

INDIAN INSTITUTE OF TECHNOLOGY MANDI

KAMAND, DISTT. MANDI – 175075 (HIMACHAL PRADESH)



MINUTES OF 64TH BOARD OF ACADEMICS MEETING

VENUE :	GUEST HOUSE (NC) CONFERENCE ROOM + ONLINE
DATE :	15 th May, 2026 (Friday)
TIME :	10:00 AM

Following members attended the meeting

1.	Dean Academics (Chairman)	Dr. Venkatesh Hanumant Rao Chembrolu
2.	Associate Dean (Research)	Dr. Maheshreddy Gade
3.	Associate Dean (Courses)	Dr. Himanshu Pathak
4.	Nominee-1: School of Computing and Electrical Engineering	Dr. Samar
5.	Nominee-2: School of Computing and Electrical Engineering	Prof. Hitesh Shrimali
6.	Nominee-1: School of Physical Sciences	Dr. Harsh Soni
7.	Nominee-1: School of Biosciences and Bioengineering	Dr. Baskar Bakthavachalu
8.	Nominee-1: School of Mathematical and Statistical Sciences	Prof. Manoj Thakur
9.	Nominee-1: School of Civil and Environmental Engineering	Dr. Sandip Saha
10.	Nominee-2: School of Civil and Environmental Engineering	Dr. Harshad Kulkarni
11.	Nominee-1: School of Mechanical and Materials Engineering	Dr. Gajendra Singh
12.	Nominee-1: School of Humanities & Social Sciences	Dr. Masudul Hasan Adil
13.	Nominee-1: School of Management (I-MBA)	Dr. Ashish Bollimballa
14.	Nominee-2: School of Management (MBA)	Dr. Puran Singh
15.	Nominee-1: Centre of AI and Robotics	Dr. Praful Tejerao Hambarde
16.	Nominee-1: CQST	Dr. Vaibhav Gupta
17.	Nominee-1: IKSHMA	Dr. Neha Thakur
18.	Nominee-1: CHCI	Dr. Dinesh Singh
19.	Academic Affairs Secretary UG	Mr. Vishnu
20.	Deputy Registrar (Academics): Secretary	Sh. Suresh Rohilla

Following members could not attend the meeting

Sl. No.		Name	
1.	Chairman Senate Library Committee	Prof. Anjan Kumar Swain	Member
2.	Nominee-1: School of Chemical Sciences	Dr. Bhaskar Mondal	Member
3.	Nominee-2: School of Mechanical and Materials Engineering	Dr. Deepak Deelip Patil	Member
4.	Nominee-1:C3DAR	Dr. Vivek Gupta	Member
5.	CnP Adviser	Dr. Prateek Saxena	Member
6.	Industry Member-1	Mr. Avi Dahiya (CEO, TWYN)	Member
7.	Academic Affairs Secretary PG	Mr. Hemant Kumar	Member
8.	Research Affairs Secretary	Mr. Anshul Aggarwal	Member

Special Invitee (s)

Sl. No.	Name	Designation	School/Centre
1	Prof. Suman Kalyan Pal	Professor	SPS
2	Dr. Garima Agrawal	Associate Professor	SCS
3	Dr. Kala Venkata Uday	Associate Professor	SCEE
4	Dr. Rahul Shrestha	Associate Professor	SCEE
5	Dr. Srinivasu Bodapati	Associate Professor	SCEE
6	Dr. Bikram Paul	Assistant Professor	SCEE
7	Dr. Gaurav Sood	Assistant Professor	SCEE
8	Dr. Prateek Vishnoi	Assistant Professor	SCEE
9	Dr. Narendra Kumar Dhar	Assistant Professor	SCEE
10	Dr. Abhishek Sharma	Assistant Professor	SCEE
11	Dr. Mohit Mishra	Assistant Professor	SCEE
12	Dr. Shivang Shekhar	Assistant Professor	SCEE
13	Dr. Abhimanew Dhir	Assistant Professor	SCS
14	Dr. Lokeshkumar Pisaram Ramteke	Assistant Professor	SBB
15	Dr. Archi Banerjee	Assistant Professor	IKSMHA
16	Dr. P. Nirmal Harish	Assistant Professor	IKSMHA
17	Dr. Krishna Gajendra Panda	Assistant Professor	IKSMHA

PART-A

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

64.1 Confirmation of the minutes of 63th meeting of the Board of Academics:

The minutes of the 63th meeting of the Board of Academics held on 16th February, 2026 were confirmed.

64.2 To consider new courses from CAIR.

Dr. Praful Hambarde presented the revised proposal for the new courses from Centre for Artificial Intelligence and Robotics (CAIR), as listed in the table below. After due deliberation, the BoA approved the proposed courses with minor revisions. The same shall be reported to the Senate.

S.No	Course Code	Name of the Course	Credits
1	AR-521	Control of Robotic Systems	3-0-0-3
2	AR-522	Robot Vision	3-0-0-3
3	AR-524	Robot Simulators	2-0-2-3
4	AR-525	Reinforcement Learning for Robotics	3-0-0-3
5	AR-526	Multimodal Learning	3-0-0-3

The revised course descriptions are placed at **Annexure–A**.

64.3 To consider new courses from IKSHMA.

The nominees for the respective courses, as listed in the table below, presented the course proposals from IKSHMA. After due deliberation, the BoA approved the following courses with minor revisions, and the same shall be reported to the Senate.

S.No.	Course Code	Name of the Course	Credits	Proposed By
1	IK-520	Foundations of Indian Knowledge Systems in Music	3-1-0-4	Dr. P. Nirmal Harish
2	IK-521	Connecting Indian Music with Life	2-1-2-4	Dr. Archi Banerjee
3	IK-522	Ancient Indian Chemistry and Metallurgy	3-0-0-3	Dr. Neha Thakur
4	IK-523	Ancient Indian Mathematics	3-0-0-3	Dr. Krishna Gajendra Panda
5	IK-524	Introduction to Indian Architecture	3-0-0-3	Dr. Krishna Gajendra Panda
6	IK-525	Advanced Vedanta Philosophy	3-0-0-3	Dr. Krishna Gajendra Panda
7	IK-526	Kalā and NāṭyaŚāstra	2.5-0-1-3	Dr. P. Nirmal Harish and Dr. Archi Banerjee
8	IK-527	Sanskrit Language – Level I	3-0-0-3	Dr. Krishna Gajendra Panda

The revised course descriptions are placed at **Annexure – B**.

64.4 To consider a new course from SCENE.

Nominee from SCENE presented the proposal for the following new course. After due deliberation, the BoA approved the proposal with minor modifications and the same shall be reported to the Senate.

S.No	Course Code	Name of the Course	Credits
1	CE-570	Construction Network Scheduling and Cost Management	2-0-0-2

The revised proposal is placed at **Annexure-C**.

64.5 To consider new courses from SCEE.

Dr. Gourav Sood from SCEE presented the proposal for the new courses from SCEE. After due deliberation, the BoA approved the courses with the remarks as noted below and the same shall be reported to the Senate.

S.No	Course Code	Name of the Course	Credits	Remarks
1	CS-527	Pseudorandomness and Derandomization	3-0-0-3	Approved with revision in the course code from CS-610 to CS-527.
2	CS-528	Unconditional Lower Bounds for Algorithms and Data Structures	3-0-0-3	Approved with revision in the course code from CS-612 to CS-528.
3	EE-694	Photonic Computing	2-0-2-3	Deferred

The revised course descriptions are placed at **Annexure – D**.

64.6 To consider a new course from SPS.

The above agenda item was deferred to the next meeting of the BoA.

64.7 To consider the proposal for introducing new elective courses from the School of Chemical Sciences (SCS).

The nominees for the respective courses, as listed in the table below, presented the course proposals from SCS. After due deliberation, BoA approved the following courses and the same shall be reported to the Senate.

S.No	Course Code	Name of the Course	Proposed By	Credits
1	CY-405	Introduction to Structural Chemistry	Dr. Abhimanew Dhir	3-0-0-3
2	CY-563	Polymers for Advanced Technology	Dr. Garima Agrawal	3-0-0-3

The detail course descriptions are placed at **Annexure- E**.

64.8 To consider the revision of courses from the respective schools.

The nominees from the respective schools presented the proposals for revision of courses from their schools. After due deliberation, the BoA approved the revisions to the courses, as listed in the table below, and the same shall be reported to the Senate.

S.No	Course Code	Course Name	School	Remarks
1	AR-523	Robot Manipulators	CAIR	The course AR-501 (Robot Kinematics, Dynamics and Control) was replaced by AR-523 (Robot Manipulators), while the content remained the same.
2	AR-520	Design of Mechatronics Systems	CAIR	The course AR-503 (Mechatronics) was replaced by AR-520 (Design of Mechatronics Systems), while the content remained the same.
3	BE-308	Introduction to Biomanufacturing	SBB	The Course Content was revised.
4	IC-161	Applied Electronics	SCEE	The Course content was revised.

5	VL-211	Analog Circuit Design	SCEE	The Course EE-211 was discontinued and replaced with VL-211.
6	EE-517	Wireless Communications and Networking	SCEE	Deferred
7	MB-531	Legal and Ethical Aspects of Business	SoM	The course content was revised.
8	MB-592	Management Science in Practice- A Modelling and Case Studies approach with MS-Excel	SoM	The course was moved from Discipline Elective basket to Free Elective.
9	MA-576	Non-Linear Optimization	SMSS	Deferred
10	MT-304	Mechanical Behaviour of Materials	SMEE	The Course EN-611 (Durability Behaviour of Energy Materials) was discontinued and replaced with MT-304.
11	ME-212	Product Manufacturing Technology	SMEE	The course IC-141(Product Realization Technology (4 credits)) was discontinued and replaced with ME-212 (Product Manufacturing Technology) (3 Credits)

The revised course descriptions and modifications are placed at **Annexure-F**.

64.9 To consider revision in courses from CQST.

The above agenda item was deferred.

64.10 To consider the proposal regarding revision of the curriculum of I-Ph.D. and M.Sc. Physics.

Prof. Suman K. Pal presented the proposal regarding the revision of the curriculum for the I-Ph.D. and M.Sc. Physics. After due deliberation, the BoA approved the proposal with minor modifications and the same shall be reported to the Senate.

The revised proposal is placed at **Annexure-G**.

64.11 To consider proposal for introducing two minor programmes.

Dr. Bikram Paul presented the proposal for the following two minor programmes for UG students enrolled in various B.Tech. programmes.

1.	Minor in VLSI Design	VL-404: CMOS Analog IC Design [3-0-2-4]
		EE-524: Digital MOS LSI Circuits [3-0-0-3]
		EE-519P: Digital IC Design Practicum [0-0-3-2]
2.	Minor in VLSI Technology	VL-311: CMOS Processing and Practicum [3-0-2-4]
		VL-312: Electronic System Packaging [0-0-3-2]
		EE-615: Nanoelectronics and Nano-Microfabrication [3-0-0-3]

After due deliberation, the BoA recommended the proposal (as placed at **Annexure-H**) for the consideration of the Senate and its approval.

64.12 To consider the proposal for introduction of an Integrated Master's programme for B.Tech. M&VLSI students.

The above agenda item was deferred.

- 64.13 To consider the proposal for specialization in Structural Engineering.**
Nominee from SCENE presented the proposal for the introduction of a Specialization in structural engineering for students enrolled in the B.Tech. Civil Engineering Programme. After due deliberation, the BoA recommended the proposal (as placed at **Annexure- I**) for consideration of the Senate and its approval.
- 64.14 To consider the proposal for mapping of specialization with UG Programmes.**
Dr. Himanshu Pathak, Associate Dean courses presented the proposal after incorporating the responses received from each school regarding the alignment of the specialization with the UG programme. After due deliberation, the BoA approved the proposal with minor modifications.
The revised proposal is placed at **Annexure-J**.
- 64.15 To consider the proposal for revision of the requirements and courses for the Minor in Robotics programme.**
Dr. Praful Hambarde, from CAIR, presented the proposal for the revision of the requirements and courses for the Minor in Robotics programme. After due deliberation, the BoA approved the proposal as placed at **Annexure -K** and the same shall be reported to the Senate.
- 64.16 To consider the proposal for revision of the curriculum of the Minor in CSE programme.**
The above agenda item was not presented by the proposer and dropped.
- 64.17 To consider the proposal for revision of the curriculum of B. Tech. Mathematics and Computing programme.**
Prof. Manoj Thakur presented the proposal for revision of the curriculum of the B.Tech. Mathematics and Computing programme. After due deliberation, the BoA recommended that the revision be carried out within the school at its own level.
- 64.18 To consider the proposal regarding accelerated and standard patent filing procedures.**
Dr. Gajendra Singh presented the proposal regarding accelerated and standard patent filing procedures. After due deliberation, the BoA recommended the proposal for the consideration of the Dean's Committee.
- 64.19 To consider the proposal for counting MTP credits under the Discipline Elective (DE) or Free Elective (FE) basket for General Engineering and other branches.**
Dr. Gajendra Singh presented the proposal to consider MTP credits under the Discipline Elective category for General Engineering students. Previously, MTP credits earned from other branches/schools were being counted under the Free Elective category for General Engineering students. After due deliberation, the BoA has decided to reclassify these credits under the Discipline Elective category.
- 64.20 To consider the standard format and guidelines for synopsis and thesis submission.**
The above agenda item was not presented by the proposer and dropped.
- 64.21 To consider the proposal regarding revision of the Young Innovator Fellowship.**
Dr. Gajendra Singh presented the proposal regarding revision of the Young Innovator fellowship. After due deliberation, the BoA recommended the proposal for the consideration of the Senate and its approval.
The revised proposal is placed at **Annexure-L**.
- 64.22 To consider the proposal for the Minor in Entrepreneurship.**
Dr. Gajendra Singh presented the proposal for a Minor in Entrepreneurship programme for students enrolled in the B.Tech. and B.Tech. + M.Tech. dual degree programmes. After due deliberation, the BoA recommended the proposal with minor modifications for consideration of the Senate and its approval.
The revised proposal is placed at **Annexure-M**.

64.23 To consider the proposal for Minor in Management programme.

Dr. Puran Singh presented the proposal for a Minor in Management programme for undergraduate students. After due deliberation, the BoA approved the proposal with minor modifications and the same shall be reported to the Senate.

The revised proposal is placed at **Annexure-N**.

Any other item with the permission of the Chair:

64.24 To consider proposal for revision of I-MBA curriculum.

Dr. Ashish Bollimbala, from SoM presented the proposal for revision of I-MBA curriculum. After due deliberation, the BoA approved the proposal as placed at **Annexure-O** and the same shall be reported to the Senate. The approved curriculum will be applicable from 2024 batch onwards.

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.



Chairman, Board of Academics



Secretary, Board of Academics

शैक्षणिक अनुभाग
Inward No. 7809
07 JAN 2026
Academics Section

शैक्षणिक अनुभाग
Outward No. 5931-
08 JAN 2026
Academics Section

Proposal for a New Course

Course number: AR 521

Course Name: Control of Robotic Systems

Credit Distribution: 3-0-0-3

Intended for: B.Tech, M.Tech, M.Tech. (R), PhD

Prerequisite: For B.Tech. – Control System or equivalent course; For all – Linear Algebra

Mutual Exclusion: None

1. Preamble:

Control systems play a vital role in the field of engineering, by helping regulate and manipulate a process or a system to obtain controlled outputs. Robot control systems are the brains behind robots, allowing them to perceive, plan, and execute actions in the real world. This course provides an idea about the control methodology needed specifically in the field of robotics and associated construction, through specific foundational experimental setups.

Course Objectives:

- To learn foundational control theory specifically applicable to Robotic Systems
- To learn PD, PID, and State Estimation Theory for Motion Control.
- To decipher concepts related to the control of robotic manipulators.
- To understand dynamics, force control, compliance, and related concepts.

2. Course Modules with quantitative lecture hours:

Unit 1: Overview of Control Systems, Linear Time Invariant Systems with Single Input and Output, Feedback Control and Stability, Joint Space Control, Resolved Motion Rate Control, Natural Systems, Dissipative Systems, Passive System Stability, Trajectory generation: Determining the joint variables for desired trajectory. (8 hours)

Unit 2: PD Control, Control Partitioning, Motion Control, Disturbance Rejection, Steady-State Error, PID Control, State Estimation in Feedback Systems, Effective Inertia (6 hours)

Unit 3: Manipulator Control, PD Control Stability, Task-Oriented Control, Task-Oriented Equations of Motion, Operational Space Dynamics, Example, Nonlinear Dynamic Decoupling, Trajectory Tracking (8 hours)

Unit 4: Compliance, Force Control, Indirect vs Direct Force Control Strategies, Dynamics, Task Description for Robot Control (12 hours)

Unit 5: Control of Rotary Flexible Links and Flexible Joints, Control of Rotary Double Inverted Pendulum, Rotary Servo Base Unit for Modular Control Experiment, Gantry Crane Control System. (6 hours)

3. Textbooks:

(Relevant and Latest, Only 2)

1. Norman S. Nise, "Control Systems Engineering", Wiley India, Student Edition (Fifth), 2009
2. Robot Modeling and Control by M.W. Spong, S. Hutchinson, and M. Vidyasagar, Wiley, 2006.

4. References:

1. Introduction to Robotics: Mechanics and Control by J.J. Craig, Pearson, 4th Edition, 2017.
2. Modern Robotics: Mechanics, Planning, and Control by K.M. Lynch and F.C. Park, Cambridge University Press, 2017.

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.	NA	ME-310	Few topics (not all) of Unit-1 and 2	Less than 20%

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

Similarity is less than 20%.

Proposed by: Prof. Dipankar Deb

School: CAIR

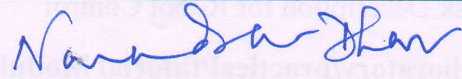

Signature: 

Date: 05.01.2026

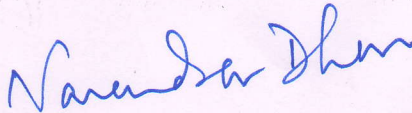
Approvals:

Other Faculty interested in teaching this course: – Dr. Narendra Kumar Dhar

The following faculty members (at least 3) discussed the course on **05.01.2026** and approved the course on **06.01.2026**.

S. No.	Name	Signature
1	Dr. Narendra Dhar	
2	Dr. Deepak Raina	 06.01.2026
3	Dr. Amit Shukla	Email approval attached

School Chair: Dr. Narendra Kumar Dhar

Signature: 

School: CAIR

Date: 06-01-2026

Recommended/Not Recommended, with Comments:

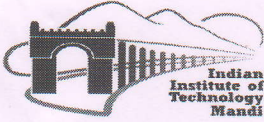
Date: _____

Chairperson, CPC

Approved / Not Approved

Date: _____

Chairperson, BoA



CAIR OFFICE IIT MANDI <cairoffice@iitmandi.ac.in>

Request for Approval of New Course Proposal

2 messages

CAIR OFFICE IIT MANDI <cairoffice@iitmandi.ac.in>

Tue, Jan 6, 2026 at 4:51 PM

To: Amit Shukla <amitshukla@iitmandi.ac.in>


Dear Sir,

Please find attached the proposal for a new course by Prof. Dipankar Deb. I kindly request your review and approval.

Thank you for your time and consideration.

Best regards,

Abhay

 Adobe Scan 6 Jan 2026 (1).pdf
1266K

Amit Shukla <amitshukla@iitmandi.ac.in>

Tue, Jan 6, 2026 at 5:34 PM

To: CAIR OFFICE IIT MANDI <cairoffice@iitmandi.ac.in>

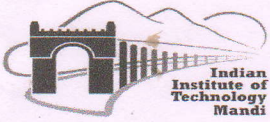
Recommended.

With best regards

Amit

Dr. Amit Shukla,
Chairperson, Centre for AI and Robotics, CAIR@IITMandi,
Affiliated faculty, IIT Mandi IHUB and HCI Foundation,
Affiliated faculty, Indian Knowledge System, and Mental Health Appl. (IKSHMA),
IIT Mandi-175005, Himachal Pradesh, India
<https://www.amitshuklaiitk.com/>

[Quoted text hidden]



Dipankar Deb <dipankar@iitmandi.ac.in>

Approved Proposal for New Course (AR 521)

Deepak Raina <deepakraina@iitmandi.ac.in>

Wed, Jan 7, 2026 at 7:33 PM

To: Dipankar Deb <dipankar@iitmandi.ac.in>

Cc: Amit Shukla <amitshukla@iitmandi.ac.in>, tushar@iitmandi.ac.in, Narendra Kumar Dhar <narendra@iitmandi.ac.in>, Chairperson CAIR <chair_cair@iitmandi.ac.in>

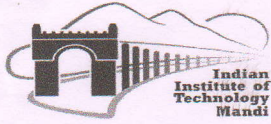
Dear Prof. Dipankar,

I do not have any additional comments and approve the proposal as shared.

Best regards,

Deepak

[Quoted text hidden]



Dipankar Deb <dipankar@iitmandi.ac.in>

Approved Proposal for New Course (AR 521)

Chairperson CAIR <chair_cair@iitmandi.ac.in>

Wed, Jan 7, 2026 at 5:13 PM

To: Dipankar Deb <dipankar@iitmandi.ac.in>

Cc: Narendra Kumar Dhar <narendra@iitmandi.ac.in>

Dear Sir,

The course content seems fine.

Kind regards,
Narendra

Dr. Narendra Kumar Dhar
Phone: 1905-267749
IIT Mandi-175005, Himachal Pradesh, India
[Quoted text hidden]

IIT Mandi

Proposal for a New Course

Course number : AR 522
Course Name : Robot Vision
Credit : 3-0-0-3
Distribution : *L-T-P-C*
Prerequisite : IC114: Linear Algebra/ Equivalent courses and Programming Knowledge (Python)
Intended for : UG, PG and PhD
Mutual Exclusion : None

1. Preamble:

This advanced course provides a comprehensive understanding of computer vision and deep learning for robotic perception, equipping students with the theoretical foundations and practical skills to design vision-based systems for real-world applications. The course bridges traditional techniques with modern deep learning approaches to solve challenges in robotics, autonomous systems, medical imaging, and industrial automation. By the end of the course, students will be equipped with the knowledge and skills to apply advanced vision techniques in autonomous robotic systems.

2. Course Modules with quantitative lecture hours:

- **Introduction to Robot Vision:** Overview of robotic perception, Importance of vision in robotics, Camera Models and Calibration: Pinhole camera model, Intrinsic & extrinsic parameters, Lens distortion and correction, Calibration techniques (chessboard, Zhang's method), Basic Image fundamentals (**6 Hours**)
- **AI-Based Visual Processing and Learning:** Image Preprocessing Techniques: Point processing, Neighbourhood Processing, edge detection technique; Foundations of Deep Learning; Training of robot vision based deep networks (**5 Hours**)
- **Learning-Based Architectures for Robot Vision:** CNN Architectures for Robotics Perception; CNN Architectures for Robotics system; Training and Fine-Tuning CNNs for Robot Vision; Hyperparameter Optimization for Real-Time Robot Vision (**6 Hours**)
- **Advanced Learning Models for Robotic Perception:** Object Detection for Robotic Vision; Semantic and Instance Segmentation in Robotics; Generative Models for Robotic Vision; Attention Mechanisms for Robotic Vision; Vision Models for Autonomous Systems (**11 Hours**)
- **3D Vision and Depth Estimation:** 3D Reconstruction from Stereo Images: Epipolar Geometry and Stereo Matching, Depth Maps; Structure from Motion (SfM) and SLAM: 3D Scene Reconstruction using Multiple Views; Depth Estimation with DL: Estimating Depth from Monocular Images. (**11 Hours**)

- **Applications of Robotics Vision** : Medical & Healthcare robotics; Manufacturing and Quality Control; Vision for Robotic Navigation; Autonomous Drones **(3 Hours)**

Laboratory/practical/tutorial Modules: NA

3. Text books:

(Latest, Only 2)

1. Dominik Sankowski, and Jacek Nowakowski, eds. Computer vision in robotics and industrial applications. Vol. 3. World Scientific, 2014.
2. Ian Goodfellow, Yoshua Bengio and Aaron Courville, Deep learning, In preparation for MIT Press, Available online: <http://www.deeplearningbook.org>, 2016

4. References:

- Richard Szeliski, Computer Vision: Algorithms and Applications.
- David Forsyth and Jean Ponce, Computer Vision: A Modern Approach, 2nd Edition.
- R. C. Gonzalez and R. E. Woods, Digital Image Processing, 3rd Edition, Pearson Education, 2009

Approvals:

Faculty interested in teaching this course: –

1. **Dr. Praful Hambarde**

Proposed by: Dr. Praful Hambarde

School: Centre for AI & Robotics (CAIR)

Signature:



Date: 24/01/2026

(No limit on numbers, relevant)

Standard format can be followed

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.		EE511	Basic computer vision concepts including camera models, image processing fundamentals, segmentation, CNN overview, and depth estimation	20–25%

Justification:

- AR522 is primarily focused on: Robotic vision, deep learning for robotics, SLAM, autonomous systems, robot navigation, attention mechanisms, robotics applications.
- EE511 is more traditional/general computer vision with geometry, probabilistic models, optical flow, feature tracking, etc.

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

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
1.	Dr. Subrahmanyam Murala	
2.	Dr. Santosh Kumar Vipparthi	
3.	Dr. Deepak Raina	

School Chair: **Dr. Narendra Dhar**



School: **Centre for AI & Robotics (CAIR)**

Date: 24/01/2026

This proposal is reported inth Board of Academics on

Dean Academics

Date:

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

Comments of the Reviewers:



Praful Hambarde <praful@iitmandi.ac.in>

Request for Course Review: Robotics Vision

3 messages

Praful Hambarde <praful@iitmandi.ac.in>
To: Subrahmanyam Murala <muralas@tcd.ie>

Mon, Jun 23, 2025 at 3:49 PM

Dear Dr. Subrahmanyam Murala Sir,

I am reaching out to kindly request your expert review of our newly designed course titled "**Robotics Vision.**" Given your expertise in computer vision and robotics, your insights and feedback would be highly valuable in strengthening the course content and ensuring its alignment with current research and industry trends.

The course is intended for PG, and Ph.D students and focuses on topics such as Deep learning for robotics vision, and real-time visual navigation systems. We aim to equip students with both theoretical knowledge and practical skills relevant to autonomous robotic vision systems.

I've attached the draft syllabus for your reference. Please feel free to suggest any modifications, additions, or improvements.

Looking forward to your feedback, and thank you in advance for your time and support.

--

Thanks & Regards,

Dr. Praful Hambarde,

Assistant Professor,

Centre For AI and Robotics,

IIT Mandi-175005, Himachal Pradesh, India

Email: hambarde.praful@gmail.com, praful@iitmandi.ac.in



Updated_model course proposal form - proposed_B.docx

22K

Subrahmanyam Murala <MURALAS@tcd.ie>
To: Praful Hambarde <praful@iitmandi.ac.in>

Thu, Jun 26, 2025 at 5:13 PM

Dear Praful,

As discussed, the revised course content is relevant, and I recommend proceeding with the course for the next steps.

Best regards

S Murala

Thanks & Regards

Subrahmanyam Murala

Associate Professor

CVPR Lab

School of Computer Science and Statistics

Trinity College Dublin

Dublin 2, Ireland

Email: subbumurala@gmail.com

My website: [Official](#) / [Personal](#)

Sent from my iPhone!!!

From: Praful Hambarde <praful@iitmandi.ac.in>
Sent: Monday, June 23, 2025 3:49:19 PM
To: Subrahmanyam Murala <MURALAS@tcd.ie>
Subject: Request for Course Review: Robotics Vision

[External Email] This email originated outside of Trinity College Dublin. **Do not click links or open attachments** unless you recognise the sender and know the content is safe.

[Quoted text hidden]

Praful Hambarde <praful@iitmandi.ac.in>
To: Subrahmanyam Murala <MURALAS@tcd.ie>

Thu, Jun 26, 2025 at 5:23 PM

Dear Dr. Subrahmanyam Murala Sir,

Thank you for your feedback.

Best Regards,

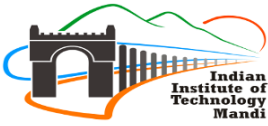
Praful

--

Thanks & Regards,

Dr. Praful Hambarde,
Assistant Professor,
Centre For AI and Robotics,
IIT Mandi-175005, Himachal Pradesh, India
Email: hambarde.praful@gmail.com, praful@iitmandi.ac.in

[Quoted text hidden]



Praful Hambarde <praful@iitmandi.ac.in>

Request for Course Review: Robotics Vision

3 messages

Praful Hambarde <praful@iitmandi.ac.in>
To: Santosh Kumar Vipparthi <skvipparthi@iitrpr.ac.in>

Mon, Jun 23, 2025 at 3:51 PM

Dear Dr. Santosh Kumar Vipparthi Sir,

I am reaching out to kindly request your expert review of our newly designed course titled "**Robotics Vision.**" Given your expertise in computer vision and robotics, your insights and feedback would be highly valuable in strengthening the course content and ensuring its alignment with current research and industry trends.

The course is intended for PG, and Ph.D students and focuses on topics such as Deep learning for robotic vision, and real-time visual navigation systems. We aim to equip students with both theoretical knowledge and practical skills relevant to autonomous robotic vision systems.

I've attached the draft syllabus for your reference. Please feel free to suggest any modifications, additions, or improvements.

Looking forward to your feedback, and thank you in advance for your time and support

--

Thanks & Regards,

Dr. Praful Hambarde,
Assistant Professor,
Centre For AI and Robotics,
IIT Mandi-175005, Himachal Pradesh, India
Email: hambarde.praful@gmail.com, praful@iitmandi.ac.in

 Updated_model course proposal form - proposed_B.docx
22K

Santosh Kumar Vipparthi <skvipparthi@iitrpr.ac.in>
To: Praful Hambarde <praful@iitmandi.ac.in>

Mon, Jun 23, 2025 at 9:29 PM

Dear Dr. Praful,
The course structure looks good.
You may add more lab content for training tiny models.

****This email sent through mobile, Pls ignore typos if any****

Regards
Santosh Kr. Vipparthi
Head, sAIDE, Associate Professor
IIT Ropar

[Quoted text hidden]

CONFIDENTIALITY NOTICE: The contents of this email message and any attachments are intended solely for the addressee(s) and may contain confidential and/or privileged information and may be legally protected from disclosure. If you are not the intended recipient of this message or their agent, or if this message has been addressed to you in error, please immediately alert the sender by reply email and then delete this message and any attachments. If you are not the intended recipient, you are hereby notified that any use, dissemination, copying, or storage of this message or its attachments is strictly prohibited.

Praful Hambarde <praful@iitmandi.ac.in>
To: Santosh Kumar Vipparthi <skvipparthi@iitrpr.ac.in>

Mon, Jun 23, 2025 at 9:37 PM

Dear Dr. Santosh Kumar Vipparthi Sir,

I appreciate your feedback and have included tiny model training in the assignments section.

[Quoted text hidden]



Praful Hambarde <praful@iitmandi.ac.in>

Request for your feedback- Robot Vision

3 messages

Praful Hambarde <praful@iitmandi.ac.in>
To: Deepak Raina <deepakraina@iitmandi.ac.in>

Sat, Jan 24, 2026 at 1:17 PM

Dear All,

I request your valuable feedback on the new course proposal titled "**Robot Vision.**"
A copy of the course proposal is attached for your kind review and reference.

Thank you in advance for your time and feedback.

Best regards,
Praful

--

Thanks & Regards,
Dr. Praful Hambarde,
Assistant Professor,
Centre For AI and Robotics,
IIT Mandi-175005, Himachal Pradesh, India
Email: hambarde.praful@gmail.com



Robot Vision.pdf
237K

Deepak Raina <deepakraina@iitmandi.ac.in>
To: Praful Hambarde <praful@iitmandi.ac.in>

Sat, Jan 24, 2026 at 2:12 PM

Hello Dr. Praful,

The course proposal on Robot Vision looks good to me.

Best,
Deepak
[Quoted text hidden]

Praful Hambarde <praful@iitmandi.ac.in>
To: Deepak Raina <deepakraina@iitmandi.ac.in>

Sat, Jan 24, 2026 at 2:39 PM

Thanks for your feedback.

--

Thanks & Regards,
Dr. Praful Hambarde,
Assistant Professor,
Centre For AI and Robotics,
IIT Mandi-175005, Himachal Pradesh, India
Email: hambarde.praful@gmail.com

[Quoted text hidden]

IIT Mandi

Proposal for a New Course

Course number: AR 524

Course Name: Robot Simulators

Credit Distribution: 2-0-2-3

Intended for: B.Tech, M.Tech, M.Tech. (R), PhD

Prerequisite: Linear Algebra (IC114) or equivalent courses, and basic programming skills

Mutual Exclusion: None

1. Preamble:

This course provides a hands-on, concept-driven learning to robot simulation ecosystems, bridging theoretical modeling with industry-relevant simulation workflows. Students will learn why simulators are indispensable, how robot motion and sensors are mathematically modeled, and simulated inside state-of-the-art robotic simulators.

By integrating robot motion and sensor models for state estimation along with ROS-based programming, the course equips students with the practical skill set required to transition seamlessly from simulation to real-world deployment. Exposure to modern simulation platforms and workflows—including synthetic data generation, hardware-in-the-loop testing, and digital twin creation—ensures strong alignment with current industry practices.

By the end of the course, students will acquire the knowledge and skills required to understand the role of high-fidelity digital twins, design realistic simulation environments, and validate algorithms before hardware deployment, making them well-prepared for careers in robotics, Physical AI, and advanced industrial automation.

2. Course Modules with quantitative lecture hours:

Foundations and Motivation of Robot Simulation: Why Robot Simulators? Concepts, advantages, types, Key Components of Robot Simulators and Selection Criteria, Role of simulation in robotics design and validation, Synthetic Data Generation for Physical AI and Scaleup the simulation environment using Gen2Sim. **(4 Hours Theory + 2 Hours Lab)**

Robot Motion Modeling and Simulation: Unicycle, Bicycle model, Robot Jacobian and Quadcopter model, Velocity motion model, Odometry motion model and their simulation. **(6 Hours Theory + 6 Hours Lab)**

Robot Programming With ROS: Fundamentals, Architecture for ROS1 and ROS2, Publisher and Subscriber node, rostopic, Rviz, URDF Modeling and ROS Navigation Stack. **(6 Hours Theory + 6 Hours Lab)**

Sensor Modeling, Calibration, Filtering, and Data Fusion: Beam range finder model, Camera model and sensor calibration, EKF and Quantum stochastic filtering. **(6 Hours Theory + 6 Hours Lab)**

Popular Robot Simulation Platforms and Digital Twins: ROS–Gazebo integration, PyBullet for manipulation and control, AirSim for aerial robotics, CARLA for autonomous vehicles, Isaac Sim for AI-driven robotics, Environment modeling, Sim2Real transfer considerations, HIL, and digital twins. **(6 Hours Theory + 8 Hours Lab)**

3. Text books:

1. Thrun, Sebastian, “Probabilistic robotics”, Communications of the ACM 45.3 (2002): 52-57.
2. Corke, Peter I., Witold Jachimeczyk, and Remo Pillat, “Robotics, vision and control: fundamental algorithms in MATLAB”, Vol. 73. Berlin: Springer, 2011.

4. References:

1. Katara, Pushkal, Zhou Xian, and Katerina Fragkiadaki, “Gen2sim: Scaling up robot learning in simulation with generative models”, IEEE International Conference on Robotics and Automation (ICRA), 2024.
2. Quigley, Morgan, Brian Gerkey, and William D. Smart, “Programming Robots with ROS: a practical introduction to the Robot Operating System”, O’Reilly Media, Inc., 2015.
3. Joseph L., Mastering ROS for Robotics Programming: Design, build, and simulate complex robots using the Robot Operating System.
4. Collins, Jack, et al., “A review of physics simulators for robotic applications”, IEEE Access 9 (2021): 51416-51431.
5. Behera, Laxmidhar, and Indrani Kar, “Quantum stochastic filtering”, IEEE International Conference on Systems, Man and Cybernetics. Vol. 3, 2005.
6. Fairchild, Carol, and Thomas L. Harman, “ROS robotics by example”, Packt Publishing Ltd, 2016.
7. Coumans, Erwin, and Yunfei Bai, “PyBullet quickstart guide”, ed: PyBullet Quickstart Guide. <https://docs.google.com/document/u/1/d> (2021).

5. Similarity with the existing courses: None

(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%: NA

Other Faculty interested in teaching this course: Dr. Radhe Shyam Sharma and Dr. Deepak Raina

Proposed by: Dr. Radhe Shyam Sharma

School: CAIR

Signature:

Date: 5/11/2026

Approvals:

The following faculty members (at least 3) discussed the course on 6/11/2026 and approved the course on 6/11/2026

S. No.	Name	Signature
1	Dr. Narendra Dhar	
2	Dr. Rajul Hambhal	
3	Dr. Deepak Raina	

School Chair:

Signature:

School: CAIR

Date: 06-01-2026

Recommended/Not Recommended, with Comments:

Date: _____

Chairperson, CPC

Approved / Not Approved

Date: _____ **Chairperson, BoA**



Radhe Shyam Sharma <radheshyam@iitmandi.ac.in>

Request for your feedback

5 messages

Radhe Shyam Sharma <radheshyam@iitmandi.ac.in>

Wed, Jan 7, 2026 at 7:10 PM

To: Narendra Kumar Dhar <narendra@iitmandi.ac.in>, Chairperson CAIR <chair_cair@iitmandi.ac.in>, Deepak Raina <deepakraina@iitmandi.ac.in>, Praful Hambarde <praful@iitmandi.ac.in>

Dear all,

I request your feedback on the new course proposal titled "**Robot Simulators**". A copy of the course proposal is attached to this email for your reference.

Thanks,
Radhe Shyam

 **AR524-Robot_Simulators.pdf**
2237K

Praful Hambarde <praful@iitmandi.ac.in>

Wed, Jan 7, 2026 at 7:22 PM

To: Radhe Shyam Sharma <radheshyam@iitmandi.ac.in>

Cc: Narendra Kumar Dhar <narendra@iitmandi.ac.in>, Chairperson CAIR <chair_cair@iitmandi.ac.in>, Deepak Raina <deepakraina@iitmandi.ac.in>

Dear Dr. Radheshyam Sir,

Thank you for the revisions. I have reviewed the updated course content and approve it.

Best Regards

Praful

--

Thanks & Regards,

Dr. Praful Hambarde,
Assistant Professor,
Centre For AI and Robotics,
IIT Mandi-175005, Himachal Pradesh, India
Email: hambarde.praful@gmail.com

[Quoted text hidden]

Deepak Raina <deepakraina@iitmandi.ac.in>

Wed, Jan 7, 2026 at 7:25 PM

To: Radhe Shyam Sharma <radheshyam@iitmandi.ac.in>

Cc: Narendra Kumar Dhar <narendra@iitmandi.ac.in>, Chairperson CAIR <chair_cair@iitmandi.ac.in>, Praful Hambarde <praful@iitmandi.ac.in>

Thank you for incorporating the feedback. The revised course content is approved from my side.

Best,
Deepak

[Quoted text hidden]

Narendra Kumar Dhar <narendra@iitmandi.ac.in>

Wed, Jan 7, 2026 at 7:44 PM

To: Radhe Shyam Sharma <radheshyam@iitmandi.ac.in>

Cc: Chairperson CAIR <chair_cair@iitmandi.ac.in>, Deepak Raina <deepakraina@iitmandi.ac.in>, Praful Hambarde <praful@iitmandi.ac.in>

The discussion points have been included in the revised proposal. I approve the same.

Thank you.

Kind regards,
Narendra

Dr. Narendra Kumar Dhar
Assistant Professor,
School of Computing and Electrical Engineering,
Office: A17-2-11
IIT Mandi-175005, Himachal Pradesh, India

[Quoted text hidden]

Radhe Shyam Sharma <radheshyam@iitmandi.ac.in>

Wed, Jan 7, 2026 at 8:29 PM

To: Narendra Kumar Dhar <narendra@iitmandi.ac.in>, Deepak Raina <deepakraina@iitmandi.ac.in>, Praful Hambarde <praful@iitmandi.ac.in>

Cc: Chairperson CAIR <chair_cair@iitmandi.ac.in>

Thank you all for your valuable time and insightful inputs during the discussion.

Regards,
Radhe Shyam

[Quoted text hidden]

IIT Mandi
Proposal for a New Course

Course number: AR 525

Course Name: Reinforcement Learning for Robotics

Credit Distribution: 3-0-0-3

Intended for: B.Tech, M.Tech, M.Tech. (R), PhD

Prerequisite: IC272: Machine Learning / CS305 or CS362: Artificial Intelligence / Equivalent courses and Programming Knowledge (Python)

Mutual Exclusion : None

1. Preamble:

Reinforcement Learning (RL) is a paradigm that models trial-and-error decision making, enabling physical robotic systems to learn optimal behaviors through interaction with uncertain, dynamic environments where explicit supervision is unavailable. This course introduces the mathematical foundations of RL while emphasizing robotics-specific challenges, including continuous state–action spaces, partial observability, contact-rich dynamics, safety constraints, sim-to-real transfer, and data efficiency. Core algorithms will be discussed alongside robot-centric case studies such as manipulation, locomotion, mobile navigation, and human–robot interaction. Applications will be drawn primarily from robotics, with additional examples from healthcare, autonomous systems, and human-AI collaboration.

2. Course Modules with quantitative lecture hours:

Introduction to Reinforcement Learning: RL problem formulation with robotic agents, Basic Definitions, Examples from robotic navigation, manipulation, and control, Strengths and limitations of RL for real-world robots (sample efficiency, safety, interpretability) **(2 hours)**

Finite Markov Decision Process (MDP): Markov processes and MDPs with robot state representations, Continuous vs. discrete state/action spaces in robotics, Rewards for robotic tasks (sparse vs. shaped rewards), Partially Observable MDPs (POMDPs) for sensing-limited robots, Value functions and optimality in motion planning and control, Approximation issues arising from high-dimensional robot states **(6 hours)**

Dynamic Programming for Robotics (Planning by DP): Policy and value iteration in robot motion planning, Relationship to shortest-path and optimal control problems. Generalized Policy Iteration for robotic decision-making, Limitations of DP for high-dimensional robotic systems, Convergence and contraction mappings with robotics examples **(6 hours)**

Model-Free Prediction in Robotic Systems: Monte Carlo and TD learning for robotic task evaluation, Eligibility traces for delayed rewards in manipulation tasks, Temporal credit

assignment in sequential robot actions, On-policy vs. off-policy prediction in physical systems (**4 hours**)

Model-free Control for Robotics: On-policy and off-policy control for robots, Exploration–exploitation trade-offs in real robots, Safety-aware exploration strategies (**4 hours**)

Value Function Approximation for High-Dimensional Robots: Function approximation for continuous robotic states, Deep Q-Learning for robotic decision-making, Experience replay and sample reuse in robotics, Challenges of instability and overestimation in control tasks (**4 hours**)

Policy Gradient Methods for Robot Control: Stochastic policies for continuous control, Actor–critic methods for robotic manipulation and locomotion, Comparison with classical optimal control methods, Variance reduction techniques in robot learning (**4 hours**)

Integrating Planning and Learning in Robotics: Model-based RL for robotic dynamics, Learning residual models over analytical physics, Simulation-based planning and rollouts, Combining RL with trajectory optimization and MPC (**4 hours**)

Deep Reinforcement Learning for Robotics: Continuous-control algorithms: PPO, DDPG, TD3, SAC, TRPO, GRPO, Stability and robustness issues in physical robots, Sim-to-real transfer, domain randomization (**4 hours**)

Reinforcement Learning with Human Feedback in Robotics (Coaching): Imitation learning from human demonstrations, Inverse RL for learning reward functions in robotics, Human preference learning for shared autonomy, Safety, alignment, and trust in human–robot interaction (**4 hours**)

3. Text books:

(Relevant and Latest, Only 2)

1. Richard S. Sutton and Andrew G. Barto; Reinforcement Learning: An Introduction; 2nd Edition, MIT Press, 2020.
2. Bertsekas, D. (2019). Reinforcement learning and optimal control (Vol. 1). Athena Scientific.

