b) The Senate in its 54th meeting, vide. S 54.03, considered the regulations of UG programmes and after detailed deliberations and after incorporating the modifications suggested by Senators, the regulations of UG programmes were approved.
- c) As per the Ordinances and Regulations of Undergraduate Programmes, UG.19.1. Evaluation and Grading System (relevant part only), the student is awarded letter grade, as per the table reproduced below, for all courses except non-conventional institute core courses, which indicates the level of performance in a course and has a grade point for the purpose of computing the Cumulative Grade Point Average (CGPA).

Marks obtained & Grade	Performance	Grade Point
$85 \leq A+ \leq 100$	Excellent	10
$75 \leq A < 85$	Very Good	9
$65 \leq B < 75$	Good	8
$50 \leq C < 65$	Average	6.5
$40 \leq D < 50$	Pass	4.5
$0 \leq F < 40$	Re-appear	00

It has a foot note which states that the percentage of marks obtained by a student be calculated as equal to CGPA multiplied by 9.00.

The multiplying factor used to convert grades/CGPA into percentage is usually based on the relationship between grade scale and the actual percentage of marks.

The general idea is, Percentage = Grade point or CGPA $\times$ multiplying factor.

In order to estimate conversion factors from the grade ranges, midpoint averages may be used. Using the above grade table, there is no single exact multiplying factor, because the grade points are assigned in ranges and not by a linear formula, i.e. the system is non-linear. But an approximate conversion factor can be derived using the midpoint of each marks range as tabled below:

Range of marks obtained	Midpoint marks	Grade Point	Multiplying factor = midpoint marks/grade point
85 - 100	92.5	10	9.25
75 - 84	79.5	9	8.83
65 - 74	69.5	8	8.69
50 - 64	57	6.5	8.77
40 - 49	44.5	4.5	9.89
			Average = 9.086

Therefore, a reasonable overall multiplying factor is 9.

Percentage $\approx$ CGPA $\times$ 9

A detailed statistical analysis can also be done by studying past student data of marks and grades, and by taking median value instead of midpoint marks, the percentage that typically corresponds to a CGPA can be calculated. But this is likely to give a multiplying factor lesser than 9.

Recommendation:

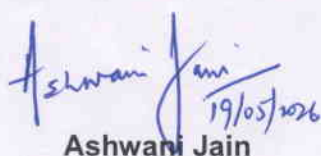
After careful consideration of the facts of the matter based on the documents, the committee recommends the following:

It is not possible to further increase the multiplying factor. The multiplying factor of 9 to convert CGPA to percentage, with the present range of marks and grades as per the ordinances and regulations of undergraduate programmes in the institute, is rational and has sound scientific basis.

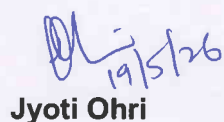
Further:

A revised table of range of marks and grade points may be prepared to increase the multiplying factor, which requires careful consideration of the implications therefrom, and the same be done without compromising academic standards in the institute. A relative grading system could be adopted in the institute. All this is beyond the purview of the constituted committee.

Submitted for further necessary action please.


Ashwani Jain

(Prof. Civil Engg.)


Jyoti Ohri

(Prof. Electrical Engg.)


J K Kapoor

(Prof. Chemistry)

Dean (Academic)

Existing CGPA & Conversion to percentage		Alternate possibility	
Range of Marks & Grade	Grade Point	Range of Marks & Grade	Grade Point
$85 \leq A^+ \leq 100$	10	$90 \leq A^+ \leq 100$	10
$75 \leq A < 85$	9	$80 \leq A < 90$	9
$65 \leq B < 75$	8	$70 \leq B < 80$	8
$50 \leq C < 65$	6.5	$60 \leq C < 70$	7
$40 \leq D < 50$	4.5	$50 \leq D < 60$	6
$0 \leq F < 40$	0	$40 \leq E < 50$	5
		$0 \leq F < 40$	0
Present Conversion factor (ideal) = 9.0		Conversion factor = 9.5	
Conversion factor of 9.5 is not possible For example, a student having 75 marks in a subject gets A grade and with conversion factor of 9.5, the marks convert to $9 \times 9.5 = 85.5$ which is beyond the range of 75 to 85. Conversion factor of 9.4 is also not possible for same reason ($8 \times 9.4 = 75.2$, beyond range of 65 to 75) 888			
If we consider the mean of range of $85 \leq A^+ \leq 100$ i.e. 92.5 approximate to 93.0, the maximum conversion factor can be 9.3			
Advantages 1. It is pro CGPA. The students with 85 and 75 marks get A^+ and A grade respectively. 2. CGPA is standard for admission in higher studies and the private companies visiting the Institute for recruitment. 3. Can be applied to present and past students having the similar range. Students Concern: 1. Some Government /public sector units demand marks in percentage.		Disadvantages 1. It is not pro CGPA. The students with 85 and 75 marks get A and B grade respectively 2. A student with 85 marks and Grade A ultimately transforms to $9 \times 9.5 = 85.5$ whereas in existing scheme it comes out as $10 \times 9 = 90$ marks	

S 59.09 To consider the report of the Committee constituted to revisit the 8th semester scheme of all B.Tech. courses.

The Senate in its 58th meeting held on 13.02.2026 and 26.02.2026 vide agenda items no. S 58.07 and S 58.16 decided that the scheme and syllabus of final year of each B.Tech. program will be revisited after the decision of the Committee which will be constituted to look after the scheme and syllabus of all programmes looking into the internship prospective of the students during final year. As per approval of the Competent Authority, the following Committee was constituted:

- | | | |
|----|---------------------------------------|----------|
| 1. | Dean (R&C) | Chairman |
| 2. | HoD, Computer Engg. | Member |
| 3. | HoD, Electrical Engg. | Member |
| 4. | HoD, RIE | Member |
| 5. | Prof. Ashwani Jain, Prof. Civil Engg. | Member |

Now, the Committee has submitted its recommendations which are enclosed as Annexure S 59.09.

The Senate may consider and decide.

OFFICE OF THE DEAN (R&C)
N I T KURUKSHETRA - 136119

No. Dean (R&C)/2026/89

Date: 20/05/2026

Subject: Scheme and syllabus of B.Tech. 8th Semester of all UG programmes with respect to internship prospects of the students during final year

Reference: Letter No. Acad./2026/413, dated 16.03.2026 of Dean (Academic) related to constitution of a committee on the matter cited in the subject above

Competent Authority approved the constitution of a committee as referred above, as per the decision of the Senate in its 58th meeting held on 13.02.2026 and 26.02.2026, vide agenda items S 58.07 and S 58.16, to revisit the scheme and syllabus of final year of all B.Tech. programmes looking into the internship prospective of the students during final year.

A meeting of the committee was held on 20.05.2026 after initial brainstorming on the issue. The matter was deliberated upon and is reported as follows.

Scope of reference:

To make recommendations for:

1. Scheme of examination of B.Tech. 8th semester of various UG programmes ensuring uniformity in distribution of credits for full-semester internship and course work.
2. Guidelines for evaluation procedure of B.Tech. students proceeding on internship during B.Tech. 8th semester of their studies.

Documents referred:

1. Minutes of 53rd meeting of the Senate - S 53.07.
2. Minutes of 54th meeting of the Senate - Any Other item.
3. Minutes of the 70th SCSA meeting - SCSA 70.01.
4. Minutes of the 58th meeting the Senate held on 13.02.2026 and 26.02.2026 - S 58.02, S 58.04 (iii), S 58.07, S 58.16, S 58.17, S 58.28, and letter No. Acad./26/596 dated 09.04.2026 of DR (Academic).
5. Placement Policy, T&P Cell - 9.0, 10.0.
6. Ordinances and Regulations of Undergraduate Programmes - UG.18.6.
7. Letter No. Acad./2025/35, dated 07.01.2025 of Dean (Academic) and Letter No. Acad./26/597, dated 09.04.2026 of DR (Academic).
8. Schemes of examination of B.Tech. 8th Semester of various UG programmes.

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Main Observations:

After close examination of the above documents, the following are the key observations of the committee.

- a) The Senate considered and approved the proposal of revised B.Tech. 3rd & 4th year scheme of all UG programmes in its 53rd meeting vide. S 53.07.
- b) The Senate in its 54th meeting, under any other item, discussed the matter of internship in 8th semester. It was decided that it is to be uniformly implemented to all departments. The students who get internship + full time employment (FTE) through the drives conducted by Training and Placement Cell of the institute, can complete their courses through MOOCs or any other online platform, and the successful credits earned through MOOCs shall be counted by the institute for overall credit calculation.
- c) The SCSA in its 70th meeting, vide. 70.01, decided that the following guidelines for the students who get off-campus summer internships + employment will be included in the UG Ordinance & Regulations under clause UG.18. Internship/Project.
 - i. The stipend for the internship should be equal to or greater than INR 35,000 per month, and the Cost to Company (CTC) must be equal to or greater than INR 8,00,000 per annum.
 - ii. For Off-campus summer internships, the reputation and the authenticity of the organization in which the student is willing to do the internship will be ensured by the Training & Placement Cell.
 - iii. The NOCs for the Off-campus summer internships will be issued by the Training & Placement Cell.

Apart from internship, the MOOC courses should be cleared. While discussing regarding internship in the scheme of 8th semester, the Chairman, SCSA, desired that there should be uniformity in 8th semester scheme of each department. It was decided that in 8th semester, there should be up to 20 credits. Every department has to ensure that these credits are equally distributed, i.e. for MOOC/NPTEL/project/internship. Minimum two or three MOOC/NPTEL courses would be mandatory in the scheme of 8th semester. It was decided that the final scheme of 8th semester of each department will be discussed in the next Senate meeting.

The Senate in its 58th meeting vide. S 58.02 noted the minutes of the meeting of 70th SCSA.

- d) The Senate in its 58th meeting vide:
 - i. S 58.04 (iii) ratified the approval of the Chairman Senate, for provision of two subjects through NPTEL during internship for 8th semester students of CSE & IT.
 - ii. S 58.16 approved the scheme of examination of B.Tech. 8th semester of AI & ML, CSE and IT, with a rider that the scheme and syllabus of final year may be revisited after the decision of the committee which will be constituted to look after the scheme and syllabus of all programmes looking into the internship prospective of the students during final year. Further, the Senate approved the NPTEL courses list for B.Tech. CSE & IT.
 - iii. S 58.17 considered and approved the list of NPTEL courses for B.Tech. ECE 8th semester.

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- iv. S 58.28 considered and approved the proposal, sent by Electronics and Communication Engineering Department, for three months (or longer) internship for B.Tech. students to increase the placement options for students, particularly for opportunities commencing after January 2026, where selections were also made after January 2026.

The decisions under S 58.16 and S 58.17 were notified vide. letter No. Acad./26/596 dated 09.04.2026 of DR (Academic).

e) T & P guidelines:

- i. 9.0 gives guidelines applicable to the UG students appearing for the drives of B.Tech. 8th semester internship of 6-month duration, apart from that for internship for PG students, and summer internship after B.Tech. 2nd year and 3rd year. In the guidelines for Off-campus summer internships, it is stated that the reputation and authenticity of the organization in which the student is willing to do the internship will be ensured by the Faculty Placement/Internship Coordinator of the respective department. Also, the NOCs for the Off-campus summer internships will be issued by the Faculty Placement/Internship coordinator of the respective department.
 - ii. 10.0 gives guidelines for Off-Campus NOC for "Intern + FTE/PPO" opportunities.
- f) As per the Ordinances and Regulations of undergraduate programmes, referring to UG.18.6, the students of UG programmes will be allowed internship in 8th semester where internship + full-time employment (FTE) offered by particular organizations/industries through the drives conducted by Training and Placement Cell of the Institute. If in 8th semester, there are courses to be completed, they can be done through MOOCs platform and the successful credits earned through MOOCs shall be counted by the institute for overall credit calculation. Other students will do the course work.
- g) The guidelines for evaluation process of B.Tech. 8th Semester students opting for internship and doing course work either through MOOC platform or in self-study mode were circulated vide. No. Acad./26/597, dated 09.04.2026, by DR (Academic).
- h) Comments regarding the Scheme of Examination of B.Tech. 8th semester of various UG programmes for 2022-batch students:

Table showing breakup of credits for course work and internship

S. No.	UG Programme	Credits breakup for students of 2022 - batch	
		For students doing course work only (Total for Course work)	For students proceeding on 6-month internship (Course work + Internship)
1	Civil	18	15 + 3
2	Mech./PIE	16/15	13 + 3/12 + 3
3	Electrical	18	14 + 4
4	ECE	20 18	17 + 3 - initial approval 9 (NPTEL) + 9, 12 (self-study) + 6 - final approval
5	CSE/IT/ AI & ML	15	0 + 15 - initial approval 6 + 9 - final approval

- i) Comments regarding evaluation of internship and provision for course work for 2022-batch students proceeding on semester internship:
- (i) Civil, Mechanical and Electrical Engineering departments proposed evaluation of semester internship in line with that for 2021-batch students, where internship replaces project work, and for rest of the courses, the student needs to register for equivalent MOOC/NPTEL courses or appear in end semester examination in self-study mode.
 - (ii) Electronics & Communication Engineering Department, initially, had the same provision as was for Civil, Mechanical and Electrical Engineering departments. Later, the department proposed that the students need to appear for three (3) NPTEL courses alongwith semester internship.
 - (iii) Computer Engineering Department, in the initial scheme, proposed no course work for students proceeding on internship. Later, the department proposed that the students need to appear for two (2) NPTEL courses alongwith semester internship.
- j) The term 'Summer Internship' has been loosely used in various documents to define various types of internships related to UG programmes creating some confusion with regard to the responsibility that needs to be shared by various departments and sections of the institute. The following table lists various types of internships available to UG students in the institute.

Type of internship	Duration	Schedule in academic calendar
Summer Internship	4 to 8 weeks	During summer vacations after 4 th and/or 6 th semester
Semester Internship	6 - month	During 8 th Semester

The related policy documents need to be corrected suitably, wherever required.

Recommendations:

After careful consideration of the facts of the matter based on documents, the committee recommends the following. The same may be made applicable to the students of 2023-batch onwards, i.e. with effect from B.Tech. 8th semester of the Session 2026-27.

1. Related to the mechanism - Academic Section, T & P Cell and Concerned Department

The following mechanism is proposed to be adopted.

Role of Academic Section - to act as an interface between T & P Cell and the concerned department.

Role of T & P Cell - to handle semester internship of students.

For On-campus as well as Off-campus semester internships, the reputation and authenticity of the organization in which the student is willing to do the internship will be ensured by the

Training & Placement Cell. Also, the NOC for the On-campus as well as Off-campus semester internships will be issued by the Training & Placement Cell. Due intimation regarding the students proceeding on semester internship should be sent to the academic section as well the concerned department.

In view of the above, the T & P Cell needs to modify its 'Placement Policy' suitably.

Role of the concerned department - to handle academics part of semester internship through Faculty Placement/Internship Coordinator.

For the students proceeding on internship, department would decide the mechanism of course work - MOOC/NPTEL/Self-study mode. Due intimation regarding this should be sent to the academic section.

2. Related to the scheme - Internship and Course work

Internship

The duration of internship has to be 16-week (minimum - keeping in view the duration of a semester) to 22-week duration or longer. The students of 2022-batch were allowed, 3-month (or longer) internship, may be due to lack of clarity about provision for the course work.

Course Work

- a. The students proceeding on internship need to earn required credits for the courses of B.Tech. 8th semester scheme as decided by various departments, either in self-study mode, or as equivalent MOOC/NPTEL/SWAYAM courses as decided by the department.
- b. The number of credits for Internship part needs to be limited to a reasonable level, more so for the students of CSE/ IT/ AI & ML, as the project work done by the students during internship is not shared with or reported to the department, as mandated by the organisations due to professional considerations. Therefore, shifting of credits to internship should be done limiting it to 6 - 9 credits from laboratory, open elective, programme elective, programme core courses, broadly in that order as applicable to various UG programmes. For example, for Civil Engg., it could be done by shifting 6 credits to internship (OE 3 + PE-project 3), and 12 credit for programme core courses to be earned either in self-study mode, or as equivalent MOOC/NPTEL/SWAYAM courses.
- c. Keeping in view difficulty faced by the students, option of earning required credits needs to be given to the students proceeding on semester internship, either through NPTEL/MOOC/SWAYAM or in self-study mode.
- d. Separate course code and course nomenclature needs to be assigned to semester internship by the departments, e.g. for Civil, it could be CEIC402 - Semester Internship.

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e. Other students, who don't proceed on internship, would do all the course work.

f. The students proceeding on internship are expected to attend classes during the intervening period.

In view of the above, for B.Tech. 8th semester scheme, decision needs to be taken at department level with regard to the following:

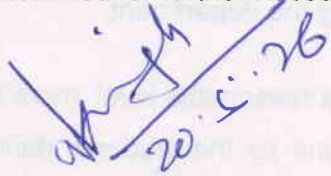
- Total credits of semester internship.
- Total credits that a student proceeding on internship needs to earn for course work.
- If course work is to be done through NPTEL/MOOC/SWAYAM, the list of courses needs to be approved to earn equivalent credits.
- If course work is to be done in self-study mode, the subjects of B.Tech. 8th semester scheme that a student needs to appear in end semester examination.

3. Related to the evaluation

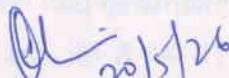
The guidelines of evaluation process, as notified vide. No. Acad./26/597 dated 09.04.2026, by DR (Academic), may be broadly followed with suitable modifications as per recommendations of the committee.

The committee was of the opinion that in order to implement semester internship, the schemes of examination of various UG programmes have to be revisited in entirety.

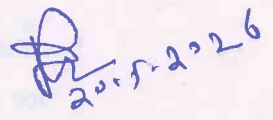
Submitted for further necessary action please.



HoD (Computer Engg.)



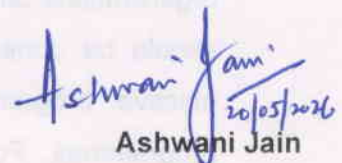
HoD (Electrical Engg.)



HoD (RIE)



Dean (R&C)



Ashwani Jain

(Prof. Civil Engg.)

Dean (Academic)

S 59.09

8th Semester Credits for Main Branches of Engineering

Branch	Theory Courses		Practical Courses		Credits for Project		Total Credits
	Regular Students	Students on Internship opting MOOC	Regular Students	Students on Internship	Regular Students	Students on Internship opting MOOC	
Civil	5	5	-	-	3	3	18
Mech.	4	4	1	1	3	3	16
PIE	4	4	-	-	3	3	15
Electrical	4	4	1	1	4	4	18
ECE	4	3	-	-	6	9	18
CSE/IT	4	2	1 (integrated)	-	2	9	15

S 59.10 To consider the proposal for constitution of review/moderation committee at department level where fail percentage in a course is equal to or more than 20% ($\geq 20\%$) for normalization of marks.

It is proposed to constitute a Review Committee (consisting of Head of Deptt. Chairman DUGC and Course Coordinator) at department level where fail percentage in a course is equal to or more than 20%. The Committee will consider the following facts:

1. The difficulty level of paper
2. Issues regarding method of evaluation
3. Other issues as deemed fit by the Review Committee

The Committee will consider the above facts and recommend to award upto maximum 10% of total marks of paper (i.e. 5 marks) as a relaxation measure so that the fail percentage may be brought to about 20%. This relaxation marks will be awarded to each student appearing in that paper subject to not exceeding maximum marks of the paper. The proposal in tabulated form is given below:

Sr.No.	Roll No. of student	Marks Secured out of 50	Marks secured after reviewing by Committee
1	1	14 (F)	14+3 = 17 (F)
2	2	20	20+3 = 23
3	3	25	25+3 = 28
4	4	21	21+3 = 24
3	5	22	22+3 = 25
6	6	31	31+3 = 34
7	7	11 (F)	11+3 = 14 (F)
8	8	17 (F)	17+3 = 20 (P)
9	9	20	20+3 = 23
10	10	18 (F)	18+3 = 21 (P)
11	11	15 (F)	15+3 = 18 (F)
12	12	35	35+3 = 38
13	13	31	31+3 = 34
14	14	27	27+3 = 30
15	15	29	29+3 = 32
16	16	38	38+3 = 41
17	17	30	30+3 = 33
18	18	16 (F)	16+3 = 19 (F)
19	19	28	28+3 = 31
20	20	25	25+3 = 28

Fail percentage = 30%

Fail percentage after Relaxation of marks (5) = 20%

The Senate may consider and discuss.

S 59.11 To consider the proposal for provision of make-up classes during mid sem. break/vacations for the students having reappears.

At present, there is no provision of make-up classes for the students having reappears. The students having reappears need academic help and guidance for clearing the reappear subjects. Therefore, it is proposed to consider the proposal for provision of make-up classes during mid sem. break/vacations for the students having reappears. The students will contact the subject coordinator/faculty member teaching the concerned subject for clearing their doubts. The subject coordinator/faculty member teaching the concerned subject may help the students in any of the following ways:

- By conducting extra classes during mid semester break/vacations in online/offline mode
- By clearing students' doubts online
- By giving assignment to the students
- By providing study material in the form of links for online lecture or in any other form

The Senate may consider and decide.

S 59.12 To consider and approve the Academic Calendars for Odd and Even Semesters of Academic Year 2026-27.

As per discussions with Dean (R&C) and Dean (SW), the Academic Calendars for Odd and Even semesters of AY 2026-27 have been prepared. The classes of all UG and PG programmes will commence from 24.08.2026. Accordingly, the Academic Calendars for all UG and PG programmes for odd and even semesters of AY 2026-27 have been prepared and are placed as Annexure S 59.12.

The Senate may consider and approve.

ACADEMIC CALENDAR FOR ALL UG/PG AND PHD PROGRAMMES
ODD SEMESTER OF AY 2026-27

Sr. No.	Academic Activities	Dates
1.	Registration for Odd Semester Starts	21-08-2026 (Friday)
2.	Commencement of Classes	24-08-2026 (Monday)
3.	Registration for Odd Semester Ends	21-09-2026 (Monday)
3.	Mid Semester Exam-I	28-09-2026 to 30-09-2026 (Monday, Tuesday, Wednesday)
4.	Talent Show	19-09-2026 to 20-09-2026 (Saturday & Sunday)
5.	Confluence-2026	09-10-2026 to 11-10-2026 (starts from 08-10-2026 AN)
6.	Mid Semester Exam-II	18-11-2026 to 20-11-2026 (Wednesday, Thursday, Friday)
7.	Practical Examination Begins during ongoing classes	30-11-2026 (Monday)
8.	Teaching Closes	04-12-2026 (Friday)
9.	End Semester Examination Begins	11-12-2026 (Friday)
10.	End Semester Examination Concludes	28-12-2026 (Monday)
11.	Winter Break	29-12-2026 (Tuesday) to 11-01-2027 (Monday)
12.	Registration (Even Semester:2026-27)	29-12-2026 (Tuesday) to 28-01-2027 (Thursday) (Without late fee)
13	Commencement of Classes (Even Semester:2026-27)	18-01-2027 (Monday)

Late registration will attract a fine as per Notification No. -Acad./2022/1160 dated 22.07.2022.

Note:- Winter Break for Faculty is from 29-12-26 to 11-01-27 and for Students, it is from last date of exam up to 17-01-27

Half Day Classes will be off on 08-10-2026 due to Inaugural of Confluence in afternoon. The notice in this regard will be issued by the Academic Section.

ACADEMIC CALENDAR FOR ALL UG/PG AND PHD PROGRAMMES
EVEN SEMESTER OF AY 2026-27

Sr. No.	Academic Activities	Dates
1.	Registration for Even Semester Starts	11-01-2027 (Monday)
2.	Commencement of Classes	18-01-2027 (Monday)
3.	Registration for Even Semester Ends	10-03-2027 (Wednesday)
4.	CITIUS-2027	05-02-2027 (Friday) to 07-02-2027 (Sunday)
5.	Techspardha-2027	05-03-2027 (Friday) to 07-03-2027 (Sunday)
6.	Mid Semester Exam-I	17-03-2027 to 19-03-2027 (Wednesday, Thursday, Friday)
7.	Mid Semester Break	22-03-2027 (Monday) to 26-03-2027 (Friday)
8.	Mid Semester Exam-II	20-04-2027 to 22-04-2027 (Monday, Tuesday, Wednesday)
9.	Practical Examination Begins during ongoing classes	26-04-2027 (Monday)
10.	Teaching Closes	30-04-2027 (Friday)
11.	End Semester Examination Begins	07-05-2027 (Friday)
12.	End Semester Examination Concludes	24-05-2027 (Monday)
13.	Summer Break	04-06-2027 (Friday) to 19-07-2027 (Monday)
	Registration (Odd Semester:2027-28)	20-07-2027 (Tuesday) to 19-08-2027 (Thursday) (Without late fee) <i>No registration will be allowed after 18-09-2027. Unregistered students will not be allowed to attend the classes.</i>
	Commencement of Classes (Odd Semester:2027-28)	29-07-2027 (Wednesday)

* Late registration will attract a fine as per Notification No. -Acad./2022/1160 dated 22.07.2022.

* Note:- Mid Sem. Break is for Students only. Summer Break for Faculty is from 04-06-27 to 19-07-27 and for Students, it is from last date of exam up to 28-07-27

Half Day Classes will be off on 04-03-2027 due to Inaugural of Techspardha in afternoon. The notice in this regard will be issued by the Academic Section.

S 59.13 To consider the proposal for attendance relaxation of 10% in lieu of clubs, technical events, NCC, NSS, minor medical issues etc. to be allowed by HoD of concerned department to smoothen the process.

As per UG regulations under clause 14.1,

- Minimum requirement of attendance for being eligible to appear in the end semester examinations shall be 75%. However, this may be relaxed upto a maximum of 10%, i.e. upto 65% by the Director.

To smoothen the process, it is proposed that the relaxation of 10% in lieu of clubs, technical events, NCC, NSS, minor medical issues etc. to be allowed by HoD of concerned department. Other rules & regulations of the attendance will remain same.

The Senate may consider and decide.

S 59.14 To consider and approve the scheme & syllabi of M.Sc. Economics (3rd & 4th Semester).

The Senate in its 56th meeting held on 5.8.2025 vide agenda item no. S 56.02 noted the minutes of 69th SCSA meeting held on 23.04.2025 vide which 1st year scheme & syllabi of M.Sc. (Economics) was approved. Now, the scheme & syllabi of M.Sc. (Economics) for 3rd & 4th semester has been received from the department of Humanities & Social Sciences duly approved by BoS which is enclosed as Annexure S 59.14.

The Senate may consider and approve.

**DEPARTMENT OF HUMANITIES AND SOCIAL SCIENCES
NATIONAL INSTITUTE OF TECHNOLOGY
KURUKSHETRA-136119**

No. Hum & S.S/26/274

Date: 15.05.2026

**Minutes of the 33rd Meeting of the Board of Studies of Department of Humanities & Social Sciences
held on 15.05.2026**

The 33rd Meeting of the Board of Studies of the Department of Humanities & Social Sciences, NIT Kurukshetra was held on 15.05.2026 (Friday) at 11:30 am in online mode in the office of HoD. The following attended the meeting:

1. Dr. Kiran Mor	Professor and Head	Chairperson
2. Dr. V. Upadhyay	Professor (IIT Delhi)	External Expert (Online)
3. Dr. Vikas Choudhary	Professor	Member
4. Dr. Geeta Sachdeva	Assistant Professor	Member
5. Dr. Rajesh Sharma	Assistant Professor	Member
6. Dr. Bhawna Shrey	Assistant Professor	Member

At the outset, the undersigned welcomed all the External Experts & Internal Members on the BOS of the Department. Thereafter, the agenda was taken up and following decisions were taken:

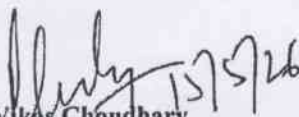
1. The minutes of the 32nd Meeting of the Board of Studies held on 14.01.2026 were confirmed.
2. The Scheme and Syllabi of M.Sc Economics (3rd & 4th Semester) were discussed and approved w.e.f. AY 2026-27.
3. The revision of the syllabi of Financial Education (HSIC-103) & Business Studies (HSIC-104) courses were discussed and approved.

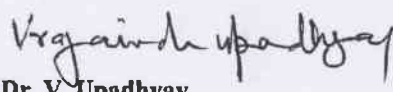
The meeting ended with a vote of thanks to the Chair.


Dr. Bhawna Shrey
Member


Dr. Rajesh Sharma
Member


Dr. Geeta Sachdeva
Member


Dr. Vikas Choudhary
Member


Dr. V. Upadhyay
External Expert (Online)


Dr. Kiran Mor
Chairperson, BOS & HOD

Copy to:
All Members via E-mail
Dean (Academic)

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DEPARTMENT OF HUMANITIES & SOCIAL SCIENCES

Programme: B. Tech

Course Title: Business Studies

Course Category: IC

Course Code: HSIC 104

Credits: 3 (L-3, T-O)

Semester: 1st/2nd

Internal: 50 Marks

Theory: 50 Marks

Total: 100 Marks

Time: 3 hrs

Course Objectives

- The Course is designed to inculcate business attitude and develop skills among students.
- The Course aims to acquaint students with the dynamic nature and inter-dependent aspects of Business.
- The Course aims to familiarize students with theoretical foundations of the Process of organizing and managing the operations of a business firm.

Unit I: Fundamentals of Business

Business: Meaning and Characteristics of Business, Objectives of Business. Classification of Business Activities: Industry and Commerce, Industry types: Primary, Secondary and Tertiary. Types of Businesses: Sole Proprietorship, Partnership, Limited Liability Company, Private and Public Company.

Unit II: Sources of Business Finance

Business Finance: Concept and Importance. Types of Sources of Finance: Long-term Sources (Equity Shares, Preference shares, Debentures, Term Loans, Retained earnings, Loan from Financial Institutions, etc.), Short Term Sources (Trade Credit, Accrued Expenses, Commercial Papers, Public Deposits etc.)

Unit III: Business Services and Social Responsibility of Business

Business Services: Meaning and Types. Banking: Types of Bank Accounts: Savings, Current, Recurring, Fixed Deposit. Emerging Modes of Business, E-business: Concept, Scope and Benefits, E-commerce, Role of Internet. Social Responsibility of Business and Business Ethics.

Course Outcomes

- The Course would help the students in understanding different forms and numerous processes of a business.
- The Course would sensitize the students to practice the ethical behaviour of the businesses.
- The Course will help prepare the students to analyse, manage, evaluate and respond to changes which affect business.

Suggested Readings

1. Business Studies: Learners Book, Oxford Successful
2. Business Studies: Fourth Edition, Ian Chambers and David Gray, CPo
3. Modern Business Organisation: CB Gupta, Sultan Chand and Sons, Educational Publishers, New Delhi.
4. Business Organisation and Management: TN Chhabra, Sun India Publications.



DEPARTMENT OF HUMANITIES & SOCIAL SCIENCES

Programme: B. Tech

Course Title: Financial Education

Course Category: IC
Course Code: HSIC 103
Credits: 3 (L-3, T-O)
Semester: 1st/2nd

Internal: 50 Marks
Theory: 50 Marks
Total: 100 Marks
Time: 3hrs

Course Objectives

The purpose of this course is to empower the students with sound financial knowledge and financial management skills for their long-term financial being.

The course is designed with the strong belief that financial well-being has a positive correlation with the overall well-being of an individual as well as society.

Note for Examiner

The number of questions to be set will be six covering the entire syllabus. The examinees will be required to attempt five questions. All questions shall carry equal marks.

UNIT-I Foundations of Finance

Financial Management: Concept, Finance Function. Financial Goals: Short Term and Long Term. Banking in India: Concepts of Banking, Types of Bank Accounts and Deposits.

UNIT-II Investment Management

Investment Goals: Basic Investment Objectives. Investment and Saving alternatives for a Common Investor: Insurance, Stocks, Bonds, Mutual Fund etc. Stock Markets Primary and Secondary Markets. Criteria for Stock Selection.

UNIT-III Financial Planning and Mutual Funds

Financial Planning: Concept, Objectives and Need for Financial Planning. Mutual Funds: Concept and History of Mutual Funds in India. Types of Mutual Funds. Securities and Exchange Board of India (SEBI).

Course Outcomes

After the completion of this Course, students will be able to acquire financial management skills-essential life skills for 21st Century. It will also enhance their financial literacy and equip them with knowledge and skills critical to make financial decisions.

Suggested Readings

1. Introduction to Financial Planning: Indian Institute of Banking and Finance.
2. Financial Management-MY Khan & PK Jain (Tata McGraw Hill)
3. Financial Management-Sheeba Kapil (Pearson)
4. Financial Literacy for Young Adults Amplified: Raman Keane, Independent Publisher.



Scheme of M.Sc Economics Semester III & IV

Semester III:

Teaching Scheme				Contact Hours/Week		
Sr. No.	Course Code	Course Title	Credits	L	T	P
1	HSEC511	Indian Economy	4	4	0	0
2	HSEC513	Development Economics	4	4	0	0
3	HSEC515	Research Methods and Report Writing	3	3	0	0
4	HSEC5XX	Program Elective I*#	4	-	-	-
5	HSEC5XX	Program Elective II*#	4	-	-	-
		Total	19			

Semester IV:

Teaching Scheme				Contact Hours/Week		
Sr. No.	Course Code	Course Title	Credits	L	T	P
1	HSEC512	Public Economics	4	4	0	0
2	HSEC514	International Economics	4	4	0	0
3	HSEC516	Dissertation/Project Report	6	6	0	0
4	HSEC5XX	Program Elective I*#	4	-	-	-
5	HSEC5XX	Program Elective II*#	4	-	-	-
		Total	22			

*Any 2 courses from the elective course list

#Student may opt for course from MOOC platforms subject to permission from department.





Courses for Semester III

Sr. No.	Course Code	Course Title	Credits	Contact Hours/Week		
				L	T	P
Core Courses						
1	HSEC511	Indian Economy	4	4	0	0
2	HSEC513	Development Economics	4	4	0	0
3	HSEC515	Research Methods and Report Writing	3	3	0	0
Elective Courses*#						
1	HSEC517	Political Economy	4	4	0	0
2	HSEC519	Environmental Economics	4	4	0	0
3	HSEC521	Agricultural Economics	4	4	0	0
4	HSEC523	Labour Economics	4	4	0	0
5	HSEC525	Behavioural Economics	4	4	0	0
6	HSEC527	Causal Inference in Economics & Policy	4	2	0	4
7	HSEC529	Game Theory	4	4	0	0
8	HSEC531	Time Series Econometrics	4	2	0	4
9	HSEC533	Data Science in Economics	4	2	0	4
10	HSEC535	Spatial Econometrics	4	2	0	4

* Any two courses from the list of electives.

Student may opt for course from MOOC platforms **subject** to permission from department.

Courses for Semester IV

Sr. No.	Course Code	Course Title	Credits	Contact Hours/Week		
				L	T	P
Core Courses						
1	HSEC512	Public Economics	4	4	0	0
2	HSEC514	International Economics	4	4	0	0
3	HSEC516	Dissertation/Project Report	6	6	0	0
Elective Courses*#						
1	HSEC518	Health Economics	4	4	0	0
2	HSEC520	Economics of Education	4	4	0	0
3	HSEC522	Urban & Regional Economics	4	4	0	0
4	HSEC524	Financial Economics	4	4	0	0
5	HSEC526	Economics of Technology & Innovation	4	4	0	0
6	HSEC528	Nobel Laureates in Economics: Readings & Application	4	4	0	0
7	HSEC530	Experimental Economics	4	4	0	0
8	HSEC532	Panel Data Econometrics	4	2	0	4
9	HSEC534	AI & Machine Learning in Economics	4	2	0	4
10	HSEC536	History of Economic Thought	4	4	0	0

* Anytwo courses from the list of electives.

Student may opt for course from MOOC platforms subject to permission from department.






SEMESTER III

Syllabi

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DEPARTMENT OF HUMANITIES & SOCIAL SCIENCES
M.Sc. Economics SEMESTER III (CORE)

Course Title: Indian Economy

Course Category: Core

Course Code: HSEC 511

Credits: 4 (L-4, T-O, P-O)

Semester: 3rd

Internal: 50 Marks

Theory: 50 Marks

Total: 100 Marks

Course Objective

This course aims to provide students with a comprehensive understanding of the structure and dynamics of the Indian economy, including growth trends, sectoral performance, policy frameworks, and challenges in development.

UNIT-I: Economic Growth and Structural Change

Nature of the Indian economy: mixed economy characteristics, planning legacy, and market transition; Growth performance of the Indian economy since independence; Structural transformation: agriculture, industry, and services; Economic Reforms; Demographic trends and their implications; Human development indicators, poverty trends, and inter-state inequality; Post-COVID economic recovery and its structural implications.

UNIT-II: Agriculture and Rural Economy

Role of agriculture in economic development; Land reforms, Green Revolution, and other agricultural policies; Food security and the Public Distribution System; Climate change and its implications for Indian agriculture; Digital agriculture: precision farming, e-NAM, and agricultural technology platforms; Rural credit, employment, and poverty alleviation; Critical evaluation of farm policy debates including MSP reform and farm laws controversy.

UNIT-III: Industry, Services, and Infrastructure

Industrial growth, liberalization, privatization, globalization; MSMEs, public sector, and FDI policies; Growth of service sector and role of infrastructure; India's digital public infrastructure: UPI, Aadhaar, and the India Stack; Role of Artificial Intelligence in economic transformation: productivity implications, labour market disruption, and India's AI policy framework; Startup ecosystem and innovation economy.

UNIT-IV: Fiscal, Monetary, and External Sector

Fiscal policy, GST reform, and public debt sustainability; Monetary policy frameworks and financial sector reforms; External sector: trade, balance of payments, WTO and globalization challenges; Regional trading pacts; Tariff Wars; India's role in global supply and value chains; Geopolitical shifts and their implications for India's external sector; Analysis of Union Budget and RBI Annual Report.

Course Outcomes

Upon completion, students will:

- Gain analytical knowledge of the structural features of the Indian economy.
- Critically assess economic reforms and their impacts on different sectors.
- Develop skills to evaluate contemporary policy debates in the Indian context.

Suggested Readings

1. Uma Kapila (Ed.) (2021). *Indian Economy: Performance and Policies*. Academic Foundation.
2. Mishra, S. K., & Puri, V. K. (2019). *Indian Economy: Its Development Experience*. Himalaya Publishing House.
3. Dutt, R. & Sundaram, K. P. M. (2018). *Indian Economy*. S. Chand.
4. Ahluwalia, I. J., & Little, I. M. D. (1998). *India's Economic Reforms and Development*. Oxford University Press.
5. Jalan, B. (2006). *The Indian Economy: Problems and Prospects*. Viking.
6. Panagariya, A. (2008). *India: The Emerging Giant*. Oxford University Press.



7. Dreze, J. & Sen, A. (2013). *An Uncertain Glory: India and its Contradictions*. Princeton University Press.

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DEPARTMENT OF HUMANITIES & SOCIAL SCIENCES
M.Sc. Economics SEMESTER III (CORE)

Course Title: Development Economics

Course Category: Core

Course Code: HSEC 513

Credits: 4 (L-4, T-0, P-0)

Semester: 3rd

Internal: 50 Marks

Theory: 50 Marks

Total: 100 Marks

Course Objective

This course introduces students to the central theories and issues of economic development. It covers the dynamics of growth, poverty, inequality, and the critical role of institutions, agriculture, industry, and globalization in shaping development outcomes. Students will engage deeply with both theoretical models and policy debates.

UNIT I: Concepts and Theories of Development

Defining development: Income, well-being, and multidimensional measures; Classical approaches: Smith, Ricardo, Malthus, and Marx; Neoclassical growth: Harrod-Domar and Solow models; Endogenous growth theory; Big push theory; Dual economy models: Lewis, Fei-Ranis, and Kuznets process; Rostow's stages and criticisms; Demographic transition theory and population-development linkages; Behavioural development economics: psychological and social factors in development decisions; Resource misallocation as a constraint on development.

UNIT II: Poverty, Inequality, and Human Development

Measurement of poverty: headcount ratio, poverty gap, Foster-Greer-Thorbecke (FGT) class of measures, and Sen's index; Multidimensional poverty: Alkire-Foster methodology and the Multidimensional Poverty Index (MPI); Inequality: Income, Wealth and Health; Inequality measurement: Lorenz curve, Gini coefficient, Atkinson index, and Ray's inequality axioms; Human Development Index (HDI) and Sen's Capability Approach; Gender and development; Labour markets and development: informality, wages, and employment quality as dimensions of human development; Sustainable Development Goals (SDGs) as a contemporary policy framework and intergenerational equity.

UNIT III: Institutions, Agriculture, and Industry

Colonial origins of underdevelopment: dependency theory, world systems theory, and Frank-Wallerstein framework; New Institutional Economics: North's framework; Extractive versus inclusive institutions: Acemoglu and Robinson; Role of institutions in land, labor, credit, governance, and corruption; Agrarian institutions: tenancy, sharecropping, interlinkages of land and credit markets; Agriculture-industry linkages and structural transformation; Industrial policy debate: state-led versus market-led development and East Asian developmental states; Dualism and surplus labor debate revisited.

UNIT IV: Trade, Globalization, and Policy Issues

Trade and development: comparative advantage, Prebisch-Singer hypothesis, and infant industry arguments; Washington Consensus: content, implementation, and Stiglitz-Rodrik critique; Globalization: capital flows, FDI, technology diffusion, vulnerability of developing economies; Aid effectiveness debate: Sachs's aid optimism versus Easterly's scepticism and Moyo's Dead Aid critique; Microfinance and poverty alleviation strategies; green finance and climate finance; Technology, digitalisation, and AI as emerging drivers of development and inequality; Case studies in development strategies (East Asia, Sub-Saharan Africa, India).

Course Outcomes: Upon successful completion, students will:

1. Grasp the evolution of development economics as a discipline.
2. Apply theoretical models to analyze poverty, inequality, and growth processes.
3. Critically examine the role of institutions in shaping agricultural and industrial development.



