बयालीसवीं सीनेट बैठक का कार्यवृत्त

MINUTES OF THE 42nd SENATE MEETING OF IIT MANDI

January 23, 2024

Indian Institute of Technology Mandi

भारतीय प्रौद्योगिकी संस्थान मण्डी
कमांद – 175075, हिमाचल प्रदेश

INDIAN INSTITUTE OF TECHNOLOGY MANDI
KAMAND – 175075, HIMACHAL PRADESH

INDIAN INSTITUTE OF TECHNOLOGY MANDI
KAMAND, HIMACHAL PRADESH

42nd SENATE MEETING OF IIT MANDI
TUESDAY, JANUARY 23, 2024

INDIAN INSTITUTE OF TECHNOLOGY MANDI

Minutes of the 42nd Senate Meeting of IIT Mandi held on January 23, 2024 at 03:00 PM in Conference Room, C.V. Raman Guest House, North Campus, IIT Mandi, Kamand.

The following were present:

In the Chair

Prof. Laxmidhar Behera, Director, IIT Mandi

Members:

Prof. Binay Kumar Pattnaik, Dept. of HSS, IIT Kanpur
Prof. Subrata Ghosh, Professor, SCS, IIT Mandi
Prof. Suman Kalyan Pal, Professor and Chairperson SPS, IIT Mandi
Prof. Rajeev Kumar, Professor, SMME and Dean (I&S), IIT Mandi
Prof. Chayan Kanti Nandi, Professor, SCS and Dean (DoRA), IIT Mandi
Prof. Pradeep C. Parameswaran, Professor and Chairperson, SCS, IIT Mandi.
Prof. Satinder K. Sharma, Professor, SCEE, Dean (Faculty) & Co-ordinator C4DFED, IIT Mandi.
Prof. Syed Abbas, Professor, SMSS & Dean (SRIC & IR) IIT Mandi.
Prof. Anirudhha Chakraborty, Professor, SCS and Dean (Academics), IIT Mandi.
Prof. Tulika Srivastava, Professor, SBB, IIT Mandi
Prof. Rahul Vaish, Professor, SMME, IIT Mandi
Dr. Shyamasree Dasgupta, Chairperson, SHSS, IIT Mandi
Prof. Manoj Thakur. Professor, SMSS and Chairperson, SoM, IIT Mandi
Prof. Anjan Swain, Professor, SHSS, IIT Mandi
Dr. Hitesh Shrimali, Dean (Students), IIT Mandi
Dr. Viswanath Balakrishnan, Dean (F&A), IIT Mandi
Dr. Aditya Nigam, Chairperson, SCEE, IIT Mandi
Dr. Muslim Malik, Chairperson, SMSS, IIT Mandi
Dr. Shyam Kumar Masakpalli, Chairperson, SBB, IIT Mandi
Dr. Atul Dhar, Chairperson, SMME, IIT Mandi
Dr. Varun Dutt, Chairperson, IKSMHA, IIT Mandi
Dr. C.S. Yadav, Co-ordinator, AMRC & Chairperson, CQST, IIT Mandi
Dr. Shubhajit Roy Chowdhury, Chairperson, HCI, IIT Mandi
Mr. Hemachandra Bhat, General Manager and Practice Head, Robotics Platforms, Wipro.
Mr. Rajesh Sinha, Chief Scientist & Head - Smart Machines Research Program, TCS.
Dr. Rahul Shrestha, Associate Professor, SCEE, IIT Mandi.
Dr. Kala Venkata Uday, Associate Professor, SCENE, IIT Mandi
Dr. Bhaskar Mondal, Assistant Professor, SCS, IIT Mandi.
Dr. Amit Prasad, Associate Professor, SBB, IIT Mandi.
Dr. Satvasheel Ramesh Powar, Associate Professor, SMME, IIT Mandi.
Dr. Surya Prakash Upadhyay, Associate Professor, SHSS, IIT Mandi
Dr. P. Anil Kishan, Associate Dean (Courses), IIT Mandi.
Dr. Amit Jaiswal, Associate Dean (Research), IIT Mandi.
Dr. Kumar Sambhav Pandey, Registrar & Secretary - Senate, IIT Mandi.
Mr. Naresh Singh Bhandari, Deputy Librarian, IIT Mandi

Mr. Suresh Rohilla, Deputy Registrar (Academics), IIT Mandi

Invitees:

Dr. Rohit Saluja, Assistant Professor, SCEE, IIT Mandi
Dr. Prasad Kasturi, Assistant Professor, SBB, IIT Mandi
Dr. Akhaya Kumar Nayak, Associate Professor, SoM, IIT Mandi
Dr. Sukarn Agarwal, Assistant Professor, SCEE, IIT Mandi
Dr. Vivek Gupta, Assistant Professor, SCENE, IIT Mandi
Dr. Padmanabhan Rajan, Associate Professor, SCEE, IIT Mandi
Student Academic Affairs Secretary, IIT Mandi (Special Invitee).
Student Research Affairs Secretary, IIT Mandi (Special Invitee).
PG Academic Affairs Secretary, IIT Mandi (Special Invitee).

The following Senate members/invitees could not attend the meeting due to prior commitments:

Prof. Siddhartha Mukhopadhyay, Dept. of Electrical Engineering, IIT Kharagpur.
Prof. Sandeep Verma, Dept. of Chemistry, IIT Kanpur & Secretary (SERB).
Prof. Arti Kashyap, Professor, SPS and Dean (DCS), IIT Mandi
Prof. Venkata Krishnan, Professor, SCS, IIT Mandi
Prof. Rajendra K. Ray, Professor, SMSS, IIT Mandi
Prof. Prem Felix Siril, Professor, SCS, IIT Mandi
Dr. Deepak Swami, Associate Professor, SCENE, IIT Mandi
Dr. Prosenjit Mondal, Co-ordinator, Bio-X Centre, IIT Mandi
Dr. Derick P. Shukla, Chairperson, SCENE, IIT Mandi
Dr. Amit Shukla, Chairperson, CAIR, IIT Mandi
Dr. Satyajitsinh A. Thakor, Associate Professor, SCEE, IIT Mandi
Dr. Bindu Radhamany, Associate Professor, SPS, IIT Mandi.
Dr. Nitu Kumari, Associate Professor (SMSS), IIT Mandi
Dr. Puran Singh, Associate Professor (SoM), IIT Mandi
Dr. Jinesh Machhar, Assistant Professor, SCEE, IIT Mandi.
Dr. Arnav Bhavsar Vinayak, Associate Professor, IKSMHA, IIT Mandi.
Dr. Narendra Dhar, Assistant Professor, CAIR, IIT Mandi.
Dr. Tushar Jain, Head CCE, IIT Mandi
Dr. Devika Sethi, Assistant Professor, SHSS, IIT Mandi.
Student General Secretary, IIT Mandi (Special Invitee).

The Chairman Senate extended a warm welcome to all the Senate members and Invitees attending the 42nd Senate meeting of the Institute.

Thereafter, the following agenda items were taken up.

Senate 42.1: **To confirm the minutes of the 41st Senate meeting held on October 8, 2023.**

The minutes of 41st Senate meeting held on October 8, 2023, at IIT Mandi, were circulated to members of the Senate on October 11, 2023 (through email) for comments and no comments have been received on the minutes.

In view of the above, the Senate confirmed the minutes of the 41st Senate meeting.

Senate 42.2: **To receive a report on the actions taken for the decisions taken in the 39th, 40th and 41st Senate meetings were held on April 25, 2023, September 17, 2023, and October 8, 2023.**

The Senate noted the actions taken on the decisions taken in its 39th, 40th and 41st meetings held on April 25, 2023, September 17, 2023, and October 8, 2023.

Senate 42.3: **To consider the proposal to establish a new Centre for Climate Change and Disaster Management.**

Dr. Venkata Uday Kala, presented the proposal to establish a new Centre for Climate Change and Disaster Management as placed at **Annexure – A; Page No. 01 to 04**. After deliberations, the Senate resolved to recommend the proposal for consideration and approval of the Board of Governors (BoG).

Senate 42.4: **To consider the proposal of a Research Methodology (RM-600) course to be floated at the school level.**

Dr. Amit Jaiswal, Associate Dean (Research) presented the proposal that the Research Methodology (RM-600) course will be floated at the school level from the next semester starting January, 2024. The curriculum should be tailored to meet the research-related requirements specific to each school, and the evaluation of the course will also be conducted at the school level. The school is advised to take necessary action in this regard, prepare the revised curriculum, and seek the required approvals. After discussion, the Senate resolved to approve the proposal. The senate advised that the supervisors should make efforts so that the scholars are prepared enough to publish a review paper as an outcome of the Research Methodology course.

Senate 42.5: **To consider the proposal for Early Induction for (M.Tech. + Ph.D) Dual degree programmes:**

Prof. Rahul Vaish, presented the proposal for Early Induction programme to admit in M.Tech. + Ph.D. Dual Degree program as placed at **Annexure – B; Page No. 05 to 06.** After deliberations, the Senate resolved to approve the proposal.

Senate 42.6: **To consider the revision of the new CSE curriculum and change in course for minor in Intelligent Systems:**

Dr. Padmanabhan Rajan, Nominee SCEE, presented the revision of the new CSE curriculum and change in course for a minor in Intelligent Systems as placed at **Annexure – C; Page No. 07 to 11.** The Senate approved the proposal.

Senate 42.7: **To consider the proposal of crediting of independent study course for graduate students:**

Dr. Varun Dutt, Chair IKSMHA, presented the proposal of crediting of independent study course for graduate students as placed at **Annexure – D; Page No. 12 to 16.** After deliberations, the Senate extended one-time approval. The Senate directed the Dean (Academics) to constitute a committee to explore the possibility of credit based independent study course/project for PG students.

Senate 42.8: **To consider the new courses for BS Chemical Sciences in 2nd Year Curriculum:**

Dr. Bhaskar Mondal, Nominee SCS, presented the new courses for BS Chemical Sciences in the 2nd Year Curriculum as placed at **Annexure – E; Page No. 17 to 55.** After deliberations, the Senate resolved to approve the proposal.

Senate 42.9: **To consider the proposal for inclusion of HSS paper in JAM for admission to MA program:**

Dr. Shyamasree Dasgupta, Chair SHSS, presented the proposal for the inclusion of HSS paper in JAM for admission to the MA program as placed at **Annexure – F; Page No. 56 to 62.** After deliberations, the Senate resolved to approve that the school may initiate a process of application towards inclusion of an HSS paper in JAM. If the inclusion is approved by JAM, then the School of Humanities and Social Sciences is willing to admit students through JAM. It is further advised that the school may explore other options like CUET and its own admission test.

Senate 42.10: **To consider the new courses from IKSMHA:**

Dr. Ramajayam, presented the new courses from IKSMHA as placed at **Annexure – G; Page No. 63 to 71.** The Senate approved the proposal.

Senate 42.11: **To consider the proposal of new Master of Arts in Indian Knowledge System (IKS) programme:**

Dr. Varun Dutt, Chair IKSMHA, presented the proposal of new Master of Arts in Indian Knowledge System (IKS) programme as placed at **Annexure – H; Page No. 72 to 186.** After deliberations, the Senate resolved to approve this two-year program and further recommended to float this program for working professionals with an exit option after one year with a PG Diploma Certificate.

Senate 42.12: **To consider the proposal for M.S. (Research) in Music and Musopathy and Ph.D. program:**

Dr. Pratim Kundu, presented the proposal for M.S. (Research) and Ph.D. program in Music and Musopathy as placed at **Annexure – I; Page No. 187 to 222.** After deliberations, the Senate resolved to approve the proposal.

Senate 42.13: **To consider the revision of M.Tech. (Biotechnology) Curriculum:**

Dr. Kasturi Prasad, presented the revision of M.Tech. (Biotechnology) Curriculum as placed at **Annexure – J; Page No. 223 to 228.** After deliberations, the Senate resolved to approve the proposal.

Senate 42.14: **To consider the revision of MBA DS & AI and IMBA curriculum:**

Dr. Akhaya Nayak, Chair of SOM Curriculum Committee presented the proposal for revision of the MBA DS & AI curriculum as placed at **Annexure – K; Page No.**

229 to 230 and IMBA curriculum as placed at **Annexure – L; Page No. 231 to 234**. In the IMBA program, there would be two exit options.

(a) After successful completion of three years, upon exit, the student would be awarded a BBA Analytics degree.

(b) After successful completion of four years, upon exit, the student would be awarded a BBA Analytics (Honors) degree.

After deliberations, the Senate resolved to approve the proposal with remarks that after successful completion of the full 5 years of the IMBA program, the students shall be awarded two separate degrees as follows:

(a) BBA Analytics (Honors) (under the Integrated Master of Business Administration program).

(b) MBA DS & AI (under the Integrated Master of Business Administration program).

Senate 42.15: **To consider reservation applicability in Ph.D. admission from CFTIs B.Tech. Candidates:**

Prof. Aniruddha Chakraborty, Dean (Academics) presented the proposal for reservation applicability in direct Ph.D. admission from CFTIs B.Tech. candidates. As approved in the 39th meeting of the senate held on April 25, 2023, the exemption allows from mandatory requirements of valid GATE or National Level examination and permits the students for direct Ph.D. admission who have B.Tech./B.E./B.S. (or equivalent) degree from CFTI (Centrally Funded Technical Institute)/ any of the top 100 institutes according to NIRF ranking (overall category) at the time of application/ any Himachal Pradesh Govt. institution or universities with CGPA/CPI of at least 7.5 (on a scale of 10) or equivalent. After deliberations, the Senate resolved to approve the proposal with the application of reservation as per GoI norms and to relax the criteria for the categories of OBC/SC/ST/PwD as below:

1. OBC (NCL): 7 CGPA
2. SC/ST/PwD: 6.5 CGPA

However, other qualifying criteria will remain same.

Senate 42.16: **To consider the proposal to create an Entrepreneurship-Practicum Programme for the UG students in the Institute:**

Dr. Satvasheel Powar, Academic Coordinator of the Entrepreneurship-ecosystem program presented a proposal to add the entrepreneurship practicum to the Academic Curriculum of B.Tech. students as placed at **Annexure – M; Page No. 235 to 237**. After deliberations, the Senate resolved to approve the proposal.

Senate 42.17: **To consider the proposal to start a new Minor in Japanese language:**

Dr. P Anil Kishan, Associate Dean (Courses), presented a proposal to start a new Minor in the Japanese language. After deliberations, the Senate resolved to approve the proposal, with one-time exemption for present final year students to opt for these courses (N5/N4/N3 level) in addition to the HSS basket and these credits shall be taken from Free Elective Basket. One Time relaxation is given to exceed the HSS credit limit, due to the new Minor in Japanese Language. After deliberations, the Senate resolved to approve the proposal.

Senate 42.18: **Any other agenda item with the permission of the Chairman, Senate.**

(i) Dr. Shyamasree Dasgupta, Chair SHSS presented the proposal regarding

revision in the curriculum of M.A. Development Studies as placed at **Annexure – N; Page No. 238 to 241.** After deliberations, the Senate resolved to approve the proposal.

(ii) Dr. Akhaya Nayak, Member of SOM Admission Committee presented the revised eligibility criteria for admission to MBA DS & AI and IMBA program as placed at **Annexure – O; Page No. 242 to 244.** After deliberations, the Senate resolved to approve the proposal.

(iii) Prof. Tulika P Srivastava, Associate Dean (I & R) presented a proposal for the management of attendance for students going for the International Semester Exchange Program. After deliberations, the Senate resolved to approve the following:

a. The students are permitted to register for this semester's courses, however, their attendance will count from the day they report to the institute. They need to fulfil the attendance criterion specified by the institute.

b. The students may be provided with the video recordings of the classes (if available/made available), link for online classes, or equivalent courses on NPTEL/SWAYAM etc. The student(s) may work with the instructor and FA to identify the online courses, if available. Students will be attending the lectures / watching the lectures online till they are back on campus.

c. The mid sem exams for those students need to be conducted during the makeup slots. They have to attend the end exam, as per the regular schedule.

Senate 42.19: **To report decisions/action taken by the Chairman, Senate.**

The agenda item was noted by the Senate.

Senate 42.20: **Issues to be discussed by the Senate without Student Members being present.**

None

The meeting concluded with a vote of thanks to the Chair and to the Members.

05/02.

Registrar & Secretary-Senate

9/2/24

Chairman, Senate

ANNEXURE-A

Title: **Center for Climate Change and Disaster Resilience Research (C3DAR)**

Introduction

Climate change is a major challenge the world is facing today, with impacts already being felt globally. IPCC (2022) highlights that the rapidly accelerating climate change has altered the characteristics of the hydrological cycle resulting in higher intensity and frequency of climate and weather extremes. Climate hazards propagate through the atmosphere, hydrosphere, and lithosphere leading to related disaster events. These include large-scale events such as droughts, floods, hot and cold extremes, and leading to local-scale disasters such as landslides, cloud bursts, forest fires and flash floods. While large-scale events demand global interventions and stakeholders, the risk mitigation strategies, both structural and non-structural, can be taken up for localised adaptation to extreme events. However, for designing better interventions, it is critical to understand not only the localised causative factors behind the climate change, such as the behaviour of air pollutants, aerosol concentration and, carbon transport in the atmosphere, but also the impact of climate change on the ecosystem, people and infrastructure better.

In the Indian subcontinent, especially in the Indian Himalayan Region (IHR), a rapid increase in extreme events coupled with rapid infrastructural development has significantly impacted the region's water resources, agriculture, and infrastructure. These impacts can potentially affect vulnerable communities living in poverty or in remote or isolated areas disproportionately. Additionally, the tectonic movements leading to earthquake hazards may add momentary yet disaster risk compounding to the long-term but steadily increasing climate risk. The approaches and schemes for adaptation and/or mitigation for each event differ. The design of these measures demands knowledge of the global to local conditions investigations, data collection and systematic field, laboratory and/or numerical analysis. Finally, these strategies should be implemented in coordination with various stakeholders with acceptance from the pertinent communities.

Situated in the Shivalik range of the mid-Himalayan region in India, the IIT Mandi research community took advantage of being located in the serene yet disaster-prone mountainous range. The critical combination of wideband expertise available with IIT Mandi, ready-to-adopt society, easily reachable sites and data-intense conditions surely motivate the need for such a centre. The centre intends to encourage brainstorming, innovation, testing, and reaching society with implementable and affordable schemes.

The 'Center for Climate Change and Disaster Resilience Research' at IIT Mandi would be a valuable resource for addressing the challenges of climate change in the IHR and beyond. By bringing together experts from various fields, conducting research, developing and implementing adaptation and mitigation strategies, and engaging with stakeholders, the centre would work towards understanding and addressing the impacts of climate change and associated disasters and improve the resilience of communities in the region.

Objectives

1. National level facility creation for field-laboratory-numerical studies in climate change and disaster resilience
2. Encourage innovation, critical thinking, teaching and learning aspects
3. Developing innovative and sustainable solutions for resilient infrastructure with a specific focus on mountainous hazards.
4. Developing informed mitigation measures/schemes through exploiting technological advancements and AI/ML based tools.
5. Increasing the outreach by short-term courses, aligned diploma and masters programs, training and capacity building programs.
6. Creation of national-level competence to address the domain issues for state-region-local requirements

Focus

The realm of the center falls into the core expertise of IIT Mandi faculty working in sub-areas as listed below:

Domain	Sub-areas
Climate Change studies	Climate Change Impact Assessment, Data Assimilation Adaptation planning, Weather Forecasting, Extreme Event Forecasting
Atmosphere	Air pollution, Aerosols, Black and brown carbon
Hydrosphere	Glaciers, Avalanches, water, rainfall patterns, flood, drought, soil moisture
Lithosphere	Landslide, Earthquake and liquefaction
Infrastructure	Hazard and risk management, infrastructural disaster management, Service life prediction, Smart infrastructure/cities

Existing and Proposed labs and research groups

- → Extreme Hydroclimatology Lab,
- → i4s lab
- → Geohazard Lab
- → Theoretical and Computational Geomechanics Research Lab
- → Atmospheric Chemistry and Climate Change Lab
- → Computational Engineering Seismology
- → Sustainable Infrastructure Lab
- → Structural Dynamics and Uncertainties (STUDENT) Research Group
- → MH-RESIST - Multi-Hazard RESilient Infrastructure SysTems Research Lab
- → Computational Engineering Seismology
- → Sustainable Infrastructure Lab

Deliverables

High quality research
International collaborations
Capacity building and workshops
Certificate and higher level courses and programs

One stop solution for life-line departments IPH, PWD, NHAI, DDMA, SDMA, NDMA technical consultancy on detailed project reports, technical consultation, extreme event reports and mitigation schemes.

Sustainable Development Goals (SDGs) aspects targeted (CoP: 27)
SDG 6: Clean water and Sanitation
SDG 9: Innovation, Industry and Infrastructure
SDG 11: Sustainable cities and communities
SDG 13: Climate action
SDG 17: Partnership for the goals

Collaborations (Indian and International)

- National Institute of Disaster Management (NIDM)
- IITs [Bombay, Roorkee, Ropar, Indore, Madras, Guwahati, Kanpur, Gandhinagar, Delhi]
- IISc Banglore
- Central Building Research Institute,
- IISER Kolkata,
- Jawaharlal Nehru University,
- Tezpur University,
- National Center for Polar and Ocean Research
- International
- UCL London
- Milan: Prof. Roberto Paolucci (Polytechnic University of Milan)
- National Institute of Hydrology Roorkee
- University of California Merced
- KAUST-Saudi Arabia
- Team i4s, India, Rennes, France, Dingsheng Li, Shantanu Univ, China
- Jafar Ali parole, Kuwait
- Vincenzo Nava, Spain"
- Durham University, UK
- Physical Research Laboratory
- National Physical Laboratory,
- Linkoping University (Sweden),
- Karolinska Institut (Sweden)
- Jinan University (China),
- Sun Yat-sen University (China)
- CNRS (France)
- National University of Singapore
- Monash University,
- University of Adelaide
- TU Munich
- Kyoto University
- NTNU Norway
- UNISA, Italy
- TAMU, Arlington

- UIC, Chicago
- University of Brussels, Belgium

Industries/Organizations:

- National Disaster Management Authority (NDMA)
- State and District Disaster Management Authority (SDMA-HP, Mandi, Kinnaur, Kangra, Chamba)
- Intiot Services Pvt Ltd.
- Macaferri Env Sol
- Techfab India
- Line departments (IPH, PWD, NHAI, NDRF)

ANNEXURE-B

Proposal for Early admission in Dual Degree M.Tech (R) + PhD program

Preamble: It has been noticed that higher technical education in Indian institutes is always less attractive among professional undergraduate students. It is due to more lucrative private companies offers, unawareness and many peers and social influences. In order to strengthen Indian education and research, it is important to motivate and admit young bright candidates into higher education. Indian government and many institutes in India have initiated many schemes to fulfill the objectives.

Early admission to M.Tech/M.Tech (R)/PhD can be one of the attractive provisions where students would like to join to save time.

The Seante approves this proposal to attract young bright candidates to admit in IIT Mandi Dual degree PhD program.

Early admission in M.Tech (R)+ PhD dual degree program

Students can be provisionally admitted in (M.Tech (R) +PhD) and allow to work in IIT Mandi in their last semester/year of UG/PG programs . During this duration, students need to fulfill academic requirements of their parents institutions and can start working on research projects and course requirements of (M.Tech+PhD). Students may require additional courses to fulfill UG/PhD requirements. After successful completion of B.Tech/MSc or equivalent degree from their parent institutions, student will be registered in respective program and will continue full time at IIT Mandi to complete academic requirement of registered program.

1. Student can ONLY opt for exit to M.Tech (R) degree till the completion of his/her PG/UG degree from their parent institution.
2. Norms of M.Tech (R) (in case of exit opted) /Dual degree are applicable once registration is confirmed after successful submission of eligibility requirements to the IIT Mandi.
3. No tuition fee will be charged during overlapping period. Lodging/boarding will be as per norms for existing students. For courses credited (only offline mode) during this period, student will be paying per credit/course charges as per existing norms.
4. No other financial support (yearly grant/contingency/monthly fellowship under HTRA) during overlapping period. However, these students are eligible for earning and learning scheme under Institute TA support. Sametime, supervisor can also support

from their assigned fund including PDA/PDF/Project etc. (as per respective fund norms).

5. Date of registration will be considered from date of regularization after completing their eligibility criteria (previous degree).
6. Once join, IIT Mandi, supervisor and DC will be formed to monitor and guidance of student progress.

Eligibility of the students

B.Tech (students of VIIth /VIIIth Semester)/MSc/M.Tech students in top 100 NIRF institutions (overall category)/ CFTIs/MoU partner institutions/Government collages/universities of HP with 7.50 CGPA/10.00 scale or equivalent.

Relaxation for reservation categories will also be applicable as per Institute norms.

Provisionally enrolled students should also fulfill minimum eligibility criteria and fellowship criteria (as per existing norms of M.Tech (R)+PhD dual degree program) at the end of completion of overlapping period to regularize their admission and fellowship.

Fellowship: Fellowship can be awarded after completion of their UG/PG degree and as per existing Norms for the M.Tech (R) /Dual degree.

Selection Procedure:

There can be three modes selection

1. Common advertisements followed by shortlisting and written test/interviews
2. Selection through campus placement
3. These offers can be made for intern students through interview/PI recommendations.