4. References:

1. Ghasemi, M., Moosavi, A. H., & Ebrahimi, D. (2024). A comprehensive survey of reinforcement learning: From algorithms to practical challenges. arXiv preprint arXiv:2411.18892.
2. Hausknecht, M., Stone, P., & Mc, O. P. (2016, July). On-policy vs. off-policy updates for deep reinforcement learning. In Deep reinforcement learning: frontiers and challenges, IJCAI 2016 Workshop. AAAI Press New York, NY, USA.
3. Grondman, I., Busoniu, L., Lopes, G. A., & Babuska, R. (2012). A survey of actor-critic reinforcement learning: Standard and natural policy gradients. IEEE Transactions on Systems, Man, and Cybernetics, part C (applications and reviews), 42(6), 1291-1307.

4. Moerland, T. M., Broekens, J., Plaat, A., & Jonker, C. M. (2023). Model-based reinforcement learning: A survey. *Foundations and Trends® in Machine Learning*, 16(1), 1-118.
5. Lillicrap, T. P., Hunt, J. J., Pritzel, A., Heess, N., Erez, T., Tassa, Y., ... & Wierstra, D. (2015). Continuous control with deep reinforcement learning. *arXiv preprint arXiv:1509.02971*.
6. Raina, D., Balakuntala, M. V., Kim, B. W., Wachs, J., & Voyles, R. (2024). Coaching a robotic sonographer: learning robotic ultrasound with sparse expert's feedback. *IEEE Transactions on Medical Robotics and Bionics*.

5. Similarity with the existing courses: None

(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%: NA

Other Faculty interested in teaching this course:- Dr. Deepak Raina and Dr. Amit Shukla

Proposed by: Dr. Deepak Raina

School: CAIR

Signature: 

Date: 06.11.2025

Approvals:

The following faculty members (at least 3) discussed the course on **07.11.2025** and approved the course on **10.11.2025**. Feedback was received via email (see attached comments), and the physical review sheet is currently pending signatures from the reviewers.

S. No.	Name	Signature
1	Dr. Aditya Nigam	
2	Dr. Narender Kumar Dhar	
3	Dr. Yanumula Venkata Karteek	


School Chair:

Signature:



School: CAIR

Date:



Recommended/Not Recommended, with Comments:

Chairperson, CPC

Date: _____

Approved / Not Approved

Chairperson, BoA

Date: _____



Deepak Raina <deepakraina@iitmandi.ac.in>

New course proposal for review

9 messages

Deepak Raina <deepakraina@iitmandi.ac.in>

Fri, Nov 7, 2025 at 11:20 AM

To: aditya@iitmandi.ac.in, karteek@iitmandi.ac.in, Narendra Kumar Dhar <narendra@iitmandi.ac.in>

Dear Dr. Aditya, Narendra and Karteek,

I am proposing a new course on Reinforcement Learning to be offered next semester. I would greatly appreciate it if you could review the proposal and share your feedback.

Thank you for your time.

<https://docs.google.com/document/d/1j2PYUdpKJmaRDq4l3JKPI5z3ZDVVPN2EegmP6QrSirc/edit?tab=t.0>

Best,
Deepak

--

Deepak Raina

Assistant Professor

Center for AI and Robotics (CAIR)

Indian Institute of Technology Mandi

Kamand, Mandi, HP-175075, India

Office: A11.05.16

<https://faculty.iitmandi.ac.in/~deepakraina/>

Narendra Kumar Dhar <narendra@iitmandi.ac.in>

Fri, Nov 7, 2025 at 3:40 PM

To: Deepak Raina <deepakraina@iitmandi.ac.in>

Cc: aditya@iitmandi.ac.in, karteek@iitmandi.ac.in

Dear Dr. Deepak,

Thank you for sharing the proposal.

The course structure covers several and requisite topics in different modules. I have two questions:

- Will this course be taught in a general way demonstrating different use cases or the course is oriented towards robotics?
- Are you planning to include some applications as case studies?

Thank you.

Kind regards,
Narendra

[Quoted text hidden]

--

Dr. Narendra Kumar Dhar

Assistant Professor,

School of Computing and Electrical Engineering,

Office: A17-2-11

IIT Mandi-175005, Himachal Pradesh, India

Deepak Raina <deepakraina@iitmandi.ac.in>

Fri, Nov 7, 2025 at 7:55 PM

To: Narendra Kumar Dhar <narendra@iitmandi.ac.in>

Cc: aditya@iitmandi.ac.in, karteek@iitmandi.ac.in

Hi Dr. Narendra,

Thank you for reviewing the proposal and for your thoughtful questions.

1. The course is intended to be taught in a general way. However, I plan to illustrate many of the concepts through examples and demonstrations from robotics, as I feel robotics will offer more intuitive and practical insights into RL

formulations. Also, robotics align more with my research area.

2. Yes, I plan to include a application-oriented case studies for each topic, such as Reinforcement Learning with Human Feedback using my own work [6] and similarly connecting other topics to relevant contemporary studies.

Let me know if you have any other suggestions. Thanks!

Best,
Deepak

[Quoted text hidden]

Narendra Kumar Dhar <narendra@iitmandi.ac.in>
To: Deepak Raina <deepakraina@iitmandi.ac.in>
Cc: Aditya Nigam <aditya@iitmandi.ac.in>, "Y. Venkata Karteek" <karteek@iitmandi.ac.in>

Fri, Nov 7, 2025 at 10:09 PM

Thank you Dr. Deepak for your answers.

Best wishes.

Kind regards,
Narendra

[Dr. Narendra Kumar Dhar](mailto:narendra@iitmandi.ac.in)
Assistant Professor,
School of Computing and Electrical Engineering,
Office: A17-2-11
IIT Mandi-175005, Himachal Pradesh, India

[Quoted text hidden]

Y. Venkata Karteek <karteek@iitmandi.ac.in>
To: Narendra Kumar Dhar <narendra@iitmandi.ac.in>
Cc: Deepak Raina <deepakraina@iitmandi.ac.in>, Aditya Nigam <aditya@iitmandi.ac.in>

Sat, Nov 8, 2025 at 11:28 AM

Hi Dr. Deepkap Raina,

Thanks for considering me as a reviewer and sharing the syllabus. It seems there are minor overlaps with syllabus from other courses from CAIR itself, although scattered across multiple courses, please relook at https://iitmandi.ac.in/files/iit%20mandi%20courses29_07_2024.pdf. There might be an updated version of the syllabi, I am not sure. The course content seems fine to me, no comments further after looking at your answers to the questions raised by Dr. Narendra.

Best wishes.

[Quoted text hidden]

--

[Dr. Yanumula, Venkata Karteek](mailto:karteek@iitmandi.ac.in),
Assistant Professor,
School of Computing and Electrical Engineering (SCEE),
Indian Institute of Technology (IIT) Mandi.

Deepak Raina <deepakraina@iitmandi.ac.in>
To: "Y. Venkata Karteek" <karteek@iitmandi.ac.in>
Cc: Narendra Kumar Dhar <narendra@iitmandi.ac.in>, Aditya Nigam <aditya@iitmandi.ac.in>

Sat, Nov 8, 2025 at 4:13 PM

Hi Dr. Karteek,

Thank you for reviewing the syllabus and sharing for your feedback.

Yes, the course structure at CAIR was changed last semester, and most of the earlier courses listed in that PDF are no longer being offered. This new structure has consolidated and reorganized several topics, so there won't be any overlap of proposed RL course.

Best regards,
Deepak

On Sat, Nov 8, 2025, 11:28 AM Y. Venkata Karteek <karteek@iitmandi.ac.in> wrote:

Hi Dr. Deepak Raina,

[Quoted text hidden]

[Quoted text hidden]

Deepak Raina <deepakraina@iitmandi.ac.in>
To: Aditya Nigam <aditya@iitmandi.ac.in>

Mon, Nov 10, 2025 at 10:13 AM

Hi Dr. Aditya,

Just a gentle reminder regarding my earlier note to review the course proposal. Thank you!

Best,
Deepak

[Quoted text hidden]

Aditya Nigam <aditya@iitmandi.ac.in>
To: Deepak Raina <deepakraina@iitmandi.ac.in>
Cc: kartEEK@iitmandi.ac.in, Narendra Kumar Dhar <narendra@iitmandi.ac.in>

Mon, Nov 10, 2025 at 10:39 AM

Dear Dr. Deepak,

The course structure appears to be very well-conceived and the content is extensive.

Suggestions

1. It would be valuable to include some additional algorithms such as **TD3**, **SAC**, and, if possible, **TRPO** and **GRPO**, along with modules on **Imitation Learning** and **GAIL**.
2. Including both a **project component** and a **research paper presentation** will further strengthen the learning outcomes by combining practical implementation and scholarly engagement.

Warm regards,

Aditya Nigam

School of Computing and Electrical Engineering (SCEE)

IIT Mandi

Deepak Raina <deepakraina@iitmandi.ac.in>
To: Aditya Nigam <aditya@iitmandi.ac.in>
Cc: kartEEK@iitmandi.ac.in, Narendra Kumar Dhar <narendra@iitmandi.ac.in>

Mon, Nov 10, 2025 at 4:14 PM

Dear Dr. Aditya,

Thank you for reviewing the proposal and for your encouraging feedback. I have made changes to it based on your suggestions.

1. I will incorporate the additional algorithms you mentioned like TD3, SAC, TRPO, and GRPO into the Deep RL module. I am also adding a dedicated section on Imitation Learning and GAIL within the RL with Human Feedback (RLHF) module to better motivate the relevance of RLHF.
2. I will include both a project component and a research paper presentation.

Best Regards,
Deepak

[Quoted text hidden]

IIT Mandi

Proposal for a New Course

Course number : AR 526
Course Name : Multimodal Learning
Credit : 3-0-0-3
Distribution : L-T-P-C
Prerequisite : Introductory course in machine-learning/AI
Intended for : UG, PG and PhD
Mutual Exclusion : None

1. Preamble:

Recent advances in artificial intelligence and robotics have underscored the importance of multimodal learning for enabling machines to understand, reason, and act using diverse sources of information such as text, vision, audio, and sensor data. In robotic systems, the ability to fuse and align multiple modalities is critical for perception, navigation, and interaction in complex real-world environments. This course offers a comprehensive introduction to multimodal learning, with a focus on its applications in natural language processing, computer vision, audio analysis, and robotics. Through hands-on assignments and project work, learners will acquire the skills to build multimodal AI systems capable of performing language-guided navigation, audio-visual perception, sensor fusion, and intelligent decision-making in robotic platforms.

2. Course Modules with quantitative lecture hours:

- **Foundations of Multimodal Learning:** Definition and motivation; Key modalities: text, image, audio, video, sensor data; Key Challenges: Alignment, fusion, heterogeneity, missing modalities; Classical vs deep multimodal learning. **(6 Hours)**
- **Unimodal Representations: Text:** Word2Vec, BERT, LLM embeddings; **Vision:** CNN, ResNet, ViT; **Audio:** MFCC, log-mel spectrograms, Wav2Vec; **Robotics:** Sensor (LiDAR, IMU) embeddings, proprioception; Feature normalization, dimensionality issues; Contrastive pre-training and feature alignment (CLIP, ALIGN). **(8 Hours)**
- **Multimodal Fusion Techniques:** Early, late, and hybrid fusion; Feature-level vs decision-level fusion; Multimodal alignment; Multimodal transformers: ViLT, LXMERT, and ALBEF; Case studies in multimodal classification & grounding **(5 Hours)**

- **Cross-Modal Generation and Translation:** Vision-to-text (image captioning, VQA, video summarization, BLIP/BLIP2, Flamingo, LLaVA); Text-to-vision (image synthesis with diffusion models (DALL·E) and GANs); Speech-to-text and text-to-speech translation; Robotics: Language-conditioned behaviour generation; Cross modality loss function analysis; Hands-on: Implementing image captioning using pre-trained BLIP model. **(6 Hours)**
- **Large Multimodal Models (LMMs):** LLaVA, GPT-4V, Gemini, Kosmos-2, and MM-ReAct architectures; Visual Instruction Tuning (VIT) and Multimodal Chain-of-Thought; Tool-augmented and grounded multimodal agents; Hands-on: Building a lightweight multimodal chatbot (Vision + Text) **(9 Hours)**
- **Evaluation, Explainability, and Applications:** Metrics: accuracy, retrieval recall, alignment, cross-modal entropy; Explainability in multimodal systems (Grad-CAM, attention visualization); Applications: Robotics, Healthcare, surveillance, AR/VR, and forensics; Ethical considerations: bias, misinformation, and data privacy. **(6 Hours)**

Laboratory/practical/tutorial Modules: NA

3. Text books:

(Latest, Only 2)

1. Sebe, N., Snoek, C., & Tuytelaars, T. (2024). *Multimodal Machine Learning: Techniques and Applications*. Cambridge University Press.
2. Wu, D. (2021). *Deep Learning for Multimodal Data Fusion*. Springer.
3. Ding, S., Ong, D. C., & Morency, L.-P. (2022). *Foundations of Multimodal Deep Learning*. Morgan & Claypool Publishers, Synthesis Lectures on Artificial Intelligence and Machine Learning.

4. References:

1. For detailed references, please refer to research papers published in top-tier conferences such as CVPR, ICRA, IROS, ECCV, ICCV, NeurIPS, ICLR.
2. During the lecture, I will provide additional research publications for further reference.

Approvals:

Faculty interested in teaching this course: –

1. **Dr. Praful Hambarde**



Proposed by: Dr. Praful Hambarde

School: Centre for AI & Robotics (CAIR)

Signature:

Date: 24/01/2026

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
1.	Dr. Subrahmanyam Murala	
2.	Dr. Santosh Kumar Vipparthi	
3.	Dr. Deepak Raina	

Narendra Dhar
29-01-2026



Praful Hambarde <praful@iitmandi.ac.in>

Request for Course Review: Multimodal Learning

5 messages

Praful Hambarde <praful@iitmandi.ac.in>
To: Subrahmanyam Murala <muralas@tcd.ie>

Wed, Nov 12, 2025 at 7:39 PM

Dear Dr. Subrahmanyam Murala Sir,

I am reaching out to kindly request your expert review of our newly designed course titled "*Multimodal Learning*." Given your extensive expertise in computer vision and deep learning, your insights and feedback would be invaluable in refining the course structure and ensuring its alignment with the latest research and industry trends.

The course is designed for UG, PG, and Ph.D. students, focusing on topics such as multimodal representation learning, fusion architectures, and cross-modal reasoning with applications in vision, language, and audio understanding. It aims to equip students with both theoretical foundations and hands-on experience relevant to modern multimodal AI systems.

I have attached the draft syllabus for your reference. Please feel free to suggest any additions, modifications, or improvements.

Thank you very much for your time and kind support. I look forward to your valuable feedback.

Best regards,
Praful

--

Thanks & Regards,
Dr. Praful Hambarde,
Assistant Professor,
Centre For AI and Robotics,
IIT Mandi-175005, Himachal Pradesh, India
Email: hambarde.praful@gmail.com

**Multimodal learning_updated.pdf**

158K

Subrahmanyam Murala <MURALAS@tcd.ie>
To: Praful Hambarde <praful@iitmandi.ac.in>

Mon, Nov 17, 2025 at 5:13 PM

Dear Praful,

As discussed over the call, please send me the updated proposal so that I can review it for final approval.

Best regards,

S Murala

--

Thanks & Regards

Subrahmanyam Murala

Associate Professor

CVPR Lab

School of Computer Science and Statistics

Trinity College Dublin

Dublin 2, Ireland

Email: subbumurala@gmail.com

My website: [Official](#) / [Personal](#)

From: Praful Hambarde <praful@iitmandi.ac.in>
Date: Wednesday, 12 November 2025 at 14:10
To: Subrahmanyam Murala <MURALAS@tcd.ie>
Subject: Request for Course Review: Multimodal Learning

[External Email] This email originated outside of Trinity College Dublin. **Do not click links or open attachments** unless you recognise the sender and know the content is safe.

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Praful Hambarde <praful@iitmandi.ac.in>
To: Subrahmanyam Murala <MURALAS@tcd.ie>

Mon, Nov 17, 2025 at 5:18 PM

Dear Sir,
I have incorporated all your corrections into the revised course content.
Please find the updated copy attached.

--

Thanks & Regards,
Dr. Praful Hambarde,
Assistant Professor,
Centre For AI and Robotics,
IIT Mandi-175005, Himachal Pradesh, India
Email: hambarde.praful@gmail.com

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 **Multimodal learning_updated2.pdf**
159K

Subrahmanyam Murala <MURALAS@tcd.ie>
To: Praful Hambarde <praful@iitmandi.ac.in>

Mon, Nov 17, 2025 at 6:21 PM

Hi Praful,

Thank you for the revisions. I have reviewed the updated course content and approve it.

Best Regards

[Quoted text hidden]

Praful Hambarde <praful@iitmandi.ac.in>
To: Subrahmanyam Murala <MURALAS@tcd.ie>

Mon, Nov 17, 2025 at 6:22 PM

Thank you for your feedback.

[Quoted text hidden]



Praful Hambarde <praful@iitmandi.ac.in>

Request for Course Review: Multimodal Learning

3 messages

Praful Hambarde <praful@iitmandi.ac.in>
To: Santosh Kumar Vipparthi <skvipparthi@iitrpr.ac.in>

Wed, Nov 12, 2025 at 7:39 PM

Dear Dr. Santosh Kumar Vipparthi Sir,

I am reaching out to kindly request your expert review of our newly designed course titled "*Multimodal Learning*." Given your extensive expertise in computer vision and deep learning, your insights and feedback would be invaluable in refining the course structure and ensuring its alignment with the latest research and industry trends.

The course is designed for UG, PG, and Ph.D. students, focusing on topics such as multimodal representation learning, fusion architectures, and cross-modal reasoning with applications in vision, language, and audio understanding. It aims to equip students with both theoretical foundations and hands-on experience relevant to modern multimodal AI systems.

I have attached the draft syllabus for your reference. Please feel free to suggest any additions, modifications, or improvements.

Thank you very much for your time and kind support. I look forward to your valuable feedback.

Best regards,
Praful

--

Thanks & Regards,
Dr. Praful Hambarde,
Assistant Professor,
Centre For AI and Robotics,
IIT Mandi-175005, Himachal Pradesh, India
Email: hambarde.praful@gmail.com



Multimodal learning_updated.pdf

158K

Santosh Kumar Vipparthi <skvipparthi@iitrpr.ac.in>
To: Praful Hambarde <praful@iitmandi.ac.in>

Mon, Nov 17, 2025 at 4:52 PM

Dear Dr. Praful,
The syllabus is nice.
One suggestion: As this is interesting course, suggesting you to make project based learning.

[Thanks & Kind Regards](#)

[Dr. Santosh Kumar Vipparthi | Ph.D. & MTech.](#)

[Head & Associate Professor, School of Artificial Intelligence and Data Engineering \(SAIDE\)|
Indian Institute of Technology Ropar \(IIT Ropar\) | IIT Guwahati |
Rupnagar, 140001, Punjab, India |
Tel: \(+91\) 1881-232218](#)

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Praful Hambarde <praful@iitmandi.ac.in>
To: Santosh Kumar Vipparthi <skvipparthi@iitrpr.ac.in>

Mon, Nov 17, 2025 at 5:18 PM

Thanks a lot for the feedback.

--

Thanks & Regards,

Dr. Praful Hambarde,

Assistant Professor,

Centre For AI and Robotics,

IIT Mandi-175005, Himachal Pradesh, India

Email: hambarde.praful@gmail.com

[Quoted text hidden]



Praful Hambarde <praful@iitmandi.ac.in>

Request for your feedback- Multimodal Learning

4 messages

Praful Hambarde <praful@iitmandi.ac.in>
To: Deepak Raina <deepakraina@iitmandi.ac.in>

Sat, Jan 24, 2026 at 1:19 PM

Dear All,

I request your valuable feedback on the new course proposal titled "**Multimodal Learning.**"
A copy of the course proposal is attached for your kind review and reference.

Thank you in advance for your time and feedback.

Best regards,
Praful

--

Thanks & Regards,
Dr. Praful Hambarde,
Assistant Professor,
Centre For AI and Robotics,
IIT Mandi-175005, Himachal Pradesh, India
Email: hambarde.praful@gmail.com

 **Multimodal learning.pdf**
228K

Deepak Raina <deepakraina@iitmandi.ac.in>
To: Praful Hambarde <praful@iitmandi.ac.in>

Sat, Jan 24, 2026 at 2:14 PM

Hi Dr. Praful,

There is a typo error in the LMMs section. It should be "Hands-on:"

Rest of the proposal looks good.

Best,
Deepak
[Quoted text hidden]

Praful Hambarde <praful@iitmandi.ac.in>
To: Deepak Raina <deepakraina@iitmandi.ac.in>

Sat, Jan 24, 2026 at 2:38 PM

Dear Dr. Deepak,

I have incorporated your corrections into the revised course proposal. Please find the updated proposal attached for your review.

Best regards,
Praful

--

Thanks & Regards,
Dr. Praful Hambarde,
Assistant Professor,
Centre For AI and Robotics,
IIT Mandi-175005, Himachal Pradesh, India
Email: hambarde.praful@gmail.com

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 **Multimodal learning.pdf**
228K

Deepak Raina <deepakraina@iitmandi.ac.in>
To: Praful Hambarde <praful@iitmandi.ac.in>

Sat, Jan 24, 2026 at 2:54 PM

Thanks

[Quoted text hidden]

IIT Mandi

Proposal for a New Course

Course number : IK520

Course Name : Foundations of Indian Knowledge Systems in Music

Credit : 4 credits

Distribution : 3-1-0-4

Intended for : B. Tech/MTech/MS/MSc/PhD

Prerequisite : None (Compulsory for MA in Music and Musopathy students)

Mutual Exclusion: There are no equivalent or overlapping courses across schools.

1. Preamble:

This course examines Indian music as a structured knowledge system within the framework of Indian Knowledge Systems (IKS). It introduces theoretical foundations, classical treatises and scholarly publications, temple traditions, sources and transmission of music, and interdisciplinary dimensions including musical instruments, acoustics, and cognition. The course is research-oriented and emphasizes analytical learning through assignments and guided projects.

2. Course Modules with quantitative lecture hours:

Module 1: Introduction to IKS and Concept of Indian Music (8 hours)

Weeks (1-2 weeks) Theory (6 hours), Tutorials (2 Hrs)

Overview of Indian Knowledge Systems, concepts of Nāda (sound), Śruti and Swara, Bhakti (devotional) tradition, folk traditions, philosophical and cultural foundations of Indian music, evolution of India's musical heritage. (this will be taught along with the practical illustrations)

Module 2: Structure of Indian Music (12 hours)

Weeks (3-5 weeks), Theory (9hours), Tutorials (3Hrs)

Swara system and tonal organization, Raga tradition with its structure and framework, Tala as cyclic rhythm and mathematical framework, integration of melody and rhythm through Swara-Sāhitya, foundational principles of Indian musical composition and performance.

Module 3: Classical Treatises and Publications (12 hours)

Weeks (6–8 weeks), Theory (9hours), Tutorials (3Hrs)

Introduction to ancient, medieval, and modern musical treatises, inscriptions and paintings as sources of musical history, evolution of musicological thought, research works and publications in Indian music, oral and textual knowledge traditions in the transmission of music.

Module 4: Temple Traditions as Knowledge Systems (12 hours)

(Weeks 9–11), Theory (3hours), Tutorials (3Hrs)

Music in ritual and worship, temples as cultural and artistic centres, case studies of Thanjavur, Thiruvavur, Gwalior, and Agra traditions, role of hereditary practitioners and Parampara traditions including Mānganyār tradition, Nāṭya Sangeeth, and Sikh Shabads, relationship between music, sacred spaces, and spiritual experience. The relationship between music, sacred spaces, and spiritual experience is studied alongside the role of royal patronage in sustaining musical traditions in both South and North India.

Module 5: Musical Transmission, Instruments, and Interdisciplinary Dimensions (12 hours)

(Weeks 12–14), Theory (3 hours), Tutorials (3Hrs)

A. Musical Transmission

Guru–Śiṣya parampara, notation systems, archival traditions, institutional dissemination of music.

B. Indian Musical Instruments

Classification of instruments into Tata, Avanaddha, Sushira, and Ghana, study of key instruments such as veena, mridangam, tabla, flute, and tanpura, role of instruments in classical and temple traditions.

C. Interdisciplinary Connections

Music and mathematics through rhythm and permutations, music and physics through acoustics and resonance, music and cognition through perception and memory, music and philosophy through aesthetics and rasa, music and society through cultural continuity, music and wellness beyond performance traditions.

Tutorial component

The tutorial component includes presentations, short assignments, group projects, discussions, and interactive activities designed to encourage critical engagement with the interdisciplinary dimensions of music and the Indian

Knowledge System. These activities aim to help students explore the cultural, philosophical, historical, scientific, and aesthetic aspects of Indian music through collaborative learning and reflective inquiry.

3. Text books:

1. Sambamurthy. P, South Indian Music, Vol: 1-13, Indian Music Publishing House, Madras, 1973
2. Chelladurai P. T, The Splunder of South Indian Music, Vaigarai Publishers, 2000..

4. References:

1. Seetha s. Tañjāvūr as a Seat of Music. University of Madras, 2001.
2. Gowri Kuppaswamy and Hariharan M. Music in Indian Royal Kingdoms. Delhi: B.R. Rhythms, 2015. Print.
3. Day, C. R. The Music and Musical Instruments of Southern India and the Deccan. Novello, Ewer & Co., 1891
4. Bhagyalekshmy, S. Lakshanagranthas in Music. Thiruvananthapuram: CBH Publications, 1991. ISBN: 8185381135
5. Brahmaśri Subbarāma Dīkṣita. Saṅgīta Sampradaya Pradarśini (English). Vol. 1, The Music Academy, Chennai, Jan 2011.
6. Music and Temple Ritual in South India: Performing for Śiva by Isabelle R. Tallotte. Routledge, 2024.
7. Śārṅgadeva. Saṅgīta Ratnākara. Edited and translated by R. K. Shringy and Prem Lata Sharma. New Delhi: Munshiram Manoharlal Publishers, various editions.
8. Venkaṭamakhin. Caturdaṇḍī Prakāśikā. Edited with English introduction and notes by S. Subrahmanya Sastri. Madras: The Adyar Library and Research Centre, 1934 (reprint editions available).
9. Mataṅga Muni. Bṛhaddeśī. Edited by Dr. Prem Lata Sharma. New Delhi: Indira Gandhi National Centre for the Arts (IGNCA), 1992.

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.	IK 513, IK 508, IK 609, IK519	Core concepts of Indian classical music theory, rāga, tala, basic compositions, and practical exercises	~20-25%
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6. Justification of new course proposal if cumulative similarity content is >30%:

- While the proposed course shares a limited overlap (approximately 20–25%) with existing Musopathy-focused graduate courses and IK519: Introduction to Indian Classical Music in areas such as basic music theory and other technical aspects, it is uniquely designed to integrate Indian classical music with the broader framework of Indian Knowledge Systems (IKS), offering foundational insights that are not comprehensively addressed in the current Musopathy curriculum.
- By integrating music and IKS through historical, cultural, philosophical, and interdisciplinary perspectives, the course provides holistic exposure to Indian music traditions and knowledge systems, thereby fulfilling a distinct and essential role within the curriculum.

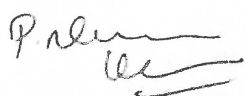
Approvals:

Faculty interested in teaching this course: –

Dr. P. Nirmal Harish.

Proposed by: Dr. P. Nirmal Harish

School: IKSHMA



Signature:

Date:

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

Sl. No	Faculty Name	Signature
1.	Dr. B. Lakshmi Surya Teja, Assistant professor, Fine and performing arts, Gitam University, Vishakhapatnam	Reviewed via e-mail
2.	Ms. Amrithalekshmi. V, Assistant professor, Fine and performing arts, Gitam University, Vishakhapatnam	Reviewed via e-mail

3.	Mr. R. Mohan, Performig artist & art connoisseur, Bengaluru	Reviewed via e-mail
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School Chair:

School: IKSHMA, Centre

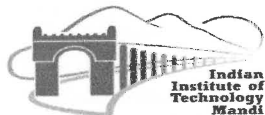
Date:



This proposal is reported in 64th the Board of Academics on May 15, 2026

Dean Academics

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



P. Nirmal Harish <nirmal@iitmandi.ac.in>

Request for Review of the Course: Foundations of Indian Knowledge Systems in Music

Lakshmi Surya Teja Bhavaraju <lbhavara@gitam.edu>
To: "Dr. P. Nirmal Harish" <nirmal@iitmandi.ac.in>

Wed, May 6, 2026 at 4:20 PM

Namasthe Sir,

Warm Greetings!

The course "**Foundations of Indian Knowledge Systems in Music**" offers a holistic understanding of Indian music by situating it within the broader framework of Indian Knowledge Systems. The well-structured modules coherently integrate theory, history, philosophy, and interdisciplinary perspectives, making it highly engaging for learners from diverse academic backgrounds. The inclusion of temple traditions, classical treatises, and the guru-śiṣya parampara provides depth and authenticity to the learning experience.

Overall, it is a thoughtfully designed, research-oriented course that successfully bridges tradition and contemporary academic inquiry. Going forward, this course lays a foundational base, like a prerequisite, for students to venture into the practical aspects of Music. It is also heartening to know that the history of Indian Knowledge Traditions, especially Music and Musicology, is being offered to IIT students, which truly helps them in their holistic development.

I wish all the best to the faculty and students of IIT Mandi for a successful journey in Indian Classical Music.

Regards,

Dr. Bhavaraju Lakshmi Surya Teja

Assistant Professor

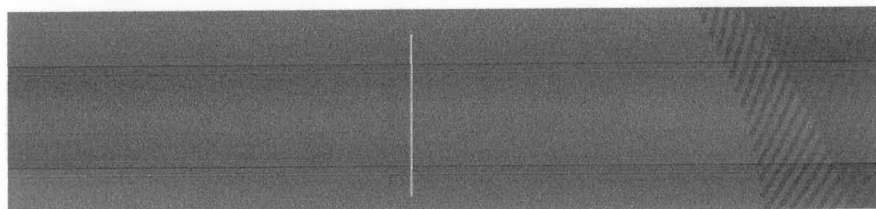
Fine and Performing Arts

GITAM School of Humanities and Social Sciences

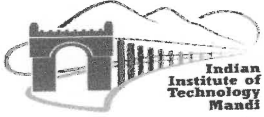
Visakhapatnam

M +91 9440658033

www.gitam.edu



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P. Nirmal Harish <nirmal@iitmandi.ac.in>

Request for Review of the Course: Foundations of Indian Knowledge Systems in Music

Mohan R <akriti53@gmail.com>
To: "Dr. P. Nirmal Harish" <nirmal@iitmandi.ac.in>

Wed, May 6, 2026 at 3:19 PM

Dear Sir,

I thank you for giving me an opportunity to review the course "Foundations of Indian Knowledge Systems in Music"

Music is one of the fabrics which connect the entire sub continent in an intuitive manner. The preamble of the course material makes it quite clear about the purpose of this course. Music reflects the knowledge base of Indian ethos and the course is designed to cover major aspects of the same. This course includes the transmission of generally accepted information about its origins, theories, practices, traditions, folk music, dance, drama, theatre, devotional music of saint poetry, musical instruments, revered publications; both modern and medieval.

This course is designed to cover music's interdisciplinary connections in paintings, sculpture, physics, mathematics, acoustics, resonance, cognition etc.

The course is designed to introduce the concepts of transmissions of music, such as Guru-Shishya parampara, notations, music archives etc.

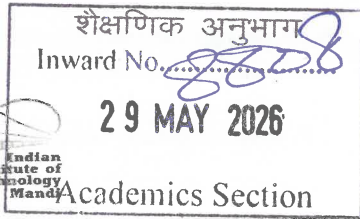
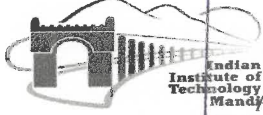
Overall a very good course structured for research oriented and analytical learning for comprehending Indian Music, as a part of the framework of Indian Knowledge Systems (IKS).

With warm regards,

R.Mohan

[Quoted text hidden]

5/14/26, 9:31 PM



Educational Mail - Re: Request to review

P. Nirmal Harish <nirmal@iitmandi.ac.in>

Re: Request to review

Amrithalekshmi.V <amrithalekshmi@gmail.com>
To: "Dr. P. Nirmal Harish" <nirmal@iitmandi.ac.in>

Wed, May 6, 2026 at 7:45 PM

Good Evening Sir!!!

The course "**Foundations of Indian Knowledge Systems in Music**" presents an insightful and comprehensive exploration of Indian music as a knowledge system rather than just a performing art. The emphasis on concepts such as nāda, rāga, tāla, and their connections to acoustics, cognition, and cultural practices makes the course intellectually stimulating. The interdisciplinary approach, along with practical components and documentation practices, enhances both analytical and experiential learning. It is an excellent initiative that will significantly contribute to students' understanding of Indian musical heritage and its relevance in modern academic contexts.

It would be even more beneficial if the course incorporates additional scholarly references and source materials alongside those already prescribed, as this would further broaden students' perspectives and strengthen the research dimension of the curriculum.

I extend my sincere appreciation and best wishes to the faculty and institution for designing such a meaningful and visionary course, and I hope it continues to inspire deeper engagement with India's rich intellectual and cultural traditions.

Thankyou

Amrithalekshmi V

On Wed, 6 May 2026 at 4:32 PM, Dr. P. Nirmal Harish <nirmal@iitmandi.ac.in> wrote:
Namasthe mam

I hope you are doing well. I kindly request you to review the proposed course titled "Foundations of Indian Knowledge Systems in Music." The course is designed to introduce the foundations of Indian classical music within the broader framework of Indian Knowledge Systems (IKS), integrating historical, cultural, philosophical, and interdisciplinary perspectives.

I would be grateful if you could kindly review the course structure and share your valuable suggestions and feedback.

Thank you for your time and consideration

Dr. P. Nirmal Harish,
Assistant Professor,
IKSHMA Centre,
Indian Institute of Technology Mandi,
Himachal Pradesh 175005

IIT Mandi
Proposal for a New Course

Course number : IK 521

Course Name : **Connecting Indian Music with Life**

Credit : 4 credits

Distribution :2-1-2-4

Intended for : M.A/ B. Tech/MTech/MS/MSc/PhD

Prerequisite : None (Compulsory for MA in Music and Musopathy students)

Mutual Exclusion: There are no equivalent or overlapping courses across schools.

1. Preamble:

This course explores the inherent connections between Indian music, nature, life and values, in an attempt to bridge Indian musical knowledge systems (passed on through Guru-Shishya Parampara) with contemporary understandings of emotion, cognition, wellbeing, creativity and holistic human lived experience. Through a balance of theory, tutorials and intensive experiential practice, students are expected to see Indian music not merely as a performance training, but as a transformative medium connecting sound, self, society and consciousness.

Course Modules:

Module 1: Indian Music, Nature, Human Values and Life
(Weeks 1–3) – Theory (6 hours), Tutorial (3 hours), Practical (6 hours)

- Music as a way of life in Indian tradition – Connection to Indian Philosophies
- *Guru–Shishya Paramparā* and holistic learning
- Music, nature and the five elements
- Human qualities and values in music learning: concentration, discipline, humility, acceptance, love, empathy, surrender
- Uniqueness of Indian music:
 - monophonic and vocal orientation
 - *meend* and continuity
 - cyclicity
 - improvisation
 - intuition
- Music as self-discovery and inner development

Module 2: Sound & Breath, Long-Note Practice and Tānpurā
(Weeks 4–6) – Theory (6 hours), Tutorial (3 hours), Practical (6 hours)

- Acoustics and psychoacoustics of Indian music
- Role of Sā and tonal reference
- Tānpurā as the “Mother of Indian Music”
- Difference between Indian natural shrutis and equally-tempered scale

- Long-note practice with Aumkār and five different vowels: concentration, breath control, improving resonance, mindfulness
- Importance of Dynamics modulation and its practice
- Neurocognitive and therapeutic implications of drone and sustained tones
- Music, respiration and attention regulation

Module 3: Sur Darshan and Tāl Darshan: Visualization, Embodiment and Creativity (Weeks 7–9) – Theory (6 hours), Tutorial (3 hours), Practical (6 hours)

- Concept of Sur vs Swar
- Visualization-oriented pedagogy
- Synesthetic and embodied learning approaches
- Sur Darshan: imagining melodic movement as painting on air with air
- Tāl Darshan: visualizing laya, chhanda and tāl as painting on time
- Kinaesthetic cognition in Indian rhythm
- Conscious vs habitual practice
- Role of improvisation in creativity development
- Cognitive science of musical visualization

Module 4: Kāvya, Rāga and Emotional Communication through their Bonding (Weeks 10-12) – Theory (6 hours), Tutorial (3 hours), Practical (6 hours)

- Kāvya Darshan and lyrical visualization
- Bhāva and emotional communication
- Relationship between lyrics, melody and rhythm
- Lexical and non-lexical features of rāga
- *Meend, andolan, nyās, sparsha* and rāga personality
- Improvisation and emotional nuance
- Music, memory and affective processing

Module 5: Indian Music, Wellbeing and Contemporary Applications (Weeks 13-14) – Theory (4 hours), Tutorial (2 hours), Practical (4 hours)

- Indian music and mindfulness
- Music, cognition and emotional wellbeing
- Music and mental health applications
- Music for social harmony and world peace
- Introduction to music-based therapeutic thinking
- Contemporary interdisciplinary applications: learning & memory – education, emotional regulation and various other therapy, neuroscience, wellbeing, community engagement

Tutorial/Practical Components:

Module 1: Guided reflective listening sessions, Group discussions on music-life experiences, Voice-body awareness exercises, Introduction to mindful listening with tānpurā drone, Observation journal/Reflective Diary: “Music and Everyday Emotional Experience”, Comparative listening analysis: Hindustani, Carnatic, Various Indian devotional and folk and selected world traditions; Group presentation on Music, nature and life. Take home assignments on exploring these connectivities.

Module 2: Daily long-note practice, Aumkār and vowel resonance exercises, Sound and Breath control with beats, Tānpurā playing and tuning demonstrations, Loudness modulation exercises, Voice projection and stability training, Recording and self-analysis of sustained-note practice. Take home assignments on sound, breath and mind connections.

Module 3: Melodic visualization exercises, Simple one-way pattern and reverse-pattern pālā practice, Beat visualization with hand gestures, multi-sensory rhythm exercises, Metronome-based tempo awareness, Group improvisation exercises, Rhythmic movement and mind-body coordination, Creation of visual melodic maps. Take home assignments on sur & tāl darshan.

Module 4: Lyric interpretation exercises (Reading lyrics without & with melody) with songs of different genres – classical, devotional, folk, singing with emotional modulation, Comparative rāga mood analysis, Bandish learning with expressive phrasing, Improvisation maintaining rāga bhāva, Group discussions on emotional perception in music, Emotion-analysis presentation, Analysis of general vs. reflective performance. Take home assignments on rāga bhava and kāvya bhava connectivity.

Module 5: Designing music-based wellbeing exercises (in the form of mini research/project), Community or classroom-based demonstrations, Guided relaxation using rāga and Tānpurā drone, Applied music intervention models, Final integrative practical presentation. Take home assignments like experiment designing, data collection and analysis and mini-project presentations.

2. Text books:

- Shrutinandan* by Ajoy Chakrabarty, Macmillan Publishers India Ltd., 2002.
- Finding the Raga: An Improvisation on Indian Music* by Amit Chaudhuri, Penguin Hamish Hamilton Publishers, 2021.

3. References:

- Saarikallio, S., Alluri, V., Maksimainen, J., & Toiviainen, P. (2021). Emotions of music listening in Finland and in India: Comparison of an individualistic and a collectivistic culture. *Psychology of Music*, 49(4), 989-1005.
- Valla, J. M., Alappatt, J. A., Mathur, A., & Singh, N. C. (2017). Music and emotion—a case for north indian classical music. *Frontiers in psychology*, 8, 2115.
- Natyasastra of Bharatmuni (Vol. 1,2,3,4) Sanskrit Text with Abhinavabharati commentary (Sanskrit Edition), Editor R. S. Nagar, Parimal Publications Delhi, 2012.
- Hindustani Sangeet Paddhati Kramik Pustak Malika (Part 1 to 6) by Pandit Vishnu Narayan Bhatkhande and Harishchandra Shrivastava, Sangeet Sadan Prakashan, 2022
- Music Revisited: The Shrutinandan Way* by Ajoy Chakrabarty, (with publishers)

4. 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.	IK 515 (Music & Cognition)	Basic elements of Indian music and impact of music on cognition and wellbeing	15

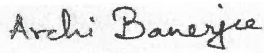
5. Justification of new course proposal if cumulative similarity content is >30%: NA

Approvals:

Faculty interested in teaching this course: Dr. Archi Banerjee

Proposed by: Dr. Archi Banerjee

School: IKSHMA

Signature: 

Date:

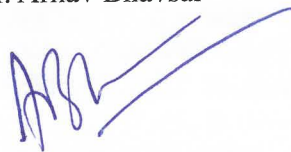
The following faculty (at least 3 faculty) discussed on.....and approved the proposal on.....

Sl. No	Faculty Name	Signature
1.	Prof. Arnav Bhavsar, Professor and Chairman, IKSMHA Centre, IIT Mandi, Himachal Pradesh (Internal Reviewer)	Feedback received via email (attached below)
2.	Dr. P. Nirmal Harish, Assistant Professor, IKSHMA centre, IIT Mandi, Himacal Pradesh (Internal Reviewer)	Feedback received via email (attached below)
3.	Prof. Priyadarshi Patnaik, Professor, Department of Humanities and Social Sciences, IIT Kharagpur, West Bengal (External Reviewer)	Feedback received via email (attached below)

School Chair: Prof. Arnav Bhavsar

School: IKSMHA

Date:

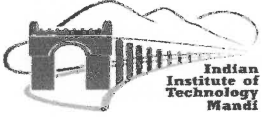


This proposal is reported in the 64th Board of Academics on 15th May 2026.

Dean Academics

Date:

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



Archi Banerjee <archi@iitmandi.ac.in>

Requesting your feedback and approval for the course "Connecting Indian Music with Life" (for MA in Music and Musopathy Program)

Arnav Bhavsar <chairiksmha@iitmandi.ac.in>

Fri, May 22, 2026 at 6:34 PM

To: Archi Banerjee <archi@iitmandi.ac.in>

Dear Archi

Thanks for sharing the course.

There are courses on music therapy, cognitive aspects of music, music and wellbeing at various places.

However, as compared to these, this course promises to be more holistic and unique in terms of connecting different components of music with aspects such as creativity, emotions, communications, wellbeing, neurocognitive aspects etc.

I am also happy to see the practical modules, where there seems to be an effort to try to make students understand such connections at an experiential level.

One suggestion in the practical parts, in addition to lab based exercises, would be to give some take home assignments where the students can creatively explore and experiment with some of these aspects with more time on their hands.

Thanks,

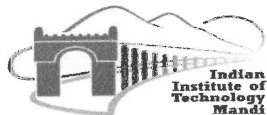
Arnav Bhavsar

Indian Knowledge System and Mental Health Applications (IKSMHA) Centre

Indian Institute of Technology Mandi

Mandi – 175075, Himachal Pradesh, India

[Quoted text hidden]



Archi Banerjee <archi@iitmandi.ac.in>

Requesting your feedback and approval for the course "Connecting Indian Music with Life" (for MA in Music and Musopathy Program)

Dr. P. Nirmal Harish <nirmal@iitmandi.ac.in>

Thu, May 14, 2026 at 9:48 PM

To: Archi Banerjee <archi@iitmandi.ac.in>

Dear Dr. Archi Banerjee Ma'am,

Greetings to you. I carefully went through the course proposal titled "*Connecting Indian Music with Life*" and found it to be a very thoughtful, meaningful, and well-structured course that beautifully connects Indian music with life, wellbeing, human values, creativity, and holistic learning. The interdisciplinary and experiential approach of the course makes it highly relevant and unique in the present academic context, especially with its integration of traditional Indian knowledge systems and contemporary perspectives. I believe this course will become one of the valuable offerings of the IKSMHA Centre and will significantly add academic and cultural value to the department as well as to IIT Mandi. Wishing you all the very best for the successful approval and implementation of the course.

