INDIAN INSTITUTE OF TECHNOLOGY MANDI

KAMAND, DISTT. MANDI – 175075 (HIMACHAL PRADESH)

MINUTES OF 56TH BOARD OF ACADEMICS MEETING

VENUE	:	GUEST HOUSE (NC)CONFERENCE ROOM + ONLINE
DATE	:	3rd July, 2024 (WEDNESDAY)
TIME	:	02:30 PM

Following members attended the meeting

1.	Dean Academics	Prof. Aniruddha Chakraborty
2.	Nominee-1: School of Computing and Electrical Engineering	Dr. Padmanabhan Rajan
3.	Nominee-1: School of Biosciences and Bioengineering	Dr. Sumit Murab
4.	Nominee-2: School of Biosciences and Bioengineering	Dr. Kasturi Prasad
5.	Nominee-2: School of Civil and Environmental Engineering	Dr. Prasanna Rousseau
6.	Nominee-2: School of Mathematical and Statistical Sciences	Dr. Syed Abbas
7.	Nominee-1: School of Mechanical and Materials Engineering	Dr. Gaurav Bhutani
8.	Nominee-2: Centre of AI and Robotics	Dr. Jagadeesh
9.	Nominee-2: IKSHMA	Dr. Sumit Murab
10.	CnP Advisor	Dr. Kala Venkata Uday
11.	Deputy Registrar (Academics): Secretary	Mr. Suresh Rohilla
12.	Academic Affairs Secretary	Mr. Pourush Sharma
13.	PG Academic Secretary	Ms. Anugraha
14.	Research Affairs Secretary	Mr. Santu Shit

Following members could not attend the meeting

Sl. No.		Name	
1.	Chairman Senate Library Committee	Prof. Anjan Kumar Swain	Member
2.	Associate Dean (Research)	Dr. Amit Jaiswal	Member
3.	Associate Dean (Courses)	Dr. P Anil Kishan	Member
4.	Nominee-2: School of Computing and Electrical Engineering	Dr. Gopi Shrikanth Reddy	Member
5.	Nominee-1: School of Civil and Environmental Engineering	Dr. Maheshreddy Gade	Member
6.	Nominee-1: School of Physical Sciences	Dr. Arko Roy	Member
7.	Nominee-2: School of Physical Sciences	Dr. Gargee Sharma	Member
8.	Nominee-1: School of Chemical Sciences	Dr. Bhaskar Mondal	Member
9.	Nominee-2: School of Chemical Sciences	Dr. Garima Agrawal	Member
10.	Nominee-1: School of Mathematical and Statistical Sciences	Dr. Rajendra K Ray	Member
11.	Nominee-2: School of Mechanical and Materials Engineering	Dr. Sudhir Pandey	Member
12.	Nominee-1: School of Humanities & Social Sciences	Dr. Rajeshwari Dutt	Member
13.	Nominee-2: School of Humanities & Social Sciences	Dr. Ramna Thakur	Member

14.	Nominee-1: Centre of AI and Robotics	Dr. Narendra Dhar	Member
15.	Nominee-1: IKSHMA	Dr. Aniruddha Chakraborty	Member
16.	Nominee-1: Centre of Human Computer Interaction (HCI)	Dr. Dinesh Singh	Member
17.	Nominee-2: Centre of Human Computer Interaction (HCI)	Dr. Deepak Sachan	Member
18.	Industry Member – 1	Dr. Nadeem Akhtar	Member

Special Invitee

Sl. No.	Name	
1	Dr. Satvasheel Powar	Assoc. Prof., SMME
2	Dr. Surya Kant Sahdeo	Asst. Prof., SCENE
3	Dr. Shashank	Asst. Prof., SCENE
4	Dr. Sube Dheeraj Prakashchand	Asst. Prof., SMME

PART-A

(Issues discussed by the Board of Academics when the Student Members were present)

56.1 Confirmation of the minutes of 55th meeting of the Board of Academics:

The minutes of the 55th meeting of the Board of Academics held on 31th May, 2024 were confirmed.

56.2 To consider proposal for B.Tech. DSE Curriculum/sequencing:

Dr. Padmanabhan Rajan, nominee SCEE presented the proposal B.Tech in Data Science & Engineering programme for 2022 and 2023 Batch. After due deliberations, the BoA approved the proposal and the same shall be reported to the Senate.

The modified proposal is placed as **Annexure – A.**

56.3 To consider proposal for revision of B.Tech. in Bioengineering Curriculum:

Dr. Sumit Murab, Nominee, SBB presented the proposal for revision of B.Tech. in Bioengineering Curriculum. After due deliberations, the BoA approved the proposal and the same shall be reported to the Senate.

The modified proposal is placed as **Annexure – B.**

56.4 To consider proposal for conversion of registration of Full time M.Tech. to Part Time Programme to take up job:

Dr. Satavasheel Powar presented the proposal for conversion of registration of Full Time M.Tech. to Part time Programme to take up job. After due deliberations, the BoA recommended the proposal with minor modifications for the consideration of Senate and its approval.

The modified proposal is placed as **Annexure – C.**

56.5 To consider proposal to consider proposal for Predoctoral Preparatory Program:

A four members committee was constituted by the Director, IIT Mandi to consider the proposal for Predoctoral Preparatory programme. Dr. Dube Dheeraj Prakashchand, Chair of the committee presented the proposal. After due deliberations, the BoA suggested to revisit the recommendations and to seek advice from senior faculty members to make the proposal more elaborated and effective. Revised proposal may be submitted in upcoming BoA.

56.6 To consider new courses from SMSS:

BoA approved the following course from SMSS in new format and the same shall be reported to the Senate:

Sl.No.	Course No.	Course Name	Credits
1.	MA-588	Mathematical Control Theory	3-1-0-4

The course descriptions are placed as **Annexure- D**

56.7 To consider new courses from SCEE:

BoA approved the following course from SCEE in new format and the same shall be reported to the Senate:

Sl.No.	Course No.	Course Name	Credits
1.	CS-347	Software Engineering	3-0-2-4
2.	EE-231	Measurement and Instrumentation	2-0-2-3

The course descriptions are placed as **Annexure- E**

56.8 To consider new courses from SCENE:

BoA approved the following course from SCENE in new format and the same shall be reported to the Senate:

Sl.No.	Course No.	Course Name	Credits
1.	CE-524	Applied Hydroclimatology	3-0-0-3
2.	CE-524P	Computational Hydroclimatology Lab	0-0-2-1

The course descriptions are placed as **Annexure- F**

56.9 To consider new courses from CAIR:

BoA approved the following course from CAIR in new format and the same shall be reported to the Senate:

Sl.No.	Course No.	Course Name	Credits
1.	AR-518	Advanced Blockchain and web3	3-0-0-3

The course descriptions are placed as **Annexure- G**

56.10 Any other item with the permission of the Chair:

(1) To consider the procedural requirements of considering residual requirements for final year students under On the Spot Selection Method(Campus Drive admissions):

Dean(Academics) presented the proposal for procedural requirements of considering residual requirements for final year students under On the Spot Selection Method(Campus Drive admissions):

As per Existing Norms for On the Spot admission " *Selection of the candidates will be treated as final only after the approval of the Chairman Senate IIT Mandi, based upon the fulfilment of eligibility criteria as per O&R. The same should be clearly conveyed to all the candidates during presentation.*

For other admissions in the Ph.D./M.Tech(Research) admissions IIT Mandi consider the candidates for provisional admission before completion of their final semester

and after approval of the Chairman Senate, the provisional offer letters are issued to them stating that the offer will be provisional till the previous qualifying Degree is completed. It is recommended that the same guidelines may be considered for "On The Spot Selection Method)" and the candidates may be provisionally offered as in the case of other admission with the approval of the Chairman Senate.