ANNEXURE-C

Sl. No.	Semester	Type	Course Code	Course Name	L	T	P	C	L - T - P - C	Remarks	Semesterwise Credits	Credits Completed
				First Semester								
1	I	IC	ICxxx	Calculus	1.5	0.5	0	2	1.5-0.5-0-2			
2	I	IC	ICxxx	Complex and Vector Calculus	1.5	0.5	0	2	1.5-0.5-0-2			
3	I	IC	IC140	Engineering Graphics for Design	2	0	3	4	2-0-3-4			
4	I	IC	IC152	Introduction to Python and Data Science	3	0	2	4	3-0-2-4			
5	I	IC	ICXXX	IC Core basket – 1	2.5/3	0.5/0	0	3	2.5-0.5-0-3	https://cloud.iitmandi.ac.in/f/f7a485930ece4b0fbaa0/		
6	I	HSS	HSXXX	HSS Course	3	0	0	3	3-0-0-3	Preferably English Course for weak students; Other courses may also run		
7	I	IKS	IKS181	Ikshma Course	3	0	0	3	3-0-0-3			
8			ICXXX	Foundations of Design Practicum	1	0	6	4	1-0-6-4	Only one course (FDP/IKS) needs to be taken by students. They may take the other course in the 2nd semester		
										The total credits may be 18 if HSS course is not taken by the student. Accordingly the subsequent number would changed. The compulsary 12 credits from HSS need to be completed by Sem VI. IKS and FDP may run in both semesters. Half of the batch does one course while the other half of the students do the other course. In the second semester, this will be swapped. Accordingly students may do 18-22 credits	21	21
				Second Semester								
1	II	IC	ICxxx	Linear Algebra	1.5	0.5	0	2	1.5-0.5-0-2			
2	II	IC	ICxxx	ODE & Integral Transforms	2.5	0.5	0	3	2.5-0.5-0-2			
3	II	IC	IC161	Applied Electronics	3	0	0	3	3-0-0-3			
4	II	IC	IC 161P	Applied Electronics Lab	0	0	3	2	0-0-3-2			
5	II	IC	IC252	Probability and Statistics	3	0	2	4	3-0-2-4			
6	II	IC	ICXXX	Programming and Data Structures	2.5/3	0.5/0	0	3	2.5-0.5-0-3			
7	II	IC	ICXXX	Foundations of Design Practicum	1	0	6	4	1-0-6-4			
8	II	IC	IC221P	Physics Practicum	3	0	0	3	0-0-3-2			
9	II	IC	IKS	Iksmha courses						IKSHMA course and FDP may swap their batches from 1st year. Total credits may be 20-21 based on the courses	24	45
				Third Semester								
1	III	IC	IC272	Machine Learning	3	0	0	3	3-0-0-3			
2	III	DC	CS213	Reverse Engineering	0	0	2	1	0-0-2-1			
3	III	DC	CS208	Mathematical Foundations of Computer Science	3	1	0	4	3-1-0-4			
4	III	DC	CS212	Design of Algorithms	3	0	2	4	3-0-2-4			
5	III	DC	CS214	Computer Organization	3	0	2	4	3-0-2-4			
6	III	HSS	HSXXX	HSS Course	x	x	x	3	x-x-x-3			
										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	19	64

				Fourth Semester								
1	IV	IC	IC201P	Design Practicum	0	0	6	3	0-0-6-3			
2	IV	DC	CS304	Formal Languages and Automata Theory	3	0	0	3	3-0-0-3			
3	IV	DC	CS309	Information Systems and Databases	3	0	2	4	3-0-2-4			
4	IV	DC	CSXXX	Software Engineering	3	0	2	4	3-0-2-4			
5	IV	DE	DE-1	Discipline Elective-1	3	0	0	3	3-0-0-3		17	81
				Fifth Semester								
1	V	DC	CS312	Operating Systems	3	0	2	4	3-0-2-4			
2	V	DC	CS313	Computer Networks	3	0	2	4	3-0-2-4			
3	V	DC	CSXXX	Artificial Intelligence	3	0	0	3	3-0-0-3			
4	V	DE	DE-2	Discipline Elective-2	x	x	x	4	x-x-x-4			
5	V	FE	FE-1	Free Elective-1	x	x	x	4	x-x-x-3		19	100
				Sixth Semester								
1	VI	DC	CS302	Paradigms of Programming	3	0	2	4	3-0-2-4			
2	VI	DE	DE-3	Discipline Elective-3	x	x	x	4	x-x-x-4			
3	VI	DE	DE-4	Discipline Elective-4	x	x	x	4	x-x-x-4			
4	VI	FE	FE-2	Free Elective-2	x	x	x	3	x-x-x-4			
5	VI	FE	FE-3	Free Elective-3	x	x	x	3	x-x-x-4			
	VI	ISTP	ISTP	ISTP/Free elective	x	x	x	4	x-x-x-4	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	22	122
				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-5	Discipline Elective-5	x	x	x	4	x-x-x-4			
2	VII	DE	DE-6	Discipline Elective-6	x	x	x	4	x-x-x-4			
3	VII	FE	FE-4	Free Elective-4	x	x	x	4	x-x-x-4			
4	VII	FE	FE-5	Free Elective-5	x	x	x	4	x-x-x-4			
5	VII	MTP-1	MTP-1	MTP-1	x	x	x	3	x-x-x-3		21	143
				Eighth Semester								
1	VIII	DE	DE-7	Discipline Elective-7	x	x	x	4	x-x-x-4			
2	VIII	DE	DE-8	Discipline Elective-8	x	x	x	4	x-x-x-4			
3	VIII	FE	FE-6	Free Elective-6	x	x	x	4	x-x-x-4			
5	VIII	MTP 2	MTP-2	MTP-2	x	x	x	5	x-x-x-5		17	160
										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.		

Program:

List of Discipline ElectivesElectives

Sl. No	Course Code	Course Name	L	T	P	Cr	L-T-P-C	Remarks
1	CS303	Software Engineering	2	0	2	3	2-0-2-3	
2	CS451	Computer Graphics and Game Design	2	0	2	3	2-0-2-3	
3	CS456	Distributed Databases	3	0	0	3	3-0-0-3	
4	CS507	Computer Architecture	3	0	2	4	3-0-2-4	
5	CS508	Introduction to Heterogeneous Computing	2	0	0	2	2-0-0-2	
6	CS514	Data Structures and Algorithms-II	3	0	2	4	3-0-2-4	
7	CS522	Distributed Algorithms	3	0	0	3	3-0-0-3	
8	CS523	Verification of Reactive Systems	3	0	0	3	3-0-0-3	
9	CS541P	IoT Systems and the Cloud	3	0	2	4	3-0-2-4	
10	CS542	Design patterns for scalable systems						
11	CS544	Formal Concept Analysis: Theory and Practice	2	0	2	3	2-0-2-3	
12	CS545	Software Design Pattern	3	0	0	3	3-0-0-3	
13	CS546	Design of Concurrent Software	3	0	0	3	3-0-0-3	
14	CS549	Performance analysis of computer networks	3	0	0	3	3-0-0-3	
15	CS550	Computer Graphics and Geometric Design	2	0	2	3	2-0-2-3	
16	CS561	Map Reduce and Big Data	3	0	0	3	3-0-0-3	
17	CS563	Scalable Data Science	3	1	0	4	3-1-0-4	
18	CS606	Computational Modeling of Social Systems	3	0	0	3	3-0-0-3	
19	CS609	Speech Processing	3	0	2	4	3-0-2-4	
20	CS611	Program Analysis	3	1	0	4	3-1-0-4	
21	CS660	Data Mining for Decision Making	3	0	0	3	3-0-0-3	
22	CS662	Mobile Virtual Reality and Artificial Intelligence	3	0	0	3	3-0-0-3	
23	CS669	Pattern Recognition	3	1	0	4	3-1-0-4	
24	CS670	Kernel Methods for Pattern Recognition	4	0	0	4	4-0-0-4	
25	CS671	Deep Learning and Applications	3	0	1	4	3-0-1-4	
26	DS201	Data handling and visualization	2	0	2	3	2-0-2-3	
27	DS301	Mathematical Foundation of Data Science	3	1	0	4	3-1-0-4	
28	DS303	Statistical Foundations of Data Science	3	0	0	3	3-0-0-3	
29	DS401	Optimization for Data Science	3	0	0	3	3-0-0-3	
30	DS403	Introduction to Statistical Learning	3	0	2	3	3-0-2-3	

This Discipline Electives list will be maintained by Academics Office. Elective courses are not allowed to delete. The addition of courses is permitted. This list may be modified during the time of next curriculum revision. UG students may preferably be allowed to take upto 5 level courses as Discipline Courses. 6 level courses may be offered as free electives.

Semester	DC	DE	DC + DE
III	13	0	13
IV	11	3	14
V	11	4	15
VI	4	8	12
VII	0	8	8
VIII	0	8	8
Total	39	31	70

Symbol	Course Type	Credits
DC	Discipline core	39
DE	Discipline elective	31
FE	Free elective	18
HSS	Humanities and Social Science Course	12
IC	Institute Core	45
IKS	Indian knowledge system	3
ISTP	Interactive Socio-Technical Practicum	4
MTP 1	Major Technical project 1	3
MTP 2	Major Technical project 2	5
		160

Including the baskets

Acad Office <acadoa1@iitmandi.ac.in>

Fwd: Minor in intelligent systems

1 message

Padmanabhan Rajan <padman@iitmandi.ac.in> Fri, Dec 15, 2023 at 2:48 PM
To: Sonia Gupta <acadoa1@iitmandi.ac.in>

---------- Forwarded message ---------
From: **Jinesh Machchhar** <jinesh@iitmandi.ac.in>
Date: Thu, Sep 21, 2023 at 12:55 PM
Subject: Fwd: Minor in intelligent systems
To: Padmanabhan Rajan <padman@iitmandi.ac.in>

Hi Paddy,

The following change need to be made to the list of courses for minor in Intelligent Systems:

1. Remove "CS669" from the list.
2. Add "DS403 Introduction to Statistical Learning" to the list.

This needs to be approved in the **BOA meeting.** It has been discussed amongst our colleagues. (see the trailing email).
Regs
Jinesh

---------- Forwarded message ---------
From: **Dileep A. D** <addileep@iitmandi.ac.in>
Date: Mon, Jul 31, 2023 at 3:54 PM
Subject: Re: Minor in intelligent systems
To: Jinesh Machchhar <jinesh@iitmandi.ac.in>
Cc: SCEE_fac <scee@iitmandi.ac.in>, chairscee <chairscee@iitmandi.ac.in>, Padmanabhan Rajan <padman@iitmandi.ac.in>

Please go ahead.

On Mon, 31 Jul 2023, 3:44 pm Jinesh Machchhar, <jinesh@iitmandi.ac.in> wrote:

> Hello Folks,
>
> CS669 is listed as one of the courses for minor in Intelligent Systems. However CS669 is only open to PG students. In view of this CS669 is to be replaced with "DS403 Introduction to statistical learning".
>
> Let me know if you have any comments in this regards by tomorrow.
>
> Regs
> Jinesh

--
Padmanabhan Rajan
School of Computing and Electrical Engineering
Indian Institute of Technology Mandi
Himachal Pradesh, India.
Office: A17-03-12, North Campus
http://faculty.iitmandi.ac.in/~padman/

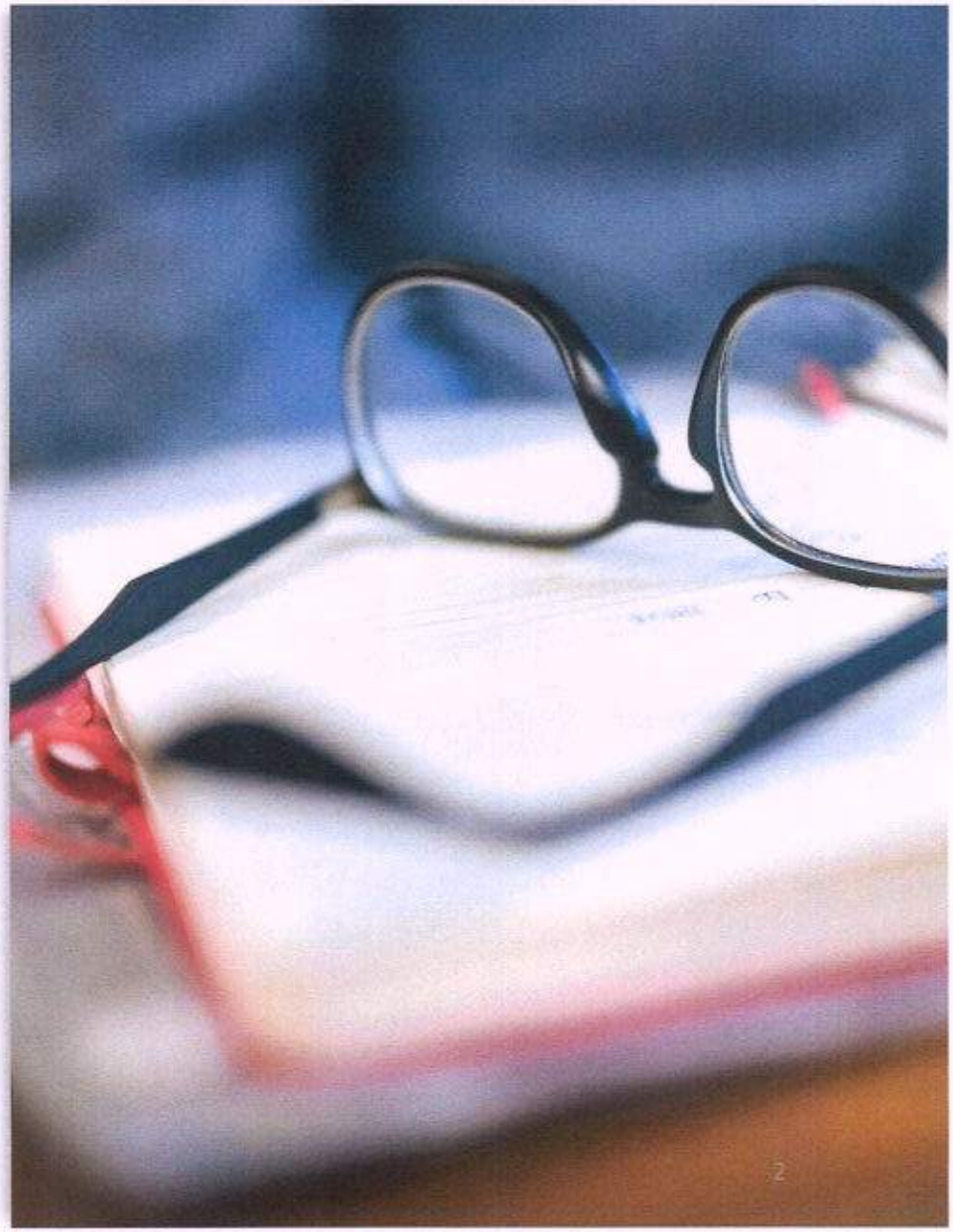
ANNEXURE-D

Proposal for making Independent Study Course for Credits for Graduate Students

Committee: Prof. Anil Kishan (Chair), Prof. Arnav Bhavsar (Member), and Prof. Varun Dutt (Member)

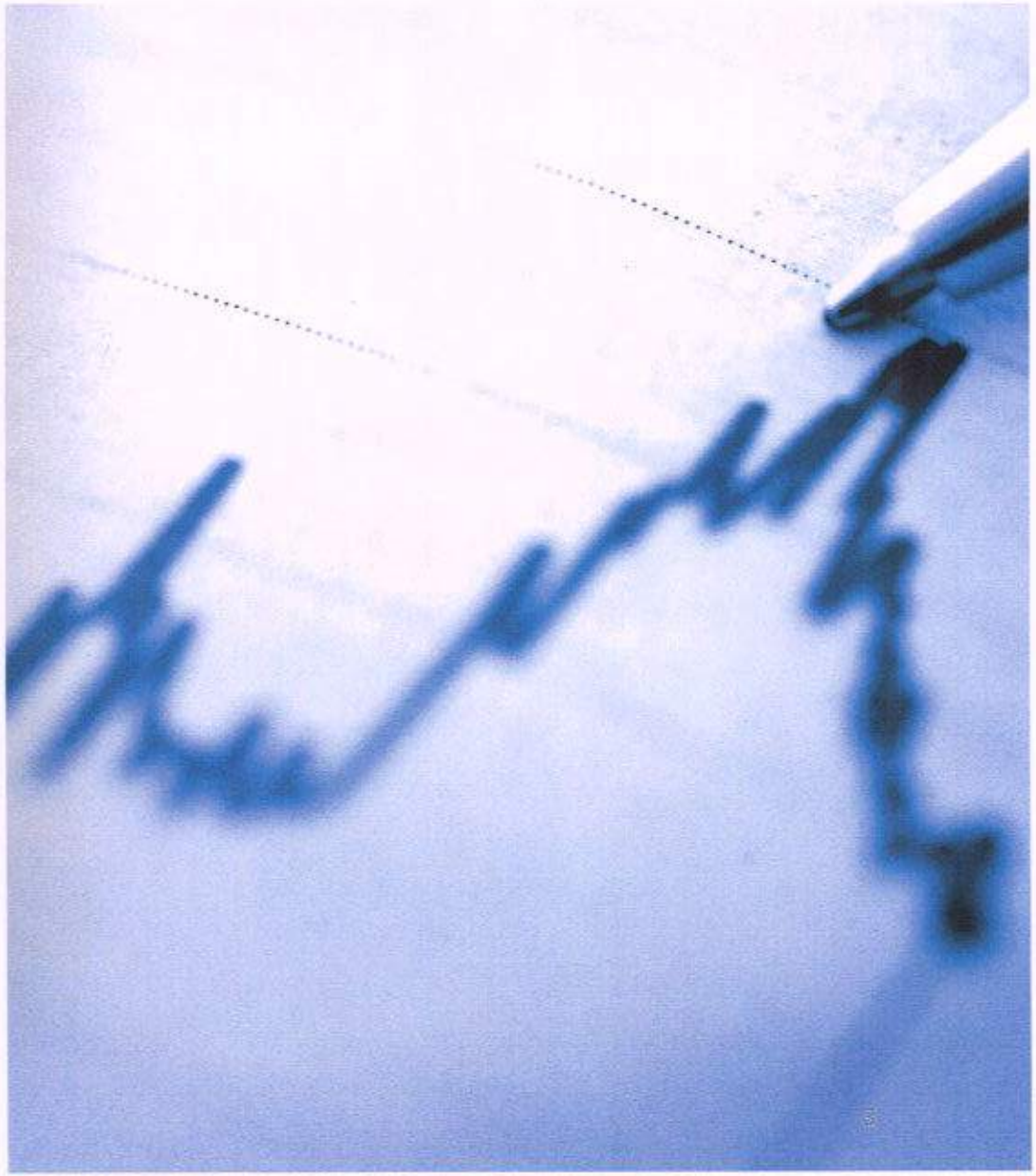
Independent Study Course at IIT Mandi

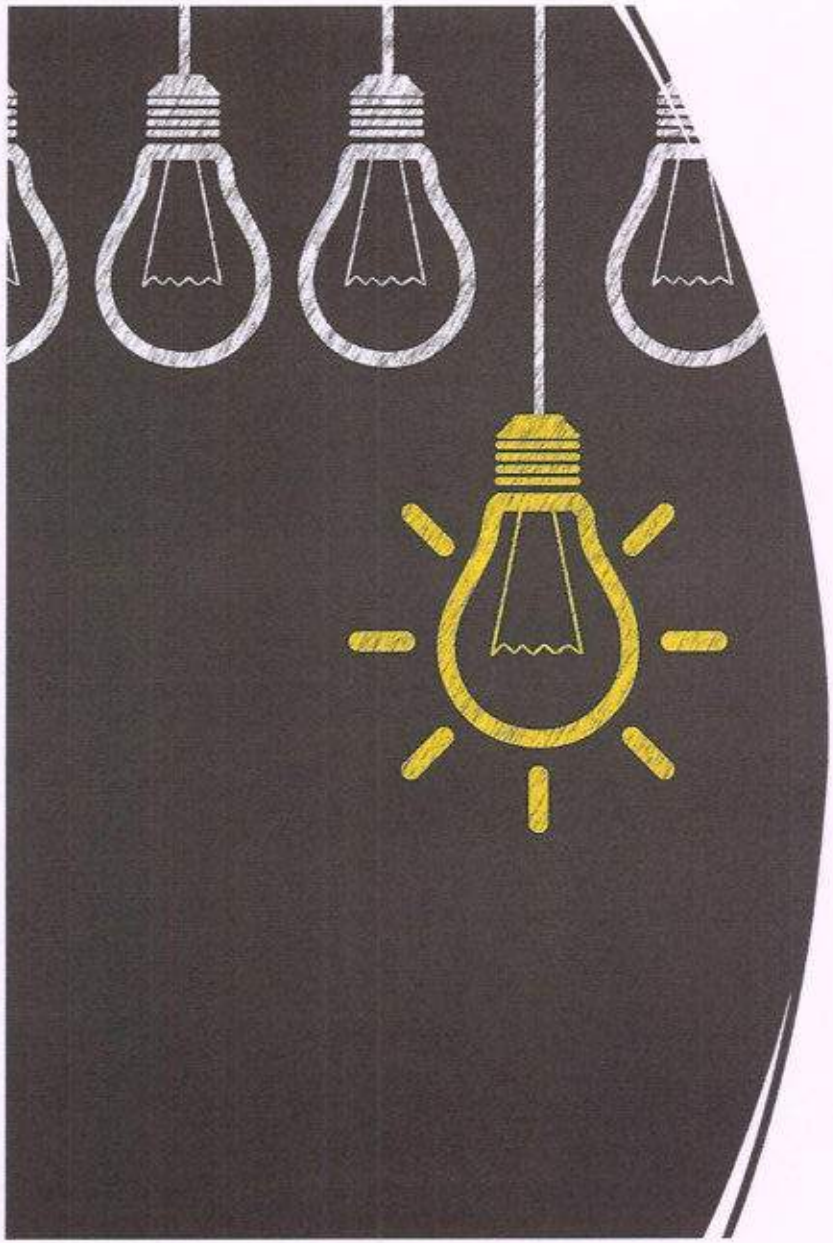
- Credit-based independent study course.
- Facilitates self-learning, supervised by faculty.
- Detailed proposal and approval process.
- Open to B.Tech./Dual Degree, M.A./M.Sc./M.Tech. students.
- M.S. or Ph.D. students can take it, but credits aren't counted towards minimum coursework.



Proposed Change: Extending Credits to Graduate Students

- Proposal to allow Master by Research and Ph.D. students to take the independent study course for credits.
- This will be in addition to their existing curriculum and count towards minimum course work requirements.
- Proposal to introduce a graded evaluation, moving away from the current PASS/FAIL system for these graduate students.



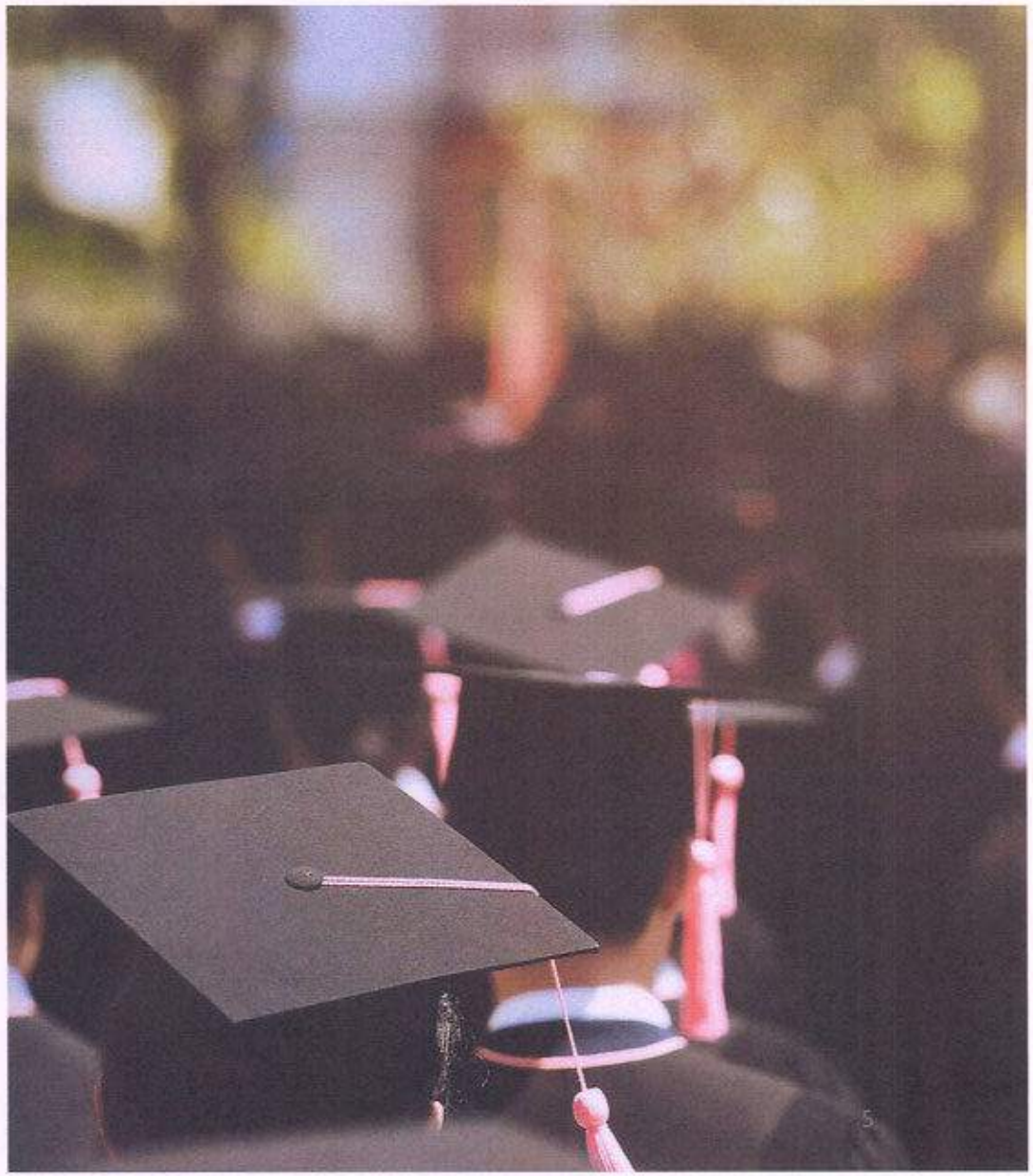


Rationale

- The rise of new Centres such as IKSMHA, CAIR, and HCI without ample core faculty and courses.
- Graduate students find value in undertaking specialized topics under the guidance of faculty members.
- Enabling credits and grades provide an incentive and formal recognition of student's sincere efforts.