Dr. P. Nirmal Harish,
Assistant Professor,
IKSHMA Centre,
Indian Institute of Technology Mandi,
Himachal Pradesh 175005

[Quoted text hidden]



Archi Banerjee <archi@iitmandi.ac.in>

Requesting your feedback and approval for the course "Connecting Indian Music with Life" (for MA in Music and Musopathy Program)

Priyadarshi Patnaik <priyadarshi1@yahoo.com>
To: Archi Banerjee <archi@iitmandi.ac.in>
Cc: Priyadarshi Patnaik <priyadarshi.p@gmail.com>

Mon, May 11, 2026 at 8:00 AM

Prof. Archi Banerjee
Assistant Professor
IIT Mandi

Morning Prof. Banerjee

Here are my observations about the course proposal:

I have gone through the proposal and have nothing to add to it. It is very well conceptualized and I am sure it will develop into a really value-added course.

To the best of my knowledge, in the context of music academia, a course that looks holistically at the entire spectrum of music - sur, taal, kavya - and that integrates life philosophy into music pedagogy, is virtually non-existent. Given that it is strongly influenced by Pt. Ajoy Chakraborty's pedagogy, I am sure it will add great value to the Masters' program being developed.

Given the association Dr. Banerjee has with Pt. Ajoy Chakraborty and his pedagogy, I am sure that what is included here will be competently executed by you and your team.

I wish the course all success.

Regards
Priyadarshi Patnaik

Priyadarshi Patnaik, PhD
Professor
Department of Humanities & Social Sciences
Indian Institute of Technology Kharagpur
West Bengal 721302
India

On Thursday, May 7, 2026 at 01:54:35 PM GMT+5:30, Archi Banerjee <archi@iitmandi.ac.in> wrote:

[Quoted text hidden]



IIT Mandi

Proposal for a New Course

Course number	: IK 522
Course Name	: Ancient Indian Chemistry and Metallurgy
Credit Distribution	: 3-0-0-3
Intended for	: BTech/MTech/MS/MSc/MA/Ph.D.
Prerequisite	: None
Mutual Exclusion	: None

1. Preamble:

This course explores the development of chemical knowledge and metallurgical practices in ancient India through a structured integration of philosophical concepts, empirical observations, and technological applications. It highlights how early Indian thinkers conceptualized matter, transformation, and energy, and how these ideas translated into practical domains. By combining theoretical frameworks with technological advancements such as metal extraction, alloying, and chemical formulations, this course provides a holistic view of chemistry and metallurgy as practiced in ancient India, while also drawing connections to contemporary scientific approaches.

2. Course Modules with quantitative lecture hours:

Unit 1: Concepts of Matter, Energy, and Transformation (10 hours)

Sāṅkhya–Pātañjala framework: Prakṛti as the fundamental constituent and its transformations. Conservation and transformation of energy, causation, and principles of collocation, storage, and dissipation of energy. Evolution of matter and infra-atomic concepts. Vedantic concept of Pañcīkaraṇa and structured formation of matter. Atomic theories in Buddhist and Jain traditions. Discussion of elements, compounds, and chemical analysis and synthesis, with connections to modern atomic theory, thermodynamics, and phase transformations.

Unit 2: Chemical Concepts in Medical and Material Traditions (7 hours)

Chemistry in ancient Indian medical schools. Physical characteristics of Bhūtas and Mahābhūtas. Mechanical mixtures and chemical combinations. Emergence of molecular properties in compounds. Chemistry of colors, pigments, and material transformations. Systems of measurement including weight and capacity. Concept of minimum visible size and observational limits. Connections to formulation chemistry, materials characterization, and pigment science.

Unit 3: Nyāya–Vaiśeṣika Theory and Chemical Interactions (7 hours)

Theory of atomic combinations and classification of compounds (mono- and hetero-bhautika). Concept of dynamic contact (Viśṭambha) and chemical bonding analogies. Role of heat in chemical transformations. Three-axis representation of compounds (Vācaspati model). Concept of molecular motion (Parispanda) and its relevance to kinetics. Interpretation in light

of modern chemical bonding, reaction mechanisms, and molecular motion.

Unit 4: Applied Chemistry in Classical Texts and Practices (5 hours)

Chemical knowledge in texts such as Bṛhatsamhitā. Preparation of Vajralepa and Vajrasamghāta as examples of coatings and composite materials. Gandhayukti as formulation science involving fragrances and mixtures. Discussion of combustion-related formulations in alchemical texts, including saltpetre (śora) based mixtures and compositions analogous to gunpowder. Broader discussion of traditional chemical processing techniques and their relevance to coatings, organic chemistry, and materials engineering.

Unit 5: Metallurgical Traditions and Technologies (7 hours)

Metallurgical knowledge from texts such as Arthaśāstra and Rasashastra literature. Extraction and processing of metals including gold, silver, copper, iron, tin, mercury, lead, and zinc. Alloying, high-temperature processes, and furnace technologies. Central role of mercury (Rasa) in Indian alchemical traditions, including its purification (Śodhana) and processing in Rasashastra. Zinc distillation techniques described in Rasārṇava and related texts. Concepts of acids and bases derived from plant, organic, and mineral sources. Transition from natural to mineral chemical systems.

Unit 6: Modern Scientific Interpretation and Relevance (6 hours)

Interpretation of ancient chemical and metallurgical knowledge using modern scientific tools, frameworks, and data analysis, with connections to materials science, reaction mechanisms, and analytical techniques such as spectroscopy and surface analysis. Relevance to heritage materials, sustainable technologies, and contemporary materials research.

Laboratory/practical/tutorial Modules: NA

Textbooks:

1. Ray, P. C. (1902–1909). *A history of Hindu chemistry: From the earliest times to the middle of the sixteenth century A.D.* (Vols. 1-2).
2. Chattopadhyaya, D. (1986–1991). *History of science and technology in ancient India* (Vols. 1-3).

References:

1. Ray, P. C. (1956). *History of Chemistry in Ancient and Medieval India.*
2. Biswas, A. K., & Biswas, S. (1995). *Minerals and Metals in Ancient India* (Vol. 2).
3. Agrawal, D. P. (2000). *Ancient metal technology and archaeology of South Asia.*
4. Skoog, D. A. *Principles of Instrumental Analysis.*
5. Brereton, R. G. *Chemometrics: Data Analysis for the Laboratory and Chemical Plant.*
6. *Rasaratna Samuccaya.*
7. *Rasārṇava.*
8. *Rasendra Chūdāmaṇi.*

**3. 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.	Ancient Indian Materials and Chemistry	IK518	Topic on ancient chemistry and metallurgy, metal extraction, and alloying practices	~15%

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

NA

Approvals:

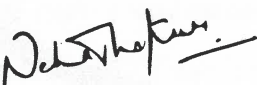
1. Prof. Gautam R. Desiraju, IISc Bangalore
2. Prof. Chayan K. Nandi, School of Chemical Sciences, IIT Mandi
3. Dr. Abhimanew Dhir, School of Chemical Sciences, IIT Mandi
4. Dr. Neha Shukla, School of Mechanical and Materials Engineering, IIT Mandi

All approvals are via email.

Other Faculty interested in teaching this course: –

Proposed by: Dr. Neha Thakur

School: Indian Knowledge System and Mental Health Applications Centre

Signature: 

Date: 2nd May 2026

Recommended/Not Recommended, with Comments:

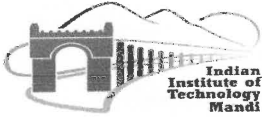
Date: _____

Chairperson, CPC

Approved / Not Approved

Date: _____

Chairperson, BoA



Neha Thakur <nehathakur@iitmandi.ac.in>

Re: Request for Review: MA-IKS Course on Ancient Indian Chemistry and Metallurgy

1 message

Chayan K. Nandi <chayan@iitmandi.ac.in>
To: Neha Thakur <nehathakur@iitmandi.ac.in>

Sun, May 3, 2026 at 10:30 PM

Dear Neha,
It looks nice. Please proceed.
best
Chayan

On Sun, May 3, 2026 at 9:20 PM Neha Thakur <nehathakur@iitmandi.ac.in> wrote:
Dear Prof. Chayan,

Thank you for your valuable comments and thoughtful inputs. I have incorporated the suggested revisions and highlighted the changes in yellow in the attached document.

1. I will confirm with Sir whether the course is intended for 3rd or 4th year B.Tech students and update this before the BoA meeting.
2. The lecture hours in Modules 1, 2, and 3 have been adjusted, with the corresponding hours reallocated to Module 6.
3. One spectroscopy and one data analysis book have been added to the revised list.

Please let me know if any further changes are required.

Thank you once again.

Warm regards,
Neha

On Sat, May 2, 2026 at 10:55 PM Chayan K. Nandi <chayan@iitmandi.ac.in> wrote:
Dear Neha,

The course has been framed nicely. Here are a few suggestions from my side:

1. Will it for all B. tech. Students? Please look into it. It may be for 3rd and 4th year B. Tech. students. However, Director Sir can provide more inputs in this.
2. Course module 1,2,3 contains 28 lectures. These may be reduced and atleast 5-6 lectures on module 6 for materials and their data analysis by the state of instrumentation. 2 lectures are not enough. This is an important component when metallurgy is involved.
3. 1-2 spectroscopy and data analysis books may be added in reference.

Best
Chayan

On Sat, May 2, 2026 at 3:33 PM Neha Thakur <nehathakur@iitmandi.ac.in> wrote:
Dear Prof. Chayan,

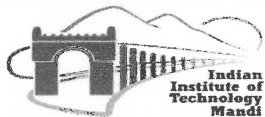
I hope you are doing well.

I am writing to kindly request your review of the proposed MA-IKS course on Ancient Indian Chemistry and Metallurgy. The course has been designed to align closely with the UGC-NET syllabus for Indian Knowledge Systems.

I request for your valuable feedback **on or before 6th May**, so that the same can be incorporated ahead of the upcoming BoA meeting on 7th May.

Thank you very much in advance for your time and consideration.

Warm regards,
Neha Thakur



Neha Thakur <nehathakur@iitmandi.ac.in>

Re: Request for Review: MA-IKS Course on Ancient Indian Chemistry and Metallurgy

1 message

Abhimanew Dhir <abhimanew@iitmandi.ac.in>

Wed, May 6, 2026 at 9:43 AM

To: Neha Thakur <nehathakur@iitmandi.ac.in>

Thanks Dr. Neha for your email. It looks perfect to me. Please go ahead with further proceedings.

Regards
Abhi

On Wed, 6 May, 2026, 09:17 Neha Thakur, <nehathakur@iitmandi.ac.in> wrote:

Dear Dr. Abhimanew,

Thank you very much for your feedback and for taking the time to review the course content. The revisions have been incorporated and are highlighted in yellow in the attached document.

1. The role and significance of mercury in Indian alchemical traditions has been explicitly included in **Unit 5 (Metallurgical Traditions and Technologies)**.

2. References to saltpetre-based mixtures and compositions analogous to gunpowder, presented in an appropriate historical and chemical context, have been incorporated in **Unit 4 (Applied Chemistry in Classical Texts and Practices)**.

Thank you once again for your insightful inputs, which have helped strengthen the course structure.

Kindly let me know if further modifications are required.

Warm regards,
Neha

On Tue, May 5, 2026 at 12:47 PM Abhimanew Dhir <abhimanew@iitmandi.ac.in> wrote:

Dear Dr. Neha,

Thank you so much for your email and sharing the course content with me. The course is well designed, and all the modules are bridged well. Just two suggestions

1) The importance of mercury is much greater in Indian alchemy. So the role of mercury and its importance should be highlighted and explicitly mentioned in the content outline in the relevant module. This should also be bridged by the work of Acharya P. C. Ray on mercury.

2) I think it would be fair to include Indian alchemical prescriptions on the origin of explosives, particularly gunpowder if possible.

Regards,
Abhimanew

On Sat, May 2, 2026 at 3:31 PM Neha Thakur <nehathakur@iitmandi.ac.in> wrote:

Dear Dr. Abhimanew,

I hope you are doing well.

I am writing to kindly request your review of the proposed MA-IKS course on Ancient Indian Chemistry and Metallurgy. The course has been designed to align closely with the UGC-NET syllabus for Indian Knowledge Systems.

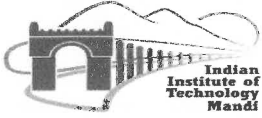
I request for your valuable feedback **on or before 6th May**, so that the same can be incorporated ahead of the upcoming BoA meeting on 7th May.

07/05/2026, 10:08

Educational Mail - Re: Request for Review: MA-IKS Course on Ancient Indian Chemistry and Metallurgy

Thank you very much in advance for your time and consideration.

Warm regards,
Neha Thakur



Neha Thakur <nehathakur@iitmandi.ac.in>

Re: Request for Review: MA-IKS Course on Ancient Indian Chemistry and Metallurgy

1 message

Neha Shukla <nehashukla@iitmandi.ac.in>
To: Neha Thakur <nehathakur@iitmandi.ac.in>

Mon, May 4, 2026 at 10:14 AM

Dear Dr. Neha,

It looks good to me. Please go ahead.

Thanks and Regards

Dr. Neha Shukla, Assistant Professor,
School of Mechanical and Materials Engineering
Indian Institute of Technology, Mandi.

Office: A11-04-23/IIT Mandi North Campus,
Mandi, Himachal Pradesh, 175075, India

On Mon, 4 May, 2026, 09:44 Neha Thakur, <nehathakur@iitmandi.ac.in> wrote:

Dear Dr. Neha,

I hope you are doing well.

I am writing to kindly request your review of the proposed MA-IKS course on Ancient Indian Chemistry and Metallurgy. The course has been designed to align closely with the UGC-NET syllabus for Indian Knowledge Systems. I am attaching the UGC-NET syllabus pdf as well for your reference below.

I request for your valuable feedback **on or before 6th May**, so that the same can be incorporated ahead of the upcoming BoA meeting on 7th May.

Thank you very much in advance for your time and consideration.

Warm regards,

IIT Mandi

Proposal for a New Course

Course number : IK 523

Course Name : Ancient Indian Mathematics

Credit : 3 credits

Distribution : 3-0-0-3

Intended for : B.Tech/MTech/MS/MSc/MA/PhD

Prerequisite : Basic mathematical aptitude and interest in Indian Knowledge Systems

Mutual Exclusion : None

Preamble:

This course is designed in strict accordance with Unit 6 (Mathematics) of the official UGC NET Indian Knowledge System (IKS) Code 103 syllabus. The course introduces the foundational mathematical traditions of ancient India including geometry in Śulbasūtras, decimal place value systems, numeral systems, arithmetic, algebra, trigonometry, cyclic quadrilaterals, Kuṭṭaka methods, continued fractions, and the Kerala School of mathematics.

The course systematically examines the contributions of major Indian mathematicians including Āryabhaṭa, Brahmagupta, Bhāskara, Mādhava, Nīlakaṇṭha, and the Kerala School traditions. Particular emphasis is placed on mathematical reasoning, computational techniques, geometrical constructions, infinite series, trigonometric developments, and the interdisciplinary significance of Indian mathematical traditions within Indian Knowledge Systems.

The course is research-oriented and emphasizes analytical learning through mathematical demonstrations, textual engagement, historical interpretation, and computational understanding of traditional Indian mathematical methods.

Course Modules with Quantitative Lecture Hours

Total Course Duration: 42 Hours

Total Modules: 7

Hours per Module: 6 Hours

Module 1: Geometry in Śulbasūtras and Foundations of Indian Mathematics (6 Hours)

Geometry in Śulbasūtras, altar geometry and ritual constructions, expressions for surds in Śulbasūtra texts, methods for obtaining perpendicular bisectors, cord-folding techniques, Bodhāyana method of square construction, Bodhāyana–Pythagorean theorem, and foundations of geometrical reasoning in ancient Indian mathematics.

Module 2: Decimal Place Value System and Indian Numeration Traditions (6 Hours)

Numbers in Vedic literature, enumeration of large numbers from koti to mahaugha, akṣauhiṇī and named numeral systems, decimal place value system, Āryabhaṭan numeration, Bhūtasankhyā system, Kaṭapayādi system, and the evolution of Indian numeral notation traditions.

Module 3: Arithmetic, Algebra and Trigonometry in Classical Indian Mathematics (6 Hours)

Methods for square roots and cube roots, Āryabhaṭa's sine-table, trigonometric modifications in Tantrasaṅgraha, Mādhava series for sine and cosine functions, methods from Karaṇapaddhati for obtaining sine values, Brahmagupta's treatment of positive, negative, and zero quantities, linear and quadratic equations, cyclic quadrilaterals, and the development of algebraic and trigonometric traditions in India.

Module 4: Līlāvātī Traditions and Mathematical Applications (6 Hours)

Līlāvātī traditions of mathematical pedagogy, arithmetical operations, inversion methods, rule of supposition, quadratic equations, mixtures, combinations, progressions, plane figures, applications of right triangles, Sūc problems, construction of quadrilaterals, cyclic quadrilaterals, value of π , area of circles, surface area and volume of spheres, and practical mathematical applications in classical India.

Module 5: Kuṭṭaka Methods, Continued Fractions and Computational Traditions (6 Hours)

Kuṭṭaka methods of Āryabhaṭa and Brahmagupta, computational procedures in Indian mathematics, Vallyupasamhāra and continued fractions, Vallyupasamhāra Method I and II from Karaṇapaddhati, nearest-integer continued fractions in Dṛkkaṇa traditions, and algorithmic traditions in classical Indian computation systems.

Module 6: Kerala School of Mathematics and Infinite Series Traditions (6 Hours)

Kerala School contributions to mathematics, Mādhava series for π , Antyasamskāra (end-correction), fast convergent series for π , Putumana-Somayājī series, Nīlakaṇṭha's

treatment of the irrationality of π , infinite geometric series traditions, and the global significance of Kerala mathematical innovations.

Module 7: Comparative, Computational and Interdisciplinary Perspectives on Indian Mathematics (6 Hours)

Comparative study of Indian and global mathematical traditions, mathematical logic and algorithmic thinking in Indian knowledge systems, computational methods in classical Indian mathematics, intersections between mathematics and astronomy, relevance of Indian mathematics to modern computational sciences and AI, and contemporary interdisciplinary applications and research perspectives.

Text books:

1. Datta, B. and Singh, A. N. History of Hindu Mathematics, Vol. I & II, Asia Publishing House.
2. Joseph, George Gheverghese. The Crest of the Peacock: Non-European Roots of Mathematics, Princeton University Press.
3. Sarasvati Amma, T. A. Geometry in Ancient and Medieval India, Motilal Banarsidass.
4. Śarma, K. V. Sarma. Indian Astronomy and Mathematics, Motilal Banarsidass.

References:

1. Āryabhaṭa. Āryabhaṭīya.
2. Brahmagupta. Brāhmasphuṭasiddhānta.
3. Bhāskarācārya. Līlāvātī.
4. Tantrasaṅgraha and Karaṇapaddhati traditions.
5. Studies on Kerala School mathematical traditions.

Similarity with the existing courses:

(Similarity content is declared as per the number of lecture hours on similar topics after detailed comparison with the existing MA Indian Knowledge System curriculum and course structures of IKSMHA Centre, IIT Mandi.)

S. No.	Course Code	Similarity Content	Approx. % of Content
1.	IK 563	Mathematical computations related to astronomy, trigonometric calculations, sine tables, calendrical and computational traditions	~15%
2.	IK 556	Numerical calculations, astronomical mathematics, traditional computational systems	~10%

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

While the proposed course shares limited thematic overlap with courses such as IK 563 (Indian Astronomy), IK 556 (Surya Siddhanta), and introductory Indian Knowledge Systems courses, the present course is academically distinct in its objectives, methodology, and mathematical focus.

The existing courses primarily focus upon:

- astronomical systems,
- calendrical traditions,
- philosophical foundations,
- or broad introductions to Indian Knowledge Systems.

In contrast, the proposed course is exclusively devoted to the mathematical traditions of ancient India in strict alignment with Unit 6 (Mathematics) of the official UGC NET Indian Knowledge System (Code 103) syllabus.

The course uniquely includes:

- Geometry of Śulbasūtras,
- Decimal place value systems,
- Bhūtasāṅkhyā and Kaṭapayādi numeration systems,
- Āryabhaṭa's trigonometric methods,
- Brahmagupta's algebraic techniques,
- Līlāvātī mathematical traditions,
- Kuṭṭaka algorithms and continued fractions,
- Kerala School infinite series traditions,
- Mathematical developments relating to π and trigonometric expansions.

These topics are not systematically or comprehensively taught in any existing course currently offered within the MA Indian Knowledge System curriculum at IKSMHA Centre, IIT Mandi. Therefore, despite limited overlap in computational and astronomical aspects, the proposed course fulfills a distinct academic, research-oriented, and UGC NET Code 103-aligned requirement within the curriculum.

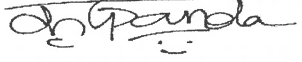
Approvals:

Faculty interested in teaching this course: – Dr. Anil Narayanan

Proposed by: Dr. Krishna Panda

School: IKSHMA

Signature:



Date:


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

Sl. No	Faculty Name	Signature
1.	Prof. Arnav Bhavsar Vinayak, Chairperson, IKSMHA Centre, IIT Mandi	Reviewed via e-mail
2.	Dr. Venkatesh H. Chembrolu, Dean Academics, IIT Mandi	Reviewed via e-mail
3.	Dr. Anil Narayanan N, Assistant Professor in Sanskrit (Sahitya) Government Sanskrit College, Trivandrum, Kerala.	Reviewed via e-mail

School Chair: Prof. Arnav Bhavsar Vinayak

School: IKSHMA, Centre

Date:

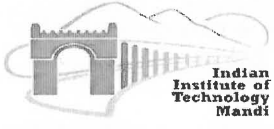


This proposal is reported inthe Board of Academics on

Dean Academics

Date:

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



Amandeep Singh <amandeep_singh@iitmandi.ac.in>

Fwd: Request for Review and Approval of Course Proposal: IK XXX – Ancient Indian Mathematics

1 message

Krishna Gajendra Panda <krishnapanda@iitmandi.ac.in>

Mon, May 25, 2026 at 11:13 AM

To: Amandeep Singh <amandeep_singh@iitmandi.ac.in>, acadoffice@iitmandi.ac.in

Namaskar.

With warm and respectful regards,

Dr. Krishna Gajendra Panda

स्वामिनारायणवेदान्तार्थः तद्विषये च विश्वविद्यालयलभ्यस्वर्णपदकः, वेदाचार्यः,
Qualified UGC-NET, SET, GATE 2025 - All India Rank 126
PhD in Swaminarayan Vedant - 2022, PhD in Ved (ongoing) - 2028
Lifetime Member of Indian Philosophical Congress

Assistant Professor, Centre for Indian Knowledge Systems and Mental Health Applications (IKSMHA),

Indian Institute of Technology, Mandi, VPO - Kamand, Mandi, Himachal Pradesh, India. Pincode -175075



✉ krishnapanda@iitmandi.ac.in

☎ +91-90990-69404

Forwarded Conversation

Subject: Request for Review and Approval of Course Proposal: IK XXX – Ancient Indian Mathematics

From: Krishna Gajendra Panda <krishnapanda@iitmandi.ac.in>

Date: Fri, May 22, 2026 at 4:26 PM

To: <anilnarayananom@gmail.com>

Respected Prof. Arnav Bhavsar Sir,
Respected Dr. Venkatesh Sir,
Respected Dr. Anil Narayanan Sir,

Namaskar.

I hope you are all doing well.

Please find attached herewith the course proposal for:

IK XXX: Ancient Indian Mathematics (3 Credits)

The proposal has been carefully prepared in strict alignment with Unit 6 (Mathematics) of the official UGC NET Indian Knowledge System (Code 103) syllabus. The course systematically incorporates major themes of ancient Indian mathematical traditions including Śulbasūtra geometry, decimal place value systems, Bhūtasāṅkhyā and Kaṭapayādi numeration systems, Āryabhaṭīya trigonometric traditions, Brahmagupta's algebraic methods, Kuṭṭaka algorithms, continued fractions, and Kerala School infinite series traditions.

As today is the final deadline for submission of the course proposals for the forthcoming BOA process, I humbly request you to kindly review the attached proposal and approve it at the earliest possible convenience. Your valuable suggestions, observations, and approval will greatly help in timely submission and further processing of the proposal.

I shall remain sincerely grateful for your kind support, guidance, and encouragement in this matter.

Namaskar.

With warm and respectful regards,

Dr. Krishna Gajendra Panda

स्वामिनारायणवेदान्ताचार्यः तद्विषये च विश्वविद्यालयलब्धस्वर्णपदकः, वेदाचार्यः,

Qualified UGC-NET, SET, GATE 2025 - All India Rank 126

PhD in Swaminarayan Vedant - 2022, PhD in Ved (ongoing) - 2028

Lifetime Member of Indian Philosophical Congress

Assistant Professor, Centre for **Indian Knowledge Systems and Mental Health Applications (IKSMHA)**,

Indian Institute of Technology, Mandi, VPO - Kamand, Mandi, Himachal Pradesh, India. Pincode -175075



✉ krishnapanda@iitmandi.ac.in

☎ +91-90990-69404

From: **Dr. Anil Narayanan N** <anilnarayananom@gmail.com>

Date: Fri, May 22, 2026 at 9:35 PM

To: Krishna Gajendra Panda <krishnapanda@iitmandi.ac.in>

Dear Sir,

Namaste.

This course outline effectively brings together major streams of Indian mathematical traditions, from Śulbasūtra geometry and classical number systems to Āryabhaṭa's trigonometry, Brahmagupta's algebra, Kuṭṭaka methods, and Kerala School contributions.

It would be highly suitable for offering to IKS enthusiasts, as it provides both depth and coherence across these foundational traditions.

Please proceed as deemed appropriate.

Thanking you,

...
Dr. Anil Narayanan N
Kerala.

IIT Mandi

Proposal for a New Course

Course number : IK 524

Course Name : Introduction to Indian Architecture

Credit : 3 credits

Distribution : 3-0-0-3

Intended for : B.Tech/MTech/MS/MSc/MA/PhD

Prerequisite : None

Mutual Exclusion : There are no equivalent or overlapping courses across schools.

Preamble:

This course is designed in strict accordance with Unit 5 (Architecture) of the official UGC NET Indian Knowledge System (IKS) Code 103 syllabus. The course introduces the architectural traditions of ancient and medieval India including urban planning traditions of the Indus Valley Civilization, Hindu temple architecture, Buddhist and Jaina architectural traditions, rock-cut cave architecture, Himalayan temple traditions, Sun temples, water harvesting systems, and the fundamentals of Vāstu Śāstra.

The course systematically examines the architectural, cultural, civilizational, and spiritual dimensions of Indian architecture through the study of major temples, monuments, sacred spaces, urban systems, and water management traditions across different regions of India. Particular emphasis is placed on Nāgara, Drāviḍa, and Vesarā temple styles, architectural symbolism, regional diversity, sacred geography, and traditional Indian ecological approaches to settlement and construction.

The course is research-oriented and emphasizes analytical learning through architectural interpretation, historical understanding, comparative stylistic analysis, and interdisciplinary engagement with Indian architectural knowledge systems.

Course Modules with quantitative lecture hours:

Module 1: Indus Valley Civilization and Foundations of Indian Architecture (Weeks 1–2)

Indus Valley Civilization, urban planning traditions, Dholavira, foundations of ancient Indian settlement planning, introduction to sacred architecture and civilizational planning traditions in India.

Module 2: Hindu Temple Architecture and Architectural Styles (Weeks 3–4)

Elementary concepts of Nāgara style temples, Drāviḍa style temples, and Vesarā style temples, structural and symbolic elements of Hindu temple architecture, regional variations in temple traditions, introduction to temple planning and sacred spatial organization.

Module 3: Buddhist, Jaina, Rock-cut and Himalayan Temple Traditions (Weeks 5–7)

Buddhist and Jaina temples including Udayagiri, Sanchi, Sarnath, and Nalanda; rock and cave temples including Elephanta, Jageshvari, Ajanta, and Ellora; Himalayan temples including Kedarnath, Tungamatha, Jageshvara, and Baleshvara; elementary knowledge of architectural style, historical period, and presiding deities associated with these traditions.

Module 4: Ancient and Medieval Temple Traditions of India (Weeks 8–10)

Mundeshwari Devi Temple, Daśāvatāra Viṣṇu Temple, Deogarh, Khajuraho Temples, Liṅgarāja Temple (Bhubaneswar), Ṭerākoṭā Temple (Viṣṇupura), temples of Bādāmī and Aihole (Cālukyāna temples), Kāñcī and Mahābalīpuram temples, Cōla temples, Sun temples of Kōṅārka, Mōḍhērā, Kaṭāramala (Almora), and Mārtaṇḍa (Anantanag), including elementary knowledge of architectural style, historical period, and presiding deities.

Module 5: Ancient Indian Water Storage and Harvesting Systems (Weeks 11–12)

Ancient and medieval Indian water storage and harvesting systems including Kallanai Dam, Aḍalāja Stepwell, Ṭāmkā techniques of Rajasthan, and Āhāra-Pāina systems of Bihar; ecological knowledge systems and sustainable architectural traditions in India.

Module 6: Fundamentals of Vāstu Śāstra and Contemporary Relevance (Weeks 13–14)

Fundamentals of Vāstu Śāstra, elementary concepts of spatial harmony and traditional Indian architectural principles, relation between architecture, sacred space, ecology, environment, ritual, and wellbeing, contemporary relevance of Indian architectural knowledge systems.

Text books:

1. Acharya, P. K. Architecture of Manasara, Oxford University Press.
2. Brown, Percy. Indian Architecture: Buddhist and Hindu Periods, D.B. Taraporevala Sons & Co.
3. Stella Kramrisch. The Hindu Temple, Motilal Banarsidass.
4. Dagens, Bruno. Mayamata: An Indian Treatise on Housing, Architecture and Iconography.
5. Michell, George. The Hindu Temple: An Introduction to Its Meaning and Forms.

References:

1. Vāstuśāstra texts and temple architectural manuals.
2. Studies on Dholavira and Indus Valley urban planning traditions.
3. Research studies on Ajanta, Ellora, Khajuraho, and Konark temples.
4. Literature on Indian water harvesting systems and sacred architecture traditions.

Similarity with the existing courses:

(Similarity content is declared as per the number of lecture hours on similar topics after detailed comparison with the existing MA Indian Knowledge System curriculum and course structures of IKSMHA Centre, IIT Mandi.)

S. No.	Course Code	Similarity Content	Approx. % of Content
1.	IK 573	Introductory references to Indian Knowledge Systems and heritage traditions	~10%
2.	Existing architecture and civil engineering foundation courses	General concepts of planning and structural understanding	~10%
3.	Existing heritage or culture-oriented elective courses	Introductory historical references to temples and monuments	~5%

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

The proposed course is uniquely designed as a specialized course focusing exclusively on ancient and medieval Indian architectural traditions in strict alignment with Unit 5 (Architecture) of the official UGC NET Indian Knowledge System (Code 103) syllabus.

Unlike existing introductory IKS or engineering-oriented courses, this course systematically emphasizes Hindu temple architecture, Buddhist and Jaina architectural traditions, rock-cut cave architecture, Himalayan temple systems, ancient Indian water harvesting systems, Vāstu Śāstra traditions, sacred spatial organization, and ecological dimensions of Indian architecture.

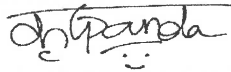
By integrating architectural history, sacred geography, ecological planning, temple traditions, and civilizational perspectives, the course fulfills a distinct and essential role within the MA Indian Knowledge System curriculum and provides direct academic support for UGC NET/JRF (Code 103) preparation.

Approvals:

Faculty interested in teaching this course: – Dr. Pravesh Vyas

Proposed by: Dr. Krishna Panda

School: IKSHMA

Signature: 

Date:

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

Sl. No	Faculty Name	Signature
1.	Prof. Arnav Bhavsar Vinayak, Chairperson, IKSMHA Centre, IIT Mandi	Reviewed via e-mail
2.	Dr. Venkatesh H. Chembrolu, Dean Academics, IIT Mandi	Reviewed via e-mail
3.	Dr. Pravesh Vyas, Assistant Professor, Department of VastuShastra, Shri Lal Bahadur Shastri National Sanskrit University, New Delhi-16	Reviewed via e-mail

School Chair: Prof. Arnav Bhavsar Vinayak

School: IKSHMA, Centre



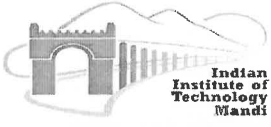
Date:

This proposal is reported inthe Board of Academics on

Dean Academics

Date:

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



Amandeep Singh <amandeep_singh@iitmandi.ac.in>

Fwd: Request for Review and Approval of Course Proposal: IK XXX – Introduction to Indian Architecture

1 message

Krishna Gajendra Panda <krishnapanda@iitmandi.ac.in>
To: Amandeep Singh <amandeep_singh@iitmandi.ac.in>, acadoffice@iitmandi.ac.in

Mon, May 25, 2026 at 11:16 AM

Namaskar.

With warm and respectful regards,

Dr. Krishna Gajendra Panda

स्वामिनारायणवेदान्ताचार्यः तद्विषये च विश्वविद्यालयलभ्यस्वर्णपदकः, वेदाचार्यः,
Qualified UGC-NET, SET, GATE 2025 - All India Rank 126
PhD in Swaminarayan Vedant - 2022, PhD in Ved (ongoing) - 2028
Lifetime Member of Indian Philosophical Congress

Assistant Professor, Centre for **Indian Knowledge Systems and Mental Health Applications (IKSMHA)**,

Indian Institute of Technology, Mandi, VPO - Kamand, Mandi, Himachal Pradesh, India. Pincode -175075



✉ krishnapanda@iitmandi.ac.in

☎ +91-90990-69404

Forwarded Conversation

Subject: Request for Review and Approval of Course Proposal: IK XXX – Introduction to Indian Architecture

From: **Krishna Gajendra Panda** <krishnapanda@iitmandi.ac.in>

Date: Thu, May 7, 2026 at 3:18 PM

To: Arnav Bhavsar Vinayak <arnav@iitmandi.ac.in>, Venkatesh H Chembrolu <venkatesh@iitmandi.ac.in>,
<pravesh@slbsrsv.ac.in>

Cc: IKSMHA IIT Mandi <iksmha-office@iitmandi.ac.in>

Respected Prof. Arnav Bhavsar Sir,
Respected Dr. Venkatesh Sir,
Respected Dr. Pravesh Vyas Sir,

Namaskar.

I hope you are all doing well.

Please find attached herewith the course proposal for:

IK XXX: Introduction to Indian Architecture (3 Credits)

The proposal has been carefully prepared in strict alignment with Unit 5 (Architecture) of the official UGC NET Indian Knowledge System (Code 103) syllabus. The course systematically incorporates major themes of ancient and medieval Indian architectural traditions including Indus Valley urban planning, Nāgara, Drāviḍa, and Vesarā temple architecture, Buddhist and Jaina architectural traditions, rock-cut cave architecture, Himalayan temple systems, ancient Indian water harvesting traditions, and the fundamentals of Vāstu Śāstra.

The following documents are attached for your kind perusal:

1. MS Word version of the course proposal
2. PDF version of the course proposal

As today is the final deadline for submission of the course proposals for the forthcoming BOA process, I humbly request you to kindly review the attached proposal and approve it at the earliest possible convenience. Your valuable suggestions, observations, and approval will greatly help in timely submission and further processing of the proposal.

I shall remain sincerely grateful for your kind support, guidance, and encouragement in this matter.

With respectful regards,

Namaskar.

With warm and respectful regards,

Dr. Krishna Gajendra Panda

स्वामिनारायणवेदान्ताचार्यः तद्विषये च विश्वविद्यालयलब्धस्वर्णपदकः, वेदाचार्यः,
Qualified UGC-NET, SET, GATE 2025 - All India Rank 126
PhD in Swaminarayan Vedant - 2022, PhD in Ved (ongoing) - 2028
Lifetime Member of Indian Philosophical Congress

Assistant Professor, Centre for **Indian Knowledge Systems and Mental Health Applications (IKSMHA)**,

Indian Institute of Technology, Mandi, VPO - Kamand, Mandi, Himachal Pradesh, India. Pincode -175075



✉ krishnapanda@iitmandi.ac.in

☎ +91-90990-69404

From: **Krishna Gajendra Panda** <krishnapanda@iitmandi.ac.in>

Date: Thu, May 7, 2026 at 4:44 PM

To: Neha Thakur <nehathakur@iitmandi.ac.in>

Namaskar.

With warm and respectful regards,

Dr. Krishna Gajendra Panda

स्वामिनारायणवेदान्ताचार्यः तद्विषये च विश्वविद्यालयलब्धस्वर्णपदकः, वेदाचार्यः,

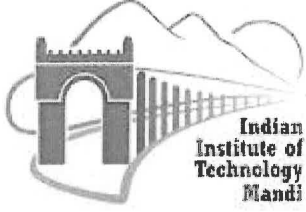
Qualified UGC-NET, SET, GATE 2025 - All India Rank 126

PhD in Swaminarayan Vedant - 2022, PhD in Ved (ongoing) - 2028

Lifetime Member of Indian Philosophical Congress

Assistant Professor, Centre for **Indian Knowledge Systems and Mental Health Applications (IKSMHA)**,

Indian Institute of Technology, Mandi, VPO - Kamand, Mandi, Himachal Pradesh, India. Pincode -175075



✉ krishnapanda@iitmandi.ac.in

☎ +91-90990-69404

From: **Pravesh Vyas** <pravesh@slbsrsv.ac.in>

Date: Thu, May 7, 2026 at 4:54 PM

To: Krishna Gajendra Panda <krishnapanda@iitmandi.ac.in>

Cc: Arnav Bhavsar Vinayak <arnav@iitmandi.ac.in>, Venkatesh H Chembrolu <venkatesh@iitmandi.ac.in>, IKSMHA IIT Mandi <iksmha-office@iitmandi.ac.in>

Namaste to all,

I've gone through the syllabus.

This is basically the 5th unit of the IKS NET exam syllabus. So, mostly the Religious(Temple and water resources) part is included in it.

But if we want to give an introduction to Indian Vastushastra to students, these topics can also be added -

Basic principles of Vastushastra (Five elements, Directions, Solar Energy, Gravitation and Magnetic force, Concept of Vastu Purusha, Vastu Pad Mandala, etc)

Tradition of Vastu Texts(starting from Vedas) and Archaryas(Vishvakarama, Maya, Bhojraja, Sutradhar manadan, etc)

Basic principles of Residential Vastu can also be included (Land selection, Shape, slope and nature of land, House layout, auspicious plans, etc)

Then the course can be more attractive and useful

2 attachments

 **Ancient Indian Architecture.docx**
20K

 **Ancient Indian Architecture.pdf**
137K

IIT Mandi

Proposal for a New Course

Course number : IK 525

Course Name : Advanced Vedanta Philosophy

Credit : 3 credits

Distribution : 3-0-0-3

Intended for : B.Tech/MTech/MS/MSc/MA/PhD

Prerequisite : IK 536: Introduction to Vedanta Philosophy or IKS 541: Upanisads and Vedanta Studies or an equivalent understanding of Indian Philosophy

Mutual Exclusion : None

Preamble:

This course is an advanced and comprehensive study of Vedānta Philosophy designed in close alignment with the Indian Philosophical Systems component of the official UGC NET Indian Knowledge System (IKS) Code 103 syllabus. The course particularly focuses on Uttaramīmāṃsā (Vedānta), Tarkaśāstra, Pramāṇa theory, Bhagavadgītā, Dharma traditions, Brahmasūtra interpretation traditions, comparative Vedānta schools, liberation theories, and Vedāntic hermeneutics.

Building upon the foundational course “Introduction to Vedanta Philosophy,” the present course systematically introduces the major Vedānta schools including Advaita, Viśiṣṭādvaita, Dvaita, Bhedābheda, Śuddhādvaita, Śiva-Viśiṣṭādvaita, Avibhāgādvaita, and Acintyābheda traditions. The course emphasizes Brahman, Jīva, Mokṣa, epistemology, causation, Bhakti, liberation theories, and the interpretation traditions of the Brahmasūtras and Upaniṣads.

The course is specially structured for advanced understanding of Vedānta philosophy, comparative analysis of Vedānta traditions, UGC NET/JRF (Code 103) preparation, conceptual clarity in Indian philosophical systems, and research-oriented engagement with Vedāntic literature and traditions.

Course Modules with Quantitative Lecture Hours

Total Course Duration: 42 Hours

Total Modules: 7

Hours per Module: 6 Hours

Module 1: Foundations of Vedānta and Indian Philosophical Systems (6 Hours)

Meaning, scope, and distinct characteristics of Vedānta, Vedānta as Uttaramīmāṃsā and word-rooted philosophy, Prasthānatrayī, concepts of Brahman, Ātman, Jīva, Jagat, and Mokṣa, Caturdaśa Vidyāsthānas, āstika and nāstika darśanas, overview of Nyāya, Sāṅkhya, Yoga, Pūrvamīmāṃsā, and Vedānta systems, Dharma–Artha–Kāma–Mokṣa framework, and introduction to Vedāntic literature.

Module 2: Tarkaśāstra, Pramāṇa Theory and Vedāntic Hermeneutics (6 Hours)

Pramāṇa theory including Pratyakṣa, Anumāna, Upamāna, Śabda, Arthāpatti, and Anupalabdhi, concepts of Pramātā, Pramāṇa, Prameya, Pramā, Svataḥprāmāṇya, and Parataḥprāmāṇya, powers of words including Abhidhā, Lakṣaṇā, Vyañjanā, and Tātparya, Mahāvākyas, Catuḥsūtrī, Pañcādhikaraṇa system, Pūrvapakṣa–Uttarapakṣa methodology, role of Tarka in Vedānta, and Mīmāṃsā–Śāstrabheda traditions.

Module 3: Śaṅkarācārya's Kevalādvaitavāda (6 Hours)

Advaita literature, Adhyāsa theory, Saviśeṣa and Nirguṇa Brahman, Vedic knowledge of Brahman, Jīva–Brahman relationship, Jīvanmukti, nature of liberation, Śaṅkara's interpretation of Brahmasūtra and Catuḥsūtrī, interpretation of Bheda Śrutis, refutation of opponent schools, and Śaṅkara's philosophical understanding of the world.

Module 4: Viśiṣṭādvaita, Svābhāvika-Bhedābheda and Dvaita Traditions (6 Hours)

Bhāskara's Bhinnābhinnarūpa-Brahmavāda, Jñāna-karma-samuccayavāda, Jīva–Brahman relation, Brahman and world, liberation, meaning of the Vedas, Rāmānuja's Viśiṣṭādvaita literature, interpretation of Catuḥsūtrī, Bhakti and Śaraṇāgati, Pramāṇa theory, Pāñcarātra doctrines, critique of Advaita and Jīvanmukti, Nimbārka's Svābhāvika-bhedābheda doctrine, Madhvācārya's Dvaita philosophy, interpretation of Śrutis and Vedāntic principles, and theories of liberation across these traditions.

Module 5: Śaiva, Śuddhādvaita, Acintyabhedābheda and AksharPurushottam Darshan Traditions (6 Hours)

Śrīkaṇṭha's Śiva-Viśiṣṭādvaita, Śiva principle, Jīva principle, Vidyā and liberation, interpretation of Catuḥsūtrī, Śrīpati's Viśeṣādvaita and Vīra-Śaivism, Vedabāhya systems, Jīva–Brahman relation, Vallabhācārya's Śuddhādvaita, Bhaktirasa, Puruṣottamavāda, Mokṣa and epistemology, Vijñānabhikṣu's Avibhāgādvaita, critique of Śaṅkara, Baladeva Vidyābhūṣaṇa's Acintyabhedābheda, Caitanya tradition, AksharPurushottam Darshan ;and liberation doctrines in later Vedāntic systems.

Module 6: Comparative Review of Vedānta Schools and Scriptural Traditions (6 Hours)

Comparative review of Vedānta schools, doctrine of Brahman, Brahman as the highest goal of life, refutation of anti-Vedic systems, Purāṇic Vedānta traditions, Śaiva schools, Tantra and Vedānta traditions, status of the Vedas in Tantric literature, Bhagavadgītā as a Vedāntic text, and Daivī-Āsurī Sampat of Bhagavadgītā Chapter 16.