After due deliberations, the BoA approved the proposal and the same shall be reported to the Senate.

(2) To consider proposal for revision of B.Tech. in Electrical Engineering Curriculum:

Nominee, SCEE presented the proposal for revision of B.Tech. in Electrical Engineering Curriculum. After due deliberations, the BoA approved the proposal and the same shall be reported to the Senate.

The modified proposal is placed as **Annexure – H.**

-NIL-

PART-B

(Issues discussed by the BoA without the Student Members being present)

-NIL-

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

Secretary, Board of Academics

(via-email)
Chairman, Board of Academics

Academic Office <acadoffice@iitmandi.ac.in>

Minutes of 56th BoA meeting

Aniruddha Chakraborty <achakraborty@iitmandi.ac.in> Sat, Jul 13, 2024 at 7:24 PM
To: Academic Office <acadoffice@iitmandi.ac.in>
Cc: DR Academics <dracad@iitmandi.ac.in>, Dean Academics <deanacad@iitmandi.ac.in>

Approved, please proceed.

On Fri, 12 Jul 2024 at 3:07 PM, Academic Office <acadoffice@iitmandi.ac.in> wrote:

> Dear Sir,
>
> Please see attached herewith the Scanned copy of the Minutes of 56th BoA meeting for your kind approval
>
> Regards
>
> SONIA

B.Tech in Data Science & Engineering
Curriculam

Annexure A

	Semester	Type	Course Code	Course Name	L	T	P	C
				First Semester				
1	I	IC	ICxxx	Calculus	1.5	0.5	0	2
2	I	IC	ICxxx	Complex and Vector Calculus	1.5	0.5	0	2
3	I	IC	IC140	Engineering Graphics for Design	2	0	3	4
4	I	IC	IC152	Introduction to Python and Data Science	3	0	2	4
5	I	IC	ICXXX	IC Core basket – 1	2.5/3	0.5/0	0	3
6	I	HSS	HSXXX	HSS Course	3	0	0	3
7	I	IKS	IKS181	Ikshma Course	3	0	0	3
8			ICXXX	Foundations of Design Practicum	1	0	6	4
				Second Semester				
1	II	IC	ICxxx	Linear Algebra	1.5	0.5	0	2
2	II	IC	ICxxx	ODE & Integral Transforms	2.5	0.5	0	3
3	II	IC	IC161	Applied Electronics	3	0	0	3
4	II	IC	IC 161P	Applied Electronics Lab	0	0	3	2
5	II	IC	IC252	Probability and Statistics	3	0	2	4
6	II	IC	ICXXX	Programming and Data Structures	2.5/3	0.5/0	0	3
7	II	IC	ICXXX	Foundations of Design Practicum	1	0	6	4
8	II	IC	IC221P	Physics Practicum	3	0	0	3

9	II	IC	IKS	Iksmha courses				
				Third Semester				
1	III	IC	IC272	Machine Learning	3	0	0	3
2	III	IC	IC	Data Structures and Algorithms	0	0	2	1
3	III	DC	DS301	Mathematical Foundations of Data Science	3	1	0	4
4	III	DC	DS201	Data handling and visualization	2	0	2	3
5	III	DE	CS214	Computer Organization	3	0	2	4
6	III	HSS	HSXXX	HSS Course	x	x	x	3
				Fourth Semester				
1	IV	IC	IC201P	Design Practicum	0	0	6	3
2	IV	DC	DS411	Optimization for Data Science	3	1	0	4
3	IV	DC	DS313	Statistical Foundations of Data Science	3	0	2	4
4	IV	DC	DS412	Matrix Computations for Data Science	3	0	2	4
5	IV	DE	DE-1	Discipline Elective-1	3	0	0	3
				Fifth Semester				
1	V	DC	DS413	Introduction to Statistical Learning	3	0	2	4
3	V	DC	CSXXX	Artificial Intelligence	3	0	0	3
4	V	DE	DE-2	Discipline Elective-2	x	x	x	4
	V	DE	DE-4	Discipline Elective-4	x	x	x	4
5	V	FE	FE-1	Free Elective-1	x	x	x	4
				Sixth Semester				

1	VI	DC	DS404	Information Security and Privacy	3	0	0	3
	V	DC	DS302	Computing Systems for Data Processing	3	0	2	4
2	VI	DE	DE-3	Discipline Elective-3	x	x	x	4
3	VI	DE	DE-4	Discipline Elective-4	x	x	x	4
4	VI	FE	FE-2	Free Elective-2	x	x	x	3
5	VI	FE	FE-3	Free Elective-3	x	x	x	3
	VI	ISTP	ISTP	ISTP/Free elective	x	x	x	4
				Seventh Semester				
1	VI/VII	IC	IC010	Internship	x	x	x	2
1	VII	DE	DE-5	Discipline Elective-5	x	x	x	4
2	VII	DE	DE-6	Discipline Elective-6	x	x	x	4
3	VII	FE	FE-4	Free Elective-4	x	x	x	4
4	VII	FE	FE-5	Free Elective-5	x	x	x	4
5	VII	MTP-1	MTP-1	MTP-1	x	x	x	3
				Eighth Semester				
1	VIII	DE	DE-7	Discipline Elective-7	x	x	x	4
2	VIII	DE	DE-8	Discipline Elective-8	x	x	x	4
3	VIII	FE	FE-6	Free Elective-6	x	x	x	4
5	VIII	MTP 2	MTP-2	MTP-2	x	x	x	5