Benefits

- Enhances the academic depth for graduate students.
- Facilitates interdisciplinary learning.
- Provides a solution to the challenge of fewer courses in new centers.



Annexure 'E'

Semester-Wise Curriculum

1st and 2nd Year (Total Credit: 84)			
Semester-I		**Semester-II**	
• Math-I: Calculus (IC)	2	• Math-III: Linear Algebra (IC)	2
• Math-II: Complex Variable and Vector Calculus (IC)	2	• Math-IV: ODE & Integral Transform (IC)	2
• Engineering Graphics (IC)	4	• Applied Electronics (IC)	3
• Introduction to Python and Data Science (IC)	4	• Applied Electronics Lab (IC)	2
• IC-I Basket (IC131 Chemistry Compulsion)	3	• Probability and Statistics (IC)	4
• HSS Course (HSS, Basket)	3	• IC-II Basket (IC121 Physics Compulsion)	3
• IKSMHA (IKS)	3	• Foundations of Design Practicum (IC)	4
		• Physics Practicum (IC)	2
	21		**22**
Semester-III		**Semester-IV**	
• Understanding Biotech. and its Application (IC-I)	3	• Discipline Elective II (DE)	2
• Physical Chemistry-I (CY)	3	• Physical Chemistry-II (Quantum & Spec.) (CY)	3
• Basic Organic Chemistry (CY)	3	• Analytical Chemistry (CY)	3
• Principles of Inorganic Chemistry (CY)	3	• Discipline Elective III (DE)	3
• Discipline Elective I (DE)	3	• Organic Chemistry Lab (CY, Lab-II)	2
• Physical Chemistry Lab (CY, Lab-I)	2	• Inorganic Chemistry Lab (CY, Lab-III)	2
• HSS Course (HSS Basket)	3	• HSS Course (HSS Basket)	3
		• Free Elective I (FE)	3
	20		**21**

Proposed Courses (2, 3, and 4 Levels)

Course Code	Course Title	L-T-P-C
CY-3XX	Principles and Theories of Physical Chemistry	3-0-0-3
CY-4XX	Introduction to Quantum Chemistry & Molecular Spectroscopy	3-0-0-3
CY-2XX	Physical Chemistry Laboratory	0-0-4-2
CY-3XX	Principles of Organic Chemistry	3-0-0-3
CY-2XX	Organic Chemistry Laboratory	0-0-4-2
CY-3XX	Fundamentals of Inorganic Chemistry	3-0-0-3
CY-2XX	Inorganic Chemistry Laboratory	0-0-4-2
CY-3XX	Basic Analytical Chemistry	3-0-0-3
CY-4XX	Applied Materials Chemistry	3-0-0-3
CY-4XX	Numerical Methods and Data Analysis in Chemistry	3-0-0-3

IIT Mandi
Proposal for a New Course

Course number : **CYXXX**
Course Name : **Principles and Theories of Physical Chemistry**
Credit Distribution : 3-0-0-3
Intended for : **BS Chemical Sciences**
Prerequisite : None
Mutual Exclusion : None

---

1. **Preamble:**

This course deals with fundamental concepts of physical chemistry involving properties of gases, viscosity and surface tension, chemical kinetics, thermodynamics, and conductance. This is foundation course for all students interested in Chemistry and the concepts taught here would be required for most of the advanced and specialized courses in Chemistry.

2. **Course Modules with quantitative lecture hours:**

Unit 1: Gaseous State and Fluids (12 Lectures)

Gas laws, distribution of molecular speeds, kinetic energy distribution, molar heat capacity of gases, virial expressions, collision of gas molecules and mean free path. Viscosity of fluids, viscosity coefficient, temperature dependence of viscosity, surface tension of liquids, capillary rise, measurement of surface tension, temperature dependence of surface tension.

Unit 2: Concepts of Thermodynamics (12 Lectures)

Equilibrium and concept of temperature, the zeroth-law of thermodynamics, first law of thermodynamics, state and path functions, extensive and intensive properties, equation of state, work, heat, internal energy, heat capacity and concept of enthalpy, second law of thermodynamics, reversible and irreversible process, heat engines, Carnot cycle, concept of entropy, free energy, criteria for equilibrium and stability, third law of thermodynamics, concept of the absolute zero temperature and Nernst heat theorem.

Unit 3: Chemical Kinetics and Photochemistry (12 Lectures)

Rate laws and rate constants, order and molecularity of reactions, determination of order, kinetics of zero-, first- and second-order reactions, parallel, reversible and consecutive reactions, rate-determining and steady-state approximation, temperature dependence of rate constant, potential energy surface, Frank-Condon principle, decay of excited states, fluorescence and phosphorescence, Jablonsky diagram, laws of photochemistry, quantum yield.

Unit 4: Conductance and Electrochemistry (6 Lectures)

Mechanism of electrolysis and Faraday's law, strong and weak electrolytes, conductance, electrolytic conductance, ionic conductance, conductometric titration, estimation of solubility product. Types of electrochemical cells, cell reactions, EMF and change thermodynamics properties, Nernst equation, standard cells, half-cells/electrodes.

Textbooks:

- *Physical Chemistry, Peter Atkins, Julio de Paula, James Keeler, Oxford University Press (2018).*
- *Physical Chemistry: A molecular approach, Donald A. McQuarrie & John D. Simons, Indian Reprint, Viva books (2019).*

3. References:

- *Physical Chemistry, Ira N. Levine, McGraw Hill Book Co. (2008).*
- *Physical Chemistry, G. W. Castellan, Narosa Publications. (2004).*

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.	NA	CY513, CY514	15%	

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

NA

Approvals:

Other Faculty interested in teaching this course: –

Proposed by: B. Mondal and C. K. Nandi **School: Chemical Sciences**

Signature: **Date: 22.12.2022**

Recommended/Not Recommended, with Comments:

_____ **Date:** _____

Chairperson, CPC

Approved / Not Approved

_____ **Date:**_____

Chairperson, BoA

IIT Mandi
Proposal for a New Course

Course number	**: CYXXX**
Course Name	**: Introduction to Quantum Chemistry & Molecular Spectroscopy**
Credit Distribution	: 3-0-0-3
Intended for	**: BS Chemical Sciences**
Prerequisite	: None
Mutual Exclusion	: None

---

1. Preamble:

This is an introductory course and must for all areas of chemistry. This course aims to provide molecular level understanding of fundamental chemistry. It includes topic from spectroscopy, reaction dynamics, thermodynamics, molecular structure, and dynamics.

2. Course Modules with quantitative lecture hours:

Unit 1: 20 Lectures

Introduction to Schrödinger equation, Bohr's atom, De Broglie's Wave, wave-particle duality, Light-atom/molecule interaction, Introduction to optical spectroscopy, time-independent Schrodinger equation, Particle in a box, Quantum Mechanics of Hydrogen Atom.

Unit 2: 14 Lectures

Heisenberg's Uncertainty Relation, Operators, Commutators, Eigenvalues and Eigenvectors, absorption and emission spectra, Boltzmann Energy distribution, Principle of equipartition of energy Einstein's Semiclassical model, Born Oppenheimer Approximation, Beer-Lambert Law.

Unit 3: 8 Lectures

Diatomic Vibrational Spectra: Harmonic Model, Morse Oscillator Model, Molecular Vibrations in Polyatomic Molecules, Diatomic rotational spectra, rotation of polyatomic molecules, electronic absorption, and emission spectra.

3. Textbooks:

Physical Chemistry, Peter Atkins, Julio de Paula, James Keeler, Oxford University Press (2018).

4. References:

Quantum Chemistry & Spectroscopy, Thomas Engel, Pearson, 3rd edition (2015).

Physical Chemistry: A molecular approach, Donald A. McQuarrie & John D. Simons, Indian Reprint, Viva books (2019).

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			

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

NA

Approvals:

Other Faculty interested in teaching this course: –

Proposed by: **A. Chakraborty** **School: Chemical Sciences**

Signature: **Date: 25.11.2022**

Recommended/Not Recommended, with Comments:

_____ **Date:** _____

Chairperson, CPC

Approved / Not Approved

_____ **Date:**_____

Chairperson, BoA

IIT Mandi
Proposal for a New Course

Course number : **CYXXX**
Course Name : **Physical Chemistry Laboratory**
Credit Distribution : 0-0-4-2
Intended for : **BS Chemical Sciences**
Prerequisite : None
Mutual Exclusion : None

---

1. Preamble:

In this laboratory course, students will be introduced to basic data analysis and Physical Chemistry experiments involving spectroscopy, pH-metry, conductometry, chemical kinetics, etc. This laboratory course is designed to complement the theories and principles learned by the students in the general chemistry and basic physical chemistry courses.

2. Course Modules with quantitative lecture hours:

Module-I: Data Analysis and Programming

1. Determination of distribution, mean, variance, standard deviation, confidence interval from sample data obtained for the space variables of diffusive particles at a finite-time.
2. Determination of correlations, auto-correlations and spectral density of sample data obtained for the space and momentum variables of diffusive particle at a given time.
3. Linear and non-linear curve fitting (regression analysis) of given spectroscopic data (Abs. coefficient. vs. T/Fl. Decay) and determination of physical properties from fitting.
4. Writing a Fortran/C++ program for matrix multiplication, diagonalization, and calculation of roots of a Secular determinant.

Module-II: Physical Properties

5. Determining a given solution's viscosity coefficient with Ostwald's viscometer

considering aqueous solutions of glycerol, ethanol, etc.

6. Determination of surface tension of a given solution by drop weight method using a stalagmometer, considering aqueous solutions of NaCl, acetic acid, ethanol, etc., as systems.

Module-III: Chemical Kinetics

7. Study of kinetics of saponification of ester by using the conductometric method.
8. Study of the kinetics of the reaction $I^- + S_2O_8^{2-}$ by colorimetric method.
9. Acid hydrolysis of methyl acetate at different temperatures at a given concentration of $[H^+]$ ions.

Module-IV: Spectroscopy

10. Verification of Beer-Lambert law using colorimetry.
11. Absorption spectrum of a conjugated dye, polymethine, interpretation of the spectra using the "free-electron" model.
12. Determination of quantum yield.

Module-V: Electrochemistry

13. Determination of emf of an electrochemical cell and measurement of thermodynamic parameters from the temperature dependence of emf.
14. Determination of E_0 of Fe^{3+}/Fe^{2+} couple in the hydrogen scale by potentiometric titration of ferrous ammonium sulfate solution using $KMnO_4$, or $K_2Cr_2O_7$ as standard.

3. Textbooks:

- *Experimental Physical Chemistry, D. P. Shoemaker, C. W. Garland, and J. W. Nibler, 8th Edition, McGraw Hill (2009).*
- *Experimental Physical Chemistry, G. Peter Matthews, Oxford University Press (1986).*

4. References:

- *Experimental physical chemistry, Frederick A. Bettelheim, Saunders; 1st edition (1971)*
- *A. Ghosal, B. Mahapartra, A. K. Nad, An Advanced Course in Practical Chemistry, New Central Book Agency Pvt Ltd, Calcutta (2000).*

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			

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

NA

Approvals:

Other Faculty interested in teaching this course: –

Proposed by: B. Mondal and C. K. Nandi **School: Chemical Sciences**

Signature: **Date: 25.11.2022**

Recommended/Not Recommended, with Comments:

_____ **Date:** _____

Chairperson, CPC

Approved / Not Approved

_____ **Date:** _____

Chairperson, BoA

IIT Mandi
Proposal for a New Course

Course number : **CY1XX**
Course Name : **Principles of Organic Chemistry**
Credit Distribution : 3-0-0-3
Intended for : **BS Chemical Sciences**
Prerequisite : None
Mutual Exclusion : None

---

1. Preamble:

This course introduces basic concepts in organic chemistry with the aim to provide understanding with respect to structure, stereochemistry, reactivity, and mechanism. It would cover acid-base theory, aromaticity, oxidation and reduction protocols, reactive intermediates, reaction energetics and principles of stereochemistry.

2. Course Modules with quantitative lecture hours:

Unit 1: Bonding & Aromaticity (10 lectures)

Atomic orbitals and their overlaps, bonding of different types – σ-bond, π-bond, Bond dissociation energy, Bond order and multiplicity, Hybridization, VSEPR theory, Bent's rule, Dipole moment, Molecular orbital (MO) theory, Electronic effects: inductive & field effects, Mesomeric effects, Hyperconjugation, Resonance. Aromaticity, antiaromaticity, and homoaromaticity; Hückel's rule, aromatic ring currents; examples of nonbenzenoid aromatic and antiaromatic compounds.

Unit 2: Reaction Kinetics and Reactive Intermediates (8 lectures)

Energetics of a chemical reaction, Transition state, Hammond's postulate, Hammett equation, Arrhenius equation, Effect of a catalyst, Kinetic Isotope Effect (primary and secondary), Isotope scrambling, Structure, stability and reactivity of carbocations, carbanions, free radicals, carbenes, and nitrenes

Unit 3: Acid-Base Theory (4 lectures)

Acidity, basicity, and pKa, Brønsted & Lowry concept, Lewis concept, The definition of pKa, Basicity, Factors that influence the acidity and basicity, HSAB Principle, Keto-enol tautomerism

Unit 4: Principles of Stereochemistry (10 lectures)

Baeyer's strain theory, Pitzer strain (torsional strain) and conformational analysis (up to cyclohexane), geometrical isomerism (E/Z), optical isomerism, projections, CIP rules (R/S nomenclature of acyclic and cyclic molecules); nomenclature – threo and erythro, syn and anti, endo and exo, and meso and d/l; Introduction to chirality and its origin;

Unit 5: Organic Reactions (10 lectures)

Carbon-carbon bond forming reactions, Olefination reactions, Reduction & oxidation reactions, aromatic substitution reactions (electrophilic, nucleophilic, etc.), chemistry of carbonyl compounds, alkenes and alkynes.

3. Textbooks:

- Clayden, J., Greeves, N., Warren, S., Wothers, S. Organic Chemistry, Oxford University Press, 2001.
- Eliel, E. L., Wilen, S. H., Doyle, M. P. Basic Organic Stereochemistry, John Wiley and Sons, 2001.
- Smith, M. B. and March, J. Advanced Organic Chemistry, Wiley Interscience, 2007.
- D. Nasipuri, Stereochemistry of Organic Compounds-Principle and Applications, 4 Revised ed., New Academic Science, 2012.
- P. Sykes, A Guidebook to Mechanism in Organic Chemistry, 7ed., Addison-Wesley, 2003.

4. References:

- Modern Synthetic Reactions by H. O. House, W.A. Benjamin, Inc., 1972
- Understanding Organic Reaction Mechanism by A. Jacobs, Cambridge 1998.

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	CY501	5%	

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

NA

Approvals:

Other Faculty interested in teaching this course:

Proposed by: Amit B. Pawar and Abhishek Dewanji **School: Chemical Sciences**

Signature: **Date: 31.12.2022**

Recommended/Not Recommended, with Comments:

_____ **Date:** _____

Chairperson, CPC

Approved / Not Approved

_____ **Date:**_____

Chairperson, BoA

IIT Mandi
Proposal for a New Course

Course number : **CY2XX**
Course Name : **Organic Chemistry Laboratory**
Credit Distribution : 0-0-4-2
Intended for : **BS**
Prerequisite : None
Mutual Exclusion : None

---

1. Preamble:

This course will provide an opportunity to the students to learn the fundamental aspects in organic synthesis with the help of hand-on experiments. It includes the principles and applications of separation, isolation, and analytical techniques in organic chemistry.

2. Course Modules with quantitative lecture hours:

Unit 1: Basic Lab Techniques

(a) To determine type and detection of extra elements (N, S, Cl, Br, I) in organic compounds (b) Thin layer chromatography (TLC) and calculation of Rf values (c) Separation of 2 organic compounds by paper chromatography (d) Purification of organic compounds by crystallization.

Unit 2: Organic Qualitative Analysis

Separation of two components from the binary mixture of organic compounds (Solid-Solid, Solid-Liquid).

Unit 3: Organic Preparations (any 6)

(a) Preparation of paracetamol (b) Preparation of aspirin (c) Preparation of phthalimide form phthalic anhydride (d) Preparation of 2:4-DNP derivative of aldehyde or ketone (e) Preparation 4-chloro benzyl alcohol from 4-chloro benzaldehyde (f) Base catalyzed Aldol condensation (g) Preparation 4-iodonitrobenzene from 4-nitroaniline by Sandmeyer Reaction (h) Preparation of Glucosazone derivative of Glucose (i) Preparation of quinone from hydroquinone (j) Preparation of Oxime derivative of Ketones.

3. Textbooks:

- Vogel's book of Practical Organic Chemistry (2006), 5th Edition, Longman Scientific & Technical.
- Organic Chemistry A Lab Manual, Pavia, Lampman, Kriz & Engel (2009), Cengage Learning.

4. References:

- Advanced Practical Organic Chemistry, Leonard, Lygo & Procter (1998), Stanley Thomas

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	-	-	

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

NA

Approvals:

Other Faculty interested in teaching this course:

Proposed by: Amit B. Pawar **School: Chemical Sciences**

Signature: **Date: 01.11.2023**

Recommended/Not Recommended, with Comments:

_____ **Date:** _____

Chairperson, CPC

Approved / Not Approved

_____ **Date:**_____

Chairperson, BoA

Response to Reviewer's Comments

Prof. P. Anbarasan, IIT Madras

We are extremely thankful to the reviewer for his valuable comments and suggestions. Following are the responses to the reviewer's comments.

Theory syllabus

1. I feel it start from B.Sc level and ends in M.Sc level. Have a look at some of the IIT BS program syllabus or central university syllabus to have some good idea.

Response: As suggested, we have modified the syllabus accordingly.

2. Unit 1: Bonding and aromaticity is fine. I am not sure whether it is important to discuss Baker-Nathen effect after hyperconjugation. In the aromaticity, you may specify the Huckel's rule.

Response: As suggested, we have removed the Baker-Nathen effect and also included Huckel's rule under aromaticity.

3. Unit 2 looks fine. You may want to add primary and secondary in KIE.

Response: As suggested, we have now incorporated primary and secondary in KIE.

4. Unit 3 is OK.

5. Unit 4: some of the parts are M.Sc level. For the first course to BS students, please restrict the conformational analysis to butane and may be cyclohexane, decalin is of master level. Similarly, include center of chirality and remove planar chirality and helicity. Also, remove the rest after that.

Response: As suggested, we have now restricted the conformational analysis to butane cyclohexane. The conformation analysis of decalin is removed. We have also included the center of chirality and removed planar chirality, helicity, and rest after that.

6. Unit 5 is very broad. You may include aromatic substituted reactions (electrophilic, nucleophilic and etc), chemistry/reactions of carbonyl compounds and chemistry/reactions of alkene. Please make it more specific to help the students.

Response: As suggested, we have now included aromatic substituted reactions (electrophilic, nucleophilic, etc.), chemistry/reactions of carbonyl compounds, and chemistry/reactions of alkene under the Unit-5.

Laboratory syllabus

Most of them is not appropriate to BS student who may be doing the lab for first time. Please include qualitative analysis of functional groups, may be even from mixture of compounds without separation.

Include the experiments that you are teaching them in the theory course as part of the lab experiment. This would give them good feel and will be able to appreciate the course also.

Response: As suggested, we have now modified the syllabus accordingly.

IIT Mandi
Proposal for a New Course

Course number : **CY XXX**
Course Name : **Fundamentals of Inorganic Chemistry**
Credit Distribution : 3-0-0-3
Intended for : **BS Chemical Sciences**
Prerequisite : None
Mutual Exclusion : None

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1. Preamble:

The main focus of this course is to provide the students with the fundamental understanding of the properties of inorganic compounds. Additionally, this course will strengthen the conceptual knowledge of students related to inorganic chemistry such as chemical periodicity, structure and bonding, acidity and basicity etc. This course will help the students appreciate the importance of the elements of the periodic table in practical world.

2. Course Modules with quantitative lecture hours:

Module 1: Periodic properties (8 Lectures)

Atomic Structure, electronic configuration, Chemical periodicity and periodic anomalies, Size of atoms and ions, Effective nuclear charge, Screening effect, Ionization energy, Electronegativity, Electron affinity, Lanthanide contraction, Fajan's rules.

Module 2: Concepts of acids and bases (8 Lectures)

Theories of acids and bases, Bronsted and Lewis acids and bases, Gas phase versus solution acidity, leveling effects of solvents, Concepts of pH, pKa, pKb, Hardness and softness, surface acidity.

Module 3: Principles of electrochemistry (6 Lectures)

Oxidation and reduction, Redox potential and stability, Electrode potentials, Nernst equation, Frost, Latimer and Pourbaix diagrams.

Module 4: s & p block elements (8 Lectures)

Structure and properties of s and p block elements, and their compounds like hydrides, oxides, and halides, biological functions of inorganic elements in organisms

Module 5: Transition elements (8 Lectures)

Coordination complexes, Isomerism, Theories of metal-ligand bonding and their limitations, Valence bond theory, Spectrochemical series of ligands, Crystal field theory, Splitting of d orbitals in octahedral, tetrahedral and square planar complexes, Low-spin and high-spin complexes, Brief introduction to color and magnetism.

Module 6: Introduction to nuclear chemistry (4 Lectures)

Nuclear reactions, fission and fusion, radio analytical techniques

3. Textbooks:

1. Ajai Kumar, Basic Inorganic Chemistry, Aaryush Education, 2nd Edition, 2019.
2. J. E. Huheey, E. A. Keiter and R. L. Keiter, Inorganic Chemistry: Principles of Structure and Reactivity, 4th edition, Pearson Education Inc., 2000.

4. References:

1. F. A. Cotton, G. Wilkinson, C. A. Murillo and M. Bochmann, Advanced Inorganic Chemistry, Wiley, 6th edition, 2007.
2. B. Douglas, D. McDaniel and J. Alexander, Concepts and Models of Inorganic Chemistry, 3rd edition, Wiley, 2006.
3. J. D. Lee, Concise Inorganic Chemistry, 5th edition, Wiley, 2010.
4. P. Atkins et al, Shriver & Atkins' Inorganic Chemistry, 5th edition, W. H. Freeman and Company, New York, 2010.

5. Similarity with the existing courses:

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

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

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:**

Recommended/Not Recommended, with Comments:

_____ **Date:** _____

Chairperson, CPC

Approved / Not Approved

_____ **Date:**_____

Chairperson, BoA

IIT Mandi
Proposal for a New Course

Course number	**: CY XXX**
Course Name	**: Inorganic Chemistry Laboratory**
Credit Distribution	: 0-0-4-2
Intended for	**: BS Chemical Sciences**
Prerequisite	: None
Mutual Exclusion	: None

---

1. Preamble:

This course is intended to provide the BS students with practical training on various aspects of inorganic chemistry.

2. Course Modules with quantitative lecture hours:

1. General introduction to inorganic laboratory
2. Basic concepts of quantitative analysis
3. Errors in chemical analysis data
4. Qualitative analysis: Inorganic semi micro qualitative analysis with four radicals
5. Quantitative analysis:
    a) Volumetric Analysis:
        - Acid-base titrations relevant to the neutralizing power of antacids
        - Complexometric and spectroscopic estimation of metal ions
    b) Gravimetric Analysis:
        - Estimation of barium/sulphate as barium sulphate
        - Estimation of iron as ferric oxide etc.
6. Synthesis:
    a) Preparation of potash alum from scrap aluminum
    b) Preparation of hexamine Ni(II) chloride
    c) Preparation of tetramine Cu(II) sulphate

3. Textbooks:

1. A Collection of Interesting General Chemistry Experiments: A.J. Elias (2007)Revised edition Universities Press (India) Pvt. Ltd.

4. References:

1. Vogel's Textbook of Quantitative Chemical Analysis, 5th Edn, Orient Longman, 1989.

2. Vogel's Textbook of Macro and Semimicro Qualitative Inorganic Analysis, 5th Edn, Orient Longman, 1982.

3. Synthesis and Technique in Inorganic Chemistry, Robert J. Angelici, University Science Books,U.S.; 2nd edition, 1991.

4. Lab Manual and Instrument Manuals

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			

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:**

Recommended/Not Recommended, with Comments:

_____ **Date:** _____

Chairperson, CPC

Approved / Not Approved

_____ **Date:**_____

Chairperson, BoA

Response to Reviewer's Comments

Prof. G. K. Lahiri, IIT Bombay

Comment: Thanks. It looks fine.