Module 7: Vedānta and Contemporary Intellectual Discourses (6 Hours)

Vedānta and consciousness studies, Vedānta and psychology, Vedānta and wellbeing, Vedānta and contemporary philosophy, Vedānta and cognitive sciences, interdisciplinary relevance of Vedānta, Vedānta in dialogue with global intellectual traditions, and contemporary applications of Vedāntic thought in modern academic and philosophical discourse.

Text books:

1. Radhakrishnan, S. Indian Philosophy, Vol. I & II, Oxford University Press.
2. Sharma, Chandradhar. A Critical Survey of Indian Philosophy, Motilal Banarsidass.

References:

1. Rāmānujācārya. Śrībhāṣya.
2. Madhvācārya. Anuvyākhyāna.
3. Vallabhācārya. Anubhāṣya.
4. Nimbārka. Vedānta Pārijāta Saurabha.
5. Baladeva Vidyābhūṣaṇa. Govinda Bhāṣya.
6. Deutsch, Eliot. Advaita Vedanta.
7. Clooney, Francis X. Vedanta Theology.
8. Dasgupta, Surendranath. A History of Indian Philosophy, Vol. I, Cambridge University Press.
9. Swami Gambhirananda. Brahma Sutra Bhashya of Adi Shankaracharya, Advaita Ashrama.
10. Bhagavadgītā with classical commentaries.
11. Bhadreshdas Swami. Swaminarayan Bhashyam, Swaminarayan Aksharpith.

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.	IK 536	Introductory Vedānta concepts and Indian philosophical systems	~25%
2.	IK 541	Upaniṣadic and Vedāntic discussions	~20%
3.	IK 530, IK 540, IK 551	Bhagavadgītā and liberation-oriented discussions	~10%
4.	IK 562	Pramāṇa and epistemological traditions	~10%

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

While the proposed course shares thematic overlap with existing courses such as IK 536 (Introduction to Vedanta Philosophy), IK 541 (Upanishads and Vedanta Studies), Bhagavad-Gītā sequence courses, and IK 562 (Research Methodology – Tantra Yukti and Pramāṇa Śāstra), the present course is academically distinct in structure, orientation, and objectives.

Unlike the currently existing courses, the proposed course is uniquely designed as an advanced and specialization-oriented comparative Vedānta course aligned with the Indian Philosophical Systems component of the UGC NET Indian Knowledge System (Code 103) syllabus. The course systematically integrates Brahmasūtra interpretation traditions, comparative Vedānta schools, liberation theories, Vedāntic epistemology, hermeneutics, Bhakti traditions, and advanced metaphysical debates within a single structured framework.

By integrating classical Vedānta traditions with comparative philosophical analysis and NET-oriented conceptual preparation, the course fulfills a distinct and essential role within the MA Indian Knowledge System curriculum.

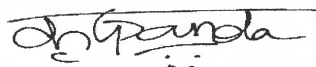
Approvals:

Faculty interested in teaching this course: – Dr. Krishna Gajendra Panda

Proposed by: Dr. Krishna Gajendra Panda

School: IKSHMA

Signature:



Date:

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

Sl. No	Faculty Name	Signature
1.	Prof. Arnav Bhavsar Vinayak, Chairperson, IKSMHA Centre, IIT Mandi	Reviewed via e-mail
2.	Dr. Venkatesh H. Chembrolu, Dean Academics, IIT Mandi	Reviewed via e-mail
3.	Dr. Sagar Acharya, Principal, BAPS Swaminarayan Sanskrit Mahavidyalay, Sarangpur	Reviewed via e-mail

School Chair: Prof. Arnav Bhavsar Vinayak

School: IKSHMA, Centre

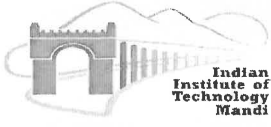
Date:

This proposal is reported inthe Board of Academics on

Dean Academics

Date:

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



Amandeep Singh <amandeep_singh@iitmandi.ac.in>

Fwd: Request for Review and Approval of Course Proposal: Advanced Vedanta Philosophy

1 message

Krishna Gajendra Panda <krishnapanda@iitmandi.ac.in>
To: Amandeep Singh <amandeep_singh@iitmandi.ac.in>, acadoffice@iitmandi.ac.in

Mon, May 25, 2026 at 11:14 AM

Namaskar.

With warm and respectful regards,

Dr. Krishna Gajendra Panda

स्वामिनारायणवेदान्ताचार्यः तद्विषये च विश्वविद्यालयलभ्यस्वर्णपदकः, वेदाचार्यः,
Qualified UGC-NET, SET, GATE 2025 - All India Rank 126
PhD in Swaminarayan Vedant - 2022, PhD in Ved (ongoing) - 2028
Lifetime Member of Indian Philosophical Congress

Assistant Professor, Centre for **Indian Knowledge Systems and Mental Health Applications (IKSMHA)**,

Indian Institute of Technology, Mandi, VPO - Kamand, Mandi, Himachal Pradesh, India. Pincode -175075



✉ krishnapanda@iitmandi.ac.in

☎ +91-90990-69404

Forwarded Conversation

Subject: Request for Review and Approval of Course Proposal: Advanced Vedanta Philosophy

From: **Krishna Gajendra Panda** <krishnapanda@iitmandi.ac.in>

Date: Fri, May 22, 2026 at 7:38 PM

To: Arnav Bhavsar Vinayak <arnav@iitmandi.ac.in>, Venkatesh H Chembrolu <venkatesh@iitmandi.ac.in>, Sagar Acharya <acharyasagar241@gmail.com>

Respected Prof. Arnav Bhavsar Sir,
Respected Dr. Venkatesh Sir,
Respected Dr. Sagar Acharya,

Namaskar.

I hope you all are doing well.

Please find attached herewith the course proposal for:

Advanced Vedanta Philosophy (3 Credits)

The proposal has been carefully prepared in alignment with the UGC NET Indian Knowledge System (Code 103) syllabus, with particular emphasis on Vedānta philosophy, comparative Vedānta traditions, Pramāṇa theory, Brahmasūtra interpretation traditions, liberation theories, and related Indian philosophical systems.

The following documents are attached for your kind perusal:

1. MS Word version of the course proposal

As today is the final deadline for submission of the course proposals for the forthcoming BOA process, I humbly request you to kindly review the attached proposal and approve it at the earliest possible convenience. Your valuable suggestions, observations, and approval will greatly help in timely submission and further processing of the proposal.

I shall remain sincerely grateful for your kind support and guidance in this matter.

Namaskar.

With warm and respectful regards,

Dr. Krishna Gajendra Panda

स्वामिनारायणवेदान्ताचार्यः तद्विषये च विश्वविद्यालयलब्धस्वर्णपदकः, वेदाचार्यः,
Qualified UGC-NET, SET, GATE 2025 - All India Rank 126
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Lifetime Member of Indian Philosophical Congress

Assistant Professor, Centre for **Indian Knowledge Systems and Mental Health Applications (IKSMHA)**,

Indian Institute of Technology, Mandi, VPO - Kamand, Mandi, Himachal Pradesh, India. Pincode -175075



✉ krishnapanda@iitmandi.ac.in

☎ +91-90990-69404

From: **Arnav Bhavsar Vinayak** <arnav@iitmandi.ac.in>

Date: Sat, May 23, 2026 at 2:28 PM

To: Krishna Gajendra Panda <krishnapanda@iitmandi.ac.in>

Cc: Venkatesh H Chembrolu <venkatesh@iitmandi.ac.in>, Sagar Acharya <acharyasagar241@gmail.com>

Dear Krishna

I do not have the sufficient background to review the course for this topic.

Course proposals can be reviewed by someone who is more suitable, instead of me.

Thanks

Arnav Bhavsar

School of Computing and Electrical Engg

IIT Mandi

Mandi, India

From: **Sagar Acharya** <acharyasagar241@gmail.com>

Date: Sun, May 24, 2026 at 5:46 PM

To: Krishna Gajendra Panda <krishnapanda@iitmandi.ac.in>

Dear Dr. Panda,

Namaskar.

Thank you for submitting the comprehensive course proposal for "Advanced Vedanta Philosophy."

I have reviewed the documents and find the alignment with the UGC NET Indian Knowledge System syllabus to be excellent and well-structured. The proposal stands approved from my end for the forthcoming BOA process.

Wishing you the very best for the timely submission and processing.

Best regards,

Dr. Sagar Acharya



Advanced Vedanta Philosophy.docx

22K

IIT Mandi
Proposal for a New Course

Course number : IK 526
Course Name : Kalā & NāṭyaŚāstra
Credit : 3 credits
Distribution :2.5-0-1-3
Intended for : M.A/ B. Tech/MTech/MS/MSc/PhD
Prerequisite : None

Mutual Exclusion: There are no equivalent or overlapping courses across schools.

1. Preamble:

This course introduces students to the foundational theories, practices, and cultural contexts of Indian arts, including classical music, dance, theatre, visual arts, and puppetry. It explores aesthetic principles such as rasa, the influence of sacred texts, and the socio-cultural frameworks shaping traditional and contemporary art forms along with few practical components. The course also examines regional practices, intangible cultural heritage, and systems such as tāla, laya, and kaṭapayādi.

Course Modules:

Module 1: Foundations of Indian Aesthetics (9 hours)

(Weeks 1–3), Theory (7.5 hours), Practical (3 hours)

- Overview of Indian Music, classical dance traditions of India, Theatre art forms, Indian painting traditions.
- Introduction to the term folk, tribal and modern art forms of India.
- Concept of Navarasa and aesthetic experience
- An account of the traditional art forms and cultural festivals of India as represented in UNESCO Intangible Cultural Heritage (ICH)

Module 2: Indian Classical Music Systems (9 hours)

(Weeks 4–6), Theory (7.5 hours), Practical (3 hours)

- Hindustani & Carnatic music: structure and classification
- Major forms in Carnatic music & Hindustani traditions
- Concepts of Tāla and Laya and chhanda
- Concept of a complete Sangeet (A marriage between Sur, Tāla and Kāvya)
- Kaṭapayādi system in Melakarta rāga classification

- Evolution from Caturdaṇḍi to modern Carnatic concert paddhati
- Practical demonstration and analysis of a few Hindustani and Carnatic musical forms

Module 3: Classical Dance / Theatre Traditions (9 hours)

(Weeks 7-9), Theory (7.5 hours), Practical (3 hours)

- Overview of the eight classical dance forms:
Bharatanatyam, Mohiniyattam, Kathakali, Kuchipudi, Kathak, Odissi, Manipuri, Sattriya
- Introduction to Bharata Muni's Nāṭyaśāstra & Overview of Abhinaya Darpaṇa
- Introduction to regional theatre practise- Yakshagana, Chhau, Jatra, Theyyam, Koodiyattam, Bhaona, etc.
- Socio-cultural context – Folk, tribal, traditional & ritualistic performances
- Practical demonstration and analysis of a few Indian traditional dance forms and how abhinaya (theatre) is inherently related to it or Body acting based theatre workshop

Module 4: Texts and Visual Traditions (9 hours)

(Weeks 10-12), Theory (7.5 hours), Practical (3 hours)

- Influence of Gīta Govinda, Rāmāyaṇa, Mahābhārata in Indian Dance and Paintings
- Indian painting traditions: Madhubani, Pattachitra, Pahari, Kalamkari
- Interrelation between literature and visual culture
- Practical demonstration and analysis of a few Indian traditional visual art forms or Workshop on various visual cultures of India

Module 5: Puppetry and Narrative Traditions (6 hours)

(Weeks 13-14), Theory (5 hours), Practical (2 hours)

- Types of Indian puppetry:
Kathputli, Tholu Bommalata, Ravana Chhaya, Tolpavakoothu
- Influence of Panchatantra and oral storytelling traditions & Kath KālkṢepam
- Practical demonstration and analysis of a few Indian puppetry forms or Workshop on storytelling and various ancient texts of India

2. Text books:

- a. Sambamurthy. P, South Indian Music, Vol: 1-13, Indian Music Publishing House, Madras, 1973
- b. Ananda K. Coomaraswamy. *The Dance of Śiva: Essays on Indian Art and Culture*. New Delhi: Munshiram Manoharlal.

3. References:

- a. Seetha s. Tañjāvūr as a Seat of Music. University of Madras, 2001.
- b. Traditional Indian Theatre. New Delhi: National Book Trust, 1974.
- c. Ajanta. Oxford University Press, 1930–1955.
- d. The Hindu Temple. Calcutta: University of Calcutta, 1946.
- e. The Nāṭyaśāstra: A Treatise on Ancient Indian Dramaturgy and Histrionics. Edited by Manomohan Ghosh. Calcutta: Manisha Granthalaya.
- f. Dasarupaka. Translated by George C. O. Haas. New York: Columbia University Press, 1912.
- g. Erin B. Mee (ed.). *Theatres of India: A Concise Companion*. New Delhi: Oxford University Press.
- h. P. Sambamoorthy. *The Splendour of South Indian Music*. Madras: The Indian Music Publishing House.
- i. Richard Widdess. *The Rāgas of Early Indian Music: Modes, Melodies and Musical Notations from the Gupta Period to c.1250*. Oxford University Press.

4. 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.	IK 519 (Introduction to Indian Classical Music)	Major forms and Basic elements of Indian classical music	> 10%
2.	IK 521 (Connecting Indian Music with Life)	Basic elements of Indian (Hindustani) classical music	> 10%

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

Approvals:

Faculty interested in teaching this course: –

Dr. P. Nirmal Harish & Dr. Archi Banerjee

Proposed by: Dr. P. Nirmal Harish

School: IKSHMA

Signature:

Dr. Archi Banerjee

School: IKSHMA

Signature:

Archi Banerjee

Date:

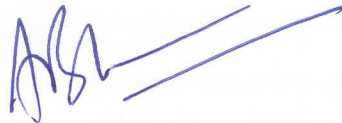
The following faculty (at least 3 faculty) discussed on.....and approved the proposal on.....

Sl. No	Faculty Name	Signature
1.	Ms. Amrithalekshmi V, Assistant Professor, Department of Fine and Performing Arts, Gitam University, Vishakhapatnam (External Reviewer)	Reviewed via e-mail
2.	Dr. Pinaki Gayen, Assistant Professor, Department of Textile Design, Kala Bhavana, Visva Bharati University (External Reviewer)	Reviewed via e-mail
3.	Dr. Lakshmi Suriya Teja, Assistant Professor, Department of Fine and Performing Arts, Gitam University, Vishakhapatnam (External Reviewer)	Reviewed via e-mail

School Chair: Prof. Arnav Bhavsar

School: IKSMHA

Date:

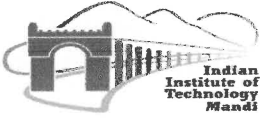


This proposal is reported in 64th the Board of Academics on May 15, 2026

Dean Academics

Date:

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



P. Nirmal Harish <nirmal@iitmandi.ac.in>

Requesting your feedback and approval for the course "Kalā & NāṭyaŚāstra" (for MA in IKS Program)

PINAKI GAYEN <pinakigcac23@gmail.com>
To: Archi Banerjee <archi@iitmandi.ac.in>
Cc: "P. Nirmal Harish" <nirmal@iitmandi.ac.in>

Mon, May 11, 2026 at 6:23 PM

Dear Dr. Archi Banerjee.

I am glad to see that such a wonderful and relevant course structure has been planned by your centre IK SMAH. I wish you and your centre all the best for implementing such initiatives. Sharing my detailed feedback on the course structure. Please go through the following text:

The course structure of *Kalā & Nāṭyaśāstra* is comprehensive, interdisciplinary, and thoughtfully designed to introduce students to the rich heritage of Indian performing and visual arts. It successfully balances theoretical foundations with practical exposure, enabling students to appreciate both the historical depth and living traditions of Indian culture. The inclusion of classical music, dance, theatre, painting, puppetry, and storytelling provides a holistic understanding of Indian artistic practices.

A major strength of the course is its integration of aesthetic concepts such as *Navarasa*, *abhinaya*, *tāla*, and *laya* with socio-cultural and ritual contexts. The focus on UNESCO Intangible Cultural Heritage traditions and regional performance practices broadens students' perspectives beyond mainstream classical forms. Additionally, the practical workshops and demonstrations are valuable in making learning experiential and engaging.

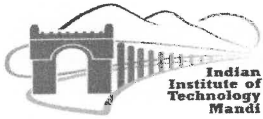
The progression of modules—from aesthetics and music systems to theatre, visual traditions, and puppetry—is logically organized and academically enriching. The inclusion of sacred texts like the *Rāmāyaṇa*, *Mahābhārata*, and *Gīta Govinda* further highlights the deep connection between literature and artistic expression in India.

Overall, the course is culturally relevant, intellectually stimulating, and highly suitable for students interested in Indian arts, heritage, and performance studies.

Best wishes.

With regards,
Dr. Pinaki Gayen
Assistant Professor
Department of Textile Design
Kala Bhavana, Visva Bharati University
West Bengal, India, Pin - 731235

[Quoted text hidden]



P. Nirmal Harish <nirmal@iitmandi.ac.in>

Review for the course- Kalā & NāṭyaŚāstra

AMRITHALEKSHMI V <avenugop@gitam.edu>
To: "Dr. P. Nirmal Harish" <nirmal@iitmandi.ac.in>

Thu, May 14, 2026 at 8:23 PM

Greetings!

The proposed course “**Kalā & NāṭyaŚāstra**” is a well-conceived, academically enriching interdisciplinary offering that aligns closely with the objectives of holistic education, cultural literacy, and Indian Knowledge Systems. It presents a comprehensive introduction to the diverse traditions of Indian performing and visual arts, integrating theory, history, aesthetics, and practice in a balanced manner.

The syllabus is thoughtfully structured into five progressive modules covering Indian aesthetics, classical music systems, dance and theatre traditions, visual cultures, and puppetry/narrative traditions. The inclusion of both Hindustani and Carnatic traditions, along with regional and folk practices, reflects commendable breadth and inclusivity. The emphasis on foundational concepts such as Navarasa, Tāla, Laya, Kaṭapayādi, Nāṭyaśāstra, and Abhinaya ensures strong conceptual grounding.

A notable strength of the course is the integration of practical demonstrations, workshops, and experiential learning components, which will significantly enhance student engagement and appreciation of embodied art traditions. Such components are particularly valuable for students from non-arts backgrounds.

The course would be further enriched by incorporating additional scholarly references and source materials alongside the existing prescribed texts, thereby broadening students' perspectives and enhancing the research orientation of the curriculum.

I extend my sincere appreciation and best wishes to the faculty and institution for conceptualizing such a meaningful and forward-looking course, and I hope it continues to inspire deeper engagement with India's rich intellectual and cultural heritage.

Thankyou

Amrithalekshmi V

AMRITHALEKSHMI V

Assistant Professor

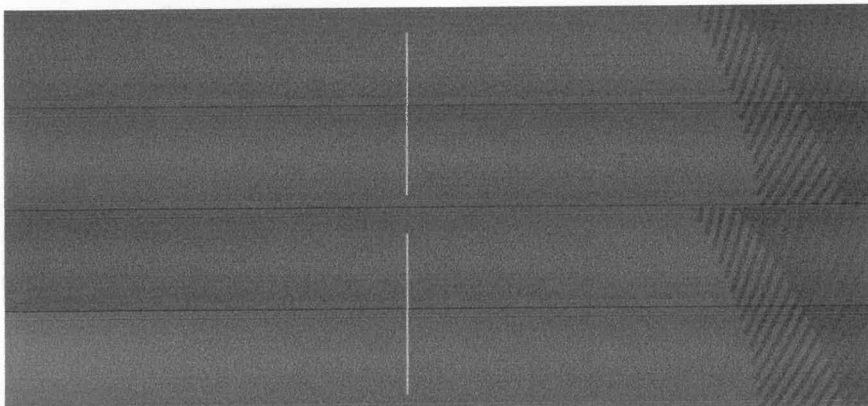
Fine and Performing Arts

GITAM School of Humanities and Social Sciences

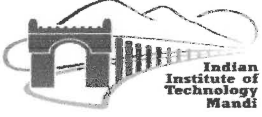
Visakhapatnam

M +91 9446168133

www.gitam.edu



[Quoted text hidden]



P. Nirmal Harish <nirmal@iitmandi.ac.in>

Request for Review and Approval – Course Proposal for “Kalā & NātyaŚāstra”

Lakshmi Surya Teja Bhavaraju <lbhavara@gitam.edu>
To: "Dr. P. Nirmal Harish" <nirmal@iitmandi.ac.in>

Thu, May 14, 2026 at 10:25 PM

Namasthe

This is a well-structured course that moves logically from aesthetic foundations to specific traditions in music, dance, theatre, visual arts, and puppetry, effectively balancing theory with practical and cultural context like UNESCO. It covers both classical and folk/tribal forms without hierarchy and integrates all the key concepts from different genres.

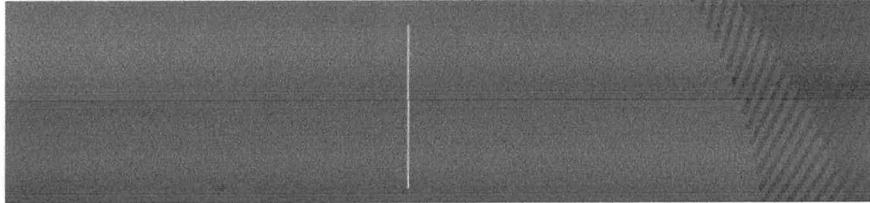
It's a rich, teachable syllabus that connects art forms to their socio-cultural roots. This course lays a groundwork for students to delve deeper into Indian Knowledge Systems.

Best wishes for a successful start, meaningful impact and an enriching experience ahead with this new course.

Thanking you

Dr. Bhavaraju Lakshmi Surya Teja
Assistant Professor
Fine and Performing Arts
GITAM School of Humanities and Social Sciences
Visakhapatnam

M +91 9440658033
www.gitam.edu



[Quoted text hidden]

IIT Mandi

Proposal for a New Course

Course Number: IK 527

Course Name: Sanskrit Language – Level I

Credit: 3-0-0-3

Distribution: L-T-P-C

Intended for: UG (B.Tech) students

Prerequisite: None

Mutual Exclusion: None

Preamble

This course introduces students to the **Sanskrit language**, the foundation of India's intellectual and cultural heritage. Sanskrit, though ancient, remains relevant as the language of logic, science, philosophy, and literature in the Indian tradition.

The course aims to help learners acquire **basic grammatical structures, pronunciation, reading, writing, and speaking skills** in Sanskrit while also developing an appreciation for its linguistic precision and beauty.

Students will engage with simple conversational expressions, fundamental grammar, and short literary and cultural passages. The approach is **communicative and activity-based**, focusing on using Sanskrit as a living language.

After taking this course, students will be able to:

- Read and write in **Devanāgarī script** with correct pronunciation.
- Understand and use basic everyday Sanskrit expressions and greetings.
- Construct and comprehend simple Sanskrit sentences.

- Identify grammatical elements like nouns, verbs, pronouns, cases, and tenses.
- Recite and explain selected verses and moral stories in Sanskrit.
- Appreciate Sanskrit's contribution to India's intellectual and cultural life.

Course Modules with Quantitative Lecture Hours

Classes will be supported by multimedia and conversation-based exercises.

Unit / Lesson	Title and Learning Focus	Lecture Hours
Lesson 1	Introduction to Sanskrit language, Indian Knowledge Systems, and Devanāgarī script.	1.5 hrs
Lesson 2	Vowels (svarāḥ), consonants (vyañjanāni), pronunciation practice, and articulation points (sthāna-prayatna).	1.5 hrs
Lesson 3	Sanskrit greetings (namaste, katham asi?), self-introduction, and basic conversational expressions.	1.5 hrs
Lesson 4	Introduction to nouns (nāma), gender (masculine, feminine, neuter), and vocabulary-building exercises.	1.5 hrs
Lesson 5	Number system (singular, dual, plural) and introduction to pronouns (ahaṃ, tvam, saḥ, sā, tat).	1.5 hrs
Lesson 6	Introduction to verbs (asti, gacchati, paṭhati) and formation of simple Sanskrit sentences.	1.5 hrs
Lesson 7	Introduction to vibhakti (case endings) and grammatical usage in simple sentences.	1.5 hrs
Lesson 8	Common expressions and conversations related to greetings, family, and classroom interaction.	1.5 hrs

Unit / Lesson	Title and Learning Focus	Lecture Hours
Lesson 9	Conversational Sanskrit related to daily routine and practical communication.	1.5 hrs
Lesson 10	Present tense verb conjugations and sentence transformation exercises.	1.5 hrs
Lesson 11	Introduction to past tense and future tense forms.	1.5 hrs
Lesson 12	Verb conjugation practice (paṭhati, likhati, khādati) through role-play activities.	1.5 hrs
Lesson 13	Introduction to simple Sanskrit stories and storytelling traditions.	1.5 hrs
Lesson 14	Ekalavya and Hitopadeśa stories — reading and comprehension exercises.	1.5 hrs
Lesson 15	Story narration, moral interpretation, and vocabulary extraction activities.	1.5 hrs
Lesson 16	Numbers, counting systems, and time expressions in Sanskrit.	1.5 hrs
Lesson 17	Colors, days, fruits, animals, household objects, and vocabulary-building activities.	1.5 hrs
Lesson 18	Sentence formation exercises using vocabulary from daily life contexts.	1.5 hrs
Lesson 19	Introduction to adjectives, participles, and noun-adjective agreement.	1.5 hrs
Lesson 20	Basic prepositions and indeclinables (adhaḥ, upari, saha, vinā) with conversational applications.	1.5 hrs

Unit / Lesson	Title and Learning Focus	Lecture Hours
Lesson 21	Reading comprehension through short Sanskrit passages and moral stories.	1.5 hrs
Lesson 22	Introduction to subhāṣitas (wise sayings), recitation, and interpretation.	1.5 hrs
Lesson 23	Listening comprehension and pronunciation refinement exercises.	1.5 hrs
Lesson 24	Spoken Sanskrit interaction, pair conversation, and group discussion activities.	1.5 hrs
Lesson 25	Writing practice: composing simple Sanskrit sentences and short paragraphs.	1.5 hrs
Lesson 26	Translation exercises (Sanskrit ↔ English) and guided composition activities.	1.5 hrs
Lesson 27	Cultural exposure through Sanskrit recitation, chanting, music, dramatization, and role-play activities.	1.5 hrs
Lesson 28	Sanskrit for Innovation, AI, Computational Linguistics, Yoga, and Future Knowledge Systems — interactive concluding session connecting Sanskrit with contemporary science, technology, creativity, leadership, and holistic living.	1.5 hrs

Total: 42 Hours

Laboratory / Practical / Tutorial Modules

- Reading and pronunciation workshops.
- Sanskrit conversation practice through pair and group activities.
- Chanting of simple shlokas and dialogues.
- Audio-visual support using Sanskrit e-learning resources.

- Role-play activities and Sanskrit games (*Sanskritam Khelāḥ*).

Textbooks

1. **Sanskrita Bharati**, *Samṣkrta Bodha – A Beginner's Course in Sanskrit*, Sanskrita Bharati, Bengaluru.
2. **K. V. Abhyankar**, *First Lessons in Sanskrit Grammar and Reading*, Motilal Banarsidass, Delhi.
3. **Swami Prabhavananda**, *Learn Sanskrit the Easy Way*, Ramakrishna Mission Institute of Culture, Kolkata.

References

- **A.M. Ruppel**, *The Cambridge Introduction to Sanskrit*, Cambridge University Press, 2017.
- **A. A. Macdonell**, *A Sanskrit Grammar for Students*, Oxford University Press, 2004.
- **Sanskrit Documents Repository**: <https://sanskritdocuments.org>
- **Sanskrita Bharati Online Resources**: <https://sanskritabharati.in/>

Similarity with Existing Courses - None

Justification for New Course Proposal

Currently, IIT Mandi offers courses in several foreign languages such as Japanese, French, German, and Chinese. However, **Sanskrit, India's classical language and the foundation of its knowledge systems**, is not yet offered as a language elective.

In keeping with the **National Education Policy (NEP) 2020**, which emphasizes the promotion of Indian languages and the integration of Indian Knowledge Systems, this course aims to:

- Provide B.Tech students with a structured opportunity to learn Sanskrit as an **Indian language elective**.
- Promote cultural literacy, linguistic awareness, and national identity.
- Encourage linguistic diversity and cross-cultural understanding by treating Sanskrit with the same academic status as other world languages.

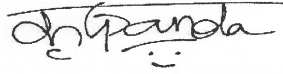
Approvals:

Faculty interested in teaching this course: – Dr. Krishna Panda

Proposed by: Dr. Krishna Panda

School: IKSHMA

Signature:



Date:

The following faculty (at least 3 faculty) discussed on 13th May and approved the proposal on 14th May.

Sl. No	Faculty Name	Signature
1.	Prof. Arnav Bhavsar Vinayak, Chairperson, IKSMHA Centre, IIT Mandi	Reviewed via e-mail
2.	Dr. Venkatesh H. Chembrolu, Dean Academics, IIT Mandi	Reviewed via e-mail
3.	Dr. Sagar Acharya, Principal, BAPS Swaminarayan Sanskrit Mahavidyalay, Sarangpur	Reviewed via e-mail

School Chair: Prof. Arnav Bhavsar Vinayak

School: IKSHMA, Centre



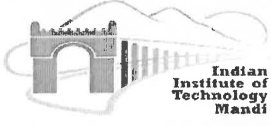
Date:

This proposal is reported in 64th Board of Academics on 15th May 2026.

Dean Academics

Date:

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



Amandeep Singh <amandeep_singh@iitmandi.ac.in>

Fwd: Submission of Course Proposal: Sanskrit Language – Level I (B.Tech Elective)

1 message

Krishna Gajendra Panda <krishnapanda@iitmandi.ac.in>

Mon, May 25, 2026 at 11:14 AM

To: Amandeep Singh <amandeep_singh@iitmandi.ac.in>, acadoffice@iitmandi.ac.in

Namaskar.

With warm and respectful regards,

Dr. Krishna Gajendra Panda

स्वामिनारायणवेदान्ताचार्यः तद्विषये च विश्वविद्यालयलभ्यस्वर्णपदकः, वेदाचार्यः,

Qualified UGC-NET, SET, GATE 2025 - All India Rank 126

PhD in Swaminarayan Vedant - 2022, PhD in Ved (ongoing) - 2028

Lifetime Member of Indian Philosophical Congress

Assistant Professor, Centre for **Indian Knowledge Systems and Mental Health Applications (IKSMHA)**,

Indian Institute of Technology, Mandi, VPO - Kamand, Mandi, Himachal Pradesh, India. Pincode -175075



✉ krishnapanda@iitmandi.ac.in

☎ +91-90990-69404

Forwarded Conversation

Subject: Submission of Course Proposal: Sanskrit Language – Level I (B.Tech Elective)

From: **Krishna Gajendra Panda** <krishnapanda@iitmandi.ac.in>

Date: Fri, May 22, 2026 at 7:29 PM

To: Arnav Bhavsar Vinayak <arnav@iitmandi.ac.in>, Venkatesh H Chembrolu <venkatesh@iitmandi.ac.in>, Sagar Acharya <acharyasagar241@gmail.com>

Respected Prof. Arnav Bhavsar Sir,

Respected Dr. Venkatesh Sir,

Respected Dr. Sagar Acharya,

Namaskar.

I hope you all are doing well.

Please find attached herewith the course proposal for:

Sanskrit Language – Level I (B.Tech Elective)

The proposal has been carefully prepared with the objective of introducing Sanskrit as a structured language elective for B.Tech students at IIT Mandi, in alignment with the broader vision of the National Education Policy (NEP) 2020 and the integration of Indian Knowledge Systems within higher education.

The course has been designed in an activity-based, communicative, and interdisciplinary manner, focusing on:

1. Foundational Sanskrit language learning
2. Devanāgarī script, pronunciation, and spoken Sanskrit
3. Basic grammar, sentence formation, and conversational skills
4. Reading, writing, translation, and comprehension exercises
5. Sanskrit stories, subhāṣitas, chanting, and cultural exposure
6. Interdisciplinary relevance of Sanskrit in AI, computational linguistics, yoga, and future knowledge systems

The following document is attached for your kind perusal:

1. MS Word version of the course proposal

As discussed and decided during the Board of Academics process held on 15th May, I am now respectfully seeking your kind approval and consent so that the same may be formally submitted to the Dean Academics Office for further processing and official consideration.

I humbly request you to kindly review the attached proposal and share your approval, suggestions, observations, or modifications, if any, at your earliest convenience. Your valuable guidance and support will greatly help in the smooth and timely processing of this academic initiative.

I shall remain sincerely grateful for your kind encouragement, guidance, and support in this matter.

Namaskar.

With warm and respectful regards,

Dr. Krishna Gajendra Panda

स्वामिनारायणवेदान्ताचार्यः तद्विषये च विश्वविद्यालयलभ्यस्वर्णपदकः, वेदाचार्यः,

Qualified UGC-NET, SET, GATE 2025 - All India Rank 126

PhD in Swaminarayan Vedant - 2022, PhD in Ved (ongoing) - 2028

Lifetime Member of Indian Philosophical Congress

Assistant Professor, Centre for **Indian Knowledge Systems and Mental Health Applications (IKSMHA)**,

Indian Institute of Technology, Mandi, VPO - Kamand, Mandi, Himachal Pradesh, India. Pincode -175075



✉ krishnapanda@iitmandi.ac.in

☎ +91-90990-69404

From: **Arnav Bhavsar Vinayak** <arnav@iitmandi.ac.in>

Date: Sat, May 23, 2026 at 2:28 PM

To: Krishna Gajendra Panda <krishnapanda@iitmandi.ac.in>

Cc: Venkatesh H Chembrolu <venkatesh@iitmandi.ac.in>, Sagar Acharya <acharyasagar241@gmail.com>

I do not have the sufficient background to review the course for this topic.

Course proposals can be reviewed by someone who is more suitable, instead of me.

Thanks
Arnav Bhavsar
School of Computing and Electrical Engg
IIT Mandi
Mandi, India

From: **Sagar Acharya** <acharyasagar241@gmail.com>
Date: Sun, May 24, 2026 at 5:49 PM
To: Krishna Gajendra Panda <krishnapanda@iitmandi.ac.in>

Dear Dr. Panda,

Namaskar. I hope you are doing well.

Thank you for putting together this structured and thought-out curriculum. An activity-based, communicative approach to Sanskrit is exactly what our B.Tech students need to appreciate the language's logical depth and cultural richness.

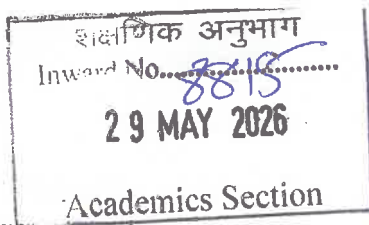
This proposal faithfully reflects the decisions made during our BOA meeting on the 15th. I fully support this academic initiative and gladly accord my consent for its formal submission to the Dean Academics Office.

Thank you for your continued efforts in driving the integration of Indian Knowledge Systems at IIT Mandi.

Sincerely,

Dr. Sagar Acharya

 **IIT Mandi B.Tech Basic Sanskrit.docx**
27K



IIT Mandi

Proposal for a New Course

Course Number: CE5XXP (CE570)

Course Name: Construction Network Scheduling and Cost Management

Credit: 2

Distribution (L-T-P-C): 2-0-0-2

Intended for: B.Tech and M.Tech (Structural Engineering)

Prerequisite: N/A

1. Preamble:

This course adopts an applied and practical approach to Construction Network Scheduling and Cost Management. The course modules are designed to illustrate several aspects of planning, scheduling, monitoring, and controlling construction projects under time and budget constraints. Students first observe how typical construction projects are organized and represented through network scheduling techniques, then analyze project data to identify critical paths, activity durations, resource allocations, and cost implications. Emphasis is placed on connecting practical project scenarios with idealized analytical models, understanding scheduling logic, time-cost optimization, resource leveling, and project uncertainties directly through case studies and software-based exercises. Students learn to operate scheduling tools, cost estimation software, and project monitoring systems. This hands-on framework develops strong practical understanding, analytical thinking, and managerial insight for applications in building construction, bridges, highways, infrastructure systems, and industrial projects. The course is designed to aid an understanding of construction planning and management problems as relevant to modern engineering applications.

Course Title

Construction Network Scheduling and Cost Management

Course Description

The course focuses on:

- Network-based planning (CPM/PERT)
- Scheduling under constraints
- Optimization approaches in construction
- Cost control, earned value analysis, and productivity

Learning Objectives

Students will be able to:

- Develop network schedules
- Analyze critical paths and delays
- Integrate cost and schedule
- Apply optimization concepts
- Interpret project performance

Module-wise Breakdown

Module 1: Fundamentals of Project Planning (2 hrs)

- Work breakdown structures
- Activity definition

Module 2: Network Scheduling Techniques (8 hrs)

- CPM / PERT
- Critical path analysis

Module 3: Time–Cost Tradeoffs (6 hrs)

- Crashing
- Cost optimization

Module 4: Resource Allocation & Optimization (6 hrs)

- Resource leveling
- Linear Programming Applications

Module 5: Productivity & Performance Control (6 hrs)

- Monitoring
- Earned value analysis

Delivery Format

- Lectures with worked examples and case-based discussions
- Short assignments / exercises

Total: 28 hours

5. Similarity with Existing Courses: None

6. Justification of New Course Proposal if Cumulative Similarity >30%:
Not applicable

Approvals:

Faculty Interested in Teaching This Course:

- Prof. Amarjit Singh, Professor, University of Hawaii

Proposed by: Dr. Subhamoy Sen & Dr. Rajneesh Sharma

School: School of Civil and Environmental Engineering

Signature: _____



Date: 27/05/2026

The following faculty (at least 3) provided feedback, discussed among school/centre faculty on: 21st April 2026

Sl. No	Faculty Name	Signature
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1	Thainswemong Choudhury	
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2	Maheshreddy Gade	
---	------------------	--

3	Shivang Shekhar	
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School Chair: _____

School: _____

Date: _____

This proposal is reported in _____th Board of Academics on _____

Dean Academics: _____

Date: _____

Comments of the Reviewers:

Preamble may mention that the experiments are designed to aid an understanding of problems of structural dynamics as relevant to earthquake engineering applications.

To

The Dean (Academics)

IIT Mandi

Through: Chairperson, School of Civil and Environmental Engineering

Subject: Proposal for Organizing a Two-Credit Specialized Course on “Construction Network Scheduling and Cost Management” by Prof. Amarjeet Singh, Univ. Hawaii.

Dear Sir,

I propose to organize a **two-credit specialized course** titled “Construction Network Scheduling and Cost Management” at the School of Civil and Environmental Engineering IIT Mandi. The course will be delivered by **Prof. Amarjeet Singh**, Civil, Environmental and Construction Engineering, **University of Hawaii**, he is an expert in computational plasticity and continuum damage mechanics.

The course is designed to provide comprehensive theoretical and practical exposure to advanced concepts in Construction Network Scheduling and Cost Management, which are increasingly important in project planning, resource optimization, time control, and budget management in construction projects. It will be particularly beneficial for B.Tech. and M.Tech. students working in the areas of construction management, civil engineering, project planning, and infrastructure development. The course is scheduled to be conducted over 28 hours over span of 3 months and will include both lecture sessions and hands-on laboratory/tutorial components.

Justification and Necessity of the Course:

This course is highly relevant for research scholars and postgraduate students involved in planning, scheduling, and cost control of construction projects. It introduces the foundational principles and modern analytical approaches in Construction Network Scheduling and Cost Management, and aligns well with the core focus areas of project management, resource optimization, time-cost trade-off analysis, and infrastructure development. Hosting this course at IIT Mandi will also promote academic collaboration between IIT Mandi and the University of Hawaii and contribute to the institute’s vision of interdisciplinary and application-oriented learning.

Estimated Expenditure:

Head	Amount (INR)
Honorarium (As per norms)	₹150,000/-
Total	₹1,50,000/-

I kindly request approval to invite Prof. Amarjeet Singh to support the above expenditure for successfully conducting this specialized course.

List of Enclosures:

- A complete course proposal in prescribed format
- CV of the invited speaker Prof. Amarjeet Singh
- Recommendation of the faculty colleagues from related subject domain

Thank you for your consideration.

Sincerely,

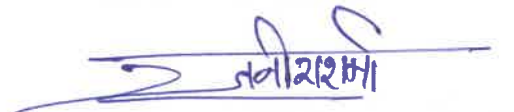


D. Subhamoy Sen

Associate Professor

School of Civil and Environmental Engineering

IIT Mandi



Recommendation of Chairperson SCENE

Recommendation of Dean (Academics)

26 MAY 2026

Academics Section

IIT Mandi
Proposal for a New Course

Course number : ~~CS-640~~ CS-527
Course Name : Pseudorandomness and Derandomization
Credit : 3-0-0-3
Distribution : L-T-P-C
Intended for : M.Tech / Ph.D. / B.Tech 3rd and 4th year
Prerequisite : CS-208, CS-212, basic discrete probability or equivalent
Mutual Exclusion: None

1. Preamble:

Many algorithmic problems have efficient randomized algorithms, but no known efficient deterministic algorithms. This course studies techniques for derandomizing randomized algorithms through the theory of pseudorandomness.

2. Course Modules with quantitative lecture hours:

Unit 1: Randomized algorithms: introduction and motivating examples. (3 hours)

Unit 2: Basic derandomization techniques: the method of conditional expectations, pairwise independence, pairwise independent hash functions. (6 hours)

Unit 3: Expander graphs: vertex and spectral expansion, random walks on expander graphs, explicit construction of expander graphs, application: undirected connectivity in deterministic logspace. (11 hours)

Unit 4: Pseudorandom generators: definition, Nisan-Wigderson generator from average-case hardness, worst-case to average-case reduction. (11 hours)

Unit 5: Advanced topics (choose one of the following): randomness extractors, connection of pseudorandom objects and list-decoding, unconditional pseudorandom generators for weaker computational models, hardness vs randomness. (11 hours)

Laboratory/practical/tutorial Modules: None

3. Text books:

1. Salil P. Vadhan, Pseudorandomness, Now Publishers, 2012.
2. Pooya Hatami and William Hoza. Paradigms for Unconditional Pseudorandom Generators, Emerald Publishing, 2024.

Page No. _____
Date: _____
Page No. 3
Page No. _____

4. References:

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.	CS-510	Randomized Algorithms	7.5%
2.	CS-525	Pseudorandom Generators	5%

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

Approvals:

Faculty interested in teaching this course: – Dr. Gaurav Sood

Proposed by: Dr. Gaurav Sood

School: SCEE

Signature: Gaurav Sood

Date: 4 May 2026

The following faculty (at least 3 faculty) discussed on 6-5-26 and approved the proposal on 6-5-26

Sl. No	Faculty Name	Signature
1	PRATEEK VISHNOI	<u>[Signature]</u>
2	Singh	<u>[Signature]</u>
3	Jinesh Machchhar	<u>[Signature]</u>

School Chair

School: [Signature]

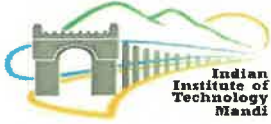
Date: 25 MAY 2026

This proposal is reported inth Board of Academics on

Dean Academics

Date:

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



Fwd: Course Proposal (CS-527): Comments by Dr. Varunkumar Jayapaul

1 message

Gaurav Sood <gauravsood@iitmandi.ac.in>
To: Academic_Office_IITMandi <acadoffice@iitmandi.ac.in>

Thu, May 21, 2026 at 2:54 PM

Please see the forwarded email for comments on the course proposal for CS-527 (Pseudorandomness and Derandomization).

Regards

Dr. Gaurav Sood

Assistant Professor

School of Computing and Electrical Engineering

Indian Institute of Technology Mandi

----- Forwarded message -----

From: **Varunkumar Jayapaul** <varunkumar@iitmandi.ac.in>

Date: Wed, May 20, 2026 at 12:37 PM

Subject: Re: Requesting comments on a new elective: CS-610 (Pseudorandomness and Derandomization)

To: Gaurav Sood <gauravsood@iitmandi.ac.in>

No additional comments.
Looks fine to me.