4. Evaluate the impact of globalization and policy interventions on developing economies.

Suggested Readings

1. Ray, D.(1998). *Development Economics*. Princeton University Press.
2. Sen, A. (1999). *Development as Freedom*. Oxford University Press.
3. Todaro, M. P., & Smith, S. C. (2015). *Economic Development*. Pearson.
4. Piketty, T. (2014). *Capital in the ~~twenty-first~~ century*. Harvard University Press.
5. Meier, G. M., & Rauch, J. (2005). *Leading Issues in Economic Development*. Oxford University Press.
6. Thirlwall, A. P. (2011). *Economics o/Development*. Palgrave Macmillan.
7. Stiglitz, J. (2002). *Globalization and Its Discontents*. W.W. Norton.
8. Acemoglu, D. & Robinson, J. A. (2012). *Why Nations Fail*. Crown Publishers.
9. Barro, R. J. & Sala-i-Martin, X. (2004). *Economic Growth*. MIT Press.
10. Alkire, S. et al. (2015). *Multidimensional Poverty Measurement and Analysis*. Oxford University Press
11. Easterly, W. (2006). *The White Man's Burden*. Penguin
12. Chang, H. J. (2002). *Kicking Away the Ladder*. Anthem Press



DEPARTMENT OF HUMANITIES & SOCIAL SCIENCES

M.Sc. Economics SEMESTER III (CORE)

Course Title: Research Methods and Report Writing

Course Category: Core

Course Code: HSEC 515

Credits: 3 (L-3, T-O, P-O)

Semester: 3rd

Internal: 50 Marks

Practical: 50 Marks

Total: 100 Marks

Course Objective

This course is designed to provide students with advanced exposure to research methodology in economics and social sciences. It integrates theory with practice, covering research design, data collection, data analysis, causal inference, and academic writing. Emphasis is placed on rigorous methods (both qualitative and quantitative), reproducibility, and preparation of high-quality research reports and presentations at the level expected in leading global institutions.

UNIT-I: Fundamentals of Research

Meaning, objectives, and types of research; Philosophy of science and research paradigms in economics; Research process and elements of research design; Formulation of research problems, testable hypotheses and review of existing literature; Identification of research gaps; Role of theory, conceptual frameworks, and ethics in research.

UNIT-II: Data Collection and Processing

Primary and secondary sources of data; Survey design, case studies, and experimental methods (RCTs, field and lab experiments); Sampling strategies and representativeness; construction of questionnaires and instruments; coding, cleaning, and treatment of missing values; Reproducible research practices and use of open data repositories (World Bank WDI, NSSO, IHDS).

UNIT-III: Data Analysis and Interpretation

Exploratory data analysis and visualization; Hypothesis testing and confidence intervals; Regression methods and causal inference techniques (OLS, IV, Panel data, Propensity score matching, Difference-in-Differences, and Regression discontinuity); Robustness checks and sensitivity analysis; Interpretation of empirical findings in economics and policy.

UNIT-IV: Report Writing and Presentation

Structure of research reports, Dissertations, and journal articles; Academic writing style, referencing systems and citation management using different software, Plagiarism, intellectual integrity, and research misconduct; Preparation of policy briefs and executive summaries; Advanced tools for professional writing and presentation (LaTeX, Overleaf, R Markdown, Jupyter Notebooks); Strategies for oral defense, peer review, and dissemination of research findings.

Course Outcomes

Upon completion, students will:

- Understand and apply advanced research methodology in economics and related disciplines.
- Acquire skills in designing surveys, experiments, and observational studies, with competence in data collection and processing.
- Apply statistical and econometric methods for robust causal inference and interpretation.
- Develop professional skills in academic writing, report preparation, and presentation using modern tools.
- Practice reproducible and ethical research aligned with global academic standards.



Suggested Readings

1. Creswell, J. W., & Creswell, J. D. (2018). *Research Design: Qualitative, Quantitative, and Mixed Methods Approaches*. Sage.
2. Bryman, A. (2016). *Social Research Methods*. Oxford University Press.
3. Booth, W. C., Colomb, G. G. & Williams, J. M. (2016). *The Craft of Research*. University of Chicago Press
4. Debraj Ray (1998). *Development Economics*. Princeton University Press. (for applied research design in development)
5. Angrist, J. D., & Pischke, J.-S. (2015). *Mastering 'Metrics: The Path from Cause to Effect*. Princeton University Press.
6. Imbens, G., & Rubin, D. (2015). *Causal Inference for Statistics, Social, and Biomedical Sciences*. Cambridge University Press.
7. Gentzkow, M., & Shapiro, J. (2014). *Code and Data for the Social Sciences: A Practitioner's Guide*. University of Chicago (Open Access).
8. Cameron, A. C., & Trivedi, P. K. (2009). *Microeconometrics Using Stata*. Stata Press.

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DEPARTMENT OF HUMANITIES & SOCIAL SCIENCES
M.Sc. Economics SEMESTER III (Program Elective)

Course Title: Political Economy

Course Category: Program Elective

Course Code: HSEC 517

Credits: 4 (L-4, T-0, P-0)

Semester: 3rd

Internal: 50 Marks

Theory: 50 Marks

Total: 100 Marks

Course Objective

To examine how political institutions, processes, and power relations shape economic policies and outcomes, combining insights from economics, political science, and sociology.

UNIT I: Foundations of Political Economy

Historical evolution of political economy - Smith's market liberalism, Marxist political economy and class conflict, Keynesian state intervention, and Hayek's critique of planning; Varieties of capitalism and comparative economic systems; Market and state interactions; Property rights and institutions

UNIT II: Public Choice and Political Institutions

Collective decision-making and social choice: Political business cycles - Nordhaus model and partisan theory: Rent-seeking behaviour: Bureaucracy - Niskanen's model and principal-agent problems in public administration; Voting models and median voter theorem; Interest groups and lobbying

UNIT III: Political Economy of Development

State capacity, governance and economic performance; Acemoglu and Robinson's framework: Inequality and redistribution; Automation, Robotics and AI and politics of Local Development; Role of media and information in governance and accountability

UNIT IV: Contemporary Issues

Globalization and political economy; Populism, political stability, institutional quality, and economic performance; Political economy of reforms in India; Central Bank Independence; Emergence of New World Order and Regional Powers; Political economy of climate change and global collective action; International Political Economy; Deglobalisation: dedollarisation

Course Outcomes

Students will be able to:

- Understand how political factors shape economic outcomes.
- Apply political economy theories to policy debates.
- Analyze institutional and governance issues in economic development.

Readings

1. Acemoglu, D., & Robinson, J. (2012). *Why Nations Fail*. Crown.
2. Persson, T., & Tabellini, G. (2002). *Political Economics*. MIT Press.
3. Drazen, A. (2000). *Political Economy in Macroeconomics*. Princeton.
4. Bardhan, P. (2005). *Scarcity, Conflicts, and Cooperation*. MIT Press.
5. Olson, M. (1971). *The Logic of Collective Action*. Harvard University Press.
6. Besley, T. (2006). *Principled Agents? The Political Economy of Good Government*. Oxford University Press.

DEPARTMENT OF HUMANITIES & SOCIAL SCIENCES
M.Sc. Economics SEMESTER III (Program Elective)

Course Title: Environmental Economics

Course Category: Program Elective

Course Code: HSEC 519

Credits: 4 (L-4, T-O, P-O)

Semester: 3rd

Internal: 50 Marks

Theory: 50 Marks

Total: 100 Marks

Objective

To apply economic tools to analyze environmental challenges, resource management, and sustainable development.

Syllabus:

UNIT-I: Economics of Environment

Concept and scope of environmental economics; Relationship between environment and economic development; Market failure and environmental degradation; Externalities - positive and negative; Property rights and Coase theorem; Public goods and common property resources; Tragedy of the commons and collective action problems.

UNIT-II: Valuation Methods

Need for environmental valuation; Welfare economics foundation of valuation; Methods of valuation - contingent valuation method (CVM), travel cost method (TCM), hedonic pricing, and choice modeling; Measuring willingness to pay (WTP) and willingness to accept (WTA); Cost-benefit analysis in project appraisal; Environmental impact assessment and social cost of carbon.

UNIT-III: Environmental Policy Instruments

Rationale for government intervention; Command-and-control approaches - standards and regulations; Market-based instruments - Pigovian taxes and subsidies, tradable pollution permits, deposit-refund systems; Performance-based regulations; Comparative analysis of policy instruments - efficiency, equity, and administrative feasibility; Case studies of environmental policy implementation in India and abroad.

UNIT-IV: Global Environmental Issues and Governance

Economics of climate change - mitigation and adaptation; International agreements and negotiations - Kyoto Protocol, Paris Agreement, COP summits; Biodiversity loss and conservation policies; Deforestation, desertification, and water scarcity as economic problems; Sustainable development goals (SDGs); Green growth and circular economy; Role of international organizations and NGOs in global environmental governance.

Outcomes:

Students will be able to critically evaluate environmental policies using economic principles, apply valuation techniques to natural resources and environmental goods, and analyze policy responses to global environmental challenges.

Suggested Readings:

- Hanley, N., Shogren, J., & White, B. *Environmental Economics*
- Kolstad, C. D. *Environmental Economics*
- Tietenberg, T., & Lewis, L. *Environmental and Natural Resource Economics*
- Perman, R. et al. (2011). *Natural Resource and Environmental Economics*. Pearson
- Stern, N. (2007). *The Economics of Climate Change: The Stern Review*. Cambridge University Press
- Bateman, I. J. et al. (2002). *Economic Valuation with Stated Preference Techniques*. Edward Elgar



DEPARTMENT OF HUMANITIES & SOCIAL SCIENCES

M.Sc. Economics SEMESTER III (Program Elective)

Course Title: Agricultural Economics

Course Category: Program Elective

Course Code: HSEC 521

Credits: 4 (L-4, T-O, P-O)

Semester: 3rd

Internal: 50 Marks

Theory: 50 Marks

Total: 100 Marks

Objective:

To explore economic principles in agriculture, covering production, markets, and policy.

Syllabus:

UNIT-I: Agriculture in Economic Development

Role of agriculture in economic development; Classical and modern theories of agricultural development (Lewis, Schultz, Mellor, and Boserup); Linkages between agriculture and other sectors - forward and backward linkages; Structural transformation and the declining share of agriculture; Dual economy models and rural-urban migration

UNIT-II: Agricultural Production Economics

Agricultural production functions - Cobb-Douglas, CES, and frontier functions; Resource use efficiency and returns to scale; Farm size-productivity debate; Role of technology and innovations in agriculture - Green Revolution, mechanization, and biotechnology; Risk and uncertainty in agriculture - weather shocks, price volatility, and crop insurance; Decision-making under risk - expected utility theory, safety-first criterion, and portfolio approaches.

UNIT-III: Agricultural Markets and Price Policy

Structure and functioning of agricultural markets; Price determination and cobweb model; Market imperfections - information asymmetry, middlemen, and credit constraints; Storage, warehousing, and buffer stocks; Marketing institutions - regulated markets, cooperatives, contract farming, and e-NAM; Agricultural trade and global value chains; Role of Minimum Support Price (MSP) and price stabilization policies.

UNIT-IV: Agricultural Policy in India

Evolution of agricultural policy since independence; Land reforms, subsidies, and input support policies; Food security policies – Public Distribution System (PDS), National Food Security Act; WTO and agriculture – Agreement on Agriculture, trade liberalization, and implications for India; Agricultural sustainability – soil health, irrigation, and climate change adaptation; Recent policy reforms - crop diversification, doubling farmers' income, and digital agriculture.

Outcomes:

Students will develop an understanding of the role of agriculture in economic development, analyze farm-level production decisions under risk and uncertainty, evaluate the functioning of agricultural markets, and critically assess agricultural policies in India in the context of globalization and sustainability.

Suggested Readings:

- Mellor, J. W. *Agricultural Development and Economic Transformation*
- Sadoulet, E., & de Janvry, A. *Quantitative Development Policy Analysis*
- Rao, C. H. Hanumantha. *Agricultural Growth, Rural Poverty, and Environmental Degradation in India*
- Tomek, W. G. & Kaiser, H. M. (2014). *Agricultural Product Prices*. Cornell University Press
- Dillon, J. L. & Anderson, J. R. (1990). *The Analysis of Response in Crop and Livestock Production*. Pergamon

DEPARTMENT OF HUMANITIES & SOCIAL SCIENCES
M.Sc. Economics SEMESTER III (Program Elective)

Course Title: Labour Economics

Course Category: Program Elective

Course Code: HSEC 523

Credits: 4 (L-4, T-0, P-O)

Semester: 3rd

Internal: 50 Marks

Theory: 50 Marks

Total: 100 Marks

Course Objective

The course aims to examine labour markets, employment, wages, and policies affecting workers and employers, integrating both theoretical frameworks and empirical evidence. It introduces students to the fundamentals of labour supply and demand, wage-setting mechanisms, employment and unemployment dynamics, and the role of institutions and policies. Special emphasis is placed on the challenges of labour markets in developing economies, including informality, globalization, and policy responses.

Syllabus

UNIT I: Labour Market Fundamentals

Nature and characteristics of labour as a factor of production; Labour supply and demand theories - neoclassical model, household decision-making, and firm demand for labour; Human capital theory - education, training, and returns to skills; Job search theory and matching models; Determinants of labour force participation - demographic factors, gender, and migration; Labour market segmentation and dual economy models.

UNIT II: Wage Determination

Wage-setting in competitive vs. non-competitive labour markets; Monopsony power and implications for wages and employment; Compensating wage differentials - risk, working conditions, and amenities; Efficiency wage theories - shirking, turnover, nutrition, and sociological explanations; Impact of technological change and globalization on wage structures; Empirical wage equations and returns to education.

UNIT III: Employment and Unemployment, and Informal Labour

Concepts and measurement of employment, unemployment, and underemployment; Types of unemployment - frictional, structural, cyclical, and seasonal; Labour market rigidities and employment generation; Informal labour markets - size, characteristics, and policy challenges in developing economies; Gig economy and platform labour - emerging forms of work and regulatory challenges; Employment generation schemes and labour market interventions; Empirical case studies from India and other emerging economies.

UNIT IV: Labour Institutions, Policies, and Globalization

Role of trade unions, collective bargaining, and employer associations in wage determination and industrial relations; Minimum wage legislation - rationale, effectiveness, and debates; Employment protection laws, contract labour, and social security provisions; Gender and labour policies; Labour migration - domestic and international perspectives; Globalization and labour market outcomes - outsourcing, labour standards, and international competitiveness.

Learning Outcomes

On successful completion of the course, students will be able to:

Understand the functioning of labour markets and wage dynamics under different institutional settings. Evaluate the effectiveness of labour policies in India and in comparative global contexts. Apply empirical and econometric tools to labour market data for policy analysis. Critically analyze challenges related to informal employment, inequality, and globalization.

Suggested Readings

1. Borjas, G. (2020). *Labour Economics*. McGraw Hill.
2. Ehrenberg, R., & Smith, R. (2017). *Modern Labour Economics*. Routledge.
3. ILO (various reports). *Global Employment Trends*.
4. Papola, T. S., & Pais, J. (2007). *Labour and Employment in India*.
5. Manning, A. (2003). *Monopsony in Motion*. Princeton University Press
6. Deshpande, L. K. et al. *Liberalisation and Labour: Labour Flexibility in Indian Manufacturing*. Institute for Human Development
7. Becker, G. S. (1962). Investment in human capital: A theoretical analysis. *Journal of political economy*, 70(5, Part 2), 9-49.
8. Mincer, J. (1974). Schooling, experience, and earnings. *Human behavior & social institutions* no. 2.
9. Angrist, J. D., & Krueger, A. B. (1991). Does compulsory school attendance affect schooling and earnings? *The quarterly journal of economics*, 106(4), 979-1014.
10. Card, D., & Krueger, A. B. (1993). Minimum wages and employment: A case study of the fast food industry in New Jersey and Pennsylvania.
11. Goldin, C. (2006). The quiet revolution that transformed women's employment, education, and family. *American economic review*, 96(2), 1-21.

DEPARTMENT OF HUMANITIES & SOCIAL SCIENCES

M.Sc. Economics SEMESTER IV (program Elective)

Course Title: Behavioural Economics

Course Category: Program Elective

Course Code: HSEC 525

Credits: 4 (L-4, T-O, P-O)

Semester: 3rd

Internal: 50 Marks

Theory: 50 Marks

Total: 100 Marks

Course Objective

This course introduces students to the insights of behavioural economics, highlighting systematic deviations from the assumptions of rational choice theory. It examines how cognitive limitations, psychological biases, and heuristics shape individual decision-making under risk, uncertainty, and intertemporal settings. The course explores foundational theories such as prospect theory, time inconsistency, and models of self-control, while also emphasizing the role of nudges and behavioral interventions in improving policy effectiveness. By integrating psychology with economics, the course equips students to analyze real-world decisions and apply behavioural insights in economic, business, and policy contexts.

Syllabus

UNIT I: Foundations of Behavioural Economics

Origins and evolution of behavioural economics; Departure from rational choice theory; Bounded rationality; Heuristics and biases; Contributions of Simon, Kahneman, and Tversky; Experimental evidence against standard models.

UNIT II: Prospect Theory, Mental Accounting, and Risk Preferences

Expected utility theory and its violations; Prospect theory: reference dependence, loss aversion, probability weighting; Mental accounting and the endowment effect; Applications to insurance, investment, and market behaviour; empirical evidence on risk preferences.

UNIT III: Time Inconsistency and Self-Control

Exponential vs hyperbolic discounting; quasi-hyperbolic models; Procrastination, under saving, and addiction as manifestations of time inconsistency; Present bias in labour supply and consumption decisions; Commitment devices and self-control mechanisms; Behavioural applications in health and personal finance.

UNIT IV: Behavioural Game Theory, Nudges, and Policy Applications

Behavioural game theory - level-k thinking, cognitive hierarchy models, and beauty contest experiments; Concept and design of nudges; Libertarian paternalism; Applications of behavioural insights in pensions, taxation, health, and environment; Ethical concerns around paternalism and autonomy; Real-world case studies of behavioural policies.

Learning Outcomes

By the end of the course, students will be able to:

- Explain major departures from classical rational choice models.
- Apply prospect theory to real-world contexts involving risk and uncertainty.
- Analyze issues of time inconsistency and evaluate solutions through behavioural interventions.
- Assess the role and effectiveness of nudges in economic policy design.

Suggested Readings

1. Thaler, R. H. (2015). Misbehaving: The Making of Behavioural Economics. W.W. Norton.
2. Kahneman, D. (2011). Thinking, Fast and Slow. Farrar, Straus and Giroux.
3. Camerer, C. F. (2003). Behavioural Game Theory. Princeton University Press.
4. Mullainathan, S., & Shafir, E. (2013). Scarcity: Why Having Too Little Means So Much. Macmillan.

5. Sunstein, C. R. (2014). *Why Nudge? The Politics of Libertarian Paternalism*. Yale University Press.
6. Camerer, C. F., Loewenstein, G. & Rabin, M. (Eds.) (2004). *Advances in Behavioral Economics*. Princeton University Press



DEPARTMENT OF HUMANITIES & SOCIAL SCIENCES

M.Sc. Economics SEMESTER III (Program Elective)

Course Title: Causal Inference in Economics and Policy

Course Category: Program Elective

Course Code: HSEC 527

Credits: 4 (L-2, T-O, P-4)

Semester: 3rd

Internal: 50 Marks

Theory: 50 Marks

Total: 100 Marks

Objective:

This course equips students with rigorous tools for causal identification and programme evaluation, bridging econometric methods with real-world policy applications. It develops competence in designing and critically evaluating randomised and quasi-experimental approaches, while building applied skills in translating causal estimates into actionable policy recommendations across health, education, labour, and social protection.

Syllabus:

UNIT-I: Counterfactual Framework and Causal Identification

Potential outcomes and counterfactual reasoning; Assumptions for identification: ignorability, SUTVA, and overlap; Causal graphs and Directed Acyclic Graphs (DAGs); Identification of confounding, mediation, and colliders; Connection between DAGs and potential outcomes; policy relevance of causal identification: moving from correlation to causation in economic research.

UNIT-II: Randomised Controlled Trials and Field Experiments

Design and implementation of RCTs; Randomisation strategies: simple, stratified, and clustered; Threats to validity: noncompliance, attrition, spillovers, and Hawthorne effects; Balance checks and power analysis; Internal versus external validity; Ethical and practical challenges; RCT applications in development, health, education, and social protection: evidence from J-PAL and IPA studies; Translating RCT findings into policy recommendations.

UNIT-III: Instrumental Variables, Difference-in-Differences, and Natural Experiments

Natural experiments as policy evaluation tools; Instrumental variable estimation: relevance, exclusion restriction, weak instruments, and LATE interpretation; Difference-in-Differences: parallel trends assumption, pre-trends tests, staggered adoption, and event study designs; Triple differences; Policy applications: labour market programmes, health interventions, and welfare schemes in India and developing economies.

UNIT-IV: Regression Discontinuity, Synthetic Controls, and Policy Practice

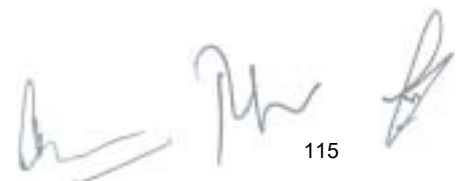
Sharp and fuzzy regression discontinuity designs; Graphical and formal estimation; Bandwidth selection and robustness checks; Synthetic control methods for comparative policy evaluation; Extensions to staggered adoption and case studies; Cost-benefit integration: translating causal estimates into policy decisions; Case studies from Indian policy: MGNREGA, Direct Benefit Transfers, and Ayushman Bharat; Emerging approaches: machine learning for causal inference, big data in policy evaluation.

Outcomes:

Upon successful completion, students will be able to apply counterfactual reasoning and causal identification methods to economic and policy questions, design and critically evaluate RCTs and quasi-experimental studies, and assess published empirical work for identification assumptions and robustness. Students will further demonstrate the ability to integrate causal estimates with cost-benefit analysis to inform policy design, and communicate evaluation findings effectively for both academic and policy audiences.

Suggested Readings:

- Angrist, J., & Pischke, J. (2009). *Mostly Harmless Econometrics*. Princeton University Press.



- Imbens, G., & Rubin, D. (2015). *Causal Inference for Statistics, Social, and Biomedical Sciences*. Cambridge University Press.
- Pearl, J., & Mackenzie, D. (2018). *The book of why: the new science of cause and effect*. Basic books.
- Hernan, M., & Robins, J. (2020). *Causal Inference: What If*. Chapman & Hall/CRC.
- Angrist, J., & Pischke, J. (2014). *Mastering 'Metrics: The Path from Cause to Effect*. Princeton University Press.
- Scott Cunningham (2021). *Causal Inference: The Mixtape*. Yale University Press.
- Bardach, E., & Patashnik, E. M. *A Practical Guide for Policy Analysis*.
- Pearl, J. (2009). *Causality*. Cambridge university press.
- Gertler, P. J. et al. (2016). *Impact Evaluation in Practice*. World Bank Publications
- Susan Athey, Guido W. Imbens. 2019. Machine Learning Methods That Economists Should Know About. *Annual Review Economics*. 11 :685-725.



DEPARTMENT OF HUMANITIES & SOCIAL SCIENCES
M.Sc. Economics SEMESTER III (Program Elective)

Course Title: Game Theory
Course Category: Program Elective
Course Code: HSEC 529
Credits: 4 (L-4, T-0, P-0)
Semester: 3rd

Internal: 50 Marks
Theory: 50 Marks
Total: 100 Marks

Objective:

To provide students with analytical tools for understanding and analyzing strategic interactions among rational agents, with applications in economics, business, and public policy.

Syllabus

UNIT-I: Foundations of Game Theory

Introduction to strategic interaction and rational choice; Representation of games in normal (strategic) form and extensive form; Strategies - pure and mixed; Concepts of dominance - strictly dominant, weakly dominant, and dominated strategies; Iterated elimination of dominated strategies; Backward induction in finite games of perfect information.

UNIT-II: Nash Equilibrium and Repeated Games

Definition, properties, existence and uniqueness of Nash equilibrium; Computation of equilibria in normal and extensive form games; Mixed strategy equilibria – motivation and applications; Repeated games - finite and infinite horizon; Folk theorem and strategies for cooperation in repeated interactions; Applications to collusion, coordination, and enforcement.

UNIT-III: Games with Incomplete Information

Types of incomplete information – asymmetric information, hidden actions, hidden information; Bayesian games and Bayesian Nash equilibrium; Perfect Bayesian equilibrium in dynamic settings; Signaling games and screening models; Applications in markets with adverse selection and moral hazard; Reputation and information transmission in games.

UNIT-IV: Applications in Economics

Auction theory - first-price, second-price, all-pay, and English auctions; Revenue equivalence theorem and auction design; Bargaining models – Nash bargaining solution, alternating offers, and real-world applications; Oligopoly models - Cournot, Bertrand, and Stackelberg competition; Policy applications - regulation, trade negotiations, and voting games.

Outcomes:

Students will be able to model and analyze strategic decision-making problems, identify and compute different equilibrium concepts, and apply game-theoretic reasoning to real-world economic and policy situations such as auctions, bargaining, and oligopoly behavior.

Suggested Readings:

- Osborne, M. J. *An Introduction to Game Theory*
- Gibbons, R. *Game Theory for Applied Economists*
- Myerson, R. B. *Game Theory: Analysis of Conflict*
- Tadelis, S. *Game Theory: An Introduction*
- Krishna, V. (2009). *Auction Theory*. Academic Press

DEPARTMENT OF HUMANITIES & SOCIAL SCIENCES
M.Sc. Economics SEMESTER III (program Elective)

Course Title: Time Series Econometrics

Course Category: Program Elective

Course Code: HSEC 531

Credits: 4 (L-2, T-O, P-4)

Semester: 3rd

Internal: 50 Marks

Theory: 50 Marks

Total: 100 Marks

Objective:

To equip students with theoretical understanding and practical tools for analyzing time-dependent economic and financial data, focusing on both stationary and non-stationary processes and advanced models of dynamic behavior.

Syllabus

UNIT-I: Stationarity and ARMA/ARIMA Models

Nature of time series data - trends, seasonality, cycles, and randomness; Concepts of weak and strict stationarity; Autocovariance and autocorrelation functions; White noise processes; Autoregressive (AR), Moving Average (MA), and Autoregressive Moving Average (ARMA) models; Box-Jenkins methodology - identification, estimation, diagnostic checking, and forecasting; ARIMA models for non-stationary series; Seasonal ARIMA models and their applications in macroeconomic and financial forecasting.

UNIT-II: Unit Roots, Cointegration, and Error Correction Models

Random walks and spurious regressions; Unit root tests - Dickey-Fuller, Augmented Dickey-Fuller, Phillips-Perron, and KPSS tests; Cointegration and its economic interpretation; Engle-Granger two-step method; Johansen's maximum likelihood approach; Error Correction Models (ECMs) and their role in capturing short-run dynamics with long-run equilibrium relationships; Applications in demand functions, consumption-income dynamics, and interest rate parity.

UNIT-III: Vector Autoregression (VAR), Causality, and Impulse Response Analysis

Introduction to multivariate time series; VAR models – specification, lag selection, estimation, and forecasting; Granger causality tests and their applications in economics; Impulse response functions - interpretation and policy applications; Forecast error variance decomposition (FEVD); Structural VAR (SVAR) models and identification issues; Applications in macroeconomic policy analysis, monetary shocks, and international linkages.

UNIT-IV: Volatility Modeling and Financial Time Series

Stylized facts of financial time series - volatility clustering, leptokurtosis, fat tails; Autoregressive Conditional Heteroskedasticity (ARCH) models; Generalized ARCH (GARCH) models - estimation and properties; Extensions - EGARCH, TGARCH, and GARCH-M; Forecasting volatility and risk measurement; Value-at-Risk (VaR) and applications in financial markets; Use of volatility models for portfolio management, derivative pricing, and risk regulation.

Outcomes:

Students will develop the ability to handle and analyze time series data using appropriate econometric techniques. They will be able to model and forecast economic and financial variables, test for unit roots and cointegration, apply VAR methods for policy analysis, and use ARCH/GARCH models for volatility forecasting.

Suggested Readings:

- Hamilton, J. D. *Time Series Analysis*
- Enders, W. *Applied Econometric Time Series*
- Lutkepohl, H. *Introduction to Multiple Time Series Analysis*
- Tsay, R. S. *Analysis of Financial Time Series*

DEPARTMENT OF HUMANITIES & SOCIAL SCIENCES

M.Sc. Economics SEMESTER III (Program Elective)

Course Title: Data Science in Economics

Course Category: Program Elective

Course Code: HSEC 533

Credits: 4 (L-2, T-O, P-4)

Semester: 3rd

Internal: 50 Marks

Theory: 50 Marks

Total: 100 Marks

Objective:

To introduce students to modern computational tools and methods for handling, analyzing, and interpreting economic data. The course bridges economics with data science by combining statistical theory, machine learning, and big data applications, enabling students to conduct advanced empirical research and address real-world policy challenges.

Syllabus:

UNIT-I: Public Data Sources and Data Cleaning

Overview of publicly available datasets: Household surveys, national accounts, and international databases; Understanding codebooks, variable labels, survey weights, and sampling design; Data cleaning: handling missing values, duplicates, outliers, recoding, and variable construction; Data wrangling: importing, reshaping, merging, and transforming datasets using Stata and R; Working with survey microdata and sampling weights using `svyset` in Stata and the survey package in R; Accessing data through APIs.

UNIT-II: Exploratory Data Analysis and Visualization

Exploratory data analysis (EDA): summary statistics, cross-tabulations, distributional analysis, and kernel density estimates; Data visualization: graphs, charts, and dashboards using Stata and R; Use of packages such as `ggplot2`, `sf`, and `RColorBrewer` in R alongside Stata's visualization commands; Producing publication-quality tables and figures in Stata and R; Visualizing spatial economic data: district and state-level maps in Stata and R.

UNIT-III: Machine Learning for Economists

Introduction to supervised and unsupervised learning; Linear and logistic regression for prediction; Classification techniques: decision trees, random forests, and support vector machines implemented using R; Model evaluation: cross-validation, bias-variance trade-off, confusion matrix, ROC curves; Clustering methods: K-means and hierarchical clustering; Dimensionality reduction techniques such as Principal Component Analysis (PCA).

UNIT-IV: Applications, Ethics, and Reproducibility

Text as data: tokenization, sentiment analysis, and topic modelling using `tidytext` in R; Applications in policy documents, news, and administrative data; Causal inference using ML: double machine learning, propensity score methods in Stata, and heterogeneous treatment effects in R; Applications in labour economics, development economics, and public policy; Data ethics: algorithmic bias, fairness in machine learning, and data protection regulations; Open science practices: reproducible code, replication, and documentation; Limitations of ML and big data approaches in economic analysis.

Outcomes:

Students will acquire hands-on experience in Stata and R for data analysis and visualization, apply machine learning techniques to economic datasets, and critically evaluate policy issues using computational methods. They will also develop awareness of ethical and reproducibility issues in handling large-scale data, preparing them for research and professional work in academia, industry, and policy.

Suggested Readings:

- Varian, H. R. (2014). *Big Data: New Tricks for Econometrics*. Journal of Economic Perspectives.



- Mullainathan, S., & Spiess, J. (2017). *Machine Learning: An Applied Econometric Approach*. Journal of Economic Perspectives.
- Gentzkow, M., Kelly, B., & Taddy, M. (2019). *Text as Data*. Journal of Economic Literature.
- James, G., Witten, D., Hastie, T., & Tibshirani, R. (2021). *An Introduction to Statistical Learning with Applications in R*.
- McKinney, W. (2022). *Python for Data Analysis*. O'Reilly
- O'Neil, C. (2016). *Weapons of Math Destruction*. Crown Publishers

DEPARTMENT OF HUMANITIES & SOCIAL SCIENCES

M.Sc. Economics SEMESTER III (Program Elective)

Course Title: Spatial Econometrics

Course Category: Program Elective

Course Code: HSEC 535

Credits: 4 (L-2, T-O, P-4)

Semester: 3rd

Internal: 50 Marks

Theory: 50 Marks

Total: 100 Marks

Objective

To analyze spatial dependence and spatial heterogeneity in economic data, equipping students with advanced tools to understand how location, geography, and spatial interactions shape economic outcomes. The course emphasizes both theory and applications, enabling students to apply spatial econometric techniques to regional, urban, and environmental problems.

Syllabus

UNIT-I: Spatial Data and Exploratory Spatial Analysis

Introduction to spatial data - cross-sectional, panel, and lattice structures; Types of spatial datasets - point data, areal data, and spatial networks; Spatial weights matrices (contiguity-based, distance-based, and k-nearest neighbors); Visualization of spatial data using maps and GIS tools; Exploratory Spatial Data Analysis (ESDA) - identifying clustering patterns, hot spots, and spatial outliers; Case illustrations from regional and urban datasets.

UNIT-II: Spatial Autocorrelation

Concept of spatial dependence and its implications for econometrics; Global spatial autocorrelation - Moran's I, Geary's C; Local Indicators of Spatial Association (LISA) for detecting local clusters and heterogeneity; Spatial correlograms; Hypothesis testing and significance of spatial autocorrelation; Practical applications in detecting regional disparities, neighborhood effects, and spatial diffusion processes.

UNIT-III: Spatial Econometric Models

Econometric consequences of ignoring spatial dependence - biased and inefficiency estimators; Spatial autoregressive models (SAR), spatial error models (SEM), and spatial Durbin models (SDM); Estimation techniques - Maximum Likelihood (ML), Generalized Method of Moments (GMM); Interpretation of spatial spillover effects; Software implementation in R, Stata, and GeoDa; Applications in housing markets, regional growth, and environmental externalities.

UNIT-IV: Applications in Regional, Urban, and Environmental Economics

Use of spatial econometrics in regional inequality analysis, labor market spillovers, and urban agglomeration; Spatial modeling of land use, housing prices, and transportation networks; Applications in environmental economics – diffusion of pollution, spatial distribution of natural resources, and conservation policy; Policy relevance of spatial dependence in planning, governance, and development strategies; Case studies based on Indian regional and urban datasets.

Outcomes:

Students will develop the ability to detect and model spatial dependence in economic phenomena, apply advanced econometric techniques for spatial analysis, and interpret policy implications of spatial heterogeneity. They will gain hands-on experience with spatial econometric software, preparing them for applied research in regional science, urban planning, and environmental studies.

Suggested Readings:

- Anselin, L. (1988). *Spatial Econometrics: Methods and Models*. Springer.
- LeSage, J., & Pace, R. K. (2009). *Introduction to Spatial Econometrics*. Chapman and Hall/CRC.
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- Ward, M. D., & Gleditsch, K. S. (2008). *Spatial Regression Models*. Sage
- Bivand, R. S., Pebesma, E. & Gomez-Rubio, V. (2013). *Applied Spatial Data Analysis with R*. Springer

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SEMESTER IV

Syllabi

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DEPARTMENT OF HUMANITIES & SOCIAL SCIENCES
M.Sc. Economics SEMESTER IV (CORE)

Course Title: Public Economics

Course Category: Core

Course Code: HSEC 512

Credits: 4 (L-4, T-0, P-0)

Semester: 4th

Internal: 50 Marks

Theory: 50 Marks

Total: 100 Marks

Course Objective

This course introduces the principles of public economics with a focus on the role of the government in economic activities, taxation, expenditure, public goods, and fiscal federalism. It equips students with analytical tools to evaluate the impact of public policies.

UNIT I: Role of Government, Market Failure, and Public Goods

Role of government in a mixed economy; Social welfare functions and distributional objectives; Market failure: public goods, externalities, asymmetric information, and principal-agent problems; Samuelson optimality condition and the free-rider problem; Lindahl equilibrium and its limitations; Pigouvian taxes and subsidies and Coase theorem; Government failure and public choice: rent seeking, median voter theorem, and Buchanan's contribution.

UNIT II: Public Expenditure, Social Insurance, and Cost-Benefit Analysis

Theories of public expenditure growth: Wagner's law and Peacock-Wiseman displacement hypothesis; Optimal public expenditure and public choice; Social insurance: rationale and fiscal implications of pension systems and health financing; Principles and techniques of social cost-benefit analysis; Shadow pricing, social discount rate, and treatment of risk and uncertainty; Distributional weights in project appraisal.

UNIT III: Taxation and Public Revenue

Principles of taxation: equity, efficiency, and administrative feasibility; Tax incidence: partial and general equilibrium approaches; Deadweight loss and excess burden of taxation; Optimal tax theory: Ramsey rule and Diamond-Mirrlees framework; Direct and indirect taxes: design and efficiency considerations; GST: structure, rationale, and reform experience in India; Digital taxation and taxation of platform economy; International taxation: transfer pricing and Base Erosion and Profit Shifting (BEPS).

UNIT IV: Fiscal Policy and Federal Finance

Fiscal policy: objectives and instruments; Ricardian equivalence: theoretical basis and empirical critique; Deficit financing, public debt, and fiscal sustainability; Fiscal rules and FRBM; Fiscal federalism: Musgrave's assignment problem and Oates' decentralisation theorem; Tiebout model and interjurisdictional competition; Intergovernmental transfers: grants, revenue sharing, and equalisation; Centre-state financial relations in India, Finance Commission and GST council.

Course Outcomes

Upon completion, students will:

- Understand the rationale for government intervention in the economy.
- Analyze taxation and expenditure policies and their economic implications.
- Evaluate fiscal challenges and intergovernmental financial relations.

Suggested Readings

1. Musgrave, R. A., & Musgrave, P. B. (1989). *Public Finance in Theory and Practice*. McGraw-Hill.
2. Stiglitz, J. E. (2000). *Economics of the Public Sector*. W. W. Norton.
3. Rosen, H. S., & Gayer, T. (2014). *Public Finance*. McGraw-Hill.
4. Atkinson, A. B., & Stiglitz, J. E. (1980). *Lectures on Public Economics*. McGraw-Hill.

5. Bhatia, H. L. (2019). *Public Finance*. Vikas Publishing House.
6. Oates, W. E. (1972). *Fiscal Federalism*. Harcourt Brace.
7. Boardman, A. E. et al. (2018). *Cost-Benefit Analysis: Concepts and Practice*. Cambridge University Press.



DEPARTMENT OF HUMANITIES & SOCIAL SCIENCES
M.Sc. Economics SEMESTER IV (CORE)

Course Title: International Economics

Course Category: Core

Course Code: HSEC 514

Credits: 4 (L-4, T-O, P-O)

Semester: 4th

Internal: 50 Marks

Theory: 50 Marks

Total: 100 Marks

Course Objective

This course aims to provide an understanding of international trade and finance theories, policies, and institutions. It develops analytical tools to examine trade patterns, exchange rate systems, balance of payments, and the role of international organizations.

UNIT I: Theories of International Trade

Classical theories: Absolute and comparative advantage; Dornbusch-Fischer-Samuelson continuum model; Specific factors model and income distribution effects; Heckscher-Ohlin model: factor endowments and trade patterns; Stolper-Samuelson theorem; Rybczynski theorem, and factor price equalisation; Leontief paradox and empirical testing; New trade theory and economies of scale; Intra-industry trade and the Krugman model; Gravity model of trade and empirical applications; Global value chains and trade in tasks as contemporary extensions of trade theory.

UNIT II: Trade Policy and Protection

Tariffs: partial and general equilibrium effects; Optimal tariff theory and terms of trade argument; Quotas, voluntary export restraints, and non-tariff barriers; Strategic trade policy and its limitations; Trade and income distribution: winners and losers from globalisation; Economic integration: free trade areas, customs unions, common markets; Trade creation and trade diversion; WTO: principles, dispute settlement, and contemporary challenges; Digital trade and e-commerce as emerging trade policy issues; Trade policies of developing countries

UNIT III: Balance of Payments and Exchange Rates

Balance of payments accounting and inter-relationships between accounts; Exchange rate determination: purchasing power parity, and interest parity; Mundell-Fleming model: under fixed and flexible exchange rate regimes; Dornbusch overshooting model; Marshall-Lerner condition, and the J-curve effect; Absorption approach and expenditure switching policies; Capital flows, sudden stops, and balance of payments crises; Currency wars and competitive devaluations as contemporary policy issues; Exchange rate policy in developing and emerging economies.

UNIT IV: International Monetary System

Evolution of international monetary system: gold standard, Bretton Woods, and post-Bretton Woods; Impossible trinity: Mundell's trilemma and policy implications; Currency crises: first, second, and third generation models; Contagion and financial vulnerability in emerging economies; Role of IMF: surveillance, conditionality, and Special Drawing Rights; Geopolitics and de-dollarisation: emerging challenges to dollar hegemony; Climate finance and green bonds in the international financial architecture; Global imbalances, reserve accumulation, and reform of international financial institutions.

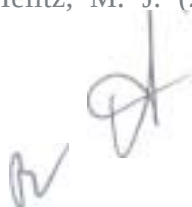
Course Outcomes

Upon completion, students will:

- Understand the theoretical foundations of international trade and finance.
- Critically evaluate trade and exchange rate policies.
- Analyze the role of international institutions in shaping global economic relations.

Suggested Readings

1. Krugman, P. R., Obstfeld, M., & Melitz, M. J. (2018). *International Economics: Theory and Policy*. Pearson.



2. Salvatore, D. (2013). *International Economics*. Wiley.
3. Appleyard, D. R., & Field, A. 1. (2014). *International Economics*. McGraw-Hill.
4. Feenstra, R. C. & Taylor, A. M. (2017). *International Economics*. Worth Publishers.
5. Bhagwati, J. (2007). *In Defense of Globalization*. Oxford University Press.
6. Obstfeld, M. & Rogoff, K. (1996). *Foundations of International Macroeconomics*. MIT Press



DEPARTMENT OF HUMANITIES & SOCIAL SCIENCES
M.Sc. Economics SEMESTER IV (CORE)

Course Title: Dissertation / Project Report

Course Category: Core

Course Code: HSEC 516

Credits: 6 (L-6, T-0, P-0)

Semester: 4th

Internal: 50 Marks

Practical: 50 Marks

Total: 100 Marks

Course Objective

This course builds upon the earlier course on *Research Methods and Report Writing*. Students are expected to independently undertake an empirical/theoretical study on a chosen topic in economics, applying appropriate research methods and presenting the findings in a dissertation/project report.