Response: No changes were required in the both the syllabus of theory and laboratory course of Inorganic Chemistry

IIT Mandi
Proposal for a New Course

Course number	**: CYXXX**
Course Name	**: Fundamental Analytical Chemistry**
Credit Distribution	: 3-0-0-3
Intended for	**: BS Chemical Sciences**
Prerequisite	: None
Mutual Exclusion	: None

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1. Preamble:

This course aims to sensitize students towards appropriate scientific reporting of the data, and use of statistics for testing hypothesis. It also emphasizes the reproducibility of experiments and the sources of "errors" during repetitions of experiments. In the later part, it deals with the principles of separation techniques employed on synthetic chemicals and biomolecules.

2. Course Modules with quantitative lecture hours:

Unit 1: Basic Tools of Analytical Chemistry (10 Hours)

Measurements in Analytical Chemistry, Units of Measurement, Uncertainty in Measurements, Concentration, Molarity and Formality, Normality, Molality, Weight, Volume, and Weight-to-Volume Percent, Parts Per Million and Parts Per Billion, Converting Between Concentration Units, Stoichiometric Calculations, Types of errors in Chemical Analyses, Accuracy, Precision, Sensitivity, Specificity and Selectivity, Sampling, Standardization and Calibration, Least square fit, Limit of detection and quantification, Statistical Data Treatment and Evaluation, Basic Equipment, Signal and noise in instrumental measurement, Equipment for Measuring Mass and Volume, Equipment for Drying Samples, Spreadsheets and Computational Software,

Unit 2: Classical Methods of Analysis (10 Hours)

Preparing Solutions, Preparing Stock Solutions, Preparing Solutions by Dilution, Gravimetric Methods of Analysis, Titrations in Analytical Chemistry, Principles of Neutralization Titrations, Complex Acid/Base Systems, Applications of Neutralization Titrations, Complexation and Precipitation Reactions and Titrations, Titration Curves,

Calculation of the pH of Solutions.

Unit 3: Chemical Equilibria (8 Hours)

Reversible Reactions and Chemical Equilibria, Thermodynamics and Equilibrium Chemistry, Equilibrium Constants for Chemical Reactions, Precipitation Reactions, Acid–Base Reactions, Complexation Reactions, Oxidation–Reduction (Redox) Reactions, Le Châtelier's Principle, Buffer Solutions.

Unit 4: Analytical Electrochemistry (8)

Potentiometry-General principles, Calomel Electrodes, Ag-AgCl electrodes, Membrane electrodes-ion selective electrodes, glass electrodes, biosensors. Coulometry: Basic principles, constant current and constant potential coulometry. Voltammetry: different waveforms – linear scan, square scan and triangular scan, cyclic voltammetry.

Unit 5: Separation Techniques (6 Hours)

Principles and applications of TLC, General Theory of Column Chromatography, Gas chromatography (GC), High Performance Liquid Chromatography (HPLC), FPLC, Ion chromatography (IC), Supercritical Fluid Chromatography, Capillary Electrophoresis.

3. Textbooks:

- D. A. Skoog, D. M. West, F. J. Holler, S. R. Crouch, Fundamentals of Analytical Chemistry, 9th Edition, Thomson, 2013.
- D. Harvey, Analytical chemistry 2.1, McGraw-Hill, 2016. (better to include: Analytical Chemistry by G.D. Christian, P.K. Dasgupta and K.A. Schug, 7th edition, Wiley,)
- H. H. Willard, L. L. Merritt Jr.,J. A. Dean, f. A. Settle Jr., Instrumental Methods of Analysis, CBS Publishers, New Delhi, 1986.
- J. C. Miller, J. N. Miller, Statistics for Analytical Chemistry, 2nd Edition, Wiley, 1998.
- D. C. Harris, W. H. Freeman Quantitative Chemical Analysis, 7th Edition, 2006.

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.	NA	-	-	

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

NA

Approvals:

Other Faculty interested in teaching this course:

Proposed by: Dr. Sharvan Kumar **School: Chemical Sciences**

Signature: **Date: 29-09-23**

Recommended/Not Recommended, with Comments:

_____ **Date:** _____
Chairperson, CPC

Approved / Not Approved

_____ **Date:** _____
Chairperson, BoA

Response to Reviewer's Comments

Prof. Raj KumarDutta, IIT Roorkee

Comment: I have edited a few points in the proposed syllabus. Overall, the syllabus looks fine, hopefully atomic spectroscopic methods will be covered as advanced course?

Response: All the corrections are included in the revised proposal.

IIT Mandi
Proposal for a New Course

Course number : **CY xxx**
Course Name : **Applied Materials Chemistry**
Credit Distribution : *3-0-0-3*
Intended for : **BS**
Prerequisite : None
Mutual Exclusion : None

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1. Preamble:

Applying the fundamentals of chemistry for developing functional materials has revolutionized the human life at various fronts. The exciting opportunity to tune material properties by manipulating various parameters opens up plethora of novel applications. Materials chemistry has 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 material chemistry and which is available to the material chemist in conjunction with other core and elective courses in the BS-MS program.

2. Course Modules with quantitative lecture hours:

Module 1: Introduction to Materials chemistry (6 Hours)

Concepts of materials chemistry, Different types of materials, Sources and characteristics of traditional materials, Uses of materials, Approaches to producing new materials with new properties, Atomic level growth of solid material (crystalline and amorphous), Types of bonding in solids, Crystal structures

Module 2: Polymers and Polymer based Materials (9 Hours)

Introduction to polymers, History and recent developments, Classification and nomenclature of polymers, Thermoplastics, Thermosets, Elastomers, Molecular weight, Polymer synthesis, Techniques of polymerization Conducting polymers

Module 3: Nanomaterials (9 Hours)

Fundamentals of nanotechnology, Classification of nanomaterials, Synthesis of

nanomaterials, Top down and bottom-up approach, Discovery and synthesis of quantum dots, Particle surface functionalization: electrostatic, steric and electrosteric stabilization, Toxicity

Module 4: Biomaterials (9 Hours)

Introduction to biomaterials and its history, Classification, Properties of Biomaterials, biocompatibility and biodegradability, biopolymers, hydrogels, sealants and adhesives, Chemistry of dental materials

Module 5: Functional materials, properties, and their applications (9 Hours)

Smart materials, Carbon materials, Energy materials, Optoelectronic materials, Catalysis, Environment, Agriculture, Biomedicine, Emerging materials, Thin films, Chemical vapour deposition (CVD), Atomic Layer deposition (ALD).

3. Textbooks:

1. Harry R. Allcock, Introduction to Materials Chemistry, Wiley, 2nd Edition, 2019.
2. V. R. Gowarikar, N. V. Viswanathan, J. Sreedhar, Polymer Science, New Age International. Wiley, 3rd Edition, 2019.
3. Bikramjit Basu; Biomaterials Science and Tissue Engineering: Principles and Methods; Cambridge University Press; [ISBN: 9781108415156]; 2017.
4. M.D. Ventra, S. Evoy, J.R. Heflin Jr. (Eds.), Introduction to Nanoscale Science and Technology, Kluwer Academic Publishers, Boston.
5. The Chemistry of Dental Materials (Classic Reprint) Hardcover – 21 October 2018 by Charles Stanley Gibson (Author)

4. References:

1. R. J. Young and P. A. Lovell, Introduction to Polymers, CRC Press, Taylor & Francis group.
2. C. E. Carraher, Polymer Chemistry, CRC Press, Taylor & Francis group.
3. L. M. Liz-Marsan and P. V. Kamat, Nanoscale Materials, Kluwer Academic Publishers, Boston, USA.
4. Advanced Biomaterials: Fundamentals, Processing and Applications; John Wiley & Sons, Inc., USA (ISBN: 978-0-470-19340-2), September, 2009.
5. Related journal articles

6. Semiconducting and Metallic Polymers: The Fourth Generation of Polymeric Materials, Alan J. Heeger, J. Phys. Chem. B, Vol. 105, No. 36, 2001

7. Handbook of Conducting Polymers, ed. T. A. Skotheim, Dekker, New York, 1986, vol. 1–2.

8. Nanotechnology in catalysis vol.3, Eds. Bing Zhou, Scott Han, Robert Raja, and Gabor A. Somorjai, Springer 2007

9. Introduction to Nanotechnology by Charles P. Poole Jr and Frank J. Owens, Wiley India student Edition 2008
10. Nanoscale Materials in chemistry by K.J. Klabunde and Ryan M. Richard
11. Nanostructured Materials by Guozhong Cao, Imperial College Press 2004

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			

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:**

Recommended/Not Recommended, with Comments:

_____ **Date:** _____
Chairperson, CPC

Approved / Not Approved

_____ **Date:**_____
Chairperson, BoA

Response to Reviewer's Comments

Prof. Jacob (IIT Delhi):

Email with Prof. Jacob's comments enclosed.

1. In my opinion, there is too much of content packed into this course. I think the characterization module can be removed and be part of another course solely on characterization (probably you are planning on it anyway). The currently allocated teaching hours can be easily distributed among the other modules.

Thank you very much for the suggestion. We have now removed the characterization module and redistributed the teaching hours.

2. For the polymer part (module 2), thermoplastics, thermosets and elastomers should also included. The proposed topics under this head still look heavy. Check if processing aspects are part of any other course, if so, these can be excluded.

Thank you very much for the suggestion. We have now included thermoplastics, thermosets and elastomers in module 2. We have also removed polymer processing part from the module 2.

3. The reference book by G. Odian is not easy for BS students to follow. Introduction to polymers by Yound and Lovell or Polymer chemistry by Charles Carraher is a lot easier to follow at this stage.

Thank you very much for the suggestion. We have now removed G. Odian and added the suggested books.

Prof. Rao (IIT Madras):

Email with Prof. Rao's comments enclosed.

- Module 2: conducting polymers (PANI and others),
Refer J. Phys. Chem. B, Vol. 105, No. 36, 2001 (FEATURE ARTICLE)

It has been included. Thank you.

- Module 3: Discovery and synthesis of quantum dots (quantum dots are used in photonics industry and research) Recently the Nobel prize 2023 in chemistry has been awarded "for the discovery and synthesis of quantum dots" to Moungi Bawendi (MIT, USA), Louis Brus Columbia, USA and Alexei Ekimov (Nanocrystals Technology Inc, USA). .... https://www.nobelprize.org/prizes/chemistry/

It has been included. Thank you.

- Module 4: Chemistry of dental materials

It has been included. Thank you.

- *Module 5: X-ray photoelectron spectroscopy, EXAFS, Raman spectroscopy*

As per the suggestion from the first reviewer, this module has been removed from the syllabus.

- *Module 6: carbon materials,*
Thin films, Chemical vapour deposition (CVD), Atomic Layer deposition (ALD).

It has been included. Thank you.

- *Textbooks: The Chemistry of Dental Materials (Classic Reprint) Hardcover – 21 October 2018 by Charles Stanley Gibson (Author)*

It has been included. Thank you.

- *References:*

5. Semiconducting and Metallic Polymers: The Fourth Generation of Polymeric Materials, Alan J. Heeger, ***J. Phys. Chem. B, Vol. 105, No. 36, 2001***
6. Handbook of Conducting Polymers, ed. T. A. Skotheim, Dekker, New York, 1986, vol. 1–2.
7. Nanotechnology in catalysis vol.3, Eds. Bing Zhou, Scott Han, Robert Raja, and Gabor A. Somorjai, Springer 2007
8. Introduction to Nanotechnology by Charles P. Poole Jr and Frank J. Owens, Wiley India student Edition 2008
9. Nanoscale Materials in chemistry by K.J. Klabunde and Ryan M. Richard
10. Nanostructured Materials by Guozhong Cao, Imperial College Press 2004

Suggested references have been included in the revised course content file. Thank you.

IIT Mandi
Proposal for a New Course

Course number : **CY xxx**
Course Name : **Numerical methods and Data Analysis in Chemistry**
Credit Distribution : *3-0-0-3*
Intended for : **BS**
Prerequisite : Computing and Data Science **IC152**
Mutual Exclusion : None

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1. **Preamble:** Various mathematical methods are essential to deal with several fundamental branches of chemistry; such as kinetic theory, thermodynamics, chemical kinetics, transport phenomena, quantum mechanics and spectroscopy, and so on. In many cases, the problems related to these subjects are not exactly solvable and then there appears the need to apply numerical techniques for advancement. The objective of the present course is to offer the students learning the theories of numerical analysis and computer simulation techniques to solve the problems by employing the method of solution of the linear set of equations and nonlinear equations, numerical differentiation and integration, interpolation and extrapolation techniques, solution of ordinary and partial differential equations, Fast Fourier Transform, etc. The programming techniques will primarily be demonstrated in Python and Fortran programming languages with also some introduction to C and C++. The course would also focus on the important aspect of statistical analysis of data. The course will provide exposure to the students regarding the importance of learning stochastic simulations and Monte Carlo techniques in chemistry. The students would be introduced to the basic techniques of time-series analysis and machine learning to get an idea about their importance in crucial chemical applications; for example, detecting bond orders and normal modes, predicting reaction pathways, and designing new molecules and materials, to mention a few.

2. **Course Modules with quantitative lecture hours:**

Unit 1: Theories of Numerical Methods: (12 lectures)

(a) Methods of solution of sets of linear equations: Gauss elimination, Gauss-Jordan

elimination, Gauss-Seidel method, QR decomposition method

(b) *Solution of nonlinear algebraic equations*: Bisection method, Newton-Raphson method, Secant method

(c) *Interpolation and extrapolation*: Polynomial interpolation and extrapolation, Rational function interpolation and extrapolation, Cubic spline interpolation

(d) *Numerical differentiation*: Finite-difference method, Higher-order methods

(e) *Numerical integration*: Newton-Cotes quadrature – Rectangle rule, Trapezoidal rule, Simpson's $1/3^{rd}$ and $3/8^{th}$ rule, Romberg's method; Gaussian quadrature

(f) *Solution of differential equations*: Euler method, Predictor-corrector method - Improved and Modified Euler method, Runge-Kutta method; Finite-difference method

(g) *Fourier analysis*: Fourier transform of discretely sampled data, Fast Fourier transform

Unit 2: Significance and application of the numerical methods in Chemistry: (8 lectures)

Application of the solution of the sets of linear equations in Quantum Mechanics, Application of the solution of the nonlinear algebraic equations to get the optimum of the energy landscapes and minimum of the error function, Application of interpolation and extrapolation techniques in Chemistry; to predict data related to chemical experiments at a given condition, Application of the numerical differentiation techniques to solve diffusion equation, Brief introduction to the Molecular Dynamics; Störmer-Verlet, Verlet, Velocity – Verlet methods, Importance of Fourier analysis in spectroscopy.

Unit 3: Data Analysis (4 lectures)

Determining the distribution of a set of data, Moments of a distribution – its mean, variance, skewness etc., Correlation of data – linear correlation, auto-correlation, least square fit method, Importance of data analysis in Chemistry

Unit 4: Introduction to the Langevin Dynamics Simulations and Monte Carlo Techniques: (6 lectures)

Idea of the random numbers, Langevin Dynamics Simulations, Monte Carlo algorithm, Metropolis algorithm, Gillespie algorithm; their significance in Chemistry

Unit 5: Introduction to time-series analysis and machine learning and their connection to chemistry (12 lectures)

(a) *Time-series analysis*: Trend, stationarity, seasonality and correlations; Moving average (MA), Autoregressive (AR), Autoregressive moving average (ARMA), Autoregressive integrated moving average (ARIMA) models; Forecasting with ARIMA model; Spectral density function and Spectral analysis

(b) *Machine learning:* Supervised learning and linear regression, Logistic regression, Decision tree and Random forest, Unsupervised learning, Time-series modelling, Deep learning

(c) *Significance in Chemistry:* Illustration of the applicability of time-series analysis and machine learning in important problems related to chemistry; such as calculating bond orders and determining normal modes, forecasting reaction pathways, proposing the designing techniques of new molecules and materials etc.

3. Textbooks:

(a) H. W. Press, S. A. Teukolsky, W. T. Vettering, and B. P. Flannery, Numerical Recipes - The Art of Scientific Computing (Cambridge Univ. Press, 1992).

(b) F. Jensen, Introduction to Computational Chemistry, Second Edition (Wiley, New York, NY, 2006).

(c) T. Hastie, R. Tibshirani and J. Friedman, The Elements of Statistical Learning (Springer, New York, NY, 2009).

(d) R. H. Shumway and D. S. Stoffer, Time series analysis and its applications (Springer, New York, 2011)

4. References:

(a) H. W. Press, S. A. Teukolsky, W. T. Vettering, and B. P. Flannery, Numerical Recipes in Fortran (Cambridge Univ. Press, 1992)

(b) W.H. Press, B.P. Flannery, S.A. Teukolsky, and W.T. Vetterling, Numerical Recipes in C (Cambridge Univ. Press, 1990)

(c) J. M. Zelle. Python Programming: An Introduction to Computer Science (Beedle & Associates, Inc.: Portland, OR, USA, 2004)

(d) Carleo et al., Machine learning and the physical sciences, *Reviews of Modern Physics* **91**, 045002 (2019).

5. 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.	Numerical Analysis (3-1-0-4)	MA523	8 lectures	19%
2.	Numerical Analysis (3-0-0-3)	MA551	8 lectures	19%
3.	Numerical Analysis (2-0-2-3)	MA607	8 lectures	19%
4.	Numerical Methods for Engineering Computation (3-0-0-3)	ME 504	8 lectures	19%

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

NA

Approvals:

Other Faculty interested in teaching this course: -

Proposed by: Dr. Moupriya Das

School: Chemical Sciences

Signature: **Date:**

Recommended/Not Recommended, with Comments:

_____ Date: _____

Chairperson, CPC

Approved / Not Approved

_____ Date:_____

Chairperson, BoA

Response to Reviewer's Comments

Following the suggestions of the Reviewer, the listed changes were made in the listed course proposal.

Prof. Ramakrishna Ramaswamy, IIT Delhi

1. I completely agree with the Reviewer that including the basic programming part in the current proposal will make the course content of much higher volume compared to what is appropriate for one semester. Therefore, the Unit in the previous proposal has been completely removed. Consequently, a B. Tech 'Computing and Data Science' course (**IC152**) has been mentioned as the prerequisite that comes under the curriculum of the target students assuming this course will cover the basic programming part. I thank the Reviewer for pointing out this fact.

2. As suggested by the Reviewer, the application part of the numerical methods related to specific chemical problems has been included explicitly under all the methods discussed, in addition to what was proposed only for Unit 4 before. Considering the fact that the explanation of these applications in the classroom will benefit the students, they have been included in the lectures. As recommended, homework and assignments will be planned accordingly so that the students get a better idea of how to implement the methods in real applications.

3. I agree with the Reviewer that numerical packages are used extensively for Units 1(e) and 1(f). However, presuming the importance of providing the students with an idea about how these numerical packages run and the basic principles, the suggested methods have been included in the course proposal.
Some of the involved methods could be removed in case the lecture hours were not sufficient. However, as Unit 3 has been omitted from the proposal, it is presumed that proper scheduling of the lectures is done including the topics in 1(e) and (f).

4. It was a very important suggestion to add the discussions on the Monte Carlo method as it has significant applications in Chemistry including calculations of numerical integration. A new section (Unit 4 in the current proposal) has been added covering both Langevin dynamics simulations and Monte Carlo methods.

I extend my sincerest thanks to the Reviewer for his valuable time in evaluating the course proposal and for his constructive criticisms and valuable suggestions
on it.

Annexure 'F'

PROPOSAL

Proposal for inclusion of HSS paper in JAM for admission to MA programs in IITs and IISERs

CONTENTS

I. PREAMBLE

It is proposed that a new Humanities and Social Sciences (HSS) paper be added to the list of subjects that are currently included in the JAM for testing. This new paper will allow candidates to take the exam with a view towards applying for admissions to the MA programmes currently being offered at IIT Guwahati, IIT Mandi, as well as other postgraduate programmes available at other institutions. The aforementioned programmes are examples of the wide variety of programmes on offer at IITs and IISERs that can use JAM scores for admissions.

The Joint Admission Test for Masters (JAM) for admission into postgraduate programmes at IITs and the Indian Institute of Science, Bangalore is a computer based online examination. Admissions to most postgraduate programmes across various institutions is made on the basis of the JAM scores/ ranks.

Eight institutes conduct JAM: IISc, IITB, IITK, IITD, IITM, IITKGP, IITR, and IITG. The others are admitting institutes. There are 21 IITs that participate in admissions only through JAM that includes admissions also with respect to the Science programmes. The inclusion of the HSS paper and syllabi in the JAM test structure will widen the ambit of admissions into several PG courses of study available at IITs, IISERs etc.

II. JUSTIFICATION

1. The inclusion of an HSS paper for admission to MA programmes as mentioned above will allow students from across India and abroad to take the exam in a more convenient manner.
2. The HSS paper, if included in JAM, will allow greater number of aspirants to sit for the exam from different regions who otherwise may not be able to take it as the exam is currently held only at IIT Guwahati, IIT Mandi or at other specific institutions who conduct their own entrance exams.

Gender and Development, Violence and Social Unrest, Population and Development in India.

b. **Economy, Polity and Development:** Indian Economy, Planning and liberalization; Relevant policies in sectors such as agriculture, industry, health, education, etc.; Monetary and Fiscal policies; Poverty, inequality, unemployment, inflation; Demand and supply; Consumers' and producers' behaviour; Market structure; Welfare economics; Trade; Public Economics;

c. **Global Politics and Economy:** Sustainable Development Goals, International Relations and Politics, Treaties and Declarations, World Affairs and Global Economy, Global North and South Divide, Cold War, Trade and International Organizations, UN, WTO, NAM, NATO, SAARC, ASEAN, BRICS.

d. **Ecology and Development:** Environment, Ecology and Development, Environmental Pollution and Health Hazards, Climate Change, Environmental Movements in India, Natural Resources Management, Displacement and Development.

e. **India's History and Politics:** India's Struggle for Independence, Nationalism, Emergence of the Indian Nation State, Contemporary history, Indian political thinkers and theories..

IV. ELIGIBILITY

Eligibility requirement is any bachelor's degree (3 yr or 4 yr), 55% marks (or equivalent CGPA) obtained in bachelor's degree.

***

3. The inclusion of this new paper in JAM will allow institutes to have a more seamless mode of selection of students for any additional programmes of study that may be introduced in the future.
4. The paper (a sample of which is provided with this proposal) will test students on standardized components as outlined. This will be beneficial to assess their suitability for the programmes offered.
5. Since several IITs already use the JAM for admissions into their postgraduate programmes, the inclusion of this new paper puts our programmes on par with the latest testing processes in the country currently used for admissions.
6. The online examination such as JAM obviates the need for a paper-based, single city testing process for MA admissions. This all-India online examination will enable students to take the exam in the event of travel, weather or other related disruptions that can prevent students to sit for a paper-based exam scheduled in a few cities.

III. JAM SYLLABUS (Indicative)

HUMANITIES AND SOCIAL SCIENCES

1. **Logic and Reasoning:**
   Deductive Reasoning, Statement Analysis, Figure Matrix, Syllogism, Statement and Assertion, Premises and Conclusion, Extension and Intension, Pattern Series and Sequences, Order and Ranking, Alphanumeric series, Analogical Reasoning, Inductive Reasoning, Abductive Reasoning, Data Sufficiency, Cause and Effect, Picture Series and Sequences.

2. **Quantitative Ability:**
   Number systems, Polynomials, Linear and Quadratic Equations, Areas, Surfaces, Volumes, basic arithmetic, interpretation of tables, graphs, charts, etc.

3. **Verbal Ability:**
   Antonyms, Synonyms, Reading Comprehension, Error detection, One word substitutions, Concise and precise writing, Conversion from passive to active voice, Omission of vague words, Jumbled words, Jumbled sentences and paragraph, paragraphs, Idioms and Phrases.

4. **Disciplinary Competence:**

a. **Indian Society and Culture:** Structure of Indian Society (Marriage, Family and Kinship), Political Institutions, Stratification and Inequality (Caste, Class, Religion, Tribe, Region), Social Change in India, Affirmative Action and Policies of Positive Discrimination, Commissions and Policy Interventions, Social Movements in India,

Proposal for inclusion of HSS paper in JAM for admission to MA programs in IITs and IISERs

HSS JAM

- The Joint Admission Test for Masters (JAM) for admission into postgraduate programmes at IITs and the Indian Institute of Science, Bangalore is a computer based online examination. Admissions to most postgraduate programmes across various institutions is made on the basis of the JAM scores/ ranks.
- It is proposed that a new Humanities and Social Sciences (HSS) paper be added to the list of subjects that are currently included in the JAM for testing. This new paper will allow candidates to take the exam with a view towards applying for admissions to the MA programmes currently being offered at IIT Guwahati, IIT Mandi, as well as other postgraduate programmes available at other institutions

BENEFITS

- The inclusion of an HSS paper for admission to MA programmes as mentioned above will allow students from across India and abroad to take the exam in a more convenient manner.
- The HSS paper, if included in JAM, will allow greater number of aspirants to sit for the exam from different regions who otherwise may not be able to take it as the exam is currently held only at IIT Guwahati, IIT Mandi or at other specific institutions who conduct their own entrance exams.
- The inclusion of this new paper in JAM will allow institutes to have a more seamless mode of selection of students for any additional programmes of study that may be introduced in the future.
- The paper will test students on standardized components as outlined. This will be beneficial to assess their suitability for the programmes offered.
- Since several IITs already use the JAM for admissions into their postgraduate programmes, the inclusion of this new paper puts our programmes on par with the latest testing processes in the country currently used for admissions.
- The online examination such as JAM obviates the need for a paper-based, single city testing process for MA admissions. This all-India online examination will enable students to take the exam in the event of travel, weather or other related disruptions that can prevent students to sit for a paper-based exam scheduled in a few cities.