1	VI	DC	DS404	Information Security and Privacy	3	0	0	3
	V	DC	DS302	Computing Systems for Data Processing	3	0	2	4
2	VI	DE	DE-3	Discipline Elective-3	x	x	x	4
3	VI	DE	DE-4	Discipline Elective-4	x	x	x	4
4	VI	FE	FE-2	Free Elective-2	x	x	x	3
5	VI	FE	FE-3	Free Elective-3	x	x	x	3
	VI	ISTP	ISTP	ISTP/Free elective	x	x	x	4
				Seventh Semester				
1	VI/VII	IC	IC010	Internship	x	x	x	2
1	VII	DE	DE-5	Discipline Elective-5	x	x	x	4
2	VII	DE	DE-6	Discipline Elective-6	x	x	x	4
3	VII	FE	FE-4	Free Elective-4	x	x	x	4
4	VII	FE	FE-5	Free Elective-5	x	x	x	4
5	VII	MTP-1	MTP-1	MTP-1	x	x	x	3
				Eighth Semester				
1	VIII	DE	DE-7	Discipline Elective-7	x	x	x	4
2	VIII	DE	DE-8	Discipline Elective-8	x	x	x	4
3	VIII	FE	FE-6	Free Elective-6	x	x	x	4
5	VIII	MTP 2	MTP-2	MTP-2	x	x	x	5

Annexure B

Bachelor of Technology in Bioengineering

Indian Institute of Technology Mandi

Program Level	Under Graduate
Minimum Duration	4 Years (8 Semesters)
Maximum Duration	6 Years (12 Semesters)

B.Tech. Bioengineering Program at IIT Mandi

Academic courses offered by IIT-Mandi for the B.Tech./B.Tech. (Honours) program are classified as Institute Core (IC), Discipline Core (DC), Discipline Elective (DE) and Free Elective (FE) courses. Hierarchically, IC courses provide a broader view of all engineering disciplines and IIT Mandi believes in making this learning process instrumental. Here, students are conceptualized with the fundamentals of these essential courses via theoretical approach and by conducting methodically structured experiments for same. These IC courses are offered during 1^{st} – 4^{th} semesters of B. Tech. program.

The DC courses are focused more towards mechanical engineering subjects where the students explore core concepts in further depth. These DC courses are well structured and cover wide range of areas in mechanical engineering. They are offered between 3^{rd} – 7^{th} semesters of the B. Tech. program along with few IC & DE courses. From the 4^{th} semester onwards, discipline elective (DE) courses are offered to the students giving them the option to choose from a long list of courses based on their interest; the list is presented in the latter part of this document. These courses help the student gain more width into peripheral areas of mechanical engineering or attain further depth into advanced topics.

In the 4^{th} semester, students are offered with the design practicum course which is a flagshipsource offered by IIT Mandi. The students solve real-world engineering problems through product design and development in this practicum-based course. In this era of interdisciplinary technology,students are encouraged to credit courses apart from the core mechanical engineering subjects. These free electives (FE) are offered from the 6^{th} semester onwards. The students have full freedom choosing and registering for the FE courses.

Interactive Socio-Technical Practicum (ISTP) is offered during the 6^{th} semester. This course provides an opportunity for the students to explore deeper into the social problems of surrounding regions and propose socio-technical solutions to the same. The students can pursue an optional major technical project (MTP) in the final two semesters to utilize their engineering education for pursuing industry-relevant projects, with the guidance of faculty members.

In a nutshell, the mechanical engineering program of IIT Mandi offers state-of-the-art interdisciplinary education in the field, providing significant freedom to the candidates to pursue ancillary interests with options of minor degrees. With the vision of training the future mechanical engineers of India, the Mechanical Engineering program of IIT Mandi is designed, and regularly updated, to ensure that the students stay top on the technology and are ready to take up the challenges of the future.

B.Tech. Bioengineering Curriculum

Semester wise distribution of all courses
(Minimum credit requirements for B.Tech. degree: 160 credits)

Semester 1

Course Code	Course Name	L - T - P - C
IC112	Calculus	1.5-0.5-0-2
IC113	Complex Variables and Vector Calculus	1.5-0.5-0-2
IC140	Engineering Graphics	2-0-3-4
IC152	Introduction to Python and Data Science	3-0-2-4
IC114	Linear Algebra	2-0-0-2
IC136	Understanding Biotechnology and its Applications (IC Basket – 1)	3-0-0-3
YYXXX	IKS Course	3-0-0-3
	Total	20

Semester 2

Course Code	Course Name	L - T - P - C
IC115	ODE and Integral transform	2-0-0-2
IC161	Applied Electronics	3-0-0-3
IC 161P	Applied Electronics Lab	0-0-3-2
IC252	Probability and Statistics	3-0-2-4
IC222P	Physics Practicum	0-0-3-2
IC241	Materials Science for Engineers (IC Basket-2)	3-0-0-3
IC102P	Foundations of Design Practicum	1-0-6-4
	Total	20

Semester 3

Course Code	Course Name	L - T - P - C
BE308	Introduction to Biomanufacturing	3-0-2-4
IC272	Machine Learning	2-0-2-3
BE201	Cell Biology	3-0-2-4
BE202	Biochemistry and Molecular Biology	3-0-2-4
BE309	Biosensing & Bioinstrumentation	3-0-2-4
HSXXX	HSS Course	3-0-0-3
	Total	22

Semester 4

Course Code	Course Name	L - T - P - C
IC201P	Design Practicum	0-0-6-3
BE301	Biomechanics	3-0-2-4

BE203	Enzymology and Bioprocessing	3-0-2-4
BE304	Bioinformatics	3-0-2-4
HSXXX	HSS Course	3-0-0-3
FE-1	Free Elective	3-0-0-3
	Total	21

Semester 5

Course Code	Course Name	L - T - P - C
BE306	Genetic Engineering: Principles and Applications	3-1-0-4
BE310	Biomaterials	3-0-2-4
BE303	Applied Biostatistics	3-0-2-4
BE305	Bioethics & Regulatory Affairs	2-0-0-1
DE-1	Discipline Elective	3-0-0-3
HSXXX	HSS Course	3-0-0-3
	Total	19

Semester 6

Course Code	Course Name	L - T - P - C
BE101P	Reverse Engineering for Bioengineers	0-0-2-1
DE-2	Discipline Elective	3-0-0-3
DE-3	Discipline Elective	3-0-0-3
DE-4	Discipline Elective	3-0-0-3
DE-5	Discipline Elective	3-0-0-3
FE-2	Free Elective	3-0-0-3
DP301P	ISTP	0-0-8-4
	Total	20

Semester 7

Course Code	Course Name	L - T - P - C
IC010	Internship	0-0-0-2
DE-6	Discipline Elective	3-0-0-3
DE-7	Discipline Elective	3-0-0-3
FE-3	Free Elective	3-0-0-3
FE-4	Free Elective	3-0-0-3
FE-5	Free Elective	1-0-0-1
MTP-1	MTP-1	0-0-8-4
	Total	19

Semester 8

Course Code	Course Name	L - T - P - C
DE-8	Discipline Elective	3-0-0-3
FE-6	Free Elective	3-0-0-3
FE-7	Free Elective	3-0-0-3
FE-8	Free Elective	3-0-0-3
HSXXX	HSS Course	3-0-0-3
MTP-2	MTP-2	0-0-8-4
	Total	19
	Grand Total	**160**

Compulsory IC courses in Science Baskets:

Science I:

Materials Science for Engineers

Science II:

Understanding Biotechnology and its applications

Annexure C

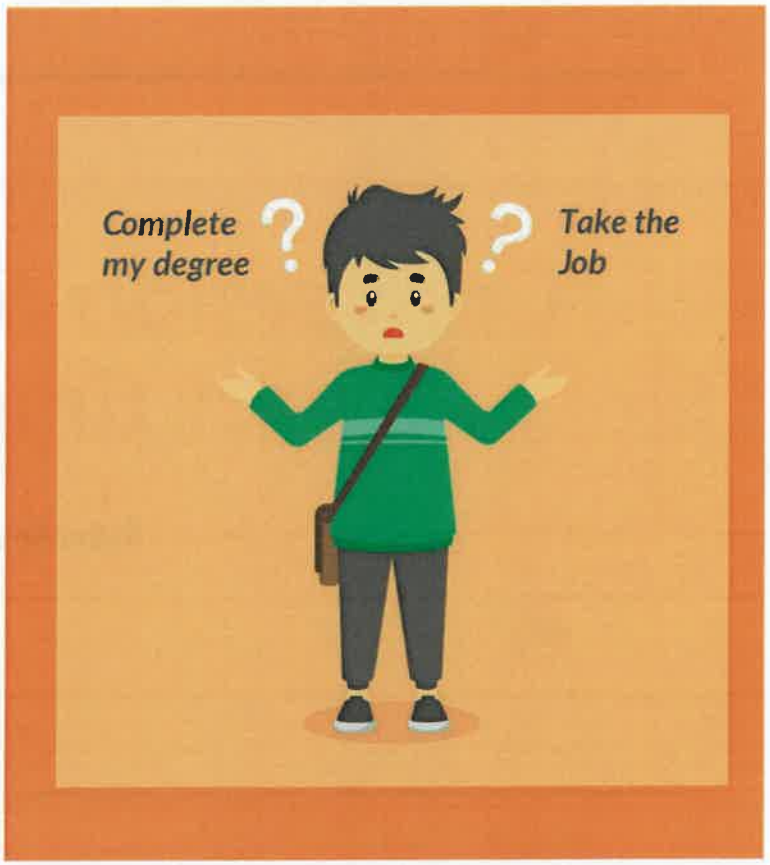
Conversion of M Tech to a part time MTech

Satvasheel Powar

Provision to Convert

To cater to the needs of the students, and understanding the priorities of the student community, it is important to introduce a provision to convert from a regular masters degree to part-time degree.

- Many times, students admitted in regular masters degree program get recruited before completion of their degree.
- Challenging circumstances force them to drop their degree mid-way.
- It is important that we support such students and allow them to complete their degree by converting into part-time



SIMILAR PROVISION IN OTHER IITS.

IITs that allow conversion of degree from Regular to Part-Time

- IIT BOMBAY
- IIT GUWAHATI
- IIT ROORKEE
- IIT PATNA
- IIT BHU

- Apart from this many NIT's also have this provision

- If a M Tech student has completed the course work requirements in a full time mode of studies, the student may be allowed to convert the thesis/dissertation requirements in a part time once the below mentioned requirements are fulfilled
- The student is employed full time in a Government organization
- The company offers NOC for the part-time completion of the Masters requirements
- Students must complete the remaining part of the MTech program within 2 years from the date of conversion to a part time MTech, or their studentship will be terminated.
- Upon transitioning from the 'Regular' to the 'Part-Time' category, MTech/MA students will forfeit their eligibility for Institute Fellowship.
- The student may be permitted, with the recommendation of the Academic supervisor, Faculty advisor, School Chair, Dean (Academics), and subsequent approval from the Chairman, Senate.

Annexure D

IIT Mandi
Proposal for a New Course

Course number : MA-588
Course Name : MATHEMATICAL CONTROL THEORY
Credit Distribution : *(3-1-0-4)*
Intended for : M.Sc. / BTech 3rd and 4rth years / MTech/ PhD (All Branches)
Prerequisite : MA511, M513 & MA521
Mutual Exclusion : (None)

1. Preamble:

This course will provide a comprehensive study to mathematical control problems and its applications. In the first half part of the course, students will study the finite dimensional control problems. Matrix theory will be used to study the finite dimension control systems. Real worlds examples will be given to show the applications of these control models. The concept of controllability will be introduced and theory will be developed to solved such type of control problems. In the second half of the course, infinite dimensional control systems will be introduced. The semigroup of linear operators on abstract spaces will be introduced to solve these infinite dimensional control problems. Semigroup of linear operators is a very rich theory to solved the abstract control systems. Different kind of controllability concepts will be introduced for such systems. It is useful for students and researchers in mathematics, engineering, physics and other related fields.

2. Course Modules with quantitative lecture hours:

Unit 1: Solution of Uncontrolled Systems - Spectral Form, Exponential Matrix, Repeated Roots, Solution of Controlled System – State Space, Control Space, Time Varying Systems, Discrete Time Systems. [8 Lecture]

Unit 2: Linear Control System, State Transition Matrix, Properties of State Transition Matrix, Controllability, Kalman Matrix, Kalman Condition for Controllability, Controllability Matrix and Related Theorems. [10 Lecture]

Unit 3: Semigroup of Linear Operators, Infinitesimal Generators, Strongly Continuous and Uniformly Continuous Semigroups, Properties of Semigroups, Hille-Yosida

Theorem, Compactness and Differentiability of semigroups, Analytic Semigroup, Semigroup of Compact Operators, Abstract Differential Equations and Their Solutions.

[12 Lecture]

Unit 4: Solution of Infinite Dimensional Control Systems, Controllability - Exact Controllability, Approximate Controllability, Null Controllability, Controllability Map, Controllability Grammian. Necessary and Sufficient Conditions for Exact and Approximate Controllability. [12 Lecture]

3. Text books:

1. **R. F. Curtain and Hans Zwart, An Introduction to Infinite-Dimensional Linear System Theory, Springer New York, NY, 1995.**
2. **S. Barnett, Introduction to Mathematical Control Theory, Clarendon Press, 1985.**

4. References:

1. **A. Pazy, Semigroup of Linear operators and Applications to Partial Differential Equations: Springer Verlag, 1983**
2. **1. D. E. Kirk, Optimal Control Theory, Mineola, N.Y.: Dover Publications, 2004.**
3. **2. W. L. Brogan, Modern Control Theory, Third Edition, Englewood Cliffs, N. J.: Prentice Hall, 1991.**

5. Similarity with the existing courses:
(Similarity content is declared as per the number of lecture hours on similar topics)

S. No		Course Code	Similarity Content	Approx. % of content
1.	Matrix Solution of Linear Systems	MA512-Linear Algebra	2 Hours	~8.0 %

6. Justification of new course proposal if cumulative similarity content is >30%:

Approvals:

Other Faculty interested in teaching this course: – Prof. Syed Abbas

Proposed by: Dr. Muslim Malik **School: SMSS**

Signature: **Date: 16. 07. 2024**

Recommended/Not Recommended, with Comments:

_____ **Date:**_____

Chairperson, CPC

Approved / Not Approved

_____ **Date:**_____

Chairperson, BoA

IIT Mandi
Proposal for a New Course

Course number : CS 347
Course Name : Software Engineering
Credit : 4
Distribution : 3-*0-2-4*
Intended for : B.tech CSE (Third Year)
Prerequisite : None
Mutual Exclusion : None

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1. Preamble:

The course introduces students to the different phases of Software Development Life Cycle (SDLC) used in maintaining, developing and delivering software products. Student will acquire basic software development skills and understand common terminology used in software engineering profession.