UNIT I: Research Proposal and Approval

Refinement of research problem identified earlier; Systematic literature review and identification of research gaps; Formulation of research objectives, questions, and testable hypotheses; Preparation and submission of a detailed research proposal; Responsible use of AI tools in academic research: permissible applications and ethical boundaries; Approval of topic and research plan by supervisor/departamental committee; Detailed work plan and timeline

UNIT II: Data Collection / Theoretical Framework

Implementation of data collection strategy (survey/secondary sources); Development of theoretical or conceptual framework; Operationalisation of variables and construction of research instruments; Ethical considerations in research; Data documentation standards and open data practices; Reproducible research tools.

UNIT III: Analysis and Results

Application of econometric/statistical tools appropriate to the research design; Empirical analysis or theoretical modelling; Interpretation of results in relation to hypotheses/objectives. Robustness checks, sensitivity analysis, and treatment of limitations; Critical reflection on policy or theoretical implications of findings.

UNIT IV: Dissertation Writing and Defence

Finalization of dissertation structure and chapters; Drafting, revising, and editing; Plagiarism, AI-assisted writing disclosures, and academic integrity standards; Preparation of bibliography and appendices; Submission of the completed dissertation; preparation and delivery of viva-voce presentation; response to examiner queries and incorporation of revisions.

Course Outcomes

Upon completion, students will:

- Apply research methodology in a focused dissertation/project.
- Demonstrate ability to work independently under supervision.
- Write and present a structured academic dissertation that reflects analytical rigor and clarity.

Suggested Readings

1. Bryman, A. (2016). *Social Research Methods*. Oxford University Press.
2. Creswell, J. W. (2018). *Research Design: Qualitative, Quantitative and Mixed Methods Approaches*. Sage.
3. Kumar, R. (2019). *Research Methodology: A Step-by-Step Guide/or Beginners*. Sage.
4. Supplementary journal articles relevant to student's chosen topic.

DEPARTMENT OF HUMANITIES & SOCIAL SCIENCES

M.Sc. Economics SEMESTER IV (Program Elective)

Course Title: Health Economics

Course Category: Program Elective

Course Code: HSEC 518

Credits: 4 (L-4, T-Q P-O)

Semester: 4th

Internal: 50 Marks

Theory: 50 Marks

Total: 100 Marks

Course Objective

The objective of this course is to introduce students to the economic concepts underlying health and healthcare systems, with a focus on both theory and applied policy issues. Students will study healthcare markets, the demand and supply of health services, the functioning of health insurance, and the challenges of moral hazard and adverse selection. The course will also provide training in evaluating health interventions using economic tools such as cost-effectiveness and cost-benefit analysis. Finally, it will examine the role of health policy and public health programs in shaping health outcomes, particularly in developing countries.

Syllabus

UNIT I: Introduction to Health Economics and Healthcare Markets

Introduction to health economics: Concept of health as a consumption good and as an investment good; Arrow's contribution to health economics and the special characteristics of healthcare markets; Grossman's model of health demand; Determinants of healthcare utilization - income, education, demographics, and health status; Supply-side considerations - provider behavior, pricing, and regulation; Market failures in healthcare - externalities, information asymmetry, and public goods; International comparisons of healthcare systems.

UNIT II: Health Insurance and Information Problems

Need for health insurance - risk pooling and financial protection; Types of health insurance - public, private, and community-based models; Concepts of adverse selection and moral hazard in insurance markets; Mechanisms to address information problems - co-payments, deductibles, and managed care; Insurance reforms and their impact on efficiency and equity; Case studies of health insurance schemes in India (Ayushman Bharat, RSBY) and other countries.

UNIT III: Cost-Effectiveness and Economic Evaluation in Health

Introduction to economic evaluation in health - cost-effectiveness analysis (CEA), cost-utility analysis (eUA), and cost-benefit analysis (CBA); Measuring health outcomes - QALYs (Quality-Adjusted Life Years), DALYs (Disability-Adjusted Life Years); Burden of disease analysis and its policy applications; Incremental cost-effectiveness ratios (ICERs) and decision-making thresholds; Applications of health technology assessment (HTA); Case studies in resource allocation for health interventions.

UNIT IV: Health Policy and Public Health Interventions

Role of government in healthcare provision and financing; Public health economics prevention vs. cure; Policy interventions to address health inequalities; Health workforce and human resources for health; Evaluation of public health programs in India - National Health Mission, immunization programs, nutrition interventions; Global health policies and lessons from international experience.

Learning Outcomes

On successful completion of this course, students will be able to:

- Understand the economic foundations of health demand, supply, and healthcare markets.
- Analyze the functioning of health insurance and the challenges posed by information asymmetry.

- Apply cost-effectiveness and other economic evaluation tools to assess health interventions.
- Evaluate health policies and public health programs in the context of both developed and developing economies.

Suggested Readings

1. Folland, S., Goodman, A., & Stano, M. (2017). *The Economics of Health and Health Care*. Routledge.
2. Bhattacharya, J., Hyde, T., & Tu, P. (2013). *Health Economics*. Palgrave Macmillan.
3. Zweifel, P., Breyer, F., & Kifmann, M. (2009). *Health Economics*. Springer.
4. World Health Organization (various reports). *World Health Report*.
5. Drummond, M. F. et al. (2015). *Methods for the Economic Evaluation of Health Care Programmes*. Oxford University Press
6. Heckman, J. J. (2006). Skill formation and the economics of investing in disadvantaged children. *Science*, 312(5782), 1900-1902.
7. Grossman, M. (1972). On the concept of health capital and the demand for health. *Journal of Political economy*, 80(2), 223-255.
8. Fuchs, V. R. (1996). Economics, values, and health care reform. *American Economic Review*, 86(1), 1-24.
9. Fuchs, V. R., & Eggleston, K. (1998). *Who shall live? Health, economics and social choice*.
10. Cutler, D. M., & Gruber, J. (1996). Does public insurance crowd out private insurance? *The Quarterly Journal of Economics*, 111(2), 391-430.

DEPARTMENT OF HUMANITIES & SOCIAL SCIENCES

M.Sc. Economics SEMESTER IV (Program Elective)

Course Title: Economics of Education

Course Category: Program Elective

Course Code: HSEC 520

Credits: 4 (L-4, T-0, P-0)

Semester: 4th

Internal: 50 Marks

Theory: 50 Marks

Total: 100 Marks

Course Objective

The primary objective of this course is to examine education as a fundamental component of human capital formation and its contribution to individual earnings, productivity, and overall economic development. The course introduces students to theoretical foundations and empirical approaches in the economics of education. It emphasizes education as both a private and social investment, explores issues of efficiency and equity in education financing, and evaluates the role of policy interventions in improving educational outcomes. International comparisons will provide insights into how different educational systems contribute to growth and inequality reduction.

Syllabus

UNIT I: Human Capital and Returns to Education

Concept of human capital - education, health, and training as investments; Theories of human capital (Becker, Schultz, Mincer); Signalling theory and the sheepskin effect: Spence's model and its implications; Private and social rates of return to education; Mincerian earnings function; Education, productivity, and growth linkages; Evidence from developed and developing countries.

UNIT II: Education Production Functions and Learning Outcomes

The concept of education production functions - inputs and outputs; Role of teachers, class size, curriculum, technology, and peer effects; Value-added models of teacher effectiveness; Measuring learning outcomes and quality of education; Standardized testing and international assessment (PISA, TIMSS, and ASER); Evidence on determinants of educational achievement; Challenges in improving school quality in developing economies.

UNIT III: Financing of Education and Equity Issues

Sources of education finance - public expenditure, private contributions, and household spending; Role of international aid and non-governmental organizations; Public-private partnerships in education; Issues of affordability, access, and efficiency; Distributional impacts of education financing; Gender, caste, and regional disparities in access to quality education; Policies for inclusive and equitable education.

UNIT IV: Policy Interventions and Skill Development

Education policies for universal access and quality improvement; Demand-side interventions - scholarships, conditional cash transfers, and midday meal schemes; Role of technology and digital education; Higher education financing- cost recovery, student loans, and privatisation; Vocational and skill-based education in the context of labor markets; Lessons for India from global experiences- OECD, BRICS, and low-income countries.

Learning Outcomes

On completion of this course, students will be able to:

- Understand the role of education in human capital formation and economic growth.
- Apply theoretical and empirical methods to estimate returns to education.
- Analyze the determinants of learning outcomes using education production functions.
- Evaluate financing mechanisms for education with a focus on equity and efficiency.
- Critically assess education policies in India and draw insights from international best practices.



Suggested Readings

1. Psacharopoulos, G., & Patrinos, H. (2004). *Returns to Investment in Education: A Further Update*. Education Economics, 12(2), 111- 134.
2. Becker, G. (1993). *Human Capital: A Theoretical and Empirical Analysis with Special Reference to Education*. University of Chicago Press.
3. Hanushek, E., & Woessmann, L. (2020). *The Knowledge Capital of Nations: Education and the Economics of Growth*. MIT Press.
4. Tilak, J. B. G. (2007). *The Economics of Inequality in Education*. Sage Publications.
5. Barr, N. (2012). *Economics of the Welfare State*. Oxford University Press



DEPARTMENT OF HUMANITIES & SOCIAL SCIENCES
M.Sc. Economics SEMESTER IV (Program Elective)

Course Title: Urban and Regional Economics

Course Category: Program Elective

Course Code: HSEC 522

Credits: 4 (L-4, T-0, P-0)

Semester: 4th

Internal: 50 Marks

Theory: 50 Marks

Total: 100 Marks

Course Objective

The objective of this course is to provide students with a systematic understanding of the spatial organization of economic activity, with a focus on cities, regions, and the forces shaping their development. It explores how location decisions by firms and households influence urbanization, the functioning of housing and land markets, regional inequality, and patterns of migration. The course also introduces theoretical models and empirical approaches to study urban and regional economies, while critically examining policy interventions for sustainable and balanced development.

Syllabus

UNIT I: Location Theory and Urbanization

Classical and modern theories of location - von Thiinen, Weber, Christaller, Losch; New economic geography Krugman's core-periphery model and agglomeration forces; Determinants of urban growth and city size; Agglomeration economies and diseconomies; Central Place Theory and the hierarchy of settlements; Urbanization in developing countries; Megacities and metropolitan regions; Urban sprawl and associated challenges.

UNIT II: Land Use and Housing Markets

Urban land use models - Alonso-Muth-Mills (AMM) model; Bid-rent theory; Determinants of land values and rents; Housing demand and supply; Segmentation in housing markets; Informal housing and slums in developing countries; Public policy interventions in land and housing - zoning laws, rent control, subsidies, and smart cities.

UNIT III: Regional Inequality and Migration

Concepts and measurement of regional inequality; Core-periphery models; Cumulative causation and regional divergence; Determinants and consequences of inter-regional migration; Rural-urban migration and Harris-Todaro model; Brain drain and remittances; Regional disparities in India - empirical evidence and policy responses.

UNIT IV: Urban Policy and Planning

Urban infrastructure and service provision - transport, sanitation, water, and waste management; Issues of congestion, pollution, and sustainability; Regional planning approaches - growth poles, special economic zones, industrial corridors; Urban governance and institutional framework; Sustainable urbanisation and climate change adaptation; Policy debates on balanced regional development in the context of globalisation.

Learning Outcomes

On successful completion of this course, students will be able to:

- Understand the theoretical foundations of location and urbanization.
- Analyze the functioning of land and housing markets and their policy implications.
- Assess causes and consequences of regional inequality and migration.
- Evaluate urban and regional policies aimed at sustainable and equitable development.

Suggested Readings

1. O'Sullivan, A. (2012). *Urban Economics*. McGraw Hill.
2. Fujita, M., Krugman, P., & Venables, A. (1999). *The Spatial Economy: Cities, Regions, and International Trade*. MIT Press.

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3. World Bank (2009). *World Development Report: Reshaping Economic Geography*. World Bank.
 4. Brueckner, J. K. (2011). *Lectures on Urban Economics*. MIT Press

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DEPARTMENT OF HUMANITIES & SOCIAL SCIENCES
M.Sc. Economics SEMESTER IV (program Elective)

Course Title: Financial Economics

Course Category: Program Elective

Course Code: HSEC 524

Credits: 4 (L-4, T-0, P-0)

Semester: 4th

Internal: 50 Marks

Theory: 50 Marks

Total: 100 Marks

Course Objective

The course aims to provide students with a rigorous theoretical and empirical foundation in financial economics. It explores the functioning of financial markets, the pricing of assets, the role of risk and uncertainty, and the linkages between capital markets and corporate finance. It also introduces derivative instruments, examines concepts of market efficiency, and critically evaluates the causes and consequences of financial crises. By blending theory with empirical applications, the course equips students to apply financial economics to real-world market and policy problems.

Syllabus

UNIT I: Portfolio Theory and Asset Pricing

Risk, return, and diversification; Markowitz mean-variance portfolio theory; Capital Market Line and Sharpe ratio; Capital Asset Pricing Model (CAPM): assumptions, derivation, and empirical testing; Arbitrage Pricing Theory (APT) and multifactor models; Consumption-based asset pricing models; Empirical evidence on risk-return trade-off.

UNIT II: Capital Markets and Corporate Finance

Structure and functioning of capital markets: equity, debt, and money markets; Role of financial intermediaries and institutions; Corporate financing decisions – capital structure theories (Modigliani-Miller, trade-off, pecking order); Dividend policy and valuation; Corporate governance and its interaction with capital markets; Case studies on capital raising and investment decisions.

UNIT III: Financial Derivatives

Forward and futures contracts: pricing and hedging applications; Options: valuation (binomial model, Black-Scholes model), trading strategies, and risk management; Swaps and structured financial products; Derivatives in emerging markets; Regulatory issues and financial stability concerns.

UNIT IV: Market Efficiency and Crises

Efficient Market Hypothesis (EMH): forms, tests, and critiques; Shiller's excess volatility critique and long-run return predictability; Behavioral finance perspectives: biases, heuristics, and anomalies; Bubbles, crashes, and financial contagion; Case studies of global financial crises (Great Depression, 1997 Asian crisis, 2008 global financial crisis, Eurozone crisis); Policy and regulatory responses to financial instability.

Learning Outcomes

By the end of the course, students will be able to:

- Apply portfolio theory and asset pricing models to evaluate investments.
- Analyze the interaction between corporate finance decisions and capital markets.
- Understand the mechanics, valuation, and uses of financial derivatives.
- Critically assess market efficiency, behavioral anomalies, and causes of financial crises.
- Use empirical tools to examine financial market data.

Suggested Readings

1. Copeland, T., Weston, J., & Shastri, K. (2014). *Financial Theory and Corporate Policy*. Pearson.
2. Merton, R. C. (1990). *Continuous-Time Finance*. Blackwell.

3. Campbell, J. Y., Lo, A. W., & MacKinlay, A. C. (1997). *The Econometrics of Financial Markets*. Princeton University Press.
4. Bodie, Z., Kane, A., & Marcus, A. (2018). *Investments*. McGraw Hill.
5. Shiller, R. J. (2015). *Irrational Exuberance*. Princeton University Press.
6. Hull, J. C. (2021). *Options, Futures, and Other Derivatives*. Pearson
7. Brealey, R. A., Myers, S. C. & Allen, F. (2020). *Principles of Corporate Finance*. McGraw-Hill



DEPARTMENT OF HUMANITIES & SOCIAL SCIENCES

M.Sc. Economics SEMESTER IV (Program Elective)

Course Title: Economics of Technology and Innovation

Course Category: Program Elective

Course Code: HSEC 526

Credits: 4 (L-4, T-0, P-0)

Semester: 4th

Internal: 50 Marks

Theory: 50 Marks

Total: 100 Marks

Objective

To provide students with a rigorous understanding of the economic foundations of technological change and innovation. The course integrates theory, empirical methods, and policy debates to analyze how innovation drives growth, shapes industrial structures, and influences welfare. Students will also gain hands-on experience with innovation datasets and econometric tools.

Syllabus

UNIT-I: Theories of Technological Change and Innovation

Concepts of technology and innovation: definitions, scope, and historical perspectives; Schumpeterian theories of innovation (Mark I and Mark II); Nelson-Winter evolutionary theory of economic change; Aghion-Howitt model of creative destruction; Quality-ladder models and leapfrogging in developing economies; Innovation races and strategic behavior of firms; General Purpose Technologies (GPTs) and their economic impact.

UNIT-II: R&D, Knowledge Spillovers, and Intellectual Property Rights

R&D as a knowledge production function; Role of human capital and absorptive capacity; Social vs. private returns to R&D; Models of patent races (Nordhaus, Reinganum); Optimal patent length and breadth; Open innovation model: Chesbrough's framework and implications for firm strategy; Intellectual Property Rights (IPR) regimes and innovation incentives; Spillovers and technology diffusion across firms and countries.

UNIT-III: Technology Diffusion, Digital Platforms, and Data Economy

Models of technology adoption and diffusion (epidemic and Mansfield models); Network effects and increasing returns; Economics of digital platforms and two-sided markets; Data as a new factor of production; Artificial Intelligence, automation, and labor markets; Platform regulation and competition policy in digital markets; Case studies: UPI and Aadhaar in India, Silicon Valley ecosystems, China's digital transformation.

UNIT-IV: Empirical Measurement and Policy Challenges

Measuring innovation: patent counts, citations, R&D intensity, innovation indices; Econometric models for innovation: Poisson and Negative Binomial regressions for patent data; Role of big data, text analysis, and network methods in innovation measurement; Mission-oriented innovation policy: Mazzucato's entrepreneurial state framework; Innovation policy challenges: TRIPS, North-South technology transfer, green innovation, and industrial policy; Comparative innovation systems: OECD vs. emerging economies.

Outcomes

By the end of the course:

- 1) Students will acquire a rigorous theoretical foundation in the economics of technology and innovation, develop skills to empirically analyze innovation-related data, and critically evaluate real-world policies.
- 2) Students will be able to link formal models with practical evidence and propose informed strategies for fostering innovation-led growth in different economic contexts.

Suggested Readings

- Schumpeter, J. A. (2013). *Capitalism, socialism and democracy*. routledge.
- Aghion, P., & Howitt, P. *Endogenous Growth Theory*



- Nelson, R., & Winter, S. *An Evolutionary Theory of Economic Change*
- Hall, B. H., & Rosenberg, N. (Eds.). *Handbook of the Economics of Innovation*
- Stiglitz, J. E., & Greenwald, B. *Creating a Learning Society: A New Approach to Growth, Development, and Social Progress*
- Selected policy reports: OECD Science, Technology and Innovation Outlook; WIPO World Intellectual Property Indicators
- Tirole, J. (2017). *Economics for the Common Good*. Princeton University Press
- Mazzucato, M. (2013). *The Entrepreneurial State*. Anthem Press
- Arrow, K. J. (1962). The economic implications of learning by doing. *The review of economic studies*, 29(3), 155-173.
- Romer, P. M. (1986). Increasing returns and long-run growth. *Journal of political economy*, 94(5), 1002-1037.
- Romer, P. M. (1990). Endogenous technological change. *Journal of political Economy*, 98(5, Part 2), S71-S102.
- Acemoglu, D., Johnson, S., & Robinson, J. A. (2005). Institutions as a fundamental cause of long-run growth. *Handbook of economic growth*, 1, 385-472.
- Solow, R. M. (1957). Technical change and the aggregate production function. *The review of Economics and Statistics*, 39(3), 312-320.
- Aghion, P., & Howitt, P. (1990). A model of growth through creative destruction.
- Aghion, P., Bloom, N., Blundell, R., Griffith, R., & Howitt, P. (2005). Competition and innovation: An inverted-U relationship. *The quarterly journal of economics*, 120(2), 701-728.
- Mokyr, J. (1992). *The lever of riches: Technological creativity and economic progress*. Oxford University Press.
- Mokyr, J. (2016). *A culture of growth: The origins of the modern economy*.

DEPARTMENT OF HUMANITIES & SOCIAL SCIENCES

M.Sc. Economics SEMESTER IV (Program Elective)

Course Title: Nobel Laureates in Economics: Readings and Applications

Course Category: Program Elective

Internal: 50 Marks

Course Code: HSEC 528

Theory: 50 Marks

Credits: 4 (L-4, T-0, P-O)

Total: 100 Marks

Semester: 4th

Course Objective

To expose students to the seminal contributions of Nobel Laureates in Economics, focusing on works that transformed the discipline. The course emphasizes conceptual understanding, intuition, and applications over formal proofs, while familiarizing students with the Nobel lectures and key research articles.

UNIT I: Microeconomic Foundations and Game Theory

Explore foundational works establishing microeconomic theory and strategic interaction, including welfare economics, social choice, and game theory, supplemented by behavioural economics insights.

- Arrow, K. J. (1951). *Social Choice and Individual Values* (Ch. 2, "Impossibility Theorem").
- Samuelson, P. A. (1938). "A Note on the Pure Theory of Consumer's Behavior." *Economica*, 5(17), 61-71.
- Nash, J. F. (1950). "Equilibrium Points in n-Person Games." *PNAS*, 36(1), 48-49.
- Harsanyi, J. C. (1955). "Cardinal Welfare, Individualistic Ethics, and Interpersonal Comparisons of Utility." *JPE*, 63(4), 309-321.
- Sen, A. K. (1970). "The Impossibility of a Paretian Liberal." *JPE*, 78(1), 152-157.
- Kahneman, D. & Tversky, A. (1979). "Prospect Theory." *Econometrica*, 47(2), 263-291.

UNIT II: Macroeconomic Thought and Policy Innovations

Examine landmark contributions to macroeconomics-growth, monetary theories, expectations, trade-and their policy implications globally and for India, including recent financial and labor market research.

- Solow, R. M. (1956). "A Contribution to the Theory of Economic Growth." *QJE*, 70(1), 65-94.
- Friedman, M. (1968). "The Role of Monetary Policy." *AER*, 58(1), 1-17.
- Phelps, E. S. (1967). "Phillips Curves, Expectations of Inflation and Optimal Unemployment." *Economica*, 34(135), 254-281.
- Krugman, P. (1979). "Increasing Returns, Monopolistic Competition, and International Trade." *JIE*, 9(4), 469-479.
- Shiller, R. J. (1981). "Do Stock Prices Move Too Much to Be Justified by Subsequent Changes in Dividends?" *AER*, 71(3), 421-436.
- Lucas, R. E. (1976). "Econometric Policy Evaluation: A Critique." *Carnegie-Rochester Series on Public Policy*.

UNIT III: Empirical Methods and Econometrics

Study Nobel-winning advances in econometrics and causal inference, enriched with experimental and behavioral economics methods shaping empirical economic analysis.

- Heckman, J. J. (1979). "Sample Selection Bias as a Specification Error." *Econometrica*, 47(1), 153-161.
- McFadden, D. (1974). "Conditional Logit Analysis of Qualitative Choice Behavior." In *Frontiers in Econometrics*, pp. 105-142.
- Deaton, A. (1980). "The Measurement of Welfare: Theory and Practical Guidelines." *World Bank LSMS Paper No. 7*.

- Angrist, J. D., & Imbens, G. W. (1995). "Two-Stage Least Squares Estimation of Average Causal Effects." *JASA*, 90(430), 431-442.
- Tirole, J. (1983). "The Theory of Industrial Organization: A Survey of Recent Developments." *Econometrica*, 51(3), 743-784.

UNIT IV: Development, Institutions, and Indian Economy

Engage with development economics, institutional theories, and policy innovations with special focus on India's poverty alleviation, governance reforms, randomized experiments, and environmental economics.

- Ostrom, E. (1990). *Governing the Commons* (Ch. 3).
- Sen, A. K. (1981). "Ingredients of Famine Analysis: Availability and Entitlements." *QJE*, 96(3), 433-464.
- Kremer, M. (1993). "The a-Ring Theory of Economic Development." *QJE*, 108(3), 551-575.
- Banerjee, A. V., & Duflo, E. (2007). "The Economic Lives of the Poor." *JEP*, 21(1), 141-167.
- Duflo, E., Glennerster, R., & Kremer, M. (2007). "Using Randomization in Development Economics Research: A Toolkit." *Handbook of Development Economics*, Vol. 4.
- Banerjee & Iyer (2005). "History, Institutions, and Economic Performance: The Legacy of Colonial Land Tenure Systems in India." *AER*, 95(4), 1190-1213.

Other Readings

- Banerjee, A. & Duflo, E. (2019) "Good Economics for Hard Times" (selected chapters or related working papers)
- Kremer, M. (2004). "Randomized Evaluations of Educational Programs in Developing Countries: Some Lessons" (American Economic Review Papers and Proceedings)
- North, D. C. (1990). "Institutions, Institutional Change and Economic Performance" (key chapters)
- Acemoglu, D., Johnson, S., & Robinson, J. A. (2001). "The Colonial Origins of Comparative Development" (American Economic Review)-not a Nobel yet, but highly cited.
- Economics of climate change: Stern, N. (2007). "The Economics of Climate Change: The Stern Review" (selected sections)
- Universal basic income: "Universal Basic Income: A Global Perspective" (World Bank Policy Research Paper, cross-national relevance)
- Digital economy and labor: Autor, D. (2015). "Why Are There Still So Many Jobs? The History and Future of Workplace Automation" (Journal of Economic Perspectives).

DEPARTMENT OF HUMANITIES & SOCIAL SCIENCES
M.Sc. Economics SEMESTER IV (Program Elective)

Course Title: Experimental Economics

Course Category: Program Elective

Course Code: HSEC 530

Credits: 4 (L-4, T-O, P-O)

Semester: 4th

Internal: 50 Marks

Theory: 50 Marks

Total: 100 Marks

Course Objective

This course introduces students to experimental methods in economics, emphasizing how controlled settings can be used to test theories, generate evidence, and examine real-world behaviour. Students will learn the principles of experimental design, implementation, and analysis while critically evaluating experimental studies. The course also addresses replication challenges and ethical standards in experimental research, preparing students to design rigorous and credible experiments in economics.

UNIT I: Foundations of Experimental Economics

Introduction to experimental economics: why experiments in economics; Laboratory versus field experiments; History and development of experimental methodology; Identifying the primary reasons for conducting economics experiments; Defining market institution and economic environment; Experimental design principles: induced value theory, incentive compatibility, and control; Designing and conducting experiments; Interpreting experimental findings; Ethics of economic experiments: informed consent, deception, and institutional review.

UNIT II: Individual Decision Making and Behavioural Foundations

Expected utility theory and its violations; Risk aversion and incentive effects; Prospect theory, endowment effect, willingness to pay versus willingness to accept gap; Preference reversals and framing effects; Time preferences, hyperbolic discounting, and dynamic inconsistency; Overconfidence and belief formation; Anomalies in individual choice and their implications for standard economic theory; Experimental tests of rational choice models.

UNIT III: Strategic Behaviour and Market Experiments

Coordination games, subgame perfection, learning and sophistication, information and signalling, and auction experiments; Ultimatum and dictator games; Trust and reciprocity experiments; Social preferences and fairness: inequality aversion, efficiency preferences, and sequential reciprocity; Altruism, fairness, and public goods provision; Market experiments: double auction markets, posted prices, and competitive equilibrium; Applications in industrial organisation and mechanism design.

UNIT IV: Field Experiments and Policy Applications

Natural experiments and quasi-experiments; Randomised control trials (RCTs) in development economics; Preferences for competition and gender differences in economic behaviour; Field experiments in labour economics, public policy, and development; Applications in poverty, education, and health; Analysis of experimental data: treatment effects, statistical power, and randomisation checks; Replication and reproducibility in experimental economics.

Learning Outcomes

By the end of the course, students will be able to:

- Apply theoretical concepts through experimental methods.
- Design and implement economic experiments in laboratory and field settings.
- Critically assess experimental results with respect to internal and external validity.
- Ensure ethical and replicable experimental practices in economics.

Suggested Readings

1. Banerjee, A. & Duflo, E. (2011).*Poor Economics*. PublicAffairs.
2. Kagel, J. H., & Roth, A. E. (1995). *Handbook of Experimental Economics*. Princeton University Press.
3. Friedman, D., & Sunder, S. (1994). *Experimental Methods: A Primer for Economists*. Cambridge University Press.
4. Falk, A., & Heckman, J. J. (2009). Lab Experiments Are a Major Source of Knowledge in the Social Sciences. *Science*.
5. Croson, R., & Gächter, S. (2010). The Science of Experimental Economics. *Journal of Economic Behavior & Organization*.
6. Gertler, P. J. et al. (2016).*Impact Evaluation in Practice*. World Bank.
7. Simmons, J. P., Nelson, L. D., & Simonsohn, U. (2011). False-Positive Psychology: Undisclosed Flexibility in Data Collection and Analysis Allows Presenting Anything as Significant: Undisclosed Flexibility in Data Collection and Analysis Allows Presenting Anything as Significant. *Psychological Science*, 22(11), 1359-1366.



DEPARTMENT OF HUMANITIES & SOCIAL SCIENCES

M.Sc. Economics SEMESTER IV (Program Elective)

Course Title: Panel Data Econometrics

Course Category: Program Elective

Course Code: HSEC 532

Credits: 4 (L-2, T-0, P-4)

Semester: 4th

Course Objective

This course provides rigorous training in econometric methods for analyzing panel data, which combine cross-sectional and time-series dimensions. It emphasizes the advantages of panel data in controlling for unobserved heterogeneity, improving estimation efficiency, and studying dynamic processes. Students will learn both foundational and advanced panel data models, understand issues of endogeneity, and gain practical experience applying these methods to real-world datasets.

Syllabus

UNIT I: Pooled, Fixed, and Random Effects Models

Introduction to panel data and its benefits; pooled regression models and limitations; Fixed vs Random Effects models; estimation strategies; Hausman specification test; empirical applications.

UNIT II: Dynamic Panel Data Models

Lagged dependent variables in panels; Nickell bias; Arellano-Bond estimator; Generalized Method of Moments (GMM): difference and system GMM; diagnostics and instrument validity; applications in productivity and growth studies.

UNIT III: Endogeneity in Panel Data

Sources of endogeneity: omitted variables, simultaneity, measurement error; techniques: Instrumental Variables (IV), control function approaches, panel GMM; case studies emphasizing instrument selection and robustness.

UNIT IV: Applications to Micro and Macro Datasets

Applications to firm-level productivity, household behaviour, labor markets, and cross-country growth analysis; dataset construction, estimation, and interpretation of empirical results.

Learning Outcomes

By the end of the course, students will be able to:

- Explain the advantages of panel data compared to pure cross-sectional or time-series data.
- Apply fixed and random effects methods appropriately.
- Estimate and interpret dynamic panel models using GMM techniques.
- Address endogeneity issues in panel applications.
- Conduct empirical research and critically evaluate applied econometric studies.

Suggested Readings

1. Baltagi, B. H. (2021). *Econometric Analysis of Panel Data*. Springer.
2. Wooldridge, J. M. (2010). *Econometric Analysis of Cross Section and Panel Data*. MIT Press.
3. Hsiao, C. (2014). *Analysis of Panel Data*. Cambridge University Press.
- 4.



DEPARTMENT OF HUMANITIES & SOCIAL SCIENCES

M.Sc. Economics SEMESTER IV (Program Elective)

Course Title: AI and Machine Learning in Economics

Course Category: Program Elective

Course Code: HSEC 534

Credits: 4 (L-2, T-O, P-4)

Semester: 4th

Internal: 50 Marks

Theory: 50 Marks

Total: 100 Marks

Course Objective

This course introduces students to the applications of Artificial Intelligence (AI) and Machine Learning (ML) in economics. It demonstrates how modern computational tools enhance traditional econometric methods for prediction, classification, and pattern recognition in large, complex datasets. Students will gain hands-on experience applying supervised, unsupervised, and natural language processing techniques to economic problems such as demand forecasting, credit risk modeling, and policy analysis, while also critically evaluating the ethical implications and interpretability of AI/ML methods.

UNIT I: Foundations of Machine Learning for Economists

Introduction to supervised and unsupervised learning; Key algorithms: regression, classification (SVM, logistic regression), clustering, decision trees, k-nearest neighbors, PCA; Distinction between prediction and causal inference: relevance for economic research; Double machine learning and causal forests; Cross-validation, regularisation: LASSO and Ridge regression; Model selection and bias-variance trade-off in economic applications.

UNIT II: Demand Prediction and Risk Modelling

Applications in consumer demand forecasting, and pricing; Credit risk assessment and financial inclusion; Portfolio optimization; Systemic risk analysis; Nowcasting GDP, inflation, and macroeconomic indicators using high-frequency data; Predictive analytics in labour markets and poverty mapping; ML approaches to heterogeneous treatment effects in policy evaluation.

UNIT III: Natural Language Processing (NLP) in Economics

Text as data: sentiment analysis, topic modelling, and word embeddings; Large language models (LLMs): capabilities, limitations, and economic applications; Applications in analyzing financial statements, policy documents, and social media; Measuring economic policy uncertainty using text data; Detecting investor sentiment and firm-level risk from earnings calls.

UNIT IV: Ethics, Bias, and Interpretability

Algorithmic bias and fairness in economic decision-making; Transparency and accountability in predictive models; Interpretable ML techniques (SHAP, LIME); AI and labour market displacement: evidence and policy responses; Regulatory implications of AI in financial markets and credit allocation; Implications for economic research integrity and replicability.

Learning Outcomes

By the end of the course, students will be able to:

- Apply supervised and unsupervised learning methods to economic data.
- Develop predictive models for demand forecasting and risk management.
- Utilize NLP tools for extracting insights from textual data.
- Critically assess interpretability and ethical challenges in AVML applications.

Suggested Readings

1. Mullainathan, S., & Spiess, J. (2017). Machine Learning: An Applied Econometric Approach. Journal of Economic Perspectives.



2. Varian, H. (2014). Big Data: New Tricks for Econometrics. *Journal of Economic Perspectives*.
3. Athey, S., & Imbens, G. (2019). Machine Learning Methods Economists Should Know About. *Annual Review of Economics*.
4. Hastie, T., Tibshirani, R., & Friedman, J. (2009). *The Elements of Statistical Learning*. Springer.
5. O'Neil, C. (2016). *Weapons of Math Destruction*. Crown.
6. James, G. et al. (2021). *An Introduction to Statistical Learning*. Springer.
7. Gentzkow, Matthew, Bryan Kelly, and Matt Taddy. 2019. "Text as Data." *Journal of Economic Literature* 57 (3): 535- 74.



DEPARTMENT OF HUMANITIES & SOCIAL SCIENCES
M.Sc. Economics SEMESTER III (Program Elective)

Course Title: History of Economic Thought

Course Category: Program Elective

Course Code: HSEC 536

Credits: 4 (L-4, T-O, P-O)

Semester: 4th

Internal: 50 Marks

Theory: 50 Marks

Total: 100 Marks

Objective

To introduce students to the evolution of economic ideas and the contributions of major economists, particularly Nobel laureates, equipping them with a clear understanding of how theoretical frameworks have developed over time and how they relate to contemporary economic issues. The course emphasizes conceptual clarity, critical interpretation of competing schools of thought, and the application of historical insights to modern policy debates and empirical research.

Syllabus

UNIT I: Foundations of Economic Thought and Long-Run Development

Evolution of economic ideas from mercantilism and physiocracy to classical political economy; Contributions of Adam Smith on markets and moral philosophy; David Ricardo on trade and distribution in a globalized economy; Thomas Malthus in the context of population, environment, and sustainability; Karl Marx and modern debates on inequality and capitalism; Growth and technological change: Joseph Schumpeter on innovation and creative destruction; Robert Solow on growth accounting and technological progress; Paul Romer on endogenous growth and knowledge-driven economies.

UNIT II: Neoclassical Economics, Welfare, and Market Failures

Marginal revolution and formalization of economics; Alfred Marshall and price theory; General equilibrium and welfare foundations; Vilfredo Pareto and efficiency in modern policy design; Arthur Pigou and externalities with applications to climate change and public health; information economics and market imperfections: George Akerlof on asymmetric information, Michael Spence on signalling, and Joseph Stiglitz on screening and market failures; Implications for regulation, inequality, and public policy.

UNIT III: Macroeconomic Thought, Policy, and Economic Fluctuations

John Maynard Keynes and demand management in modern crises; Evolution of macroeconomic frameworks from IS-LM to DSGE models; Monetarism and inflation targeting: Milton Friedman; rational expectations and policy credibility: Robert Lucas; time inconsistency and policy rules: Finn Kydland and Edward Prescott; unemployment, search, and matching: Christopher Pissarides; contemporary debates on inflation, fiscal policy, and global macroeconomic stability.

UNIT IV: Contemporary Economic Thought, Behavior, and Development

Behavioral economics and decision-making: Daniel Kahneman and bounded rationality; Development economics and welfare: Amartya Sen on capability approach; Experimental and micro-development approaches: Abhijit Banerjee, Esther Duflo, and Michael Kremer; Institutional economics and political economy: Douglass North and Daron Acemoglu; Game theory and strategic interaction: John Nash; emerging themes including digital economy, inequality, climate change, and data-driven policy analysis.

Outcomes:

Upon completion, students will be able to critically evaluate major economic theories in their historical context, compare different schools of thought, and connect classical and modern

They will develop the ability to engage with original texts, synthesize diverse perspectives, and apply theoretical insights to empirical and policy-oriented research.

Suggested Readings:

- Blaug, M. (1997). *Economic theory in retrospect*. Cambridge university press.
- Medema, S.O., & Samuels, W.J. (Eds.). (2003). *The History of Economic Thought: A Reader: A Reader; Second Edition* (1st ed.). Routledge.
- Kurz, R.D., & Salvadori, N. (2003). *Classical Economics and Modern Theory: Studies in Long-Period Analysis* (1st ed.). Routledge.
- Smith, A. (1937). *The wealth of nations* [1776] (Vol. 11937).
- Ricardo, D. (1891). *Principles of political economy and taxation*, ed. by ECK Gonnner.
- Marshall, A., & Ouillebaud, C. W. (1961). *Principles of economics* (Vol. 1, pp. 267-277). London: Macmillan.
- Keynes, J. M. (2018). *The general theory of employment, interest, and money*. Springer.
- Sen, A. (2000). Development as freedom. *Development in Practice-Oxford-*, 10(2), 258-258.
- Schumpeter, J. A. (2006). *History of economic analysis*. Routledge.



S 59.15 To consider and approve the revision of syllabi of Financial Education (HSIC-103) & Business Studies (HSIC-104) in the deptt. of Hum. & S.S. w.e.f. 2026-27.

The revised syllabi of Financial Education (HSIC-103) & Business Studies (HSIC-104) in the deptt. of Hum. & S.S. w.e.f. 2026-27 duly approved by the BoS of concerned department is enclosed as Annexure S 59.15.

The Senate may consider and approve.

**DEPARTMENT OF HUMANITIES AND SOCIAL SCIENCES
NATIONAL INSTITUTE OF TECHNOLOGY
KURUKSHETRA-136119**

No. Hum & S.S/26/274

Date: 15.05.2026

**Minutes of the 33rd Meeting of the Board of Studies of Department of Humanities & Social Sciences
held on 15.05.2026**

The 33rd Meeting of the Board of Studies of the Department of Humanities & Social Sciences, NIT Kurukshetra was held on 15.05.2026 (Friday) at 11:30 am in online mode in the office of HoD. The following attended the meeting:

1. Dr. Kiran Mor	Professor and Head	Chairperson
2. Dr. V. Upadhyay	Professor (IIT Delhi)	External Expert (Online)
3. Dr. Vikas Choudhary	Professor	Member
4. Dr. Geeta Sachdeva	Assistant Professor	Member
5. Dr. Rajesh Sharma	Assistant Professor	Member
6. Dr. Bhawna Shrey	Assistant Professor	Member

At the outset, the undersigned welcomed all the External Experts & Internal Members on the BOS of the Department. Thereafter, the agenda was taken up and following decisions were taken:

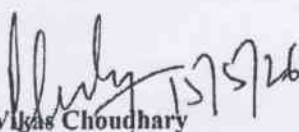
1. The minutes of the 32nd Meeting of the Board of Studies held on 14.01.2026 were confirmed.
2. The Scheme and Syllabi of M.Sc Economics (3rd & 4th Semester) were discussed and approved w.e.f. AY 2026-27.
3. The revision of the syllabi of Financial Education (HSIC-103) & Business Studies (HSIC-104) courses were discussed and approved.

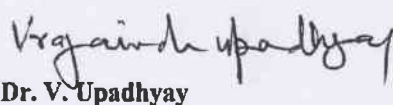
The meeting ended with a vote of thanks to the Chair.


Dr. Bhawna Shrey
Member


Dr. Rajesh Sharma
Member


Dr. Geeta Sachdeva
Member


Dr. Vikas Choudhary
Member


Dr. V. Upadhyay
External Expert (Online)


Dr. Kiran Mor
Chairperson, BOS & HOD

Copy to:
All Members via E-mail
Dean (Academic)

DEPARTMENT OF HUMANITIES AND SOCIAL SCIENCES
NATIONAL INSTITUTE OF TECHNOLOGY
KURUKSHETRA-136119

No. Hum & SS/26/256

Date: 13.05.2026

Minutes of DAC Meeting

A Meeting of the Department Advisory Committee (DAC) was held on 13.05.2026 at 11:00 AM in the office of the undersigned regarding revision of syllabi of Financial Education (HSIC103) & Business Studies (HSIC-I04). The following attended the meeting:

- | | | |
|----|---------------------|------------|
| 1. | Dr. Kiran Mor | (In Chair) |
| 2. | Dr. Vikas Choudhary | Member |
| 3. | Dr. Geeta Sachdeva | Member |
| 4. | Dr. Shahida | Member |

The DAC discussed and approved the revision of syllabi of Financial Education (HSIC-103) & Business Studies (HSIC-104) in the Department w.e.f. AY 2026-27.