Regards,
VkJ

On Tue, May 19, 2026 at 5:17 PM Prateek Vishnoi <prateekvishnoi@iitmandi.ac.in> wrote:
Looks good to me.

Best Regards



Dr. Prateek Vishnoi
Assistant Professor
School of Computing & Electrical Engineering
32, 2nd Floor, A17 Building
North Campus, IIT Mandi

On Tue, May 19, 2026 at 5:12 PM Gaurav Sood <gauravsood@iitmandi.ac.in> wrote:
Dear colleagues

The course proposal for the course "Pseudorandomness and Derandomization" was presented at the 64th BoA. The BoA suggested making the following two changes to the course:

1. Change course code from CS-610 to CS-527
2. Add the term "or equivalent" in the prerequisites

I have made the above changes. I request your comments on the course proposal (attached with this email).

Regards

Dr. Gaurav Sood

Assistant Professor

School of Computing and Electrical Engineering

On Tue, May 5, 2026 at 12:32 PM Gaurav Sood <gauravsood@iitmandi.ac.in> wrote:
Dear SCEE Faculty

Please see the proposal for a new elective CS-610 (Pseudorandomness and Derandomization): <https://cloud.iitmandi.ac.in/f/7b4218e04c8a4f2d923a/>
If you have any comments/suggestions, please let me know by tonight.

Regards
Dr. Gaurav Sood
Assistant Professor
School of Computing and Electrical Engineering
Indian Institute of Technology Mandi



Fwd: Course Proposal (CS-527): Comments by Dr. Jinesh Machchhar

1 message

Gaurav Sood <gauravsood@iitmandi.ac.in>
To: Academic_Office_IITMandi <acadoffice@iitmandi.ac.in>

Thu, May 21, 2026 at 2:50 PM

Please see the forwarded email for comments on the course proposal for CS-527 (Pseudorandomness and Derandomization).

Regards
Dr. Gaurav Sood
Assistant Professor
School of Computing and Electrical Engineering
Indian Institute of Technology Mandi

----- Forwarded message -----

From: Jinesh Machchhar <jinesh@iitmandi.ac.in>
Date: Tue, May 19, 2026 at 5:18 PM
Subject: Re: Requesting comments on a new elective: CS-610 (Pseudorandomness and Derandomization)
To: Gaurav Sood <gauravsood@iitmandi.ac.in>

The course contents are fine.

Regards
Jinesh

On Tue, May 19, 2026 at 5:12 PM Gaurav Sood <gauravsood@iitmandi.ac.in> wrote:

Dear colleagues

The course proposal for the course "Pseudorandomness and Derandomization" was presented at the 64th BoA. The BoA suggested making the following two changes to the course:

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2. Add the term "or equivalent" in the prerequisites

I have made the above changes. I request your comments on the course proposal (attached with this email).

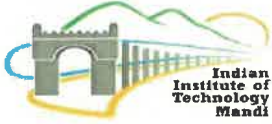
Regards
Dr. Gaurav Sood
Assistant Professor
School of Computing and Electrical Engineering
Indian Institute of Technology Mandi

On Tue, May 5, 2026 at 12:32 PM Gaurav Sood <gauravsood@iitmandi.ac.in> wrote:

Dear SCEE Faculty

Please see the proposal for a new elective CS-610 (Pseudorandomness and Derandomization): <https://cloud.iitmandi.ac.in/f/7b4218e04c8a4f2d923a/>
If you have any comments/suggestions, please let me know by tonight.

Regards
Dr. Gaurav Sood
Assistant Professor
School of Computing and Electrical Engineering



Fwd: Course Proposal (CS-527): Comments by Dr. Prateek Vishnoi

1 message

Gaurav Sood <gauravsood@iitmandi.ac.in>
To: Academic_Office_IITMandi <acadoffice@iitmandi.ac.in>

Thu, May 21, 2026 at 2:49 PM

Regards
Dr. Gaurav Sood
Assistant Professor
School of Computing and Electrical Engineering
Indian Institute of Technology Mandi

----- Forwarded message -----

From: **Prateek Vishnoi** <prateekvishnoi@iitmandi.ac.in>
Date: Tue, May 19, 2026 at 5:17 PM
Subject: Re: Requesting comments on a new elective: CS-610 (Pseudorandomness and Derandomization)
To: Gaurav Sood <gauravsood@iitmandi.ac.in>
Cc: Jinesh Machchhar <jinesh@iitmandi.ac.in>, Samar Agnihotri <samar@iitmandi.ac.in>, Varunkumar Jayapaul <varunkumar@iitmandi.ac.in>

Looks good to me.

Best Regards



Dr. Prateek Vishnoi
Assistant Professor
School of Computing & Electrical Engineering
32, 2nd Floor, A17 Building
North Campus, IIT Mandi

On Tue, May 19, 2026 at 5:12 PM Gaurav Sood <gauravsood@iitmandi.ac.in> wrote:

Dear colleagues

The course proposal for the course "Pseudorandomness and Derandomization" was presented at the 64th BoA. The BoA suggested making the following two changes to the course:

1. Change course code from CS-610 to CS-527
2. Add the term "or equivalent" in the prerequisites

I have made the above changes. I request your comments on the course proposal (attached with this email).

Regards
Dr. Gaurav Sood
Assistant Professor
School of Computing and Electrical Engineering
Indian Institute of Technology Mandi

On Tue, May 5, 2026 at 12:32 PM Gaurav Sood <gauravsood@iitmandi.ac.in> wrote:

Dear SCEE Faculty

Please see the proposal for a new elective CS-610 (Pseudorandomness and Derandomization): <https://>

cloud.iitmandi.ac.in/f/7b4218e04c8a4f2d923a/

If you have any comments/suggestions, please let me know by tonight.

Regards

Dr. Gaurav Sood

Assistant Professor

School of Computing and Electrical Engineering

Indian Institute of Technology Mandi

IIT Mandi
Proposal for a New Course

Course number : ~~CS-612~~ CS-528
Course Name : Unconditional Lower Bounds for Algorithms and Data Structures
Credit : 3-0-0-3
Distribution : L-T-P-C
Intended for : M.Tech / Ph.D. / B.Tech 3rd and 4th year
Prerequisite : CS-208, CS-212 & equivalent
Mutual Exclusion : None

1. Preamble:

The theory of NP-completeness allows us to prove that a computational problem cannot have polynomial-time algorithms (i.e. a superpolynomial lower bound on the time required to solve the problem). However, such lower bounds rely on the unproven assumption that $P \neq NP$. In this course, we will study some techniques for proving unconditional lower bounds for many computational problems.

2. Course Modules with quantitative lecture hours:

Unit 1: Motivation via streaming algorithms: data stream model, estimation of frequency moments, connection with one-way communication. (5 hours)

Unit 2: One-way communication complexity: definition of one-way protocols, definition of disjointness, index, and gap-hamming problem, lower bound for disjointness and index. (6 hours)

Unit 3: Lower bounds for streaming algorithms: space lower bound for F_2 estimation, reducing (one-way communication) gap-hamming problem to F_0 estimation, lower bound on the one-way communication complexity of gap-hamming. (8 hours)

Unit 4: Two-way communication complexity: deterministic and randomized protocols, monochromatic rectangles, fooling sets, distribution complexity, corruption method. (12 hours)

Unit 5: Lower bounds for data structures: the approximate nearest neighbour problem, cell-probe model, asymmetric communication complexity, lower bound for the approximate nearest neighbour problem. (11 hours)

Laboratory/practical/tutorial Modules: None

3. Text books:

1. Tim Roughgarden, Communication Complexity (for Algorithm Designers), Now Publishers, 2016.

4. References:

1. Amir Yehudayoff and Anup Rao, Communication Complexity and Applications, Cambridge University Press, 2020.
2. Eyal Kushilevitz and Noam Nisan, Communication Complexity, Cambridge University Press, 2009.

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

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

Approvals:

Faculty interested in teaching this course: – Dr. Gaurav Sood

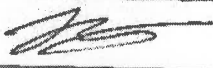
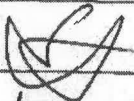
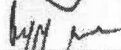
Proposed by: Dr. Gaurav Sood

School: SCEE

Signature: Gaurav Sood

Date: 5 May 2026

The following faculty (at least 3 faculty) discussed on...6/5/26 and approved the proposal on...6/5/26

Sl. No	Faculty Name	Signature
1	Jinesh Machherkar	
2	S. Arora	
3	Prateek Vishwak	

School Chair:



School:

25 MAY 2026

Date:

This proposal is reported inth Board of Academics on

Dean Academics

Date:

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



Academic Office <acadoffice@iitmandi.ac.in>

Fwd: Course Proposal (CS-528): Comments by Dr. Varunkumar Jayapaul

1 message

Gaurav Sood <gauravsood@iitmandi.ac.in>
To: Academic_Office_IITMandi <acadoffice@iitmandi.ac.in>

Thu, May 21, 2026 at 2:58 PM

Please see the forwarded email for comments on the course proposal for CS-528 (Unconditional Lower Bounds for Algorithms and Data Structures).

Regards
Dr. Gaurav Sood
Assistant Professor
School of Computing and Electrical Engineering
Indian Institute of Technology Mandi

----- Forwarded message -----

From: **Varunkumar Jayapaul** <varunkumar@iitmandi.ac.in>
Date: Wed, May 20, 2026 at 12:36 PM
Subject: Re: Requesting comments on a new elective: CS612 (Unconditional Lower Bounds for Algorithms and Data Structures)
To: Prateek Vishnoi <prateekvishnoi@iitmandi.ac.in>
Cc: Gaurav Sood <gauravsood@iitmandi.ac.in>, Jinesh Machchhar <jinesh@iitmandi.ac.in>, Samar Agnihotri <samar@iitmandi.ac.in>

No additional comments.
Looks fine to me.

Regards,
VkJ

On Tue, May 19, 2026 at 5:18 PM Prateek Vishnoi <prateekvishnoi@iitmandi.ac.in> wrote:

Dear Gaurav,
Looks fine to me.

Best Regards



Dr. Prateek Vishnoi
Assistant Professor
School of Computing & Electrical Engineering
32, 2nd Floor, A17 Building
North Campus, IIT Mandi

On Tue, May 19, 2026 at 5:12 PM Gaurav Sood <gauravsood@iitmandi.ac.in> wrote:

Dear colleagues

The course proposal for the course "Unconditional Lower Bounds for Algorithms and Data Structures" was presented at the 64th BoA. The BoA suggested making the following two changes to the course:

1. Change course code from CS-612 to CS-528
2. Add the term "or equivalent" in the prerequisites.

I have made the above changes. I request your comments on the course proposal (attached with this email).

Regards

Dr. Gaurav Sood

Assistant Professor

School of Computing and Electrical Engineering

Indian Institute of Technology Mandi

On Wed, May 6, 2026 at 6:57 AM Gaurav Sood <gauravsood@iitmandi.ac.in> wrote:

Dear SCEE Faculty

Please see the proposal for a new elective CS612 (Unconditional Lower Bounds for Algorithms and Data Structures): <https://cloud.iitmandi.ac.in/f/d4898a4dd9c54456b80e/>

If you have any comments/suggestions, please let me know by today afternoon.

Regards

Dr. Gaurav Sood

Assistant Professor

School of Computing and Electrical Engineering

Indian Institute of Technology Mandi



Academic Office <acadoffice@iitmandi.ac.in>

Fwd: Course Proposal (CS-528): Comments by Dr. Prateek Vishnoi

1 message

Gaurav Sood <gauravsood@iitmandi.ac.in>
To: Academic_Office_IITMandi <acadoffice@iitmandi.ac.in>

Thu, May 21, 2026 at 2:57 PM

Please see the forwarded email for comments on the course proposal for CS-528 (Unconditional Lower Bounds for Algorithms and Data Structures).

Regards
Dr. Gaurav Sood
Assistant Professor
School of Computing and Electrical Engineering
Indian Institute of Technology Mandi

----- Forwarded message -----

From: **Prateek Vishnoi** <prateekvishnoi@iitmandi.ac.in>

Date: Tue, May 19, 2026 at 5:18 PM

Subject: Re: Requesting comments on a new elective: CS612 (Unconditional Lower Bounds for Algorithms and Data Structures)

To: Gaurav Sood <gauravsood@iitmandi.ac.in>

Cc: Jinesh Machchhar <jinesh@iitmandi.ac.in>, Varunkumar Jayapaul <varunkumar@iitmandi.ac.in>, Samar Agnihotri <samar@iitmandi.ac.in>

Dear Gaurav,
Looks fine to me.

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Assistant Professor
School of Computing & Electrical Engineering
32, 2nd Floor, A17 Building
North Campus, IIT Mandi

On Tue, May 19, 2026 at 5:12 PM Gaurav Sood <gauravsood@iitmandi.ac.in> wrote:

Dear colleagues

The course proposal for the course "Unconditional Lower Bounds for Algorithms and Data Structures" was presented at the 64th BoA. The BoA suggested making the following two changes to the course:

1. Change course code from CS-612 to CS-528
2. Add the term "or equivalent" in the prerequisites.

I have made the above changes. I request your comments on the course proposal (attached with this email).

Regards
Dr. Gaurav Sood
Assistant Professor
School of Computing and Electrical Engineering
Indian Institute of Technology Mandi

On Wed, May 6, 2026 at 6:57 AM Gaurav Sood <gauravsood@iitmandi.ac.in> wrote:

Dear SCEE Faculty

Please see the proposal for a new elective CS612 (Unconditional Lower Bounds for Algorithms and Data Structures): <https://cloud.iitmandi.ac.in/f/d4898a4dd9c54456b80e/>

If you have any comments/suggestions, please let me know by today afternoon.

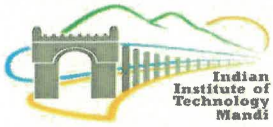
Regards

Dr. Gaurav Sood

Assistant Professor

School of Computing and Electrical Engineering

Indian Institute of Technology Mandi



Fwd: Course Proposal (CS-528): Comments by Dr. Jinesh Machchhar

1 message

Gaurav Sood <gauravsood@iitmandi.ac.in>
To: Academic_Office_IITMandi <acadoffice@iitmandi.ac.in>

Thu, May 21, 2026 at 2:56 PM

Please see the forwarded email for comments on the course proposal for CS-528 (Unconditional Lower Bounds for Algorithms and Data Structures).

Regards
Dr. Gaurav Sood
Assistant Professor
School of Computing and Electrical Engineering
Indian Institute of Technology Mandi

----- Forwarded message -----

From: **Jinesh Machchhar** <jinesh@iitmandi.ac.in>
Date: Tue, May 19, 2026 at 5:17 PM
Subject: Re: Requesting comments on a new elective: CS612 (Unconditional Lower Bounds for Algorithms and Data Structures)
To: Gaurav Sood <gauravsood@iitmandi.ac.in>

The course contents look good and I have no suggestions for any modifications.

Regards
Jinesh

On Tue, May 19, 2026 at 5:12 PM Gaurav Sood <gauravsood@iitmandi.ac.in> wrote:

Dear colleagues

The course proposal for the course "Unconditional Lower Bounds for Algorithms and Data Structures" was presented at the 64th BoA. The BoA suggested making the following two changes to the course:

1. Change course code from CS-612 to CS-528
2. Add the term "or equivalent" in the prerequisites.

I have made the above changes. I request your comments on the course proposal (attached with this email).

Regards
Dr. Gaurav Sood
Assistant Professor
School of Computing and Electrical Engineering
Indian Institute of Technology Mandi

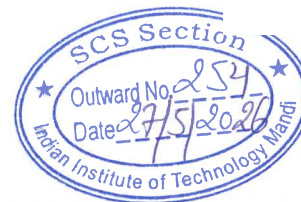
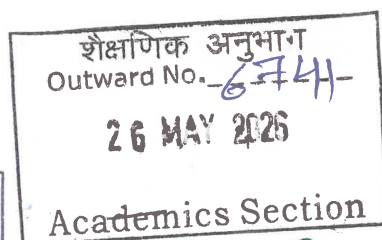
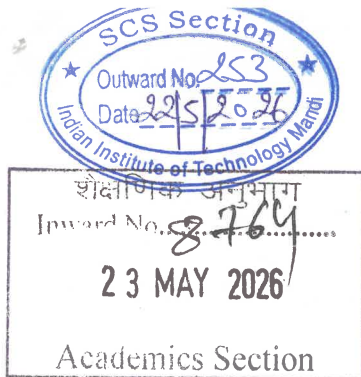
On Wed, May 6, 2026 at 6:57 AM Gaurav Sood <gauravsood@iitmandi.ac.in> wrote:

Dear SCEE Faculty

Please see the proposal for a new elective CS612 (Unconditional Lower Bounds for Algorithms and Data Structures): <https://cloud.iitmandi.ac.in/f/d4898a4dd9c54456b80e/>

If you have any comments/suggestions, please let me know by today afternoon.

Regards
Dr. Gaurav Sood
Assistant Professor



IIT Mandi Proposal for a New Course

Course number : CY 405
Course Name : Introduction to Structural Chemistry
Credit : 3 credits
Distribution : 3-0-0-3
Intended for : BS
Prerequisite : None
Mutual Exclusion : (courses with high similarity not allowed to credit by the students after or along with this course)

1. Preamble:

Course Overview

Structural Chemistry is the important for understanding how the microscopic arrangement of atoms commands the macroscopic properties of materials. The course begins at the atomic level, exploring the fundamental forces and interactions that bind atoms together before scaling up to the periodicity of crystalline solids.

Objectives and Scope

Students will understand the fundamental forces and interactions governing organic molecules, coordination complexes, metals, non-metals and ionic solids. By examining crystal lattices, crystal structures, symmetry, packing motifs, and phase transitions, students will learn to predict material behavior. The course bridges abstract theories with practical application, focusing structural principles, polymorphism and intermolecular interaction with their applications pharmaceutical industry.

2. Course Modules with quantitative lecture hours:

Module 1

Foundation of Structural Chemistry

(lectures 6)

Interatomic bonds, energies of chemical interaction of atoms, concept of bond angles and bond distances in (organic molecules, organometallic compounds, clusters and coordination

compounds), intermolecular interactions (crystallographic van der Waals Radii, equilibrium radii of atoms, anisotropic van der Waals radii and donor acceptor interactions)

Module 2

Crystal Lattice, crystal structures and crystal properties.

(lectures 6)

Introduction to crystallography, translational periodicity, crystal lattices and crystal structure, characteristics of crystal structure, structural motifs, crystal defects, Introduction to crystallographic space groups, symmetry in crystal structure, applications of crystal structure, Introduction to crystal packings and structures using software tools, Cambridge crystallographic data center (CCDC)

Module 3

Structure of metals, non-metals and ionic compounds **(lectures 14)**

Packing and structure of pure metals, structure of solid solutions and metallic compounds, structure of surface of metals, structural chemistry of non-metallic compounds, structural chemistry and importance of hydrogen bonding, structural chemistry of H₂O, ionic crystal structures, linkage rules in coordination polyhedral, Pauling rule of ionic crystal structure, structural chemistry of silicates.

Module 4

Phase Transitions and Polymorphism **(lectures 6)**

Polymorphism, energies of phase transition, enthalpies of phase transformations, polymorphic transformations, effect of phase transition on crystal properties.

Module 5

Applications and case studies in pharmaceuticals **(lectures 5)**

3. References:-

- 1) Crystal Engineering: G. R. Desiraju by World Scientific Publishers.
- 2) Perspective in Structural Chemistry, J. K. Burdett, Chem. Rev. 1988, 88, 3-30.

4. Text books:

- 1) Fundamental of structural Chemistry by Gong-Du-Zhou; publisher world scientific.
- 2) Introduction to structural chemistry by Stepan S. Batsanov, Andrei S Batsanov; publisher Springer.

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

S. No.	Courses	Course Code	Similarity Content	Approx. % of Content
1.	Fundamentals of Inorganic Chemistry	CY 303	Concept of bond angles and bond distances, Intermolecular Interactions	5 to 7 percent
2	Chemical Crystallography	CY547	Introduction to space groups and symmetry, translational periodicity	2-4 percent

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

NA

Approvals:

Other Faculty interested in teaching this course: –

Proposed by: Dr. Abhimanew Dhir

School: School of Chemical Sciences

Signature:

Dr. A. Dhir

Date: 29.04.2026

Recommended/Not Recommended, with Comments:

Date:

Chairperson, CPC *SCS*

Approved / Not Approved

Date:

Chairperson, BoA

Address to Reviewer Comments on Course Proposal 'CY 405-Introduction to Structural Chemistry' for BS-Chemical Sciences

Comments given by Reviewer 1

(G. R. Desiraju, Distinguished Professor, IKSMHA Indian Institute of Technology, Mandi)

There are two items that need to be addressed.

1. Forces and interactions are not the same. They are quite different. They seem to be used interchangeably in the outline.

* The forces and interactions are separately mentioned in the revised outline of course.

2. A crystal lattice is different from a crystal structure. This should be brought out clearly in the outline.

* We have explicitly mentioned crystal structure and crystal lattices in the outline as well as module 2

The above two points should be clearly explained in the lectures.

Comments by Reviewer 2

(Prof. Dr. Kana M. Sureshan, FRSC, FASc, FNA, JC Bose National Fellow, School of Chemistry, IISER Thiruvananthapuram, Govt of India Kerala, INDIA.)

The course follows a sound pedagogical path, starting from the atomic/molecular level and scaling up to macroscopic crystal lattices and phase transitions. Including a module on applications and case studies in the pharmaceutical industry is highly commendable. Understanding polymorphism and intermolecular interactions is critical for drug formulation and solid-state stability. The focus on diverse systems (organic molecules, coordination complexes, and ionic solids) provides students with a holistic view of structural science.

While the syllabus is robust, incorporating the following elements could further align it with modern research standards. While the course focuses on structure, it currently lacks mention of determination.

- 1. Adding a brief introduction to single-crystal, even at a conceptual level, would help students understand how the 3-D structures they study are actually discovered.**

* The suggestions have been included in the revised content of module 2 of the proposed course.

2. Consider introducing students to the Cambridge Structural Database. Even a single lecture or demonstration on using tools like Olex2 or Mercury for visualizing molecular packing and polymorphism would significantly enhance the students' spatial awareness and practical skills.

* The suggestions have been included in the revised content of module 2 of the proposed course.

3. In the crystal lattice section, inclusion of symmetry and defects is good. Ensure that Point Groups and Space Groups are introduced here, as they are essential for interpreting inorganic topologies.

* The suggestions have been included in the revised content of module 2 of the proposed course.

Phase transitions is a strong inclusion. This module bridges the gap between structural chemistry and thermodynamics, which is vital for understanding material behavior. The course is highly recommended for approval. It successfully bridges abstract structural theories with practical industrial applications. Strengthening the syllabus with a brief overview of X-ray crystallography and computational visualization would elevate it from a theoretical course to a modern, research-aligned elective.

Comments by Reviewer 3

*(Professor T.N. Guru Row, Solid State and Structural Chemistry Unit, Indian Institute of Science
Bangalore 560012)*

*I have gone through the course content in detail and find it satisfactory. It depends on who teaches this course and his/her capability in conveying the concepts clearly and addressing specific examples as this course is targeted to undergrads. The issue of what happens to an atom when it becomes a part of a molecule and what happens to the molecule when it gets into a crystal lattice in condensed matter should follow the pathway in teaching. Introducing phase transitions, polymorphism and its relevance in the pharma industry looks a bit unconnected in the course structure and **I suggest these be taught with caution**. The student should not get a feeling that polymorphism is only of relevance to the pharma industry for example. I feel introducing this course as an elective is appropriate.*

* The reviewer's suggestion will be taken care while delivering lectures.



IIT Mandi

Proposal for a New Course

Course number : CY 563
Course Name : Polymers for Advanced Technology
Credit Distribution : 3-0-0-3
Intended for : BS, MSc, PhD in Chemical Sciences
Prerequisite : CY 302 (Principles of Organic Chemistry)
Mutual Exclusion : None

1. Preamble:

Applying the fundamentals of chemistry for developing functional polymer-based materials has revolutionized the human life at various fronts. Polymeric materials have emerged as a dynamic platform for billion-dollar industry in a very short span of time. This course will provide the students an appreciation of the versatility which is inherent in polymers, and which is available to the material chemist in conjunction with other core and elective courses in the BS and MSc program.

2. Course Modules with quantitative lecture hours:

Module 1: Fundamentals of Polymers (5 Hours)

Molecular weight and molecular weight distribution, Amorphous and crystalline states, Degree of crystallinity, Glass transition temperature, Factors affecting T_g, Polymer architectures

Module 2: Concepts in Polymer Synthesis (7 Hours)

Free radical polymerization, Copolymerization, Kinetics, Ionic polymerization, Step Growth Polymerization, Techniques of polymerization

Module 3: Characterization Techniques (10 Hours)

Osmometry, Gel permeation chromatography, Light scattering, Scanning electron microscopy, Transmission electron microscopy, Atomic force microscopy, XPS, XRD, DSC, TGA, Mechanical testing

Module 4: Smart Polymers (5 Hours)

Chemical responsive polymers, Temperature responsive polymers, pH and light responsive polymers, Color changing polymers, Magnetic field responsive polymers, Self-healing polymers, Multiple stimuli responsive polymers

Module 5: Polymers for Healthcare and Food Safety (6 Hours)

Biocompatibility and biodegradability, Biopolymers, Hydrogels, Polymeric materials for drug delivery and Tissue engineering, Challenges in agriculture and food sectors, polymeric materials in agriculture, Controlled release, Biodegradable packaging materials, Packaging for shelf-life enhancement

Module 6: Emerging Polymeric Materials and their Applications (9 Hours)

Polymers and sustainability, Energy materials, Polymer-based electrolytes, Optoelectronic materials, Electrospun nanofibers, Catalysis, Water purification, Polymers for automobile and aerospace sectors etc., Polymer waste management

3. Textbooks:

1. V. R. Gowariker, N. V. Viswanathan, J. Sreedhar, Polymer Science, New Age International. Wiley, 3rd Edition, 2019.
2. M. Chanda, Introduction to Polymer Science and Chemistry: A Problem-Solving Approach, CRC Press, 2nd Edition, 2013.

4. References:

1. G. Odian, Principles of polymerization, 4th Edition, Wiley, 2004.
2. C. E. Carraher, Seymour/Carraher's Polymer Chemistry, 6th Edition, Marcel Dekker, Inc., 2003.
3. D. Campbell and J. R. White, Polymer Characterization: Physical Techniques, Chapman and Hall, 1989.
4. M. Mishra, Encyclopedia of Polymer Applications, CRC Press, 2019.
5. Related journal articles

**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.		CY 555	Polymer Synthesis	~10%

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

NA

Approvals:

Other Faculty interested in teaching this course: –

Proposed by: Dr. Garima Agrawal

School: Chemical Sciences

Signature: 

Date: 22/05/2026

Recommended/Not Recommended, with Comments:

Chairperson, CPC *SCS*

Date: _____

Approved / Not Approved

Date: _____

Chairperson, BoA

Response to Reviewer's Comments

Prof. Jacob (IIT Delhi):

Email with Prof. Jacob's comments is enclosed.

1. I think module 3 should come before module 2 (characterization should come first, in my opinion). Thank you very much for the suggestion. We have now put the characterization module before the module dealing with smart polymers.
2. I would say it is quite packed with too much stuff, however, you can adjust as you go along. Thank you very much for the suggestion. We have now readjusted the content, as suggested. We have merged module 4 and 5 into a single module, and the total duration has been reduced to 6 h.
3. Also, it seems references are also textbooks only. Book by Manas Chanda also should be included, this is also a really good book and covers a lot of characterization aspects with lot of problems. Thank you very much for the suggestion. We have now included the book by Manas Chanda.

Prof. Maji (IIT Roorkee):

Email with Prof. Maji's comments is enclosed.

1. **Module 1:** The topic "Amorphous and crystalline states" may be expanded to include the concept of degree of crystallinity and its influence on material properties. Since Glass Transition Temperature (T_g) is a critical parameter in polymer science, inclusion of the factors affecting T_g would further enrich the module. In addition, the allotted duration of 4 hours appears slightly limited considering the breadth of topics covered. Increasing the duration or reducing some advanced topics may help ensure effective delivery of the content.
Thank you very much for the suggestion. The suggested changes have been incorporated in the revised course file.
2. **Module 2:** The module is appropriate and well-designed. However, the inclusion of polymerization kinetics would further strengthen the fundamentals.
Thank you very much for the suggestion. We have now included kinetics.
3. **Module 2':** The module content appears satisfactory.
Thank you.
4. **Module 3:** It may be challenging to comprehensively cover the entire content within the allotted 10 hours. Topics related to pure chemistry-based characterization techniques such as IR, UV-Vis, and NMR spectroscopy may be reduced or omitted, as students are generally exposed to these techniques in other courses.
Thank you very much for the suggestion. We have made the suggested changes in the revised course file.
5. **Modules 4 and 5:** These two modules may be merged into a single module, and the total duration could potentially be reduced to 6 hours.
Thank you very much for the suggestion. We have merged them in a single module, as suggested.

6. **Module 6:** Topics related to polymers and sustainability may be incorporated into the syllabus. Inclusion of polymer waste management, as well as applications of polymers in the automobile and aerospace sectors, would make the course more contemporary and application-oriented.

Thank you very much for the suggestion. Suggested changes have been incorporated.

7. Overall, the syllabus is comprehensive, contemporary, and academically relevant for introducing students to the fundamentals of polymer science in advanced applications.

Thank you.

IIT Mandi
Proposal for a New Course

Course number: AR523

Course Name: Robot Manipulators

Credit Distribution: 2-1-0-3

Intended for: B.Tech, M.Tech, M.Tech. (R), PhD

Prerequisite: IC114: Linear Algebra / Introductory course in Linear Algebra, ME206: Mechanics of Solids / ME209: Dynamics, EE 301: Control Systems, Programming Knowledge (Python)

Mutual Exclusion : None

1. Preamble:

Robot manipulators are one of the most widely used and studied classes of robots in both industrial and research settings. These robotic arms are designed to interact with the environment through physical manipulation and are essential in fields ranging from manufacturing and logistics to medical robotics and space exploration. The study of robot manipulators lies at the intersection of mechanical systems, control theory, and computer science, and provides a foundation for understanding broader robotic systems.

In this course, students will explore the modeling, analysis, and control of robot manipulators. The course will build mathematical foundations using concepts from linear algebra, differential equations, rigid body mechanics, and system dynamics. Students will also study classic and modern control techniques. Emphasis will be placed on practical applications through programming assignments and lab work, with tools such as Python and ROS forming a core part of the learning.

2. Course Modules with quantitative lecture hours:

Introduction: Basic definitions, mechanism, degree of freedom, Rigid Body Motions, Serial and parallel manipulators **(4 hours)**

Kinematics: Kinematic parameters, Denavit-Hartenberg (DH) representation, Forward and inverse kinematics, Analytical and numerical solutions, Differential kinematics, Jacobian matrix, Mapping between configuration-space to operational-space, Pseudo inverse concepts, Introduction to workspace singularities **(10 hours)**

Dynamics: Forward and inverse dynamics. Lagrangian (Lagrange-Euler) and Newton-Euler formulations. Dynamic simulation: Dynamic modeling of robotic manipulators and computer-based numerical simulations **(10 hours)**

Motion Planning: Path and Trajectory planning, Configuration (joint) space trajectory and operational (task) space trajectory generations **(8 hours)**

Control: Velocity control, Joint space and task-space control schemes, Force control: Direct, Indirect, Hybrid position/force, Vision-based control, Advanced control: Reinforcement learning, Imitation learning **(10 hours)**

3. Text books:

(Relevant and Latest, Only 2)

1. Modern Robotics: Mechanics, Planning, and Control by K.M. Lynch and F.C. Park, Cambridge University Press, 2017.
2. Introduction to Robotics, Third Edition, by S. K. Saha, McGrawHill, 2024.

4. References:

1. A Mathematical Introduction to Robotic Manipulation by Murray et al, CRC Press, 1994.
2. Fundamentals of Robotic Mechanical Systems by J. Angeles, Springer Verlag, 200
3. Robotics: Modelling, Planning and Control by B. Siciliano, L. Sciavicco, L. Villani, and G. Oriolo, Springer, 2009.
4. Introduction to Robotics: Mechanics and Control by J.J. Craig, Pearson, 4th Edition, 2017.
5. Robot Modeling and Control by M.W. Spong, S. Hutchinson, and M. Vidyasagar, Wiley, 2006.
6. Principles of Robot Motion: Theory, Algorithms, and Implementations by H. Choset, K.M. Lynch, S. Hutchinson, G. Kantor, W. Burgard, L.E. Kavraki, and S. Thrun, MIT Press, 2005.

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.	NA	NA	NA	NA


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

Approvals:

Other Faculty interested in teaching this course:- Dr. Deepak Raina and Dr. Amit Shukla

Proposed by: Dr. Deepak Raina

School: CAIR

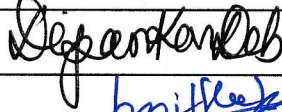
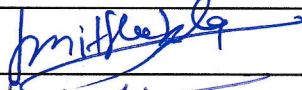


Signature: 

Date: 09.12.2025

Approvals:

Approvals:

The following faculty members (at least 3) discussed the course on **10.12.2025** and approved the course on **11.12.2025**.

S. No.	Name	Signature
1	Prof. Dipankar Deb	
2	Dr. Amit Shukla	
3	Dr. Jagadeesh Kadiyam	
4	Dr. Radhe Shyam Sharma	

School Chair: Dr. Narendra Kumar Dhar

Signature: 

School: CAIR

Date: 12-12-2025

Recommended/Not Recommended, with Comments:

Chairperson, CPC

Date: _____

Approved / Not Approved

Chairperson, BoA

Date: _____



Course number	: AR520
Course Name	: Design of Mechatronics Systems
Credit Distribution	: 2-0-2- 3
Intended for	: UG, PG and Ph.D.
Prerequisite	: Engineering mathematics and Basic programming skills
Mutual Exclusion	: None

1. Preamble: Students will be introduced to the main topics in the Mechatronics which blends the disciplines of mechanical engineering, computing, and electronics to create a huge range of electromechanical systems. It includes Introduction to the design of electromechanical systems. Interfacing sensors and actuators to a personal computer and a single-board computer. Electrical and mechanical design, prototyping, and construction. Dissection of a commercial mechatronic product. Students work in teams to produce final computer-controlled electromechanical projects of their own design.

2. Course Outline: Introduction to mechatronics, Example systems and architecture, Basic circuits review, Nonlinear circuit elements, Motor control. Various types of controllers. Data conversion devices. Review of programming. Number systems. Single-board computer. Digital design and integrated circuits. Sensors. Actuators, Power transmission, torque, speed, power equations, efficiency, inertia. Hydraulics, Pneumatics. Design and fabrication of Mechatronics systems. Final project.

3. Course Modules with quantitative lecture hours including lab:

Introduction to Mechatronics: Introduction, Examples of Mechatronic systems, Measurement systems, Basic Electrical Elements (Resistor, Capacitor and Inductor), Kirchhoff's Laws, Voltage and current sources, meters, Equivalent circuits, Alternating Current Circuit Analysis and Impedance. **(2 L)**

Semiconductor Electronics: Semiconductor physics for electronic devices, Diodes: Junction diode, Zener diode, Voltage regulators, Bipolar Junction Transistor-Switch and packages, Darlington transistor and Phototransistor & Optoisolator, Field-Effect Transistors. **(4 L)**

System response: Amplitude linearity, Fourier Series Representation of Signals, Bandwidth and Frequency Response, Phase Linearity, Distortion of Signals, Dynamic Characteristics of Systems: Zero-Order System, First-Order System and Second-Order System, Frequency Response of a System and System Modeling and Analogies. **(4 L)**

Analog Signal Processing Using Operational Amplifiers: Amplifiers, Operational Amplifiers: Ideal Model, Inverting, Noninverting Op Amps, Summer, Difference, Integrator, Differentiator, Comparator, The real operational Amplifier. **(4 L)**

Digital Circuits: Digital Representations, Combinational Logic and Logic Classes, Timing Diagrams, Boolean Algebra, Design of Logic Networks, finding a Boolean Expression Given a Truth Table, Sequential Logic: Flip-Flops, Applications of Flip-Flops, TTL and CMOS Integrated Circuits, Using data sheets and standard symbols. **(4 L)**

Microcontroller Programming Interfacing and data acquisition: Microprocessors and Microcomputers, Microcontrollers, The PIC Microcontroller, The Arduino Prototyping Platform, Interfacing, Serial Communication, Method to Design a Microcontroller-Based System, Prototyping and Design, Quantizing theory, Analog-to-Digital Conversion and Digital-to-Analog Conversion. **(4 L)**

Sensors: Position and Speed Measurement, Stress and Strain Measurement, Temperature Measurement, Vibration and Acceleration Measurement, Pressure and Flow Measurement, Semiconductor Sensors and Microelectromechanical Devices. **(3 L)**

Actuators: Electromagnetic Principles, Solenoids and Relays, Electric Motors, Stepper Motors, RC Servomotors, Selecting a Motor, Hydraulics and Pneumatics. **(3 L)**

4. Laboratory/practical/tutorial Modules:

- i. Introduction to simulators for simple circuits and Arduino programming.
- ii. Introduction to practical considerations: Breadboard, Multimeter, Resistor circuits.
- iii. Function generators, Oscilloscope, Capacitors, RC Filters. Simulation in TinkerCAD and implementing hardware.
- iv. LEDs, Diodes, Zener Diodes, Rectification: Half wave rectification and Full wave rectification.
- v. Bipolar Junction Transistor as a switch and an amplifier. Photoelectric Circuit.
- vi. Operational Amplifiers hardware and Timer, 555 Timer as an oscillator.
- vii. Basics of soldering: Soldering wires and Soldering components to a perf board.
- viii. 3D Design and 3D Printing.
- ix. Sensors and Actuators I: Orientation sensor, Photocell and Distance sensor.
- x. Sensors and Actuators II: DC motor, Servo motor and Stepper motor.

5. Text books:

1. Alciatore, David G, Introduction to Mechatronics and Measurement Systems, McGraw Hill, 5th edition, 2019.
2. Bolton, William. Mechatronics: electronic control systems in mechanical and electrical

engineering. Pearson Education, 7th edition, 2023.

6. References:

1. Mahalik, Nitaigour Premchand. Mechatronics. Tata McGraw-Hill.
2. Bishop, Robert H. Mechatronics: an introduction. CRC Press.
3. Mechatronics system design by Devdas Shetty and Richard A. Kolk, Cengage Learning.
4. Mechatronics by G. Hegde, Jones and Bartlett.

5. Similarity with the existing courses:

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

S. No.		Course Code	Similarity Content	Approx. % of Content
1.		IC160	Basic diodes and Op-amps	< 20%


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

Approvals: This course is a part of the BoA approval for the CAIR courses during the centre setup.

Other Faculty interested in teaching this course:


Proposed by: Jagadeesh Kadiyam

School: CAIR

Signature: 

Date: 27-01-2026

Recommended/Not Recommended, with Comments:



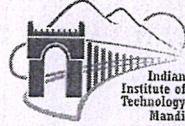
Chairperson, CAIR

Date: 29-01-2026

Approved / Not Approved

Chairperson, BoA

Date: _____



IIT Mandi

Proposal for a Revised Course

Course number	: BE-308
Course Name	: Introduction to Biomanufacturing
Credit Distribution	: 3-0-2-4
Intended for	: B.Tech.-M.Tech. Integrated Dual Degree in Bioengineering
Prerequisite	: IC 136 Understanding Biotechnology and its Applications or Consent of Faculty Member
Mutual Exclusion	: NA
Approval	: 50th BoA

1. Preamble:

This course introduces the principles and practices of biomanufacturing, focusing on the production of value-added products using biological systems. It covers upstream and downstream processing, bioreactor design, scale-up strategies, quality control, regulatory frameworks, and emerging trends such as synthetic biology and biofoundries. The course integrates theory with case studies from pharmaceuticals, biofuels, food, and environmental sectors.

2. Course Modules with quantitative lecture hours:

Module 1: Introduction to Biomanufacturing (12 Hours)

Definition, scope, and importance of biomanufacturing; Introduction to biologicals and biomolecules for Industrial Application, Stages of biomanufacturing and overview of bioprocess workflow; Types of bioproducts: pharmaceuticals, vaccines, enzymes, biofuels. Historical development and industrial relevance; Overview of biomanufactured products: Pharmaceuticals (antibiotics, vaccines); biofuels (bioethanol, biogas, biodiesel); food & enzymes; Introduction to expression systems, nutritional strategies, and cell culture media with relevant industrial case studies.

Module 2: Production, Isolation & Purification (12 Hours)

Media preparation, sterilization, inoculum development, and fermentation strategies (batch, fed-batch, continuous). Bioreactor design, operation, process monitoring, aeration, agitation, oxygen transfer, and scale-up considerations. Cell harvesting, centrifugation, filtration, chromatography, membrane separation, ultrafiltration, diafiltration, viral clearance, and product purification.

Module 3: Industrial Scaleup and Regulatory Framework (12 Hours)

Process scale-up, process optimization, techno-economic analysis (TEA), and life cycle assessment (LCA). Process validation and characterization. Good Manufacturing Practices (GMP), Quality Assurance (QA), Quality Control (QC), documentation, and regulatory guidelines (CDSCO, US FDA, EMA). Biosafety, ethical considerations, and product

approval processes.

Module 4: Industrial Applications and Emerging Trends (06 Hours)

Biomanufacturing applications in tissue engineering, monoclonal antibodies, recombinant therapeutics, gene therapy, and mRNA vaccines. AI in bioprocess optimisation, sustainable biomanufacturing, and industrial case studies.

Laboratory Experiments (28 Hours):

1. Media preparation and sterilization
2. Cell separation
3. Chromatography
4. Ultrafiltration and diafiltration
5. Biomass estimation and product analysis
6. Alginate bead encapsulation

3. Textbooks:

1. Shuler & Kargi – Bioprocess Engineering: Basic Concepts
2. Nielsen & Villadsen – Bioreaction Engineering Principles

4. References:

1. Gilleskie, Gary, Charles Rutter, and Becky McCuen, Biopharmaceutical Manufacturing: Principles, Processes, and Practices, Walter de Gruyter GmbH & Co KG, 2021.
2. Doran – Bioprocess Engineering Principles
3. Atala, Anthony, and Julie Allickson, eds., Translational regenerative medicine, Academic Press, 2014.
4. Wei Wang, Manmohan Singh, Biological Drug Products: Development and Strategies, Wiley, 2013.
5. Stanbury et al. – Principles of Fermentation Technology
6. Harrison et al. – Bio-separations Science and Engineering
7. Ratledge & Kristiansen – Basic Biotechnology

5. Similarity with the existing courses:

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

S. No.	Course	Course Code	Similarity Content	Approx. % of Content
1	Understanding Biotechnology and its Applications	IC136	Basic biology	2%

6. Justification of the new revised course proposal if cumulative similarity content is >5%:

Approvals:

Other Faculty interested in teaching this course: –

Proposed by: Lokeshkumar Pisaram Ramteke
School: School of Biosciences and Bioengineering

Signature:

L. Ramteke
7/05/2026

Date: 07/05/2026

The following faculty (at least 3 faculty) discussed on *07/05/26* and approved the proposal on.....

Sl. No	Faculty Name	Signature	Comment (If Any)
1.	Baskar Bakthavath	<i>[Signature]</i>	Recommended
2.	Amrit Jaiswal	<i>[Signature]</i>	Recommended
3.	Shyam Masakerathi	<i>[Signature]</i>	Recommended.

School Chair: *[Signature]*

School: **SBB**

Date: **15th May 2026**

This proposal is reported in *64*th Board of Academics on *15/05/2026*

Dean Academics

Date:

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

Recommended/Not Recommended, with Comments:

Chairperson, CPC

Date: _____

Approved / Not Approved

Chairperson, BoA

Date: _____



-
- Course Code: **IC161.**
 - Course Name: **Applied Electronics.**
 - Credit (L-T-P-C): **3-0-0-3.**
 - Prerequisite: **Consent of the faculty member.**
 - Students Intended for: **B. Tech. First Year.**
 - Elective or Core: **Core.**
 - Semester: **Even/Odd.**

Course Objective:

To understand the principle behind common digital and analog electronics devices. Understanding the fundamentals of electronic components and electrical quantities used in electronic circuits. To analyse basic analog and digital electronic circuits used in engineering applications. To introduce students with the concepts of digital electronics including logic gates, combinational, and sequential circuits.