ELIGIBILITY

- Eligibility requirement is any bachelor's degree (3 yr or 4 yr), 55% marks (or equivalent CGPA) obtained in bachelor's degree.

IIT Mandi
Proposal for a New Course

Course number : **IK_506**
Course Name : **Research methods and statistics for contemplative science**
Credit Distribution : (2-1-0-3) *(Lectures-Tutorial-Practical-Total credits)*
Intended for :**3rd & 4th Year B. Tech, Masters and PhD**
Prerequisite : **None**
Mutual Exclusion: None

---

1. Preamble:

Research methods and statistics are the foundation for scientific research. Two existing courses of the institute (HS550 & HS 522) covers research methods and statistics from social science perspective. Considering the inherent challenges associated with contemplative science research (e.g., Yoga/Meditation), this course is designed to equip the students to develop skills in research methods and statistics from a contemplative science perspective. This course would enable the students/research scholars working on Indian knowledge systems and mental health applications (IKSMHA) to understand the concepts better from a contemplative science and mental health perspective.

2. Course Modules with quantitative lecture hours (42 hours):

Module 1 (21 hours + 7 tutorial hours)

Research methods theory:

Basic assumptions underlying scientific research

Ethics in scientific research

Literature review and hypothesis formulation

Data collection methods

Measurement techniques & Sampling methods

Research designs

Apart from controlled trial designs (including randomized controlled trial designs-RCT), emphasis will also be given on case-control study design and prospective cohort design from contemplative science perspective. For example, studying the effect of advanced meditation (with monks is more feasible from case-control design

than RCT). Similarly naturalistic cohort long term follow-up studies are optimal from sampling perspective to study the effect of yogic/meditative lifestyle.

Procedure for conducting research experiment

Control techniques in experimental research

Mixed methods research

Emphasis on first person (for subjective experience) and third person perspective-based assessments will be discussed. Special emphasis on experience sampling method and its relevance for contemplative science will be discussed

Scientific writing

Tutorial sessions

Randomization procedure

Scientific illustrations-Inkscape and blender

Reference management-Zotero

Qualitative data coding-Qualcoder

Note: All the tutorial sessions will be taught with Yog/Meditation based dataset for better understanding of the concepts

Module 2 (7 hours + 7 tutorial hours)

Statistics theory

Data representation-tables & figures

Descriptive statistics

Key ingredients for inferential statistics

Hypothesis testing, statistical significance and decision errors

T tests

ANOVA

Correlation

Regression

Chi square test

Linear mixed model analysis (LMM)

Distribution free statistics

Tutorial sessions (Using Jamovi & R-open-source free software)

Data wrangling

T tests

ANOVA

Correlation & Regression

Chi square test

LMM

Sample size calculation-G power

Note: All the tutorial sessions will be taught with Yog/Meditation based dataset for better understanding of the concepts

3. Text books:

Christensen LB, Johnson B, Turner LA. Research Methods, Design, and Analysis. Pearson Education; 2019.

Aron A, Aron EN. Statistics for psychology (6th Ed). Pearson Education; 2013.

4. References:

Zar JH. Biostatistical analysis. Pearson Education India; 1999.

Creswell JW, Poth CN. Qualitative inquiry and research design: Choosing among five approaches. Sage publications; 2016

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.		HS550	Hypothesis testing, T test, ANOVA, correlation & regression	25%
2		HS 522	Literature review & Hypothesis formulation	5 %

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

Approvals:

Faculty interested in teaching this course: –

G. Ramajayam

Proposed by: Dr Ramajayam G **School: IKSMHA**

Signature: **Date:**

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

Sl. No	Faculty Name	Signature

School Chair:

School:

Date:

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

Dean Academics

Date:

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

Responses for the reviewer's comments:

Reviewer 1:

Dr Arun Sasidharan MBBS, PhD (Neurophysiology)
Scientist-C
Centre for Consciousness Studies
Dept of Neurophysiology
National Institute of Mental Health & Neurosciences (NIMHANS)
Bengaluru

Comment 1:

As there are overlapping courses from social science perspective, it would be good to have a subtopic (in Module 1 & 2) that describes the differences between social science and contemplative science perspectives in terms of application/challenges in research method and statistics approaches.

Response 1:

Suggestions are incorporated on page no-1 & 2, under research designs and mixed methods section in module 1

Comment 2:

Explicitly mention that the Lab sessions would use examples/datasets from contemplative science research

Response 2:

Suggestions are incorporated on page no- 2, under tutorial sessions in module 1 & 2

Reviewer 2:

Dr Bhupendra Singh MBBS, MD (Psychiatry)
Additional Professor
Dept of Psychiatry (Geriatric Mental Health)
King George Medical College
Lucknow

Comments:

The course content looks good.

IIT Mandi
Proposal for a New Course

Course number : **IK_507**
Course Name : **Neuroscience and mental health**
Credit Distribution : (3-0-0-3) *(Lectures-Tutorial-Practical-Total credits)*
Intended for : **3rd & 4th Year B.Tech, Masters and PhD**
Prerequisite : **None**
Mutual Exclusion: None

---

1. Preamble:

As per the National Mental Health Survey 2016, 120 million people in India are suffering from common mental health disorders like depression and anxiety and 12 million Indians are suffering from severe mental health disorders like psychosis. Many of these mental health disorders are preventable if the youth are sensitized appropriately, as many of these mental health disorders begin in young adulthood. This course would enable the students to have a scientific understanding of common mental health problems and adopt a healthy lifestyle to prevent mental health disorders. It would also facilitate the students to develop new research questions related to preventive/therapeutic technologies for promotion of positive mental health.

2. Course Modules with quantitative lecture hours (42 hours):

Theory (38 hours)

Module 1(10 hours)

Basics of neuroscience

Structure and function of the nervous system-1

Structure and function of the nervous system-2

Module 2 (14 hours)

Neuropsychology underlying illness & wellness

Illness & Wellness-perspectives from neuroscience

Neuroscience of positive psychology

Human development through life cycle and the neuroscience of ageing

Theories of personality & psychopathology: eastern & western perspectives

Module 3 (14 hours)

Mental health disorders

Classification of mental health disorders

Substance related mental health disorders

Common mental health disorders

Severe mental health disorders

Practical (4 hours)

Module 4 (4 hours)

Stigma of mental illness-discussion

The beautiful mind-movie analysis

Active listening as a crisis intervention-activity in pairs

Complementary & integrative mental health practices-discussion

3. Text books:

Kandel ER, Koester JD, Mack SH, Siegelbaum SA. Principles of Neural Science, Sixth Edition. McGraw Hill LLC; 2021.

Sadock BJ, Sadock VA. Kaplan & Sadock's Concise Textbook of Clinical Psychiatry. Wolters Kluwer/Lippincott Williams & Wilkins; 2008.

4. References:

Sadock BJ, Sadock VA, Ruiz P. Kaplan & Sadock's Comprehensive Textbook of Psychiatry. Wolters Kluwer; 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			

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

Approvals:

Faculty interested in teaching this course: –

Proposed by: Dr Ramajayam G **School: IKSMHA**

Signature: **Date:**

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

Sl. No	Faculty Name	Signature

School Chair:

School:

Date:

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

Dean Academics

Date:

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

Responses for the reviewer's comments:

Reviewer 1:

Dr Arun Sasidharan MBBS, PhD (Neurophysiology)
Scientist-C
Centre for Consciousness Studies
Dept of Neurophysiology
National Institute of Mental Health & Neurosciences (NIMHANS)
Bengaluru

Comments:

1. As the Module-2 has subtopics on Neuroscience besides Psychology, it may be renamed from "Psychology underlying illness & wellness" to "Neuropsychology underlying illness & wellness".

Response:

1. As suggested by the reviewer, "Psychology underlying illness & wellness" is renamed as "Neuropsychology underlying illness & wellness" in module 2 on page no. 1

Reviewer 2:

Dr Bhupendra Singh MBBS, MD (Psychiatry)
Additional Professor
Dept of Psychiatry (Geriatric Mental Health)
King George Medical College
Lucknow

Comments:

The course content looks good.

Annexure 'H'

Master of Arts in Indian Knowledge System

Indian Knowledge System and Mental Health Applications (IKSMHA) Centre,
Indian Institute of Technology Mandi, Himachal Pradesh, India - 175005

Brainstorming Workshop attendees for developing the MA in Indian Knowledge System Curriculum

Experts in the Workshop

- **Prof. Laxmidhar Behera:** Director, IIT Mandi
- **Prof. Hari Ram Mishra:** Associate Professor in the School of Sanskrit and Indic Studies at Jawahar Lal Nehru University, Delhi.
- **Prof. Nachiketa Tiwari:** Professor in Mechanical Engineering at IIT Kanpur.
- Prof. Arnab Bhattacharya: Professor in Computer Science and Engineering, IIT Kanpur. (Online)
- **Prof. Rampal Shukla:** Head of Department, Traditional Sanskrit Studies, Maharaja Sayajirao University, Vadodara.
- **Prof. Mithilaprasad Tripathi:** Sanskrit poet who won the Sahitya Akademi Award for Sanskrit in 2010. (Online)
- **Prof. Amba Kulkarni:** Professor in the Department of Sanskrit Studies at the University of Hyderabad. (Online)
- **Prof. Pawan Goyal:** Associate professor at IIT Kharagpur. (Online)
- **Prof. Sadashiv Kumar Dwivedi:** Professor in the Department of Sanskrit, Faculty of Arts at Banaras Hindu University, Uttar Pradesh, India. (Online)
- **Prof. Varun Dutt:** Chair of the Indian Knowledge System and Mental Health Applications (IKSMHA) Centre, IIT Mandi
- **Prof. Rohit Saluja:** Workshop Coordinator and Assistant Professor in the School of Computing and Electrical Engineering, IIT Mandi
- **Prof. Aniruddha Chakraborty:** Professor in the School of Chemical Sciences, IIT Mandi
- **Prof. Venkata Krishnan:** Professor in the School of Chemical Sciences, IIT Mandi
- **Prof. Atul Dhar:** Associate Professor in the School of Mechanical and Materials Engineering, IIT Mandi
- **IKSMHA Centre students, staff, and Postdocs**

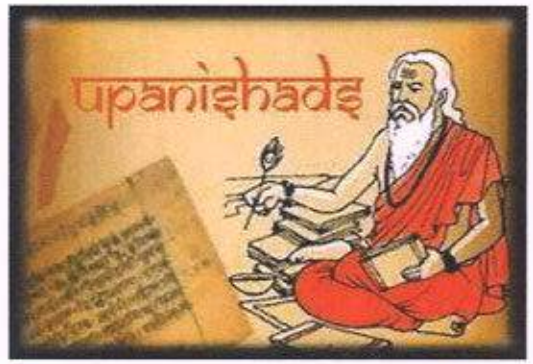
Expert committee reviewing the program

- **Prof. Nachiketa Tiwari:** Professor in the Department of Mechanical Engineering at IIT Kanpur (Chair)
- **Prof. Rampal Shukla:** Head of Department, Traditional Sanskrit Studies, Maharaja Sayajirao University, Vadodara (Member)
- **Prof. Mithilaprasad Tripathi:** Sanskrit poet who won the Sahitya Akademi Award for Sanskrit in 2010 (Member)
- **Prof. Amba Kulkarni:** Professor in the Department of Sanskrit Studies at the University of Hyderabad (Member)

Committee Comments and Responses

Introduction

- Sanskrit and Vedanta studies are crucial for understanding India's philosophies and culture.
- The program blends traditional studies with technology.
- It aims to use modern computational techniques for decoding ancient Sanskrit texts.
- This approach makes the program interdisciplinary and distinct.



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Program Curriculum & Eligibility Criteria

Program Level: Post Graduate

Duration: 2 Years (4 Semesters)

Commencement: August 2024

Blend of: Classical Studies & Modern Tech Integration

Eligibility Criteria:

- Candidates should a Bachelor's degree of minimum 3 years duration.
- Minimum of 55% marks or a CGPA of 5.5 (appropriate relaxation for those from certain categories as per GOI norms).

Admission Process: Stage 1: Aptitude Test
Stage 2: Interview

Credit Distribution Architecture

Core Courses	27 credits
Discipline Electives - IKSMHA (16 credits) - Free (8 credits)	24 credits
Field Study	4 credits
Practicum	2 credits
Research Project/Internship	23 credits
Total	**80 credits**

Semester Courses

1st Sem	2nd Sem	Summer Term	3rd Sem	4th Sem
Core: 12 Credits Elective: 6 Credits	Core: 9 Credits Elective: 9 Credits Practicum: 2 Credits	Field Study: 4 Credits	Core: 6 Credits Elective: 9 Credits	Research Project/ Internship: 23 Credits

Tentative Semester courses	Credits
Semester I 1. IK 530 Bhagavad-Gītā Part I (Chapters 1-6, Sanskrit and Philosophy) 2. IK 501 Patanjali Yoga Sutra 3. IK 538 Basic Sanskrit Grammar and Semantics 4. IK 536 Introduction to Vedanta Philosophy 5. Elective 1 6. Elective 2 **Total**	 3 3 3 3 3 3 **18**
Semester II 1. IK 540 Bhagavad-Gītā Part II (Chapters 7-12, Sanskrit and Philosophy) 2. IK 541 Upanishads and Vedanta Studies 3. IK 552 Selected Topics in Ramayana 4. Elective 3 5. Elective 4 6. Elective 5 7. IK 543 Practicum in Vedic Chants **Total**	 3 3 3 3 3 3 2 **20**
Summer Term IK 546 Field Study: Exploring Ancient Sanskrit Sites and Temples	 **4**

Tentative Semester courses	Credits
Semester III	
1. IK 551 Bhagavad-Gītā Part III (Chapters 13-18, Sanskrit and Philosophy)	3
2. Elective 6	3
3. Elective 7	3
4. Elective 8	3
5. IK 562 Research Methodology - Tantra Yukti and Pramana Shastra	3
Total	**15**
Semester IV	
IK 550 Research Project/Internship on Sanskrit and Technology Applications	23
Total	**23**

Electives List

1. IK 535 Ancient Sanskrit Literature and Scriptures: 3 credits
2. IK 553 Pāṇini Ashtadhyayi: 3 credits
3. IK 547 Sanskrit Poetry and Drama: 3 credits
4. IK 554 Bhagwat Sankhya: 3 credits
5. IK 555 Selected Topics in Mahabharata: 3 credits
6. IK 556 Surya Siddhanta: 3 credits
7. IK 557 The Study of Dharma: 3 credits
8. IK 558 Hinduism, Yoga and Ecology: 3 credits
9. IK 559 Three Short Upanishads (Kena, Ishavasya, and Mandukya Upanishads): 3 credits
10. IK 560 Vaishnavism: History, Teachings and Practice: 3 credits
11. IK 539 Sanskrit and Technology: An Overview: 3 credits
12. IK 570 NLP for Sanskrit: Introduction and Basics: 3 credits
13. IK 542 Machine Learning for Sanskrit Text Analysis: 3 credits
14. IK 548 Advanced NLP Techniques for Indian Languages: 3 credits

Electives List

15. IK 502 Biosignals
16. IK 503 Cognitive Psychology and Indian Thought System
17. IK 563 Indian Astronomy
18. IK 511 Science of Ayurveda
19. IK 566 Introduction to Vedic Traditions
20. IK 567 Saundarya Shastra
21. IK 592 Selected topics in Music and Musopathy
22. IK 568 Indian Performing Arts
23. IK 569 Mahabharat (Dharma Dasha Lakshanam)
24. IK 572 Vedangas
25. IK 573 Tapestry of Indian Knowledge Systems

Syllabus

Exit after 1 year with PG diploma

- The MA degree program would be of 2-years duration.
- Students may be able to exit with PG diploma in Indian Knowledge System after 1 year of study.

Employment Potential

- Teaching and Academia in universities and colleges
- Research and Documentation in research institutions, libraries, and museums
- Positions in Cultural and Heritage Organizations like Official Language Officer
- Opportunities in Publishing and Writing
- Translation and Interpretation work
- Roles in the Yoga and Wellness Industry
- Positions in Government and Non-Profit Organizations
- Freelancing and Consulting in Sanskrit and Vedanta studies

THANK YOU

Existing Institutes offering similar programs

Several prominent institutes in India and around the world offer Master's programs in Sanskrit, Hindu Studies, or related fields focusing on Indian classical languages, philosophies, and literature. Here are a few notable ones:

In India:

Banaras Hindu University (BHU), Varanasi: Known for its strong focus on Indian culture, religion, and languages, BHU offers various programs in Sanskrit and related studies.
Rashtriya Sanskrit Sansthan: A deemed university, established for the propagation and promotion of Sanskrit language, offering various levels of courses in Sanskrit.
University of Delhi, New Delhi: Offers courses in Sanskrit and often includes a broader spectrum of Indian studies.
Jawaharlal Nehru University (JNU), New Delhi: Known for its broad humanities and arts faculties, JNU offers courses in Sanskrit and Indian cultural studies.

Outside India:

Oxford Centre for Hindu Studies, University of Oxford (UK): Offers a wide range of courses related to Hinduism and the Sanskrit language.
Harvard University, USA: Offers courses in South Asian Studies, including Sanskrit and Hindu studies through its Department of South Asian Studies.
University of Chicago, USA: Renowned for its programs in South Asian Languages and Civilizations, including studies in Hinduism and Sanskrit.
Columbia University, USA: Offers programs in South Asian Studies, including Sanskrit language and Indian culture.
Leiden University, Netherlands: Known for its broad approach to Asian studies, including Hinduism and Sanskrit.

Salient Points

- Orientation program for 15 days to orient and motivate students, and setting the right expectations.
- 2 new Core Courses:
  - Puranas and Itihasas
  - **Research Methodology** - Tantra Yukti and Pramana Shastra
- Baskets for electives in Sanskrit Vyakarana, Hindu Studies, Applications/Technology, etc.
  - One course per basket is compulsory in semesters 1-2
  - Semester 3-4 should for specializations
  - More electives: Astronomy, Astrology, Ayurveda, Introduction to Vedic Traditions
  - Saundarya Shastra, Music and Performing Arts, Mahabharat 10 stories (Dharma dasha lakshanam)
- As far as possible Sanskrit terms should be used. At-least 15 terms in Sanskrit should be clearly distinguished from their deviated English translations
- Course Handbook should be ready by December 2023
  - Two core expert teams for curating content of the courses
  - Hindu Studies: Prof. Nachiketa Tiwari, Prof. Sadashiv Dwivedi, Prof. Mithilaprasad and Prof. Rampal Shukla
  - Sanskrit: Prof. Pawan Goyal, Prof. Amba Kulkarni, Prof. Hariram Mishra, Prof. Arnab Bhattacharya

Salient Points

- Bhagavad Gita portal by University of Hyderabad is encouraged be used
- Shruti component collaborations with Gurukulas and Pathshalas during the field visits and/or projects
- Eligibility Criteria: Any 3 or 4 Year Bachelor's Degree with 65% marks or 6.5 CGPA. Relaxations as per GoI norms
- Admission through aptitude test and interview
- Repetition of same concepts in different courses should be avoided
- Offer some courses which provide global view (Ganesha story)
- Manpower in Sanskrit and Hindu study areas via call for “faculty applications” and “recommendation from experts”.

Graduate Program

Master of Arts in Indian Knowledge System

Indian Knowledge System and Mental Health Applications (IKSMHA) Centre, Indian Institute of Technology Mandi, Himachal Pradesh, India - 175005

22nd September, 2023

Table of Contents

Master of Arts in Indian Knowledge System (with an option to exit with PG Diploma in Indian Knowledge System after 1 year)

Program Level: Post Graduate
Year of Commencement: 2024 (August)
Duration: 2 Years (4 Semesters): MA in Indian Knowledge System; Students may be able to exit with PG diploma in Indian Knowledge System after 1 year of study.

Motivation

Understanding the intricacies of the Indian Knowledge System is vital to grasping the deep-seated philosophies, culture, and traditions of India. This program is not only focused on traditional studies but also emphasizes the amalgamation of technology and ancient scripts. The idea is to use modern computational techniques to decode, understand, and interpret ancient Sanskrit literature and texts, making the program interdisciplinary and unique.

Description

The MA in Indian Knowledge System is a blend of classical and modern curriculum, aiming to produce graduates who are not just well-versed in Indian Knowledge System texts but are also adept at utilizing modern tools to analyze these texts. The integration with fields like Machine Learning and NLP will open new avenues of research and employment in tech-driven educational and research institutes.

Curriculum

Credit Distribution:
Core Courses: 27 credits
Electives: 24 credits
Field Study: 4 credits
Practicum: 2 credits
Research Project/Internship: 23 credits
Total: 80 credits

Thus, the structure of the program has the following pillars:

Discipline Cores (27 credits)

The foundation of the Master of Arts in Indian Knowledge System lies in its core courses, designed to instill a deep understanding of Indian philosophies. Beginning with an in-depth study of the Bhagavad-Gītā, spread over three semesters, students are introduced to its profound philosophical content. The inclusion of the Patanjali Yoga Sutra in the first semester aids in comprehending the roots of Yoga philosophy. Basic Sanskrit Grammar and Semantics provide students with a structured understanding of the language, facilitating their journey through texts and scriptures. A holistic view of Indian philosophies is ensured through courses like the Introduction to Indian Philosophy and Upanishads and Vedanta Studies. Together, these courses are meticulously curated to offer students a comprehensive grounding in Sanskrit literature, philosophy, and grammar.

Discipline Electives (18 + 6 = 24 credits)

While the core courses lay the foundational knowledge, the electives are designed to allow students the flexibility to explore specific areas of interest in greater depth. With options ranging from Ancient Sanskrit Literature and Scriptures to Modern NLP Techniques for Indian Languages, the electives cater to both traditional enthusiasts and tech aficionados. Students can delve into topics like Sanskrit Poetry and Drama, or even the intricate teachings of the Rāmāyaṇa and Mahabharata. On the modern tech front, courses like Sanskrit and Technology, NLP for Sanskrit, and Machine Learning for Sanskrit Text Analysis offer avenues for those eager to blend the ancient with the avant-garde. Additionally, courses on Astronomy, Ayurveda, Astrology, and Vedic Traditions show the vastness and diversity of the field. These electives not only offer varied perspectives but also open up potential avenues of research and employment in tech-driven educational and research institutes. The pool of Discipline Electives is dynamic in nature and more courses may be added in the future depending upon suitability. Students also have to take 6 credits offered in the Institute from outside the pool of Discipline Electives defined for this program.

Practicum, Field Exposure, Projects/Internships (2 + 4 + 23 = 29 credits)

The program emphasizes experiential learning, recognizing that true comprehension often comes from practical exposure. The Practicum courses, such as Vedic Chants, immerse students in hands-on practices, allowing them to connect theory with real-world applications. Field Study courses, like the exploration of Ancient Sanskrit Sites and Temples, offer students a chance to witness and interact with the remnants of ancient Sanskrit civilization, further bridging the gap between textual knowledge and its historical manifestation. The culmination of this learning trajectory is the extensive Research Project/Internship in the fourth semester. Tailored to emphasize the synthesis of Sanskrit and technological applications, this segment allows students to integrate their cumulative knowledge, work on substantial projects, and gain

invaluable industry or research experience, making them proficient and well-equipped for both academia and the professional world. During Semester 4, a choice will be given to the students to choose between working on a research project at IIT Mandi and doing a guided internship with an appropriate agency.

Orientation (1-2 weeks long at the start of the program)

The commencement of the Master of Arts in Indian Knowledge System is marked by a meticulously designed 1-2 weeks long orientation program. This is not merely an introduction to the course structure but is conceived as a comprehensive initiation into the rich tapestry of Indian traditions. Using this period, students are oriented to understand the profound depths of the subjects they are about to explore, setting their academic and personal motivations in alignment with the course's vision.

Eligibility

Candidates should hold a minimum 3 year Bachelor's Degree, having secured a minimum of 55% marks or a CGPA of 5.5, with appropriate relaxation for those from certain categories as per Government of India norms. The admission process is holistic, involving both an aptitude test to gauge the foundational understanding and affinity towards the subjects, followed by an interview to assess the aspirants' motivation and fitment into the program. The MA degree program would be of 2-years duration. Students may be able to exit with a PG diploma in the Indian Knowledge System after 1 year of study.

Employability and Future Prospects

Graduates of the Master of Arts in Indian Knowledge System will be equipped with a unique blend of classical knowledge and modern analytical skills, rendering them highly valuable in various sectors, especially within the realm of Government services. Their deep-rooted understanding of ancient Indian scriptures and traditions, combined with contemporary analytical proficiency, positions them as ideal candidates for roles in cultural, educational, administrative, and research departments of the government. Furthermore, their interdisciplinary training will lay a robust foundation for doctoral studies, enabling them to pursue Ph.D. programs with research interests bridging traditional Indian Knowledge System with modern applications. As the academic landscape expands and there's a resurgence of interest in indigenous knowledge systems, graduates may also find opportunities as faculty members in prestigious colleges and universities. Here, they will not only impart the timeless wisdom of the Indian Knowledge System but also contribute to the evolving discourse by integrating the modern tools and techniques they've mastered.