Dr. Shahida
Member



Dr. ~~Geeta~~ Sachdeva
Member



Dr. Vikas Choudhary
Member

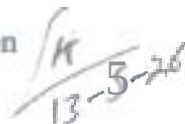


(Dr. Kiran Mor)
HOD & Chairperson DAC

Copy to:

Dean (Academic) for further necessary action

All Members



13-5-26

(

DEPARTMENT OF HUMANITIES & SOCIAL SCIENCES

Programme: B. Tech

Course Title: Business Studies

Course Category: IC

Course Code: HSIC 104

Credits: 3 (L-3, T-O)

Semester: 1st/2nd

Internal: 50 Marks

Theory: 50 Marks

Total: 100 Marks

Time: 3 hrs

Course Objectives

- The Course is designed to inculcate business attitude and develop skills among students.
- The Course aims to acquaint students with the dynamic nature and inter-dependent aspects of Business.
- The Course aims to familiarize students with theoretical foundations of the Process of organizing and managing the operations of a business firm.

Unit I: Fundamentals of Business

Business: Meaning and Characteristics of Business, Objectives of Business. Classification of Business Activities: Industry and Commerce, Industry types: Primary, Secondary and Tertiary. Types of Businesses: Sole Proprietorship, Partnership, Limited Liability Company, Private and Public Company.

Unit II: Sources of Business Finance

Business Finance: Concept and Importance. Types of Sources of Finance: Long-term Sources (Equity Shares, Preference shares, Debentures, Term Loans, Retained earnings, Loan from Financial Institutions, etc.), Short Term Sources (Trade Credit, Accrued Expenses, Commercial Papers, Public Deposits etc.)

Unit III: Business Services and Social Responsibility of Business

Business Services: Meaning and Types. Banking: Types of Bank Accounts: Savings, Current, Recurring, Fixed Deposit. Emerging Modes of Business, E-business: Concept, Scope and Benefits, E-commerce, Role of Internet. Social Responsibility of Business and Business Ethics.

Course Outcomes

- The Course would help the students in understanding different forms and numerous processes of a business.
- The Course would sensitize the students to practice the ethical behaviour of the businesses.
- The Course will help prepare the students to analyse, manage, evaluate and respond to changes which affect business.

Suggested Readings

1. Business Studies: Learners Book, Oxford Successful
2. Business Studies: Fourth Edition, Ian Chambers and David Gray, CPo
3. Modern Business Organisation: CB Gupta, Sultan Chand and Sons, Educational Publishers, New Delhi.
4. Business Organisation and Management: TN Chhabra, Sun India Publications.

DEPARTMENT OF HUMANITIES & SOCIAL SCIENCES

Programme: B. Tech

Course Title: Financial Education

Course Category: IC
Course Code: HSIC 103
Credits: 3 (L-3, T-O)
Semester: 1st/2nd

Internal: 50 Marks
Theory: 50 Marks
Total: 100 Marks
Time: 3hrs

Course Objectives

The purpose of this course is to empower the students with sound financial knowledge and financial management skills for their long-term financial being.

The course is designed with the strong belief that financial well-being has a positive correlation with the overall well-being of an individual as well as society.

Note for Examiner

The number of questions to be set will be six covering the entire syllabus. The examinees will be required to attempt five questions. All questions shall carry equal marks.

UNIT-I Foundations of Finance

Financial Management: Concept, Finance Function. Financial Goals: Short Term and Long Term. Banking in India: Concepts of Banking, Types of Bank Accounts and Deposits.

UNIT-II Investment Management

Investment Goals: Basic Investment Objectives. Investment and Saving alternatives for a Common Investor: Insurance, Stocks, Bonds, Mutual Fund etc. Stock Markets Primary and Secondary Markets. Criteria for Stock Selection.

UNIT-III Financial Planning and Mutual Funds

Financial Planning: Concept, Objectives and Need for Financial Planning. Mutual Funds: Concept and History of Mutual Funds in India. Types of Mutual Funds. Securities and Exchange Board of India (SEBI).

Course Outcomes

After the completion of this Course, students will be able to acquire financial management skills-essential life skills for 21st Century. It will also enhance their financial literacy and equip them with knowledge and skills critical to make financial decisions.

Suggested Readings

1. Introduction to Financial Planning: Indian Institute of Banking and Finance.
2. Financial Management-MY Khan & PK Jain (Tata McGraw Hill)
3. Financial Management-Sheeba Kapil (Pearson)
4. Financial Literacy for Young Adults Amplified: Raman Keane, Independent Publisher.



S 59.16 To consider the proposal for conduct of reappear examinations for the students who have appeared in 8th semester examinations through MOOC courses.

The Senate in its 58th meeting allowed the students, who were on internship in 8th semester, to appear for end semester examinations through MOOC courses or in self-study mode. Now, many students could not clear/pass the MOOC courses. The regular students of 8th semester have a chance to clear the reappears of 7th and 8th semester in special reappear examinations which are conducted within one month of declaration of 8th semester result. Only those students can appear who have maximum five reappears in 7th and 8th semester examinations.

The students who could not qualify MOOC courses will have chance to appear in MOOC course again only after six months. They have requested to allow them to appear in special reappear examinations by choosing the subjects offered in self-study mode in place of MOOC courses. The subjects chosen will be of same credits. The subjects chosen for examination in self-study mode should be different from the subjects passed through MOOC, if any. The evaluation of the subjects passed in self-study mode will be as per notification No Acad/26/597 dated April 9, 2026.

The Senate may discuss the matter and decide.



Regarding NPTEL Certificates

1 message

ARYAN SINGH <12212171@nitkkr.ac.in>

Thu, May 28, 2026 at 3:27 PM

To: gbhushan@nitkkr.ac.in

Respected Sir,

I hope you are doing well.

I am writing to sincerely explain my situation regarding the NPTEL certificates required for the completion of my 8th semester.

As students pursuing internships were allowed to opt for NPTEL courses in place of college examinations, I had registered for two NPTEL courses accordingly. However, during the semester, I was simultaneously managing my internship responsibilities, PPO-related work, internal project releases, vulnerability fixes, and multiple project deadlines. Due to this continuous pressure and workload, I unfortunately could not focus adequately on the assignment components of the courses.

At that time, I misunderstood the certification criteria and believed that performing well in the final examination would be sufficient for certificate eligibility. Despite the situation, I prepared seriously for the exams, travelled to the allotted examination centre, and successfully cleared the exams. However, I later realized that the certificate is awarded only when the assignment criteria are also completed, because of which I could not obtain the final certificates.

I fully understand that this was my responsibility, and I sincerely regret the oversight. I kindly request you to please consider my situation and guide me regarding any possible solution or alternative that would allow me to complete the semester requirements. I assure you that there was never any intention to neglect academics, and this happened solely due to poor handling of an unusually demanding schedule during the internship period.

I would be extremely grateful for your consideration and support.

Thank you for your time and understanding.

Yours sincerely,
Aryan Singh

Roll - 12212171

B.Tech CSE
NIT Kurukshetra



(no subject)

1 message

MANSI SARKAR <12213145@nitkkr.ac.in>

To: gbhushan@nitkkr.ac.in

Thu, May 28, 2026 at 2:02 PM

Respected Sir,

I hope you are doing well.

I am writing to sincerely explain my situation regarding the NPTEL certificates required for the completion of my 8th semester.

As students pursuing internships were allowed to opt for NPTEL courses in place of college examinations, I had registered for two NPTEL courses accordingly. However, during the semester, I was simultaneously managing my internship responsibilities, PPO-related work, internal project releases, vulnerability fixes, and multiple project deadlines. Due to this continuous pressure and workload, I unfortunately could not focus adequately on the assignment components of the courses.

At that time, I misunderstood the certification criteria and believed that performing well in the final examination would be sufficient for certificate eligibility. Despite the situation, I prepared seriously for the exams, travelled to the allotted examination centre, and successfully cleared the exams. However, I later realized that the certificate is awarded only when the assignment criteria are also completed, because of which I could not obtain the final certificates.

I fully understand that this was my responsibility, and I sincerely regret the oversight. I kindly request you to please consider my situation and guide me regarding any possible solution or alternative that would allow me to complete the semester requirements. I assure you that there was never any intention to neglect academics, and this happened solely due to poor handling of an unusually demanding schedule during the internship period.

I would be extremely grateful for your consideration and support.

Thank you for your time and understanding.

Yours sincerely,
Mansi Sarkar
12213145
B.Tech (IT)
NIT Kurukshetra



Logout

NOC candidate profile



Mansi Sarkar

✉ 12213145@nitkkr.ac.in

📅 Jun 02 2004

NOC Exam results

Timeline	Name	Course Name	Assignment score out of 25	Exam score out of 75	Final Score out of 100	Download E- Certificate
Jan- Apr2026	Mansi Sarkar	Introduction to Internet of Things	0.0	67.5	68	Not eligible



Logout

NOC candidate profile



Mansi Sarkar

✉ 12213145@nitkkr.ac.in

📅 Jun 02 2004

NOC Exam results

Timeline	Name	Course Name	Assignment score out of 25	Exam score out of 75	Final Score out of 100	Download E- Certificate
Jan- Apr2026	Mansi Sarkar	Programming in Modern C++	0	22.5	23	Not eligible

S 59.17 To consider and decide about template for dual degree program.

The Senate in its 52nd meeting vide agenda item No S 52.14 approved the proposal for starting integrated dual degree programmes in all core branches of B. Tech. programmes. Ten percent of total seats of Civil, Mechanical, Electrical, ECE and CSE were earmarked for integrated dual degree programmes from AY 2024-25 onwards. It was decided in a meeting of Deans & HoD's under the Chairmanship of Director, held on 08.12.2025, that scheme and syllabi of first three years of dual degree program will be common with the regular B. Tech. programs and the last two years exclusively reserved as an M. Tech. program. A template in this regard was also shared by academic section. The minutes of the meeting were circulated vide letter No Acad./2025/ dated 15.12.2025. It is pertinent to mention that the first batch of the students admitted for dual degree program is presently in third year and their scheme will be different from the students studying regular B. Tech program from 7th semester onwards. Therefore, the final scheme of dual degree program needs to be approved from the senate in the AY 2026-27.

Regarding template shared, some departments are of the opinion that replacing final year B. Tech course with M. Tech first year courses may not be feasible as some core courses in B. Tech 7th /8th semester are mandatory for studying advanced courses of M. Tech. Another set of guidelines for dual degree program was proposed by Dean (Academic) vide letter No Acad./2026/850 dated 19.05.2026 for discussion in the departments. The suggestions, if any, regarding the same were also invited. The response of Civil and Electrical Engineering departments regarding dual degree program has been received. Civil Engg. Deptt. has opted for the first template, circulated on 08.12.2025 whereas Electrical Engg. Deptt. has opted for guidelines circulated on 19.05.2026. No suggestions have been received from other departments.

The Senate may discuss and decide about the guidelines to be followed for preparing scheme of dual degree program.

NATIONAL INSTITUTE OF TECHNOLOGY
KURUKSHETRA

No. Acad./2025/

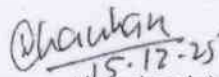
Date: 15.12.2025

Minutes of the meeting to discuss the scheme and syllabus of integrated programmes held on 8.12.2025 at 4.30 p.m. under the Chairmanship of the Director.

A meeting of all Deans and HoDs was held on 8.12.2025 at 4.30 p.m. at the Board Room of the Institute under the Chairmanship of the Director to discuss the scheme and syllabus of integrated programmes. The integrated programmes in five core branches were started in Academic year 2024-25. The scheme and syllabus of first three years of integrated programmes will be common with the regular B.Tech. programmes. The template for the scheme of Integrated programmes was shared to all HoDs. It was decided that all HoDs should prepare the scheme of integrated programmes according to the template and it will be finalized in the next meeting of Senate. Many other issues related to the syllabus and scheme were discussed which are as follows:

1. It was decided that the total credits for integrated programmes will be between 200-220.
2. Industry visit and summer internship of 6-8 weeks are mandatory for all engineering departments.
3. It was decided that the next Senate meeting be scheduled around 15th January 2026.
4. All HoDs were suggested that they should keep the proper faculty student ratio for the purpose of NBA accreditation while shifting faculty members to new departments. Only long term running branches are eligible for NBA accreditation.
5. The remaining scheme and syllabus of all programmes yet to be approved, will be placed in the next Senate meeting which should be sent to the Academic Section before 5.1.2026.

The meeting ended with vote of thanks.


15.12.25
Dean (Academic)

SCHEME AND TEMPLATE

Bachelor and Master of Technology (Dual Degree)

B.Tech XXXX and M.Tech in XXXX

**Offered by the Department of XXXX,
National Institute of Technology Kurukshetra**

w.e.f. 2025-26



SEMESTER - I					
S. No	Course Code	Course Title	L T P	Credits	Contact Hrs
1		Communication Skills in English OR Financial Education			
2		Differential Calculus and Differential Equations			
3		Engineering Physics			
4		Institute Core Course			
5		Energy & Environmental Science			
6		Engineering Practices (P)			
7		AU1			
8		Sports			
9		NCC/NSS/Yoga			
Total					
SEMESTER - II					
S. No	Course Code	Course Title	L T P	Credits	Contact Hrs
1		Economics for Engineers OR Business Studies			
2		Integral Calculus and Difference Equations			
3		Institute Core Course			
4		Institute Core Course			
5		Institute Core Course			
6		Institute Core Course			
7		AU2			
8		Sports			
9		NCC/Yoga/Clubs/NSS			
Total					
SEMESTER - III					
S. No	Course Code	Course Title	L T P	Credits	Contact Hrs
1		Institute Core Course			
2		Program Course			
3		Program Course			
4		Program Course			
5		Program Course			
6		Program Course			
Total					
SEMESTER - IV					
S. No	Course Code	Course Title	L T P	Credits	Contact Hrs
1		Program Course			
2		Program Course			
3		Program Course			
4		Program Course			
5		Program Elective			
Total					

SEMESTER - V					
S. No	Course Code	Course Title	L_T_P	Credits	Contact Hrs
1		Institute Core Course			
2		Program Course			
3		Program Course			
4		Program Course			
5		Program Course			
6		Program Course			
7		Program Elective			
Total					
SEMESTER - VI					
S. No	Course Code	Course Title	L_T_P	Credits	Contact Hrs
1		Program Course			
2		Program Course			
3		Program Elective			
4		Program Elective			
5		Program Elective			
6		Program Elective			
Total					
SEMESTER - VII					
S. No	Course Code	Course Title	L_T_P	Credits	Contact Hrs
1		Program Course (PG)			
2		Program Course (PG)			
3		Program Course (PG)			
4		Program Elective (PG)			
5		Program Elective (PG)			
6		Lab (PG)			
7		Lab (PG)			
8		Seminar			
Total					
SEMESTER - VIII					
S. No	Course Code	Course Title	L_T_P	Credits	Contact Hrs
1		Program Course (PG)			
2		Program Course(PG)			
3		Program Elective(PG)			
4		Program Elective(PG)			
5		Program Elective(PG)			
6		Lab(PG)			
7		Lab(PG)			
8		Project			
Total					
SEMESTER – IX (Internship/Course Work)					
S. No	Course Code	Course Title	Credits		
1		Dissertation Part-I			
2		Program Elective			
3		Program Elective			
SEMESTER – X (Internship/Course Work)					
S. No	Course Code	Course Title	Credits		
1		Dissertation Part-II			

Semester Wise Program Credits

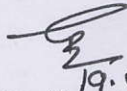
Semester	Credits
I.	
II.	
III.	
IV.	
V.	
VI.	
VII.	
VIII.	
IX.	
X.	
Total Credits	

NATIONAL INSTITUTE OF TECHNOLOGY
KURUKSHETRA

No. Acad./2026/ 850

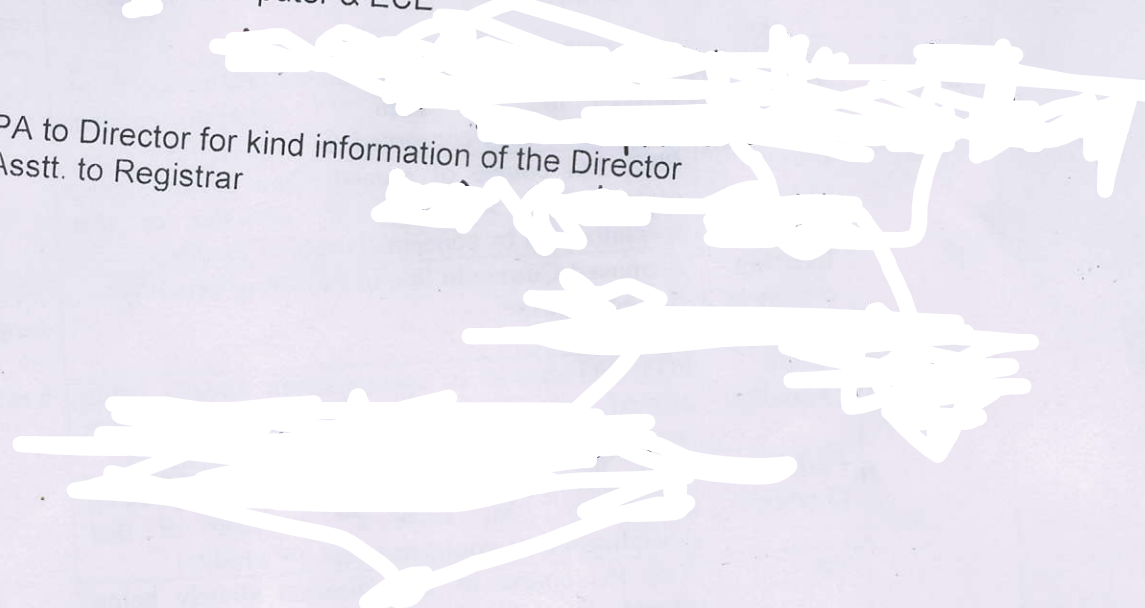
Dated: 19.5.2026

Please find enclosed the proposed guidelines for Dual Degree programs at NIT Kurukshetra. The same may be discussed in the department and suggestions, if any, may be sent to the office of Dean (Academic) by June 02, 2026 positively.


19.05.26
Dean (Academic)

HoDs- Civil, Elect., Mech., Computer & ECE

Copy to:

1. Sr. PA to Director for kind information of the Director
 2. Sr. Asstt. to Registrar
- 

Proposed Guidelines for Dual Degree Program at NIT Kurukshetra

A student admitted in five-year dual degree program may undertake 7 courses of his/her M. Tech. specialization, from M. Tech. program already being offered by the concerned department, during 7th semester to 9th semester as described below. The student will study remaining courses of 7th & 8th semesters along with B. Tech students of his/her class. The total minimum credits requirement for dual degree program is 200.

Semester	Courses to be studied by the students of dual degree program		Total Credits
I	Same as for UG program		Same as for UG program
II	Same as for UG program		Same as for UG program
III	Same as for UG program		Same as for UG program
IV	Same as for UG program		Same as for UG program
V	Same as for UG program		Same as for UG program
VI	Same as for UG program <i>A student will finalize his/her PG specialization in 6th semester so that he/her can choose subjects accordingly from 7th semester onwards.</i>		Same as for UG program
VII	Existing course of B. Tech	Proposed Course in lieu of PE/OE of existing B. Tech course	Existing Credits of 7 th semester of UG program + 2 credits
	PE/OE (3 credits)	PG1: PG course of specialization already being offered in M. Tech. 1 st semester of that specialization by concerned dept. (4 [#] credits)	
	PE/OE (3 credits)	PG2: PG course of specialization already being offered in M. Tech. 1 st semester of that specialization by concerned dept. (4 [#] credits)	
VIII	Existing course of B. Tech	Proposed Course in lieu of PE/OE of existing B. Tech course	Existing Credits of 8 th semester of UG program + 6 credits
	PE/OE (3 credits)	PG3: PG course of specialization already being offered in M. Tech. 2 nd semester of that specialization by concerned dept. (4 [#] credits)	
	PE/OE (3 credits)	PG4: PG course of specialization already being offered in M. Tech. 2 nd semester of that specialization by concerned dept. (4 [#] credits)	
	NIL	PG5: PG course of specialization already being offered in M. Tech. 2 nd semester of that specialization by concerned dept. (4 [#] credits)	
IX	PG6: PG course of specialization already being offered in M. Tech. 1 st semester of that specialization by the concerned dept. (4 [#] credits)		16 credits
	PG7: PG course of specialization already being offered in M. Tech. 1 st semester of that specialization by concerned dept. (4 [#] credits)		
	*Dissertation Part I (8 credits)		
X	*Dissertation Part II (16 credits)		16 credits
Total credits			16 credits
			Credits of existing UG program + 40 credits

Assuming M. Tech courses are of 4 credits each. In case M. Tech courses are of 3 credits, additional courses may be introduced for meeting extra 40 credits requirements

*The students can opt for internship in place of dissertation of minimum 6 months after 9th semester

Department of Civil Engineering
National Institute of Technology Kurukshetra-136119

No. CED/2026/497

Dated: 25.05.2026

Subject: Minutes of the meeting of Sectional Heads held on 25.05.2026 to finalize the course structure of 5 Year - Bachelor and Master of Technology (Dual Degree) programme in Civil Engineering.

Reference: Letter No. Acad./2026/850, dated 19.05.2026 of Dean (Academic) for the proposed guidelines of dual degree programmes.

A meeting of Sectional Heads of the department was held on 25.05.2026 to discuss the course structure of 5 Year - Bachelor and Master of Technology (Dual Degree) programme in Civil Engineering as per above reference. Prof. Baldev Setia, Sectional Head - Water Resources Engg., could not attend the meeting, being on leave.

The matter was deliberated upon and is reported as follows.

Scope of reference:

To make recommendations for the Scheme of Examination of 5 Year - Bachelor and Master of Technology (Dual Degree) programme in Civil Engineering.

Documents referred:

1. Minutes of the 52nd meeting of the Senate - S 52.14.
2. E-mail received from academic section on 08.12.2025 regarding scheme template for B.Tech. M.Tech. Integrated programme.
3. Letter No. Acad./2025/-, dated 15.12.2025 of Dean (Academic) regarding minutes of the meeting to discuss the scheme and syllabus of integrated programmes held on 08.12.2025.
4. Letter No. Acad./2026/850, dated 19.05.2026 of Dean (Academic) regarding proposed guidelines for dual degree programmes.
5. Ordinances and Regulations of Undergraduate Programmes - UG.4.1. UG.4.4. (a).
6. Ordinances and Regulations of Postgraduate Programmes - PG.4.1, PG 4.3. (a).
7. Scheme of examination of B.Tech (Civil Engineering), 1st to 6th semesters, effective from Session 2023 - 24.
8. Schemes of examination of M.Tech. (Civil Engineering) effective from Session 2025 - 26.
9. Agenda and minutes of the 58th meeting of the Senate - S 58.25.

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Main Observations:

After close examination of the above documents, following are the key observations.

- a) In its 52nd meeting, vide. S 52.14, the Senate considered the proposal for starting integrated programmes in the core branches of B.Tech. programmes.

After detailed deliberations, the Seante approved the proposal for starting integrated programmes in all branches of B.Tech. from Session 2024-25. Ten percent of total seats of all branches were earmarked to integrated programmes. The Senate confirmed the minutes of the agenda item during the meeting itself and recommended it to the Board of Governors for approval.

- b) An e-mail was received from academic section on 08.12.2025 communicating the scheme template for B.Tech. M.Tech. Integrated programme. The proposed course structure of 5 Year - Bachelor and Master of Technology (Dual Degree) programme was shared with details of semester-wise breakup of institute core, non-conventional institute core, programme core, programme elective, open elective and laboratory courses to be studied for the duration of the programme. Separate B.Tech. and M.Tech. semester course structures were proposed, with first three years as regular B.Tech. programme and last two years exclusively reserved as an M.Tech. programme.

- c) A meeting of Deans and HoDs under the Chairmanship of the Director was held on 08.12.2025 to discuss the scheme and syllabus of integrated programmes. The minutes of the meeting were circulated vide. letter No. Acad./2025/- dated 15.12.2025 of Dean (Academic). It was brought to the notice that the integrated programmes in five core branches started in Academic Year 2024-25. The scheme and syllabus of first three years of integrated programmes will be common with the regular B.Tech. programmes. It was decided that all HoDs would prepare the scheme of integrated programmes according to the shared template and it would be finalized in the next meeting of Senate. It was also decided that the total credits for integrated programmes will be between 200 - 220.

- d) A letter No. Acad./2026/850, dated 19.05.2026 was received from the Dean (Academic) regarding proposed guidelines for dual degree programmes for discussion in the department and for suggestions. The proposed course structure of 5 Year - Bachelor and Master of Technology (Dual Degree) was shared. According to the document, a student admitted in five-year dual degree programme may undertake 7 courses of his/her M.Tech. specialization from M.Tech. programme already being offered by the concerned department, during 7th semester to 9th semester. The student will study remaining courses of 7th and 8th semesters

alongwith B.Tech. students of his/her class. The total minimum credits requirement for the dual degree programme would be 200.

- e) As per Ordinances and Regulations of Undergraduate Programmes - UG.4.1, the curriculum of any branch of Undergraduate Programme is designed to have a requirement of minimum 160+6 credits, and UG.4.4. (a) Credit Requirements, minimum earned credit requirement for the award of degree is 160 with a CGPA of not less than 4.5.
- f) As per Ordinances and Regulations of Postgraduate Programmes - PG.4.1, the curriculum of any branch of the PG program is designed to have a requirement of a minimum of 80+3 credits, and PG.4.3. (a) Credit Requirements, minimum earned credit requirement for the award of degree is 80 with a CGPA of not less than 5.5.
- g) As per Scheme of examination of B.Tech. (Civil Engineering), 1st to 6th semesters, effective from Session 2023 - 24, total credit count till 6th semester is 127.
- h) As per Schemes of Examination of various M.Tech. programmes in Civil Engineering effective from Session 2025 - 26, total credits for the award of postgraduate degree are 80 + 3# (# - optional).
- i) The Senate in its 58th meeting, vide. S 58.25, considered and approved the report of the Committee constituted to look into the matter of availing the flexibility of extra course credits by the students. To summarize it, it was decided that the students of UG programmes can take the benefit of flexibility in total credit count (160+6) for the award of degree in any semester of B.Tech. programme. The students of PG programmes can take the benefit of flexibility in total credit count (80+3) for the award of M.Tech. degree 1st semester onwards. This flexibility would be limited to leaving elective courses and non-conventional institute core courses in any semester. The core courses would be mandatory.

Decisions:

All the aspects were deliberated in detail, and after careful consideration of the facts of the matter based on documents, the following decisions were taken. The same may be made applicable to the students admitted to 5 Year - Bachelor and Master of Technology (Dual Degree) programme, 2024-batch onwards.

1. Course structure of Dual Degree programme in Civil Engineering

The following course structure is proposed to be adopted. The proposed course structure is broadly aligned to the scheme template of B.Tech. M.Tech. Integrated programme shared by

 3

the Academic Section vide. e-mail dated 08.12.2025. The scheme and syllabus of the first three years of integrated programme will be common to the regular B.Tech. programme in Civil Engineering (presently the scheme effective from Session 2023 - 24). The course structure of last two years of studies for the 5-year dual degree programme would be same as of a 2-year M.Tech. degree programme already being offered by the department, presently from the relevant Schemes of Examination for various specializations of M.Tech. (Civil Engineering) effective from Session 2025 - 26.

The above provision would help in strengthening the existing M.Tech. programmes and allow capacity building in different streams of Civil Engineering without diluting course content related to various specializations. Further, it would best optimize the use of resources and infrastructure available in department and the institute.

**Proposed course structure of 5 Year - Bachelor and Master of Technology
(Dual Degree) programme in Civil Engineering**

Semester	Courses	Total credits
I	Same as the Scheme of Examination of B.Tech. (Civil Engineering) Degree Course - Semester - I (presently the scheme effective from Session 2023 - 24)	21
II	Same as the Scheme of Examination of B.Tech. (Civil Engineering) Degree Course - Semester - II (presently the scheme effective from Session 2023 - 24)	22
III	Same as the Scheme of Examination of B.Tech. (Civil Engineering) Degree Course - Semester - III (presently the scheme effective from Session 2023 - 24)	22
IV	Same as the Scheme of Examination of B.Tech. (Civil Engineering) Degree Course - Semester - IV (presently the scheme effective from Session 2023 - 24)	20
V	Same as the Scheme of Examination of B.Tech. (Civil Engineering) Degree Course - Semester - V (presently the scheme effective from Session 2023 - 24)	19
VI	Same as the Scheme of Examination of B.Tech. (Civil Engineering) Degree Course - Semester - VI (presently the scheme effective from Session 2023 - 24)	23
VII	Same as the Scheme of Examination of Semester - I of a running M.Tech. specialization in Civil Engg. (presently the scheme effective from Session 2025 - 26)	23
VIII	Same as the Scheme of Examination of Semester - II of a running M.Tech. specialization in Civil Engg. (presently the scheme effective from Session 2025 - 26)	23
IX	Same as the Scheme of Examination of Semester - III of a running M.Tech. specialization in Civil Engg. (presently the scheme effective from Session 2025 - 26)	19
X	Same as the Scheme of Examination of Semester - IV of a running M.Tech. specialization in Civil Engg. (presently the scheme effective from Session 2025 - 26)	18
Total		210

2. Allocation of a specialization

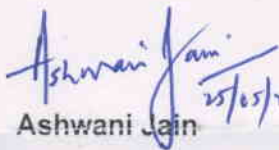
The total number of sanctioned seats for a particular batch of 5-year integrated programme is 12. The students would be allocated equally to all the running specializations on the basis of preference and merit.

3. Credit Requirement

The minimum earned credit requirement for the award of Dual degree may be taken as 204 with a CGPA of not less than 5.0.

The students can take benefit of flexibility in total credit count (204 + 6) as 3 credits in any semester of the first three years in B.Tech. programme, and additional 3 credits in any semester during the last 2 years in an M.Tech. programme. This flexibility would be limited to leaving elective courses and non-conventional institute core courses in any semester. The core courses are mandatory.

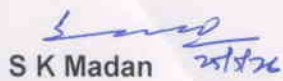
Submitted for further necessary action please.


Ashwani Jain 25/05/2016

Sectional Head - Geotechnical Engg.


Praveen Aggarwal 25/5/2016

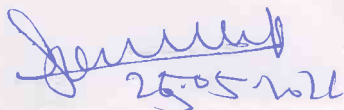
Sectional Head - Transportation Engg.


S K Madan 25/5/2016

Sectional Head - Structural Engg.

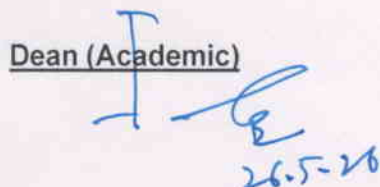

Mahesh Pal 28/5/16

Sectional Head - Geoinformatics


25.05.2016

S K Patidar

HoD & Sectional Head - Environmental Engg.

Dean (Academic)

26.5.2016

Acad./Inward/26/1799
Dated:/04/06/26

DEPARTMENT OF ELECTRICAL ENGINEERING
NATIONAL INSTITUTE OF TECHNOLOGY, KURUKSHETRA

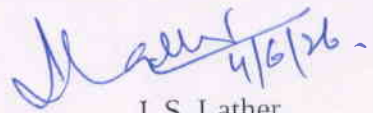
Ref. No. EED/26/851

Dated: 04.06.2026

Subject: Regarding Credits in the Integrated Course in Electrical Engineering

Dear Sir,

Kindly find enclosed the draft of the scheme for the 7th Semester to 10th Semester of Integrated Course in Electrical Engineering in response to your reference. The detailed subject names will be finalized in DAC and shall be duly forwarded to your office pl.



J. S. Lather
Head of Department

Dean Academics

ANNEXURE – I

Semester VII: Integrated Course in Electrical Engineering (Draft Scheme Format)

S. No.	Course Category	Course code	Course Title	L	T	P	Credits
1	UG-IC	IC	Entrepreneurship and Start Up	3	-	-	3
2	UG-PC	PC	Electric Drives	3	-	-	3
3	UG-PC	EEPC403	Summer internship UG	-	-	-	1
4	PG-PC	MEECxxxx		3	-	-	3
5		MEECxxxx		3	-	-	3
6		MEECxxxx		3	-	-	3
7	PG-PE	MEEExxxx	Any One Program Elective out of Existing PG Electives	3	-	-	3
8	Lab	MEEL101/ MEEL201/ MEEL301	Modelling & Simulation Lab/ Programming & Simulation Lab/ Machines and Drives Lab	-	-	4	2
9	Lab	MEEP101/ MEEP201/ MEEP301	Design Project-I	-	-	3	1
		Contact hours		18	-	7	22
		Total contact hours		25			

Comments: Existing UG Credits (18) + 4 credits

Semester VIII : Integrated Course in Electrical Engineering (Draft Scheme Format)

S. No.	Course Category	Course code	Course Title	L	T	P	Credits
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1	UG-PC	PC	Electric Vehicles	3	-	-	3
2	PG-PC	MEECxxxx		3	-	-	3
3		MEECxxxx		3	-	-	3
4		MEECxxxx		3	-	-	3
5	PG-PE	MEEExxxx	Any One Program Elective out of Existing PG Electives for Even Sem	3	-	-	3
6	PG-PE	MEEExxxx	Any One Program Elective out of Existing PG Electives for Even Sem	3	-	-	3
7	PG-Lab	MEEL102/ MEEL202/ MEEL302	Advanced Control Systems Lab/ Advanced Power System Lab/ PEC and Microcontroller Lab	-	-	4	2
8	PG-Lab	MEEP102/ MEEP202/ MEEP302	Design Project-II	-	-	4	2
		Contact hours		18	-	8	22
		Total contact hours		26			

Comments: Existing UG Credits (18) + 4 credits

After 8th Semester -- SUMMER ACADEMIC ACTIVITY[#]

S. No.	Course Category	Course code	Course Title	L	T	P	Credits
1	AU	MEEA301	Value added courses/Industrial Training/ Expert Lectures/ short term courses/prep for dissertation	-	-	-	-

[#] Activity will be decided and evaluated by Supervisor of Student in the ninth semester (Audit)

Semester IX : Integrated Course in Electrical Engineering (Draft Scheme Format)
(Same as 3rd Semester of Mtech course)

S. No.	Course Category	Course code	Course Title	L	T	P	Credits
1	OE	M**O***/MEEM101/ M**O***/MEEM201/ M**O***/MEEM301	Open Elective-3/ MOOC course (Optional)	3	-	-	3*
2	IC	MEED101/ MEED201/ MEED301	Dissertation Part-I	-	-	-	16
			Total	-	-	-	16

* - optional credits

Semester-IX Credits - 16

Semester IX : Integrated Course in Electrical Engineering (Draft Scheme Format)
(Same as 4th Semester of Mtech course)

S. No.	Course Category	Course code	Course Title	L	T	P	Credits
1	IC	MEED102/ MEED202/ MEED302	Dissertation Part-II	-	-	-	16
			Total contact hours	-	-	-	16

Semester-X Credits - 16

S 59.18 To consider the proposal of the Committee for Preparation of Institute Innovation, Incubation and Start-up Policy

In order to promote innovation, entrepreneurship, start-up culture, industry interaction, and commercialization of research outcomes in the Institute, the following committee was constituted by the competent authority of the Institute for the preparation of the Institute Innovation, Incubation and Start-up Policy in line with the guidelines of the Ministry of Education, Govt. of India.

1. Dean (Research & Consultancy)	Chairperson
2. Dr. Sandeep Singhal, Prof. I/C (Audit)	Member
3. Professor in-charge Training & Placement	Member
4. Faculty in-charge Start-up Cell	Member
5. Faculty in-charge Innovation Cell	Member
6. Dr. Rajeev Rath, Asst. Prof. G-1, MED	Member Secretary

The above Committee met several times and deliberated upon various issues related to drafting the Institute Innovation, Incubation and Start-up Policy. The main observations/amendments suggested by the Committee have been incorporated in the draft policy document.

The draft policy document along with the minutes of the meetings are enclosed as Annexure- S 59.18.

The Senate may consider and discuss.

**OFFICE OF THE DEAN (RESEARCH & CONSULTANCY)
NATIONAL INSTITUTE OF TECHNOLOGY
KURUKSHETRA-136119**

No. Dean (R&C)/26/ **95**

Dated: 26.05.2026

Subject: Minutes of the Meeting on the Drafting of Institute Innovation, Incubation and Startup Policy Document was held on 18-05-26 at 3:30 pm in the office the Dean (R&C).

Members Present

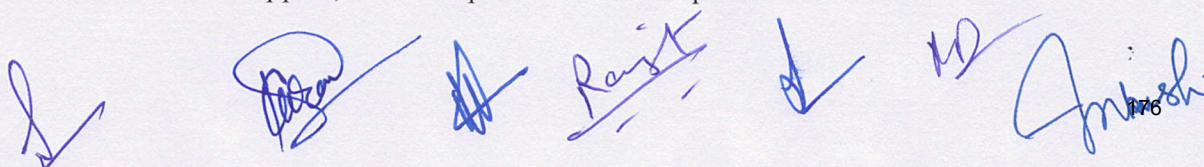
1. Prof. Mahesh Pal (Dean R&C)	Chairperson
2. Dr. Sandeep Singhal, Domain Expert	Member
3. Dr. Karamdeep Singh, FIC Innovation Cell	Member
4. Dr. Vivek Sethi, FIC Innovation Cell	Member
5. Dr. Ranjeet Kumar, FIC Startup cell	Member
6. Dr. Ankush Vashisth, FIC Startup cell	Member
7. Dr. Rajeev Rathi, Convener IIC	Member Secretary

Agenda

1. Discussion on drafting of the Institute Innovation, Incubation and Startup Policy document.

The meeting commenced with the welcome address by the Chairperson, who emphasized the need for preparing a comprehensive Institute Innovation, Incubation and Startup Policy document in line with national innovation guidelines to strengthen the institute's entrepreneurial ecosystem.

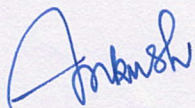
1. The committee deliberated on the structure, scope, and contents of the proposed Institute Innovation, Incubation and Startup Policy document. Various sections including objectives, governance structure, innovation support mechanisms, incubation facilities, startup support, intellectual property rights, industry collaboration, and financial assistance were discussed in detail.
2. It was resolved that the draft policy document shall be prepared incorporating provisions related to innovation promotion, incubation support, startup facilitation, intellectual property rights, technology commercialization, industry interaction, infrastructure support, and entrepreneurial development activities.



3. It was resolved that the policy document shall clearly define operational procedures, eligibility criteria, institutional support mechanisms, and roles and responsibilities of stakeholders for effective implementation.



(Vivek Sethi)



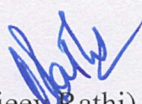
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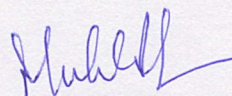
(Ranjeet Kumar)



(Rajeev Rathi)



(Sandeep Singhal)



(Mahesh Pal)

**OFFICE OF THE DEAN (RESEARCH & CONSULTANCY)
NATIONAL INSTITUTE OF TECHNOLOGY
KURUKSHETRA-136119**

No. Dean (R&C)/26/ 96

Dated: 26.05.2026

Subject: Minutes of the Meeting on the Drafting of Institute Innovation, Incubation and Startup Policy Document was held on 26-05-26 at 11:30 pm in the office the Dean (R&C).

Members Present

1. Prof. Mahesh Pal (Dean R&C)	Chairperson
2. Dr. Sandeep Singhal, Domain Expert	Member
3. Dr. Karamdeep Singh, FIC Innovation Cell	Member
4. Dr. Niyati Baliyan, FIC Training and Placement	Member
5. Dr. VivekSethi, FIC Innovation Cell	Member
6. Dr. Ranjeet Kumar, FIC Startup cell	Member
7. Dr. AnkushVashisth, FIC Startup cell	Member
8. Dr. Rajeev Rathi, Convener IIC	Member Secretary

Agenda

1. Review and discussion on the Institute Innovation, Incubation and Startup Draft Policy document.

The meeting regarding the drafting of the Institute Innovation, Incubation and Startup Policy, the draft policy document was held under the chairmanship of the Dean Research. The meeting commenced with a welcome address by the Chairperson. The Chair reviewed the discussions and recommendations made during the previous meeting. After detailed deliberations and review of the revised draft policy document, the following points were minuted:

1. The Chair informed the members that the amendments and modifications suggested during the previous meeting had been incorporated into the draft policy document. The revised draft was placed before the committee for final review and approval.
2. The committee discussed the draft policy, amendments, and modifications incorporated in the draft policy document as per the suggestions received earlier. The



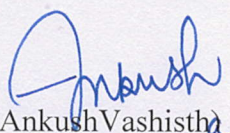
amendments suggested in the previous meeting were incorporated in the draft policy document.

3. Roles and responsibilities of various stakeholders, including departments, incubation centre, startup cell, innovation cell, faculty mentors, and students, were clarified.
4. Provisions related to innovation promotion, startup support, incubation mechanisms, faculty and student participation, intellectual property rights, and revenue sharing were reviewed and refined.
5. The committee discussed the revised provisions related to innovation promotion, startup support, incubation facilities, intellectual property rights, participation of students and faculty members, and institutional support system. The members expressed satisfaction with the incorporation of the earlier suggestions and recommendations.
6. After detailed deliberations, the committee unanimously accepted and approved the Institute Innovation, Incubation and Startup Policy Document for implementation and further submission to the competent authority for final approval and notification.

The Chair appreciated the efforts and contributions of all committee members in finalizing the policy document. The draft policy is annexed herewith for further perusal and actions.