2. Course Modules with quantitative lecture hours:

Unit 1: Introduction: software engineering principles, software life-cycle models, software requirements specification, formal requirements specification and verification - axiomatic and algebraic specifications **(9 Hours)**

Unit 2: Software Architecture and Design: Function-Oriented Software design, Object Oriented Design, UML, design patterns, user interface design, computer-aided software engineering (CASE), software reuse, component-based software development, extreme programming. **(12 Hours)**

Unit 3: Software Testing and Verification: Coding and Unit testing, Integration and System testing, debugging techniques, Software Quality: SEI CMM and ISO-9001,Software Reliability and fault tolerance. **(8 Hours)**

Unit 4: Software Management: Evolution, Project Management and Risk Analysis, Software Quality Management, Configuration Mangement, Software Metrics, Cost Analysis and Estimation, Manpower Management and Organization and Management of large software projects. **(11 Hours)**

Laboratory/practical/tutorial Modules: Lab(s)/Assignment(s) related to different aspect of software development, testing and verification using CASE tool and workbenches.

3. Text books:

1. Pressman, Software Engineering: A Practitioner's Approach, McGraw Hill Education, 7th edition, ISBN: 9780071267823

4. References:

1. I. Sommerville, Software Engineering, 5/e, Addison-Wesley, 2000.
2. T. C. Lethbridge and Robert Laganire, Object Oriented Software Engineering, Tata McGraw Hill, 2004.
3. Bennett, S. McRobb, R. Farmer, Object Oriented Systems Analysis and Design using UML, McGraw-Hill, 4th edition, 2010, ISBN 9780077125363

5. Similarity with the existing courses:
(Similarity content is declared as per the number of lecture hours on similar topics)

S. No.		Course Code	Similarity Content	Approx. % of Content
1.		None		

6. Justification of new course proposal if cumulative similarity content is >30%:

N/A

Approvals:

Faculty interested in teaching this course: –

Proposed by: Dr. Sukarn **School: SCEE**

Signature: **Date:**

The following faculty (at least 3 faculty) discussed on……and approved the proposal on……..

Sl. No	Faculty Name	Signature
1.	Dr. Jinesh	
2.	Dr. Padmanabhan	
3.		

School Chair:

School:

Date:

This proposal is reported in ……..th Board of Academics on ……

Dean Academics

Date:

Note: School is responsible for the Course Code. Academic Office provides the IC Course Code.

IIT Mandi
Proposal for a New Course

Course number : **EE231**
Course Name : **Measurement and Instrumentation**
Credit : 3
Distribution : *2-0-2-3*
Intended for : B.Tech. Electrical Engineering, allied B.Tech programmes.
Prerequisite : IC161 – Applied Electronics, EE261 - Electrical Systems around us, EE260 – Signals and Systems.
Mutual Exclusion: None.

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1. Preamble:

The objective of the course is to provide an overview of measurement and instrumentation techniques used in engineering disciplines viz. mechanical, chemical, electrical, electronics, etc.

Upon completion of this course, the students will be able to
1. Identify and differentiate between different classes of sensors and actuators and choose the right component for application-specific purposes.
2. Use commonly used instrumentation techniques for signal generation, sensor data acquisition, device actuation and automation.
3. Analyze and compare design approaches and architectures of real-world measurement systems, and identify key parameters for assessing their performance.

2. Course Modules with quantitative lecture hours:

Topic 1: Fundamentals of measurement – Physical quantities, dimensional analysis, significant figure calculations, errors in measurement, Taguchi method. (2 hours)

Topic 2: Measurement foundations – Measurement of resistances – wire and bridge methods; Measurement of impedances – bridge methods; analog and digital meters; the digital storage oscilloscope. (4 hours)

Topic 3: Sensors and Actuators – Sensors – Definitions, classification, static and dynamic characteristics, sensor examples, e.g. temperature, pressure, piezoresistive, piezoelectric, capacitative, etc.; Actuators – e.g. piezoelectric actuator, DC motors , servo motor, stepper motor. (8 hours)

Topic 4: Instrumentation – Signal conditioning – amplification, filtering, isolation and handling noise; Power supply and regulation essentials; Data acquisition approaches – principles of ADC-based acquisition, use of DAQ cards; Calibration principles and reference to standards; Standard computer interfaces and communication protocols. (8 hours)

Topic 5: System-level design - Elements of system-level thinking; introduction to microcontrollers and FPGAs; Integration of sensors, signal conditioning and data acquisition systems; Problem-based learning based on real-world examples – e.g. distance sensors, PID controllers, real-time data acquisition systems, etc.; Troubleshooting strategies. (6 hours)

Laboratory/practical/tutorial Modules:

1. Instrumentation fundamentals – soldering; using power sources, signal generators, oscilloscopes; SCPI programming (2 hours).
2. The Wheatstone Bridge – First principles calibration (1 hour).
3. The Instrumentation amplifier – Verification of working, amplification of Wheatstone bridge output (1 hour).
4. The ADC – use of off-the-shelf ADCs (ADS1115s, or MCP3008) with standard microcontrollers (e.g. Arduino) for data acquisition (1 hour).
5. System design – an end-to-end temperature logger using a thermistor. (2 hours)
6. Real-time temperature stabilization of a Peltier element using PID control and the temperature logger (2 hours).
7. Elements of digital signal processing (2 hours).
8. PID control of speed of a DC motor (3 hours).

3. Text books:

A. K. Sawhney, "A course in Electrical and Electronic Measurements and Instrumentation", Dhanpat Rai and Co.

4. References:

Doeblin, E. O., Manik, D. N., "Measurement Systems", 6/e, Tata McGraw Hill India, 2011.
Fraden, Jacob. "Handbook of modern sensors." Springer Science+Business Media, 2010.

5. Similarity with the existing courses:
(Similarity content is declared as per the number of lecture hours on similar topics)

S. No.		Course Code	Similarity Content	Approx. % of Content
1.	Applied Electronics	IC161	Sensors and Actuators	10%

6. Justification of new course proposal if cumulative similarity content is >30%:

NA.