Semester-wise Course Distribution

Core

1st Semester

IK 530 Bhagavad-Gītā Part I (Chapters 1-6, Sanskrit and Philosophy): 3 credits
IK 501 Patanjali Yoga Sutra: 3 credits
IK 538 Basic Sanskrit Grammar and Semantics: 3 credits
IK 536 Introduction to Vedanta Philosophy: 3 credits
Elective 1: 3 credits
Elective 2: 3 credits
Total: 18 credits

2nd Semester

IK 540 Bhagavad-Gītā Part II (Chapters 7-12, Sanskrit and Philosophy): 3 credits
IK 541 Upanishads and Vedanta Studies: 3 credits
IK 552 Selected Topics in Rāmāyaṇa: 3 credits
Elective 3: 3 credits
Elective 4: 3 credits
Elective 5: 3 credits
IK 543 Practicum in Vedic Chants: 2 credits
Total: 20 credits

Summer Term

IK 546 Field Study: Exploring Ancient Sanskrit Sites and Temples: 4 credits

3rd Semester

IK 551 Bhagavad-Gītā Part III (Chapters 13-18, Sanskrit and Philosophy): 3 credits
Elective 6: 3 credits
Elective 7: 3 credits
Elective 8: 3 credits
IK 562 Research Methodology - Tantra Yukti and Pramana Shastra: 3 credits
Total: 15 credits

4th Semester

IK 550 Research Project/Internship on Sanskrit and Technology Applications: 23 credits
Total: 23 credits

Electives

Electives can come from IK courses at the IKSMHA Centre and other suitable courses on campus. Some of the electives are listed below. Other elective courses can be added over time.

IK 535 Ancient Sanskrit Literature and Scriptures: 3 credits
IK 553 Pāṇini Ashtadhyayi: 3 credits
IK 547 Sanskrit Poetry and Drama: 3 credits
IK 554 Bhagwat Sankhya: 3 credits
IK 555 Selected Topics in Mahabharata: 3 credits
IK 556 Surya Siddhanta: 3 credits
IK 557 The Study of Dharma: 3 credits
IK 558 Hinduism, Yoga and Ecology: 3 credits
IK 559 Three Short Upanishads (Kena, Ishavasya, and Mandukya Upanishads): 3 credits
IK 560 Vaishnavism: History, Teachings and Practice: 3 credits
IK 539 Sanskrit and Technology: An Overview: 3 credits
IK 570 NLP for Sanskrit: Introduction and Basics: 3 credits
IK 542 Machine Learning for Sanskrit Text Analysis: 3 credits
IK 548 Advanced NLP Techniques for Indian Languages: 3 credits
IK 502 Biosignals
IK 503 Cognitive Psychology and Indian Thought System
IK 563 Indian Astronomy
IK 511 Science of Ayurveda
IK 566 Introduction to Vedic Traditions
IK 567 Saundarya Shastra
IK 592 Selected topics in Music and Musopathy
IK 568 Indian Performing Arts
IK 569 Mahabharat (Dharma Dasha Lakshanam)
IK 572 Vedangas
IK 573 Tapestry of Indian Knowledge Systems

Discipline Core

IIT Mandi
Proposal for a New Course

Course number: IK 530
Course Name: Bhagavad-Gītā Part I
Credit Distribution: 3-0-0-3
Intended for: BTech/MTech/MS/MSc/MA/Ph.D.
Prerequisite: None
Mutual Exclusion: None

1. Preamble:
The "Bhagavad-Gītā Part I" is a comprehensive exploration of the first six chapters of this ancient Indian scripture, focusing on its Sanskrit verses and philosophical tenets. As one of the world's timeless wisdom texts, the Gita offers profound insights into human nature, duty, and spirituality. This course provides students with a foundational understanding of its teachings, its relevance in today's world, and the intricacies of the Sanskrit language in which it is written. The course combines textual study with philosophical discussions, making it apt for students across disciplines seeking deeper knowledge of Indian wisdom.

2. Course Modules with quantitative lecture hours:

Unit 1: Introduction to Bhagavad-Gītā and Sanskrit Basics (8 Hours)
Origins and significance; Overview of Mahābhārata; Basics of Sanskrit language; Pronunciations and grammar.

Unit 2: Arjuna's Dilemma (Chapter 1) (6 Hours)
The setting of Kurukshetra; Arjuna's observations; Emotional conflicts and ethical issues.

Unit 3: Transcendental Knowledge (Chapter 2) (8 Hours)
Sāṅkhya yoga; Nature of soul; Concepts of Dharma and Karma; Significance of detached action.

Unit 4: Path of Devotion (Chapter 3) (6 Hours)
Karma Yoga; Duty and righteousness; The balance of action and inaction.

Unit 5: Approaching the Ultimate Truth (Chapters 4-5) (8 Hours)
Knowledge and renunciation; Concepts of Yajña and selfless action; Jñāna yoga vs. Bhakti yoga.

Unit 6: The Science of Self-Realization (Chapter 6) (6 Hours)
Dhyāna Yoga; Practices and principles of meditation; Achieving spiritual equilibrium.
Laboratory/practical/tutorial Modules: None.

3. Textbooks:

Sargeant, W. (2009). The Bhagavad-Gītā. Albany: State University of New York Press. ISBN: 978-1438428420
Swami Satchidananda. (2005). The Living Gita: The Complete Bhagavad-Gītā - A Commentary for Modern Readers. Integral Yoga Publications. ISBN: 978-0932040279

4. References:

E-learning: https://sanskrit.uohyd.ac.in
Easwaran, E. (2007). The Bhagavad-Gītā. Nilgiri Press. ISBN: 9781586380199
A.C. Bhaktivedanta Swami Prabhupada. (1986). Bhagavad-Gita As It Is. The Bhaktivedanta Book Trust. ISBN: 9780892131341

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			

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

NA

Approvals:

Other Faculty interested in teaching this course: Prof. Laxmidhar Behera

Proposed by: Prof. Varun Dutt
Mental Health Applications Centre

School: Indian Knowledge System and

Signature:

Date: 17th September 2023

Recommended/Not Recommended, with Comments:

_____ **Date:**_____
Chairperson, CPC

Approved / Not Approved

_____ **Date:**_____
Chairperson, BoA

IIT Mandi
Proposal for a New Course

Course number: IK 540
Course Name: Bhagavad-Gītā Part II
Credit Distribution: 3-0-0-3
Intended for: BTech/MTech/MS/MSc/MA/Ph.D.
Prerequisite: IK 530 Bhagavad-Gītā Part I or equivalent understanding of the first six chapters.
Mutual Exclusion: None

1. Preamble:
"Bhagavad-Gītā Part II" delves deep into the middle chapters of the Bhagavad-Gītā, emphasizing the fusion of knowledge (Jñāna) with devotion (Bhakti). These chapters offer profound insights into the nature of the Divine, the universe, and the intimate relationship between the soul and the Supreme. Through this course, students will be enriched with the Gita's philosophical essence and the intricacies of the Sanskrit in which it is couched. A combination of textual examination and philosophical interpretation will pave the way for an enhanced understanding of these transformative teachings, vital for any serious student of Indian wisdom.

2. Course Modules with quantitative lecture hours:

Unit 1: Knowledge and Wisdom (Chapter 7) (6 Hours)
The difference between Jñāna and Vijnāna; Various forms of knowledge; Understanding the Supreme.

Unit 2: The Imperishable Brahman (Chapter 8) (6 Hours)
The eternal and perishable aspects of creation; Process of dying and rebirth; Ultimate goals of life.

Unit 3: The Royal Knowledge and Royal Secret (Chapter 9) (8 Hours)
Deeper insights into devotion; Royal knowledge and its significance; Manifest and unmanifest forms of the divine.

Unit 4: Manifestation of the Universal Form (Chapter 10) (6 Hours)
Divine glories; Different manifestations and opulences of the Supreme Being.

Unit 5: The Vision of the Universal Form (Chapter 11) (8 Hours)
Arjuna's vision of the cosmic form; The infinite power of the divine; Comprehending the magnitude of the universe.

Unit 6: The Way of Love (Chapter 12) (6 Hours)
Understanding Bhakti yoga; The qualities of a true devotee; Paths to spiritual realization.

Laboratory/practical/tutorial Modules: None.

3. Textbooks:

Sargeant, W. (2009). The Bhagavad-Gītā. Albany: State University of New York Press. ISBN: 978-1438428420

Swami Satchidananda. (2005). The Living Gita: The Complete Bhagavad-Gītā - A Commentary for Modern Readers. Integral Yoga Publications. ISBN: 978-0932040279

4. References:

E-learning: https://sanskrit.uohyd.ac.in

Easwaran, E. (2007). The Bhagavad-Gītā. Nilgiri Press. ISBN: 9781586380199

A.C. Bhaktivedanta Swami Prabhupada. (1986). Bhagavad-Gita As It Is. The Bhaktivedanta Book Trust. ISBN: 9780892131341

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			

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

NA

Approvals:

Other Faculty interested in teaching this course: Prof. Laxmidhar Behera

Proposed by: Prof. Rohit Saluja
and Mental Health Applications Centre

School: Indian Knowledge System

Signature:

Date: 17th September 2023

Recommended/Not Recommended, with Comments:

_____ **Date:**_____

Chairperson, CPC

Approved / Not Approved

_____ **Date:**_____

Chairperson, BoA

100

IIT Mandi
Proposal for a New Course

Course number: IK 551
Course Name: Bhagavad-Gītā Part III
Credit Distribution: 3-0-0-3
Intended for: BTech/MTech/MS/MSc/MA/Ph.D.
Prerequisite: IK 540 Bhagavad-Gītā Part II or equivalent understanding of chapters 7-12.
Mutual Exclusion: None

1. Preamble:
The concluding segment of the Bhagavad-Gītā, chapters 13-18, provides a comprehensive exploration into the relationship between the physical and the spiritual realms. Through this course, "Bhagavad-Gītā Part III", students will grasp the concepts of the field, the knower of the field, and the supreme purpose of life. With an in-depth look into the roles of action, renunciation, and devotion, this course seeks to bestow a holistic understanding of the Gita's essence and the Sanskrit verses that encapsulate its teachings. Here, philosophical tenets intertwine with profound life guidance, making it indispensable for scholars and seekers alike.

2. Course Modules with quantitative lecture hours:

Unit 1: The Field and the Knower (Chapter 13) (6 Hours)
Understanding Prakṛiti and Puruṣha; Nature of the physical and metaphysical; Realization of the Self.

Unit 2: The Threefold Path (Chapter 14) (6 Hours)
The three Guṇas – Sattva, Rajas, and Tamas; Their influence on human behavior; Transcending the Guṇas.

Unit 3: The Supreme Self (Chapter 15) (6 Hours)
The cosmic tree; The eternal and perishable aspects; The ultimate purpose of life.

Unit 4: The Divine and the Demoniacal Natures (Chapter 16) (6 Hours)
Distinguishing the two natures; Their manifestations and implications; Path to liberation.

Unit 5: The Threefold Path to Salvation (Chapter 17) (6 Hours)
Understanding Faith; Different types of sacrifices; The role of Om, Tat, and Sat.

Unit 6: Freedom through Renunciation (Chapter 18) (8 Hours)
The essence of renunciation; Renunciation vs. relinquishment; The culmination of the Gita's teachings.

Laboratory/practical/tutorial Modules: None.

3. Textbooks:

Sargeant, W. (2009). The Bhagavad-Gītā. Albany: State University of New York Press. ISBN: 978-1438428420

Swami Satchidananda. (2005). The Living Gita: The Complete Bhagavad-Gītā - A Commentary for Modern Readers. Integral Yoga Publications. ISBN: 978-0932040279

4. References:

E-learning: https://sanskrit.uohyd.ac.in

Easwaran, E. (2007). The Bhagavad-Gītā. Nilgiri Press. ISBN: 9781586380199

A.C. Bhaktivedanta Swami Prabhupada. (1986). Bhagavad-Gita As It Is. The Bhaktivedanta Book Trust. ISBN: 9780892131341

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			

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

NA

Approvals:

Other Faculty interested in teaching this course: Prof. Laxmidhar Behera

Proposed by: Prof. Varun Dutt
Mental Health Applications Centre

School: Indian Knowledge System and

Signature:

Date: 17th September 2023

Recommended/Not Recommended, with Comments:

_____ **Date:**_____

Chairperson, CPC

Approved / Not Approved

_____ **Date:**_____

Chairperson, BoA

IIT Mandi
Proposal for a New Course

Course number: IK 501
Course Name: Yoga Sūtras
Credit Distribution: 2-0-1-3
Intended for: BTech/MTech/MS/MSc/MA/Ph.D.
Prerequisite: IK 540 Bhagavad-Gītā Part II or equivalent understanding of chapters 7-12.
Mutual Exclusion: None

1. Preamble:
India has a great treasure of knowledge and Aṣṭāṅga yoga is one of those timeless wisdoms. Yoga treats man as a transcendental spiritual being; it accords the highest position to the inner consciousness and proposes that the physical body is a by-product of the processes in consciousness, not the other way round, as envisioned by modern Scientific and Medical disciplines. Today in many countries, Yoga has gained an image as a system of exercise, physical fitness and calisthenics, totally playing down the core psychological and spiritual transformation that is brought out by following Patañjali's eight-fold framework. In this course students are imparted with this traditional wisdom, not just as a physical exercise program, but for unfolding the latent divinity in the practicing individuals. Practices that enhance the student's personality to lead a harmonious and peaceful existence.

2. Course Modules with quantitative lecture hours:

Unit 1: Philosophy of Yoga (14 Hours)

Unit 1/Topic 1: *Yoga and Yoga Texts* **(Total = 6 Hours)**

1. **Yoga – Basic Introduction**
   a. Meaning and Definition
   b. Importance of Yoga - holistic personality development
   c. Laukik and Adhyātmik benefits of Yoga
   d. Myths and Facts of Yoga
   e. Yoga's Mūla Pravakta -Hiraṇyagarbha
2. **Introduction to Bhāratīya Yoga Darśana**
   a. Patañjali Yoga Sūtras
   b. Sāṅkhya darshana - theoretical concepts
   c. Patañjali YogaSūtras - Vyāsa Bhāṣya
   d. Yoga siddhanta in Bhagavad-Gita
   e. Yoga siddhanta in Upanishads (Kaṭha, Śvetāśvatara etc)
   f. Pauranic Yoga siddhantas (Kapila)
   g. Jaina Yoga siddhantas
   h. Bauddha Yoga siddhantas
   i. Other Yogas - Tantra, Mantra, Laya, Kuṇḍalinī Yogas
3. **Various paths to Yoga: Jnana, Bhakti, Karma, Aṣṭāṅga, and Haṭha Yoga**

a. Jnana Yoga - Vivekachudamani, Uddav Gita, Ashtavakra Samhita
b. Bhakti Yoga - Nārada Bhakti Sūtras, Śrīmad Bhāgavatam
c. Karma Yoga - Bhagavad-Gītā, Mahābhārata
d. Aṣṭāṅga Yoga - Patañjali Yoga Sūtras
e. Haṭha Yoga - Gheraṇḍa Saṁhitā, Haṭha Yoga Pradīpikā, Gorakṣa Saṁhitā

4. **Yoga and Sampradayas**
   a. Nath Sampradaya
   b. Shaiva Sampradaya
   c. Śākta Sampradaya
   d. Vaiṣṇava Sampradaya
   e. Bauddha Sampradaya

Unit 1/Topic 2:Aṣṭāṅga Yoga Sūtras **(4 Hour)**

1. Prasthāvana 2.28 and 29
   a. Yama - 2.30
   b. Niyama - 2.32
   c. Āsana - 2.46
   d. Prāṇāyāma - 2.49
   e. Pratyāhāra - 2.54
   f. Dhāraṇā - 3.1
   g. Dhyāna - 3.2
   h. Samādhi - 3.3
2. Dinacharya - Importance and Practice

Unit 1/Topic 3: *Yoga Culture and Value Education* **(4 Hour)**

1. Prominent Streams of Yoga
   a. Jnāna Yoga (Discernment)
   b. Bhakti Yoga (Emotional)
   c. Karma Yoga (Kriti)
   d. Rāja Yoga (Aṣṭāṅga Yoga)
2. Positive and Negative Human Behaviours (Daivi Guṇas, Asura Guṇas)
   a. Daivi Sampada - Bhagavad-Gītā - 16.1-3
   b. Asuri Guṇas - Bhagavad-Gītā - 16.4,7,8,9,10,11-18
3. Four Principles Of Jnāna Yoga
   a. Viveka
   b. Vairāgya
   c. Shat Sampatti
   d. Mumukṣutva
4. Relevance of Ancient Indian values in modern life
   a. Puruṣārthas
   b. Ashrama Vyavastha
   c. Varna Vyavastha - Bhagavad-Gītā - 14.13
   d. Saṃskāras

Unit 2: Manas and Śarīra - Maintenance and Cleansing (6 Hours)

Unit 2/Topic 1: *Mental and Physical Aspects of the Body*

a. Antaḥkaraṇa Caturṣṭaya (Manas, Buddhi, Ahaṅkāra, Chitta)
b. Notion of Self and Health and its Metaphysics in Yoga
c. Feelings and Emotional well-being (9 Rasas)

d. Qualities of evolved intellect i.e., Buddhi

e. Well being in Yoga and Ayurveda

f. Impact of positive and negative human tendencies on Psycho-social behavior (Prajñāparādha, Pratipakṣa Bhāvana, Vitarka Badha)

g. Śauca Niyamas

h. Balanced Food and Nutrition - Āhāra Vihāra

i. Maintenance of health through Āsana and Prāṇāyāma

Unit 3: Applications of Yoga (8 Hours)

Unit 3/Topic 1: *Practical Application of Yoga to Life*

Modern view of Yoga.

Application of principles of Yoga for holistic living.

1. Management Techniques
   a. Application to Career Management
   b. Public speaking and leadership qualities
   c. Workplace wellbeing
   d. Interventions for managing Self and Career
2. Psychology
   e. Concept of Positive Psychology and Stress Management
   f. Managing the five states of Chitta Bhumis (Kṣipta, Mudha, Vikṣipta, Ekāgra, and Nirudha)
   g. Treatment and Counseling of Mentally challenged persons
   h. Prevention of Addiction and Counseling for De-Addiction
3. Application of Yoga in Defense
   i. Application of Upayas (Sama-dana-bheda-dandopayas) using Yoga
   j. Fasting in Yoga (Speech, Food, and Sleep)

Unit 3/Topic 2: *Personality and Family Relationships*

k. Forsaking enmity (Vaira tyāga) and constructive relationships (viśva bandhutva)

l. Techniques for family relationship management (Inclusive temperament, Avoiding Competition, Service attitude)

Laboratory/practical/tutorial Modules: 3 Units (14 Hours)

Unit 1/Topic 2: (4 Hour)

Tutorials: Aṣṭāṅga Yoga Sūtras, discussion of eight aṅgas with examples, recitation and memorization of important Sūtras in this context

Tutorials: Yoga for Students (Includes Theory)

1. Sūrya Namaskaras
2. Basic Prāṇāyāma and Kriyas
3. Eyesight improvement
4. Voice Culture
5. Focus and concentration techniques
6. Memory improvement techniques
7. Relaxation technique

Unit 1/Topic 3: (2 Hours)

Practicals

1. Anger management
2. Ego management
3. Time management
4. Removing obstacles in the path of wellbeing

Unit 2/Topic 2: Subtopics **(1 Hour)**

Lec-Dem: Śat karma Śuddhi (Cleansing of Body) Demonstration

1. Neti
2. Dhauti
3. Basti
4. Trāṭaka
5. Nauli
6. Kapālabhāti

Unit 2/Topic 3: Subtopics **(2 Hours)**

Tutorials: Yoga Techniques - Demo and Quick Practice

1. Important Vyāyāmas
2. Pratyāhāra
3. Dharana
4. Dhyāna
5. Samādhi

Unit 3/Topic 3: Subtopics **(5 Hour)**

Practicals: General Yoga Protocol (Children and Youth)

1. Āsanas
2. Prāṇāyāma
3. Mudra and Bandh
4. Vyāyāma
5. Sūkṣma Vyāyāma

Yoga for Women
Yoga for Elderly
Practicals: Yoga and Positive Psychology

3. Textbooks:

Patañjali Yog Darśan based on Vyāsa Bhāṣya,, by Dr. P. V. Karambelkar, Publishers - Kaivalyadham, Lonavla
Online Resources: https://dharmawiki.org/index.php/Category:Yoga

4. References:

- Hatha Pradipika of Swami Svatmarama, edited by Swami Digambarji and Kokaje, Publishers - Kaivalyadham, Lonavala
- Bhawuk, DPS (2011) Spirituality and Indian psychology. Springer, New York.
- Ranganathananda, S. (2000). Universal message of the Bhagavad-Gītā.
- Sri Aurobindo. (1942). Essays on the Gita, Vol. 13. Calcutta: Arya Publishing House.
- Swami Anubhavanada, & Kumar, A. (2007). Management with a difference: Insights from ancient Indian wisdom. New Delhi: Ane Books India.

- Swami Bodhananda Saraswati. (1998). Management lessons from Patanjali's yoga Sūtras. In *Inspirations from Indian wisdom for management*. Ahmedabad Management Association.
- Mind and Self: Patanjali's Yoga Sutra and Modern Science by Subhash Kak, Mount Meru Publishing

Books from Bihar School of Yoga, Munger, Bihar, India

- Hatha Yoga Pradipika by Swami Muktibodhananda, Yoga Publications Trust, Munger, Bihar, India
- Four Chapters on Freedom: Commentary on the Yoga Sūtras of Patanjali, by Swami Satyananda Saraswati, Yoga Publications Trust, Munger, Bihar, India
- Gheranda Samhita by Swami Niranjanananda Saraswati, Yoga Publications Trust, Munger, Bihar, India
- Yoga Chudamani Upanishad: Crown Jewel of Yoga by Satyadharma, Swami, Yoga Publications Trust, Munger, Bihar, India
- The Dynamics of Yoga by Swami Satyananda Saraswati, Yoga Publications Trust, Munger, Bihar, India
- Prana and Pranayama by Swami Niranjanananda Saraswati, Yoga Publications Trust, Munger, Bihar, India
- Surya Namaskara by Swami Satyananda Saraswati, Yoga Publications Trust, Munger, Bihar, India

Reference Papers

- Pandey, A and Navare, A.V. (2018) Paths of Yoga: Perspective for Workplace Spirituality. In *The Palgrave handbook of Workplace Spirituality and Fulfilment*. Palgrave Macmillan Cham.
- Pandey A, Gupta RK, Arora AP (2009) Spiritual climate of business organizations and its impact on customers' experience. J Bus Ethics 88(2):313–332.
- Sharma S (1999) Corporate Gita: lessons for management, administration and leadership. J Hum Values 5(2):103–123
- Pandey A, Gupta RK, Kumar P (2016) Spiritual climate and its impact on learning in teams in business organizations. Glob Bus Rev 17(3S).
- Adhia, H., Nagendra, H. R., & Mahadevan, B. (2010). Impact of adoption of yoga way of life on the emotional intelligence of managers. IIMB Management Review, 22(1-2), 32-41.
- Sternberg, R. J. (1993). Intelligence is more than IQ: The practical side of intelligence. Journal of Cooperative Education, 28(2), 6-17.
- Srinivas, K. M. (1994). Organization development: Maya moksha. *Work Motivation Models for Developing Country*. New Delhi: Sage Publications.
- Chakraborty, S. K., & Chakraborty, D. (2008). Spirituality in management - Means or end? Oxford University Press.
- Orme-Johnson, D. W., Zimmerman, E., & Hawkins, M. (1992). Maharishi's vedic psychology: The science of the cosmic psyche. In H. S. R. Kao, & Y. H. Poortinga (Eds.), Asian perspectives on psychology (pp. 282).

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			

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

NA

Approvals:

Other Faculty interested in teaching this course: Prof. Laxmidhar Behera

Proposed by: Prof. Varun Dutt
Mental Health Applications Centre

School: Indian Knowledge System and

Signature:

Date: 17th September 2023

Recommended/Not Recommended, with Comments:

_____ **Date:**_____

Chairperson, CPC

Approved / Not Approved

_____ **Date:**_____

Chairperson, BoA

IIT Mandi
Proposal for a New Course

Course number: IK 538
Course Name: Basic Sanskrit Grammar and Semantics
Credit Distribution: 3-0-0-3
Intended for: BTech/MTech/MS/MSc/MA/Ph.D.
Prerequisite: None
Mutual Exclusion: None

1. Preamble:
The Sanskrit language, with its intricate grammatical structure, offers a rich canvas for linguistic and semantic studies. Building upon the foundation set by Pāṇini's grammar, this course will expose students to the underlying structures and patterns of Sanskrit. The goal is to foster an appreciation of the semantic depth and grammatical sophistication inherent in the language.