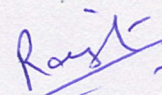
(Vivek Sethi)



(Ankush Vashistha)



(Karamdeep Singh)



(Ranjeet Kumar)



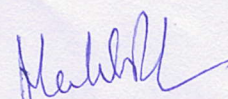
(Niyati Baliyan)



(Rajeev Rathi)



(Sandeep Singhal)



(Mahesh Pal)

NATIONAL INSTITUTE OF TECHNOLOGY
KURUKSHETRA – 136119
(Institution of National Importance)



INSTITUTE
INNOVATION, INCUBATION
&
START-UP POLICY



(2026)

www.nitkkr.ac.in
Kurukshetra – 136119, Haryana, India



Innovation, Incubation, and Startup Policy

National Institute of Technology, Kurukshetra

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1. Introduction

An incubation/startup unit is a campus support system that reduces the distance between your project and your first customer. This policy document, Startup and Innovation Policy of the National Institute of Technology Kurukshetra, specifically applies to the National Institute of Technology (NIT) Kurukshetra. It applies to all the Institute's students, faculty, and staff, along with the external startups, companies, and R&D organizations inclined to incubate their ideas at NIT Kurukshetra. The policy aligns with the National Innovation and Startup Policy 2019 for Students and Faculty, Ministry of Education, 2019. The document provides the policy statement, regulations, and procedures for the operational matters related to establishing and operating the Startups at NIT Kurukshetra. It highlights the strategies adopted, the infrastructural support, the product ownership issues, and other issues related to the support, implementation, and assessment of the Startups at NIT Kurukshetra.

Definitions:

- **NIT Kurukshetra** or **NIT KKR** or the **Institute** shall mean 'National Institute of Technology', Kurukshetra.
- **Start-up policy** shall mean this document and any revisions, modifications made therein and approved from time to time.
- **Promoter** means a promoter as defined under Section 2(69) of Companies Act.
- **Executive capacity** shall mean a role as a Director or a Chief Executive Officer, Chief Operating Officer or Manager or any person, enjoying similar role, by Whatever name called, in the Company, having executive power(s) in the Company.
- **Company** shall mean a start-up Company, having at least one Faculty member from NIT Kurukshetra in Executive or in Non-Executive Capacity in the company.
- **NIT KKR Researcher** shall mean Regular/full time faculty member, other part time faculty member on roll of NIT KKR, Institute postdoctoral researcher, staff on duty,



research scholars and other students studying in NIT KKR and other researchers associated with NITKKR in a formal manner.

- **Non-Executive position** means a person in this post who is not in employment of a company and who is not paid salary by the company.
- **Regular/Full Time Faculty member** is a faculty member appointed by the Institute and approved for taking up activities under this policy.
- **Equity Share** reflects the ownership in the issuing company where each equity holder is a fractional owner of the issuing company.
- **Startup means and include**
 - a. A start-up is a new company registered in India.
 - b. Is defined as per the provisions of the NISP document I Gazette notification therein.
 - c. Incubated inside or outside of the NIT KKR incubation center.
 - d. company with which an NIT KKR Researcher is associated with.

1.1 Policy Objectives

This policy encourages technology based entrepreneurship, enabling startups to progress from concept to scale-up. It focuses on Technology and Innovation-Driven Entrepreneurship and guides the transition of ideas into products and services as a way toward entrepreneurial undertakings. The policy presents the management framework and guidelines that enable innovation. The specific objectives of the policy document are:

- a. Identify and support innovative ideas with the potential to solve real-world problems.
- b. Encourage interdisciplinary collaboration among students, faculty, and industry partners.
- c. Provide support for proof-of-concept, prototype development, and market validation.
- d. Strengthening industry partnerships and global collaborations for knowledge exchange and market expansion.



1.2 Governance, Strategies and Scope

The strategies and governance outline the startup concept as a pathway from idea to market.

- a. The entrepreneurial agenda is the responsibility of a senior person at the Dean/equivalent position level to bring in the required commitment. This person is hereafter referred to as the "*Nodal Officer*."
- b. NIT Kurukshetra reserves the right to make the necessary amendments in the policy to ensure the smooth functioning of the startups. The nodal officer in consultation with committee can add/delete/update/change any of clauses of these guidelines in the interest of students and institute as a whole in order to develop/continue a robust startup eco system.
- c. Startup ideas within the possible startup categories (Refer to table 1) that aim to scale up well-tested and verifiable concepts into commercial ventures qualify for pre-incubation. The innovator is expected to commercialize the technology or product and transition to the incubation stage within 18 months of pre-incubation.
- d. Startups under incubation shall establish R&D partnerships with NIT Kurukshetra to commercialize novel technological ideas or scale up laboratory-proven concepts, which eventually pave the way to establishing technology business enterprises.
- e. The company applying for incubation must be registered with the RoC (Registrar of Companies) (pre-incubated companies are exempted). Those not registered with RoC at the time of admission (Proprietorship or Partnership) would have to get registered within Six months of incubation or before the disbursal of the seed fund, whichever is earlier. The aspirant organization can exist as a private limited company, proprietorship, or partnership company before it is admitted.
- f. Acceptable business would involve innovative, technology-based products, ideas, or services.
- g. Admission is limited to organizations that show realistic and plausible financial projections with significant revenues within the first five to seven years. The business plan has to be submitted during the application phase.
- h. Technology / R&D units of existing small/medium-sized enterprises, industry associations, or R&D companies who worked earlier together desire to forge a close technological



alliance with NIT Kurukshetra (TRL-3 or above). This mandates the involvement of faculty member(s).

- i. The policy will be reviewed after a period of three years.
- j. **Resolution of Disputes:** Any dispute will be resolved by mutual discussion with Dean (R&C) and if required, a committee may be set up to review the same for a resolution. Recommendation of the committee will be made to the Director and the decision of the Director will be final and binding.

1.3 Eligible and non-eligible Companies under this Policy

Eligible companies

- Such a Company must pursue businesses that are a direct result of the research and development activities of the NIT KKR researchers. In such cases, the faculty member(s) and student(s), if applicable, will be known as a founding member(s)/Promoter(s) in a Non-Executive position of the Company.
- The following entities that have direct or indirect affiliation with NIT Kurukshetra are eligible for incubation at the Institute: Faculty members, Students (UG/PG/Ph.D./ Postdoc), Alumni, R&D partners (interested in collaborating with the Institute, sponsors of R&D, and consultancy projects), NIT Kurukshetra's partner universities (having R&D collaborations and MOUs), Government Agencies.

Companies not eligible

A faculty member cannot associate, either as a Promoter or in an Executive Capacity, With:

- Companies involved in teaching and/or development of educational content. On the other hand, companies developing innovative technology platforms that facilitate delivery of content are permissible.
- Companies whose business will be to provide consultancy services.
- Such class of Companies that may be prescribed and notified by NIT KKR from time to time.



2. Startups: Categories, Process, and Documents

2.1 Startup Categories

The types of startups supported are given in Table-I:

Table 1: Startups Supported

Category	Startup Type	Description	Examples
I	Deep-Tech Startups	Startups leveraging cutting-edge R&D-driven innovations.	AI/ML, Blockchain, Quantum Computing, Cybersecurity, Edge Computing
II	Renewable Energy & Sustainability	Startups focusing on clean energy and environmental sustainability.	Solar PV, Wind, Bioenergy, Smart Grids, Energy Storage
III	Smart Infrastructure & Industry 4.0	Startups developing automation and intelligent infrastructure solutions.	Digital Twins, IoT-based Smart Cities, Industrial IoT, 3D Printing
IV	Electric Vehicles & Sustainable Mobility	Startups innovating in transportation and mobility solutions.	EV Powertrain, Battery Tech, Charging Infra, Autonomous Vehicles
V	AgriTech & Food Tech	Startups using engineering solutions for agriculture and food processing.	Smart Irrigation, Agri-Drones, AI-based Crop Monitoring
VI	EdTech & Learning Innovations	Startups revolutionizing education and skill development.	AI-based Adaptive Learning, VR/AR Classrooms, STEM Labs
VII	Social Impact & Rural Technology	Startups focused on affordable and scalable solutions for rural areas.	Rural Electrification, Water Purification, Low-cost Housing
VIII	FinTech & Smart Financial Solutions	Startups innovating in digital finance and blockchain solutions.	AI-driven Risk Management, Cryptocurrency Platforms, Digital Payments
IX	Any Technology in the relevant engineering discipline.	---	---



2.2 Admission procedure

a. The following procedure shall be adopted for admissions:

Step-1: The applicant will apply with an executive summary/ business proposal.

Step-2: The nodal officer shall forward this executive summary to an internal review committee.

Step-3: If the initial evaluation of the business plan/executive summary appears convincing, the company's founders will pitch the idea and present the business proposal.

Step-4: If found suitable for admission, the evaluation committee shall forward its recommendation to the nodal office, which will send it to the Director for further approval (typically within one week after the presentation).

Note: Applicants for pre-incubation will give a presentation and plan of activity to the evaluation committee for pre-incubation. This will be followed by Step-4.

- b. All applicants must read and agree to all the terms and conditions in the Startup Policy.
- c. Incubating companies/teams shall submit information to the Institute about all material, administrative, and financial changes or developments in their companies from time to time. Such information could be (but is not limited to) a change in the company's name, business or product profile, change in directors, promoters, or shareholders, acquisition of a new office, or additional equity or debt investments. The Institute may require such companies to submit other information as necessary. Prior permission from the Institute shall be obtained to effect any changes.
- d. Students applying for pre-incubation need to have a faculty mentor associated with the Institute. The founders will submit the declaration in advance (with application) for the product ownership between the founders and mentors to avoid any ownership issues.
- e. The Incubator can perform research and due diligence on the company, its management team, the industry, and the business's current and future competitive elements.
- f. The Incubator may seek further information from the applicant and ask the applicant to revise the executive summary and/or presentation.
- g. Moreover, the Incubator will not sign non-disclosure agreements outside a third party.



- h. The Incubating Company and the Institute will sign an MOU with all the terms and conditions.
- i. The MoU between the incubating company and the Institute will be carried out per Institute rules and regulations. Further, the concerned authorities of the Institute shall sign an approval of the MoU with the Business incubator.
- j. The following agreements shall be signed by the supported entities to the extent applicable:
 - 1. *Incubation agreement*: Between the Institute, the supported entity, and its Promoters for the Institute's incubation support. Contains rules and other incubation norms, consideration, equity holding, etc. (Applicable to all)
 - 2. *Founders' Agreement*: A copy of the agreement between the company's founders shall be shared with the institute.
 - 3. *Seed fund Agreement*: Between the institute and seed-supported company on sanction of seed support to the incubating company. Contains rules of disbursement and repayment. (Applicable to incubates availing seed fund)
- k. During the incubation period at the institute, the incubating companies will mandatorily audit their accounts, and their books of account shall be inspected by the appointed chartered accountants of the institute. Compliances laid down by the Companies Act 2013 are binding on the Incubate Companies. The companies will give a quarterly report on the compliances adhered to, as laid down in the Companies Act.
 - a) Non-compliance with the above would be liable to penalty/strict action by the Institute.
 - b) Non-adherence to the first warning of non-compliance by the said Incubating company will attract a penalty of Rs. 1000/-, billed to the facilities head.
 - c) Action against the Incubating Company's non-adherence to the second warning will make the company ineligible to apply for Seed funds at the Institute.
 - d) An action against the non-adherence to the third warning would invite a notice to vacate the residential premises allotted to them.
 - e) Companies under formal incubation will be permitted to stay, to begin with, for 11 months. Any stay beyond 18 months is subject to Institute approval and will entail additional consideration, which terms will be decided at that point as deemed necessary.



2.3 Documents: submitted by the applicant/company

1. Application Form
2. Business Plan/ Executive Summary
3. Intellectual Property Declaration Worksheet
4. Application for seed fund (if required)
5. List of infrastructural support required from the Incubator (including office space requirements (in sq ft)).
6. List of any special lab facility needed from the Institute.
7. Connectivity requirements and R&D Support are required from NIT Kurukshetra.
8. Statement of Purpose (What benefits and values do the promoters see from getting incubated at NIT Kurukshetra).
9. Schedule: Proposed date of moving in and anticipated duration of stay.
10. Memorandum of Association and Articles of Association (if the company has already been formed, otherwise this should be submitted within 30 days from the date of incubation)
11. Any other deemed suitable by the Incubator from the applicant

3. Institutional Framework

- a. The Institution will
 - Ensure Incubation support.
 - The Institute will facilitate connections with angel investors, venture capitalists, and other funding sources.
 - Support startups in launching their products/services in relevant markets through collaborations and networks.
 - Establish processes and mechanisms for the easy creation and nurturing of startups/enterprises by students, staff, faculty, alumni, and potential startup applicants from outside the institutions.
 - Create pre-incubation and incubation facilities to nurture innovation and startups in the institute.



- Create facilities for supporting pre-incubation (e.g., IICs as per the guidelines by MHRD's Innovation Cell, EDC, IEDC, New-Gen IEDC, Innovation Cell, Startup Cell, etc.) and Incubation/ acceleration by mobilizing resources from internal and external sources.
- b. This pre-incubation/incubation facility should be accessible to students, staff, and faculty from all disciplines and departments.
- c. Pre-incubation facilities may or may not be a separately registered entity or Special Purpose Vehicle (SPV).
- d. The 'Incubation Center of Technology Commercialization Unit' (TCU) will be a separate entity preferably registered under Section-8 of the Company Act 2013 or 'Society' registered under the Society Registration Act with an independent governance structure.
- e. The institute will have a provision for separate staff to run the incubation center. Different posts will be created for its operation and management, such as CEO, Manager, Assistant incubation officer and other office staff.
- f. The institute should recruit staff with strong innovation, entrepreneurial/ industrial experience, behavior, and attitude. This will help in fostering the I&E culture.
- g. The Institution will offer mentoring and other relevant services through Pre-incubation/Incubation units in return for fees, equity sharing, and (or) zero payment basis. The ownership rights are discussed later.
- h. The IIC will minimize hierarchical barriers by simplifying the approval process and queries for the students and faculty startups.
- i. The center will ensure that the approval process does not take more than eight weeks. The length of the approval process is mainly dependent on the preparedness of the prospective company. After completing the admission process, the time between approval and the actual move-in date is flexible due to varying conditions such as space requirements, paperwork, etc.
- j. Periodically, external subject matter experts, such as guest lecturers or alumni, can be engaged for strategic advice and bringing in skills not available internally.



- k. To attract and retain the right people, the Institute will develop academic and non-academic incentives and reward mechanisms for all staff and stakeholders who actively contribute to and support the entrepreneurship agenda and activities.
 - The reward system for the staff may include sabbaticals, office and lab space for entrepreneurial activities, reduced teaching loads, awards, training, etc.
 - The recognition of the stakeholders may include offering the use of facilities and services as a strategy for shared risk, such as guest teachers, fellowships, associateships, etc.
- l. The Lab-to-market strategy will be developed on a case-to-case basis.
- m. Students who are under incubation but are pursuing some entrepreneurial ventures while studying will be allowed to use their address in the Institute to register their company with due permission from the Institution.
- n. The Institute may explore the provision of accommodation to the entrepreneurs within the campus for some time depending upon the availability.
- o. The Institute will provide services based on a mixture of equity, fee-based, and/ or zero-payment models. So, a startup may choose to avail only of the support, not seed funding, from the institute on a rental basis.
- p. The institute could extend this startup facility to alumni and outsiders.

3.1 Opportunity for Students

- a. A student may work on the early part of the entrepreneurial journey as a part of his/her academics using the credits (as decided by Institute).
- b. The institute will set up a review committee for the review of startups by students, and based on the progress made, decisions related to the student startups will be made.
- c. Students can set up a startup or work part-time for the startup while studying.
- d. Students would earn academic credits for working on innovative prototypes/business models (as decided by the Institute).
- e. Student innovators/entrepreneurs may opt for a startup instead of mini projects/major projects, summer training, etc.



- f. Students already enrolled incubation process (up to 6th semester) may opt for 8th semester internship as startup in the incubation Centre.
- g. Student entrepreneurs will take a year break to work on their startup.
- h. Students would be incentivized for Innovation and Entrepreneurship on the recommendation of committee.
- i. Incubating Students may provide attendance benefits up to 50%.
- j. Undergraduate students are permitted to engage in a full-time entrepreneurship journey only when:
 - They are in the last semester of study (or)
 - They opt for a semester internship (or)
 - They opt to apply for leave for a year
- k. Masters and PhD students are eligible only when (With their supervisor consent):
 - They have completed all the coursework (including comprehensive viva for the PhD students)
 - The research topic should be in concurrence with the envisaged startup theme

3.2 Opportunity for Faculty

- a. Faculty members must obtain prior permission from the Institute before getting associated with any business venture or starting a new venture in the prescribed application format.
- b. The faculty member may provide consultancy to company in a non-executive capacity. However, explicit prior permission is required from the competent authority.
- c. The leaves are applicable as per the institute rules.
- d. Take a sabbatical and/or Leave without pay/earned leave and work full-time for the Company in an Executive Capacity (COO, CEO, Vertical Head etc). Eligibility and approvals of such leave are governed by the extant rules of the Institute. The institute will allow the use of its resources to faculty/students/staff wishing to establish a startup as a full-time effort. Seniority and other academic benefits during such a period may be preserved for staff or faculty.



- e. Faculty participation in startup related activities will be considered a legitimate activity of faculty in addition to teaching, R&D projects, industrial consultancy, and management duties. It will be considered while evaluating the annual performance of the faculty.
- f. Faculty members can undertake projects that could be conducted at the institute and managed through their startups, provided that the institute's overhead charges are duly paid as per the institute's norms.
- g. Faculty must limit engagement for the company without disturbing their academic activities/ schedules (a maximum of 20% of the office time).
- h. It is expected that the startup is involved in technology development. Merely providing consultancy services is not permitted, and such activity must be taken up as per the existing norms of the Institute's R&D consultancy.
- i. Faculty must not involve research staff or other staff of the Institute in the activities of the startups and vice-versa.
- j. The faculty must not engage in activities like internal/external committees related to the startup's objective to avoid conflict of interest. A disclosure is to be made where a possibility of overlap exists.
- k. It should be noted, however, that the faculty member of the Institute should take all possible steps to ensure that his/her duties and responsibilities as a faculty shall take precedence over all other activities, regardless of the nature of his/her engagement with the company.
- l. A company, if promoted by regular faculty, shall be granted incubation only upon the submission of a No Objection Certificate from the competent authority or obtaining permission from the competent authority of NIT Kurukshetra to register a startup company or signing an incubation agreement between NIT Kurukshetra and the faculty.
- m. A faculty member cannot associate either as a Promoter or in an Executive Capacity with companies involved in Teaching and/or educational content development. On the other hand, companies developing innovative technology platforms that facilitate content delivery are permissible.
- n. Product development, commercialization, and participating and nurturing startups would be added to faculty duties. Each faculty would choose a mix and match of these activities



(in addition to the minimum required teaching and guidance), and then the respective faculty members would be evaluated accordingly for their performance and promotion.

- o. The role of faculty may vary from being an owner/ direct promoter, mentor, consultant, or on-board member of the startup.
- p. Faculty startups may consist of faculty members alone or with students or faculty of other institutes or alumni or with other entrepreneurs.
- q. Faculty must separate and distinguish ongoing research at the Institute from the work conducted at the startup/ company.
- r. In case of selection of a faculty startup by an outside national or international accelerator, a maximum leave (as sabbatical/ existing leave/ unpaid leave/earned leave) of one semester/ year or even more depending upon the decision of review committee constituted by the Institute may be permitted to the faculty.
- s. Faculty must not accept gifts from the startup.
- t. Human subject related research in startups should get clearance from the research ethical committee.

4. Infrastructure and Services Provided

- a. The Director shall appoint an Incubation Committee (IC) to facilitate the administration of innovation and incubation centers and startups and implement their policies. The Dean R&C shall act as the Chairman of the IC. Convener IIC shall be the Secretary of IC. The Dean R &C shall be a permanent member of the committee. In addition to the Director, as Head IC and Dean (R&C), the Head IC shall appoint other faculty members of NIT Kurukshetra who are conversant with the policies, statutes, and procedures of startups, innovation, and incubation. One of the members of the IC shall be from the industry.
- b. Stakeholder engagement will be given prime importance in the institute's entrepreneurial agenda. Institutes should find potential partners, resource organizations, micro, small, and medium sized enterprises (MSMEs), social enterprises, schools, alumni, professional bodies, and entrepreneurs to support entrepreneurship and co-design the programs.



4.1 Mentoring and Advisory Services

- a. Every company incubated at NIT Kurukshetra could select one institute faculty mentor as per the Expert committee's recommendation within six months from the date of registration/joining of the incubation center.
- b. Specialized mentors: to assist with particular strategic areas or to provide project oriented consultation. (These arrangements may begin as a pro bono arrangement with an option for both parties to graduate to a paid relationship.)
- c. There shall be a mandatory faculty mentor from the Institute for startups.
- d. *Industry Mentor*: To support/guide the startups with strategic development for work.

4.2 Professional Services

NIT Kurukshetra may associate with professionals for accounting, IP, legal, consulting, and management expertise on a part-time basis. Incubating companies can avail their services on payment basis or as per institute rules.

4.3 Seed Funding

The Incubates may apply for seed funding with the Seed Support Application through the NIT Kurukshetra's Incubator. The seed support shall be in the form of a convertible instrument. Additional investment will occasionally be considered as per the terms and conditions as per the guidelines of the Startup Policy.

5. Financial Support

- a. The Institute will create an 'innovation/incubation fund' to support startup projects, pre-incubation, infrastructure, and other facilities. The funding may include:
 1. A minimum of 1% fund of the total annual budget of the Institution will be allocated for funding and supporting innovation and startup related activities.
 2. Raising funds from diverse sources to reduce dependency on public funding. External funding through government (state and central) such as DST, DBT, MOE, AICTE, TDB, TIFAC, DSIR, CSIR, BIRAC, NSTEDB, NRDC, Startup India,



Invest India, MeitY, MSDE, MSME, etc. and non-government sources will be encouraged.

3. Institute may approach private and corporate sectors to generate funds under Corporate Social Responsibility (CSR) as per Section 135 of the Company Act 2013.
4. Funding may also be raised through sponsorships/ donations/ alumni networks.
- b. To use the Institute brand and provide support, the Institute can stake a share in the startup equity held by its students/staff/faculty. Total equity held by the Institute in any company will be decided on a case-by-case basis.
- c. In case of support and services to be provided by NIT Kurukshetra, the supported entities will be subject to consideration of
 - Incubation fees
 - IP compensation
 - Revenue share
- d. For any specific additional support or extension of incubation, further consideration may be charged on a case-to-case basis.
- e. The company will have its own funding and accounting procedures in line with the prevailing statutory norms.
- f. In return for the services and facilities, the Institute may **take a 9% equity/stake** in the startup/company based on brand used, faculty contribution, the support provided, and use of the Institute's IPR (a limit of 9% is suggested so that Institute has no legal liability arising out of the startup).
- g. The Institute should usually take a much lower equity share unless its full-time faculty/staff have substantial shares. Other factors for consideration should be space, infrastructure, mentorship support, seed funds, support for accounts, legal, patents, etc.
- h. While drawing full salary from the Institution, if a faculty/staff member happens to acquire the equity/share in the incubated business/venture then he/she will not acquire more than 30% equity/share, and would share 20% of the profit earned with the institute, however the



institute will not be liable for compensation/adjustment of any losses incurred during the financial year.

- i. Faculty/staff can engage with startup in advisory or consultative roles and do not compromise with their existing academic and administrative work/duties.
- j. If the faculty/staff holds the executive or managerial position for over three months in a startup, they will go on leave (sabbatical/ leave without pay/ earned leave).
- k. In the case of the compulsory equity model, the startup may be given a cooling period of 3 months to use incubation services on a rental basis to make a final decision based on satisfaction with the services offered by the institute/incubator. During the cooling period, the Institute cannot force startups to issue equity on the first day of granting incubation support.
- l. Each Incubate must deposit Rs. 5,000 (for internal students), Rs. 25000 (for faculty/staff and others) with NIT Kurukshetra as a noninterest-bearing returnable security deposit. This amount will be returned while vacating the Incubator after deducting any outstanding dues.
- m. The ownership of all assets and facilities provided as a part of the supported entity rests with NIT Kurukshetra.

6. Product Ownership Rights

- a. When institute facilities/funds are used substantially or when IPR is developed as a part of curriculum/ academic activity, IPR is to be jointly owned by inventors and the Institute.
- b. Inventors and institutes could license the product / IPR to any commercial organization together, with inventors having the primary say. License fees could be either/or a mix of
 - Upfront fees or one-time technology transfer fees
 - Royalty as a percentage of the sale price
 - Shares in the Company licensing the product
- c. An institute may not be allowed to hold the equity as per the current statute, so SPV may be requested to have equity on their behalf.
- d. If one or more of the inventors wish to incubate a company and license the product to this company, the royalties would be no more than 4% of the sale price, preferably 1 to 2%, unless it is a pure software product. If it is shares in the company, shares will again be 1%



to 4%. For pure software product licensing, revenue sharing may be mutually decided between the Institute and the incubated company.

- e. On the other hand, if the product/ IPR is developed by innovators not using any institute facilities, outside office hours (for staff and faculty), or not as a part of the curriculum by the student, then the product/ IPR will be entirely owned by inventors in proportion to the contributions made by them. In this case, inventors can license the technology to third parties or use it as they deem fit.
- f. If there is a dispute in ownership, a minimum five membered committee consisting of two faculty members (having developed sufficient IPR and translated to commercialization), two of the Institute's alumni/ industry experts (having experience in technology commercialization), and one legal advisor with experience in IPR, will examine the issue after meeting the inventors and help them settle this, hopefully to everybody's satisfaction.
- g. The institute's IPR cell or incubation center will only be a coordinator and facilitator for providing services to faculty, staff, and students. They will have no say in how the invention is carried out, how it is patented, or how it is to be licensed. If the Institute is to pay for patent filing, they can have a committee that can examine whether the IPR is worth patenting.
- h. All institutes' decision-making bodies with respect to incubation / IPR / technology licensing will consist of faculty and experts who have excelled in technology translation.

7. Monitoring and Evaluation

- a. A committee formed by nodal officer will be formulated to facilitate the periodic assessment and monitoring. The startup committee shall submit a periodic assessment report to continue with the startup activity at the institute.
- b. The incubating company availing seed support will have to submit information as may be asked by the incubator from time to time, and an un-disbursed portion of the seed support, if any, will be released subject to the satisfactory progress of the company based on the expert committee's opinion.



- c. The Incubating companies must submit a copy of their audited annual reports within 15 working days from the date of their finalization. The incubating company has to submit a yearly audited statement of profit and loss and an unaudited quarterly statement on the activities.
- d. The formulation of strategy and impact assessment will go hand in hand. The information on the impact of the activities should be actively used while developing and reviewing the entrepreneurial strategy.
- e. The tentative rubrics for evaluating the applications submitted for assessment (Refer to table 2). It may be varied by the Incubator with category and requirement:

Table 2: Evaluation Criteria

Evaluation Criteria	Description	Weight (%)	Score (1-5)
Innovation & Uniqueness	Novelty of the idea, uniqueness in the market, and technological differentiation.	15%	
Problem-Solution Fit	Clear problem identification and how well the startup's solution addresses it.	10%	
Market Potential & Demand	Size of the target market, growth potential, and customer need.	10%	
Business Model & Revenue Generation	Feasibility of monetization strategies, revenue streams, and pricing model.	10%	
Technology Readiness (TRL Level)	Maturity of the product/technology (prototype, testing, deployment).	10%	
Scalability & Growth Potential	Ability to scale operations, expand market reach, and sustain growth.	10%	
Financial Feasibility & Investment Viability	Cost structure, capital requirements, return on investment (ROI).	10%	
Competitive Advantage	Strengths against competitors, entry barriers, and unique selling proposition (USP).	10%	
Team Capability & Execution Plan	Founders' expertise, execution plan, milestones, and roadmap.	10%	
Social & Environmental Impact	Contribution to sustainability, ethical impact, and societal benefits.	5%	
	Total	100%	



Total Score (Out of 100): ____ / 100

Decision: ☐ Approved ☐ Needs Improvement ☐ Rejected

Note: Qualification criteria: Minimum 50% Score.

8. Exit Policy

The tenure of the Startup Policy depends on the terms and conditions as per the agreement/MoU with the institute.

- a. Incubating companies will leave the Incubator under the following circumstances:
 - Company raises investment at a valuation of INR 15 crores or more. This threshold value may be changed from time to time.
 - Upon completing a stay of eighteen months, unless the Institute extends the stay (maximum up to seven years, with 11 months extension at one time).
 - Underperformance or non-viability of the business proposition. The expert committee of the Institute will decide the criteria for the same on a case-to-case basis.
 - Irresolvable disputes between promoters/ founders. The Institute will decide the condition or point when disputes are deemed irresolvable.
 - Change in promoters'/ founders' team or business profile of the company without the concurrence of the Institute.
- b. When the company enters into an acquisition, merger/amalgamation deal, or reorganization deal resulting in a substantial change in the profile of the company, its promoters, directors, shareholders, products, or business plans, or when a company plans for a public issue.
- c. Violation of any terms of the Startup Policy of Institute. Notwithstanding anything written above, Institute decision regarding the exit of an incubating company shall be final and cannot be disputed.



References:

1. National Innovation and Startup Policy, 2019, for Students and Faculty, Ministry of Education, Govt. of India.
2. Startup Policy, National Institute of Technology Warangal, 2024.
3. Startup Policy, IIT Bombay
4. Innovation and Startup Policy, NIT Jaipur
5. Innovation and Startup Policy, MNIT, Prayagraj
6. Innovation and Startup Policy, SVNIT Surat

Attendance Relaxation Guidelines

Students incubating their start-ups through the Institute's Incubation Centre may be granted attendance relaxation of up to 25% from the prescribed attendance requirement of 75%, based on startup progress assessed by the Start-up Evaluation Committee. The relaxation shall be awarded according to approved start-up milestones such as idea validation, prototype development, pilot testing, intellectual property creation, start-up registration, revenue generation, or commercialization. Under no circumstances shall the effective attendance requirement be reduced below 50%.

Table:1 Attendance Relaxation

Start-up Stage	Assessment Criteria	Attendance Relaxation	Effective Minimum Attendance Required
Level 1: Idea Validation	Problem identification, market survey	5%	70%
Level 2: Prototype/MVP Development	Working prototype/MVP demonstrated	10%	65%
Level 3: Pilot Testing	Prototype tested with users/customers	15%	60%
Level 4: Incubation Milestone Achievement	IP filing/published, start-up registration, grant/funding received, or successful piloting	20%	55%
Level 5: Commercialization	Revenue generation, Firstpaying customers, external funding, or product launch	25%	50%

Criteria for Undertaking Full Eighth Semester Internship in Own Start-up

Students enrolled in the Institute's incubation program up to the sixth semester may be permitted to undertake their entire eighth semester internship within their start-up incubated at the Institute's Incubation Centre, subject to satisfactory progress and approval by the Start-up Review Committee. The start-up must satisfy **at least four of** the following criteria at the beginning of the eighth semester:

1. **Start-up Registration:** The start-up is registered as a legal entity (Company, LLP, Partnership, etc.) or has applied for registration.
2. **Prototype/MVP Development:** A functional prototype, MVP, or validated service model has been developed and demonstrated.
3. **Customer Validation:** The start-up has conducted customer discovery and obtained documented feedback from potential users/customers.
4. **Pilot Deployment:** The product/service has been tested in a real or relevant environment through pilot implementation.
5. **Intellectual Property Creation:** Patent, copyright, design registration, trademark application, or technology disclosure has been filed.
6. **External Recognition:** The start-up has received support through grants, competitions, accelerator programs, incubation schemes, or government startup initiatives.
7. **Revenue Generation:** The start-up has generated revenue, secured purchase orders, paid pilots, subscriptions, or paying customers.
8. **Investment/Funding:** The start-up has secured seed funding, angel investment, grants, or institutional financial support.
9. **Mentor Assessment:** The assigned start-up mentor certifies that the start-up offers sufficient technical and managerial work equivalent to a full-semester internship.

S 59.19 To consider and approve the 4th year syllabus of B.Tech. IIOT

The scheme and syllabus of B.Tech. 4th year (7th & 8th semester) IIOT duly approved by the BoS has been received from the department of Electronics & Communication Engg. which is attached as Annexure S 59.19.

The Senate may consider and approve.

DEPARTMENT OF ELECTRONICS & COMMUNICATION ENGINEERING
NATIONAL INSTITUTE OF TECHNOLOGY, KURUKSHETRA

No.ECE/26/ 2017

Date: 29.05.2026

A meeting of the BOS was held on 29.05.2026 at 09:00am in the Conference Room of the Department.

The following members were present

1. Dr. Arvind Kumar, Assoc. Prof.	Chairman
2. Dr. O.P. Sahu, Prof	Member
3. Dr. Umesh Ghanekar, Prof.	Member
4. Dr. Rajoo Pandey, Prof.	Member
5. Dr. Vikas Mittal, Assoc. Prof.	Member
6. Dr. Poonam Jindal, Asst. Prof.	Member
7. Dr. Shweta Meena, Asst. Prof.	Member
8. Dr. Karamdeep Singh, Asst. Prof.	Member
9. Dr. B.B.Rao, Asst. Prof.	Special Invitee
10. Prof. Nagendra Pathak, Prof.	External Expert
11. Dr. Sushil Mishra, Sr. Director	External Expert

Dr. Brahmjit Singh, Dr. Rajender Kumar and Dr. Dheeraj Kumar Sharma could not attend the meeting.

Agenda:

To approve the syllabus of 4th year, B.Tech. (IIOT).

Decision:

HOD (ECE) presented the New B. Tech. Scheme framework for nOT Final Year. After detailed discussions the scheme & Syllabus of the B.Tech. 4th year (7th & 8th semester) nOT was approved.

The meeting ended with thanks to the chair.

Sushil Mishra

(Sushil Mishra)
(External Expert)

Nagendra Pathak

(Nagendra Pathak)
(External Expert)

Karamdeep Singh
(Karamdeep Singh)
Member

Shweta Meena
(Shweta Meena)
Member

Poonam Jindal
(Poonam Jindal)
Member

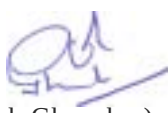
Vikas Mittal
(Vikas Mittal)
Member

To take as agenda item in upcoming Senate

SG-T

36.21


(Rajob Pandey)
Member


(Umesh Ghanekar)
Member

(O. P. Sahu)
Member


(Arvind Kumar)
HOD

Copy to:

1. All BOS Members.
2. Dean (Academic) with a request to place the documents before the coming senate for approval.
3. Sr. Secretary to Director for kind information of the Director.
4. Dean (P&D).

D/A

Scheme and Syllabus B.Tech. HOT (Final Year)

B.Tech. in Industrial Internet of Things (IIoT) Programme Scheme

SEMESTER - VII

Course Category	S.No	Course Title	Course code	Lecture(L)/ Tutorial(T)/ Practical(P) per week			Credits
				L	T@	P	
IC	1	Entrepreneurship & Start Ups	MEIC 416	3	0	0	3
PC	2	IoT Security	IIPC 401	3	0	0	3
	3	Cloud, Edge & Fog Computing	IIPC 402	3	0	0	3
PE	4	Program Elective-V	IIPE xxx	3	0	0	3
	5	Program Elective -VI	IIPE xxx	3	0	0	3
OE	6	Open Elective-III	xx OE xxx	3	0	0	3
PC-Lab	7	IoT Security Lab	IIPC 403	0	0	2	1
	8	Project-I	IIPC 404	0	0	6	3
	9	# Summer Training	IIPC 405	Six Weeks			1
		Total Credits					23

Six-week internship after VI Sem in the summer vacation is mandatory, and it is to be evaluated in the VII-Sem.

LIST OF PROGRAM ELECTIVES

Sr.No	Course Code	Course Title
PROGRAM ELECTIVES		
1	IIPE 401	Image Processing
2	IIPE 402	Biomedical Electronics
3	IIPE 403	Optical Communication Networks
4	IIPE 404	RF Microelectronics
5	IIPE 405	Mobile Application Development
6	IIPE 406	Optical Networking & Switching
7	IIPE 407	Cognitive Radio
8	IIPE 408	RADAR & Navigation
9	IIPE 409	Vehicular Ad-hoc Networks
10	IIPE 410	Quantum Communication
11	IIPE 411	Optical Wireless Techniques for IoT & 5G/6G systems
12	IIPE 412	IoT Project Management
13	IIPE 413	SCADA System Applications
14	IIPE 414	Wearable Computing
15	IIPE 415	Parallel Computing
16	IIPE 416	Mobile Computing

B.Tech. in Industrial Internet of Things (IIoT) Programme Scheme

SEMESTER - VIII (Internship/Course Work)

Only those students will be permitted to go for the full semester internship, who fulfil an academic criterion as decided by the DAC. All remaining students will study according to the following course structure.

Course Category	S.No	Course Title	Course code	Lecture(L)/ Tutorial(T)/ Practical(P) per week			Credits
				L	T@	P	
PC	1	Selected Topics in Sensors & IoT	IIPC 406	3	0	0	3
PE	2	Program Elective-VII	IIPE xxx	3	0	0	3
	3	Program Elective -VIII	IIPE xxx	3	0	0	3
OE	4	Open Elective-IV	xx OE xxx	3	0	0	3
PC-Lab	5	Project-III/Internship*	IIPC 407	0	0	12	6
Total Credits							18

LIST OF PROGRAM ELECTIVES

Sr.No	Course Code	Course Title
PROGRAM ELECTIVES		
1	nPE 417	Computer Vision
2	IIPE 418	LiDAR & Remote Sensing
3	IIPE 419	MEMS
4	IIPE 420	VLSI Physical Design
5	IIPE 421	DSP Architecture
6	IIPE 422	IoT Enhanced AR&VR
7	IIPE 423	Quantum Computing
8	IIPE 424	6G Networks
9	IIPE 425	Nano Sensors
10	IIPE 426	Bio-Sensors
11	IIPE 427	Image Forensics
12	IIPE 428	Biomedical Signal Processing
13	IIPE 429	E-Commerce and ERP
14	IIPE 430	Soft Computing & Expert Systems
15	IIPE 431	Industrial IoT Markets & Security
16	IIPE 432	Data Base Management Systems

B.Tech. in Industrial Internet of Things (HoT) Programme Scheme

Internship*
SEMESTER - VIII (Internship & Course Work)

Only those students will be permitted to go for the full semester internship, who fulfil an academic criterion as decided by the DAC. Students going for semester Internship are required to obtain at least 9 credits in the following NPTEL Courses & for internship 9 credits.

S.No	Course Title	Course code	Lecture(L)/ Tutorial(T)/ Practical(P) per week			Credits
			L	T@	P	
1	NPTEL Course-1	HOC-xxx				3
2	NPTEL Course-2	HOC-xxx				3
3	NPTEL Course-3	HOC-xxx				3
4	Internship	HPC-408				9
Total						18

LIST OF NPTEL COURSES

Sr.No	Course Code	Course Title
1	HOC 401	NPTEL Course-I
2	HOC 402	NPTEL Course-2
3	HOC 403	NPTEL Course-3
4	HOC 404	NPTEL Course-4
5	HOC 405	NPTEL Course-5
6	HOC 406	NPTEL Course-6
7	HOC 407	NPTEL Course-7

The list of seven NPTEL courses will be decided by the DAC depending on the availability of courses in the semester. The students will be asked to select any three courses from the prescribed list.

SEVENTH SEMESTER

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IIPC 401 IoT Security

Pre-requisite: Data Communication & Networking (npC 212)

L	T	P	Credits	Total contact hours
3	0	0	3	40

Brief Description about the course

This course explores the fundamental security challenges and threats within the IoT ecosystem, focusing on vulnerabilities and privacy issues. Students learn to design secure systems using cryptography, lightweight encryption, and intrusion detection tailored for constrained environments.

Course Contents:

Unit I: FUNDAMENTALS OF IoT ECOSYSTEM(10hrs.)

IoT security issues, Security challenges, threats, and privacy issues specific to IoT environments. Security vulnerabilities, security attacks, Security mechanisms and services in IoT, design of secure IoT system, Basics of cryptography, Resource-efficient encryption methods designed for constrained environments.

Unit II:(10 hrs.)

Key management and exchange protocols (Diffie-Hellman, Elliptic Curve Cryptography). Authentication mechanisms, lightweight cryptographic algorithm for IoT, Real time security attacks in IoT environment, Intrusion detection system design for IoT.

Unit III:(10 hrs.)

IoT security protocols, Physical and MAC layer security of standards- IEEE 802.15.4, 802.11 ah, and LoRaWAN, Network and Transport Layer Protocols: Security aspects of IPv6 over Low-Power Wireless Personal Area Networks (6LoWPAN), TCP, and UDP Application Layer Protocols: Security mechanisms in application protocols such as MQTT (Message Queuing Telemetry Transport), CoAP (Constrained Application Protocol), HTTP/HTTPS, and AMQP.

Unit IV:(10 hrs.)

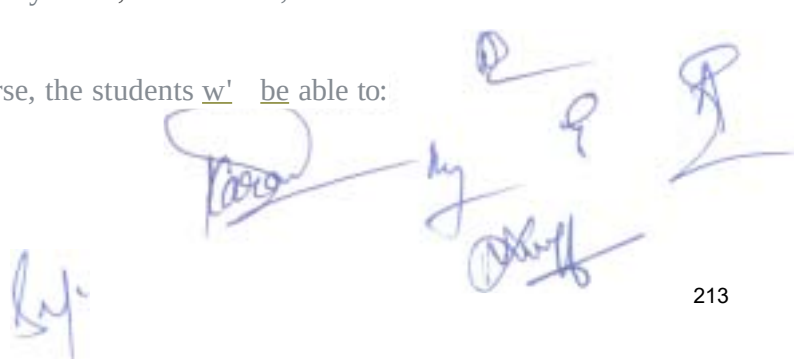
Implementation and deployment of IoT security techniques, Case studies in smart homes, smart cities, industrial IoT (Industry 4.0), and automotive applications.

Text Book(s) / Reference(s):

- [1] David Etter, "IoT Security: Practical guide book", Create Space, 1st Edition, 2016.
- [2] Drew Van Duren, Brian Russell, "Practical Internet of Things Security", Packt, 1st Edition, 2016.
- [3] Sean Smith, "The Internet of Risky Things", O'Reilly Media, 1st Edition, 2017.
- [4] Brian Russell, Drew Van Duren, "Practical Internet of Things Security: Design a security framework for an Internet connected ecosystem", 2nd Edition, 2018.