Approvals:

Faculty interested in teaching this course: –

Proposed by: **School:**

Signature: **Date:**

The following faculty (at least 3 faculty) discussed on……and approved the proposal on……..

Sl. No	Faculty Name	Signature

School Chair:

School:

Date:

This proposal is reported in ……..th Board of Academics on ……

Dean Academics

Date:

Note: School is responsible for the Course Code. Academic Office provides the IC Course Code.

Annexure F

IIT Mandi
Proposal for a New Course

Course number : CE-524
Course Name : Applied Hydroclimatology
Credit Distribution : 3-0-0-3
Intended for : PG and Ph.D. students
Prerequisite : None; however, familiarity with any computer programming language (e.g., Python, R, MATLAB, etc.) will be helpful during the course.
Mutual Exclusion : None

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1. Preamble:

Under the uncertainty posed by climate change, understanding the changing nature of different components of the hydrological cycle becomes critically important as water is an essential resource for the human and natural ecosystem. Hydroclimatology provides a systematic structure for studying how the climate system influences different spatial and temporal variations in the hydrological cycle. In this course, students will learn exploration of the climatic drivers of hydrology, such as precipitation, temperature, evapotranspiration, streamflow, and snowpack. This course will also train students to acquire, process, and analyze big climate data to generate useful information for optimal water resources management and planning. Students will also gain exposure to current research trends, gaps, future direction, and research report writing related to hydroclimatology.

2. Course Modules with quantitative lecture hours:

Module I: Introduction to hydroclimatology 4 Hours
Climate change: causes and impacts, Impact on global hydrologic cycle; Climate feedback, Tipping points, Water management in changing climate; Concept and scope of hydroclimatology.

Module II: Observation 4 Hours
Types of research data; Qualitative and quantitative data; Measurement of precipitation, temperature, snow, streamflow, snow water equivalent; Missing data handling techniques; Hydroclimatic measurement network in the Himalayan regions.

Module III: Modeling 8 Hours
Fundamental principles in hydroclimatic modeling; Types of climate models; Simple climate models, Simple energy balance climate models (e.g., zero-dimensional, single-layer, and one-dimensional); General circulation model

(GCM); Hydrologic modeling; types of hydrological models; Components of hydrologic models; SWAT model; VIC model; HEC-HMS.

Module IV: Hydroclimatic data processing and analysis 8 Hours

Gridding observed data; Reanalysis data: Satellite-derived data; Radar data; Climate data; Paleoclimatology data; Climate indices, Overview of CMIP6; Downscaling and bias correction of climate data; Impact assessment studies.

Module V: Impact on hydrology, agriculture, and ecosystem 6 Hours

Climate change impact on Dams; Weather and climate metrics for agriculture, Heat stress indices; Impact of climate change on food security in India; Energy limitation versus moisture limitation; Ecosystem services; Himalayan ecosystem and impact of climate change.

Module VII: Hydroclimatic extremes: Droughts and Floods 6 Hours

Drought definition: meteorological droughts, hydrological droughts, agricultural drought, socioeconomic drought; Drought indicators: Theory of run; Severity; Duration; Intensity; Frequency analysis; Impact of climate change on droughts;

Flood types; Extreme precipitation indices; Flood analysis; Flood Frequency analysis; Design Flood; Flood hazard and damage; Glacial lake outburst flood (GLOF); Impact of climate change on floods; Flood risk management and floodplain management. 6 Hours

3. Text books:

1. Shelton, M. L. (2009). Hydroclimatology: perspectives and applications. Cambridge University Press.
2. VenTe, C., Maidment, D. R., & Mays, L. W. (1988). Applied hydrology.

4. References:

1. Beven, K. J. (2011). Rainfall-runoff modelling: the primer. John Wiley & Sons.
2. McGuffie, K., & Henderson-Sellers, A. (2014). The climate modelling primer. John Wiley & Sons.

5. Similarity with the existing courses:
(Similarity content is declared as per the number of lecture hours on similar topics)

S. No.	Course Code	Similarity Content	Approx. % of Content
1.	CE561	Effect on streamflow and water resources; Emission paths and scenarios;	10%

6. Justification of new course proposal if cumulative similarity content is >30%:
Approvals:

Other Faculty interested in teaching this course: –

Proposed by: **School:**

Signature: **Date:**

Recommended/Not Recommended, with Comments:

_____ **Date:**_____

Chairperson, CPC

Approved / Not Approved

Date:_____

Chairperson, BoA_____

IIT Mandi
Proposal for a New Course

Course number	: CE-524P
Course Name	: Computational Hydroclimatology Lab
Credit Distribution	: 0-0-2-1
Intended for	: PG and Ph.D. students
Prerequisite	: None
Mutual Exclusion	: None

6. Preamble:

This hands-on lab course in Computational Hydroclimatology equips students with practical skills essential for analysing climate change impacts on water resources. Through ten intensive hands-on experiments, students gain proficiency in climate data analysis, hydrological modeling, and impact assessment. Participants will work with real-world datasets, applying statistical techniques to analyse climate trends and extreme events. They'll use advanced software tools to model hydrological processes, downscale climate projections, and assess impacts on water resources, agriculture, and glaciers. The course emphasizes the application of computational methods to solve real-world hydroclimatic problems, preparing students for careers in water resource management, climate science, and environmental consulting.

7. Course Modules with quantitative lecture hours:

List of Experiments

1. **Acquiring the hydroclimatic data: Acquisition and preprocessing of hydroclimatic data from various sources (2 Hours)**
2. **Analysis of Climate Change Trends**: Analyze long-term temperature and precipitation data to identify and quantify climate change trends. (2 hours)
3. **Handling Missing Hydroclimatic Data**: Apply various techniques to handle missing data in hydroclimatic time series and evaluate their effectiveness. (2 hours)
4. **Simple Energy Balance Climate Model**: Implement a zero-dimensional energy balance climate model to simulate global temperature changes under different forcing scenarios. (2 hours)
5. **Hydrologic Modelling with Lumped Models:** Set up and calibrate multiple lumped models to characterize the hydrologic behavior of the watershed.(2 Hours)
6. **Hydrologic Modeling with SWAT**: Set up and run a SWAT model for a small watershed to simulate hydrological processes and assess impacts of land use changes. (2 hours)
7. **Downscaling and Bias Correction of Climate Data**: Apply statistical downscaling and bias correction techniques to GCM outputs for use in local impact studies. (2 hours)
8. **Analysis of Climate Indices**: Calculate and analyze various climate indices to understand large-scale climate patterns and their local impacts. (2 hours)
9. **Drought Analysis using Standardized Precipitation Index (SPI)**: Compute SPI at multiple timescales to analyze historical drought patterns and assess future drought risk. (2 hours)
10. **Flood Frequency Analysis**: Perform flood frequency analysis using annual maximum streamflow data and assess non-stationarity due to climate change. (2 hours)