Course Content:

- **Devices and Basic Circuits:** Ideal Diode, PN-Junction Diodes, Clipping and Clamping, Rectification, Zener diode regulator, MOSFET structure and operation, MOSFET switches, biasing, amplifiers (Common Source, Common Gate, Common Drain). Basic logic design with transistors and diodes (CMOS).
— 10 hours
 - **Introduction to RLC Circuits and Network Theorems:** Fundamentals (Electrical Quantities, Passive Elements, Ohm's Law, Kirchhoff's Laws, Series and Parallel Circuits), Series and Parallel RLC Circuits, Resonance in RLC Circuits, Resonant Frequency, Q-Factor, Bandwidth, Important Network Theorems (Superposition Theorem, Thevenin's Theorem, Norton's Theorem, Maximum Power Transfer Theorem, Reciprocity Theorem, Millman's Theorem).
— 6 hours
 - **Feedback and Operational Amplifiers:** Introduction to feedback, Operational amplifiers (as a black box), the golden rules, Basic op-amp circuits: Inverting and Noninverting amplifier, Follower, Integrators, Differentiators, Precision rectifiers, Comparators, Schmitt trigger.
— 7 hours
 - **Digital Electronics:** Number systems (Binary, Decimal, Hexadecimal, Octal), Binary algebra, De-Morgans laws, Combinational Circuits: Adder, Subtractor, Decoder, Encoder, Multiplexers, Demultiplexers Sequential Circuits: Latch, Flipflops, Counters, Shift registers, and Memory.
— 10 hours
 - **Measurement Transducers:** Temperature, light, acceleration, pressure, force, velocity, magnetic field, particle detectors.
— 4 hours
 - **Microcontrollers:** Application of Microcontrollers, General Architecture, Interfacing, Bus Signals, Interrupts, Registers, Support Chips. Case study: Compare the architectures of two popularly used microcontrollers, programming of a microcontroller with examples.
— 5 hours
-

Books:

A. **Text Books:**

1. P. Horowitz and Winfield Hill "The art of electronics" Cambridge University.
2. M. Mano "Digital logic design", Prentice Hall.

B. **Reference Books:**

1. Adel S. Sedra, Kenneth C. Smith "Microelectronics Circuits" Oxford University Press.
 2. William Hyat, Jack Kemmerly, Jamie Phillips, Steven Durbin "Engineering Circuit Analysis" Mc Graw Hill.
-

Approvals:

Faculty interested in teaching this course:

All the Electrical Engineering Faculty Members.

Revised by:

Dr. Rahul Shrestha

School: SCEE, IIT-Mandi

Signature:

Date 15.05.2026



Recommended/Not Recommended, with Comments:

_____ Date: _____

Chairman, CPC Approved / Not Approved

_____ Date: _____

Chairman Senate

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/7a485930ece4b0fbaa0/		
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 be changed. The compulsory 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	Ikshma 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	EE260	Signals and Systems	2.5	0.5	0	3	2.5-0.5-0-3			
3	III	DC	EE261	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	EE311	Device Electronics for IC	3	0	0	3	3-0-0-3			
7	IV	DC	EE212	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	EE202	Electromagnetics & Wave Propagation	3	0	0	3	3-0-0-3			
3	IV	DC	EE206	Electro-Mechanics	2.5	0.5	2	4	2.5-0.5-2-4			
4	IV	DC	VL211	Analog Circuit Design	3	0	2	4	3-0-3-4			
6	IV	DC	EE316	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	EE223P	Reverse Engineering	0	0	2	1	0-0-2-1			
											22	86
Fifth Semester												
1	V	DC	EE302	Control Systems	3	0	2	4	3-0-2-4			
2	V	DC	EE303	Power System	3	0	2	4	3-0-2-4			
3	V	DC	EE315	Digital Signal Processing	3	0	2	4	3-0-2-4			
4	V	DC	EE326	Computer Organization & Processor Architecture Design	3	0	2	4	3-0-2-4			
5	V	DC	EE231	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		
				Eighth 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	DP402P	MTP-2	x	x	x	5	x-x-x-5					
										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.	12	161		

IIT Mandi

Proposal for a New Course

Course number	MB531
Course Name	Legal and Ethical Aspects of Business
Credit	2
Distribution	2-0-0-2
Intended for	MBA
Prerequisite	Not Applicable
Mutual Exclusion	Not applicable

1. Preamble

This course on Legal and Ethical Aspects of Business introduces students to the legal and ethical dimensions of modern business operations with a special emphasis on technology-enabled business environments. The course provides foundational understanding of legal principles relevant to managers, including contracts, business enterprises, company law, data protection, privacy, e-commerce, intellectual property rights, and cyber law.

The course also examines ethical issues in business and management by exploring individual, organizational, and societal dimensions of ethics. It introduces students to ethical decision-making, ethical leadership, organizational ethics, and the broader responsibilities of businesses in society.

Special attention is given to the evolving legal and ethical challenges arising from digital technologies, online transactions, data ecosystems, privacy concerns, cybercrime, and emerging regulatory frameworks under the Digital India Act.

The course adopts a practical and managerial orientation by using illustrative case studies and application-oriented discussions to help students understand the legal and ethical implications of managerial decisions in contemporary business environments. Course objectives are as follows:

- Understand foundational legal concepts relevant to business and management.
- Develop an understanding of contract law, business enterprises, and regulatory systems governing business activities.
- Understand legal aspects of technology-enabled business environments including data protection, privacy, e-commerce, cyber law, and intellectual property rights.
- Develop awareness of ethical issues in business and managerial decision-making.
- Understand ethical leadership, organizational ethics, and societal responsibilities of businesses.

2. Course Modules with quantitative lecture hours

Module 1: Foundations of Business Law (6 hours)

Basic legal concepts for managers; introduction to law; legal systems; role of law in business. Fundamentals of contract law; legal aspects of business enterprises; basics of company law and

corporate structures. Introduction to intellectual property rights; copyrights, trademarks, patents; protection of digital and technological innovations.

Module 2: E-Commerce and Technology Law (4 hours)

Legal compliance norms in e-commerce and m-commerce; cyber law; online transactions and digital governance. Cybercrime; freedom of speech on the internet; legal regulation of online conduct and digital platforms.

Module 3: Data Protection and Privacy (4 hours)

Data ecosystem under Digital India framework; law of privacy; legal implications of data management and digital interactions.

Module 4: Ethics in Business and Management (8 hours)

Introduction to ethics; ethical issues in business; individual, corporate, and societal ethical dimensions; ethical decision-making.

Module 5: Ethical Organizations and Leadership (6 hours)

Ethical organizations; ethical leadership; business responsibility toward society and environment.

Laboratory/practical/tutorial Modules: None

3. Text books

NA

4. References

- Bill O'Rourke, Brad Agle, and Aaron Miller, The Business Ethics Field Guide, Merit Leadership, 2016.
- Boatright, John R., Ethics and the Conduct of Business, Pearson Education, Indian Reprint, 2003
- A C Fernando, K P Muralidheeran, E K Satheesh, Business Ethics: an Indian Perspective, Pearson Education, 2019.
- The Value of Values: How Leaders Can Grow Their Businesses and Enhance Their Careers by Doing the Right Thing, MIT Press, Daniel Aronson, 2024
- Andrew Crane, Dirk Matten, Sarah Glozer, Laura Spence, Business Ethics, Oxford University Press, 2020
- Rowan, John, and Zinaich, Jr., Ethics for the Professions, Wadsworth, 2003
- M.K. Kabi, Legal Aspects of Business, Taxmann Publications Pvt. Ltd., 2020
- Relevant readings and case materials on business law, cyber law, ethics, and technology governance will be provided during the course.

5. Similarity with the existing courses

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

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

Not Applicable

Approvals:

Faculty interested in teaching this course: Guest faculty

Proposed by: Prof. Anjan Kumar Swain

School: School of Management

Signature:

Date: 14/05/2026

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

Sl. No	Faculty Name	Signature
1.	Dr. Ashish Bollimabala	
2.	Dr. Saumya Dixit	
3.	Dr. Ridhi Arora	

School Chair:

School:

Date: 14/05/2026

This proposal is reported inthe Board of Academics on

Dean Academics

Date:



Proposal for a New Course

Course number : MT304
Course Name : Mechanical Behavior of Materials
Credit : 4
Distribution : 3-0-2-4
Intended for : B.Tech.
Prerequisite : None
Mutual Exclusion: EN611-Durability Behavior of Energy Materials (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.*)

Preamble: The course examines the durability behavior of materials employed in various engineering applications. The challenge to durability comes from the deformation at room and elevated temperature under static and dynamic loading prevailing under a given application circumstance. In addition, corrosion, wear, and erosion limit the life of components. The course offers a holistic view of durability, indicating the directions of materials development for structural, thermal, and energy applications.

Course Outline: The course will start with a test of deformation behavior to identify the material parameters governing durability under static load and then proceed to understand the instantaneous deformation behavior under static and dynamic loading and after that, focuses on high-temperature time-dependent deformation behavior prevalent in high-temperature to follow the development of alloys for ultra-supercritical boilers and turbines. At the end the course focuses on durability threats to components employed in energy generation from corrosion, hot corrosion, erosion, and cavitation, as well as the strategies to counter them. The course will be delivered in the following modules.

Module 1: Static loading and Deformation behavior Distinctive load – elongation behavior of different types of materials under uni-axial loading, definition of stress and strain, stress-strain diagram, elastic behavior, yielding and plastic behavior of ductile materials; necking instability, Important design criteria based on stress and strain at ambient temperature; strain rate and its influence of stress-strain diagram at elevated temperature. [4 Hours]

Module 2: Durability under static loading Defects in materials; linear defects or dislocations – types, burgers vector, slip, slip planes and slip directions, cross slip and climb, movement of dislocations leading to plastic deformation, stacking fault and partial dislocations, strain hardening, grain boundaries, strengthening mechanisms; recovery, recrystallization and grain growth during heating of deformed materials. [4 Hours]

Module 3: Durability under Creep Deformation, Deformation under static loading at elevated temperature - creep curve, mechanisms of creep, the temperature dependence of creep, deformation mechanism maps, cavitations, stress rupture versus creep, extrapolation schemes;

Development of materials for ultra-supercritical boilers for application in furnace panels, super-heaters, thick section components, and steam lines. [4 Hours]

Module 4: Durability under Cyclic Loading, Deformation under cyclic loading, high cycle fatigue – S-N curve, effect of mean stress, Miner rule, cyclic stress-strain curve, low cycle fatigue, strain life equation, effect of stress concentration and size of component, Design for fatigue, effect of temperature on fatigue; creep-fatigue interaction, development of turbine materials. [4 Hours]

Teaching Laboratory:

Experiments:

1. **Tensile test on ferrous materials**

Determine mechanical properties (yield stress, ultimate stress, breaking stress, percentage of reduction in area, percentage of elongation, and Young's modulus) for ferrous materials.

2. **Tensile test on non-ferrous materials**

Compare the stress-strain diagrams of non-ferrous materials with those of ferrous materials.

3. **Compression test on brittle vs. ductile metallic materials**

Analyze the mechanical properties of both brittle and ductile materials under compression.

4. **Compression test on ceramic materials**

Determine the mechanical properties of ceramic materials through compression testing.

5. **Microstructure examination**

Study and compare the grain structures in various metallic and non-metallic materials using optical or electron microscopy.

6. **Creep test**

Conduct a creep test to observe the time-dependent deformation behavior of a selected material under constant stress.

7. **Stress corrosion cracking study**

Investigate the effects of stress corrosion cracking in specific materials by applying tensile stress in a corrosive environment.

8. **Hydrogen embrittlement study**

Analyze the effects of hydrogen embrittlement on selected metallic specimens by subjecting them to hydrogen exposure.

9. **Micro-hardness/nanoindentation test**

Perform hardness tests on various materials using micro-hardness or nanoindentation techniques to assess material properties at small scales.

10. **Fatigue test**

Conduct fatigue tests on selected materials to evaluate their resistance to cyclic loading and determine fatigue life.

11. Impact resistance and hardness measurement

Measure the hardness and impact resistance of various samples to assess their toughness and durability.

12. Friction and wear study

Investigate the frictional behavior of different material combinations under varying loads, sliding speeds, temperatures, and lubrication conditions to predict the coefficient of friction and wear rates.

Text Books:

1. George E. Dieter, Mechanical Metallurgy, McGraw Hill Book Company 1986

References:

1. Meyers, M.A. and Chawla, K.K., Mechanical Behavior of Materials, 2nd edition, Prentice Hall, 2008.

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

S. No.	Course Name	Course Code	Similarity Content	Approx. % of Content
1.	Durability Behavior of Energy Materials	EN611	Same content between the two courses	100%

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

The course EN611 (**Durability Behavior of Energy Materials**) is currently being offered in SMME, only to PG and PhD students. The proposed course, MT304 - **Mechanical Behavior of Materials**, is for **B.Tech students** and covers similar topics at a level suited for undergraduates. While the content overlaps, the **focus and depth** will be adjusted for B.Tech students, emphasizing practical understanding rather than advanced analysis. Thus, despite the content similarity, the difference in **target audience and objectives** justifies the new course.

Approvals:

Faculty interested in teaching this course: –

Dr. Sandeep Sahu, Dr.V.M.Suntharavel Muthaiah, Dr. Visshal, Dr. Rahul Vaish, Dr. Sudhir Pandey, Dr. Jaspreet, Dr. Rik Koner, Dr. Swati, Dr. Ravindra, Dr. [Neha Shukla](#)

Proposed by: Dr. Sandeep Sahu


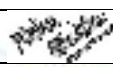
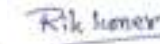
School: SMME

Signature:



Date: 03/10/2024

The following faculty (at least 3) discussed the proposal on 24/09/2024 and approved it on 03/10/2024.

Sl. No	Faculty Name	Signature
1.	Dr. Viswanath Balakrishnan	
2.	Dr.Neha Shukla	
3.	Dr. Rik Rani Koner	

School Chair:

School:

Date:

This proposal is reported in the Board of Academics on

Dean Academics

Date:

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



Ref. No.: IITMandi/Acad/BoA-59/2025/4186-90

Date: 19-06-2025

Title: **Notification regarding credit adjustment in B.Tech in Mechanical Engineering Curriculum**

NOTIFICATION

(Proposal for B.Tech in Mechanical Engineering Curriculum)

The Board of Academics (BoA) in its 59th meeting held on 16th April, 2025, vide Item No. 59.10 discussed the proposal for credit adjustment of B.Tech in Mechanical Engineering curriculum. After detailed deliberation, the BoA approved the following:

The credit structure of Electrical Systems Around us has been changed as mentioned below:

Old: IC XXX; Electrical Systems Around Us; 3-0-2-4

New: EE261; Electrical Systems Around Us; 3-0-0-3

With this, the total Discipline Core credits in Mechanical Engineering B.Tech program will become 50. Additional credits will be adjusted under discipline Elective. Revised Discipline Core courses are as follows:

Discipline Core credits : B.Tech Mechanical Engineering		
Course Code	Name	LTPC
EE 261	Electrical Systems Around Us	3-0-0-3
IC 241	Materials Science for Engineers	3-0-0-3
ME 100	Reverse Engineering	0-0-2-1
ME 205	Machine Drawing	1-0-3-3
ME 206	Mechanics of Solids	3-0-0-3
ME 210	Fluid Mechanics	3-0-0-3
ME 210P	Fluid Mechanics Lab	0-0-2-1
ME 212	Product Manufacturing Technologies	2-0-2-3
ME 213	Engineering Thermodynamics	3-1-0-4

ME 303	Heat Transfer	3-0-0-3
ME 303P	Heat Transfer Lab	0-0-2-1
ME 305	Design of Machine Elements	3-1-0-4
ME 307	Energy Conversion Devices	3-0-0-3
ME 308	Manufacturing Engineering 1	3-0-0-3
ME 309	Theory of Machines	4-0-0-4
ME 310	System Dynamics and Control	3-0-0-3
ME 311P	Design Lab 1	0-0-2-1
ME 312P	Design lab 2	0-0-2-1
ME 315	Manufacturing Engineering 2	3-0-0-3
TOTAL		50

-S/d-
Assistant Registrar
(Academics)

CC To:

1. Dean(Academics)
2. Associate Dean (Courses)
3. Chairperson, SMME
4. All faculty via email
5. All students via email

B. Tech. in Materials Science and Engineering

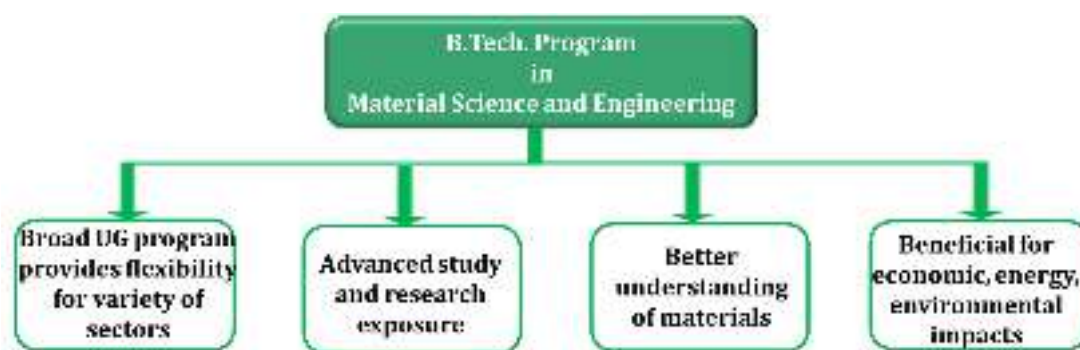


**School of Mechanical and Materials Engineering
(SMME)**

Indian Institute of Technology Mandi

Preamble:

The Bachelor of Technology (B.Tech.) in Materials Science and Engineering program aims to achieve strong foundation in Materials Science with focus on Engineering Applications by offering large number of allied engineering courses and employable skills. The idea is to develop broad B.Tech. Curriculum with a blend of science and engineering covering key elements of materials, advanced processing, additive manufacturing with hands-on training. Further the proposed curriculum will develop an understanding of the structure-properties correlation, processing, and service behavior of engineering materials, including semiconductors for electronic devices, ceramics for energy conversion and storage, and polymers for emerging biotechnologies. This understanding fosters both the development of new materials and the improvement of existing materials to optimize manufactured products and modern tools. This program will give students a strong foundation in both theoretical and practical understanding of the subject. At present scenario, student who specializes in materials science and engineering needs to study and develop solutions in the advanced emerging fields of sustainability and renewable energy, nanotechnology, quantum materials, and devices, artificial intelligence, smart materials, low-power computing, manufacturing, and productivity. We have excellent laboratories/research centers facilities for materials science and engineering at IIT Mandi. The proposed B.Tech. program will help us to bridging the gaps between the research activities and engineering education and our graduates would play a leadership role to future growth and the industry. Materials engineers also offer knowledge of materials for practical applications that serve as the cornerstone of the goods and services provided by numerous sectors. Further, the proposed B.Tech. program will promote the academic and research activities at IIT Mandi and make larger impacts in society by producing high quality engineers.



Credit Structure of the programme

The typical credit structure of the institute will be followed as shown below.

Division	Sub division	Credits
Institute Core	IC Compulsory	39
	IC Baskets	06
	Humanities and Social Sciences (HSS)	12
	Indian Knowledge System (IKS)	03
Discipline	Discipline Core (DC) + Reverse Engg.	44+1
	Discipline Electives (DE)	21
Electives	Free Electives (FE)	22
	Major Technical Project (MTP)	08
	Interactive Socio Technical Practicum (ISTP)	04
	TOTAL	160

The credit structure will be followed as per the existing norms of the institute. Out of 160 credits, 42 credits will be dedicated to discipline courses in which 12 credits will be reserved for six engineering labs and taught together with theory. Total of 21 credits will be assigned for discipline electives wherein few optional baskets will be introduced for promoting B.Tech. Specialization for 15 credits. Total of 63 credits will be maintained for DC (42 credits) and DE (21 credits) courses while the rest of the credits will be kept for IC and other institute level courses (97 credits). Additional 12 credits will be introduced for UG research program to attract motivated research students towards research career at early stage by offering B.Tech. Honors.

List of courses proposed

Core Courses	Discipline Electives	IC Courses/Other
1. Physics of Solids 2. Materials Synthesis and Characterization (2 + 2 credits of Lab) 3. Phase Transformations 4. Thermodynamics and Kinetics of Materials 5. Durability Behavior of Materials (2 + 1 credits of Lab) 6. Quantum Mechanics and Applications 7. Functional Properties of Materials (2 + 2 credits of Lab) 8. Extraction and Materials Processing (2 + 2 credits of Lab) 9. Mechanics of Solids 10. Transport Phenomena 11. Computational Materials Science (2 + 2 credits of Lab) 12. Product Realization Technology (2 + 2 credits of Lab) 13. Materials Science for Engineers (IC 241) (3 credits) 14. Reverse Engineering (1 credit)	1. Smart Materials and Actuators 2. Biomaterials 3. Thin Film Technology 4. Carbon Materials 5. Materials Modelling 6. Ancient Materials 7. Structural Materials <i>(See the other discipline elective courses under the specialization baskets below)</i>	1. Calculus 2. Complex variables and Vector Calculus 3. Linear Algebra 4. ODE 5. Engineering Graphics and Design 6. Introduction to Python and Data Science 7. Applied Chemistry 8. Applied Electronics 9. Applied Electronics Lab 10. Probability and Statistics 11. Materials Science for Engineers 12. Foundations of Design and Practicum 13. Physics Practicum 14. Design Practicum 15. Machine Learning 16. Reverse Engineering 17. MTP-1 and MTP-2 18. HSS courses 19. IKSHMA Course 20. Mechanics of Rigid Bodies

The elective courses are organized under 4 optional specialization baskets as shown below.

B.Tech. in Materials Science and Engineering with Specialization in "X"

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X: Product Design and Manufacturing

1. Fundamentals of Product Design
2. Prototyping methods
3. 3D Printing of Diverse Materials
4. Advanced Manufacturing Processes
5. Nanomanufacturing

X: Clean Energy and Sustainable Materials

1. Urban Mining and Sustainability
2. Energy Conversion and Storage Technologies
3. Recycling and Circular Economy
4. Environmental Implication of Materials
5. Green Processes and Decarbonization

X: Quantum Materials and Semiconductor Devices

1. Materials for Quantum Technologies
2. Sensor Materials and Technologies
3. Semiconductor Materials and Devices
4. Quantum Optics and Devices
5. Mesoscopic Physics and Quantum Transport

X: ICME – Integrated Computational Materials Engineering

1. Artificial Intelligence for Materials Science
2. Modelling and Simulations
3. Finite Element Method in Engineering
4. Density Functional Theory
5. Computational Materials Laboratory

- 5 courses from the proposed four elective baskets will enable specialization in B.Tech.
- It is optional and number of specialization baskets will be operated based on the available resources
- No additional credits are needed for B.Tech. with specialization in "X"

A. Provide a list of any current courses that would be cross-listed with the program:

1. Structure Property Correlations
2. Durability Behavior of Materials
3. Product Realization Technology
4. Functional Materials
5. Quantum Mechanics and Applications
6. Mechanics of Solids

Some of these courses are offered for M.Tech. wherein energy is added and may need to be edited suitably to make it common for both B.Tech. and M.Tech. programs.

B. What, if any, new courses will be required for the program? A separate course proposal is required for each new required course.

Being a new B.Tech. program, around 20 new courses will be proposed with required details. At the same time, some of the existing courses in the subject of Mechanical, Manufacturing, Energy Engineering and Physics will be adopted as per the requirement. Separate course proposals are being prepared and will be submitted in the due course.

C. Provide a sample academic plan for students completing the academic program being proposed.

The overall academic structure of B.Tech. Materials Science and Engineering is being worked out in cognizance with other B. Tech programs such as Mechanical Engineering and Engineering Physics. The semester wise detailed academic structure is shown in the table below for 8 semesters.

B.Tech. (Materials Science and Engineering) –1st Semester						
S.No	Code	Course Name	Lecture	Tutorial	Practical	Credit
1	ICXXX	Calculus	2	0	0	2
2	ICXXX	Complex variables and Vector Calculus	2	0	0	2
3	IC140	Engineering Graphics	2	0	3	4
4	IC152	Introduction to Python and Data Science	3	0	2	4
5	IC131	Applied Chemistry for Engineers (basket – 1)	2.5/3	0.5/0	0	3
6	IC241	Materials Science for Engineers (basket-2) (DC)	3	0	0	3
7	YYXXX	Ikshma Course	3	0	0	3

Total Credits: 21

B.Tech. (Materials Science and Engineering) –2nd Semester						
S.No	Code	Course Name	Lecture	Tutorial	Practical	Credit
1	ICXXX	Linear Algebra	2	0	0	2
2	ICXXX	ODE & Integral Transforms	2	0	0	2
2	IC161	Applied Electronics	3	0	0	3
3	IC 161P	Applied Electronics Lab	0	0	3	2
4	IC252	Probability and Statistics	3	0	2	4
5	ICXXX	Foundations of Design Practicum	1	0	6	4
6	IC221P	Physics Practicum	0	0	3	2
7	HSXXX	HSS Course	3	0	0	3

Total Credits: 22

B.Tech. (Materials Science and Engineering) –3rd Semester						
S.No	Code	Course Name	Lecture	Tutorial	Practical	Credit
1	IC201P	Design Practicum	0	0	6	3
2	IC272	Machine Learning	2	0	2	3
3	IC XXX	Mechanics of Rigid Bodies (basket-2)	3	0	0	3
4	DC-1	Physics of Solids	3	0	0	3
5	DC-2	Quantum Mechanics and Applications	3	0	0	3
6	DC-3	Materials Synthesis and Characterization	3	0	2	4
7	HSXXX	HSS Course				3

Total Credits: 22

B.Tech. (Materials Science and Engineering) – 4th Semester						
S.No	Code	Course Name	Lecture	Tutorial	Practical	Credit
1	DC-4	Mechanics of Solids	3	0	0	3
2	DC-5	Thermodynamics and Kinetics of Materials	3	0	0	3
3	DC-6	Functional Properties of Materials	3	0	2	4
4	DC-7	Extraction and Materials Processing	3	0	2	4
5	HSXXX	HSS Course				3
6	DE-1	Discipline Elective				3
7	FE-1	Free Elective				2

Total Credits: 22

B.Tech. (Materials Science and Engineering) – 5th Semester						
S.No	Code	Course Name	Lecture	Tutorial	Practical	Credit
1	DC-8	Phase Transformations	3	0	0	3
2	DCX-9	Transport Phenomena	3	0	0	3
3	DC-10	Computational Materials Science	3	0	2	4
4	DC-11	Durability Behavior of Materials	3	0	2	4
5	DE-2	Discipline Elective				3
6	DE-3	Discipline Elective				3
7	FE-2	Free Elective				2

Total Credits: 22

B.Tech. (Materials Science and Engineering) – 6th Semester						
S.No	Code	Course Name	Lecture	Tutorial	Practical	Credit
1	DC-12	Product Realization Technology	3	0	2	4
2	DE-4	Discipline Elective	0	0	3	3
3	DE-5	Discipline Elective	3	0	0	3
5	FE-3	Free Elective	3	0	0	3
6	HSXXX	HSS Course				3
7	ISTP					4

Total Credits: 20

B.Tech. (Materials Science and Engineering) – 7th Semester						
S.No	Code	Course Name	Lecture	Tutorial	Practical	Credit
1	DE-6	Discipline Elective				3
2	FE-4	Free Elective				3
3	FE-5	Free Elective				3
4	MTP-1	MTP-1				4
5	IC 010	Internship				2

Total Credits: 15

B.Tech. (Materials Science and Engineering) – 8th Semester						
S.No	Code	Course Name	Lecture	Tutorial	Practical	Credit
1	DE-7	Discipline Elective				3
2	FE-6	Free Elective				3
3	FE-7	Free Elective				3
4	FE-8	Free Elective				3
5		MTP-2				4

Total Credits: 16

Grand Total: 160 credits for B.Tech. Materials Science and Engineering

Brief details about the Elective Specializations are shown below.

1. B.Tech. Specialization in Product Design and Manufacturing

To establish a program bridging a gap between industrial product design and its manufacturing. The program minor will be oriented towards conceptualizing and nurturing a design idea by making it progress through various design stages. The outcome of such a practice will be a product prototype that

can be upscaled to an industrial level. The students opting for this minor will aim at working in close collaboration with the incubation center (catalyst) to support the technology transfer and/or lead to the establishment of the start-ups. Such a program will be in line with the Make-in-India objective. The engineering students, irrespective of their branch can engage themselves right from the first semester into a design philosophy which they can slowly nurture over the years ending up with a ready to launch a product by the end of their undergraduate degree.

2. B.Tech. Specialization in Clean Energy and Sustainable Materials

Materials that can be produced at a large scale in an eco-friendly manner and a reduced dependence on non-renewable sources are designated as sustainable materials. The idea of sustainable materials and production is an emerging concept in the 21st century that is inspired by the rapid global growth in the production of commercial goods featuring advanced functionalities. Sustainable materials are expected to be compatible with low energy consuming manufacturing processes that generate minimal waste. At the same time, their recyclability is an essential aspect, in order to minimize waste generation. In this specialization, courses on a range of environment-friendly materials, non-hazardous materials, waste-derived materials, recyclable and biodegradable materials, and associated process optimization will be offered. The student will also receive training on designing and developing alternative materials for existing products. In addition, general waste management processes, introduction to energy management and associated technologies will be covered. Essential energy and environment related policies, both Indian and international, will also be touched upon.

3. B.Tech. Specialization in Quantum Materials and Semiconductor Devices

The advancement of the human civilization has been immensely influenced by the discovery of new materials. Almost all the new technological developments rely on the exotic properties of materials. Materials such as Magnets, Multiferroics, Thermoelectrics, Optical, Piezoelectrics, superconductors, nanomaterial, low dimensional materials etc. whose properties cannot be explained within the pursuit of Newtonian physics, and the principles of quantum mechanics are invoked to understand their behavior, are termed as quantum materials. The technology using new quantum materials would lead to the next level of revolution in technologies for energy, electronic sensors, quantum computers, optical fiber, optical sensors, levitating trains, nano-electronics, information infrastructures etc. The new technology harnessing the quantum properties of materials is expected to be more powerful in comparison to its classical counterparts. In order to harness the quantum properties of materials for the future technology, there is need to understand, explore and tailor the new property of material as well as the fabrication of the suitable devices. The proposed minor in B.Tech. program will give an early exposure to the students to this developing field of advance technology.

4. B.Tech. Specialization in Integrated Computational Materials Engineering

The integrated computational materials engineering covering variety of theoretical and simulation approaches at different length scales with the use of different computational tools would attract students who are interested to apply their computational skills to scientific problems in Materials Science. In addition to conventional methods such as density functional theory, molecular dynamics, modeling and simulations and finite element methods, emerging subjects like application of AI and machine learning in materials science would be introduced. Materials discovery has always been challenging problem based on its numerous real life target applications. Scientist are trying to accelerate the research with use of artificial intelligence (AI) and machine learning (ML) to adapt the materials fabrication which could meet the demand of current century. tudents will be trained in multiple computational packages to solve materials engineering problems from atomic, molecular scales to macroscopic length scales.

Proposal for Minor Revisions to the IPh.D. and M.Sc. Physics Curricula

Rationale for revision

The IPh.D. program in Physics was initiated in 2015, followed by the launch of the M.Sc. Physics program in 2017. During the initial years, the limited number of faculty members constrained the breadth of courses and topics that could be offered. As a result, certain core areas of physics were either not introduced or could not be covered with the desired depth. With the subsequent expansion of faculty strength and expertise, the department is now well positioned to address these gaps and strengthen the academic framework of both programs. Over the years, we have gained valuable experience regarding the academic preparedness of students and the realistic extent of content that can be effectively delivered and assimilated within a single semester. It has been observed that some core courses currently contain excessive content, which compromises the intended rigor and depth of learning. In particular, the learning outcomes of certain 4-credit courses have not consistently met expectations due to overextended syllabi. To address these concerns, we propose a modest restructuring of credits and selective rationalization of course content. Some advanced or specialized topics currently included in core courses may be more appropriately offered as higher-level electives, especially now that the department has sufficient faculty expertise to support such offerings. This approach will allow core courses to focus on foundational principles while enabling motivated students to explore advanced topics through elective options. Additionally, the proposed revisions incorporate constructive suggestions provided by the Progress Review Committee of SPS. The overall objective of these minor modifications is to enhance academic rigor, improve learning outcomes, ensure better content balance, and strengthen the core foundations of both the IPh.D. and M.Sc. programs without altering their fundamental structure.

Credit structure

	MSc (credits)	IPhD (credits)
Core	59	71
Elective	21 (Free elective-9)	18 (Free elective-3)
Total	80	89

No changes have been proposed for overall credit structures of IPhD and MSc.

Proposed revisions

1. **Credit redistribution:** slight modification of the semester-wise credit distribution (*see attached documents*)
2. **Addition of core course:** Nuclear and Particle Physics (3 credits)
3. **Credit reduction of courses:** Mathematical Physics, Classical Mechanics, Electromagnetic Theory, Statistical Mechanics

One credit is reduced for each of these 4-credit courses and appropriate content redistribution is done in these courses.

IIT Mandi

Proposal for a Revised Course

Course number : PH 511
Course Name : Mathematical Physics
Credit : 3
Distribution : 3-0-0-3
Intended for : Core for M.Sc. and I-Ph.D. in Physics; Elective for B.Tech. 3rd and 4th Year.
Prerequisite : Undergraduate physics courses
Mutual Exclusion : NA

1. Preamble:

Mathematical physics provides a firm foundation in various mathematical methods developed and used for understanding different physical phenomena. This course provides mathematical tools to address formalisms used in the core course of master's level physics program.

2. Course Modules with quantitative lecture hours:

1. Graphical Analysis and Vector Calculus Review

Two-dimensional plots of simple functions, Review of Vector Calculus in Curvilinear coordinates. [4 lectures]

2. Linear Vector Spaces

Linear vector spaces, Gram-Schmidt orthogonalization, Self -adjoint, Unitary and Hermitian Operators, Transformation of Operators: Unitary and Similarity Transformations, Eigenvalue Equation, Hermitian Matrix Diagonalization, Dirac Delta function, Infinite-dimensional Vector Spaces, Hilbert spaces. [11 lectures]

3. Ordinary Differential Equations

Review of Second order Linear ODE, Series Solution: Frobenius Method, Inhomogeneous linear ODE, Sturm Liouville equation, Hermitian operators: Eigenvalue Problem. [8 lectures]

4. Special Functions

Bessel, Neumann, Hermite, Legendre, Spherical Harmonics, Laguerre, Gamma and Beta functions. [5 lectures]

5. Complex Analysis

Cauchy- Riemann conditions, Cauchy's Integral theorem, Laurent expansion, Singularities, Calculus of residues, evaluation of definite integrals. [9 lectures]

6. Fourier Analysis

Fourier Series general properties and application, Integral transform, Properties of Fourier transform, Laplace transform, Convolution theorem. [5 lectures]

Laboratory/practical/tutorial Modules: No

3. Text books:

1. Arfken and Weber, Mathematical methods for physicists (Elsevier Academic Press, 7th edition, 2012)
2. Mary L Boas, Mathematical Methods in Physical Sciences, (Wiley 3rd edition, 2005)

4. References:

1. V. Balakrishnan, Mathematical Physics with Applications, Problems and

Solutions(Ane Books, 2023): *Discussion of plotting of functions, Compact discussion of linear vector spaces*

2. K. F. Riley and M. P. Hobson, *Mathematical Methods for Physics and Engineering: A Comprehensive Guide* (Cambridge India South Asian Edition, 2009)
3. J. Mathews and R. L. Walker, *Mathematical Methods for Physicists* (Imprint, New edition 1973)
4. F.W. Byron and R.W. Fuller, *Mathematics of Classical and Quantum Physics* (Dover Publication, New edition, 1992)
5. P. M .Morse and H. Freshbach, *Methods of theoretical Physics Vol. I and II* (Mc-GrawHill, 1953)
6. E. Kreyszig, *Advanced Engineering Mathematics*(Wiley India Private Limited, 10th edition, 2003)
7. P .Dennery and A. Krzywicki,*Mathematics for Physicists*(Dover Publications Inc. 1996)
8. M. Spiegel, *Complex Analysis* (McGraw-Hill Education, 1980)
9. M. Spiegel, *Vector Analysis* (McGraw-Hill Education, 2nd Edition, 2016)

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%:

NA

IIT Mandi

Proposal for a Revised Course

Course number : PH 512
Course Name : Classical Mechanics
Credit : 3
Distribution : 3-0-0-3
Intended for : Core for M.Sc. and I-Ph.D. in Physics; Elective for B.Tech. 3rd and 4th Year.
Prerequisite : Undergraduate Mechanics course
Mutual Exclusion : None

1. Preamble:

Classical mechanics lies in the foundation of the mechanics of the observable world. Starting from Newtonian mechanics, this course looks into the conservation laws of mechanics, which helps to develop the analytical mechanics in terms of the generalized coordinates. The course looks into Lagrangian and Hamiltonian formalism and the framework of solvable models such as two-body, rigid-body, and small oscillations. Then, we look into the canonical transformation and associated algebraic framework required for the advanced formulation of the mechanics. This course is at an advanced level with more mathematical proofs that enhance the basic introduction to classical mechanics in the undergraduate level.

2. Course Modules with quantitative lecture hours:

Unit/Topic 1: Introduction: Mechanics of a system of particles, constraints, Lagrange's equation motion, Hamilton's principle and calculus of variations, Applications of the Lagrangian Formulation. Symmetries and conservation laws. **(10 hours)**

Unit/Topic 2: The Central Force Problem: The Equivalent one-dimensional problem and classification of orbits, the Kepler problem. **(6 Hours)**

Unit/Topic 3: The Kinematics of Rigid Body motion: Orthogonal transformations, Euler's theorem on the motion of a rigid body, finite rotations, infinitesimal rotations, rate of change of a vector, Angular momentum and kinetic energy of motion, the inertia tensor and the moment of inertia, Euler equation of motion of the rigid body. **(8 Hours)**

Unit/Topic 4: Oscillations: Formulation of the problem, the eigenvalue equation and the principal axis transformation, small oscillations, frequencies of free vibration, and normal coordinates. **(4 hours)**

Unit/Topic 5: The Hamilton Equations of Motion: Legendre Transformations and the Hamilton Equations of Motion, Cyclic Coordinates and Conservation Theorems, The Principle of Least Action. **(6 Hours)**

Unit/Topic 6: Canonical Transformations: The examples of canonical transformation Poisson Bracket and canonical invariants, Liouville's theorem. Hamilton-Jacobi theory and Action-Angle Variables **(8 Hours)**

Laboratory/practical/tutorial Modules: None

3. Textbooks:

1. H. Goldstein, Classical Mechanics, 3e, Pearson Education; 3rd edition (2011), India.

2. References:

1. C. Lanczos, The variational principles of mechanics, Dover Publications; New edition (1986), US.
1. N.C. Rana and P.S. Joag, Classical Mechanics, McGraw Hill Education, India.
2. L.D. Landau and E.M. Lifshitz, Mechanics; Third edition (1 January 2010), Elsevier, India.
3. John R Taylor Classical Mechanics, University Science Books (2005) US.

4. Similarity with the existing courses: None

(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%:

NA

IIT Mandi

Proposal for a Revised Course

Course number : PH 513
Course Name : Quantum Mechanics I
Credit : 3
Distribution : 3-0-0-3
Intended for : Core for M.Sc. and I-Ph.D. in Physics; Elective for B.Tech. 3rd and 4th Years.
Prerequisite : Undergraduate core physics courses
Mutual Exclusion : None

1. Preamble: This course is an introductory postgraduate level course on quantum mechanics covering its basic principles. Several applications of quantum mechanics will be discussed to train students to apply these ideas to model systems in both one and higher dimensions. The course begins with a review discussion of Schrodinger formalism complemented with applications. Dirac notation will be introduced. Applications of quantum mechanics in three dimensions will be discussed. Approximation techniques such as WKB and time-independent perturbation theory will be also discussed in this course.

2. Course Modules with quantitative lecture hours:

Unit/Topic 1:

Review of Schrodinger formalism with applications in 1D, Dirac notation, linear vector operators, matrix representation of states and operators, Ehrenfest theorem, commutator relations in quantum mechanics and uncertainty relations Subtopics **(12 Hours)**

Unit/Topic 2:

Theory of angular momentum in quantum mechanics, commutator relations in angular momentum, Eigen values and Eigen states of angular momentum, spin-angular momentum. **(9 hours)**

Unit/Topic 3:

Application of Schrodinger equation in 3-D models, symmetry and degeneracy, central potentials, Schrodinger equation in spherical co-ordinates, solution to hydrogen atom problem. **(9 hours)**

Unit/Topic 4:

Schrodinger and Heisenberg pictures, Heisenberg equation of motion, Interaction picture, WKB method, Time independent non-degenerate and degenerate perturbation theory with applications. Fine structure, Zeeman effect and hyperfine splitting of one-electron systems **(12 hours)**

Laboratory/practical/tutorial Modules: No

3. Text books:

1. D J Griffith, Introduction to quantum mechanics-(Pearson, Fourth edition, 2015).
2. Claude Cohen-Tannoudji, B Diu, F Laloe, Quantum Mechanics -Vol.1, (Wiley, Second edition 2020).

3. R Shankar, Principles of Quantum Mechanics - (Plenum Press, Second edition, 2011)

4. References:

1. Modern Quantum Mechanics - J J Sakurai (Pearson Edn., revised edition, 1994)
2. Quantum Mechanics Concepts and Applications – N Zetilli (2nd edition 2009)
3. The Feynman Lectures in Physics, Vol. 3, R.P. Feynman, R.B. Leighton, and M. Sands (Narosa Publishing House, 1992).
4. Practical Quantum Mechanics - Siegfried Flügge (Springer 1994)
5. Quantum Mechanics- P. C. Deshmukh(Cambridge University Press 2023)

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%:

NA

IIT Mandi

Proposal for a Revised Course

Course number : PH 514
Course Name : Electronics
Credit : 3
Distribution : 3-0-0-3
Intended for : M.Sc. and I-Ph.D. in Physics
Prerequisite : None
Mutual Exclusion: NA

1. Preamble: This course aims to provide students with a comprehensive understanding of the principles of electronic devices, circuits, and instrumentation techniques that are widely used in modern physics laboratories and scientific measurements. It introduces the theoretical foundations of analog, digital, frequency-domain, and mixed-signal electronics, with emphasis on their operating principles, characteristics, and applications in physical science experiments. The course is intended to develop the conceptual framework required to understand electronic systems used in instrumentation and measurement, thereby enabling students to interpret, analyze, and apply electronic concepts in advanced studies and research in physics and related areas.

2. Course Modules with quantitative lecture hours:

Unit/Topic 1:

Amplifiers: BJT, Classification of Amplifiers, Cascading of amplifiers, Types of power amplifiers, Amplifier characteristics, Feedback in amplifiers, Feedback amplifier topologies, Effects of negative feedback. [10 lectures]

Unit/Topic 2:

Oscillators and Multivibrators: Classification and basic principle of an oscillator, Feedback oscillator's concepts, Types of oscillators. [4 lectures]

Unit/Topic 3:

Field effect transistors: JFET, FET parameters, MOSFET. [3 lectures]

Unit/Topic 4:

Operational amplifiers: OPAMPs, OPAMP applications. [2 lectures]

Unit/Topic 5:

Boolean algebra and Digital circuit: Number systems, Boolean algebra, De Morgan's theorem, Logic Gates, Karnaugh Maps [6 lectures]

Unit/Topic 6:

Combinational circuits: Adder, Multiplexer, DE multiplexer, Encoder, and Decoder. [5 lectures]

Unit/Topic 7:

Clock and timing circuit: Clock waveform, Schmitt Trigger, 555 Timer [2 lectures]

Unit/Topic 8:

Sequential circuits: Flip-Flops, Registers, Counters, D/A and A/D conversions [10 lectures]

Laboratory/practical/tutorial Modules: No

3. Text books:

- 1) Millman and Halkias, Integrated electronics: McGraw-Hill, (2001).
- 2) A. P. Malvino and D. P. Bates Electronic Principles: (7th Edn) McGraw-Hill (2006).