Course Outcomes (COs):

Upon successful completion of the course, the students w' be able to:



C01: Understand the fundamental security issues, vulnerabilities, and privacy challenges specific to the IoT ecosystem.

C02: Apply resource-efficient cryptographic algorithms and key exchange protocols like Diffie-Hellman and ECC for constrained environments.

C03: Design intrusion detection systems and analyze security aspects of physical, network, and application layer protocols (6LoWPAN, MQTT, CoAP).

C04: Evaluate and deploy security techniques through case studies in smart homes, industrial IoT, and automotive applications.

A collection of handwritten signatures in blue ink, scattered across the page. The signatures are stylized and appear to be from multiple individuals. One signature is large and prominent on the left, while others are smaller and more compact, some appearing to be initials or short names.

IIPC 402: CLOUD, EDGE AND FOG COMPUTING

Pre-requisite: Data Communication & Networking (IIPC 212)

L	T	P	Credits	Total contact hours
3	0	0	3	40

Brief Description about the course

This course provides a comprehensive overview of the computing paradigm shift from centralized cloud to decentralized edge and fog computing. It covers the architectural principles, service models and deployment strategies of cloud Computing, followed by an in-depth study of fog and edge computing architectures designed to handle latency-sensitive applications. The course also addresses resource allocation, security challenges and the integration of these technologies with IoT and 5G networks.

Unit 1:(10 hrs.)

Overview of Computing Paradigms (Grid, Cluster, Utility), Evolution of Cloud Computing, NIST Model, Cloud Service Models (IaaS, PaaS, SaaS), Cloud Deployment Models (Public, Private, Hybrid, Community). Virtualization: Introduction, Types of Virtualizations (Server, Storage, Network), Hypervisors (Type 1 and Type 2), Virtual Machine Migration, Introduction to Containerization (Docker, Kubernetes) and Microservices.

Unit 11:(10 hrs.)

Cloud Data Center Design, Service Level Agreements (SLA), Resource Scheduling and Management, Load Balancing techniques. Cloud Security: Shared Responsibility Model, Data Security and Privacy, Identity and Access Management (IAM). Introduction to Big Data Analytics in Cloud (MapReduce, Hadoop). Serverless Computing and FaaS (Function as a Service).

Unit 111:(10 hrs.)

Limitations of Cloud for Latency-sensitive applications, Definition and Characteristics of Fog Computing, Fog Architecture (OpenFog Reference Architecture), Fog vs. Cloud, Fog Nodes and Hierarchy. Connectivity and Protocols for Fog (MQTT, CoAP, AMQP). Computation Offloading fundamentals. Fog Data Management.

Unit IV:(10 hrs.)

Introduction to Edge Computing, Multi-access Edge Computing (MEC) in 5G Networks, Mobile Cloud Computing (MCC) vs. MEC. Deep Learning at the Edge (Edge AI). Security and Privacy in Edge/Fog. Use Cases: Smart Cities, Connected Vehicles (V2X), Industrial IoT (IIoT), and Augmented Reality. Orchestration of Cloud-Fog-Edge continuum.

Text Book(s) / Reference(s):

- [1] Rajkumar Buyya, Christian Vecchiola and S. Thamarai Selvi, Mastering Cloud Computing, McGraw Hill, 2013.
- [2] Rajkumar Buyya and Satish Narayana Srirama, Fog and Edge Computing: Principles and Paradigms, Wiley, 2019.



[3] Kai Hwang, Geoffrey C. Fox, and Jack J. Dongarra, Distributed and Cloud Computing: From Parallel Processing to the Internet of Things, Morgan Kaufmann.

Course Outcomes (COs):

Upon successful completion of the course, the students will be able to:

CO1: Understand the core architecture, service models, and virtualization techniques of Cloud Computing.

CO2: Analyze resource management strategies and security implications in distributed cloud environments.

CO3: Evaluate the need for Fog computing and explain its architecture and protocols in the context of IoT.

CO4: Design and analyze Edge and MEC based solutions for latency-critical and bandwidth-intensive applications.

Handwritten signature and initials in blue ink.

IIPE 401 IMAGE PROCESSING

Pre-requisite: Signals, Systems & Random Variables (IIPC 202)

L	T	P	Credits	Total contact hours
3	0	0	3	40

Brief Description about the course

Image processing is a rapidly growing field that deals with the use of digital images to various fields of life including medical, automation, etc. This course provides an in-depth introduction to the fundamental concepts, techniques, and tools used in image processing. The course covers the topics such as image acquisition, image processing, image compression, steganography, and digital watermarking. Students will learn how to apply these techniques to identify image tampering, detect forged images, and authenticate the origin of digital images.

Course Learning Objectives:

The student should be able to understand and apply the various concepts of Digital Image Processing.

Course Contents

Unit 1:(10 hrs.)

Introduction: The Origin of Digital Image Processing, Problems and Applications, Fundamental steps in image processing, Components of an image processing system. Transforms and their properties. Two Dimensional DFT, DCT. Hadamard, Slant, Haar and KL, Transforms and their properties. Image Perception: Image models, sampling & quantization, neighbors of a pixel, connectivity, labeling of connected components.

Unit 11:(10 hrs.)

Intensity Transformation and Spatial Filtering: Basic intensity transformation functions, Histogram processing, spatial filters, homomorphic filtering, generation of spatial marks. Fuzzy techniques for Intensity Transformation and Spatial Filtering. Image Restoration and Reconstruction: Noise models, Restoration in the presence of Noise only, Frequency domain filtering, Inverse filtering, Wiener filtering, Geometric mean filtering. Image reconstruction from projections. Image Compression: Redundancy models, error free compression, Lossy compression, Some basic compression methods, Image compression standards.

Unit 111:(6 hrs.)

Color Image Processing: Color Models, Pseudocolor Image Processing, Basics of full color image processing, color transformations, segmentation, smoothing and sharpening, Noise in color Images. Morphological Image Processing: Erosion, Dilation, Opening, Closing, Some basic morphological algorithms, Gray scale morphology.

Unit IV:(10 hrs.)

Image Segmentation: Detection of Discontinuity, Edge detection, Boundary detection, Thresholding, Regional oriented segmentation uses of motion in segmentation. Representation and Description: Representation, Regional descriptors, Boundary descriptors, Image analysis,

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paste attacks, its challenges and identification. Noise removal from images depending on its nature.

Text Book(s) / Reference(s):

- [1] Rafael C. Gonzalez, Richard E. Woods, Digital Image Processing, Pearson, 3rd Edition, 2016.
- [2] Anil K. Jain, Fundamentals of Digital Image Processing, Pearson, 2002.
- [3] Kenneth R. Castleman, Digital Image Processing, Pearson, 2006.
- [4] Rafael C. Gonzalez, Richard E. Woods, Steven Eddins, Digital Image Processing using MATLAB, Pearson Education, Inc., 2000.
- [5] Hany Farid, Photo Forensics, The MIT Press, 2016.

Course Outcomes (COs):

At the end of the course student will be able to:

CO1: Understand and apply the Image filtering, Restoration, segmentation, etc.

CO2: Apply the vector approach to handle the color images.

CO3: Apply the Morphological operation for various applications.

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IIPE 402 BIOMEDICAL ELECTRONICS

Pre-requisite: Analog and Digital Electronics (npC 20 I)

L	T	P	Credits	Total contact hours
3	0	0	3	40

Course Description:

The course deals with bioelectric signal basics, different types of transducers, biomedical recording systems, diagnostic and therapeutic equipment, and medical imaging system measurements. The main objective is to help students acquire knowledge on types of sensors and transducers, working principles, selection procedures, and applications of biomedical electronic systems.

Course Contents:

Unit I: Physiological Systems and Signals(10 hrs.)

Biology of the heart, circulatory and respiratory systems, auditory systems, physiology of nerve and muscle cells, fundamental organization of brain and spinal cord. Biosignals: Origin of bioelectric signals, electrocardiogram (ECG), phonocardiogram (PCG), encephalogram (EEG) and electromyogram (EMG).

Unit II: Physiological Transducers(10 hrs.)

Electrodes: silver-silver chloride electrodes, electrodes for ECG, EEG, EMG, Microelectrodes. Performance characteristics of transducers, classification of transducers based on Electrical principle involved: Resistive position transducer, resistive pressure transducer, inductive pressure transducer, capacitive pressure transducer; Self generating inductive transducer: linear variable differential transformer (LVDT), Piezoelectric Transducer.

Unit III: Recording Systems(10 hrs.)

Preamplifier, Signal conditioning: Differential amplifier, current to voltage converter, instrumentation amplifier; biomedical filters: LPF, HPF, bandpass, band stop (Notch filter); source of noise in low level measurement, Recording systems for ECG, PCG, EEG and EMG.

Unit IV: Diagnostic and Therapeutic Equipment(10 hrs.)

Blood pressure monitors, Electro-cardio scope, Pulse Oximeter, pH meter, Auto analyzer, Pacemakers, Defibrillator, Heart lung machine, Nerve and muscle stimulators, Dialysis machines, Surgical diathermy equipment, Nebulizer; inhalator, Aspirator, Humidifier, Ventilator and spirometry. Medical Imaging Systems: X-ray imaging, Computed tomography, ultrasonic imaging systems, Magnetic resonance imaging system, thermal imaging systems.

Text Book(s) / Reference(s):

[1] Principles of Biomedical Instrumentation and Measurements, Richard Aston, Maxwell Macmillan International Publishing Company.

[2] Joseph I. Carr and John M. Brown, Introduction to Biomedical Equipment and Technology, 4th Edition, Prentice-Hall, 2001.

[3] John G Webster, Medical Instrumentation Applications and Design, John Wiley and Sons, 3rd Edition, 2011.



[4] R S Khandpur, Handbook of Biomedical Instrumentation, McGraw Hill, 3rd Edition, 2014.

[5] L A Geddes, L E Baker, Principles of Applied Medical Instrumentation, Wiley India, 3rd Edition, 2008.

Course Outcomes (COs):

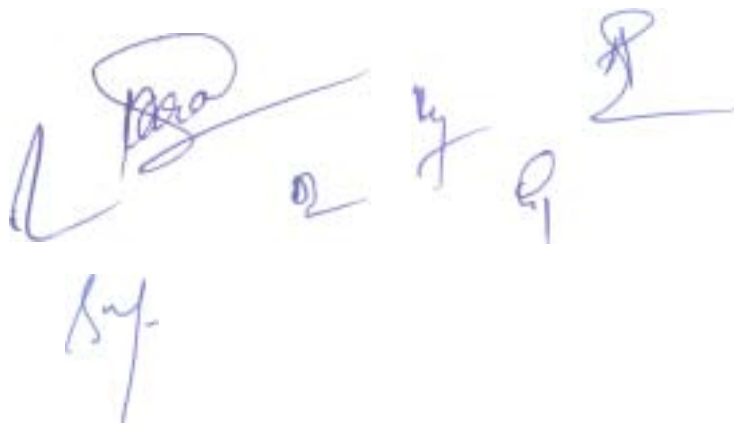
At the end of the course the student will be able to:

CO1: Apply principles and concepts of electronics to analyze input and output signals in medical electronics.

CO2: Apply principles and concepts of electronics to design filters for de-noising of medical measurements.

CO3: Recognize different types of transducers, ongoing progress in improving their design, and their application in medical measurements.

CO4: Apply principles and concepts of sensing and engineering to design diagnostic devices and evaluate quality of diagnostic devices.

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IIPE403 OPTICAL COMMUNICATION NETWORKS

Pre-requisite: Principles of Communication Engineering (IIPC 205)

L	T	P	Credits	Total contact hours
3	0	0	3	40

Brief Description about the course:

In this course, students will learn optical fiber sources and transmission techniques, the idea of optical fiber networks algorithm such as *SONET/SDH* and optical CDMA. Further students will explore trends of optical fiber measurement systems.

Course Contents:

Unit I: Introduction to Optical Fibers(10 hrs.)

Evolution of fiber optic system, Element of an Optical Fiber Transmission link, Total internal reflection, Acceptance angle, Numerical aperture, Skew rays, Ray Optics, Optical Fiber Modes and Configurations, Mode theory of Circular Wave guides, Overview of Modes, Key Modal concepts, Linearly Polarized Modes, Single Mode Fibers, Graded Index fiber structure. Signal Degradation in Optical Fibers: Attenuation, Absorption losses, Scattering losses, Bending Losses, Core and Cladding losses, Signal Distortion in Optical Wave guides, Information Capacity determination, Group Delay, Material Dispersion, Wave guide Dispersion, Signal distortion in SM fibers, Polarization Mode dispersion, Intermodal dispersion, Pulse Broadening in GI fibers, Mode Coupling, Design Optimization of SM fibers, RI profile and cut-off wavelength.

Unit II: Fiber Optical Sources and Coupling(10 hrs.)

Direct and indirect Band gap materials, LED structures, Light source materials, Quantum efficiency and LED power, Modulation of a LED, Lasers Diodes, Modes and Threshold condition, Rate equations, External Quantum efficiency, Resonant frequencies, Laser Diodes, Temperature effects, Introduction to Quantum laser, Fiber amplifiers, Power Launching and coupling, Lencing schemes, Fiber-to-Fiber joints, Fiber splicing, Signal to Noise ratio, Detector response time.

Unit III: Fiber-Optic Receiver and Measurements(10 hrs.)

Fundamental receiver operation, Pre amplifiers, Error sources, Receiver Configuration, Probability of Error, Quantum limit, Fiber Attenuation measurements, Dispersion measurements, Fiber Refractive index profile measurements, Fiber cut-off Wavelength Measurements, Fiber Numerical Aperture Measurements, Fiber diameter measurements.

Unit IV: Optical Networks and System Transmission(10 hrs.)

Basic Networks, *SONET/SDH*, Broadcast, and select WDM Networks, Wavelength Routed Networks, Non-linear effects on Network performance, Link Power budget, Rise time budget, Noise Effects on System Performance, Operational Principles of WDM Performance of WDM + EDFA system Solutions, Optical CDMA, Ultra High Capacity Networks.

Text Book(s) / Reference(s):

- [2] John, M. Senior. Optical Fiber Communication-Principle and Practice. Prentice Hall, 2009.
[3] Ramaswami, Rajiv, Kumar Sivarajan, and Galen Sasaki. Optical networks: a practical perspective. Morgan Kaufmann, 2009.
[4] J.Gower. Optical Communication System. Prentice Hall of India, 2001.

Course Outcomes (COs):

At the end of the course student will be able to:

CO1: Discuss the various optical fiber modes, configurations and various signal degradation factors associated with optical fiber.

CO2: Explain the various optical sources and optical detectors and their use in the optical communication system.

CO3: Understand basics of Fiber-Optic Receiver and Measurements.

CO4: Analyze the digital transmission and its associated parameters on system performance.

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IIFE 404 RF MICROELECTRONICS

Pre-requisite: Analog and Digital Electronics (IIPC 201), Principles of Communication Engineering (IIPC 205)

L	T	P	Credits	Total contact hours
3	0	0	3	36

Brief Description of the Course:

This course imparts knowledge on high-frequency integrated circuit design, specifically focusing on RF filters, amplifiers, and oscillators. Students learn to manage noise in RF circuits and design phase-locked loops (PLL) for wireless communication systems.

Course Contents:

Unit I: Active RF Components and RF Filter Design(8 hrs.)

Active RF Components and their characteristic parameters: RF diodes, BJT, FET, HEMT.

RF Filter Design: Filter configurations, resonators, filter realizations - Butterworth, Chebychev.

Unit II: High-Frequency Amplifier Design(10 hrs.)

High-Frequency Amplifier Design: Zeros as bandwidth enhancer, shunt series amplifier, bandwidth enhancement with IT doublers, voltage references and biasing, tuned and cascaded amplifiers, RF Power Amplifier Design.

Unit III: Noise in RF Circuits(8 hrs.)

Noise in RF Circuits: Types of noise, two port noise theory, Low-Noise Amplifier (LNA) - intrinsic MOSFET two port noise parameters, LNA topologies, design example.

Unit IV: Phase-Locked Loops and RF Oscillators(10 hrs.)

Phase-Locked Loops: PLL models, noise properties, sequential phase detectors, loop filters and charge pumps. **RF Oscillators:** tuned and negative resistance oscillators. **Mixers:** non-linear systems as mixers, multiplier based mixers. RF amplifier design - a case study.

Text Book(s) / Reference(s):

- [1] T. H. Lee, The Design of CMOS Radio Frequency Integrated Circuits, CUP.
- [2] R. Ludwig and P. Brettko, RF Circuit Design, Pearson.
- [3] B. Razavi, RF Microelectronics, PH.
- [4] B. Leung, VLSI for Wireless Communication, PH.
- [5] B. Razavi, Phase-Locking in High-Performance Systems, Wiley/IEEE.
- [6] R. E. Best, Phase-Locked Loops: Design, Simulation and Applications, Fifth Edition, MH.

Course Outcomes (COs):

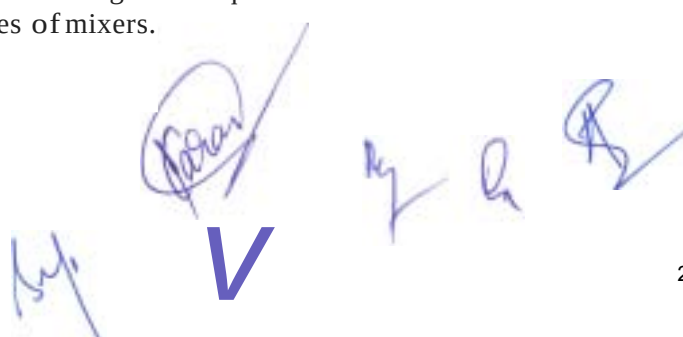
At the end of the course student will be able to:

CO1: Understand the active RF components and their performance metrics.

CO2: Analyse the design of high frequency amplifiers.

CO3: Understand the LNA, PLL, Oscillator design techniques.

CO4: Distinguish between different types of mixers.



IIPE-405 Mobile Application Development

Pre-requisite: Object Oriented Programming with JAVA (INT) (HPC 213)

L	T	P	Credits	Total contact hours
3	0	0	3	40

Brief Description:

Focused on the Android ecosystem, this course teaches the mobile development lifecycle, UI design, and data storage using SQLite. It specifically highlights integrating mobile apps with HoT services and real-time cloud data platforms like Firebase.

Course Contents:

Unit I: Introduction to Mobile Application Development

Evolution of mobile computing, Mobile platforms overview: Android, iOS, Cross-platform frameworks, Mobile OS architecture and components, Mobile application types: Native, Hybrid, Web apps, Mobile application development life cycle, Overview of Android ecosystem.

Unit II: Android User Interface Design

Android application structure, Activity and Activity lifecycle, Layouts: Linear and Relative Layout, Basic UI components: TextView, EditText, Button, ImageView, Event handling using buttons, Intents (explicit and implicit).

Unit III: Data Storage and Connectivity

Data storage methods: Shared Preferences, SQLite (basic CRUD operations), Introduction to Internet permissions, Basic networking concepts, Introduction to REST APIs, Fetching and displaying data from API (JSON basics).

Unit IV: Mobile Apps for IIoT

Introduction to IoT and HoT, Role of mobile apps in HoT, Mobile app communication with IoT devices, Introduction to MQTT protocol, Cloud platforms overview (Firebase basics), Real-time data display on mobile app. Mobile application security threats, Secure data storage and encryption, Authentication and authorization, App testing: Unit testing and UI testing, Debugging and performance optimization, App packaging and signing, Google Play Store publishing process, Case studies: HoT mobile applications.

Text Book(s) / Reference(s):

- [1] Internet of Things: A Hands-on Approach by Arshdeep Bahga and Vijay Madisetti.
- [2] Android Programming: The Big Nerd Ranch Guide by Bill Phillips, Chris Stewart, Kristin Marsicano.

Course Outcomes (COs):

Upon successful completion of the course, the students will be able to:

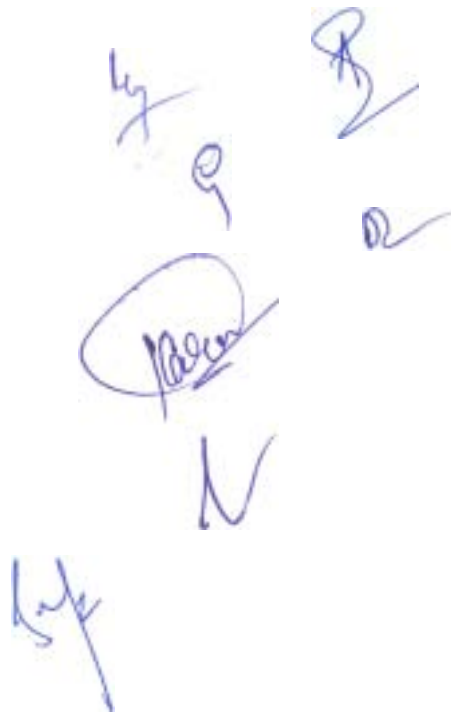
CO1: Understand the mobile application development life cycle and the architecture of the Android ecosystem.

CO2: Design and develop Android applications with advanced UI components and efficient event handling.

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C03: Implement data storage solutions using SQLite and integrate mobile apps with cloud platforms like Firebase.

C04: Develop industry-ready applications that integrate with HoT services and real-time data messagmg.

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IIFE 406 OPTICAL NETWORKING AND SWITCHING

Pre-requisite: Principles of Communication Engineering (IIPC 205), Data Communication and Networking (IIPC 212)

L	T	P	Credits	Total contact hours
3	0	0	3	40

Brief Description about the course

To equip students with understanding of Optical Networking and Switching systems. To study the enabling devices used in the networks and the different types of optical networks. Study the algorithms used for routing and access of networks. Management and control issues in optical networks.

Unit 1:(10 hrs.)

Telecom network architecture, Advantages of optical network, Optical network evolution, WDM optical networks, Different types of WDM networks, broadcast and select optical WDM network, wavelength routed optical WDM network, Challenges of optical WDM network. Optical network enabling technologies and devices: Optical transmitters, tunable and fixed laser, Optical receivers, tunable and fixed optical filters, optical amplifiers; EDFA, Raman amplifier, SOA, MUX-DEMUX, OADM, OXC, large optical switching fabric architectures, wavelength converters.

Unit 11:(10 hrs.)

Broadcast and Select Networks: single and multi-hop networks, Media-access control protocol, LAMBDANET, STARNET, Rainbow, Shufflenet, De Bruijn Graph, Hypercube. Introduction to access network, Gig Ethernet, Radio over Fiber network, different optical access networks; EPON and WDM EPON; WRPON, Access algorithms, STARGATE.

Unit 111:(10 hrs.)

Introduction to metro network, traffic grooming overview, static and dynamic traffic grooming. Traffic grooming in SONET ring and WDM ring, ATM, IP, SONET/SDH layers, RINGOSTAR. Introduction to Wavelength Routing Network, Problem formulation, routing sub-problem: routing algorithms, wavelength assignment subproblem, algorithms, Virtual topology design, ILP formulation.

Unit IV:(10 hrs.)

Optical packet switching, header and packet format, contention resolution in OPS networks, OPS node architecture, optical burst switching, signaling and routing protocols for OBS networks, implementation and application. MEMs based switching, switching with SOAs, lambda switches. Control and Management functions in optical networks, configuration management, performance management, Fault management.

Text Book(s) / Reference(s):

- [1] Mukherjee, Biswanath. Optical WDM networks. Springer, 2006.
- [2] Ramaswami, Rajiv, Kumar Sivarajan, and Galen Sasaki. Optical networks: a practical perspective. Morgan Kaufmann, 2009.

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- [3] Stem, Thomas E., Georgios Ellinas, and Krishna Bala. Multiwavelength optical networks: architectures, design, and control. Cambridge University Press, 2009.
- [4] Maier, Martin. Optical switching networks. Cambridge University Press, 2008.
- [5] Murthy, C. Siva Ram, and Mohan Gurusamy. WDM optical networks: concepts, design, and algorithms. Prentice Hall, 2002.

Course Outcomes (COs):

Upon successful completion of the course, the students will be able to:

CO1: Identify different types of networks, the enabling technologies and devices.

CO2: Understand Broadcast and Select network, Single and Multi-hop networks with example of Access networks, PONs etc.

CO3: Learn Wavelength Routing network, virtual topology, Metro and Wide area networks.

CO4: Understand Wavelength Routing and Assignment, Traffic Grooming and Protection, Network Control and Management, Optical packet and burst switching.

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IIPE 407 COGNITIVE RADIO

Pre-requisite: Principles of Communication Engineering (IIPC 205)

L	T	P	Credits	Total contact hours
3	-	-	3	40

Course Description:

Cognitive Radio is a new paradigm in wireless communication system to alleviate the problem of spectrum underutilization. The course focuses on software-defined radio, cognitive radio, its functions, spectrum sensing techniques and advance topics in cognitive radio.

Course Contents:

Unit 1:(10 hrs.)

Introduction to Wireless Communication: Wireless Channels, Path Loss, Shadowing, Fading, Delay Spread, Doppler Spread. Introduction to CR: Software Defined Radio, Cognitive Radio and its functions, Dynamic Spectrum Access, Underlay, Overlay and Interweave model, Concept of Primary and Secondary Users.

Unit 11:(8 hrs.)

Detection Theory: Hypothesis Testing, Neyman-Pearson Criteria, Likelihood Ratio Test, Receiver-Operator Characteristics (ROC), Probability of Error, Monte-Carlo Simulations.

Unit 111:(12 hrs.)

Spectrum Sensing: Primary User Detection Techniques, Energy Detection, Coherent Detection, Cyclostationary Feature Detection, Autocorrelation based Detection Effects of Imperfect knowledge of Noise Power, Cooperative Spectrum Sensing: OR, AND and MAJORITY rule.

Unit IV:(10 hrs.)

Overview of IEEE 802.22 standard, security issues in cognitive radios, emerging applications of Cognitive radio, Cognitive Radio for Internet of Things, Smart Grid Networks, Public Safety Networks.

Text Book(s) / Reference(s):

- [1] Fundamentals of Statistical Processing, Volume 2: Detection Theory by Steven M Kay, Pearson Education India.
- [2] Principles of Cognitive Radio by H. Vincent Poor, et.al, Cambridge University Press.
- [3] Fundamentals of Cognitive Radio by Peyman Setoodeh and Simon Haykin, John Wiley & Sons.

Course Outcomes (COs):

Upon successful completion of the course, the students will be able to:

CO1: Understand the fundamentals of cognitive radio networks.

CO2: Understand basic principles used in detection of primary users.

CO3: Analyze various spectrum sensing algorithms.

CO4: Understand emerging applications of cognitive radio.

IIPE 408 RADAR & Navigation

Pre-requisite: Signals, Systems & Random Variables (IIPC 202), Introduction to IoT (IIPC 205)

L	T	P	Credits	Total contact hours
3	-	-	3	40

Brief Description:

The curriculum covers RADAR operating principles, signal processing for target detection, and various navigation systems including GPS and INS. It also investigates the integration of radar sensors with IIoT environments for autonomous and industrial applications.

Course Contents:

Unit I: Fundamentals of RADAR Systems(10 hrs.)

Basic RADAR principle and block diagram, RADAR equation and power calculations, radar cross section, RADAR frequencies and spectrum allocation, Types of RADAR: Pulse RADAR, Continuous Wave (CW) RADAR, FMCW RADAR. Applications of RADAR.

Unit II: RADAR Signal Processing, Performance and Antennas(10 hrs.)

RADAR range equation and maximum detection range, Minimum detectable signal, Range resolution and accuracy, Doppler shift & effect and velocity measurement, RADAR antennas: Parabolic reflector antennas, Phased array antennas, Beamwidth, gain, and sidelobes, Clutter, noise model and signal to noise ratio, Pulse compression techniques, Moving Target Indication (MTI).

Unit III: Navigation Systems(10 hrs.)

Fundamentals of navigation, Coordinate systems and reference frames, Radio navigation systems, Hyperbolic navigation systems, Satellite Navigation systems, Inertial Navigation System (INS): Gyroscopes, Accelerometers. Global Navigation Satellite Systems (GNSS/GPS). Marine, air, and land navigation systems.

Unit IV: RADAR & Navigation in IIoT Applications(10 hrs.)

RADAR sensors in IIoT environments, Automotive RADAR for ADAS, Defense and surveillance, Industrial RADAR for: Level measurement, Collision avoidance, Object tracking. Integration of RADAR with: IoT gateways, Edge computing, Cloud analytics. Cybersecurity challenges in RADAR & navigation systems.

Text Book(s) / Reference(s):

- [1] Merrill I. Skolnik, Introduction to Radar Systems, McGraw-Hill, 2002.
- [2] Peebles, Radar Principles, Wiley, NY, 1993.
- [3] Bassem R. Mahafza, Radar Systems Analysis and Design Using MATLAB, Chapman & Hall, 2000.
- [4] E. Kaplan & C. Hegarty, Understanding GPS/GNSS, Artech House, 2006.
- [5] Byron Edde, Radar: Principles, Technology, Applications, Pearson Education, 2004.
- [6] Myron Kayton, Walter R. Fried, Avionics Navigation Systems, 2nd Edition, John Wiley & Sons, 1997.

Course Outcomes (COs):

At the end of the course, students will be able to:

COI: Explain basic RADAR principles, equations, types, and applications.

C02: Analyze RADAR performance, antennas, and signal processing techniques.

C03: Understand the navigation systems including radio, satellite, and inertial navigation.

C04: Apply RADAR and navigation concepts in IIoT and industrial applications.

Ref. Page

IIPE 409 Vehicular Ad-hoc Networks

Pre-requisite:Data Communication and Networking (npC 212), Principles of Communication Engineering (npC 205)

L	T	P	Credits	Total contact hours
3	0	0	3	40

Brief Description about the course

In this course, students will learn the fundamentals of Vehicular Ad-hoc Networks (VANETs), including their architecture and communication models. They will study vehicular communication standards, routing, and data dissemination techniques. Students will also understand security and privacy challenges in vehicular environments. The course explores applications of VANETs in Industrial Internet of Things and smart transportation systems.

Course Contents:

Unit I: Fundamentals of Vehicular Ad-hoc Networks

Introduction to Intelligent Transportation Systems (ITS), Motivation for vehicular communication, Evolution of vehicular networks, Overview of Mobile Ad-hoc Networks (MANETs), Comparison of MANETs, VANETs, and IoT networks, Characteristics of VANETs: High mobility, Rapidly changing topology, Variable network density, Predictable mobility patterns. Challenges in VANETs: Scalability, Network fragmentation, Latency constraints, Reliability and real-time requirements. VANET application domains: Road safety and accident prevention, Traffic monitoring and congestion control, Infotainment and comfort services, Emergency and disaster management.

Unit II: VANET Architecture, Communication Models and Standards

VANET system architecture, Key components: On-Board Unit (OBU), Road-Side Unit (RSU), Trusted Authority (TA). Network architectural models: Pure ad-hoc architecture, Infrastructure-based architecture, Hybrid architecture. Communication models: V2V, V2I, V2X. Mobility modeling in VANETs; Dedicated Short Range Communication (DSRC); IEEE 802.11p physical and MAC layer overview; WAVE architecture and IEEE 1609.x protocol stack; Cellular-V2X (C-V2X) communication; Role of LTE and 5G in vehicular networking.

Unit III: Routing and Data Dissemination in VANETs

Issues and challenges in VANET routing, Classification of routing protocols: Topology-based routing (proactive and reactive), Position-based (geographic) routing, Cluster-based routing. Greedy forwarding and location-based routing principles, Broadcast and geocast routing protocols, Beaconsing mechanisms, Event-driven message dissemination, Store-carry-and-forward paradigm, Delay Tolerant Networks (DTN) in VANETs. Performance evaluation metrics: End-to-end delay, Packet delivery ratio, Throughput, Routing overhead.

Unit IV: Security, Privacy and Industrial IoT Applications

Security requirements in VANETs: Authentication, Integrity, Confidentiality, Availability, Non-repudiation. Security threats and attacks: Sybil attack, Denial of Service (DoS), Message spoofing and replay attacks, False data injection. Public Key Infrastructure (PKI) for VANETs,



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Authentication and key management techniques, Trust and reputation management systems, Privacy preservation mechanisms, Secure routing and secure data dissemination, Integration of VANETs with Industrial IoT. VANET role in: Smart transportation systems, Smart logistics and fleet management, Autonomous and connected vehicles.

Text Book(s) / Reference(s):

[1] Vehicular Applications and Inter-Networking Technologies, Hannes Hartenstein & Kenneth P. Laberteaux, Wiley.

[2] Vehicular Networking, Christoph Sommer & Falko Dressler, Cambridge University Press.

[3] Routing in Vehicular Ad Hoc Networks, Fan Li & Yu Wang, Springer.

[4] Ad Hoc Wireless Networks: Architectures and Protocols, C. Siva Ram Murthy & B. S. Manoj.

Course Outcomes (COs):

At the end of the course student will be able to:

CO1: Explain the concepts, characteristics, and applications of VANETs.

CO2: Describe VANET architectures, communication models, and standards.

CO3: Analyze routing, broadcasting, and data dissemination techniques.

CO4: Apply security mechanisms and VANET concepts to HoT applications.

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IIPE 410 QUANTUM COMMUNICATION

Pre-requisite: Principles of Communication Engineering (IIPC 205)

L	T	P	Credits	Total contact hours
3	0	0	3	40

Course Description:

This course provides a comprehensive overview of quantum communication. The objective is to make the students understand fundamental concepts of quantum communication.

Course Contents:

Unit 1:(8 hrs.)

Introduction: Classical networks, overview, Maxwell's equations revisited. Applications of polarization in Quantum Networks.

Unit 11:(10 hrs.)

Photon Polarization, General Quantum Variables and Qubits, Applications of quantum variables in Quantum Networks. Composite Quantum Systems - Applications of quantum systems in Quantum Networks. Quantum Entanglement, its importance for Quantum Communications.

Unit 111:(10 hrs.)

Experimental Quantum Teleportation of Qubits, engineering sources of Entangled Photons, The No Cloning Theorem.

Unit IV:(12 hrs.)

Quantum Cryptography, The Benett-Brassard Protocol for Quantum key distribution. Eckert's Protocol for Quantum key distribution using entanglement. Quantum Teleportation - An Application of composite qubits and entanglement.

Text Book(s) / Reference(s):

- [1] Michael Nielson, Isaac Chuang, Quantum Computation and Quantum Information.
- [2] Thomas M. Cover, Joy A. Thomas, Elements of Information Theory.

Course Outcomes (COs):

The students will demonstrate the ability to:

CO1: Understand quantum communication.

C02: Analyse quantum cryptography.

C03: Evaluate the performance of quantum communication.

C04: Apply quantum teleportation.

IIPE 411 OPTICAL WIRELESS TECHNIQUES FOR IOT & 5G/6G SYSTEMS

Pre-requisite: Principles of Communication Engineering (UPC 205)

L	T	P	Credits	Total contact hours
3	0	0	3	40

Brief Description about the course

Optical Wireless Communications (OWC) has become a promising technology for supporting high-data-rate 5G communication and the massive connectivity of IoT. This course broadly covers the four important aspects of OWC systems: (a) the fundamental principles of OWC, (b) devices and systems, (c) modulation techniques and (d) channel models and system performance analysis.

Course Contents:

Unit I: Introduction - Optical Wireless Communication Systems(10 hrs.)

Existing wireless systems, OWC/Radio Comparison, Potential OWC Application Areas. Optical Sources: LEDs and Lasers (Internal and External Quantum Efficiency, Power and Luminescence Efficiency and modulation bandwidth). Detectors: PIN and APD detectors, photo detection techniques, photo detection noise.

Unit II: Channel Modelling(10 hrs.)

Indoor Optical Wireless Communication Channel modelling: LOS propagation model, Non-LOS propagation model, Interference from other light sources. Outdoor Optical Wireless Communication Channel modelling: Atmospheric channel loss, Beam divergence, Pointing loss, Different atmospheric turbulence models. Underwater Optical Wireless Communication Channel modelling: Absorption, scattering, turbulence, multipath interference, physical obstruction and background noise.

Unit III: Modulation Schemes and System Performance (Indoor)(10 hrs.)

Digital baseband modulation techniques like PPM, PAM, PIM etc., Multi-Carrier Modulation (OFDM) for OWC, Color shift keying, NOMA etc. System performance analysis - indoor OWC: Effect of ambient light sources on indoor OWC performance, link performance for multipath propagation.

Unit IV: System Performance (Outdoor) and Use Cases(10 hrs.)

System performance analysis - outdoor OWC: FSO link performance under effect of atmospheric turbulence, atmospheric turbulence induced penalty and mitigation strategies. Use cases and simulation exercises: Indoor OWC link, O-OFDM and CSK-modulation schemes, Wifi-Lifi coexistence, V2V Communications.

Text Book(s) / Reference(s):

[1] Keiser, Gerd. Optical communications essentials. McGraw-Hill Education, 2003.

[2] Ghassemlooy, Zabih et al. Visible light communications: theory and applications. CRC press, 2017.

[3] Ghassemlooy, Zabih, Wasiu Popoola, and Sujuan Rajbhandari. Optical wireless communications: system and channel modelling with Matlab. CRC press, 2019.

[4] Majumdar, Arun K., and Jennifer C. Ricklin, eds. Free-space laser communications: principles and advances. Springer, 2010.

Course Outcomes (COs):

At the end of the course student will be able to:

CO1: Identify types of light sources, their structures and optical characteristics.

C02: Understand process of photo-detection, including different type of encountered noise and statistics of optical detection process.

C03: Learn characteristics of channel impulse response for indoor, outdoor and underwater to enable efficient design of **OWE** systems.

C04: Select and implement appropriate modulation technique for indoor/outdoor **OWE** in terms of power and bandwidth efficiency.

COS: Learn different **OWE** use cases in context of 5G/6G and IoT systems including design considerations and performance parameters.



IIPE-412 IoT Project Management

Pre-requisite: Introduction to IoT (IIPC 204)

L	T	P	Credits	Total contact hours
3	0	0	3	40

Course Description:

This course teaches the management of IoT initiatives, addressing unique challenges like real-time data needs and device heterogeneity. Students learn to apply agile methods, risk mitigation, and security-by-design across the project lifecycle.

Course Contents:

Unit I: Introduction to IoT and Project Management Fundamentals

This unit introduces Internet of Things basics: definitions, characteristics, architecture (physical and logical), levels, and enablers like sensors, actuators, protocols, and cloud/edge computing. It highlights differences between traditional IT projects and IoT projects due to heterogeneity, real-time needs, privacy, and scale. Project management fundamentals include life cycle phases (initiation to closure) and relevant PMBOK areas. It covers stakeholders, business case, feasibility studies, and examples from smart cities, agriculture, healthcare, and industrial IoT.

Unit II: IoT Project Planning and Requirements Management

This unit focuses on IoT requirements engineering: capturing functional and non-functional needs, user stories, use cases, and sensor-actuator mapping. Scope management includes defining boundaries and creating WBS for hardware, firmware, middleware, and cloud tasks. Time management covers Gantt charts, CPM, and PERT for IoT timelines. Resource management addresses hardware procurement, team roles (embedded, cloud, data), and agile vs waterfall suitability. Cost estimation includes budgeting for devices, cloud, testing, deployment, and maintenance.

Unit III: Risk, Quality, and Agile Management in IoT Projects

This unit covers IoT risk management: identifying threats like security flaws, interoperability issues, network failures, and mitigation via redundancy, encryption, and OTA updates. Quality management includes testing levels (unit to field), reliability metrics, and standards compliance. Agile practices for IoT feature Serum, Kanban, sprints, MVP development, and DevOps with CI/CD pipelines. It also addresses configuration management, version control for firmware/hardware, change handling, and vendor coordination for IoT components.

Unit IV: IoT Project Execution, Monitoring, Deployment, and Closure

This unit discusses execution coordination, communication plans, and tools for distributed IoT teams. Monitoring uses KPIs (uptime, latency, security), dashboards, and earned value management. Deployment covers edge vs cloud models, pilot testing, scaling, and rollback plans. It emphasizes security-by-design, regulatory compliance (e.g., GDPR), and ethical aspects. Closure includes handover, documentation, lessons learned, and long-term maintenance planning, with case studies of successful and failed real-world IoT projects.

Text Book(s) / Reference(s):

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- [1] Internet of Things: A Hands-on Approach by Arshdeep Bahga and Vijay Madisetti.
- [2] A Guide to the Project Management Body of Knowledge (PMBOK Guide) - 7th Edition by PMI.
- [3] Project Management in Cloud and IoT Applications by Pramod Chandra P. Bhatt.
- [4] Building the Internet of Things by Maciej Kranz.
- [5] Internet of Things: Principles and Paradigms by Rajkumar Buyya and Amir Vahid Dastjerdi.

Course Outcomes (COs):

Upon successful completion of the course, the students will be able to:

CO1: Master the concepts of project initiation, planning, and execution specifically tailored for IoT environments.

CO2: Apply risk management, quality assurance, and security-by-design principles to complex IoT projects.

CO3: Utilize Agile methodologies, such as Scrum and Kanban, to manage the rapid prototyping and deployment of IoT solutions.

CO4: Effectively manage project costs, resources, and stakeholders while addressing the technical constraints of device heterogeneity.

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IIPE 413 SCADA System Applications

Pre-requisite: Automation Fundamentals (HPC 203)

L	T	P	Credits	Total contact hours
3	0	0	3	40

Brief Description:

Focusing on industrial automation, this course covers the architecture of SCADA systems and industrial communication protocols. Students learn to configure SCADA for real-world monitoring and control of industrial processes.

Course Contents:

Unit I: Introduction to SCADA Systems(10 hrs.)

Evolution of Industrial Automation and Control Systems, Definition, Need, and Scope of SCADA, SCADA vs DCS vs PLC-based Control Systems. Basic SCADA Architecture: Field Devices (Sensors, Actuators), Remote Terminal Units (RTUs), Programmable Logic Controllers (PLCs), Human Machine Interface (HMI). Data Acquisition and Supervisory Control Concepts, Overview of Industrial Applications of SCADA.