11. **Climate Change Impact on Crop Yield**: Assess the impact of climate change on crop yield using a simple crop model and climate projections. (2 hours)
12. **Glacier Mass Balance Modeling**: Implement a simple glacier mass balance model to assess climate change impacts on glacier evolution. (2 hours)

8. Text books:

(Latest, Only 2)

None. Experiment notebooks will be provided during the lab

9. References:

None. Experiment reference material will be provided during the lab

10. Similarity with the existing courses:

(Similarity content is declared as per the number of lecture hours on similar topics)

S. No.		Course Code	Similarity Content	Approx. % of Content
1.		CE561	Effect on streamflow and water resources; Emission paths and scenarios;	10%

6. Justification of new course proposal if cumulative similarity content is >30%:

Approvals:

Faculty interested in teaching this course: –

1. Dr. Deepak Swami, Associate Professor, School of Civil and Environmental Engineering
2. Dr. Aliva Nanda, Assistant Professor, School of Civil and Environmental Engineering

Proposed by: Dr. Vivek Gupta **School: SCEnE**

Signature: **Date:**

The following faculty (at least 3 faculty) discussed on……and approved the proposal on……..

Sl. No	Faculty Name	Signature
1	Dr. Ashutosh Sharma, IIT Roorkee	
2	Dr. Vishal Singh, NIH Roorkee	

3	Dr. Priyank Sharma, IIT Indore	

School Chair:

School:

Date:

This proposal is reported in ……..th Board of Academics on ……

Dean Academics

Date:

Note: School is responsible for the Course Code. Academic Office provides the IC Course Code.

IIT Mandi
Proposal for a New Course

Course number : **AR 518**
Course Name : **Advanced Blockchain and web3**
Credit : **3 Credits**
Distribution :**L-T-P-C (3-0-0-3)**
Intended for : **Undergraduate (Elective)/ Postgraduate**
Prerequisite :
Mutual Exclusion: (Specify the equivalent courses in other schools. These *Courses (with high similarity) are not allowed to credit by the students after or along with this course.*)

1. Preamble:

The course will cover the advanced topics of Blockchain and Web3 technologies and will provide thorough coverage of topics ranging from Layer2's, Rollups, ERC standards, Security, Solana, Crosschain communication, DEX, Hyperledger chain code and network deployments

2. Course Modules with quantitative lecture hours:

Course outline – Advanced Ethereum concepts (8 hours)

- ✓ EIPs (Ethereum Improvement protocols)
- ✓ Top EIPs that have changed the course of Ethereum
- ✓ ERC standards (Ethereum Request for Comment)
- ✓ Top Token standards
- ✓ Smart contract security
- ✓ Hardhat & Truffle

Course outline – Layer 2's, Rollups, DeFi, Web3 (12 hrs)

- ✓ TLayer 2 chains: What is a Layer 2 chain
- ✓ Differences between L1 and L2 chains
- ✓ Techniques for Layer2 sidechain, State channels, Plasma, Rollups
- ✓ Popular Layer2 chains – Polygon: setting up the wallet and deploying contacts to Layer 2 chains

- ✓ Rollups : What is a Rollup, Optimistic Rollups, ZK Rollups
- ✓ DeFi: Tokenization, DEX, Liquidity markets (AMM & bootstrapping), Stablecoins, Creating and deploying tokens and other smart contracts
- ✓ Web3
- ✓ DAO's
- ✓ Metaverse

Course outline – Third generation Blockchains (8 hrs)

- ✓ Third-Generation Blockchain and Major Examples
- ✓ Solana: Introduction, Architecture, consensus, Transaction policy
- ✓ Solana Nodes and Network, Sample transactions
- ✓ Cosmos: Introduction, IBC, Consensus and Network
- ✓ Cosmwasm

Course outline – DEPIN Decentralized Physical Infrastructure Networks (2 hrs)

- ✓ Introduction to DEPIN networks
- ✓ Filecoin, Storj, Arweave
- ✓ Render Network
- ✓ Theta Network
- ✓ Helium

Course outline – Hyperledger Fabric (4 hrs)

- ✓ Hyperledger Fabric Architecture
- ✓ Setting up and managing a Hyperledger network
- ✓ Chain code development and deployment

Course outline – Practicals, Projects and Assignments (8 hrs)

- ✓ Create an ERC20 token, deploy and interact with it
- ✓ Create a contract for Asset tokenisation or real-world scenario like crowdfunding/voting
- ✓ Create Supply Chain Management / Healthcare Records management / Asset Tokenization on Hyperledger fabric

Laboratory/practical/tutorial Modules:

3. Textbooks:

1. Mastering Ethereum: Building Smart Contracts and DApps
2. Blockchain with Hyperledger Fabric, Second Edition

4. References:

1. Practical Limitations of Ethereum'sLayer-2RAY NEIHEISER12 , GUSTAVO INÁCIO3, LUCIANA RECH3, CARLOS MONTEZ2, MIGUELMATOS1and LUÍS RODRIGUES1
2. From Bitcoin to Solana – Innovating BlockchainTowards Enterprise ApplicationsXiangyu Li, Xinyu Wang, Tingli Kong, Junhao Zheng, and Min Luo
3. Kim S, Deka GC, editors. Advanced applications of blockchain technology. Berlin/Heidelberg, Germany: Springer; 2020.

5. Similarity with the existing courses:
(Similarity content is declared as per the number of lecture hours on similar topics)

S. No.		Course Code	Similarity Content	Approx. % of Content
1.				

6. Justification of new course proposal if cumulative similarity content is >30%:

Approvals:

Faculty interested in teaching this course: –

1. Dr. Amit Shukla
2. Mr. Pulavarthi Bala Chandra

Proposed by: Dr. Amit Shukla **School: Centre for AI & Robotics**

Signature:  **Date: 28.06.2024**

The following external faculty (at least 2 faculty) provided the feedback and it was discussed among school/centre faculty on……..

Sl. No	Faculty Name	Signature

School Chair: **Dr. Amit Shukla**

School: **Centre for Artificial Intelligence & Robotics (CAIR)**

Date: 28.06.2024

This proposal is reported in ….56th… Board of Academics on …3rd July 2024

Dean Academics

Date:28.06.2024

Note: School is responsible for the Course Code. Academic Office provides the IC Course Code.