4. References:

- 1) D. P. Leach, A. P. Malvino and G. Saha, Digital Principles and Applications: (6th Edn), Tata McGraw Hill (2007).
- 2) A. K. Maini, Digital Electronics-Principles, Devices and Applications: John Wiley & Sons (2007).

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%:

NA

IIT Mandi

Proposal for a Revised Course

Course number : PH 515P
Course Name : Physics Laboratory
Credit : 3
Distribution : 0-0-5-3
Intended for : I-Ph.D. and M. Sc Physics students
Prerequisite : No
Mutual Exclusion : NA

1. Preamble: This experimental course is expected to develop the art of experimentation and analysis skill, understanding the basis of knowledge in physics, and collaborative learning skills among students. Course. The course content includes standard physics experiments from various modules of physics, the theory of which students have learnt during their final year of B. Sc.

2. Course Modules with quantitative lecture hours: No
Laboratory/practical/tutorial Modules:

1. Hall Effect in Semiconductor

Objective: To measure the resistivity and Hall voltage of a semiconductor sample as a function of temperature and magnetic field. The band gap, the specific conductivity, the type of charge carrier and the mobility of the charge carriers can be determined from the measurements.

2. Michelson Interferometer

Objective: To determine the wavelength of the light source by producing interference pattern.

3. Fabry-Perot Interferometer

Objective: To investigate the multibeam interference of a laser light. Also, the wavelength of light source and thickness of a transparent foil can be determined.

4. Zeeman Effect

Objective: To observe the splitting up of the spectral lines of atoms within a magnetic field (normal and anomalous Zeeman effect) and find the value of Bohr's magneton.

5. Diffraction of ultrasonic waves

Objective: To observe Fraunhofer and Fresnel diffraction and determine the wavelength of the ultrasound wave.

6. Frank-Hertz Experiment

Objective: To demonstrate the quantization of atomic energy states and determine the first excitation energy of neon.

7. Fourier optics

Objective: To observe Fourier transformation of the electric field distribution of light in a specific plan.

8. Dispersion and resolving power of a grating

Objective: Determination of the grating constant of a Rowland grating based on the diffraction angle (up to the third order) of the high intensity spectral lines. Determination of the angular dispersion and resolving power of a grating.

9. Geiger-Müller-Counter

Objective: To study random events. Determination of the half-life and radioactive equilibrium. Verification of the inverse-square law for beta and gamma radiation.

10. Scintillation counter

Objective: Energy dependence of the gamma absorption coefficient / Gamma spectroscopy.

11. Four Probe

Objective: To measure the resistivity of a semiconductor at different temperature, finding the band gap.

12. Millikan Oil drop

Objective: To estimate the electrical charge of an electron and also show that charge is quantised in units of e .

13. Magnetoresistance of a semiconductor

Objective: To study the magnetic field dependence of the transverse magnetoresistance of a semiconductor.

14. Thermal conductivity of Teflon

Objective: To determine the thermal diffusivity coefficient of Teflon (an organic solid material) using (a) linear flow of heat and (b) radial flow of heat and estimate its thermal conductivity.

3. Text books:

1. R. A. Dunlop, Experimental Physics, Oxford University Press (1988).
4. J Varma, Nuclear Physics Experiments, New Age Publishers (2001)

4. References:

1. A. C. Melissinos, Experiments in Modern Physics, Academic Press (1996).
2. E. Hecht, Optics, Addison-Wesley; 4 edition (2001)
3. Worsnop and Flint, Advanced Practical Physics for Students Methusen & Go. (1950).
4. E.V. Smith, Manual for Experiments in Applied Physics. Butterworths (1970).
5. D. Malacara (ed), Methods of Experimental Physics, Series of Volumes, Academic Press Inc. (1988).

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%:

NA

IIT Mandi

Proposal for a Revised Course

Course number : PH 521
Course Name : Electromagnetic Theory
Credit : 3
Distribution : 3-0-0-3
Intended for : Core for M.Sc. and I-Ph.D. in Physics; Elective for B.Tech. 3rd and 4th Years.
Prerequisite : Undergraduate core physics courses
Mutual Exclusion : NA

1. Preamble: This course will develop the concepts of electricity and magnetism at a level suitable for master's students. The course content includes electrostatics and magnetostatics and their unification into electrodynamics, and electromagnetic radiation. The idea of special theory of relativity has been included in classical electrodynamics.

2. Course Modules with quantitative lecture hours:

1. Electrostatics and Magnetostatics in Vacuum

Review of electrostatics and magnetostatics, Laplace and Poisson equations, Boundary Value Problems in Electrostatics, Method of Images, Electrostatic and magnetostatic energy. **(7 lectures)**

0. Electrostatics and Magnetostatics in Matter

Multipole Expansions, Dielectrics and Magnetization, Field inside cavity, Clausius-Mossotti equation. **(7 lectures)**

0. Maxwell equations

Maxwell Equations, gauge symmetry, Electromagnetic energy and momentum, Conservation Laws. **(6 lectures)**

0. Electromagnetic Waves

Waves in one dimension, reflection, refraction and polarization, Electromagnetic waves in vacuum, Electromagnetic Waves in dispersive media, Absorption and Dispersion, Waveguides. **(11 lectures)**

0. EM Radiation

Retarded Potential, Lienard-Wiechart potential, Radiation from accelerated charge, Dipole radiation, Larmor formula. **(7 lectures)**

0. Special Relativity and Electromagnetism

Magnetism as a relativistic phenomenon, Lorentz transformations of electromagnetic field, Lorentz covariance of Maxwell equations. **(4 lectures)**

Laboratory/practical/tutorial Modules:

3. Text books:

1. D.J. Griffiths, Introduction to Electrodynamics 5th ed, CUP (2025)

4. References:

1. J.D. Jackson, Classical Electrodynamics 3rd ed, Wiley(2007)
2. A. Zangwill, Modern Electrodynamics, CUP(2012)
3. K. Milton and J. Schwinger, Classical Electrodynamics, CRC Press(1998)
4. M. Maggiore, A Modern Introduction to Classical Electrodynamics, OUP(2023)

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.	EP321	Part of section 1	20%

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

NA

IIT Mandi

Proposal for a Revised Course

Course number : PH 522
Course Name : Statistical Mechanics
Credit : 3
Distribution : 3-0-0-3
Intended for : Core for M.Sc. and I-Ph.D. in Physics; Elective for others
Prerequisite : Undergraduate thermodynamics
Mutual Exclusion: None

1. Preamble:

Statistical mechanics use probability methods to extend the mechanics to many-body systems for statistical predictions of their collective behavior. This course introduces basic probability theory concepts and, with a thermodynamics review, thus acts as a bridge between thermodynamics and the mechanics of constituent particles. The topics covered include Statistical mechanics of ideal gas systems, harmonic oscillators, spin models, etc., providing the primary functioning of the formalisms of statistical mechanics for ideal systems. Methods of statistical mechanics serve as essential prerequisites to many advanced topics in physics, theoretical chemistry, and engineering that use probabilistic predictions on many-body problems. This course is at an advanced level with more mathematical proofs that enhance the basic introduction of thermodynamics and statistical mechanics at the undergraduate level.

2. Course Modules with quantitative lecture hours:

Unit/Topic 1: Review of Thermodynamics: Laws of Thermodynamics, Carnot cycle, entropy Specific heat, Maxwell relations, Thermodynamic potentials, Ideal gas, Equation of state, van der Waals equations, Gibbs-Duhem relation Thermodynamic stability **(6 Hours)**

Unit/Topic 2: Probability concepts and examples - random variables single and multiple Probability distribution of many variables Binomial distribution and One Dimensional random walk problem - probability distributions and moments. Law of large numbers and Central Limit theorem. Information and entropy. **(6 Hours)**

Unit/Topic 3: Liouville equation-Boltzman ergodic hypothesis, Gibbsian ensemble. Phase space and connection between mechanics and statistical mechanics by thermodynamic equilibrium. Microcanonical ensemble, microstates, and macrostates. Classical ideal gas, phase space volume of the ideal gas. Gibb's Paradox. **(6 Hours)**

Unit/Topic 4: Canonical ensemble, partition function. Helmholtz free energy, Thermodynamics from the partition function. Classical ideal gas- equipartition and Virial theorem. Examples: harmonic oscillator and spin systems, Grand canonical ensemble-density, and energy fluctuations- Gibbs free energy. **(10 hours)**

Unit/Topic 5: Formulation of quantum statistical mechanics density matrix- micro-canonical, canonical, and grand canonical ensembles- Maxwell-Boltzmann, Fermi-Dirac, and Bose-Einstein statistics - comparison. The density matrix of a two-particle ideal gas - comparison in different statistics. Ideal gas in classical and quantum ensembles. **(6 Hours)**

Unit/Topic 6: Ideal Bose and Fermi systems Examples of ideal quantum gases. Bose-Einstein and Fermi-Dirac functions and approximations. Bose-Einstein condensation, statistics of phonons in ideal solids, Black body radiation, Fermi Energy. **(8 Hours)**

Laboratory/practical/tutorial Modules: None

3. Text books:

1. R K Pathria and Paul D Beale , Statistical Mechanics, Academic Press US , 2011.
2. M Kardar Statistical Physics of Particles Cambridge University Press, UK, 2007.

4. References:

1. Kerson Huag, Statistical Mechanics, Wiley India, India, 2000.
2. Fundamentals of Statistical and Thermal Physics, F Reif, Waveland Press US, 2010.
3. Statistical Physics part I, L D. Landau and E. M. Lifshitz, Elsevier, India 2011.

5. Similarity with the existing courses: None

(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%:

NA

IIT Mandi

Proposal for a Revised Course

Course number : PH 524
Course Name : Atomic and Molecular Physics
Credit : 3
Distribution : 3-0-0-3
Intended for : Core for M.Sc. and I-Ph.D. in Physics; Elective for others
Prerequisite : Basic Quantum Mechanics courses
Mutual Exclusion: None

1. Preamble: This course introduces the basic ideas of atomic and molecular physics. It teaches students how to apply quantum mechanics and extract information from many-electrons atoms and molecules. The course begins with a review of some of the basic concepts in quantum mechanics and then discusses the time-dependent perturbation theory and its applications. It will then proceed to many-electron atomic systems and then to the concepts associated with molecular spectroscopy.

2. Course Modules with quantitative lecture hours:

Unit/Topic 1:

Review of perturbation theory, Atoms in electric and magnetic fields **(8 hours)**

Unit/Topic 2:

Time-dependent perturbation theory and application Fermi- Golden rule, Interaction of electromagnetic radiation with single electron atoms, Rabi flopping, Dipole approximation and dipole selection rules, Transition rates, Line broadening mechanisms, spontaneous and stimulated emissions and Einstein coefficients. **(14 hours)**

Unit/Topic 3:

Variational method and applications, two-electron and alkali systems, central field approximation, Slater determinant, Introduction to self-consistent field method, L-S coupling, J-J coupling, Fine structure and Zeeman effect in the alkali spectra, selection rules, Hyperfine interactions. **(10 hours)**

Unit/Topic 4:

Born Oppenheimer Approximation, Rotational and Vibrational and Raman Spectra of molecules-with examples from diatomic molecules. **(10 hours)**

Laboratory/practical/tutorial Modules: No

3. Text books:

1. Physics of atoms and molecules - Bransden and Joachain (Pearson, second edition, 2011)
2. A Students' Guide to Atomic Physics – M. Fox (Cambridge Univ. Press, 2018 First edition)

4. References:

1. Many-electron theory-S. Raimes (North-Holland Pub. Co.1972)
2. Fundamentals of molecular spectroscopy- C. Banwell and E. Maccash (Mc Graw Hill, 2013)
3. Quantum Mechanics- P. C. Deshmukh (Cambridge University Press 2023)
4. Quantum Mechanics-Merzbacher (Third edition, Wiley, 2011)
5. Quantum mechanics-Landau and Lifshitz (Butterworth-Heinemann Ltd; 3rd Revised edition (18 December 1981)

6. 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%:

NA

IIT Mandi

Proposal for a Revised Course

Course number : PH 612
Course Name : Nuclear and Particle Physics
Credit : 3
Distribution : 3-0-0-3
Intended for : Core for M.Sc. and I-Ph.D. in Physics; Elective for B.Tech. 3rd and 4th Years.
Prerequisite : Quantum Mechanics, Electromagnetic Theory
Mutual Exclusion : NA

1. Preamble:

The objective of the proposed course is to introduce students to the fundamental principles and concepts of nuclear and particle physics. Students will be able to know the fundamentals of the interaction of high-energy particles. This course is expected to provide a working knowledge of real-life problems.

2. Course Modules with quantitative lecture hours:

Properties of Nuclei: Nuclear size, nuclear radius and charge distribution, Rutherford Scattering, mass and binding energy, semi-empirical mass formula, nuclear stability, angular momentum, parity and isospin, magnetic dipole moment, electric quadrupole moment, and nuclear shape. **(5 Lectures)**

Nuclear models: Evidence of shell structure (magic numbers), Liquid drop model, Shell model, ground state spin & parity. **(4 Lectures)**

Two-body problems: Deuteron ground state, excited states, spin dependence of nuclear forces, two-nucleon scattering, charge symmetry and charge independence of nuclear forces, exchange nature of nuclear forces. **(4 Lectures)**

Nuclear decay: Particle decays, Gamow theory of Alpha decay, Fermi theory of Beta decay, Gamma decay, direct evidence for the neutrino. **(5 Lectures)**

Nuclear Reactions: Different types of reactions, Direct & Compound nucleus formation and break-up, nuclear fission, fusion reaction. **(4 Lectures)**

Elementary particles: Fundamental interactions. Particle Zoo: Leptons, Hadrons. Organizing principle: Baryon and Lepton Numbers, Strangeness, Isospin, The eightfold way. Quarks: Colour charge and strong interactions, confinement, Gell–Mann–Nishijima formula, Relativistic kinematics and conservation laws.

The Standard Model: parity violation in weak interaction, Wu's experiment, elementary idea about electroweak unification, quark model, concept of colour charge, discrete symmetries, properties of quarks and leptons, particle interactions, and Feynman diagrams. **(15 Lectures)**

Experimental Techniques and Applications: Particle Accelerators: LINAC, Cyclotron, Synchrotron, Brief overview on present-day accelerators (RHIC, LHC). Particle detectors:

Giger-Muller counter, scintillators, calorimeters, and trackers. Radiation therapy, nuclear medicine, and imaging, dosimetry. **(5 Lectures)**

3. Text books:

4. Kenneth S Krane, Introductory Nuclear Physics, **Vol., Wiley, UK, 2016**
5. David Griffiths, Introduction to Elementary Particles (4th Edition)

4. References:

1. An introduction to the physics of Nuclei and Particles by Richard A Dunlap (2004)
2. Nuclear and Particle Physics: An Introduction by B. R. Martin (2013)
3. Nuclear Physics: Principles and Applications by John Lilley (2001)
4. Modern Particle Physics by Mark Thomson (2013)

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.	NA	NA	NA	NA

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

NA

IIT Mandi

Proposal for a Revised Course

Course number : PH 613
Course Name : Quantum Mechanics II
Credit : 3
Distribution : 3-0-0-3
Intended for : Core for M.Sc. and I-Ph.D. in Physics; Elective for others
Prerequisite : First course on Quantum Mechanics
Mutual Exclusion: None

1. Preamble: This course introduces some of the advanced level topics in quantum mechanics. The course begins a review of some of the basic concepts in quantum mechanics and then discusses the detailed theory of angular momentum algebra. It will then proceed to discuss the concepts in scattering theory.

2. Course Modules with quantitative lecture hours:

Unit/Topic 1:

Review of basic concepts in quantum mechanics, measurements, observables and generalized uncertainty relations, change of basis, generator of translation. **(8 hours)**

Unit/Topic 2:

Angular Momentum: General theory of angular momentum, Angular momentum algebra, Addition of angular momenta, Clebsch-Gordon coefficients, illustration of Wigner-Eckart theorem. **(8 hours)**

Unit/Topic 3:

Symmetries in Quantum Mechanics: Symmetry principles in quantum mechanics, conservation laws and degeneracies, discrete symmetries, parity and time reversal. **(8 hours)**

Unit/Topic 4:

Oscillating dipoles and Bloch sphere representation, Density Operator and Density Matrix formalism, Optical Bloch Equations **(8 hours)**

Unit/Topic 5:

Scattering Theory: Non-relativistic scattering theory. Scattering amplitude and cross-section, Partial wave analysis, optical theorem, Integral equation for scattering, Born approximation. **(10 hours)**

Laboratory/practical/tutorial Modules: No

3. Text books:

1. Modern Quantum Mechanics - J J Sakurai (Addison Wisley, revised edition, 1993).
2. Quantum Mechanics, Cohen-Tannoudji, B Diu, F Laloe (Vol. I and II) (Wiley, second edition 2020)

4. References:

7. Many-electron theory-S. Raimes (North-Holland Pub. Co.1972) 2
8. Quantum Mechanics- P. C. Deshmukh(Cambridge University Press 2023)
9. Quantum Mechanics-Merzbacher (Third edition, Wiley, 2011)

10. Quantum mechanics-Landau and Lifshitz (Butterworth-Heinemann Ltd; 3rd Revised edition (18 December 1981)

11. 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%:

NA

IIT Mandi

Proposal for a Revised Course

Course number : PH 525P
Course Name : Electronics Laboratory Practicum
Credit : 3
Distribution : 0-0-5-3
Intended for : Core for M.Sc. and I-Ph.D. in Physics
Prerequisite : Electronics (PH514)
Mutual Exclusion: NA

1. Preamble: This laboratory course is designed to provide students with hands-on experience in the design, analysis, and implementation of fundamental electronic circuits and systems commonly used in physics and engineering applications. The course introduces practical aspects of analog and digital electronics through experiments. Students will gain experience in constructing and testing circuits such as transistor amplifiers, logic gates, filters, converters, multiplexers, counters, and multivibrators, and will learn the principles of interfacing sensors with microcontroller platforms such as Arduino. Through laboratory exercises and a mini-project, students will develop practical skills in circuit design, measurement, troubleshooting, and instrumentation, enabling them to apply electronic principles to real-life scientific and technological problems.

2. Course Modules with quantitative lecture hours: No

Laboratory/practical/tutorial Modules:

1. To design and use bipolar junction transistors (BJT) as an amplifier and switch, based on common emitter (CE), common collector (CC), and common base (CB) configurations. Verify and draw the IV characteristics.
2. Seven-segment display. Output verification of Logic Gates.
3. Design of Integrator, Differentiator, low pass, and high pass filter using an OpAmp IC 741.
4. Design and verify A/D and D/A converters using OpAmp.
5. Design of 4-bit Multiplexer and Demultiplexer using flip flops.
6. Design of 4-bit Shift registers and Counters using flip flops.
7. Design of Astable and Monostable Multivibrator using IC 555.
8. Development and testing of an Arduino-based sensor circuit: Arduino-Based Sensor Interfacing, Firmware Development, Circuit Design, and Calibration
9. Design of Wein Bridge and Colpitts oscillator.

Project: Developing the working model of an electronic instrument for real-life application.

3. Text books:

- 1) Millman and Halkias, Integrated electronics: McGraw-Hill, (2001).
- 2) A. P. Malvino and D. P. Bates Electronic Principles: (7th Edn) McGraw-Hill (2006).

4. References:

- 1) D. P. Leach, A. P. Malvino and G. Saha, Digital Principles and Applications: (6th Edn), Tata McGraw Hill (2007).
- 2) A. K. Maini, Digital Electronics-Principles, Devices and Applications: John Wiley & Sons (2007).

3) Sedra and Smith, Microelectronic circuits, Oxford publications, sixth edition 2013.

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%:

NA

IIT Mandi

Proposal for a Revised Course

Course number : PH 611P
Course Name : Experimental Research Techniques
Credit : 4
Distribution : 0-0-7-4
Intended for : Core for M.Sc. and I-Ph.D. in Physics
Prerequisite : No
Mutual Exclusion : NA

1. Preamble: According to Newton's third law, one may simply move the earth down and up just by throwing the ball up and down. But the central question is why don't we feel it? It is because of its immeasurability within the uncertainty of the measuring equipment. Performing an experiment without the knowledge of underlying uncertainty has little meaning. The students will be given a flavour of what it really means by (a) performing an experiment (b) developing a mini experimental setup (c) assembling and engineering tools. Aim of the proposed course is to amalgamate the concepts of physics via assembling, developing mini experiments and building components. Students will get to know about a few advanced concepts through high precision instruments.

2. Course Modules with quantitative lecture hours: No

Laboratory/practical/tutorial Modules:

Unit I (Mandatory)

LabVIEW interfacing: Introduction to data acquisition systems, LabVIEW/open source (such as Python) programming (Interfacing and programming), Signal processing and Error analysis.

Reverse engineering of any vacuum pump: A rotary pump along with its manual will be provided to the students. They have to dismantle this pump and assemble it and learn about its internal parts. This process helps in the development of skills related with assembling (spatial skills).

Skill development for carpentry: Self explanatory

Unit II

A student needs to complete at least 3-4 set of experiments from the following list of experiments.

1. Temperature dependence of electrical resistivity of materials: This experiment involves measuring temperature dependent resistivity of any material using four probe method and Vander Pauw methods. The skills that one will develop are to make fine contacts on the sample, learn the intricacies involved in making this set up.

2. Electronic properties of material using photoemission technique: Photoemission experiments will be done on any material and its electronic properties will be studied. The skills that one will develop are the intricacies involved in conducting experiments in ultra-high vacuum conditions.

3. Seebeck coefficient measurement: Develop mini Seebeck coefficient experiment to distinguish n-type and p-type semiconductors from a mixture of it.

4. Structural properties of materials using powder x-ray diffraction (XRD) technique: To understand structural phase transition of any given material. The skills that

one will develop are to understand the intricacies involved in any diffraction experiment, temperature variation set up, analysis of any powder XRD pattern.

5. Experiments on laser physics: This experiment will be helpful to understand optical pumping, spontaneous emission, induced emission, population inversion, optical resonator, resonator modes etc. The parameters like optimum output coupling, laser threshold and differential efficiency can also be determined. Students will develop skills to handle laser operation by aligning the optical components in the laser cavity.

6. Two slit interference-one photon at a time: This experiment will give hands on familiarity to confront wave-particle duality in a precise and definite way. It will develop the skill of single photon detection and theoretical modelling.

7. Molecular absorption and emission: The objective is to know the nature of molecular spectra by measuring absorption and emission spectra. This will also provide insights into the molecular energy levels and transitions between them. Preparation of molecular solution and data analysis skills will be developed.

8. Design and making of any components: This involves training to make technical drawing, operate lathe for shaping and making any given components.

9. Scanning tunnelling microscope: Introduction to the design and working principle and hands on experiments on atomically thin samples.

10. Magnetic susceptibility of a material as a function of temperature.

3. Text books:

1. Transmission Electron Microscopy, by C. Barry Carter and David B. Williams, Springer, New York (2016).
2. Experimental Techniques in Condensed Matter Physics at Low Temperatures, by Robert C. Richardson and N. Smith ; CRC Press (2018).

4. References: No

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%:

NA

Sl. No.	Semester	Type	Course Code	Course Name	L	T	P	C	L - T - P - C	Semesterwise Credits	Credits Completed	Remarks
1	I	Core	PH-511	Mathematical Physics	3	0	0	3	3-0-0-3			
2	I	Core	PH-512	Classical Mechanics	3	0	0	3	3-0-0-3			
3	I	Core	PH-513	Quantum Mechanics I	3	0	0	3	3-0-0-3			
4	I	Core	PH-514	Electronics	3	0	0	3	3-0-0-3			
5	I	Core	PH-515P	Physics Lab	0	0	5	3	0-0-5-3			
6	I	Core	HS-541	Technical Communications	1	0	0	1	1-0-0-1			
7	I	Core	PH-516	Research Project - I	0	0	4	2	0-0-4-2			
8	I	Core	PH-517	Research Project - II (Winter)	0	0	4	2	0-0-4-2			
										20	20	
9	II	Core	PH-521	Electromagnetic Theory	3	0	0	3	3-0-0-3			
10	II	Core	PH-522	Statistical Mechanics	3	0	0	3	3-0-0-3			
11	II	Core	PH-523	Condensed Matter Physics	3	0	0	3	3-0-0-3			
12	II	Core	PH-524	Atomic and Molecular Physics	3	0	0	3	3-0-0-3			
13	II	Core	PH-621	Computational Methods of Physics	2	0	4	4	2-0-4-4			
14	II	Core	PH-614	Seminar and Report	0	0	4	2	0-0-4-2			
15	II	Core	PH-526	Research Project-III	0	0	6	4	0-0-6-4			
16	II	Core	PH-527	Research Project-IV (Summer)	0	0	6	4	0-0-6-4			
										26	46	
17	II	Core	PH-612	Nuclear and Particle Physics	3	0	0	3	3-0-0-3			
18	III	Core	PH-613	Quantum Mechanics II	3	0	0	3	3-0-0-3			
19	III	Core	PH-525P	Electronics Lab Practicum	0	0	6	3	0-0-6-3			
20	III	Core	PH-615P	Mini Thesis - I	0	0	8	4	0-0-8-4			
21	III	Elective		Discipline Elective	3	0	0	3	3-0-0-3			
22	III	Elective		Discipline Elective	3	0	0	3	3-0-0-3			
23	III	Elective		Free Elective	3	0	0	3	3-0-0-3			
										22	68	Can be done in any semester instead of Discipline elective
24	IV	Core	PH-616P	Mini Thesis - II	0	0	16	8	0-0-16-8			
25	IV	Core	PH-611P	Experimental Research Techniques	0	0	8	4	0-0-8-4			
26	IV	Elective		Discipline Elective	3	0	0	3	3-0-0-3			
27	IV	Elective		Discipline Elective	3	0	0	3	3-0-0-3			
28	IV	Elective		Discipline Elective	3	0	0	3	3-0-0-3			
										Minimum 12	Minimum 80	Optional: May finish in V/VI Optional: May finish in V/VI Optional: May finish in III/IV Students need to finish a
29	V	Elective			3	0	0	3	3-0-0-3	minimum 0/maximum		
30	VI	Elective			3	0	0	3	3-0-0-3	minimum 0/maximum €	Minimum 89	Students must finish all 89

Sl. No.	Semester	Type	Course Code	Course Name	L	T	P	C	L - T - P - C	Semesterwise Credits	Credits Completed	Remarks
1	I	Core	PH-511	Mathematical Physics	3	0	0	3	3-0-0-3			
2	I	Core	PH-512	Classical Mechanics	3	0	0	3	3-0-0-3			
3	I	Core	PH-513	Quantum Mechanics I	3	0	0	3	3-0-0-3			
4	I	Core	PH-514	Electronics	3	0	0	3	3-0-0-3			
5	I	Core	PH-515P	Physics Lab	0	0	5	3	0-0-5-3			
6	I	Core	HS-541	Technical Communications	1	0	0	1	1-0-0-1			
7	I	Elective		Discipline elective/Free elective	3	0	0	3	3-0-0-3	19	19	Two Free Elective courses have to be completed. These courses can be taken in any semester.
8	II	Core	PH-521	Electromagnetic Theory	3	0	0	3	3-0-0-3			
9	II	Core	PH-522	Statistical Mechanics	3	0	0	3	3-0-0-3			
10	II	Core	PH-523	Condensed Matter Physics	3	0	0	3	3-0-0-3			
11	II	Core	PH-524	Atomic and Molecular Physics	3	0	0	3	3-0-0-3			
12	II	Core	PH-621	Computational Methods of Physics	2	0	4	4	2-0-4-4			
13	II	Core	PH-614	Seminar and Report	0	0	4	2	0-0-4-2			
14	II	Elective		Discipline elective/Free elective	3	0	0	3	3-0-0-3	21	40	
15	III	Core	PH-612	Nuclear and Particle Physics	3	0	0	3	3-0-0-3			
16	III	Core	PH-613	Quantum Mechanics II	3	0	0	3	3-0-0-3			
17	III	Core	PH-525P	Electronics Lab Practicum	0	0	6	3	0-0-6-3			
18	III	Core	PH-518P	PG Project - I	0	0	8	4	0-0-8-4			
19	III	Elective		Discipline Elective	3	0	0	3	3-0-0-3			
20	III	Elective		Discipline Elective	3	0	0	3	3-0-0-3			
21	III	Elective		Discipline elective/Free elective	3	0	0	3	3-0-0-3	22	62	
22	IV	Core	PH-519P	PG Project - II	0	0	16	8	0-0-16-8			
23	IV	Core	PH-611P	Experimental Research Techniques	0	0	8	4	0-0-8-4			
24	IV	Elective		Discipline Elective	3	0	0	3	3-0-0-3			
25	IV	Elective		Discipline elective/Free elective	3	0	0	3	3-0-0-3	18	80	

Proposal for 64th Board of Academics (BoA) Meeting

(B.Tech. in Microelectronics & VLSI Engineering, SCEE, IIT Mandi)

Agenda Item 1

1. Minor Programs in Microelectronics & VLSI Engineering

Introduction of two Minor Programs under the B.Tech. Microelectronics & VLSI Engineering curriculum:

1. Minor in VLSI Design
2. Minor in VLSI Technology

2. Motivation

The semiconductor ecosystem is witnessing rapid growth driven by advancements in VLSI hardware, processor design, SoC development, semiconductor manufacturing, and advanced electronic systems. To support interdisciplinary learning and semiconductor-focused skill development, it is proposed to introduce Minor Programs in VLSI Design and VLSI Technology. These minor programs are primarily intended for students pursuing bachelor's degrees in other disciplines who wish to acquire specialization in the VLSI and semiconductor domain. The proposed minors will help students gain foundational exposure to IC design, semiconductor processing, fabrication technologies, packaging, and advanced hardware systems.

As per institute norms, a minimum of **9 credits** in a specialized basket is required for awarding a Minor.

3. Proposed Minor Programs

3.1 Minor in VLSI Design

Sl. No.	Course Code	Course Title	L-T-P	Credits
1	VL404	CMOS Analog IC Design	3-0-2	4
2	EE524	Digital MOS LSI Circuits	3-0-0	3
3	EE519P	Digital IC Design Practicum	0-0-3	2

3.2 Minor in VLSI Technology

Sl. No.	Course Code	Course Title	L-T-P	Credits
1	VL311	CMOS Processing and Practicum	3-0-2	4
2	VL312	Electronic System Packaging	3-0-0	3
3	EE615	Nanoelectronics and Nano-Microfabrication	3-0-0	3

4. Expected Outcomes

The proposed minor programs are expected to provide interdisciplinary specialization opportunities in VLSI and semiconductor technologies for students from diverse engineering backgrounds. The programs will enhance industry and research readiness in semiconductor-related domains while encouraging participation in IC design, semiconductor processing, fabrication, packaging, and advanced hardware system development activities.



Bikram Paul <bikram@iitmandi.ac.in>

Proposal for Minor Programs in Microelectronics & VLSI

4 messages

Bikram Paul <bikram@iitmandi.ac.in>

Thu, Apr 30, 2026 at 11:21 PM

To: "Dr. Hitesh Shrimali" <hitesh@iitmandi.ac.in>, Shubhajit Roy Chowdhury <src@iitmandi.ac.in>, Animesh Biswas <animesh@iitmandi.ac.in>, Satinder Sharma <satinder@iitmandi.ac.in>, Rahul Shrestha <rahul_shrestha@iitmandi.ac.in>, Srinivasu Bodapati <srinivasu@iitmandi.ac.in>, Kunal Ghosh <kunal@iitmandi.ac.in>, Robin Khosla <robin@iitmandi.ac.in>, Abhishek Sharma <abhi@iitmandi.ac.in>, Mohit Mishra <mohitmishra.iitg@gmail.com>

Dear Colleagues,

I am planning to propose **two** minor programs - **Minor in VLSI Design** and **Minor in VLSI Technology** - under the Microelectronics & VLSI domain. As per institute norms, a minimum of 9 credits in a specialized basket is required for a minor degree (relevant ordinance attached for reference).

Proposed Course Structure:

1. Minor in VLSI Design [9 Credits]

1. VL404: CMOS Analog IC Design [3-0-2-4]
2. EE524: Digital MOS LSI Circuits [3-0-0-3]
3. EE519P: Digital IC Design Practicum [0-0-3-2]

2. Minor in VLSI Technology [10 Credits]

1. VL311: CMOS Processing and Practicum [3-0-2-4]
2. VL312: Electronic System Packaging [3-0-0-3]
3. EE615: Nanoelectronics and Nano-Microfabrication [3-0-0-3]

I would appreciate your feedback and suggestions so that the proposal can be refined and presented in the upcoming BoA meeting.

--
Best Regards,



Dr. Bikram Paul
Assistant Professor

School of Computing and Electrical Engineering(SCEE)

Phone: +911905267046; +919774143767;

 **minor program.pdf**
108K

Prof. Shubhajit Roy Chowdhury <src@iitmandi.ac.in>

Fri, May 1, 2026 at 6:17 AM

To: Bikram Paul <bikram@iitmandi.ac.in>

Cc: "Dr. Hitesh Shrimali" <hitesh@iitmandi.ac.in>, Animesh Biswas <animesh@iitmandi.ac.in>, Satinder Sharma <satinder@iitmandi.ac.in>, Rahul Shrestha <rahul_shrestha@iitmandi.ac.in>, Srinivasu Bodapati <srinivasu@iitmandi.ac.in>, Kunal Ghosh <kunal@iitmandi.ac.in>, Robin Khosla <robin@iitmandi.ac.in>, Abhishek Sharma <abhi@iitmandi.ac.in>, Mohit Mishra <mohitmishra.iitg@gmail.com>

I suggest instead of the practicum course, the course on Embedded Systems/VLSI Design for Testability is more apt from the job perspective. Both the courses have a prerequisite of Digital Systems Design or equivalent.

Rest looks fine.

Kind regards,
Shubhajit

Prof. Shubhajit Roy Chowdhury,

Professor,

School of Computing and Electrical Engineering,

Indian Institute of Technology Mandi.

Phone: +91 1905 267915

Website: <http://faculty.iitmandi.ac.in/~src/>

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[Quoted text hidden]

Hitesh Shrimali <hitesh@iitmandi.ac.in>

Fri, May 1, 2026 at 7:21 AM

To: "Prof. Shubhajit Roy Chowdhury" <src@iitmandi.ac.in>

Cc: Bikram Paul <bikram@iitmandi.ac.in>, Animesh Biswas <animesh@iitmandi.ac.in>, Satinder Sharma

<satinder@iitmandi.ac.in>, Rahul Shrestha <rahul_shrestha@iitmandi.ac.in>, Srinivasu Bodapati

<srinivasu@iitmandi.ac.in>, Kunal Ghosh <kunal@iitmandi.ac.in>, Robin Khosla <robin@iitmandi.ac.in>, Abhishek Sharma

<abhi@iitmandi.ac.in>, Mohit Mishra <mohitmishra.iitg@gmail.com>

Considering the requirements of 9 credits for the minor programme, it is fine as proposed by Bikram. Both the programmes look good to me. We can go ahead for the coming BOA if everyone agrees.

Thanks and regards,

--

Hitesh Shrimali

Professor

School of Computing and Electrical Engineering

Indian Institute of Technology Mandi, HP

Contact - +91-1905-267902 (O)

[Quoted text hidden]

Animesh Biswas <animesh@iitmandi.ac.in>

Fri, May 1, 2026 at 10:26 AM

To: Hitesh Shrimali <hitesh@iitmandi.ac.in>

Cc: "Prof. Shubhajit Roy Chowdhury" <src@iitmandi.ac.in>, Bikram Paul <bikram@iitmandi.ac.in>, Satinder Sharma

<satinder@iitmandi.ac.in>, Rahul Shrestha <rahul_shrestha@iitmandi.ac.in>, Srinivasu Bodapati

<srinivasu@iitmandi.ac.in>, Kunal Ghosh <kunal@iitmandi.ac.in>, Robin Khosla <robin@iitmandi.ac.in>, Abhishek Sharma

<abhi@iitmandi.ac.in>, Mohit Mishra <mohitmishra.iitg@gmail.com>

I think , a committee should take a call .

Regards

Animesh Biswas

[Quoted text hidden]

Specialization in Structural Engineering

1. Introduction

In accordance with the [UG Ordinance Rule 11](#) and Senate Notification [Ref. No. E.No.IITMandi/Acad/Senate/2023/232-236 dated 13-04-2023](#) regarding the award of B.Tech. degrees with Specialization, the School of Civil and Environmental Engineering proposes the introduction of a **Specialization in Structural Engineering** for students enrolled in the B.Tech. Civil Engineering programme.

The proposed specialization is intended to provide students with advanced knowledge and technical expertise in structural analysis, structural design, earthquake engineering, computational mechanics, and modern structural engineering practices. The programme is designed to strengthen both industry-oriented skills and research capabilities of UG students.

Upon successful completion of the prescribed requirements, the student shall be awarded:

B.Tech. in Civil Engineering with Specialization in Structural Engineering

The specialization shall appear on the official transcript and degree certificate in accordance with the approved institute ordinance.

2. Eligibility Criteria

Students enrolled in the **B.Tech. Civil Engineering programme** shall be eligible to pursue the Specialization in Structural Engineering. To qualify for the specialization, a student must:

- Complete a minimum of **15 credits** from the approved specialization baskets;
- Satisfy all basket-wise credit requirements; and
- Obtain a minimum **CGPA/GPA of 7.0** in the courses counted toward the specialization requirement.

3. Structure of the Specialization Programme

The Specialization in Structural Engineering shall consist of a minimum of **15 credits** distributed across the following baskets:

Basket	Category	Credits
Basket 1	Compulsory Foundation Courses	Min 6 Credits
Basket 2	Computational Analysis, Design and Construction Courses	Min 5 Credits
Basket 3 (Not Compulsory)	Advanced Structural Engineering Courses	Max 3 Credits

Basket	Category	Credits
	Total Credits	15 Credits

4. Courses Structure

4.1 Basket 1 Courses – Compulsory Foundation Courses (Min 6 Credits)

Students must take a minimum of two courses or a maximum of three courses from the following foundation courses:

Sl. No.	Course Code	Course Name	L-T-P-C
1	CE511	Structural Dynamics with Application to Earthquake Engineering	3-0-0-3
2	CE557	Solid Mechanics in Structural Engineering	3-0-0-3
3	CE563	Finite Element Methods in Engineering	3-0-2-4

4.2 Basket 2 Courses – Computational Analysis, Design and Construction Courses (Min 5 Credits)

Students must complete a minimum of two courses or a maximum of three courses from the following list of courses:

Sl. No.	Course Code	Course Name	L-T-P-C
1	CE509	Bridge Engineering	3-0-0-3
2	CE522	Matrix Methods for Structural Analysis	3-0-0-3
3	CE552	Concrete Technology	3-0-0-3
4	CE554	Prestressed Concrete Structures	3-0-0-3
5	CE555	Advanced Design of Structures	3-0-0-3
6	CE556P	Structural Engineering Laboratory	0-0-4-2
7	CE569P	Structural Design Studio	0-0-6-3
8	CE610	Analysis and Design for Earthquake Resistant Structures	3-0-0-3
9	CE528	Design of Masonry Structures	3-0-0-3

4.3 Basket 3 Courses – Advanced Courses (Max 3 Credits, Not compulsory)

This basket is not compulsory. Students can take a maximum of 1 course from the following advanced courses:

Sl. No.	Course Code	Course Name	L-T-P-C
1	CE516	Uncertainty Analysis in Civil Engineering	3-0-0-3
2	CE518	Structural Reliability and Risk Assessment	3-0-0-3
3	CE523	Building Science	3-0-0-3
4	CE602	Blast Engineering	3-0-0-3
5	CE604	Theory of Plasticity	3-0-0-3
6	CE605	Engineering Seismology and Seismic Hazard Assessment	3-0-0-3
7	CE611	Structural Health Monitoring	3-0-0-3
8	CE612	Theory of Plates and Shells	3-0-0-3
9	CE617	Mechanics of Composite Materials	3-0-0-3
Or any other Structural Engg. related courses (5 or 6 level) approved by FA/Course Instructor/School Chair.			

5. Learning Objectives

Upon completion of the specialization in Structural Engineering, students will be able to:

1. Develop an advanced understanding of structural behavior, mechanics, and structural systems.
2. Apply principles of structural dynamics and earthquake engineering in the analysis and design of structures.
3. Use computational and numerical techniques for solving complex structural engineering problems.
4. Design reinforced concrete, prestressed concrete, steel, masonry, and special structural systems.
5. Utilize modern engineering tools for structural analysis, simulation, and health monitoring.
6. Understand advanced topics such as finite element methods, reliability analysis, composite materials, and shell structures.
7. Develop analytical and research-oriented capabilities relevant to higher studies and professional practice.

6. Recommendations

Structural Engineering is one of the core domains of Civil Engineering with significant relevance to infrastructure development, seismic safety, sustainable construction, and resilient urban systems. The proposed specialization aims to:

- Provide focused academic training in modern structural engineering;

- Enhance the employability of undergraduate students in structural design and infrastructure sectors;
- Prepare students for higher studies and research in Structural Engineering and related interdisciplinary areas;
- Strengthen expertise in Earthquake Engineering and Computational Structural Mechanics
- Align the undergraduate curriculum with emerging industry and societal needs.

The specialization shall benefit students aspiring for careers in: Structural Design Consultancy; Infrastructure and Bridge Engineering; Earthquake Engineering and Disaster Resilience; Computational Structural Mechanics; Construction Technology and Advanced Materials; and Research and Higher Education.

7. Implementation and Academic Administration

1. The specialization shall be administered by the concerned discipline under the School of Civil and Environmental Engineering.
2. Courses listed under the specialization basket shall be offered subject to the availability of faculty and resources.
3. A student may count a course only once toward fulfilment of the specialization requirement.
4. The specialization shall be awarded only upon successful completion of the parent B.Tech. degree requirements.
5. Any modification in the basket structure or course offerings shall require approval through the prescribed academic processes
6. The student must express their interest to obtain specialization in Structural Engineering in the transcript by the end of the 7th semester by filling and submitting the form provided in Annexure B.

Annexure A

Relevant Senate Notification:

Ref. No.: [F.No.IITMandi/Acad/Senate/2023/232-236](https://insite.iitmandi.ac.in/circulars/show.php?ID=F.No.IITMandi/Acad/Senate/2023/232-236), Date: 13 April 2023

<https://insite.iitmandi.ac.in/circulars/show.php?ID=F.No.IITMandi/Acad/Senate/2023/232-236>

UG Ordinance Rule 11 - <https://cloud.iitmandi.ac.in/f/3cf6a9b037ae43c79358/>

Annexure B

Request for Consideration for the Award of B.Tech. in Civil Engineering with Specialization in Structural Engineering

Name:	
Roll No:	
Current CGPA:	

Have you completed all the compulsory courses in the B Tech Curriculum: Yes/No
(Attach the copy of transcript upto 6th Semester highlighting the claim)

List of courses completed/to be completed that makes you eligible for the obtaining specialization in Structural Engineering

Course		L-T-P-C	Grade	Status (completed/to be completed)	Semester in which the course is taken or will be taken
No	Name				

Declaration: I declare that I have carefully checked the eligibility norms and have filled in the details correctly.

Signature of Applicant with Date: _____

Recommended: Yes/No
Faculty Advisor

Recommended: Yes/No
Chairperson SCENE

Recommended: Yes/No
Academic Session

For Office Use Only:

File No:

Remarks:

MAPPING & IMPLEMENTATION OF UG SPECIALISATION

Reference F.No.IITMandi/Acad/Senate/2023/232-236 dated 13-04-2023; Senate 38th Meeting (Item 38.7)

1. Background and Context

The Senate of IIT Mandi, in its 38th meeting held on 8th February, 2023 (vide item no. 38.7), approved in principle the proposal for the award of B.Tech. degree with Specialisation.