2. Course Modules with quantitative lecture hours:

Unit 1 Introduction (2 hours)

Introduction to the Samskrit grammatical tradition

Unit 2 Varnamālā (वर्णमाला) and Pratyāhāra (प्रत्याहारः) (5 hours)

Scientific division of varṇamala, uccāraṇa sthāna, Śiva Sūtra, pratyāhāra, optimality of pratyāhāra Sūtras through Formal Concept Analysis

Unit 3 Kāraka (कारकम्)-prakaraṇam (5 hours)

Introduction to the kāraka system of Pāṇini, origin of dependency grammar, use of kāraka theory in Indian language technology, Information coding in language

Unit 4 Prakṛti Pratyaya Vyavastha (प्रकृतिप्रत्ययव्यवस्था) and Pada (3 hours)

Pada formation in Samskrit, Pratipādika, dhātu, introduction to Gana-patha and Dhātu-patha

Unit 5 It Prakarana (इत् प्रकरणम्) as attribute marking (2 hours)

Definition of "it", introducing anuvṛtti as well as Pāṇinian style of rules

Unit 6 Subanta (सुबन्तम्)-prakaraṇa (6 hours)

Sup pratyaya, ajanta, halanta, declension examples, Concept of Stree Pratyaya (स्त्रीप्रत्ययः)

Unit 7 Tiṅganta (तिङन्तम्)-prakaraṇa **(5 hours)**

parasmaipada, ātmanepada, lakāra (declensions in लट्, लङ्, लोट्, विधिलिङ् and लृट्), gaṇa

Unit 8 Avyaya (अव्ययम्) and Upasarga (उपसर्गः), Viśeṣaṇa Viśeṣya Sambandha (विशेषणविशेष्यसम्बन्धः) (2 hours)

Unit 9 Kṛdanta (कृदन्तम् - क्त, क्तवतुँ, शतृँ, शानच्, कृत्य-प्रत्ययाः, तुमुन्ँ, क्त्वा, ल्यप्) (4 hours)

Unit 10 Sandhi-prakaraṇa (सन्धिप्रकरणम्) and big picture of Aṣṭādhyāyī (3 hours)

Types of Sūtras, prakriya-vidhi and Sandhi (सन्धिः-अच्, हल् and विसर्गः) Sūtras

Unit 11 Structure of Aṣṭādhyāyī (अष्टाध्यायी): (1 hours)

Siddha, Asiddha and Asiddhavat; Utsarga Apavāda Vyavasthā **(उत्सर्गापवादव्यवस्था)**

Unit 12 Taddhitas (तद्धितः) (1 hours)

Unit 13 Nijanta and Sannanta (णिजन्तः and सन्नन्तः) (1 hour)

Unit 14 Word formation through nāma-dhātu **(नामधातुः) (1 hour)**

Unit 15 Compound formation: samāsa **(समासः) (1 hours)**

Laboratory/practical/tutorial Modules: None.

3. Textbooks:

Pushpa Dikshit, Aṣṭādhyāyī with Prakaraṇa Nirdeśa, Samskrita Bhārati, New Delhi, 2010.
Srisa Chandra Vasu, Siddhānta Kaumudī of Bhattoji Dīkṣita, Vol. I-III, The Pāṇini Office, Allahabad, 1906.
Teaching Tolls: Online and Offline tools for better teaching practices, teaching with examples and case studies,
Online resource: https://dharmawiki.org/index.php/Category:Vyakarana

4. References:

1. Gopal Dutt Pandey (Ed.), Aṣṭādhyāyī of Pāṇini, Chaukhamba Surbharati Prakashan, Varanasi, 2017.
2. Wiebke Petersen. (2004). A Mathematical Analysis of Pāṇini's SivaSūtras. In: JoLLI. 13 (4), p. 471-489.
3. Akshar Bharati and Rajeev Sangal. 1990. A karaka-based approach to parsing of Indian languages. In Proceedings of the 13th conference on Computational linguistics - Volume 3 (COLING '90). Association for Computational Linguistics, USA, 25–29.
4. The Aṣṭādhyāyī Sūtrapāṭha of Pāṇini, with Vārtikas, Gaṇa, Dhātupāṭha, Pāṇiniya-śikṣā and Paribhāṣāpāṭha, second edition, edited by C. Sankara Rama Shastri, printed and published by The Shri Bala Manorama Press, Mylapore, Madras, 1937.
5. The Aṣṭādhyāyī of Pāṇini, translated into English by Shrish Chandra Vasu, first published in 1891, reprinted by Motilal Benarsidass, Delhi, 1962.

6. NLP: A Pāṇinian perspective, Akshar Bharati, 1995.
7. Samskrita Bharati books on Vyakarana (https://www.samskritabharati.in/vyakaranam)
    a. Shivaram Ramkrishna Bhatt, Vyakarana Prashna Kosha, Samskrita Bharati, New Delhi, 2016.
    b. G. Mahabaleshwar Bhatt, Karakam, Samskrita Bharati, Bengaluru, 2014.
    c. Janardan Hegde, Dhaturupa Nandini, Samskrita Bharati, New Delhi, 2013.
    d. G. Mahabaleshwar Bhatt, Sandhi, Samskrita Bharati, Bengaluru, 2015.
    e. G. Mahabaleshwar Bhatt, Samasa, Samskrita Bharati, Bengaluru, 2015
    f. G. Mahabaleshwar Bhatt, Shatru Shanajanta Manjari, Samskrita Bharati, Bengaluru, 2015.
8. Samskrit Promotion Foundation books in 'Samskrit for Specific Purpose Series' (https://www.samskritpromotion.in/bookstore)
    a. Raghavendra P. Arolli and others, The Language of Vastushastra, Samskrit Promotion Foundation.
    b. Vishnu Prasad Upadhyay and others, The Language of Administration, Samskrit Promotion Foundation.
    c. Pradip Paudel and others, The Language of Arts, Samskrit Promotion Foundation.
    d. Ganamoorthi K. and others, The Language of Dharmashastra, Samskrit Promotion Foundation.
    e. Vishnu Prasad Upadhyay and others, The Language of Arthashastra, Samskrit Promotion Foundation.
    f. Raghavendra and others, Nyayasutrani The Language of Nyayasastra, Samskrit Promotion Foundation.
    g. Raghuram Bhatta and others, The Language of Ayurveda (Parts I-IV), Samskrit Promotion Foundation.
    h. Devershi Agustya, The Language of Jyotisha, Samskrit Promotion Foundation.
    i. Kirori Singh Chouhan, The Language of Mahabharata (Parts I & II), Samskrit Promotion Foundation.
    j. Pramod Shukla and Vishnu Prasad Upadhyaya, The Language of Subhashitas, Samskrit Promotion Foundation.
    k. Satyanarayana and Vishnu Prasad Upadhyaya, The Language of Rāmāyaṇa, Samskrit Promotion Foundation.
    l. Ganesh Ishwar Bhat and others, The Language of Vedanta (Parts I-IV), Samskrit Promotion Foundation.
    m. Vishwasa and others, The Language of Gita (Parts I-IV), Samskrit Promotion Foundation.
    n. Jayaraman Mohan, The Language of Yoga (Parts I-IV), Samskrit Promotion Foundation.

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			

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

NA

Approvals:

Other Faculty interested in teaching this course: Prof. Laxmidhar Behera & Online course by Dr Amba Kulakarni

Proposed by: Prof. Rohit Saluja and Mental Health Applications Centre

School: Indian Knowledge System

Signature:

Date: 17th September 2023

Recommended/Not Recommended, with Comments:

_____ **Date:**_____

Chairperson, CPC

Approved / Not Approved

_____ **Date:**_____

Chairperson, BoA

IIT Mandi
Proposal for a New Course

Course number: IK 539
Course Name: Sanskrit and Technology: An Overview
Credit Distribution: 3-0-0-3
Intended for: BTech/MTech/MS/MSc/MA/Ph.D.
Prerequisite: None
Mutual Exclusion: None

1. Preamble:
This course will introduce the current researches and developments in Sanskrit computing. The primary emphasis will be on tools and techniques developed under government and private funding and on exploring new technologies for Sanskrit. The students will get an overview of computational works undertaken in the field of Sanskrit and a clear idea about how a range of practical linguistic tasks of Sanskrit can be done by developing CL systems. And, they will also know how CL tools can facilitate the learning and teaching process in the field of Sanskrit.

2. Course Modules with quantitative lecture hours:

Unit 1 Interactive Sanskrit Teaching Learning Tools (12 hours)
Introduction to Interactive Sanskrit Learning Tools, Why Interactive Tools for Sanskrit? E-learning, Basics of Multimedia, Web-based tools development, HTML, Web page, etc., Tools and Techniques

Unit 2 Standard for Indian Languages (Unicode) (9 hours)
Nature of Devanagari/Brahmni scripts, Concept of Aksharas, Conjuncts, and Script grammar.
Typing in Devanagari Scripts, Typing Tools and Software

Unit 3 Text Processing and Preservation Tools (12 hours)
Text Processing, Preservation Techniques, Text Processing and Preservation Tools, and Techniques, Survey

Unit 4 Optical Character Reader (12 hours)
Word generation, word analysis, compound formation, sandhi generation and splitting, sentence analysis, Optical Character Reader (OCR), Applications of OCR for Sanskrit and Indian Languages, Tool and Techniques, Survey

3. Essential/recommended readings

1. Teacher's notes, ppt, and handout
2. Bharti A., R. Sangal, V. Chaitanya, "NL, Complexity Theory and Logic" in Foundations of Software Technology and Theoretical Computer Science, Springer, 1990.
3. E-Content suggested by Teacher
4. Tools developed by Computational Linguistics Group, Department of Sanskrit, University of Delhi, Delhi-110007 available at: http://sanskrit.du.ac.in
5. Basic concept and issues of multimedia:
http://www.newagepublishers.com/samplechapter/001697.pdf
6. Content creation and E-learning in Indian languages: a model:
http://eprints.rclis.org/7189/1/vijayakumarjk_01.pdf
7. HTML Tutorial - W3Schools: www.w3schools.com/html
8. The Unicode Consortium: http://unicode.org/

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.	NA			

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

NA

Approvals:

Other Faculty interested in teaching this course: Prof. Laxmidhar Behera

Proposed by: Prof. Rohit Saluja
and Mental Health Applications Centre

School: Indian Knowledge System

Signature:

Date: 17th September 2023

Recommended/Not Recommended, with Comments:

_____ **Date:**_____
Chairperson, CPC

Approved / Not Approved

_____ **Date:**_____
Chairperson, BoA

IIT Mandi
Proposal for a New Course

Course number: IK 536
Course Name: Introduction to Vedanta Philosophy
Credit Distribution: 3-0-0-3
Intended for: BTech/MTech/MS/MSc/MA/Ph.D.
Prerequisite: None
Mutual Exclusion: None

1. Preamble:
Indian Philosophy, also known as Bhārtiya Darshan, covers a broad spectrum of philosophies from the Indian subcontinent, including Vedanta , Buddhist, and Jain philosophies. The focus of this course, however, is on Vedanta Philosophy. The central themes revolve around unity and diversity (advaita and dvaita), interpretations of reality's existence, and the path to liberation (moksha). From ancient scriptures like the Vedas and Upanishads to different schools of thought such as Nyaya and Yoga, the course dives deep into the philosophical constructs that have shaped the Vedanta worldview over centuries.

2. Course Modules with quantitative lecture hours:

Unit I Introduction to Vedanta Philosophy (8 Hours)
Brief Discussion on Veda and Upanishads
Origin of Vedanta Philosophy

Unit II Charvaka Philosophy (3 Hours)
Epistemology
Metaphysics

Unit III Samkhya Philosophy (6 Hours)
Metaphysics, Theory of Causation, Prakṛti, Purusa, Evolution
Epistemology, Bondage, and Liberation

Unit IV Yoga Philosophy (4 Hours)
Organization of the Yoga Sūtras, Psychology of Yoga
The Eight-Fold Yoga, God, and Liberation

Unit V Nyaya Philosophy (9 Hours)
Epistemology, Theory of Causation
Self and Liberation, The Concept of God

Unit VI Mimansa Philosophy (5 Hours)
Epistemology, Theories of Error

Metaphysics, Nature of Self, God, and Liberation

Unit VII Vaisesika Philosophy (6 Hours)

Metaphysics and the Categories

Epistemology, The Concept of God, Bondage, and Liberation

Laboratory/practical/tutorial Modules: None.

3. Textbooks:

Chatterjee, S.G. & Datta, D.M. (1960) An Introduction to Indian Philosophy, Calcutta: University of Calcutta Press.

Sharma, C. (1964) A Critical Survey of Indian Philosophy, Delhi: Motilal Banarasidass Publication.

4. References:

Muller, F.M. (1928) The Six Systems of Indian Philosophy, London: Longmans Green and Co. Publication.

Barlingay, S.S. (1965) A Modern Introduction to Indian Logic, Delhi: National Publishing House.

Chatterjee, S.C. (1950) The Nyaya Theory of Knowledge, Calcutta: University of Calcutta Press.

Journal of Indian Philosophy: https://www.springer.com/journal/10781

Encyclopaedia of Britannica on Indian Philosophy: https://www.britannica.com/topic/Indian-philosophy

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			

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

NA

Approvals:

Other Faculty interested in teaching this course: Prof. Laxmidhar Behera

Proposed by: Prof. Varun Dutt
Mental Health Applications Centre

School: Indian Knowledge System and

Signature:

Date: 17th September 2023

Recommended/Not Recommended, with Comments:

_____ **Date:**_____

Chairperson, CPC

Approved / Not Approved

_____ **Date:**_____

Chairperson, BoA

IIT Mandi
Proposal for a New Course

Course number: IK 541
Course Name: Upanishads and Vedanta Studies
Credit Distribution: 3-0-0-3
Intended for: BTech/MTech/MS/MSc/MA/Ph.D.
Prerequisite: IK 536 Introduction to Vedanta Philosophy or equivalent foundational knowledge in Vedanta philosophy
Mutual Exclusion: None

1. Preamble:
The Upanishads and Vedanta form the philosophical backbone of Hinduism, exploring profound concepts related to the nature of reality, the self, and the ultimate purpose of life. This course delves into these revered texts and their commentaries, offering students an in-depth understanding of their teachings, historical context, and enduring impact on global spiritual and philosophical thought.

2. Course Modules with quantitative lecture hours:

Unit I Introduction to Upanishads (5 Hours)
Overview and Historical Context
Importance and Influence on Hindu Thought
Classification and Principal Upanishads

Unit II Core Teachings of Upanishads (8 Hours)
Concepts of Brahman and Atman
Understanding of Māyā (Illusion)
The Doctrine of Karma and Rebirth
The Nature of Reality: Advaita, Dvaita, and Viśiṣṭādvaita views

Unit III Deep Dive into Selected Upanishads (6 Hours)
Isha Upanishad: Vision of Oneness
Kaṭha Upanishad: Dialogue on Death and Immortality
Chāndogya Upanishad: Meditation and Rituals

Unit IV Vedanta Philosophy (7 Hours)
Introduction to Vedānta Darśana
Brahma Sūtras and their significance
Advaita Vedanta of Ādi Śaṅkarācārya
Rāmānuja's Viśiṣṭādvaita Vedanta
Madhva's Dvaita Vedanta

Unit V Contemporary Interpretations (8 Hours)

Modern Vedantic Teachers: Ramana Maharshi, Vivekananda, Aurobindo
The Theosophical interpretation of Upanishads and Vedanta
Interactions with Western Philosophy and New Age Thought

Unit VI Upanishads, Vedanta, and Daily Life (4 Hours)
Spiritual practices derived from Upanishadic teachings
Vedantic approach to modern challenges: Stress, Identity, and Morality
Upanishadic view on Ecology and Environment

Unit VII Wrap up and Reflection (4 Hours)
Student presentations on selected topics
Group discussions on the application of Upanishadic teachings in contemporary life
Closing reflections and the way forward

Laboratory/practical/tutorial Modules: None.

3. Textbooks:
Radhakrishnan, S. (1992). The Principal Upanishads. HarperCollins.
Deussen, P. (2010). Sixty Upanishads of the Veda (Vol. 1 & 2). Motilal Banarsidass.

4. References:
Vivekananda, S. (1955). Jnana Yoga. Ramakrishna-Vivekananda Center.
Swami Sivananda. (2019). Upanishads in Story and Dialogue. Divine Life Society.
Sharma, C. (1964) A Critical Survey of Indian Philosophy, Delhi: Motilal Banarasidass Publication.
Easwaran, E. (2007). The Upanishads: A Classic of Indian Spirituality. Nilgiri Press.
Rukmani, T. S. (2001). A Critical Study of the Bhagavata Purana: With Special Reference to Bhakti. Chowkhamba Sanskrit Series

5. 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.	Introduction to Vedanta Philosophy	IK 536	Basic introduction to Upanishads and Vedanta	10%

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

NA

Approvals:

Other Faculty interested in teaching this course: Prof. Laxmidhar Behera

Proposed by: Prof. Varun Dutt
Mental Health Applications Centre

School: Indian Knowledge System and

Signature:

Date: 17th September 2023

Recommended/Not Recommended, with Comments:

_____ **Date:**_____
Chairperson, CPC

Approved / Not Approved

_____ **Date:**_____
Chairperson, BoA

IIT Mandi
Proposal for a New Course

Course number: IK 542
Course Name: Machine Learning for Sanskrit Text Analysis
Credit Distribution: 3-0-0-3
Intended for: BTech/MTech/MS/MSc/MA/Ph.D.
Prerequisite: Basic Computer Fundamentals
Mutual Exclusion: None

1. Preamble:

This course is meant for students to train Sanskrit scholars in the emerging field of Sanskrit Computational Linguistics, showing the relevance of Indian grammatical theories to the field of Computational Linguistics, thereby bridging the gap between the past and the present. This program belongs to an emerging and high-tech area of Natural Language Processing.

In this course, we look at the relevance of language sciences from an Information Technology perspective. This course will introduce the following modules a) Segmentation. b) Word Analyzers and Generators c) Sentential analyzer and generator followed by the introduction to various Resources such as a) Lexical Resources b) Annotated corpus with a focus on Sanskrit and the Indian contribution to the language sciences.

2. Course Modules with quantitative lecture hours:

Unit I व्याकरण, भाषाविज्ञान एवं शाब्दबोध (12 hours)

NOTE: Only those portion which is necessary will be taught not the full text

अष्टाध्यायी,सिद्धान्तकौमुदी, Phonetics in Ancient India, W S Allen 1971, Sandhi, W S Wallen, Morphology, Syntax, Karaka Analysis, शाब्दतरंविणी, शाब्दबोधमीमांसा, Indian Theories of Meaning, Philosophy of Word and Meaning, Sanskrit Philosophy of Language, Logic, Language, Reality. The Sanskrit Language: An Overview - History and Structure, Linguistic and Philosophical Representations, Annotation schemes for sandhi, morph, compound, karaka, शब्दशक्तिप्रकाशिका, नव्यन्यायभाषाप्रदीप, महेष न्यायरत्न, An introduction to sanskrit language and linguistics.

Unit II Natural Language Processing – 1: (12 hours)

Overview of NLP and its applications, Historical perspective and evolution of NLP, Challenges in natural language understanding and generation, Basic linguistic concepts (syntax, semantics, pragmatics), Text Processing and Preprocessing, Language Models and Probability in NLP,

Unit III Machine Learning-1(Introductory): (16 hours)

Definition of Machine Learning, Applications of Machine Learning, Overview of the Machine Learning Process, Machine Learning for NLP, Project Work and Presentations on NLP

Laboratory/practical/tutorial Modules: Project based.

3. Textbooks:

1. NLP: A Pāṇinian perspective by Akshar Bharati, Vineet Chaitanya, Rajeev Sangal, prentice hall of India, 1995
2. Speech and Language Processing by Daniel Jurafsky and James H Martin
3. Explorations in Artificial Intelligence and Machine Learning, A CRC Press FreeBook, Taylor and Francis Group
4. Ashtadhyayi of Pāṇini, Dr. Naresh Jha, Chaukhamba Surbharati Prakashan, 2014
5. Sanskrit Parsing: Based on the Theories of Shabdabodha by Amba Kulkarni,D K Printworld and IIAS Shimla, 2019.
6. Dimensions of Pāṇini Grammar, Kapil Kapoor, D K Print World, 2020

4. References:

1. Language, Bloomfield, Motilal Banarsidass
2. Theories of Language: Oriental and Occidental, Prof. Korada Subramaniyam
3. शाब्दबोधमीमांसा, एन् अस् आर् ताताचा र्य, Institute Franciasde Pondicherry/ RS Vidyapeeth 2006
4. An introduction to Sanskrit Linguistics, M Sriman Narayan Murti, DK Publications, Delhi
5. Programming Python: Powerful Object-Oriented Programming, 4th Edition, Mark Lutz, O'Reilly, 2011

5. 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.				

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

NA

Approvals:

Other Faculty interested in teaching this course:

Proposed by:
Mental Health Applications Centre

School: Indian Knowledge System and

Signature:

Date: 17th September 2023

Recommended/Not Recommended, with Comments:

_____ **Date:**_____

Chairperson, CPC

Approved / Not Approved

_____ **Date:**_____

Chairperson, BoA

IIT Mandi
Proposal for a New Course

Course number: IK 552
Course Name: Selected Topics in Rāmāyaṇa
Credit Distribution: 3-0-0-3
Intended for: BTech/MTech/MS/MSc/MA/Ph.D.
Prerequisite: None
Mutual Exclusion: None

1. Preamble:
The Rāmāyaṇa, attributed to Maharshi Vālmīki, is not just an epic but a repository of cultural, moral, and philosophical lessons. This course provides a deep dive into the text, its various interpretations, and its influence on Indian literature, arts, and culture. Students will engage with traditional and global versions, understand key human values presented, and study selected portions in their original Sanskrit form.

2. Course Modules with quantitative lecture hours:

Unit I Understanding the Multiplicity of the Rāmāyaṇa (10 Hours)
The concept of multiple Rāmāyaṇas and their origins
Examination of traditional texts with divine origins
Exploration of reverential texts developed beyond India
Study of texts deviating significantly from Vālmīki's core story
Analyzing the popularity and contemporary relevance of traditional Rāmāyaṇas

Unit II Rāmāyaṇa's Influence on Indian Literature and Arts (10 Hours)
The Rāmāyaṇa as an 'Upajīvya' or Indian literature
Its influence on folk, classical, and contemporary arts
The character of Maryāda Purushottam Ram
Delving into human and human-nature relationships in the Rāmāyaṇa

Unit III Characters, Governance, and Society (10 Hours)
Analyzing the portrayal of women: Sītā, Mandodarī, Tārā, Anasūyā, Kaikeyī, Urmilā, Swayamprabhā
Unpacking the ideals of 'Rāma Rājya'
Role and significance of ṛṣis in society

Unit IV Engaging with Valmiki's Text (12 Hours)
Detailed reading and interpretation of the Vālmīki Rāmāyaṇa text, focusing on Balkāṇḍa, Chapter 1
Learning key features and linguistic richness of the original Sanskrit text
Group discussions on interpretation and relevance in modern context

Laboratory/practical/tutorial Modules: None.

3. Textbooks:

Srimad Valmiki Rāmāyaṇa of Valmiki (Critical Edition, with Commentary of Shri Govindaraja) (5 Volumes) – By T.R. Krishnacharya & T.R. Vyasacharya, Nirnayasagar Press, Bombay.
https://www.indianculture.gov.in/rarebooks/srimad-valmiki-Rāmāyaṇa-critical-edition-commentary-sri-govindaraja

Vaidic Sahitya Aur Samskrti (Hindi) - By Baladev Upadhyaya, Sharada Niketana, Varanasi, 2001.

4. References:

Samskrita Sahityetihasah (Sanskrit) – By Acharya Lokamani Dahl, Choukhamba Sanskrit Series, Varanasi, 2005.

Raghunathan, N. (2001). Srimad Valmiki Rāmāyaṇa (English translation). Vighneswara Publishing House.

Goldman, R. P. (Ed.). (2005). The Rāmāyaṇa of Valmiki: An Epic of Ancient India. Princeton University Press.

Brockington, J. (1998). The Sanskrit Epics. Brill.

Lutgendorf, P. (1999). The Life of a Text: Performing the Ramcaritmanas of Tulsidas. University of California Press.

5. 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.	Upanishads and Vedanta Studies	IK 541	Epic narratives and their influence on Indian culture	10%

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

NA

Approvals:

Other Faculty interested in teaching this course: Prof. Laxmidhar Behera

Proposed by: Prof. Rohit Saluja
Mental Health Applications Centre

School: Indian Knowledge System and

Signature:

Date: 17th September 2023

Recommended/Not Recommended, with Comments:

_____ Date:_____

Chairperson, CPC

Approved / Not Approved

_____ Date:_____

Chairperson, BoA

IIT Mandi
Proposal for a New Course

Course number: IK 562
Course Name: Research Methodology - Tantra Yukti and Pramāṇa Śāstra
Credit Distribution: 3-0-0-3
Intended for: BTech/MTech/MS/MSc/MA/Ph.D.
Prerequisite: Introduction to Sanskrit Language or foundational knowledge in Indian philosophical texts.
Mutual Exclusion: None

1. Preamble:
The course offers an immersive exploration of India's unique research methodology, particularly Tantra Yukti and Pramāṇa Śāstra, as embedded in the Sanskrit tradition. Emphasizing the ancient systematics of thesis and text construction, this course aims to provide students with both a historical and practical understanding of Indian methods of knowledge organization and presentation.

2. Course Modules with quantitative lecture hours:

Unit I Foundation of Knowledge and Organization in the Sanskrit Tradition (14 Hours)
Intellectual climate for knowledge creation: The Upanishads.
Exploring the textual wealth of ancient India: Vidyāsthānas, Vedāṅgas, Darśanas, Itihāsas, Purāṇas, Poetry, and Technical-Scientific literature.
Understanding the framework for knowledge preservation.
Major varieties of Sanskrit textual traditions.
Deep dive into concepts: Sūtra, Bhāṣya, Vārttika, Kārikā, and Vyākhyā.
Constructing texts/theses: Thoughts, Vṛttis, Praśna lakṣaṇam, Uttara-lakṣaṇam, Adhikaraṇa-lakṣaṇam, Panca-avayava-vākya, Tatparyanirṇayaka-liṅgs, and scope definition.

Unit II Tantrayukti - Overview and Historical Insights (14 Hours)
Definitions and derivations of Tantrayukti.
Introduction to Tantrasampat, Tantraguna, and Tantradoṣa.
Tracing the history of Tantrayukti utilization in Sanskrit and Tamil Literature.
Understanding the functions and roles of Tantrayukti.
Exploring the interdisciplinary application of Tantrayukti across various domains.