Comments of the Reviewers:

Annexure H

B.Tech Electrical Engineering

Sl. No.	Semester	Type	Course Code	Course Name	L	T	P	C	L - T - P - C	Remarks	Semesterwise Credits	Credits Completed
				First Semester								
1	I	IC	ICxxx	Calculus	1.5	0.5	0	2	1.5-0.5-0-2			
2	I	IC	ICxxx	Complex and Vector Calculus	1.5	0.5	0	2	1.5-0.5-0-2			
3	I	IC	IC140	Engineering Graphics for Design	2	0	3	4	2-0-3-4			
4	I	IC	IC152	Introduction to Python and Data Science	3	0	2	4	3-0-2-4			
5	I	IC	ICXXX	IC Core basket – 1	2.5/3	0.5/0	0	3	2.5-0.5-0-3	https://cloud.iitmandi.ac.in/f/f7a485930ece4b0fbaa0/		
6	I	HSS	HSXXX	HSS Course	3	0	0	3	3-0-0-3	Preferably English Course for weak students; Other courses may also run		
7	I	IKS	IKS181	Ikshma Course	3	0	0	3	3-0-0-3			
8			ICXXX	Foundations of Design Practicum	1	0	6	4	1-0-6-4	Only one course (FDP/IKS) needs to be taken by students. They may take the other course in the 2nd semester		
										The total credits may be 18 if HSS course is not taken by the student. Accordingly the subsequent number would changed. The compulsary 12 credits from HSS need to be completed by Sem VI. IKS and FDP may run in both semesters. Half of the batch does one course while the other half of the students do the other course. In the second semester, this will be swapped. Accordingly students may do 18-22 credits	21	21
				Second Semester								
1	II	IC	ICxxx	Linear Algebra	1.5	0.5	0	2	1.5-0.5-0-2			
2	II	IC	ICxxx	ODE & Integral Transforms	2.5	0.5	0	3	2.5-0.5-0-2			
3	II	IC	IC161	Applied Electronics	3	0	0	3	3-0-0-3			
4	II	IC	IC 161P	Applied Electronics Lab	0	0	3	2	0-0-3-2			
5	II	IC	IC252	Probability and Statistics	3	0	2	4	3-0-2-4			
6	II	IC	ICXXX	IC Core Basket	2.5/3	0.5/0	0	3	2.5-0.5-0-3			
7	II	IC	ICXXX	Foundations of Design Practicum	1	0	6	4	1-0-6-4			
8	II	IC	IC221P	Physics Practicum	3	0	0	3	0-0-3-2			
9	II	IC	IKS	Iksmha courses						IKSHMA course and FDP may swap their batches from 1st year. Total credits may be 20-21 based on the courses	22	43
				Third Semester								
1	III	IC	IC272	Machine Learning	3	0	0	3	3-0-0-3			
2	III	DC	EEXXX	Signals and Systems	2.5	0.5	0	3	2.5-0.5-0-3			
3	III	DC	EEXXX/P	Electrical Systems Around Us	3	0	3	5	3-0-3-5			
4	III	DC	EE203	Network Theory	2.5	0.5	0	3	2.5-0.5-0-3			
5	III	DC	EEXXX	Device Electronics	3	0	0	3	3-0-0-3			
7	IV	DC	EE210/P	Digital System Design	3	0	2	4	3-0-2-4			
										Discipline Core and elective courses may be included as per requirement; please fill the details of the courses here. Machine learning may be offered in 3rd semester, and design practicum may be offered in 4th semester		
				Fourth Semester							21	64
1	IV	IC	IC201P	Design Practicum	0	0	6	3	0-0-6-3			
2	IV	DC	EEXXX	Electromagnetics Theory	3	0	0	3	3-0-0-3			
3	IV	DC	EE201/P	Electro-Mechanics	2.5	0.5	2	4	2.5-0.5-2-4			
4	IV	DC	EE211	Analog Circuit Design	3	0	2	4	3-0-3-4			
6	IV	DC	EEXXX	Communication Systems	3	0	2	4	3-0-2-4			
6	V	HSS	HSXXX	HSS Course	x	x	x	3	x-x-x-3			
8	IV	DC	EEXXXP	Reverse Engineering	0	0	2	1	0-0-2-1			
											22	86
				Fifth Semester								
1	V	DC	EE301/P	Control Systems	3	0	2	4	3-0-2-4			
2	V	DC	EEXXX/P	Power Electronics and Systems	3	0	2	4	3-0-2-4			
3	V	DC	EEXXX	Digital Signal Processing	3	0	0	3	3-0-0-3			

4	V	DC	EEXXX	Computer Organization & Processor Architecture Design	3	0	2	4	3-0-2-4			
5	V	DC	EEXXX	Measurement and Instrumentation	2	0	2	3	2-0-2-3			
6	V	HSS	HSXXX	HSS Course	x	x	x	3	x-x-x-3			
											21	107
				Sixth Semester								
1	VI	ISTP/Alternatives	DP301P/DE-1	ISTP/Discipline Elective - 1	x	x	x	4	x-x-x-4			
2	VI	DE	DE-2	Discipline Elective - 2	x	x	x	4	x-x-x-4			
3	VI	DE	DE-3	Discipline Elective - 3	x	x	x	4	x-x-x-4			
4	VI	DE	FE-1	Free Elective - 1	x	x	x	3	x-x-x-3			
5	VI	DE	FE-2	Free Elective - 2	x	x	x	3	x-x-x-3			
6	VI	HSS	HSXXX	HSS Course	x	x	x	3	x-x-x-3			
										All core courses need to be completed by 6th semester. If the discipline core courses are completed by 5th semesters, the students may go for semester internship, without much issues of completing the core courses	21	128
				Seventh Semester								
1	VI/VII	IC	IC010	Internship	x	x	x	2	x-x-x-2	Internship needs to be completed before start of 8th semester. The grades for the internship may be added to 8th semester grades.		
1	VII	DE	DE-4	Discipline Elective - 4	x	x	x	4	x-x-x-4			
2	VII	DE	DE-5	Discipline Elective - 5	x	x	x	4	x-x-x-4			
3	VII	FE	FE-3	Free Elective - 3	x	x	x	4	x-x-x-4			
4	VII	FE	FE-4	Free Elective - 4	x	x	x	4	x-x-x-4			
5	VII	MTP-1/DE-6	DP401P/DE-6	MTP-1/Discipline Elective - 6	x	x	x	3	x-x-x-3			
											21	149
				Eigth Semester								
1	VIII	DE	DE-7	Discipline Elective - 7	x	x	x	4	x-x-x-4			
2	VIII	FE	FE-5	Free Elective - 5	x	x	x	3	x-x-x-3			
5	VIII	MTP 2		MTP-2	x	x	x	5	x-x-x-5		12	161
										If 3 credits HSS is done in Sem I then only one 3 credits needs to be done in either Se V or Sem VI. Hence the total HSS credits would be 12 and Overall Credits would be 160.		

Semester	DC	DE	C + DE	Symbol	Course Type	Credits	
III	14	0	14	DC	Discipline core	52	
IV	20	0	20	DE	Discipline elective	20	
V	18	0	18	FE	Free elective	17	
VI	0	8	8	HSS	Humanities and Social Science Course	12	
VII	0	8	8	IC	Institute Core	45	Including the baskets
VIII	0	4	4	IKS	Indian knowledge system	3	
Total	52	20	72	ISTP	Interactive Socio-Technical Practicum	4	
				MTP 1	Major Technical project 1	3	
				MTP 2	Major Technical project 2	5	
						161	