Unit II: SCADA Hardware and Communication Protocols(10 hrs.)

SCADA Hardware Components: RTU Architecture and Functions, PLC Integration in SCADA, Intelligent Electronic Devices (IEDs). Data Transmission Media: Wired (RS-232/485, Ethernet, Fiber Optics), Wireless (Radio, GSM/GPRS, Wi-Fi, LPWAN). Industrial Communication Protocols, Network Topologies for SCADA, Time Synchronization and Data Integrity.

Unit III: SCADA Software, HMI Design and Industrial Applications(10 hrs.)

SCADA Software Architecture, SCADA Configuration Concepts, Tag Management and Database Connectivity, HMI Design Principles, Data Logging and Historical Data Analysis, SCADA System Deployment, Case Studies.

Unit IV: Advanced SCADA Concepts, Cybersecurity and IIoT Integration(10 hrs.)

SCADA System Reliability and Redundancy, Performance and Scalability Issues, SCADA Cybersecurity, Standards and Guidelines (IEC 62443, NIST overview), Integration of SCADA with: HoT platforms, Cloud computing, Data analytics. Emerging Trends.

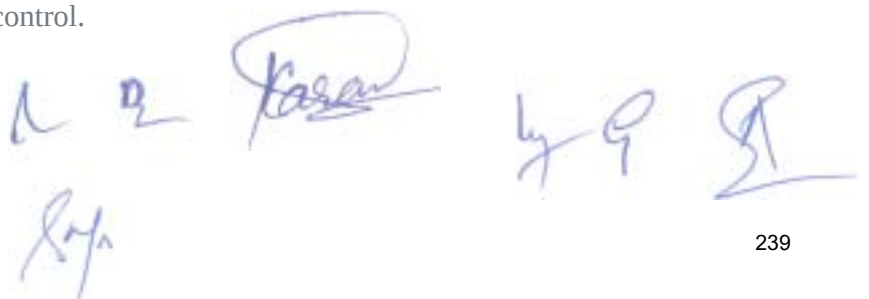
Text Book(s) / Reference(s):

- [1] Stuart A. Boyer, SCADA: Supervisory Control and Data Acquisition, 4th Edition, ISA, USA.
- [2] David Bailey and Edwin Wright, Practical SCADA for Industry, Newnes (Elsevier).
- [3] Gordon Clarke and Deon Reynders, Practical Modem SCADA Protocols: DNP3, 60870.5 and IEC 61850, Newnes (Elsevier).
- [4] Gary Dunning, SCADA Systems and Control, Industrial Press Inc.

Course Outcomes (COs):

At the end of the course, students will be able to:

CO1: Explain the architecture, components, and operating principles of SCADA systems used in industrial automation and process control.



C02: Analyze SCADA hardware and industrial communication protocols to support reliable data acquisition, monitoring, and control of field devices.

C03: Design and configure basic SCADA applications, including HMI screens, alarms, data logging, and reporting, for representative industrial processes.

C04: Evaluate advanced SCADA systems with respect to performance, cybersecurity challenges, and integration with HoT and Industry 4.0 technologies.

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IIPE 414: Wearable Computing

Pre-requisite: Microprocessors & Computer Architecture (IIPC 209)

L	T	P	Credits	Total contact hours
3	0	0	3	40

Brief Description:

This course integrates Internet of Things technologies with immersive platforms to create intelligent digital experiences. It covers wearable sensors, haptic devices, and their integration into real-time digital environments like healthcare and smart cities.

Course Contents:

Unit I: Introduction to Wearable Technologies(8 hrs.)

Fundamentals of Wearable Technologies, History of wearable Technologies, User Experience Design for Internet of Things, Social Aspects of Wearability, Internet of Things - Applications, Wearable Chemical and Biochemical Sensors, Technology of Connected Devices - Device Types, Sensors, Actuators.

Unit II: Wearable Computing Applications(8 hrs.)

Medical Applications of Wearable Technologies, Wearable Technologies - Energy Expenditure and Energy Harvesting, Technology of Connected Devices - Energy Considerations, Flexible Electronics and Textiles for Wearable Technologies.

Unit III: Wearable Computing Architecture(8 hrs.)

Wearable Algorithms, Web of Things – Architecture Standardization, Data Mining for Body Sensor Network, Internet of Things - Embedded Device UX Design.

Unit IV: Communication Technologies and Wearable Computing Case Studies (8 hrs.)

Physical Activity Modeling and Behavior Change, Internet of Things - Interface and Interaction Design, Human Body Communication for a Data Rate Sensor Network, Internet of Things - Networking, Wireless Body Area Networks, Wearable Computing as a form of urban design, Wearable Sensors for Monitoring of Physical and Physiological Changes and for Early Detection of Diseases, Wearable and Non-Invasive Assistive Technologies.

Text Book(s) / Reference(s):

[1] Practical Electronics for Inventors, Third Edition, by Paul Scherz and Simon Monk, 2016.

[2] Fundamentals of Wearable Computers and Augmented Reality, Second Edition by Woodrow Barfield, 2015.

[3] Making Sense of Sensors: End-to-End Algorithms and Infrastructure Design By Omesh Tickoo, Ravi Iyer, 2016.

[4] Programming Interactivity, Second Edition By Joshua Noble, 2012.

Course Outcomes (COs):

Upon successful completion of the course, the students will be able to:

CO1: Understand advanced and emerging technologies.

CO2: Extend the knowledge achieved and apply it to solve real world problems.

- C03:** Understanding of different methodologies for research on wearable technology.
- C04:** Ability to analyse ethical issues related to the Wearable devices.
- C05:** Contribute innovative thinking and innovation processes.
- C06:** Ability to integrate several domains through wearable technology.

Four handwritten signatures in blue ink are visible. The top-left signature is 'by R' followed by a stylized flourish. The top-right signature is a large, bold, stylized 'S' or 'Z' shape. The middle-right signature is a cursive name, possibly 'Ramon', followed by a checkmark. The bottom-left signature is 'Ry' followed by a checkmark.

IIPE 415 Parallel Computing

Pre-requisite: Microprocessors & Computer Architecture (npC 209)

L	T	P	Credits	Total contact hours
3	0	0	3	40

Brief Description:

Students learn to develop scalable programs using hardware models like SIMD/MIMD and programming standards like OpenMP, MPI, and CUDA. The course focuses on optimizing data-intensive tasks by managing hierarchical memory and thread scheduling.

Course Contents:

Unit 1:(8 hrs.)

Introduction to Parallelism: Motivation, scope, and the shift from sequential to parallel execution. Parallel Hardware: The Von Neumann model and its modifications; Flynn's Taxonomy (SISD, SIMD, MISD, MIMD); Cache coherence and the Memory Wall. Interconnection Networks: Static and dynamic networks (Bus, Crossbar, Mesh, Hypercube), routing mechanisms, and communication costs. Analytical Modeling: Sources of overhead (SynChronization, Communication, Idleness). Performance Metrics: Speedup, Efficiency, and Cost. Laws of Scalability: Amdahl's Law for strong scaling and Gustafson's Law for weak scaling.

Unit 11:(10 hrs.)

Principles of Algorithm Design: Decomposition techniques (Recursive, Data, Task, and Hybrid); Mapping techniques for load balancing; Reducing interaction overheads. Shared Memory Systems: UMA vs. NUMA. Programming with Pthreads & OpenMP: Thread creation, join, and synchronization using Mutexes and Condition Variables. OpenMP: Compiler directives, loop-level parallelism, data scoping (Private vs. Shared), and synchronization (Critical, Atomic, Barriers). Common Pitfalls: Race conditions, deadlocks, and false sharing.

Unit 111:(10 hrs.)

The Message Passing Model: Principles of distributed memory; the SPMD paradigm. MPI Basics: Environment setup, communicator, and process ranks. Point-to-Point Communication: Blocking vs. Non-blocking communication; handling deadlocks. Collective Communication: **MPI_Beast**, **MPI_Scatter**, **MPI_Gather**, **MPI_Allgather**, **MPI_Reduce**, **MPI_Allreduce**, and Prefix Sum. Derived Data Types: Creating custom MPI types for complex data structures.

Unit IV:(12 hrs.)

Heterogeneous Computing: The Host (CPU) + Device (GPU) execution model. CUDA Programming Model: Kernels, Thread, and compilation workflow. Memory Hierarchy in GPUs: Global memory, Constant memory, and the importance of Shared Memory for thread coordination. Performance Optimization: Memory Coalescing, Warp Divergence, Parallel Patterns: Implementing high-performance Convolution, Stencil operations, and Histogram generation on GPUs.

Text Book(s) / Reference(s):

[Handwritten signatures and initials in blue ink, including "Pareen", "L", "y-s", and "A"]

- [1] P. S. Pacheco, An Introduction to Parallel Programming, 2nd ed. Morgan Kaufmann, 2021.
- [2] A. Grama, A. Gupta, G. Karypis, and V. Kumar, Introduction to Parallel Computing, 2nd ed. Pearson Education, 2003.
- [3] D. B. Kirk and W. W. Hwu, Programming Massively Parallel Processors: A Hands-on Approach, 4th ed. Morgan Kaufmann, 2022.

Course Outcomes (COs):

Upon successful completion of this course, students will be able to:

CO1: Identify various parallel architectural paradigms and quantify the performance of parallel programs using speedup, efficiency, and scalability metrics.

CO2: Implement efficient shared-memory programs using OpenMP and Pthreads, ensuring correct synchronization and optimal thread management on multi-core processors.

CO3: Design and debug scalable message-passing applications using MPI for execution on distributed-memory clusters.

CO4: Develop massively parallel applications using CUDA, applying memory coalescing and shared memory techniques to optimize throughput on NVIDIA GPU architectures.

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IIPE 416: Mobile Computing

Pre-requisite: Principles of Communication Engineering (IIPC 205), Data Communication & Networking (IIPC 212)

L	T	P	Credits	Total contact hours
3	0	0	3	40

Brief Description about the course:

This course introduces the fundamentals of mobile computing and mobile communication systems, covering mobile technologies, cellular architectures, network protocols, and mobile applications. It focuses on mobility management, ad hoc and vehicular networks, transport and application layer protocols, mobile platforms, and mobile commerce, with emphasis on security and emerging trends in mobile communication.

Course Contents:

Unit I: Fundamentals of Mobile Computing

Mobile Computing: Concepts and Applications - Evolution of Mobile Communication (IG- 5G overview) - Cellular Principles - Multiple Access Techniques (FDMA, TDMA, CDMA, OFDMA) - Multiplexing — Spread Spectrum - MAC Protocols.

Unit II: Cellular and Mobile Communication Systems

Cellular System Architecture — GSM (Architecture & Services - Overview) — GPRS and UMTS (Architecture & Features) - LTE/5G Introduction — Mobility Management Handover Techniques - Frequency Allocation - Routing — Security in Cellular Networks.

Unit III: Mobile Network Layer and Ad Hoc Networks

Mobile IP - DHCP - Mobile Ad Hoc Networks (MANETs) - Routing Protocols: Proactive (DSDV), Reactive (DSR, AODV), Hybrid (ZRP) - Multicast Routing (ODMRP - overview) - Vehicular Ad Hoc Networks (VANETs) - MANET vs VANET — Security Issues.

Unit IV: Mobile Transport, Application Layer, Platforms and Applications

Mobile TCP - Wireless Application Protocol (WAP): Architecture - WDP, WTLS, WTP, WSP - Wireless Application Environment (WAE) - WML. Mobile Device Operating Systems - Design Constraints and Requirements - Modern Mobile OS (Android, iOS - overview) - SDKs - Introduction to Mobile Application Development - Mobile Commerce: Architecture, Applications, Advantages & Limitations - Mobile Payment Systems — Security and Privacy Issues.

Text Book(s) / Reference(s):

- [1] Fundamentals of Mobile Computing - Prasant Kumar Pattnaik & Rajib Mall, 2nd Edition, PHI Learning.
- [2] Mobile Communications, 2/e, Jochen Schiller, Pearson Education.
- [3] Mobile Computing, Raj Kamal, 3rd Edition, Oxford University Press.
- [4] Uwe Hansmann et al., Principles of Mobile Computing, Springer, 2003.
- [5] Gibson, J.D. ed., 2017. Mobile communications handbook. CRC press.

Course Outcomes (COs):

Upon successful completion of the course, the students will be able to:

CO1: Understand fundamentals of mobile computing and modern mobile communication technologies.

CO2: Explain cellular system architectures, mobility management, and security mechanisms.

CO3: Analyze mobile network layer protocols and routing in MANETs and VANETs.

CO4: Describe transport and application layer protocols for mobile environments.

CO5: Identify mobile platforms, application development frameworks, and mobile commerce systems with security considerations.

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IIPC 403: IoT Security LAB

Pre-requisite: Problems Solving and Programming using C (CSIC 103), Introduction to IoT (IIPC 204)

L	T	P	Credits	Total contact hours
0	0	2	1	24

Brief Description:

This lab aims to get familiarize the students about the numerical computing in various fields. Internet of Things has emerged as a leading technology around the world. Also, the advancements in Artificial Intelligence and Machine Learning have made the automation of IoT devices easy. An IoT security lab serves to research, train, and test endpoints, networks, and protocols against real-world threats. Its primary goal is to evaluate, harden, and secure smart ecosystems across industrial, commercial, and consumer environments.

List of Experiments (Any Ten experiments should be performed):

1. Implement a basic block cipher algorithm to understand how encryption secures data in IoT devices.
2. Implement the Diffie-Hellman Key Exchange algorithm for a given problem.
3. Implement the Elliptic Curve Cryptography Key Exchange algorithm for a given problem.
4. Demonstrate intrusion detection system (IDS) using any tool e.g., Snort or any other software.
5. Create a simple block chain to understand its structure and relevance in IoT security.
6. Set up an IoT device (like a Raspberry PI) and Identify potential security vulnerabilities.
7. Integrate various sensors and actuators into an IoT system, understanding their role in cyber physical systems and exploring common security challenges.
8. Conduct experiments to read RFID tags, and discuss security implications.
9. Use cryptographic libraries to create digital signatures using elliptic curves.
10. Implement Merkle trees and experiment with elliptic curve digital signatures to secure communication on basic IoT hardware like Arduino.
11. Simulate the working of Proof of Work and Proof of Stake algorithms in the context of cryptocurrencies and IoT.
12. Set up different IoT networking protocols and analyze their security features.
13. Create a simple smart contract using Ethereum to understand its application and the challenges in verification.
14. Identify a problem in your local area or college which can be solved by integrating the things you learned and create a prototype to solve it (Mini Project).

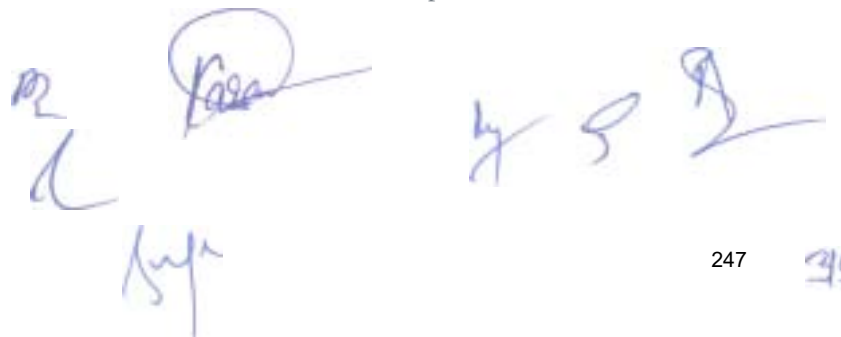
Course Outcomes (COs):

At the end of the course the student will be able to:

CO1: Implement a basic block cipher algorithm to understand how encryption secures data in IoT devices.

CO2: Replicating real-world smart networks to identify, analyze, and mitigate hardware and firmware vulnerabilities.

CO3: Implementing defense mechanisms like firewalls, secure boot processes, and zero-trust architectures for connected devices.



C04: Safeguarding information generated by IoT devices by enforcing strong encryption, data integrity, and privacy-by-design.

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IPC 404Project-I

L	T	P	Credits	Total contact hours
0	0	6	3	40

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IIPC 405 Summer Training

L	T	P	Credits	Total contact hours
-	-	-	1	Six Weeks

Course Objectives:

The internship is aimed at developing the undergraduate education program in Electronics and Communication Engineering to include a practical training in a professional engineering set up (a company, top educational institution, research institute etc.) hereafter referred to as host "organization" as deemed appropriate. The participating organizations are selected that are either already visiting NIT Kurukshetra for placement or are forming new relationships of mutual benefit. The internship gives the student the opportunity to translate engineering theory into practice in a professional engineering environment. The technical activity in the project should be related to both the student's engineering studies and to the host organization's activities and it should constitute a significant body of engineering work at the appropriate level.

Assessment Details:

Each student is assigned a faculty supervisor who is responsible for managing and assessment of the internship semester. The faculty supervisor monitors the student's progress in a semester and interacts with the industry mentor during his/her visit to the host organization twice. This includes a Reflective Diary which is updated throughout the project semester, an Interim internship Report, a Final Report with Learning Agreement/Outcomes and a Final Presentation & Viva. The mentor from the host organization is asked to provide his assessment on the designated form.

Course Outcomes (COs):

Upon completion of internship, the students will be able to:

CO1: Acquire knowledge and experience of software and hardware practices in the area of project.

C02: Carry out design calculations and implementations in the area of project.

C03: Associate with the implementation of the internship requiring individual and teamwork skills.

C04: Communicate their work effectively through writing and presentation.

COS: Demonstrate the **knowledge** of professional responsibilities and respect for ethics.



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IIPC 406 Selected Topics in Sensor & IOT

Pre-requisite: Introduction to IoT (IIPC 204)

L	T	P	Credits	Total contact hours
3	0	0	3	40

Brief Description:

Students are exposed to emerging fields like Nanosensors, BioMEMS, and advanced IoT reference architectures. The course reviews wireless technologies (Zigbee, BLE) and IP-based protocols such as 6LoWPAN and MQTT.

Course Contents:

Unit I:

IoT Reference Architecture: Getting Familiar with IoT Architecture, Reference Model of IoT, Various architectural views of IoT such as Functional, Information, Operational and Deployment. Constraints affecting design in IoT world - Introduction, Technical design Constraints. An emerging industrial structure for IoT.

Unit II:

Sensors Networks: Definition, Types of Sensors, Types of Actuators, Examples and Working, IoT Development Boards: Arduino IDE and Board Types, Raspberry Pi Development Kit, RFID Principles and components, Wireless Sensor Networks: History and Context, the node, Connecting nodes, Networking Nodes, WSN and IoT.

Unit III:

Wireless Technologies for IoT: Wireless medium access issues, MAC protocol survey, Survey routing protocols, Sensor deployment & Node discovery, Data aggregation & dissemination. WPAN Technologies for IoT: IEEE 802.15.4, Zigbee, HART, NFC, Z-Wave, BLE, Bacnet Modbus. IP Based Protocols for IoT: IPv6, 6LoWPAN, RPL, REST, AMQP, CoAP, MQTT. Edge connectivity and protocols.

Unit IV:

The topic clouds for the course include some contemporary topics in sensors and IoT (but not restricted to) like Nanosensors, MEMSINEMS sensors, biosensors modeling and design, industrial IoT. The topics may be further updated according to the instructor.

Text Book(s) / Reference(s):

- [1] Hakima Chaouchi, The Internet of Things Connecting Objects to the Web, Wiley Publications.
- [2] Olivier Hersent, David Boswarthick, and Omar Elloumi, The Internet of Things: Key Applications and Protocols, Wiley Publications.
- [3] Vijay Madiseti, Arshdeep Bahga, Internet of Things (A Hands-on Approach), 1st Edition, VPT, 2014.
- [4] I. Biron, J. Follett, Foundational Elements of an IoT Solution, O'Reilly Media, 2016.

Course Outcomes (COs):

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Upon successful completion of the course, the students will be able to:

C01: Identify and analyze advanced IoT reference architectures and industrial standards.

C02: Gain hands-on understanding of specialized sensor networks and development kits like Raspberry Pi and Arduino.

C03: Compare and contrast wireless technologies and IP-based communication protocols like Zigbee, BLE, and 6LowPAN.

C04: Explore emerging trends in the field, including Nanosensors, BioMEMS, and the Internet of Everything.

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IIPE 417 Computer Vision

Pre-requisite: Signals, Systems & Random Variables (IIPC 202)

L	T	P	Credits	Total contact hours
3	0	0	3	40

Brief Description:

This course introduces the concepts of geometric and photometric image formation, feature detection, and 3D structure from motion. It covers practical computer vision tasks such as pose estimation, triangulation, and global optimization.

Course Contents:

Unit I: Introduction

What is computer vision? A brief history, Image formation Geometric transformations and transformations, Photometric image formation, The digital camera, Point operators, Linear filtering, More neighborhood operators, Fourier transforms, Pyramids and wavelets, Geometric transformations, Global optimization.

Unit II: Feature Detection and Matching

Points and patches, Edges, Lines, Segmentation: Active contours, Split and merge, Mean shift and mode finding, Normalized cuts, Graph cuts and energy-based methods, Feature-based-alignment: 2D and 3D feature-based alignment, Pose estimation, Geometric intrinsic calibration, Structure from motion: Triangulation, Two-frame structure from motion, Factorization, Bundle adjustment, Constrained structure and motion.

Unit III: Dense Motion Estimation

Translational alignment, Parametric motion, Spline-based motion, Optical flow, Layered motion, Image stitching; Motion models, Global alignment, Compositing, Computational photography: Photometric calibration, High dynamic range imaging, Super-resolution and blur removal, Image matting and compositing, Texture analysis and synthesis.

Unit IV: Stereo Correspondence and 3D Reconstruction

Epipolar geometry, Sparse correspondence, Dense correspondence, Local methods, Global optimization, Multi-view stereo, 3D-reconstruction: Shape from X, Active range finding, Surface representations, Point-based representations, Volumetric representations, Model-based reconstruction, Recovering texture maps and albedos. Image-based rendering: View interpolation, Light fields and Lumigraphs, Recognition: Object detection, Face recognition, Instance recognition, Category recognition, Context and scene understanding.

Text Book(s) / Reference(s):

- [1] Richard Szeliski, Computer Vision: Algorithms and Applications, Springer-Verlag London Limited, 2011.
- [2] Simon I. D. Prince, Computer Vision: Models, learning and Interface, Cambridge University Press, 2012.

Course Outcomes (COs):



At the end of the course student will be able to:

C01: Understand the mathematical principles of geometric and photometric image formation and camera calibration.

C02: Implement techniques for feature detection, descriptor matching, and 2D-to-3D image transformations.

C03: Apply algorithms for structure from motion, triangulation, and 3D reconstruction from multiple views.

C04: Evaluate and utilize global optimization methods like bundle adjustment for complex visual computing tasks.

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IIPE 418 LiDAR and Remote Sensing

Pre-requisite: Principles of Communication Engineering (IIPC 205)

L	T	P	Credits	Total contact hours
3	0	0	3	40

Brief Description about the course:

LiDAR and Remote Sensing introduces the principles, technologies, and applications of Light Detection and Ranging (LiDAR) systems for remote sensing. Students explore LiDAR design, platforms (terrestrial, airborne, spaceborne), georeferencing, error correction, data processing, and classification.

Course Contents:

Unit I: LiDAR System Design

Introduction to laser and LiDAR, Definitions of LiDAR, History of LiDAR and development, Types of LiDAR, LiDAR types based on eye safety, LiDAR technology and components, Examples of LiDAR components, Types of LiDAR sensors, Discussion on LiDAR sensor characteristics, Working principle of LiDAR, LiDAR waveform and generation, Photon counting.

Unit II: LiDAR Remote Sensing Platform

Introduction to the LiDAR remote sensing platform - Historical development of LiDAR remote sensing platforms, airborne platforms, Laser scanning, Fixed-wing platforms, Rotary Wing platforms - Terrestrial, airborne, and spaceborne types - Spaceborne platforms – Orbits - Bathymetric mapping, Types of scanning mechanism, Ground measuring pattern.

Unit III: Georeferencing and LiDAR Errors

Direct Georeferencing technology - Methodology adopted for Georeferencing, Boresight calibration - Project coverage verification - Review LiDAR data against field control- LiDAR data errors and rectifications, processes calibration of LiDAR data - artifacts and anomalies – LiDAR data errors - LiDAR error budget.

Unit IV: LiDAR Data Processing and Classification

Introduction to LiDAR data formats, Examples of data formats, Types of data formats - Terrestrial, Types of data formats - Airborne, Storing LiDAR data, LiDAR data preprocessing - LiDAR filtering, Layer Extraction – Automated filtering - Manual editing and product generation - Surface editing, LiDAR data products, Definitions, LiDAR data classification and accuracy assessment.

Text Book(s) / Reference(s):

- [1] Floyd M. Henderson, Principles & Applications of Imaging Radar, John Wiley & Sons, New York, 1998.
- [2] Cheng Wang, Xuebo Yang, Xiaohuan Xi, Sheng Nie, Pinliang Dong, Introduction to LiDAR Remote Sensing, CRC press, 2024.
- [3] Raymond M. Measures, Laser Remote Sensing: Fundamentals and Applications, John Wiley & Sons, New York, 1984.

[4] Cracknell, Arthur .P, Hayes, Ladson, Introduction to Remote Sensing (2 ed.), London: Taylor and Francis, 2007.

Course Outcomes (COs):

At the end of the course student will be able to:

CO1: Explain LiDAR system components, types, working principles, and waveform generation, including photon counting techniques.

CO2: Analyze LiDAR remote sensing platforms, scanning mechanisms, and ground measurement patterns across airborne, terrestrial, and spaceborne systems.

CO3: Apply georeferencing methods, boresight calibration, and error rectification processes to ensure LiDAR data accuracy and verify project coverage.

CO4: Process, classify, and assess LiDAR data using standard formats, filtering algorithms, and editing tools to produce geospatial products with quantified accuracy.



IIPE 419 MEMS

Pre-requisite: Analog & Digital Electronics (npC 201)

L	T	P	Credits	Total contact hours
3	0	0	3	40

Brief Description about the course:

Research and development of MEMS builds on advances in silicon processing infrastructure for creating micron-scale machines. Unlike conventional ICs, MEMS devices have many functions, such as communication, sensing and actuation. This course will cover a wide range of topics including MEMS design and layout, bulk and surface micromachining, fabrication processes and applications, for example biosensors in medical applications, inertial transducers for navigation.

Course Contents:

Unit I: Introduction to MEMS and Micro fabrication(12 hrs.)

MEMS Roadmap, MEMS markets, Benefits of Miniaturization, Benefits of Scaling. Micro fabrication: Basic Fabrication Processes, Oxidation, Film Deposition, Lithography, Etching, Ion Implantation, Diffusion. Micro ElectroMechanical Systems.

Unit II: MEMS Devices(12 hrs.)

Pressure sensors, RF MEMS Switch, Temperature sensors, Humidity sensors. Microactuators: Electromagnetic and Thermal micro actuation. Physical Microsensors: Classification of physical sensors. Sensor Principles. Examples: Thermal sensors, Electrical Sensors, Chemical Sensors and Biosensors.

Unit III: Mechanics of MEMS Materials(10 hrs.)

Stress-strain-material properties. Measurement and characterization of mechanical parameters. Microstructural Elements: bending moment and strain-flexural rigidity.

Unit IV: Applications(10 hrs.)

Mechanical miniature devices. Electromagnetic actuators and sensors. RF/Electronics devices. Optical/Photonic devices. Medical devices e.g., DNA-chip, micro-arrays. Case study: BioMEMS. Case study: Emerging MEMS technologies.

Text Book(s) / Reference(s):

- [1] Chang Liu, Foundations of MEMS, Second Edition, Prentice-Hall, 2012.
- [2] Tai-Ran Hsu, MEMS and Microsystems Design and Manufacture, Tata McGraw Hill, 2017.
- [3] D. K. Bhattacharya and B. K. Kaushik, Microelectromechanical Systems, Cengage, 2015.
- [4] S. D. Senturia, Microsystem Design, Springer, 2000.
- [5] M. J. Madou, Fundamental of Microfabrication, Second Edition CRC Press, 2002.

Course Outcomes (COs):

At the end of this course, students will be able to:

CO1: Understand fundamental principles of sensing and actuation in MEMS.

CO2: Understand the principle, design, and fabrication techniques of recent devices in the MEMS industry.

C03: Understand the basic principles and applications of micro-fabrication processes, such as photolithography, ion implantation, diffusion, oxidation, CVD, PVD, and etching.

C04: Consider recent advancements in the field of MEMS and devices.

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IPE 420 VLSI Physical Design

Pre-requisite: Analog & Digital Electronics (IPC 201)

L	T	P	Credits	Total contact hours
3	0	0	3	40

Brief Description:

This course focuses on the physical implementation of integrated circuits. It covers various stages of the VLSI design flow, including partitioning, floorplanning, placement, routing, and timing analysis.

Course Contents:

Unit I: Introduction and Partitioning

Introduction to VLSI physical design and its role in the overall ASIC design flow, including physical versus logical design and key design constraints such as area, power, and performance. Modeling of VLSI circuits using graphs and hypergraphs, formulation of cost functions, and basic optimization concepts. Study of partitioning techniques for large-scale designs, including Kernighan-Lin and Fiduccia-Mattheyses algorithms, and an overview of multilevel partitioning methods.

Unit II: Floorplanning and Placement

Concepts and objectives of floorplanning and placement in VLSI physical design. Slicing and non-slicing floorplans, floorplan representations, shape functions, and cost evaluation metrics. Introduction to placement techniques including analytical placement and min-cut based placement, with emphasis on wirelength minimization, congestion control, and placement legalization.

Unit III: Routing and Clock Design

Routing fundamentals including routing problem formulation, routing layers, and design rules. Concepts of global routing, congestion estimation, and detailed routing, along with classical routing algorithms such as maze routing and Lee's algorithm. Introduction to clock distribution challenges, clock skew and jitter, and basic principles of clock tree synthesis.

Unit IV: Timing Closure and Physical Verification

Timing analysis concepts including timing graphs, setup and hold constraints, and slack computation, STA. Timing-driven optimization techniques for placement and routing. Discussion of signal integrity issues such as crosstalk, power planning, and IR drop. Design closure techniques including engineering change orders, followed by physical verification methods such as design rule checking, layout versus schematic verification, and antenna effects.

Text Book(s) / Reference(s):

- [1] Kahng, A. B., Lienig, L., Markov, I. L., Hu, J., VLSI Physical Design: From Graph Partitioning to Timing Closure, Springer, 2011.
- [2] Sherwani, N. A., Algorithms for VLSI Physical Design Automation, 3rd Edition, Springer, 1999.
- [3] Sait, S. M., Youssef, H., VLSI Physical Design Automation, McGraw-Hill, 1995.



Course Outcomes (COs):

Upon successful completion of the course, students will be able to:

CO1: Explain the complete VLSI physical design flow.

CO2: Apply partitioning, floorplanning, placement, and routing concepts.

CO3: Analyze timing and clock distribution issues in VLSI designs.

CO4: Understand design closure and physical verification techniques.

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IPC 421 DSP ARCHITECTURE

Pre-requisite: Signals, Systems & Random Variables (IPC 202)

L	T	P	Credits	Total contact hours
3	0	0	3	40

Brief Description:

The objective of this course is to enable the students to impart the knowledge of basic DSP concepts and number systems to be used, different types of A/D, D/A conversion errors. Learn the architectural differences between DSP and General purpose processor. Learn about interfacing of serial & parallel communication devices to the processor. Implement the DSP & FFT algorithms.

Course Contents:

Unit I: Architectures for Programmable Digital Signal-Processing Devices(8 hrs.)

Introduction, Basic Architectural Features, DSP Computational Building Blocks, Bus Architecture and Memory, Data Addressing Capabilities, Address Generation Unit, Programmability and Program Execution, Speed Issues, Features for External Interfacing.

Unit II: Programmable Digital Signal Processors(12 hrs.)

Introduction, Commercial Digital Signal-processing Devices, Data Addressing Modes of TMS320C54XX, Memory Space of TMS320C54xx Processors, Program Control, Detail Study of TMS320C54X & 54xx Instructions and Programming, On-Chip Peripherals, Interrupts of TMS320C54XX Processors, Pipeline Operation of TMS320C54xx Processor.

Unit III: Implementation of Basic DSP Algorithms(12 hrs.)

Introduction, The Q-notation, FIR Filters, IIR Filters, Interpolation and Decimation Filters (one example in each case). Implementation of FFT Algorithms: Introduction, An FFT Algorithm for DFT Computation, Overflow and Scaling, Bit-Reversed Index. Generation & Implementation on the TMS320C54xx.

Unit IV: Interfacing Memory and Parallel I/O Peripherals(10 hrs.)

Introduction, Memory Space Organization, External Bus Interfacing Signals. Memory Interface, Parallel I/O Interface, Programmed I/O, Interrupts and I/O Direct Memory Access (DMA). Interfacing and Applications of DSP Processors: Introduction, Synchronous Serial Interface, A CODEC Interface Circuit, DSP Based Bio-telemetry Receiver, A Speech Processing System, An Image Processing System. Case study: Advance architectures for sustainable computing, issues, & performance consideration.

Text Book(s) / Reference(s):

- [1] Avatar Singh and S. Srinivasan, Digital Signal Processing, Thomson Learning, 2004.
- [2] Ifeachor E. C., Jervis B. W, Digital Signal Processing: A practical approach, Pearson-Education, PHI, 2002.
- [3] B Venkataramani and M Bhaskar, Digital Signal Processors, TMH, 2nd Edition, 2010.
- [4] Peter Pirsch, Architectures for Digital Signal Processing, John Wiley, 2008.

Course Outcomes (COs):

At the end of this course, students would be able to:

CO1: Comprehend the knowledge and concepts of digital signal processing techniques.

CO2: Apply the knowledge of DSP computational building blocks to achieve speed in DSP architecture or processor.

CO3: Apply knowledge of various types of addressing modes, interrupts, peripherals and pipelining structure of TMS320C54xx processor. Develop basic DSP algorithms using DSP processors.

CO4: Discuss about synchronous serial interface and multichannel buffered serial port (McBSP) of DSP device. Demonstrate the programming of CODEC interfacing.

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IIPE422: IoT Enhanced AR and VR

Pre-requisite: Introduction to IoT (npC 204)

L	T	P	Credits	Total contact hours
3	-	-	3	40

Brief Description about the course:

The purpose of this course is to make students aware of the IoT-Enabled Augmented and Virtual Reality Systems, which is an interdisciplinary subject that integrates Internet of Things technologies with immersive AR and VR platforms to create intelligent, interactive and real-time digital experiences for smart and futuristic applications.

Course Contents:

Unit I: Fundamentals of IoT, AR and VR(10 hrs.)

Introduction to Internet of Things, IoT architecture including sensing, network, data and application layers, sensors and actuators, edge devices, basics of augmented reality, basics of virtual reality, AR versus VR versus mixed reality, human-computer interaction in immersive systems.

Unit II: IoT Communication and Immersive System Integration(10 hrs.)

IoT communication protocols such as MQTT, CoAP, HTTP and WebSockets, wireless technologies including Wi-Fi, Bluetooth, ZigBee, LoRa and 5G, cloud, fog and edge computing, data acquisition, storage and real-time streaming, integration of IoT data into AR and VR environments.

Unit III: AR & VR Platforms, Devices and Development(10 hrs.)

AR devices including mobile AR and smart glasses, VR devices such as head-mounted displays, controllers and haptic devices, wearable and embedded IoT sensors, AR and VR development platforms like Unity and Unreal Engine, AR SDKs including ARCore, ARKit and Vuforia, visualization of sensor data in immersive environments.

Unit IV: Applications, Intelligence and Security(12 hrs.)

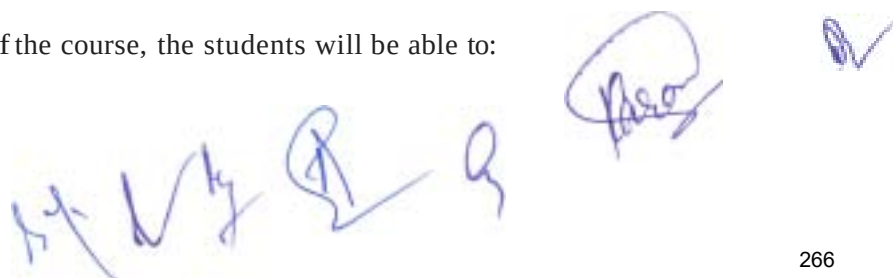
IoT-enabled AR and VR in healthcare, manufacturing, education and smart cities, space and astronaut training applications, artificial intelligence and machine learning in immersive IoT systems, real-time analytics and digital twins, cybersecurity and privacy in IoT-AR-VR systems, performance issues such as latency, bandwidth and synchronization, future trends including Metaverse, XR and intelligent environments.

Text Book(s) / Reference(s):

- [1] Rajkumar Buyya - Internet of Things: Principles and Paradigms.
- [2] Alan B. Craig - Understanding Augmented Reality: Concepts and Applications.
- [3] Tony Parisi - Learning Virtual Reality.
- [4] Jonathan Linowes - Augmented Reality for Developers.

Course Outcomes (COs):

Upon successful completion of the course, the students will be able to:



CO1: Understand the fundamental concepts of Internet of Things, Augmented Reality, Virtual Reality and immersive system architectures.

C02: Explain IoT communication technologies, data acquisition methods and their integration with AR and VR platforms for real-time applications.

C03: Develop and implement basic AR and VR applications using IoT devices, sensors and immersive development tools.

C04: Analyze the use of IoT-enabled AR and VR systems in domains such as healthcare, manufacturing, education and space applications.

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IIPE 423 QUANTUM COMPUTING

Pre-requisite: MAIC 204 (Applied Linear Algebra), npc 201 (Analog & Digital Electronics)

L	T	P	Credits	Total contact hours
3	0	0	3	40

Brief Description of the Course:

This course introduces the fundamental concepts of quantum computation, including qubits, unitary evolution, and multi-qubit states. Students explore quantum algorithms like Deutsch-Josza and Grover's search, as well as physical realizations of qubits.

Course Contents:

Unit 1:(10 hrs.)

Review of Quantum Mechanics and Motivation for Quantum Computation, Qubit: The qubit state – matrix and Bloch sphere representation - computational basis – unitary evolution, multi-qubit states - No cloning theorem - Superdense coding - Pure states to Bell states - Bell inequalities.

Unit 11:(10 hrs.)

Protocols with multi-qubits: Swapping - Teleportation - gates: CNOT - Toffoli gate - NAND - FANOUT – Walsh Hadamard, Measurement: Projective operators - General, Projective and POVM measure, Ensemble: Density operators - pure and mixed ensemble - time evolution.

Unit 111:(10 hrs.)

Composite systems: Partial trace - Reduced density operator - Schmidt decomposition - Purification - bipartite entanglement. Classical computing using qubits - Quantum parallelism - Deutsch's algorithm - Deutsch Josza algorithm, Quantum circuits: Basic gates - ABC decomposition - Gray codes - Universal gates, discrete logarithm, Role of prime factoring in classical cryptography, search algorithms.

Unit IV:(10 hrs.)

Quantum error correcting codes, Physical realization of qubits.

Text Book(s) / Reference(s):

- [1] Quantum Computation and Quantum Information, M.A. Nielsen and I.L. Chuang, Cambridge University Press.
- [2] Quantum Information and Computation, CIT Lecture Notes by J. Preskill.
- [3] Quantum Theory: Concepts and Methods, Asher Peres, Kluwer Academic Publishers.

Course Outcomes (COs):

Upon successful completion of the course, the students will be able to:

CO1: Understand quantum computing.

CO2: Analyse the qubits.

CO3: Evaluate the performance of quantum computing systems.

CO4: Apply quantum error codes.

IIPE424 6G NETWORKS

Pre-requisite: Principles of Communication Engineering (IIPC 205)

L	T	P	Credits	Total contact hours
3	0	0	3	40

Course Description:

This course covers the principles and applications of 6G networks. Topics include the requirements and challenges for 6G networks, key technologies such as terahertz communication, AI-based networking, and new network architectures, and their applications in various domains.

Course Contents:

Unit 1:(10 hrs.)

Introduction to 6G Networks, Historical background and motivation for 6G networks, Overview of 6G network requirements and challenges, Terahertz Communication for 6G Networks, Principles of terahertz communication, Design of terahertz communication systems.

Unit 11:(10 hrs.)

Artificial Intelligence-based Networking for 6G Networks, Principles of AI-based networking, Design of AI-based networking systems, New Network Architectures for 6G Networks, Principles of new network architectures (e.g., cell-free networks, network slicing), Design of new network architectures for 6G networks.

Unit 111:(10 hrs.)

Applications of 6G Networks in Different Domains, Applications of 6G networks in healthcare, transportation, and smart cities, Case studies of 6G networks in different domains, Advanced Topics in 6G Networks, Intelligent edge computing for 6G networks, Quantum communication for 6G networks, Distributed ledger technology for 6G networks.

Unit IV:(10 hrs.)

Performance Analysis of 6G Networks, Metrics and performance evaluation of 6G networks, Interference analysis and mitigation techniques for 6G networks, Future Directions in 6G Networks, Emerging trends in 6G networks research, Potential impact of 6G networks on society and the economy.

Text Book(s) / Reference(s):

- [1] 6G Technology: Performance, Applications, and Challenges by Mohammad Patwary, Mohammad Alamgir Hossain, and Atiqur Rahman.
- [2] 6G Wireless Communications: Vision and Potential Techniques by Muhammad Zeeshan Shakir, Bilal Muhammad, and Halim Yanikomeroglu.
- [3] 6G Mobile Networks: Vision, Requirements and Challenges edited by Sudhir Dixit, Ramjee Prasad, and Johan Torsoer.

Course Outcomes (COs):

At the end of the course, the students will be able to:



C01: Understand the 6G networks.

C02: Understand the Artificial Intelligence-based Networking for 6G Networks.

C03: Understand the applications of 6G Networks in Different Domains.

C04: Find the future Directions in 6G Networks.