- All B.Tech. programmes at IIT Mandi carry a significant component of electives (FE/DE). These electives broadly cover the core areas of each UG discipline. Recognising the growing need for focused expertise, the Senate approved the organisation of these electives into specialised area baskets, thereby enabling students to pursue and formally earn a Specialisation within their own discipline.
- Further, we have many specialisations domains which will not fit with the all UG disciplines. To award and identify the suitable specialisations with the UG discipline; it is needed to map specialisations for each UG disciplines.
- The proposal aims to formally institutionalise the mechanism by which a student of the B.Tech. programme at IIT Mandi may earn and have recorded on their final degree certificate a recognised Specialisation in a domain aligned with their parent discipline.

2. Eligibility Criteria

For a student to be considered for the award of Specialisation on their B.Tech. degree, the following conditions must be satisfied:

- The student must complete a minimum of 15 credits from the elective baskets prescribed for a specific Specialisation within the discipline.
- The student must have a minimum CGPA of 7.0 in the respective basket of Specialisation.
- The Specialisation must belong to those mapped to the student's parent UG discipline, as recommended by the concerned School/Centre of IIT Mandi.

3. Specialisation Mapping by UG Discipline

Recognising that not all specialisation domains are appropriate for every UG discipline, the respective Schools/Centre of IIT Mandi have undertaken a structured mapping of permissible Specialisations for each UG programme. The recommended mapping is presented below:

UG Discipline	Recommended Specialisations
Bio Engineering	<ul style="list-style-type: none"> • Biomedical Engineering • Computational Bioengineering
Civil Engineering	<ul style="list-style-type: none"> • Structural Engineering • Geotechnical Engineering • Water Resources Engineering • Environmental Engineering • Remote Sensing and GIS
Computer Science and Engineering	<ul style="list-style-type: none"> • Systems Engineering • Theoretical Computer Science
Data Science and Engineering	<ul style="list-style-type: none"> • Intelligent Systems
Electrical Engineering	<ul style="list-style-type: none"> • Power Engineering • Control and Automation • Communication Engineering • Signal Processing • Electronics Engineering • Measurement and Instrumentation • Computer Vision • Image and Speech Processing
Mechanical Engineering	<ul style="list-style-type: none"> • Machine Design • Thermal • Manufacturing • Robotics • Computational Mechanics
Materials Science and Engineering	<ul style="list-style-type: none"> • Semiconductor Devices
Microelectronics & VLSI	<ul style="list-style-type: none"> • Device Physics and Compact Modeling • SOC Test and Verification • Semiconductor Technology and Packaging • RF and Microwave Engineering • Neuromorphic Computing
Mathematics and Computing	<ul style="list-style-type: none"> • Differential Equations & AI • Statistics and Data Science • Mathematical Modelling
Engineering Physics	<ul style="list-style-type: none"> • Higher Energy Physics • Atomic & Molecular Physics

UG Discipline	Recommended Specialisations
General Engineering	<ul style="list-style-type: none"> • All specialisations mentioned above will be implemented

The Schools and Centres retain the authority to revise, add, or discontinue specialisations within their purview, based on student demand, resource availability, faculty expertise, and evolving job market requirements, subject to appropriate academic approvals.

4. Implementation Procedure

The following step-by-step procedure is proposed for processing and granting the Specialisation to eligible students:

- a. **Course List:** All schools/centres should deliberate and propose the list of applicable courses for awarding the mentioned specialisations. The proposed course list must be aligned with the mentioned specialisation; and the course list will be deciding factor for FA and academic office to award the specialisations.
- b. **Student Initiation:** The eligible student shall approach their Faculty Advisor (FA) with a request for the Specialisation, along with supporting academic records demonstrating fulfilment of the credit and CGPA criteria within the specialisation domain.
- c. **Faculty Advisor Verification:** The FA shall verify the student's eligibility against the prescribed criteria and, upon satisfaction, formally recommend the student for the Specialisation.
- d. **Forwarding to Academic Office:** The FA shall send the duly endorsed recommendation to the Academic Office for a second layer of authentication and record verification.
- e. **Dean (Academics) Approval:** Based on the authenticated recommendation, the Dean (Academics) shall grant final approval for the award of Specialisation.
- f. **Recording on Degree:** The awarded Specialisation shall be formally mentioned on the student's B.Tech. degree certificate at the time of Convocation.

Agenda 3: Modification of courses under the Minor in Robotics program.

In continuation to notification: IITMandi/Acad/BoA-57/2024/12242-46, the following revised details are issued for the Minor in Robotics courses offered by CAIR, based on detailed discussions and suggestions from the Director, IIT Mandi.

1] Revised Core Courses

- 1) **AR 501: Robot Kinematics, Dynamics, and Control** is replaced by **AR 523: Robot Manipulators**
- 2) **AR 503: Mechatronics** is replaced by **AR 520: Design of Mechatronic Systems**

Agenda 3: Modification of courses under the Minor in Robotics program.

2] Minor in Robotics – Credit Requirements

- ❖ Minimum GPA requirement: 7.0
- ❖ Total credits: 12
- ❖ Core courses: 6 credits
- ❖ Elective courses: 6 credits from approved basket

3] Approved Elective Basket

- 3) AR 502: Advanced Design Practicum
- 4) AR 504: Robot Programming
- 5) AR 505: Principles of Robot Autonomy
- 6) AR 506: Cognitive Robotics
- 7) AR 507: Probabilistic Robotics
- 8) AR 508: Marine Robotics
- 9) AR 509: Deep Learning for Robotics

- 10) AR 510: Underactuated Robotics
- 11) AR 511: Autonomous Mobile Robots
- 12) AR 512: Rapid Prototyping and Tooling
- 13) AR 513: Unmanned Aerial Systems
- 14) AR 514: Vision and Learning Based Control
- 15) AR 515: Sensors and State Estimation
- 16) EE 555: Intelligent Control System
- 17) AR 521: Control of Robotic Systems
- 18) AR 522: Robot Vision
- 19) AR 524: Robot Simulators
- 20) AR 525: Reinforcement Learning for Robotics
- 21) AR 526: Multimodal Learning
- 22) AR 527: Patenting Through Design Thinking

Agenda 3: Modification of courses under the Minor in Robotics program.

2] Minor in Robotics – Credit Requirements

- ❖ Minimum GPA requirement: 7.0
- ❖ Total credits: 12
- ❖ Core courses: 6 credits
- ❖ Elective courses: 6 credits from approved basket

3] Approved Elective Basket

- 3) AR 502: Advanced Design Practicum
- 4) AR 504: Robot Programming
- 5) AR 505: Principles of Robot Autonomy
- 6) AR 506: Cognitive Robotics
- 7) AR 507: Probabilistic Robotics
- 8) AR 508: Marine Robotics
- 9) AR 509: Deep Learning for Robotics

- 10) AR 510: Underactuated Robotics
- 11) AR 511: Autonomous Mobile Robots
- 12) AR 512: Rapid Prototyping and Tooling
- 13) AR 513: Unmanned Aerial Systems (UAS)
- 14) AR 514: Vision and Learning Based Control
- 15) AR 515: Sensors and State Estimation
- 16) EE 555: Intelligent Control System
- 17) AR 521: Control of Robotic Systems
- 18) AR 522: Robot Vision
- 19) AR 524: Robot Simulators
- 20) AR 525: Reinforcement Learning for Robotics
- 21) AR 526: Multimodal Learning
- 22) AR 527: Patenting Through Design Thinking

Indian Institute of Technology Mandi

STARTUP PRACTICUM / YOUNG INNOVATORS FELLOWSHIP

Comprehensive Program Guidelines

Selection Criteria | Course Framework | Student Expectations | Elective Pathways

Version 2.0 | Academic Year 2026–27 | IIT Mandi

Duration 18 Months (Sem 5–7) for UG students. PG students will start in any odd semester	Credits 22 Credits (with Internship) for UG students. No credits for PG students	Scholarship ₹15,000/month for UG students. ₹50,000/semester for PG students	Cohort Size Up to 10 Students
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SECTION 1: PROGRAM OVERVIEW

1.1 Background and Rationale

The Startup Practicum, also known as the Young Innovators Fellowship (YIF), is IIT Mandi's flagship entrepreneurship program. Designed to bridge the gap between academic learning and real-world venture creation, it provides a structured, credit-bearing pathway for B.Tech students who wish to pursue entrepreneurship as a primary career direction. It draws on IIT Mandi's distinctive Practicum model of learning, integrating innovation, design thinking, and market orientation directly into the curriculum alongside technical education.

The program is designed around a central conviction: that entrepreneurship is a learnable discipline, not an innate personality trait. With the right structure, mentorship, and real-world accountability, engineering students can acquire the skills to identify genuine market problems, build solutions customers want, and develop the business acumen to sustain a venture beyond the proof-of-concept stage.

1.2 Program Objectives

- **Innovation culture:** Encourage a culture of innovation by providing students with a platform to ideate, prototype, and develop marketable solutions to real-world problems.
- **Entrepreneurial skills:** Develop entrepreneurial skills — opportunity recognition, risk management, and business model thinking — enabling students to transform ideas into viable ventures.
- **Market orientation:** Build genuine market orientation: equip students with rigorous tools for customer discovery, market sizing, competitive analysis, and financial modeling, ensuring product development is driven by validated customer need rather than internal assumption.
- **Academia-to-startup transition:** Give students the skills and confidence to transition from academia to entrepreneurship, easing their journey from ideation to startup development.
- **Societal impact:** Encourage solutions to pressing societal challenges in health, education, environment, transportation, finance, agriculture, and other domains relevant to India's development.

1.3 Design Principles

This program is designed around six principles that reflect best practices from entrepreneurship education globally and the specific context of IIT Mandi:

Program Design Principles

1. **Customer Before Product:** No MVP is built without documented customer discovery. Students are required to speak with real potential users before significant engineering effort is committed.

2. Evidence Over Assertion: Every market claim must be backed by primary data — customer interviews, surveys, or observed behavior — not secondary reports alone.

3. Financial Literacy from Day One: Students learn to model unit economics (CAC, LTV, gross margin, burn rate) from the beginning of the program, not as an afterthought before demo days.

4. Failure as a Valid Outcome: A disciplined, evidence-backed decision to abandon a non-viable idea is treated as a successful learning outcome, not a failure. The program has a structured Pivot Protocol for this.

5. Real Standards, Real Panel: Evaluation panels include Venture Capitalists and Angel Investors, not only faculty. Students are held to the standards they will face in actual fundraising.

6. Domain-Matched Mentorship: Each team is assigned mentors with relevant domain expertise. General mentorship is supplemented by sector-specific guidance.

SECTION 2: DETAILED SELECTION GUIDELINES

2.1 Eligibility Criteria

All applicants must satisfy the following eligibility requirements at the time of application:

Criterion	Requirement
Degree Program	B.Tech (any discipline) at IIT Mandi
Semester Completed	Must have completed the 5th Semester
CGPA	Minimum CGPA of 7.0 (no rounding up)
Backlogs	No active backlogs at the time of application
Team Size	Individual or team of up to 2 students (as approved by the Selection Committee). The team members should be from different programs, complementing each other's skills.
Exchange / Internship	Must not participate in a semester-long exchange or a semester-long internship during the 3-semester program duration. A 2-month internship is allowed with technical mentors and YIF committee approval
Concurrent Programs	May not simultaneously enroll in another elective-intensive program that conflicts with practicum hours

2.2 Application Requirements

Applicants must submit a complete application package by the advertised deadline. Incomplete applications will not be reviewed. The application is deliberately designed to assess customer orientation and market thinking — not just technical capability.

2.2.1 Written Application Package

- Executive Summary (max 500 words):** Describe the problem being solved, the proposed solution, and why you — and your team — are the right people to solve it at this stage.
- Problem Statement and Market Opportunity:** Clearly define the problem, who has it, how often they experience it, and how severely it affects them. Include any direct observations or conversations with people who have this problem.
- Customer Evidence (Critical):** Document any primary customer research you have already conducted: interviews, observations, surveys, or informal conversations. If you have not yet spoken to potential customers, explain specifically who you plan to speak to and how. Applications with no customer evidence will be evaluated critically.

4. **Solution and Technology Approach:** Describe your proposed solution. What is the core innovation? Is there a technical component? What have you already built, tested, or validated?
5. **Market Sizing:** Provide a rough estimate of the total addressable market (TAM), serviceable addressable market (SAM), and serviceable obtainable market (SOM). Use a bottom-up calculation wherever possible.
6. **Business Model Hypothesis:** How do you plan to generate revenue? What are your primary and secondary revenue streams? How many units must you sell, or customers you must acquire, to reach break-even?
7. **Team Background:** List all team members, their disciplines, relevant skills, and why the team composition is suited to execute this idea.
8. **Motivation Statement (max 300 words):** Why are you choosing entrepreneurship over a conventional job or higher studies at this stage of your career?
9. **References:** At least one faculty member or industry professional who can vouch for the applicant's character and potential.

2.2.2 Supporting Materials (Optional but Encouraged)

- Working prototype, demo video, or proof-of-concept (links acceptable)
- Evidence of customer conversations: survey results, interview notes, or feedback screenshots
- Any prior recognition: hackathon awards, grants, fellowship selections, press coverage
- Letters of Intent from potential customers or partners

2.3 Selection Process

The selection is conducted in three stages:

Stage 1 — Application Screening

All applications are reviewed by the Selection Committee using a standardized scoring rubric. Shortlisted applicants (typically 50–60 from the applicant pool) are invited to Stage 2. Applications are evaluated on both the strength of the idea and the evidence of customer orientation — teams that demonstrate they have already talked to potential users are given priority.

Stage 2 — Presentation and Interview

Shortlisted candidates present their idea to the Selection Committee (10 minutes presentation + 10 minutes Q&A). The interview assesses:

- Depth of problem understanding and customer empathy
- Clarity and feasibility of the proposed solution
- Coachability and openness to feedback
- Team dynamics and complementary skills (for team applications)
- Commitment level and seriousness of intent

- Quality of market thinking — not just technical thinking

Stage 3 — Final Selection

The Selection Committee deliberates and finalizes up to 30 students. In case of a tie, preference is given to applicants with demonstrated customer validation over those who have only ideated. Preference is also given to teams with complementary skill sets (technical + non-technical).

2.4 Selection Committee Composition

The Selection Committee shall comprise:

- YIF Committee members
- One or Two Faculty Members with entrepreneurial or innovation backgrounds
- One or more Successful Entrepreneurs (external)
- One Venture Capitalist (external)
- One Angel Investor (external)

Committee Note

A quorum of at least 4 members (including at least 1 external member) is required for valid selections.

At least one VC or Angel Investor must be present at the selection panel. This ensures the selection standard is aligned with real investment criteria, not only academic criteria.

Any committee member with a conflict of interest must recuse themselves.

2.5 Selection Rubric

Each application and presentation is scored on the following dimensions (Total: 100 points):

Criterion	Max Points	What Evaluators Look For
Problem Significance & Clarity	20	Is the problem real and significant? Does the applicant articulate it from the customer's perspective, not just from their own interest?
Customer Understanding	20	Has the applicant spoken to potential customers? Is there evidence of genuine empathy and primary research — not just market reports?
Solution Feasibility	15	Is the proposed solution technically and commercially feasible given the applicant's resources and timeline?

Business Model Thinking	15	Does the applicant have a hypothesis for how the venture will make money? Can they explain even a rough unit economics model?
Team Capability	15	Are the skills and backgrounds sufficient to execute? Does the team have both technical and market-facing capability?
Motivation & Commitment	10	Is the applicant genuinely committed to entrepreneurship — not treating this as a fallback option or a scholarship opportunity?
Coachability	5	Does the applicant respond constructively to challenging questions and feedback during the interview?

SECTION 3: STUDENT EXPECTATIONS AND RESPONSIBILITIES

3.1 Core Commitments

Students admitted to the Startup Practicum make the following commitments for the full duration of the program (18 months across Semesters 5, 6, and 7):

Non-Negotiable Commitments

1. Full-time dedication to the venture during the program — entrepreneurship is treated as a professional responsibility, not a side project.
2. Attendance at all mandatory program events: Demo Days, Mentor Sessions, Monthly Check-ins, and Milestone Reviews.
3. Honest and transparent reporting of progress — including setbacks, pivots, and dead ends.
4. Compliance with IIT Mandi's Intellectual Property (IPR) policy for all innovations developed during the program.
5. Active participation in peer reviews and feedback sessions.
6. Monthly Customer Touchpoint Reports — documenting direct interactions with real potential customers every month.

3.2 Semester-wise Deliverables and Expectations

Semester 5 — Startup Practicum 1 (4 Credits): Discovery and Prototyping

This semester focuses entirely on problem-market fit. Students are not expected to have a finished product — they are expected to deeply understand their customer and their problem space. No engineering hours should be committed to building before the customer discovery milestones are met.

Deliverable	Description and Standard
Problem Statement Document	A rigorous 2–3 page document articulating the problem, who has it, how frequently, and what the current alternatives are. Must be revised at least once based on direct customer feedback.
Customer Discovery Report (Mandatory)	Documentation of at least 30 customer interviews — not surveys. Must include verbatim quotes, observed patterns, and an explicit statement of how findings changed initial assumptions.
Market Sizing Exercise	TAM-SAM-SOM analysis using cited sources. Bottom-up calculation required; top-down alone is insufficient.

Competitive Landscape	Mapping of existing solutions (direct and indirect), their strengths and weaknesses, and a differentiation hypothesis grounded in customer evidence.
Prototype / Proof of Concept	A working prototype, mockup, or minimum viable product demonstrable to potential customers. Paper prototypes are acceptable at this stage.
Monthly Milestone Reports	Brief monthly updates (submitted to mentor) covering: what was planned, what was done, what was learned, and what will be done next month.
End-of-Semester Pitch	10-minute pitch to the evaluation panel covering: problem, customer evidence, solution, market, team. Evaluators will probe heavily on customer evidence — claims without data will not be accepted.

Semester 6 — Startup Practicum 2 (6 Credits): MVP and Market Validation

This semester focuses on achieving product-market fit signals. Students must move from prototype to a Minimum Viable Product that real customers are using. Revenue, or documented evidence of willingness to pay, is the key milestone for this semester.

Deliverable	Description and Standard
MVP Launch	A functional product — software, hardware, service, or hybrid — used actively by at least 10 target customers. Feedback must be documented systematically.
Unit Economics Model	A working spreadsheet model including: COGS, Customer Acquisition Cost (CAC), Lifetime Value (LTV), LTV:CAC ratio, Gross Margin, Monthly Burn Rate, and break-even volume. This model will be reviewed live at Demo Day.
Revenue Traction or Willingness-to-Pay Evidence	Either documented revenue (any amount), signed LOIs/MOUs, paid pilots, or structured willingness-to-pay experiments showing customers will pay for the solution.
Go-to-Market Plan	A concrete plan for acquiring the first 100 customers: channels, messaging, conversion funnel, and cost estimates per channel.
Financial Projections (12-month)	Revenue model with assumptions clearly stated and stress-tested across pessimistic, base, and optimistic scenarios.
Entity Formation (if applicable)	If the team intends to raise external funding, legal entity incorporation is strongly encouraged by end of Semester 7.
End-of-Semester Demo Day	Investor-style pitch (15 minutes + Q&A). Panel will include at least one VC or Angel Investor. Students must demo the live product. Unit economics will be examined in detail.

Semester 7 — Startup Practicum 3 (10 Credits): Growth and Scaling

The final semester shifts focus from validation to growth. Students are expected to demonstrate that their venture is operational, generating traction, and has a credible path to scale.

Deliverable	Description and Standard
Operational Venture	The startup must be live and operational. Customers are using the product, transactions are occurring (or credibly imminent), and the team has defined roles.
Funding Strategy	A documented funding strategy: whether bootstrapping, seeking grants, angel investment, or VC. If raising: a complete pitch deck, cap table model, and term sheet literacy demonstrated during mentoring sessions.
Hiring and Team Plan	Plan for bringing in non-founding team members: what roles are needed, how they will be sourced, and how equity and compensation will be structured.
Impact Metrics Dashboard	Monthly tracking of the 3–5 metrics that matter most for the business (e.g., MRR, DAU, NPS, repeat purchase rate). Trends must be visible and explainable.
Final Capstone Report	A comprehensive 20–30 page document covering: the entrepreneurial journey, pivots taken and why, customer learnings, product evolution, financial model, competitive positioning, and future roadmap.
Final Demo Day (Investor Pitch)	A polished investor pitch (15 min + 15 min Q&A) before a panel of VCs, Angels, and Industry Leaders. Open to the broader investor community. Live product demo required.
Peer Mentorship Contribution	Each Semester 8 student/team must conduct at least 2 structured sessions mentoring Semester 6 students, explicitly sharing market research and customer discovery learnings.

3.3 Monthly Touchpoint Requirements

To maintain consistent progress and enable early identification of challenges, every student/team participates in the following monthly activities:

- **Faculty Mentor Check-in:** 60-minute one-on-one meeting to review milestone progress, address blockers, and set next-month goals.
- **Business Mentor Check-in:** 45-minute session with the assigned industry mentor focused on market, customers, and business model.
- **Customer Touchpoint Report (Mandatory):** A written report (1–2 pages) documenting all customer interactions from the past month — who was spoken to, key insights, and how it changed thinking. This report is graded.
- **Peer Cohort Session:** Monthly group session with the full cohort for peer learning, venture updates, and cross-team feedback.

3.4 Scholarship Continuation Criteria

The monthly scholarship of Rs. 15,000 is performance-based and subject to continuation review at the end of each semester:

Condition	Details
Milestone Achievement	At least 70% of agreed milestones for the semester must be met or have a credible, documented explanation for deviation.
Customer Engagement	Demonstrated, documented interactions with real customers during the semester — evidenced by Customer Touchpoint Reports.
Attendance	Attendance at ≥80% of mandatory program events (Demo Days, mentor sessions, cohort meetings).
Mentor Certification	Both mentors must certify continued engagement and good-faith effort toward the venture.
Integrity	Any falsification of data, customer interviews, or reports leads to immediate scholarship termination and may lead to program dismissal.

3.5 The Pivot Protocol

This program explicitly recognizes that discovering a venture is not viable — and acting on that discovery with discipline — is a legitimate and valuable outcome. A student who abandons an idea because market evidence proves it unworkable, and who documents that evidence clearly, has demonstrated exactly the kind of evidence-driven thinking the program aims to build.

The Pivot Protocol is a structured process for managing idea transitions:

10. The student or team identifies that current evidence does not support continued pursuit of the venture in its current form.
11. A Pivot Report is submitted to both mentors, documenting: the evidence gathered, the hypothesis that was disproved, and why continuation is not warranted.
12. The team presents the Pivot Report to the evaluation panel in a 20-minute session. The panel approves the pivot and may suggest new directions.
13. The student may continue in the program with a new idea, subject to panel approval, provided sufficient time remains in the program timeline.
14. A well-documented, evidence-backed exit from an idea earns full credit for the semester. It is not penalized.

3.6 Grounds for Program Exit

1. Voluntary withdrawal: the student notifies the program coordinator in writing.
2. Abandoning the venture without informing mentors for more than 4 consecutive weeks.
3. Failing to submit Customer Touchpoint Reports for two consecutive months without explanation.
4. Failing to meet milestone requirements for two consecutive semesters without a credible recovery plan.
5. Violation of IIT Mandi's academic integrity, IPR policy, or code of conduct.
6. Taking up a full-time internship or exchange program without prior written approval from the program coordinator.
7. On exit, the credit earned through this program would consume the free elective basket.

SECTION 4: PROGRAM STRUCTURE AND CREDIT FRAMEWORK

4.1 Credit Structure Overview

Semester	Course	Credits	Replaces
5th Semester	Startup Practicum 1	4	ISTP
6th Semester	Startup Practicum 2	6	MTP 1 + 1 FE course
7th Semester	Startup Practicum 3	10	MTP 2 + 2 FE course
Summer (Optional)	Startup Internship	2	Standard Internship
	TOTAL	22 (+ 2 optional)	

Note: The YIF fellows cannot enroll in ISTP, MTP-1, or MTP-2. Violation of these would immediately result in the termination of the fellowship.

SECTION 5: CORE COURSES (MANDATORY)

The following three courses are mandatory for all students in the Startup Practicum program. They form the academic backbone of the entrepreneurship curriculum and must be completed to qualify for the Specialization in Entrepreneurship.

Course 1: HS-510 — Essentials of Entrepreneurship (3 Credits)

Course Details

Credits: 3-0-0-3 | Distribution: Open Elective | Semester: Odd/Even

Intended for: PhD / Masters / B.Tech 3rd and 4th year | Prerequisites: Nil | Approved: 17th Senate

This course provides a foundation in entrepreneurship theory and practice. It addresses the full early-stage journey — from idea screening and customer understanding through business model design, financial basics, and team building. The course is designed to help students think like entrepreneurs, not just like engineers.

Module	Topics and Hours
Module 1: Entrepreneurship Concepts (4 hrs)	Entrepreneur vs. small business owner; entrepreneurial styles; startup lifecycle; recognizing opportunity.
Module 2: Idea, Problem, and Customer (12 hrs)	Problem identification; design thinking; customer segmentation; unique value proposition; early adopter identification; The Mom Test framework.
Module 3: Business Model Validation (12 hrs)	Lean canvas; MVP design; product-market fit; revenue streams; pricing psychology; funding basics; runway and burn rate.
Module 4: Building a Resourceful Team (4 hrs)	Co-founder dynamics; shared leadership; defining roles and responsibilities; equity pitching; collaboration tools.
Module 5: Marketing, Sales, and Support (10 hrs)	Brand vs. product; sales planning; unique selling propositions; follow-up; project management; business regulations; government schemes for startups.

Course 2: GE-523 — Startup Framework: Finance, Valuation and Structure (3 Credits)

Course Details

Credits: 3-0-0-3 | Distribution: Open Elective | Semester: Odd/Even

Intended for: UG and PG students | Prerequisites: HS-510 (Essentials of Entrepreneurship)

This course provides students with a solid understanding of the financial architecture of startups — how they are structured, valued, financed, and eventually exited. Students learn to make informed decisions about funding structures, equity distribution, and the financial implications of growth. Particular emphasis is placed on understanding what investors actually look for when they examine a startup's financials.

Unit	Topics and Hours
Unit 1: Business Structures (2 hrs)	Sole proprietorship, LLP, Pvt. Ltd.; legal and financial implications of each; when to incorporate and why.
Unit 2: Shareholding and Equity (8 hrs)	Equity basics; co-founder splits; ESOPs; vesting and cliff periods; cap table management; implications of dilution on control.
Unit 3: Company Valuation and Financial Forecasting (8 hrs)	Valuation concepts; DCF, market comparables, and asset-based methods; projecting income statements, balance sheets, and cash flows.
Unit 4: Entrepreneurial Finance (7 hrs)	Financial management for startups; risk analysis; importance of assumptions in forecasts; burn rate management; concept of runway.
Unit 5: Startup Financing Strategies (7 hrs)	Bootstrapping; angel investors; VC; crowdfunding; IPO; understanding and negotiating term sheets.
Unit 6: Exit Strategies (7 hrs)	Shareholder agreements; promoter shares; IPO, M&A, and secondary sale exits; impact of exit strategy on cap table and valuation.

SECTION 6: EVALUATION FRAMEWORK

6.1 Evaluation Philosophy

The program's evaluation philosophy is modeled on how real startups are judged by investors: on the basis of learning velocity, customer evidence, and business viability — not on how polished the pitch sounds or how impressive the technology is. Evaluation panels intentionally include investors and industry practitioners, not only faculty, to maintain this standard.

Key Evaluation Principles

Progress over perfection: A team that has pivoted twice based on strong customer evidence is valued more than a team with a polished idea and no validation.

Customer evidence is non-negotiable: Any claim about what the market wants must be backed by documented customer interactions. Assertions without evidence will be challenged.

Unit economics awareness: From Semester 7 onwards, students must be able to explain and defend their unit economics model under pressure from the panel.

Honest failure is respected: A student who identifies that their venture is not viable and explains why — with evidence — has demonstrated exactly the kind of disciplined thinking the program aims to build.

Domain expertise matters: Evaluation panels include domain experts where possible, not only generalist investors.

6.2 Grading Framework

Component	Sem 6	Sem 7	Sem 8	Notes
Mentor Evaluation (Continuous)	30%	25%	20%	Monthly milestone achievement scored by both mentors jointly.
Customer Discovery / Traction Evidence	30%	20%	15%	Sem 6: Interview quality and Customer Touchpoint Reports; Sem 7: MVP usage data; Sem 8: Revenue or LOIs.
Unit Economics and Financial Model	10%	25%	20%	Sem 7 onwards: live model reviewed at each Demo Day. No submissions without a working model.
End-of-Semester Pitch / Demo Day	20%	20%	30%	Investor-style panel. Sem 8 Demo Day is the primary capstone evaluation event.

Peer Contribution and Cohort Participation	10%	10%	10%	Attendance, quality of peer feedback, mentoring of junior cohort students (Sem 8).
Final Capstone Report	—	—	5%	Comprehensive written document submitted at end of Semester 8.

6.3 Demo Day Structure

Demo Days are the primary high-stakes evaluation events. They are structured as real investor pitch sessions, not academic presentations. Attendance by the evaluation panel is mandatory; attendance by the student is non-negotiable.

Demo Day	Format and Panel Composition
End of Semester 5	10-minute pitch + 10-minute Q&A. Panel: 2 mentors + 1 external investor. Focus: problem validation, customer evidence (30+ interviews required), prototype demo.
End of Semester 6	15-minute pitch + 15-minute Q&A. Panel: 2 investors + 1 mentor + 1 domain expert. Focus: MVP, unit economics model (live), traction, fundraising plan.
End of Semester 7 (Capstone)	15-minute pitch + 15-minute Q&A. Panel: 3 investors/VCs + 1 industry leader. Open to the broader investor community. Live product demo required. This is a real fundraising and partnership opportunity for students.

The YIF fellow must demonstrate their work in the institute-level events such as HIVE, HST, Engineering Day, and other demonstration days planned by the institute.

SECTION 7: MENTORSHIP STRUCTURE

7.1 Dual Mentorship Model

Each student/team is assigned two dedicated mentors for the duration of the program. The dual model is intentional: it creates a productive tension between technical rigor (from the faculty mentor) and market reality (from the business mentor). Students who engage actively with both mentors consistently perform better at evaluation.

Aspect	Faculty Mentor	Business / Industry Mentor
Background	IIT Mandi faculty with research, innovation, or domain expertise relevant to the venture	Successful entrepreneur, VC, Angel Investor, or industry professional with relevant sector experience
Domain Match	Assigned based on the technical domain of the venture — not randomly	Assigned based on the market domain of the venture — a healthtech startup gets a healthtech or medtech mentor
Primary Role	Academic oversight; research and technology guidance; milestone tracking; IPR guidance	Market feedback; business model review; investor network access; fundraising coaching
Meeting Frequency	Monthly (mandatory); ad-hoc as needed around key product decisions	Monthly (mandatory); additional sessions around Demo Days and key milestones
Grading Role	Contributes 60% of mentor evaluation score	Contributes 40% of mentor evaluation score
Continuity	Assigned for full 3-semester program	May change between semesters if a better domain match becomes available

SECTION 8: RECOGNITION AND SPECIALIZATION

8.1 Specialization in Entrepreneurship

Students who successfully complete all three semesters of the Startup Practicum, accumulating a minimum of 20 Startup Practicum credits (4 + 6 + 10), are recommended for formal recognition of a Specialization in Entrepreneurship on their B.Tech transcript, subject to Senate approval.

Requirement	Details
Minimum Startup Practicum Credits	20 credits across the three semesters (4 + 6 + 10)
Internship Credits	2 credits from startup-related internship (strongly recommended; not mandatory for specialization)
CGPA Requirement	No minimum CGPA required for the specialization recognition; evaluation is milestone-based
Active Venture or Learning Portfolio	At completion, student must either have an active venture or a well-documented portfolio of customer discovery, product iterations, and business model evolution
Mentor Certification	Both assigned mentors must certify satisfactory completion across all three semesters

8.2 Sponsorship to National Events

On successful completion of the YIF program, the institute will sponsor the project for its demonstration in national events.

SECTION 09: APPENDICES

Appendix A: Recommended Elective Selection by Venture Type

If your startup is...	Priority Electives (in order of recommendation)
B2C Consumer Tech / App	Market Research & Consumer Insights → Consumer Psychology & Behavioral Economics → Growth Marketing & Digital Channels → Unit Economics & Financial Modeling
B2B SaaS / Enterprise Tech	Unit Economics & Financial Modeling → B2B and B2C Sales for Founders → Product Management for Tech Startups → Legal Foundations for Startups
Hardware / IoT / Deep Tech	Operations & Supply Chain → Engineering Economics → Unit Economics & Financial Modeling → Legal Foundations for Startups
Agritech / Ruraltech	Market Research & Consumer Insights → Operations & Supply Chain → Social Entrepreneurship & Impact Measurement → Legal Foundations for Startups
Healthtech / Medtech	Legal Foundations for Startups (Regulatory focus) → Market Research & Consumer Insights → Operations & Supply Chain → Unit Economics & Financial Modeling
Edtech / Social Enterprise	Social Entrepreneurship & Impact Measurement → Consumer Psychology & Behavioral Economics → Growth Marketing → Legal Foundations for Startups
Fintech / Payments	Legal Foundations for Startups → Unit Economics & Financial Modeling → Consumer Psychology & Behavioral Economics → B2B and B2C Sales for Founders
Defence / Deep Tech / Dual Use	Legal Foundations for Startups → Market Research & Consumer Insights → Unit Economics & Financial Modeling → Product Management for Tech Startups

Appendix B: Recommended Reading for All Students

The following resources are required or strongly recommended reading for all program students. These are not academic textbooks — they are practitioner guides written by founders and investors.

- **The Mom Test by Rob Fitzpatrick:** Essential reading on how to conduct customer interviews without leading the witness. Required before the first customer interview in Semester 6.
- **The Lean Startup by Eric Ries:** The build-measure-learn cycle and validated learning. Foundation for the program's approach to iteration.
- **Zero to One by Peter Thiel:** On building ventures that create new categories rather than competing in existing ones.

- **Venture Deals by Brad Feld and Jason Mendelson:** The definitive guide to understanding term sheets and VC dynamics — required reading before any fundraising conversation.
- **Startup India Portal (startupindia.gov.in):** DPIIT recognition, government grants, and regulatory resources for Indian startups.
- **IIT Mandi Catalyst (catalyst.iitmandi.ac.in):** Incubator resources, mentor network, workspace access, and funding schemes.

Appendix C: Key Contacts

Role	Responsibility
Course Instructor / Program Coordinator	Overall program administration, student communication, academic oversight, and milestone tracking.
Faculty-in-Charge, IIT Mandi Catalyst	Incubation support, infrastructure access, mentor network management, and industry connections.
Selection Committee Convener	Manages the application and selection process for each cohort cycle.
Program Administrator	Day-to-day student queries, scholarship disbursements, and event logistics.

Document prepared by the Startup Practicum Program Team, IIT Mandi

Version 2.0 | Academic Year 2026–27

Minor in Entrepreneurship

A Minor in Entrepreneurship is proposed to be open to B. Tech. and B.Tech. + M.Tech. dual degree students at IIT Mandi. This minor consists of a curriculum in entrepreneurship, which is organized as core and elective courses of 11 credits. The successful completion of the minor requires 5 credits of core courses and a minimum of 6 credits of elective courses. The 6 credits of core courses will be earned against the following 2 core courses:

1. IC202P Design Practicum-I
2. DP302P Design Practicum-II

To obtain a Minor in Robotics, students need to maintain a minimum GPA of 7.0 in the dedicated 11 credits that they have taken to fulfill the course requirement of the Minor program. The remaining 6 credits will be earned from any of the remaining courses of the basket listed below.

1. GE 523: Startup Framework: Finance, Valuation, and Structure
2. HS 510: Essentials of Entrepreneurship
3. ME 523: Product Design
4. AR-527, Patenting Through Design Thinking

Minor Program in Management

Proposal
School of Management
Indian Institute of Technology Mandi
May 2026

1. Preamble

The proposed Minor Program in Management is designed for undergraduate engineering students of IIT Mandi. The program aims to provide foundational exposure to key management disciplines while maintaining relevance to engineering education, technology-driven organizations, and future professional pathways in industry, entrepreneurship, and academia.

The program emphasizes breadth over specialization and seeks to equip students with essential managerial understanding in areas such as economics, marketing, finance, organizational behaviour, entrepreneurship, and operations. The curriculum is structured to complement the technical training of engineering students and enable them to engage more effectively in multidisciplinary and organizational contexts.

2. Objectives of the Program

The objectives of the Minor Program in Management are as follows:

1. To provide engineering students with foundational knowledge of management principles and practices.
2. To enhance students' understanding of organizational, economic, and business systems relevant to technology-driven environments.
3. To strengthen students' preparedness for corporate careers, startup ventures, leadership roles, and higher education opportunities.

3. Program Structure

The Minor Program in Management shall comprise a total of **12 academic credits**.

3.1 Compulsory Core Courses (6 Credits)

Students must complete the following two compulsory courses at the 300 level:

Code	Course Title
MB311	Management Fundamentals for Engineers
MB312	Economic Decision-Making for Engineers

3.2 Elective Courses (6 Credits)

Students must complete any two elective courses from the following list of courses:

Code	Course Title
MB410	Marketing for Engineers
MB411	Human Resource Management and Organizational Behaviour for Engineers
MB412	Consumer Behaviour in Technology Markets
MB413	Technology Entrepreneurship and Venture Creation
MB414	Accounting Practices for Technology Businesses
MB415	Financial Management for Technology Businesses
MB416	Industrial Operations and Supply Chain Systems

Note: The school may introduce new electives from time to time.

4. Eligibility and Selection Process

4.1 Program Capacity

The program shall operate with limited intake capacity in view of instructional and pedagogical constraints. The proposed intake capacity is **55 students per batch**, aligned with the desirable faculty-to-student ratio and historical trends in minor program completion. **An additional 5 students may be admitted from General Engineering program, especially Fintech specialization.**

4.2 Entry into the Program

Students shall apply for the Minor Program at the end of the fourth semester, prior to the semester break. This shall be the only entry point into the program.

4.3 Selection Criteria

Selection shall be based on the cumulative grade point average (CGPA) at the end of Semester IV. The top 55 eligible applicants shall be admitted into the program. **Students from General Engineering may be admitted based on recommendation from FA.**

5. Exit Policy

Students enrolled in the Minor Program may voluntarily discontinue the program at any stage. Such discontinuation must be formally communicated to the School of Management office and Academic Office through email.

6. Course Progression and Academic Plan

Students shall complete the courses in the following sequence:

Semester	Courses
Semester V	Core Course 1
Semester VI	Core Course 2
Semester VII	Elective 1
Semester VIII	Elective 2

Important Notes:

- 1. Core courses may be completed in any sequence. However, both core courses must be completed before taking elective courses.**
2. Core courses must be completed within the third year of the undergraduate program.

3. Students may take two elective courses in the same semester, subject to scheduling and availability.
4. A maximum of two elective courses shall be offered in any given semester based on instructor availability.

7. Operational and Logistical Requirements

7.1 Course Offering Plan

The proposed rollout schedule is as follows:

Semester	Courses to be Offered	Faculty Requirement
July 2026	Core Course 1	1 Faculty
January 2027	Core Course 2	1 Faculty
July 2027	Core Course 1 + Elective Courses	3 Faculty Members
January 2028	Core Course 2 + Elective Courses	3 Faculty Members

7.2 Resource Requirements

The following resources shall be required for effective implementation of the program:

1. Faculty resources for course delivery.
2. Honorarium support and boarding/lodging arrangements for invited faculty members, wherever applicable.
3. Basic office infrastructure and administrative support.

8. Important Remarks

1. The School of Management shall not manage backlog completion for students from earlier batches.
2. Courses under the Minor Program shall be conducted separately for B. Tech students and shall not be merged with MBA/IMBA classes due to differences in class size, pedagogy, and timetable structures.
3. Elective offerings shall depend on faculty availability and institutional scheduling constraints.

4. Students in the fourth year shall primarily undertake elective coursework after completion of the core requirements.

IMBA Curriculum

Semester	Course Code	Type	Course Title	Credit
1	IC112	IC	Calculus	2
1	IC152	IC	Introduction to Python and Data Science (Previously DS I)	4
1	IC230	IC	Environmental Science	3
1	IC113	IC	Complex Variables and Vector Calculus	2
1	MB202	DC	Microeconomics (DC)	3
1	MB201	DC	Foundations of Business Management (DC)	4
1	IC181/Equivalent	DC	Introduction to Consicisness...../Equivalent	3
1	MB291	DE	Management Workshop I	1
Semester total Credits				22
2	IC114	IC	Linear Algebra	3
2	IC115	IC	ODE and Integral Transform	2
2	IC252	IC	Probability and Statistics (Previously DS II)	4
2	MB206	DC	Excel for data analysis	3
2	MB203	DC	Macroeconomics	3
2	MB205	DC	Written and Verbal Communication	3
2	MB301	DC	Problem solving and Decision Making for Managers	3
2	MB292	DE	Management Workshop II	1
Semester total Credits				22
3	DS201*	DC	Data handling and Visualization	3
3	IC272	IC	Machine Learning (Previously DS III)	3
3	CS208*	DC	Mathematical Foundation of Computer Science/Data Science/Ma	4
3	MB302	DC	Business Law	3
3	MB305	DC	Business Communication	3
3	MB303	DC	Financial Accounting	3
3	MB304	DC	Ethics and Values	3
Semester total Credits				22

4	MB308	DC	Introduction to Marketing	3
4	MA524	DC	Probability and Statistics	4
4	IC253	IC	Programming and Data Structures	3
4	MB306	DC	Introduction to organisational structure	3
4		FE	Elective	4
4	MB307	DC	Cost and Financial Accounting	3
4	MB391	DC	Management Workshop III	1
Semester total Credits				21
5	MB401	DC	Mathematics for Business Management	3
5	MB409	DC	Sales and Distribution Management	3
5	MB402	DC	Operations Research	3
5	MB403	DC	Foreign Language 1	3
5	MB404	DC	Business Research Methods	3
5	MB405	DC	Database for Managers	3
5	MB392		Management workshop IV	1
5	FE	FE	Elective	3
Semester total Credits				22
6	MB309	DC	Introduction to Operations Management	3
6	MB310	DC	Introduction to Financial Management	3
6	MB393		Management Workshop V (Preferably one of the Indian Art Forms)	1
6	MB406	DC	Public Speaking and debating	2
6	FE	FE	Elective	3
6	FE	FE	Elective	3
6	MB407	DC	Econometrics	3
6	MB408	DC	Indian Economy	3
Semester total Credits				21
7	Internship		Internship/Semester exchange/Start-up	12
The IMBA curriculum for 8th, 9th and 10th semester will be the same as that of MBA curriculum being followed at that moment for 2nd, 3rd, & 4th Semester respectively.				

Semester total Credits				12
8	MB520	DC	Fundamentals of Data and Analytics	2
8	MB521	DC	Disruptive Technology for Data Science	2
8	MB526	DC	Strategic Management	2
8	MB522	DC	Machine Learning for Business	2
8	MB523	DC	Introduction to AI and Automation	2
8	MB524	DC	Organizational Behavior	2
8	MB518	DC	Decision Analysis	2
8	MB536	DC	Project Management	2
8	MB535	DC	Marketing Management II	2
	MB531	DC	Ethical and Legal Aspects of Business	2
Semester total Credits				20
Summer	MB529	DC	Summer Internship	2
Semester total Credits				2
9	MB530	DC	Neural Network Fundamentals for Business	2
9	MB532	DC	Digital Business Strategy, Models and Transformations	2
9	MB533	DC	Entrepreneurship	2
9	MB537	DC	Business and Data Leadership	2
9	MB538	DC	Management Insights from Indian Knowledge System	2
9	MB528	DC	Human Resource Management	2
9	MB525	DC	Qualitative Research Methods	2
9		FE	Free Elective 1	2
9	MB534	DC	Management Project I	4
Semester total Credits				20
10	DE	DE	Discipline Elective 1	2
10	DE	DE	Discipline Elective 2	2
10	DE	DE	Discipline Elective 3	2
10	DE	DE	Discipline Elective 4	2
10	DE	DE	Discipline Elective 5	2

10	FE	FE	Free Elective 2	2
10	MB540	DC	Management Project II	4
Semester total Credits				16
			Total Credits for Five Years	200