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IIPE 425 Nano Sensors

Pre-requisite: Advanced Engineering Physics (PHIC 105)

L	T	P	Credits	Total contact hours
3	0	a	3	40

Brief Description:

This course on Nano Sensors is designed for undergraduate students. Students will be introduced to basic understanding and principle of sensors and sensor interface. The course will also include classification of sensors and their characteristics like sensitivity, transfer function, selectivity, calibration, etc. Various material properties and materials required for nano sensor applications will be discussed. Finally, the application of nano sensors for environment monitoring, healthcare, electronics and food safety will be covered.

Course Contents:

Unit 1:(12 hrs.)

Introduction, fundamental principle of nano sensing and classification of sensors. Basic transduction system in sensors. Sensor characteristics - Transfer functions, Resolution, Selectivity & sensitivity, Calibration, Noise: electronics, environmental and internal.

Unit 11:(10 hrs.)

Physical effects involved in signal transduction - Capacitance, Induction, Resistance, Piezoelectric effect, Pyroelectric effect, Hall effect, Thermoelectric effect. Sensor Interface – Interface circuit.

Unit 111:(8 hrs.)

Materials for nanosensors - nanotubes, nanowires, nanoparticles, metal oxides, quantum dots, layered nanomaterials. Properties of materials for nanosensors. MEMS and Microfluidics.

Unit IV:(10 hrs.)

Optical sensor. Chemical and Gas sensor. Wearable sensors. Temperature sensor. Mechanical sensor. Application of nanosensors for environmental monitoring, healthcare, food safety.

Text Book(s) / Reference(s):

- [1] J. Vetelino and A. Reghu, Introduction to Sensors, 1st Ed., CRC Press, 2011.
- [2] Jacob Fraden, Handbook of Modern Sensors, 4th Ed., Springer, 2010.
- [3] E. G. Bakhom, Micro- and Nano-Scale Sensors and Transducers, 1st Ed., Taylor & Francis, 2019.
- [4] Vinod Kumar Khanna, Nanosensors: Physical, Chemical, and Biological, 2nd Ed., CRC, 2021.
- [5] R. P. Areny, John G. Webster, Sensors and signal conditioning, 2nd Ed., John Wiley & Sons, 2001.

Course Outcomes (COs):

At the end of the course, students will be able to:

CO1: Understand the fundamental principles of nano sensing technology.

COS: Apply knowledge for designing of functional nano sensors for various applications like environment monitoring, wearable electronics, healthcare, etc.

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IIPE 426 BIO SENSORS

Pre-requisite: Advanced Physics (PHIC 105)

L	T	P	Credits	Total contact hours
3	0	0	3	40

Brief Description:

This subject is covered as a specialized topic within the Sensor and HoT curriculum, focusing on the modeling and design of biosensors. It examines the application of micron-scale machines (MEMS) in medical diagnostic devices, such as DNA chips and micro-arrays.

Course Contents:

Unit 1:(10 hrs.)

Description of biosensor and its general principles, Biomolecules used in biosensors and immobilization methods, immobilization of biological materials, support materials, their types and properties.

Unit 11:(10 hrs.)

The properties and characteristic of biosensors, performance factors in biosensors, enzymatic biosensors, immune-biosensors.

Unit 111:(10 hrs.)

DNA biosensors, Cell basis biosensors, Electrochemical biosensors, Optical biosensors.

Unit IV:(10 hrs.)

Other measurements methods, Biosensors in food analysis, Biosensors in environmental analysis. Futuristic technologies and challenges related to Bio-sensing.

Text Book(s) / Reference(s):

[1] A.Mulchandani, K.R. Rogers, Enzyme and Microbial Biosensors Techniques and Protocols, Humana Press, 1998.

[2] J.Cooper, T.Cass, Biosensors, Oxford University Press, second edition, 2004.

[3] Chen Jianrong, Miao Yuqing et al., Nanotechnology and biosensors, Biotechnology Advances, Volume 22, Issue 7, 2004.

Course Outcomes (COs):

At the end of the course student will be able to:

CO1: Acquire knowledge about the biosensors.

C02: Understand various biomolecules used in biosensors and immobilization methods.

C03: Design a biosensor.

C04: Acquire knowledge about advantages of biosensors.

COS: Understand DNA biosensors, Cell basis biosensors and Electrochemical biosensors.

C06: Understanding the use of Biosensors in environmental analysis.

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IIFE 427 IMAGE FORENSICS

Pre-requisite:Digital Signal Processing (IIFE 311)

L	T	P	Credits	Total contact hours
3	0	0	3	40

Brief Description about the course:

Image forensics is a rapidly growing field that deals with the analysis of digital images to determine their authenticity, integrity, and origin. This course provides an in-depth introduction to the fundamental concepts, techniques, and tools used in image forensics. The course covers the topics such as image acquisition, image processing, image compression, steganography, and digital watermarking. Students will learn how to apply these techniques to identify image tampering, detect forged images, and authenticate the origin of digital images.

Course Contents:

UnitI:(10 hrs.)

Introduction: Overview of image forensics, History of image forensics, Applications of image forensics. Image Acquisition: Types of digital images, Image formation and properties, Image acquisition devices, Image file formats.

Unit II:(10 hrs.)

Image Processing Techniques: Image enhancement and restoration, Noise reduction, Image segmentation, Feature extraction, Image analysis. Image Compression Techniques: Lossless and lossy compression, Image compression algorithms, Evaluation of compression quality, Impact of compression on image forensics.

Unit III:(10 hrs.)

Image Tampering and Forgery Detection: Types of image tampering and forgery, Image forensics tools and techniques for detection, Analysis of compression artifacts and inconsistencies, Detection of splicing and copy-paste operations. Steganography: Principles of steganography, Steganography techniques and tools, Detection of hidden information in digital images.

Unit IV:(12 hrs.)

Digital Watermarking: Principles of digital watermarking, Types of digital watermarks, Watermark embedding and extraction, Authentication of digital images. Evaluation of Image Forensics Techniques: Metrics for evaluating image forensics techniques, Benchmark datasets, Performance evaluation of image forensics tools. Case Studies and Applications: Real-world applications of image forensics, Case studies of image tampering and forgery detection, Analysis of recent image forensics research.

Text Book(s) / Reference(s):

- [1] Introduction to Digital Forensics by Brian Carrier, 2014.
- [2] Digital Forensics for Legal Professionals by Lars Daniel, 2017.
- [3] Digital Image Processing by Rafael C. Gonzalez and Richard E. Woods, 2018.
- [4] Digital Watermarking and Steganography by Ingemar J. Cox, Matthew L. Miller, and Jeffrey A. Bloom, 2007.



[5] Digital Image Forensics: There is More to a Picture than Meets the Eye, Springer, 2012.

Course Outcomes (COs):

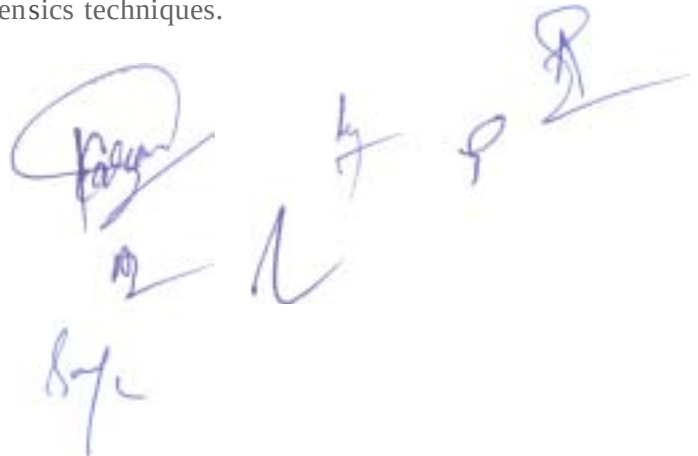
Upon completion of this course, students will be able to:

CO1: Understand the fundamental concepts and principles of image forensics.

CO2: Analyze and detect image tampering and forgeries.

CO3: Implement steganography techniques to hide information in digital images.

CO4: Evaluate the effectiveness of image forensics techniques.

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IIPE 428 BIOMEDICAL SIGNAL PROCESSING

Pre-requisite: Digital Signal Processing (IIPE 311)

L	T	P	Credits	Total contact hours
3	0	0	3	40

Course Description:

The course deals with biomedical signal basics, different types of biomedical signals, and biomedical recording system applications. The main objective is to help students acquire knowledge on different types of biomedical signal characteristics and analysis.

Course Contents:

Unit I: Signal Processing(10 hrs.)

Review of Discrete time signals and systems - LTI systems - Response of LTI systems - Convolution - Difference equation representation of discrete systems. Z transform - Transform analysis of LTI system – DFT. STFT - Introduction to wavelets - CWT and DWT with Haar wavelet.

Unit II: Introduction to Biomedical Signals(10 hrs.)

The nature of Biomedical Signals, Examples of Biomedical Signals, Objectives and difficulties in Biomedical analysis, Biomedical signals - The Brain and its potentials. Electrophysiological origin of brain waves. Electroencephalogram (EEG), signal and its characteristics, Electrocardiogram (ECG) signal origin and characteristics and Electromyogram (EMG) signal and its characteristics. ECG lead system, ECG signal characteristics; Non-Stationarities in ECG signal, EEG lead system, EEG signal characteristics. Types of noise in bio signals.

Unit III: Biomedical Signal Processing(10 hrs.)

Neurological Signal Processing: EEG analysis - Parametric modelling – Linear prediction theory; Autoregressive (AR) method; Recursive estimation of AR parameters. Cardiological signal processing: ECG parameters and their estimation - Arrhythmia analysis monitoring - ECG data reduction techniques.

Unit IV: Biomedical Signal Processing Methods and Applications(10 hrs.)

Adaptive interference / Noise cancellation: Types of noise in biomedical signals; Digital filters – IIR and FIR - Notch filters - Optimal and adaptive filters. Wiener filters - steepest descent algorithm - LMS adaptive algorithm - Adaptive noise canceller - cancellation of 50 Hz signal in ECG - Cancellation of maternal ECG in fetal electrocardiography.

Text Book(s) / Reference(s):

- [1] D. C Reddy, Biomedical Signal Processing, Principles and Techniques, Tata McGraw Hill, First Edition, 2005.
- [2] Willis J Tompkins, Biomedical Digital Signal Processing, Prentice Hall India Private Limited, First Edition, 2006.
- [3] Rangaraj M Rangayyan, Biomedical Signal Analysis - A case study approach, IEEE press, First Edition, 2002.

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[4] John G Proakis, Dimitris and G. Manolakis, Digital Signal Processing Principles algorithms, applications, PHI Third Edition, 2006.

Course Outcomes (COs):

At the end of the course the student will be able to:

CO1: Understand and analyze the dynamic characteristics of biomedical systems and modelling.

CO2: Apply specific mathematical techniques and solve problems in ECG signals.

CO3: Implement various signal processing techniques to model EEG signals.

CO4: Design and develop biomedical signal processing techniques for real time biomedical signals.

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IIPE-429: E-Commerce and ERP

Pre-requisite:-

L	T	P	Credits	Total contact hours
3	0	0	3	40

Brief Description about the course:

This course introduces students to the fundamental concepts of electronic commerce and enterprise resource planning (ERP) systems with emphasis on their role in modern industrial enterprises. It provides an understanding of digital business models, electronic payment systems, and secure e-commerce infrastructure. The course also covers ERP architecture, functional modules, and implementation methodologies. Further, it highlights integration of ERP with cloud computing, Industrial Internet of Things (IIoT), and Industry 4.0 for smart manufacturing environments.

Course Contents:

Unit I: Fundamentals of E-Commerce(10 hrs.)

Introduction to E-Commerce and Digital Business, Traditional Commerce vs E-Commerce, E-Commerce Framework and Architecture, Types of E-Commerce: B2B, B2C, C2C, C2B, G2B, Digital Markets and Digital Goods, Business Models: E-tailer, Marketplace, Portal, Subscription, On-demand, E-Commerce Applications in Manufacturing and Industrial Sector.

Unit II: E-Commerce Infrastructure, Payments and Security(10 hrs.)

Web Technologies for E-Commerce, E-Commerce Hardware and Software Infrastructure, Electronic Payment Systems, Credit/Debit Cards, Net Banking, UPI and Mobile Payments, Digital Wallets, Payment Gateways, Security Issues in E-Commerce, Encryption, Digital Signatures, SSL, Authentication, Cyber Laws and IT Act - Overview.

Unit III: ERP Concepts and Enterprise Integration(10 hrs.)

Enterprise Resource Planning: Concepts and Evolution, Benefits and Challenges of ERP, ERP Architecture and Components, Business Process Reengineering (BPR), ERP Implementation Life Cycle, Open Source vs Proprietary ERP, Role of ERP in Manufacturing Enterprises.

Unit IV: ERP Modules and IIoT Integration(10 hrs.)

ERP Functional Modules: Finance and Accounting (FI), Human Resource Management (HRM), Production Planning (PP), Sales and Distribution (SD); Cloud-based ERP Systems, ERP and Industrial Internet of Things, Case Studies: SAP S/4HANA, Oracle ERP Cloud, Microsoft Dynamics.

Text Book(s) / Reference(s):

- [1] Kenneth C. Laudon and Carol G. Traver, E-Commerce: Business, Technology, Society, Pearson.
- [2] Alexis Leon, ERP Demystified, Tata McGraw-Hill.
- [3] Joseph P. Brady, Ellen F. Monk, Bret Wagner, Concepts in Enterprise Resource Planning, Cengage Learning.
- [4] Rainer & Prince, Introduction to E-Commerce, Wiley.

Course Outcomes (COs):

After completion of this course, students will be able to:

CO1: Explain E-Commerce concepts, models, and infrastructure.

CO2: Describe electronic payment systems and security mechanisms.

CO3: Understand ERP architecture and implementation methodology.

CO4: Analyze major ERP functional modules.

COS: Explain integration ofERP with IIoT, cloud, and smart manufacturing.

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IIPE 430 SOFT COMPUTING & EXPERT SYSTEMS

Pre-requisite: Machine Learning and Data Analytics (CSIC 221), Data Structures and Algorithms (UPC 210)

L	T	P	Credits	Total contact hours
3	0	0	3	40

Brief Description about the course:

This course covers fundamental concepts used in Soft computing, including the concepts of Fuzzy logic (FL), Artificial Neural Networks (ANNs), and optimization techniques using Genetic Algorithm (GA). Applications of Soft Computing techniques to solve a number of real-life problems are also covered.

Course Contents:

Unit I: Fundamentals(10 hrs.)

Concept of computing systems, Soft computing versus Hard computing, Neurons and neural networks, Artificial neural networks: single-layer perceptron, multilayer perceptron, Back propagation, modifications to back-propagation, Radial basis function networks, Recurrent neural networks, Training of neural network, Applications of neural networks.

Unit II: Fuzzy Logic(10 hrs.)

Introduction to Fuzzy logic, Fuzzy sets and membership functions, Operations on Fuzzy sets, Fuzzy relations, rules, propositions, implications and inferences, Defuzzification techniques, Fuzzy logic controller design, Adaptive Neuro-Fuzzy systems, training methods, Some applications of Fuzzy logic.

Unit III: Genetic Algorithms(10 hrs.)

Concept of Genetics and Evolution and its application to probabilistic search techniques, Basic GA framework and different GA architectures, GA operators: Encoding, Crossover, Selection, Mutation, etc., Solving single-objective optimization problems using GAs.

Unit IV: Combined Techniques(8 hrs.)

Combined techniques - Genetic Algorithms-Fuzzy Logic, Genetic Algorithms-Neural Networks, Neural Networks- Fuzzy Logic, Application of ANN and Fuzzy systems to non-stationary time series prediction, pattern recognition, control & communication engineering, and system identification.

Text Book(s) / Reference(s):

- [1] S. Haykin, Neural Networks - A Comprehensive Foundation, Pearson Education, India.
- [2] lang, Sun and Mizutani, Neuro-Fuzzy and Soft-Computing - A computational approach to learning and machine intelligence, Prentice Hall of India.
- [3] S. Kumar, Neural Networks: A Classroom approach, Tata McGraw Hill.

Course Outcomes (COs):

Upon successful completion of the course, the students will be able to:

CO1: Able to carry out research and development of the neural work and fuzzy logic.

C02: Understanding of soft computing techniques and their application in diverse fields.

C03: In-depth analysis on technology variations in soft computing depending on the application and involvement of neural learning, classification.

C04: Application of neural network and fuzzy logic for different applications like time series prediction, control, etc.

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IIPE 431 Industrial IoT Markets & Security

Pre-requisite: Introduction to IoT (IIPC 204), IoT Security (IIPC 401)

L	T	P	Credits	Total contact hours
3	0	0	3	40

Brief Description:

This course examines the industrial structure for IoT, focusing on reference architectures and technical design constraints. It addresses critical security requirements like authentication and integrity, alongside the emerging roles of IIoT in smart logistics and autonomous systems.

Course Contents:

Unit I: Industry 4.0 and Markets

Essentials of Industrial IoT concepts and their transformative role in industrial processes, Industry 4.0: Globalization and Emerging Issues, The Fourth Revolution, LEAN Production Systems, Smart and Connected Business Perspective, Smart Factories, Application in healthcare and power plants. Consumer behavior models applicable to IoT markets.

Unit II: Data Acquisition, Model & Architecture

Various types of sensors and the criteria for selecting the right sensor for specific applications, Reinforcing fundamental sensor concepts and addressing key principles critical for sensor integration. IIoT - Introduction, IIoT Business Models Part I & Part II, IIoT Reference Architecture Part I & Part II.

Unit III: Networking and Protocols

Explores industrial networks, wireless communications (GPRS, WiFi). Wireless Technologies for IoT: Wireless medium access issues, MAC protocol survey, Survey routing protocols, Sensor deployment & Node discovery, Data aggregation & dissemination. WPAN Technologies for IoT: IEEE 802.15.4, Zigbee, HART, NFC, Z-Wave, BLE, Bacnet Modbus. IP Based Protocols for IoT: IPv6, 6LoWPAN, RPL, REST, AMQP, CoAP, MQTT. Edge connectivity and protocols.

Unit IV: IoT Connectivity Protocols and Security

The diverse landscape of IIoT connectivity, examining wireless long-range protocols. IIoT security concerns, including device security, access management, and data protection in industrial applications. On-off time measurement, showcasing the application of IIoT in monitoring and optimizing industrial processes. Quantum Computing role in network security and challenges.

Text Book(s) / Reference(s):

- [1] Industrial Internet of Things (IIoT) by Shreyanka Jha et al.
- [2] Practical Industrial Cybersecurity: ICS, Industry 4.0, and IIoT (2nd Ed.) by Charles 1. Brooks, Philip A. Craig Jr.
- [3] Industrial Network Security (3rd Ed.) by Eric D. Knapp.
- [4] Cybersecurity of Industrial Internet of Things (IIoT) by Nicola Palmarini et al.

Course Outcomes (COs):



Upon successful completion of the course, the students will be able to:

CO1: Analyze the industrial market structure, value chains, and emerging business models driven by IIoT.

C02: Evaluate technical design constraints and reference architectures (IIRA) for industrial-grade deployments.

C03: Implement robust security protocols for authentication, integrity, and privacy in industrial networks.

C04: Understand the practical applications and impact of IIoT on smart logistics, autonomous systems, and Industry 4.0.

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IIPE432 Database Management Systems

Pre-requisite: Data Communication & Networking (IIPC 212)

L	T	P	Credits	Total contact hours
3	0	0	3	40

Brief Description:

This course provides a foundation in relational database theory, covering normalization, ER modeling, and SQL query writing. It also introduces transaction processing, concurrency control, and practical skills using MySQL.

Course Learning Objectives:

1. To understand data models and database systems. 2. To understand relational database theory. 3. To learn database design and its normalization. 4. To understand concepts of transaction, its processing, and management. 5. To learn concurrency control techniques. 6. To develop practical skill in using MySQL DBMS.

Course Contents:

Unit I: Introduction

Data, Database, Database management system, Historical background from file systems to Database Systems, Data Models, Relational Data Model, ER model, Schemas and Instances, Database users, DBMS architecture.

Unit II: Relational Model and Query Language

Theory of Relational Database, Key Integrity constraint, Relational Algebra, Relational Calculus: Domain Relational Calculus, Tuple Relational Calculus, SQL, queries writing in SQL.

Unit III: Database Design

Normalization, Database Anomalies, Functional Dependencies, Candidate and Super Key, Non-loss Decomposition, Dependency Preservation, First, Second, Third Normal Form, BCNF, etc.

Unit IV: Transaction Processing and Concurrency Control

Transaction concept, a simple transaction model, states, ACID Properties, implementation of ACID properties, Serializability. Concurrency Control: Need for Concurrency, Lock-based protocols, Deadlock, Starvation, deadlock handling, time-stamp based protocols, validation-based protocols.

Text Book(s) / Reference(s):

- [1] A Silberschatz, H.P. Korth & S. Sudarshan: Data Base System Concepts, McGraw Hill, 4th, 5th or 6th edition.
- [2] Elmasri & Navathe: Fundamentals of Database Systems, 5th, 6th, or 7th edition, Pearson.

Course Outcomes (COs):

Upon successful completion of the course, the students will be able to:

CO1: Gain knowledge of fundamentals of DBMS, database design and normal forms.

- C02:** Design and Implement a small database for applications using MySQL DBMS.
C03: Apply the concepts of normalization to database design.
C04: Master the basics of SQL for retrieval and management of data.
COS: Be acquainted with the basics of transaction processing and concurrency control.

The image shows five handwritten signatures in blue ink, arranged in two rows. The top row contains three signatures, and the bottom row contains two. The signatures are stylized and cursive, typical of personal or official signatures.

S 59.20 To consider and approve the proposal of Physics Department for the following:

- (i) Minor changes in scheme of M.Sc. Physics**
- (ii) Change of name of PHIC 106 as Advanced Engg. Physics for B.Tech. in Sustainable Energy Technologies**

A proposal from the Department of Physics has been received for minor changes in the following:

- (i) Minor changes in scheme of M.Sc. Physics
Some minor changes in the scheme of M.Sc. Physics have been proposed by Physics Department. The proposed scheme & old scheme of M.Sc. Physics are attached as Annexure S 59.20.
- (ii) Change of name of Semiconductors for Energy Systems (PHIC 106) for B.Tech. 2nd semester in Sustainable Energy Technologies.

Code	Existing Name	Proposed Name
PHIC 106	Semiconductors for Energy Systems	Advanced Engineering Physics

Acad./Inward/26.1.1791
Dated: 04.06.2026

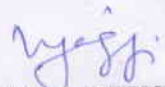
DEPARTMENT OF PHYSICS
NATIONAL INSTITUTE OF TECHNOLOGY
KURUKSHETRA

No. Ph./26/ 1850

Date: 04.06.2026

Please find enclosed Scheme of MSc Physics (with minor changes) code of Research Project Dissertation in the MSc 04th semester and change ~~the~~ name of PHIC 106 as Advanced Engineering Physics for B.Tech in Sustainable Energy Technologies for **senate approval** to be implemented in the current session.

The necessary documents are attached for your kind consideration, please.


HOD, PHYSICS

Dean (Academic)

SG-I

12.12.2025

M.Sc. (PHYSICS)

Department of Physics
National Institute of Technology Kurukshetra
Proposed Scheme for M.Sc. in Physics

Semester-I:

S. No.	Course Code	Course Title	L	T	P	Credits
1.	PHPC501	Classical Mechanics	3	0	0	3
2.	PHPC503	Quantum Mechanics	3	0	0	3
3.	PHPC505	Mathematical Physics	3	0	0	3
4.	PHPC507	Electrodynamics	3	0	0	3
5.	PHPC509	Nuclear and Particle Physics	3	0	0	3
6.	PHPC511	Physics Lab	0	0	6	3
7.	PHPC513	Computational Physics Lab	0	0	4	2
8.	**NC###	Sports/Yoga IKS/French Language /German Language	0	0	4	2
			2	0	0	
Total Credit						22

Semester-II:

S. No.	Course Code	Course Title	L	T	P	Credits
1.	PHPC 502	Solid State Physics	3	0	0	3
2.	PHPC 504	Advanced Quantum Mechanics	3	0	0	3
3.	PHPC 506	Thermodynamics and Statistical Physics	3	0	0	3
4.	PHPC 508	Electronics	3	0	0	3
5.	PHPC 510	Atomic and Molecular Physics	3	0	0	3
6.	PHPC 512	Electronics Lab	0	0	4	2
7.	PHPC 514	Advanced Physics Lab	0	0	6	3
8.	**NC ###	Sports/Yoga IKS/French Language /German Language	0	0	4	2
			2	0	0	
Total Credit						22

Semester-III:

S. No.	Course Code	Course Title	L	T	P	Credits
1.	PHPC 515	Advanced Electronics	3	0	0	3
2.	PHPC 517	Condensed Matter Physics	3	0	0	3
3.	PHPE 5##	Programme Elective – I	3	0	0	3
4.	PHPE 5##	Programme Elective –II	3	0	0	3
5.	PHOE ###	Open Elective – I	3	0	0	3
6.	PHPC 519	Analytical Instrumentation Lab	0	0	6	3
8.	PHPC 521	Seminar	0	0	1	1
7.	PHPC 523	Preparatory Research Project	0	0	4	2
Total Credit						21

Semester-IV:

S. No.	Course Code	Course Title	L	T	P	Credits
1.	PHPE 5##	Programme Elective – III	3	0	0	3
2.	PHPE 5##	Programme Elective - IV*	3	0	0	3
3.	PHOE ###	Open Electives-II*	3	0	0	3
4.	PHPC 524	Research Project (Dissertation)	0	0	18	9
Total Credit						18

Total Credit of the Programme = 22 + 22+ 21+ 18 = 83

[Handwritten signatures and initials]

M.Sc. (PHYSICS)

Annexure-A

Programme Elective – I (Semester-III):

S.No.	Course Code	CourseTitle
1.	PHPE 551	Quantum Field Theory
2.	PHPE 553	Lasers and Spectroscopy
3.	PHPE 555	Functional Materials and Characterization

Programme Elective – II (Semester-III):

S.No.	Course Code	CourseTitle
1.	PHPE 557	Radiation Physics and Nuclear Fragmentation
2.	PHPE 559	Nonlinear Spectroscopy
3.	PHPE 561	Materials Science

Programme Elective – III (Semester-IV):

S.No.	Course Code	CourseTitle
1.	PHPE 552	High Energy Physics
2.	PHPE 554	Photonics
3.	PHPE 556	Thin Film Physics and Applications

Programme Elective – IV (Semester-IV):

S.No.	Course Code	CourseTitle
1.	PHPE 558	Nuclear Technology
2.	PHPE 560	Physics of Optoelectronics Devices
3.	PHPE ###	NPTEL/SWAYAM/edX

Programme Elective NPTEL/SWAYAM/edX Courses:

S.No.	Course Code	CourseTitle
1.	PHPE ###	Accelerator Physics
2.	PHPE ###	Neutron Scattering for Condensed Matter Studies
3.	PHPE ###	Scientific Computing Using Python
4.	PHPE ###	Numerical Methods and Simulation Techniques for Scientists and Engineers
5.	PHPE ###	Computational Physics
6.	PHPE ###	A Brief Course On Superconductivity
7.	PHPE ###	Physics Of Linear And Nonlinear Optical Waveguides
8.	PHPE ###	Solar Photovoltaics Fundamentals, Technology and applications

M.Sc. (PHYSICS)

Annexure-B

Open Elective – I (Semester-III):

S.No.	Course Code	CourseTitle
1.	PHOE 581	Energy Materials and Devices
2.	PHOE 583	Polymers, Ceramics and Composite Materials
3.	PHOE 585	Fiber Optics and Optical Communication Systems

Open Elective – II (Semester-IV):

S.No.	Course Code	CourseTitle
1.	PHOE 582	Semiconductor Devices
2.	PHOE 584	Biomedical Instrumentation
3.	PHOE ###	NPTEL/SWAYAM/edX

Open Elective NPTEL/SWAYAM/edX Courses:

S.No.	Course Code	CourseTitle
1.	PHOE ###	Fundamentals of Artificial Intelligence
2.	PHOE ###	Cyber Security and privacy
3.	PHOE ###	Educational Leadership
4.	PHOE ###	Artificial Intelligence: Search methods for problem solving
5.	PHOE ###	Entrepreneurship
6.	PHOE ###	Machine Learning and Deep Learning--Fundamentals and Applications
7.	PHOE ###	Learning Analytics Tools

Annexure
PHOE 581
PHOE 582
PHOE 583
PHOE 584
PHOE 585
PHOE ###
PHOE ###
PHOE ###
PHOE ###
PHOE ###
PHOE ###
PHOE ###

**DEPARTMENT OF PHYSICS
NATIONAL INSTITUTE OF TECHNOLOGY
KURUKSHETRA**

No. Ph./26/ 1805

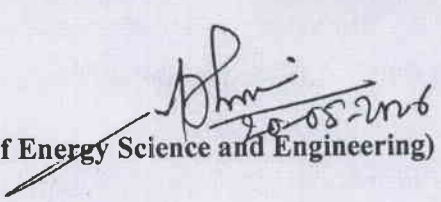
Date: 20.05.2026

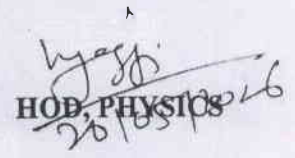
Subject: B.Tech 2nd semester Institute core syllabus PHIC 106 (Advanced Engineering Physics) for Sustainable Energy Technologies.

With reference to above said purpose, the Physics course for B.Tech 2nd semester for Sustainable Energy Technologies (SET) PHIC 106 Advanced Engineering Physics was approved in BOS Physics on 17.12.2024. This was sent to Dean Academics for approval in senate for the Academic Year 2024-25 and onwards. However, It is now noticed that the course PHIC 106 is named as Semiconductors for Energy Systems for SET whereas it should be named as Advanced Engineering Physics as approved in BOS Physics.

Kindly approve the name of PHIC 106 as Advanced Engineering Physics for B.Tech in Sustainable Energy Technologies.

The necessary documents are attached for your kind consideration, please.


HOD (Department of Energy Science and Engineering)


HOD, PHYSICS

Dean (Academics)

Copy to :

1. Faculty in-charge (Examination)

Institute Core (Semester-2)
B. TECH. (SUSTAINABLE ENERGY TECHNOLOGY)
PHIC106: Advanced Engineering Physics

Pre-requisite: --

L	T	P	Credits	Total contact hours
3	-	2	4	60

Brief description:

Upon successful completion of this course, the student will have an understanding of semiconducting materials for energy applications. Semiconductor junctions with the motivation of charge carrier separation/collection and transport. Role of semiconductors-metal junctions also for charge carrier transport. Semiconductor junctions under voltage- and light-bias conditions.

Course Content:

UNIT - I

Classical and Quantum Statistics (8 hours):

Microstates and Macro states; Classical statistical mechanics: Concepts of Maxwell-Boltzmann distribution law; Motivations for quantum statistics: Identical particle and symmetry requirement; Concepts of Fermi-Dirac and Bose-Einstein statistics.

UNIT - II

Physics of Semiconducting Materials (10 hours):

Formation of Energy Bands and Energy Gap; Fundamentals of Band structure; Charge carriers in semiconductors: Electrons and holes, Effective mass; Fermi-Dirac distribution and Density of States.

Types of Semiconductors: Direct and Indirect bandgap semiconductors; Doping and Intrinsic Carrier concentration; Carrier Concentration at Thermal Equilibrium; Temperature dependent carrier concentration; Carrier Transport Phenomena: Diffusion and Drift; Trap statistics; Current continuity equation.

(Signatures and dates)
17/12/2024
17/12/2024
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17/12/2024

UNIT - III

Junctions and their Characteristics (10 hours):

Metal semiconductor Junctions: Introduction on the work function, Ionization potential, and electron affinity, formation of the energy Barrier, Schottky and Ohmic contacts and Measurement of barrier height.

PN junctions: Introduction, PN junction under equilibrium, PN Junction under bias, I-V characteristics and Junction breakdown.

UNIT-IV

Optoelectronic Devices (8 hours):

Optoelectronic Processes in semiconductors: Optical Absorption and Emission; Radiative and Non-Radiative recombination process.

Generation and Recombination currents in PN junction.

Devices and Characteristics: Photodiodes, Photo detectors, Light-emitting diode and Solar Cells.

References/Textbooks:

1. Dittrich T., Material Concepts for Solar cells, World Scientific Publishing, 2018.
2. Neamen D. K., Semiconductor Physics and Devices Basic Principles, McGraw-Hill Companies, Inc., 4th Edition, 2011.
3. Yu P.Y. and Cardona M., Fundamentals of Semiconductors Physics and Materials Properties, Springer, 4th Edition, 2010.
4. Sze S. M. and Ng K. K., Physics of Semiconductor Devices. Hoboken, NJ, USA: John Wiley & Sons, Inc., 2006.
5. Streetman B. and Sanjay B., Solid State Electronic Devices. Pearson, 2006.
6. Fox M., Optical properties of solids. Oxford University Press, 2001.

Course outcomes:

Course outcomes:
On successful completion of the course, students will be able to

CO1: Understand the principles of classical and quantum statistics, fundamentals of semiconducting materials, doping and PN-junction formation

CO2: Appraise various optical process in semiconductors and metal-semiconductor contacts.

CO3: Understand about energy bands and charge carriers in semiconductors

CO4: Understand about optoelectronic devices

**DEPARTMENT OF PHYSICS
NATIONAL INSTITUTE OF TECHNOLOGY
KURUKSHETRA**

No. Ph./24/240

Date: 17.12.2024

MINUTES OF BOARD OF STUDIES COMMITTEE MEETING

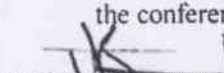
The meeting of the Board of Studies was held on 17.12.2024 at 11:00 am in the office of undersigned.
The following members were present:

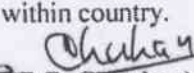
- | | |
|--|-----------------|
| 1. Prof. Neena Jaggi | Chairperson |
| 2. Prof. Ashavani Kumar, Professor | Member |
| 3. Prof. R.P. Chauhan, Professor | Member |
| 4. Dr. Prakash Chand, Assistant Professor | Member |
| 5. Dr. Y. Dwivedi, Assistant Professor | Member |
| 6. Dr. Awnish Kumar Tripathi, Assistant Professor | Member |
| 7. Dr. K.L. Ganapathi, Assistant Professor | Member |
| 8. Dr. Tanmay Maji, Assistant Professor | Member |
| 9. Dr. Than Singh Saini, Assistant Professor | Member |
| 10. Dr. H M Mittal Professor,
Department of Physics,
Dr. B R Ambedkar National Institute of Technology,
Jalandhar | External Expert |

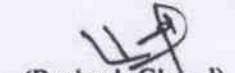
- Dr. G. D. Varma, Professor, (External Expert) from Department of Physics, Department of Physics I.I.T. Roorkee could not attend the meeting.

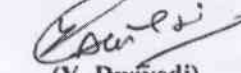
The following items were discussed in detail, corrected accordingly and approved the same:-

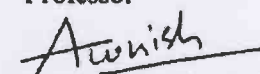
1. B.Tech 2nd semester Institute core Syllabus PHIC106 (Advanced Engineering Physics) for Sustainable Energy Technology was approved.
2. M.Sc Physics Analytical Lab (Earlier 2nd Semester) shifted to (3rd Semester) and Advanced Physics Lab shifted to 2nd semester from 3rd semester.
3. It is suggested that M.Sc students may be granted contingency for their project work/ attending the conferences within country.


(Ashavani Kumar)
Professor


(R.P. Chauhan)
Professor

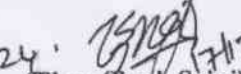

(Prakash Chand)
Assistant Professor


(Y. Dwivedi)
Assistant Professor

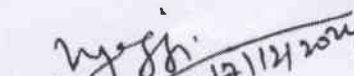

(A. K. Tripathi)
Assistant Professor


(Kolla Lakshmi Ganapathi)
Assistant Professor


(Tanmay Maji)
Assistant Professor


(Than Singh Saini)
Assistant Professor


Dr. H M Mittal
Professor, Department of Physics
Dr. B R Ambedkar National Institute of Technology,
Jalandhar
(External Expert)


(Neena Jaggi)
Chairperson, DRC

M.Sc. (PHYSICS)

Department of Physics
National Institute of Technology Kurukshetra
Proposed Scheme for M.Sc. in Physics

Semester-I:

S. No.	Course Code	Course Title	L	T	P	Credits	Page No.
1.	PHPC501	Classical Mechanics	3	0	0	3	
2.	PHPC503	Quantum Mechanics	3	0	0	3	
3.	PHPC505	Mathematical Physics	3	0	0	3	
4.	PHPC507	Electrodynamics	3	0	0	3	
5.	PHPC509	Nuclear and Particle Physics	3	0	0	3	
6.	PHPC511	Physics Lab	0	0	6	3	
7.	PHPC513	Computational Physics Lab	0	0	4	2	
8.	**AU###	Sports/Yoga	0	0	2	1*	
Total Credit						21	

Semester-II:

S. No.	Course Code	Course Title	L	T	P	Credits	Page No.
1.	PHPC502	Solid State Physics	3	0	0	3	
2.	PHPC504	Advanced Quantum Mechanics	3	0	0	3	
3.	PHPC506	Thermodynamics and Statistical Physics	3	0	0	3	
4.	PHPC508	Electronics	3	0	0	3	
5.	PHPC510	Atomic and Molecular Physics	3	0	0	3	
6.	PHPC512	Electronics Lab	0	0	6	3	
7.	PHPC514	Analytical Instrumentation Lab	0	0	6	3	
8.	**AU###	Sports/Yoga	0	0	2	1*	
Total Credit						22	

Semester-III:

S. No.	Course Code	Course Title	L	T	P	Credits	Page No.
1.	PHPC515	Advanced Electronics	3	0	0	3	
2.	PHPC517	Condensed Matter Physics	3	0	0	3	
3.	PHPE5##	Programme Elective - I	3	0	0	3	
4.	PHPE5##	Programme Elective -II	3	0	0	3	
5.	PHOE###	Open Elective - I	3	0	0	3	
6.	PHPC519	Advanced Physics Lab	0	0	6	3	
8.	PHPC521	Preparatory Research Project	0	0	4	2	
7.	PHPC523	Seminar	0	0	1	1	
Total Credit						21	

Semester-IV:

S. No.	Course Code	Course Title	L	T	P	Credits	Page No.
1.	PHPE5##	Programme Elective - III	3	0	0	3	
2.	PHPE5##	Programme Elective - IV*	3	0	0	3	
3.	PHOE###	Open Electives-II*	3	0	0	3	
4.	PHPC522	Research Project (Dissertation)	0	0	20	10	
Total Credit						19	

- Total Credit of the Programme = 21 + 22 + 21 + 19 = 83
- Qualifying credits of the programme = 80

NATIONAL INSTITUTE OF TECHNOLOGY KURUKSHETRA
(ACADEMIC SECTION)

No. Acad./26/ 597

April 9, 2026

NOTIFICATION

Rules , Regulations & Evaluation for B.Tech 8th Semester Students Opting for Internships through online MOOC Courses/Self-Study

The Senate in its 58th meeting held on 13.02.2026 & 26.02.2026 decided to allow students of 8th semester for internship in AY 2025-26. They must fulfill their academic requirements through one of the following options:

Option 1: Study through Online MOOC Courses

- a. Students can enroll in online courses offered by recognized platforms such as NPTEL, SWAYAM courses. The selected courses must:
 1. Be equivalent to the 8th-semester courses approved by the Senate on recommendation of the respective departments.
 2. Align with the course content and evaluation criteria of the academic program. Make sure that the courses must be the same as of 8th semester subjects and have equivalent credits to the subjects.
- b. The proof for MOOC course registration must have been submitted to the departments by the students on or before 28.02.2026. The proof of registration shall be verified by the faculty coordinators.
- c. The certificate of course(s) completed through MOOC along with the obtained marks/grade is to be submitted to the department by 20.05.2026. The students will have to appear for viva-voce of internship as per scheme of 8th semester.

Option 2: Self Study

The students going for internship, other than above (1), have to appear in the end semester exam after self-study in the running courses in the current semester.

Additional Guidelines

- In the self study option, the students must fulfill the following on-campus requirements by appearing in End-Semester Theory & Practical Exams covering the entire syllabus carrying 100 marks.
- Students must inform the faculty coordinator and complete all necessary formalities before opting for an internship through T&P Cell.
- For MOOC courses, students must ensure they enroll in approved courses to receive valid certificates.
- The equivalence of the MOOC courses shall be decided by the faculty coordinator.
- It is the student's responsibility to register for the MOOCs course(s) within the due date and successfully complete the course(s)
- The project work done during the internship will be considered for the major project evaluation.
- The attendance report duly certified by the concerned industry/organization should be submitted to the internship coordinator of the Institute at the end of the semester.

- The MOOC course certificate should be verified by the MOOC Coordinator at the department.

Calculation of marks in internal & external exam. for those students who complete courses through self-study during internship in 8th sem.

After completing the courses through self-study during internship in 8th sem., the students will appear only in the end semester exam. with the question paper of 50 marks.

Further, the internal components of 50 marks will be calculated on the basis of marks obtained in end sem. exam. as per table given below:

Evaluation process for theory courses

S. No.	Theory Papers	Weightage	Calculation of marks	Assessment
1	Mid Semester-I Exams	15	30% of marks obtained in end sem. exam.	Internal Assessment out of 50 Marks
2	Mid Semester-II Exams	15	30% of marks obtained in end sem. exam.	
3	Teacher's Assessment	10	20% of marks obtained in end sem. exam.	
4	Attendance	10	Full 10 marks (due to internship during full sem.)	
5	End Semester	50	100% of marks obtained in end sem. exam.	External Assessment out of 50 Marks
	Total	100		


 Deputy Registrar (Academic)
 09/04/26

Copy to:

- 1) Jr. Assistant to Director for kind information of the Director
- 2) All HoDs
- 3) Dean (Academic) for information
- 4) Faculty I/c (T&P Cell)
- 5) Faculty I/c (Examination)
- 6) Sr. Assistant to Registrar for kind information of the Registrar