Unit III Applications of Tantrayukti in Research Methodology (14 Hours)
A comprehensive look into the Yuktis/Devices of thesis construction.
Deep dive into content creation, text/thesis structuring, and language refinement Yuktis.
Exploring Tantragunas and Tantradoṣas with illustrations.
Understanding the potential scope for future research and application in diverse disciplines.

Laboratory/practical/tutorial Modules: None.**3. Textbooks:**

Lele, W.K, (2006), Methodology of Ancient Indian Sciences, Chaukhamba Surabharati Prakashan, Varanasi.
Muthuswamy, N.E., (1974), Tantrayuktivicāra, Publication Division, Government Ayurveda College, Trivandrum.

4. References:

Staal, F. (1988). Universals: Studies in Indian Logic and Linguistics. University of Chicago Press.
Matilal, B.K. (1986). Perception: An Essay on Classical Indian Theories of Knowledge. Oxford University Press.
https://www.youtube.com/watch?v=Q2JzqYjCjMU&t=1s
https://indiachapter.in/user/article/2/36/20
https://www.carakasamhitaonline.com/index.php?title=Tantrayukti

5. 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.	NA			

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

NA

Approvals:
Other Faculty interested in teaching this course: Prof. Laxmidhar Behera

Proposed by: Prof. Varun Dutt
Mental Health Applications Centre

School: Indian Knowledge System and

Signature:

Date: 17th September 2023

Recommended/Not Recommended, with Comments:

_____ **Date:**_____
Chairperson, CPC

Approved / Not Approved

_____ **Date:**_____
Chairperson, BoA

Discipline Electives

IIT Mandi
Proposal for a New Course

Course number: IK 511
Course Name: Science of Āyurveda
Credit Distribution: 3-0-0-3
Intended for: BTech/MTech/MS/MSc/MA/Ph.D.
Prerequisite: None
Mutual Exclusion: None

1. Preamble:
This course is meant for students with Science and Engineering backgrounds, and who want to research in āyurveda. The course will be oriented towards research in āyurveda with a scientific grounding in the understanding of āyurveda. The following topics will be covered: evolution of āyurveda, role of Indian thought systems in āyurveda, basic tenets of āyurveda, āyurvedic understanding and management of health and disease along with how western medicine handles the same, mental health in āyurveda, diet and nutrition in āyurveda, current research methodologies and their relevance & aptness for āyurveda, potential research areas in āyurveda.

2. Course Modules with quantitative lecture hours:

Unit 1: Evolution of Āyurveda **3 hrs**
Āyurveda: connecting the dots and sensing the past; Evolution and history of āyurveda; Masters and Teachers of āyurveda; Textual sources in āyurveda; Evolution of Western medicine.

Unit 2: Rational foundations of āyurveda **4 hrs**
The six schools of thought on physical and metaphysical realms; Specific roles of Sāṅkhya, Nyāya, Vaiśeṣika, Mīmāṃsā, Yoga and Uttara Mīmāṃsā in āyurveda; Foundations of Western medicine for comparative purpose.

Unit 3: Āyurveda and Western medicine: why, how and where they differ **4 hrs**
Worldviews and their relation to science; worldviews of classical and quantum physics and their impact on Western medical science; worldview of Indian Knowledge Systems and their impact on āyurveda; Fundamental differences between āyurveda and Western medicine and their implications for research.

Unit 4: Conceptualisation of human system in āyurveda **4 hrs**
Models for understanding human system in āyurveda and Western medicine; Integral components of life in ayurveda and Western medicine; What is life?; What is health?; Various concepts in āyurveda to understand and manage health and disease.

Unit 5: Tridoṣa **4 hrs**

What are tridoṣas?; How are they used to understand the human system, health, and disease; use of tridoṣas in diagnosis and treatment; Tridoṣas from a research perspective.

Unit 6: Āyurvedic approach to health and disease **4 hrs**

Health and disease metrics; The multipronged approach to health and disease; Diagnosis and Treatment in āyurveda; Diagnosis and treatment in Western medicine for comparative purpose.

Unit 7: Āyurvedic approach to mental health **4 hrs**

Comprehensive wellbeing in āyurveda; Understanding of mind and consciousness; Pañcakośas; yoga; Management of mental health.

Unit 8: Āyurvedic pharmacology **4 hrs**

Use of medicinal plants in āyurveda; āyurvedic pharmacological metrics; āyurvedic formulations; validation of āyurvedic medicines, Rules and regulations for the use of āyurvedic medicines, potential research areas in medicinal plants and formulations.

Unit 8: Āyurvedic approach to diet and nutrition **3 hrs**

Food and health in āyurveda; concept of diet and nutrition in āyurveda; diet and mental health; Potential research areas.

Unit 9: Research in Āyurveda **4 hrs**

Current research methodologies; Research requirements in āyurveda; Current āyurveda research; Potential research topics.

Unit 10: Interaction with practicing vaidyas **4 hrs**

Interaction with āyurvedic vaidyas from different parts of the country to get a bird's eye view of the different practices and to hear their views on research.

3. Textbooks:

Charaka Samhitha with Ayurveda Deepika Teeka of Shri. Chakrapanidatta, Edited by Yadavji Trikamji Acharya. Chaukambha Sanskrit Sansthan

Sushruta Samhita with Nibandha Samgraha Teeka of Shri. Dalhanacharya, and Nyaya Chandrika Panjika of Shri. Gayadasacharya on Nidana Sthana, Edited by Yadavji Trikamji Acharya. Chaukambha Sanskrit Sansthan

4. References:

Ashtanga Hrudaya with Sarvanga Sundara Teeka of Arunadatta and Ayurveda Rasayana Teeka of Hemadri; Edited by Pandit Hari Sadashiva Sastri Paradakar. Chaukambha Sanskrit Sansthan

Srikantamurthy KR (Translator): Ashtanga Samgraha of Vagbhata, Chaukambha Orientalia, Varanasi, 2005.

Srikantamurthy KR (Translator): Sharangdhara Samhita of Sharangdhara, Chaukambha Orientalia,Varanasi, 2000.

5. 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.	NA			

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

NA

Approvals:
Other Faculty interested in teaching this course: Prof. Rama Jayasunder, AIIMS Delhi

Proposed by: Prof. Varun Dutt
Mental Health Applications Centre

School: Indian Knowledge System and

Signature:

Date: 17th September 2023

Recommended/Not Recommended, with Comments:

_____ **Date:**_____
Chairperson, CPC

Approved / Not Approved

_____ **Date:**_____
Chairperson, BoA

IIT Mandi
Proposal for a New Course

Course number: IK 547
Course Name: Sanskrit Poetry and Drama
Credit Distribution: 3-0-0-3
Intended for: BTech/MTech/MS/MSc/MA/Ph.D.
Prerequisite: None
Mutual Exclusion: None

1. Preamble:
The primary objective of this course is to familiarize the salient features of Bhāratīya Literary Discourse.

Objectives:

- To enable the learners to explore Sanskrit Poetry and Drama.
-

2. Course Modules with quantitative lecture hours:

Unit 1: Introduction to Literary Discourse (15 Hours)
Definition of Vanmaya, Sahitya, Kavya and Śāstra
Indian Traditions of Kavya (Vedic & Laukika)
Kavya Composed in Regional Languages

Unit 2: Indian View (15 Hours)

Purpose of Poetry: Bhāratīya View

Foundations of Poetry- Kāvyahetu

Śabdavṛttis: Abhidha, Tatparya Vṛtti, Laksana, and Vyanjana

Methods of Determining Meaning (In the Light of Dhwani-Siddhanta) Literary Theory

Unit 3: Literary Theory (15 Hours)

Theories of Literary Criticism. Rasa, Alankara & Riti, Dhwani, Vakrokti & Auchitya, Rules of Editing - Abhinavagupta, Abhinavbharati
Concept of Sahrdaya

Concept & Types of Rasa and Bhava

Unit 4: Contemporary Literary Criticism (15 Hours)
Contemporary Literary Criticism - Alam Brahmavada, Chamatkaravada
Pañcakalpavada
Brief Survey of Western Literary Criticism

Laboratory/practical/tutorial Modules: None.

3. Textbooks:

1) Kane, P.V., History of Sanskrit Poetics, Motilal Banarsidass, Delhi, 1971.
2) Ram Avadh Dwivedi and Vikrmaditya Rai, Literary Critic.sm, Motilal Banarsidass, Delhi, 1988.
3) Sharma, Mukund Madhav, The Dhvani Theory in Sanskrit Poetics, Chowkhamba Sanskrit Series Office, Varanasi, 1968.
4) Triloknath Jha, An Exposition of Vyakti Vivek, Mithila Research Institute, Darbhanga.
5) Mangal Pati Jha, An Exposition of the Chitra Mimansa, Mithila Research Institute, Darbhanga. Note: The reading list will be updated from time to time.

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			

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

NA

Approvals:

Other Faculty interested in teaching this course: Prof. Laxmidhar Behera

Proposed by: Prof. Varun Dutt
Mental Health Applications Centre

School: Indian Knowledge System and

Signature:

Date: 18th September 2023

Recommended/Not Recommended, with Comments:

_____ **Date:** _____

Chairperson, CPC

Approved / Not Approved

_____ **Date:** _____

Chairperson, BoA

IIT Mandi
Proposal for a New Course

Course number: IK 502
Course Name: Introduction to Bio-signals
Credit Distribution: 3-0-2-4
Intended for: BTech/MTech/MS/MSc/MA/Ph.D.
Prerequisite: None
Mutual Exclusion: None

1. Preamble:
This course is meant for students interested and working in various types of biological signal measurements including neurological signals and images, cardiac signals, muscular signals etc. The course covers various aspects in the study of biosignals including acquisition, basic signal processing, high-level processing, and applications. This would be serve as a basic but detailed course for students and scholars working in the area of medical signal analysis as well as cognitive science.

2. Course Modules with quantitative lecture hours:

Unit 1: Mathematical Preliminaries: **(3 hours)**
Fourier transform, sampling and filtering, Solution to wave equation in spherical co-ordinate system, Introduction of Spherical Harmonics.

Unit 2: Basics of bio-signals: **(2 hours)**
Definition and models of bio-signals, types of bio-signals, bio-signals monitoring, Pre-processing for bio-signals, bio-signals analysis, and classification of bio-signals.

Unit 3: Brain signals: **(10 hours)**
Human Brain Anatomy, Electroencephalogram (EEG) and magnetoencephalogram (MEG) signals, recording of EEG and MEG signals, EEG signals characteristics and rhythms, evoke potentials, diagnosis of central nervous systems disorders based on brain-signals, various approaches for analysis, feature extraction, and classification of brain signals, MRI and FMRI basics, BOLD signal acquisition, applications of FMRI.

Unit 4: Brain Source Localization and connectivity: **(10 hours)**
Array Signal Processing Basics - Data model, correlation and subspace based (MUSIC) localization, Brain Source Localization: Forward & Inverse Problem, Introduction of Head harmonics for brain source localization (BSL), Application of BSL in BCI control, Epileptogenic zone detection. Brain connectivity representation, decomposition methods and types of networks, Clinical and cognitive applications of brain connectivity.

Unit 5: Cardiac signals: **(8 hours)**
Electrocardiogram (ECG) and phonocardiogram (PCG) signals, recording process of ECG and PCG signals, heart rate variability (HRV) signals, diagnosis of heart diseases based on cardiac signals, various methods for analysis, feature extraction, and classification for cardiac signals.

Unit 7: Muscle signals: **(6 hours)**
Electromyogram (EMG) signal, motor unit action potentials (MUAP), EMG and neuro-muscular diseases, feature extraction of EMG, analysis and classification methods for EMG signals.

Unit 8: Other bio-signals: **(3 hours)**
Pulse signals, blood pressure, blood flow, photoplethysmogram, electrooculogram, electroretinogram, center of pressure, and respiratory signals.

Laboratory/practical/tutorial Modules: The course will involve practical assignments which can be conducted in the lab, and would also involve programming assignments.

3. Textbooks:
R.M. Rangayyan, Biomedical Signal Analysis: A case Based Approach, IEEE Press, John Willy & Sons. Inc, 2002.
Kayvan Najarian and Robert Splinter, Biomedical Signal and Image Processing, Second Edition, CRC Press, 2005.

4. References:
M.A. Jatoi and N. Kamel, Brain source localization using EEG signal analysis. CRC Press, 2017
Boaz Rafaely, Fundamentals of spherical array processing, Berlin: Springer, 2015
HL Van Trees, Optimum Array Processing, New York: Wiley, 2002
Scott Heuttel, Allen Song, Gregory McCarthy, Functional Magnetic Resonance Imaging (2nd Edition), Sinauer Associates, 2009

5. 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.	NA			

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

NA

Approvals:
Other Faculty interested in teaching this course: Prof. Varun Dutt

Proposed by: Prof. Arnav Bhavsar
and Mental Health Applications Centre

School: Indian Knowledge System

Signature: **Date:** 17th September 2023

Recommended/Not Recommended, with Comments:

_____ **Date:**_____

Chairperson, CPC

Approved / Not Approved

_____ **Date:**_____

Chairperson, BoA

IIT Mandi
Proposal for a New Course

Course number: IK 503
Course Name: Cognitive Psychology and the Indian Thought System
Credit Distribution : *3-0-0-3*
Intended for: BTech/MTech/MS/MSc/MA/Ph.D.
Prerequisite: None
Mutual Exclusion: None

1. Preamble:

This course is meant for students working in mental health applications and allied areas to develop awareness on topics concerning cognitive psychology and cognitive neuroscience. These topics may include perception, attention, memory, language, problem solving, reasoning, and judgment and decision-making. This course also brings the Indian thought system perspective from the Samkhya and Yoga, and how the Indian thought contrasts with the western thought. The course will expose students to research methods involving behavioural, neuroimaging, and clinical research from the western theories. This course will provide students an understanding of theories of cognitive psychology involving mental processes for perception, attention, memory, language, problem solving, reasoning, and judgment and decision-making. Also, this course will expose students to the approaches and theories from the Indian thought system. The course may involve lectures, student presentations, discussion, video materials, and class experiments. Students may also work in groups on projects that involve doing experiments to test different theories from the western and Indian thought systems.

2. Course Modules with quantitative lecture hours:

Unit 1: Evolution, Mind, and Brain **(5 Hours)**

Nervous system - anatomy and physiology; Functional neuroanatomy; Tools for investigation – electrophysiology, imaging, and others; how the brain creates mind?; Translation to behavior — emotion/cognition/decision making; mental representations and processing; dissociations and associations.

Unit 2: The Indian Knowledge System **(7 hours)**

Six Schools of philosophy; Buddhism; Bhagavad-Gītā; Mapping with the Neuroscientific/psychological understanding from Unit 1; Mental health; cognition in Samkhya and yoga; the body–mind – intellect – consciousness complex; consciousness; panca – kosa –

a five layered existence; four states of existence; driving issues in consciousness studies; the tri – guna system; cognitive training hypothesis in yoga; psychological effects of yoga/meditation with clinical and nonclinical populations;

Extraordinary cognition hypothesis via eightfold path described in the YogaSūtras. Relative versus absolute reality hypothesis.

Unit 3: Perception and Attention **(7 Hours)**

Introduction to perception; visual perception; structure of visual system; top-down (context effects) and bottom-up (from features to objects) processing; visual recognition; interactive nature of perception; nature and roles of attention; failures of selection; successes of selection; information processing theories of attention; electrophysiology and human attention; functional neuroimaging and transcranial magnetic stimulation.

Unit 4: Representation, Encoding, and Retrieval of Knowledge in Long-Term Memory **(7 Hours)**

Role of knowledge in cognition; representations and their formats; representation to category knowledge; structures in category knowledge; category domains and organization; nature of long-term memories; encoding; retrieval; encoding with difficulty to recall; non-declarative memory systems.

Unit 5: Working Memory and Executive Processes **(6 Hours)**

Introduction to working memory; from primary memory to working memory; working memory models; person-to-person variation; dopamine's role; frontal lobe connection; frontal damage and the frontal hypothesis; executive attention; switching attention; inhibition of response; sequencing; monitoring.

Unit 6: Emotion, Cognition, Decision-making, and Problem Solving **(7 Hours)**

Defining emotion; manipulating and measuring emotion; emotional learning: acquiring evaluations; emotion and declarative memory; emotion, attention, and perception; nature of a decision; rational decision making; neural bases of expected utility calculations; human decision making and the expected utility model; complex, uncertain decision making; nature of problem solving; analogical reasoning; inductive reasoning; deductive reasoning.

Unit 7: Language, Motor Cognition, and Mental Simulation **(5 Hours)**

Nature of language; processes of language comprehension; processes of language production; language, thought, and bilingualism; nature of motor cognition; mental simulation and the motor system; imitation; biological motion.

Laboratory/practical/tutorial Modules: None.

3. Textbooks:

Smith, E. E., & Kosslyn, S. M. (2013). *Cognitive Psychology. Mind and Brain.* New Jersey: Pearson. ISBN: 978-1-292-02235-2

Eysenck, M. W., & Keane, M. T. (2020). *Cognitive Psychology, A Student's Handbook* (Eighth Edition). Hove: Psychology Press. ISBN: 1-84169-359-6

4. References:

Ward, J. (2015). *The Student's Guide to Cognitive Neuroscience* (3rd edition). Hove: Psychology Press. ISBN: 1841695343

Anderson, J. R. (2020). *Cognitive Psychology and Its Implications* (9th edition). Worth Publishers. ISBN: 1319067115

Sedlmeier P. & Srinivas K. (2016). How Do Theories of Cognition and Consciousness in Ancient Indian Thought Systems Relate to Current Western Theorizing and Research? *Front Psychol.* 2016 Mar 15;7:343. doi: 10.3389/fpsyg.2016.00343.

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			

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

NA

Approvals:

Other Faculty interested in teaching this course: – Dr. Alok Bajpai

Proposed by: Dr. Varun Dutt **School:** Indian Knowledge System and Mental Health Applications Centre

Signature: **Date: 24th August 2023**

Recommended/Not Recommended, with Comments:

_____ **Date:**_____

Chairperson, CPC

Approved / Not Approved

_____ **Date:**_____

Chairperson, BoA

IIT Mandi

Proposal for a New Course

Course number	**: IK 555**
Course Name	**: Selected Topics in Mahābhārata**
Credit Distribution	**: 3-0-0-3**
Intended for	**: BTech/MTech/MS/MSc/MA/Ph.D.**
Prerequisite	**: None**
Mutual Exclusion	**: None**

1. Preamble:

The " Selected Topics in Mahābhārata " is a comprehensive exploration chapter of ancient Indian scripture, focusing on its Sanskrit verses and philosophical tenets. This immersive journey will delve into Mahābhārata's timeless epic and explore its profound themes, characters, and narratives. Through in-depth analysis and discussion, this course aims to unravel the moral and philosophical complexities embedded in this epic, providing a deeper understanding of its relevance to both historical and contemporary contexts.

2. Course Modules with quantitative lecture hours.

Unit 1: The period of Mahābhārata **(6 Hours)**

Textual and traditional sources, as well as modern data, calendars (samvat) of Yudhiṣṭhira, Kṛṣṇa, and Vikram, the core story, and review of other versions (Indians and others)

Unit 2: 10 stories about 10 lakṣaṇa of dharma (8Hours)

A complete grantha, i.e., an encyclopedia to teach about subtleties of dharma and samsāra Dhṛti (Gaṅga avataran), kṣamā (Vasiṣṭha and Viśvāmitra), dama (Yayāti and Puru), asteya (Yudhiṣṭhira-Yakṣasamvāda), śauca, indriyanigraha (dharma vyādha'supadeśa on indriya-nigraha), dhī (Savitri), vidyā (tale of man-tiger-snake-elephant from StrīParva), satyam (Harischandra/Satyakam), akrodha (X), Mahābhārata as one of the two source-books (Upjeevya) for much of Indian literature, and arts (folk, classical, and contemporary arts)

Unit 3: Vidura-nīti and Bhagavad Gītā 6 (6 Hours)

Bhīṣma's upadeśa to Yudhiṣṭhira about politics and governance.

Unit 4: Political boundaries of Bharat-varṣa 8 (6 Hours)

Strīvimarśa in Mahābhārata

3. Textbooks:

Mahābhārata of Vyāsa (With English translation) – Ed. By Dr. Ishvar Chandra Sharma and Dr. O.N. Bimali, Translated by M.N. Dutt, Parimal Publications, Delhi. 2008.

Vaidic Sahitya Aur Samskrti (Hindi) By Baladev Upadhyaya, Sharada Niketana, Varanasi, 2001.

Samskrita Sahityetihasah (Sanskrit) – By Acharya Lokamani Dahl, Choukhamba Sanskrit Series, Varanasi, 2005.

4. References:

Easwaran, E. (2007). The Bhagavad-Gītā. Nilgiri Press. ISBN: 9781586380199

A.C. Bhaktivedanta and Swami Prabhupada. (1986). Bhagavad-Gita As It Is. The Bhaktivedanta Book Trust. ISBN: 9780892131341

5. Similarities with 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			

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

NA

Approvals:

Proposed by: **School:** Indian Knowledge System and Mental Health Applications Centre

Signature: Date:

Recommended/Not Recommended, with Comments:

_____ Date:_____

Chairperson, CPC

Approved / Not Approved

_____ Date:_____

Chairperson

Proposal for a New Course

Course number: IK 556
Course Name: Sūrya Siddhānta
Credit Distribution: 3-0-0-3
Intended for: BTech/MTech/MS/MSc/MA/Ph.D.
Prerequisite: None
Mutual Exclusion: None

1. Preamble:
The Sūrya Siddhānta is one of the earliest doctrines or traditions in Indian astronomy. This course delves into the contents, methods, and historical context of the Sūrya Siddhānta, offering students a comprehensive insight into its mathematical and astronomical principles, techniques, and innovations.

2. Course Modules with quantitative lecture hours:

Unit I Introduction to Sūrya Siddhānta (12 Hours)
Historical Context and Origin.
Overview of the key concepts.
Significance in Indian Astronomy.
Introduction to Indian calendrical computations.

Unit II Time Measurement and Planetary Models (10 Hours)
Concepts of time: Yugas, Kalpas, Manvantaras.
Day and Night calculation, Solar and Lunar days.
Sidereal, Tropical, and Anomalistic months.
Planetary models: Epicycles and Eccentricities.

Unit III Mathematics in Sūrya Siddhānta (10 Hours)
Trigonometric concepts: Sine, Cosine and R sine tables.
Mathematical techniques for astronomical computations.
Determining the positions of planets.
Eclipses: Calculation and Prediction.

Unit IV Applications and Impacts (10 Hours)
Influence on later astronomical texts and practices.
Comparison with other Siddhantas.
Contemporary relevance and applications.
Cross-cultural influences and exchanges with other astronomical traditions.

Laboratory/practical/tutorial Modules: None.

3. Textbooks:

Chakravarty, A. K. (2001). The Suryasiddhanta: the astronomical principles of the text. *The Suryasiddhanta: the astronomical principles of the text/AK Chakravarty. Kolkata: Asiatic Society.*

Burgess, E. (1860). *Translation of the Surya Siddhanta: A Text-Book of Hindu Astronomy.* Yale University Press.

4. References:

Gangooly, P. (Ed.). (1997). *The Súrya Siddhánta: A textbook of Hindu astronomy.* Motilal Banarsidass Publishers.

Digital Resource on Surya Siddhanta: https://www.wilbourhall.org/pdfs/suryaEnglish.pdf

5. 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.	NA			

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

NA

Approvals:

Other Faculty interested in teaching this course: Prof. Laxmidhar Behera

Proposed by: Prof. Rohit Saluja
Mental Health Applications Centre

School: Indian Knowledge System and

Signature:

Date: 17th September 2023

Recommended/Not Recommended, with Comments:

_____ **Date:**_____

Chairperson, CPC

Approved / Not Approved

_____ **Date:**_____

Chairperson, BoA

IIT Mandi

Proposal for a New Course

IIT Mandi

Proposal for a New Course

Course number: IK 592

Course Name: Selected Topics in Music and Musopathy

Credit Distribution: 1-0-2-2

Intended for: BTech/MTech/MS/MSc/MA/Ph.D.

Prerequisite: Curiosity, attention, and receptivity

Mutual Exclusion: None

1. Preamble:

This course will present an overview of key fundamental aspects of Music and Musopathy relevant to scientists and engineers interested in pursuing research and practice in music for wellness. The course will draw from the treasure-trove of Indian classical music knowledge systems to scientifically describe the multi-pronged connections of various aspects of sound with the human body and mind. The course will provide an overview of the state-of-the-art scenarios as well as the enormous possibilities in music-wellness research, and discuss approaches to pave the way for realizing a paradigm of rational music-based solutions for wellness, healing and therapeutics

2. Course Modules with quantitative lecture hours:

Unit 1: Overview – Sound Vibrations and vibes, moods and wellbeing (3 hrs)

Effects of vibrations, frequencies, volume, speed, spacings, patterns on the body and the mind

Unit 2: Music, life and society (2 hrs)

Music across the universe and within life forms, primacy of sound, language, vedas, mantras, yoga & nada yoga and the individual & society

a. https://ww.clisonics.com/

b. https://melharmonymusic.com/

c. Other links and references will be provided during the course.

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.	NA			

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

NA

Approvals:

Instructors:

Visiting Professor and Resident Artist Sangeet Samrat Chitravina N Ravikiran

Visiting Professor Ganpati Ramanath (Rensselaer Polytechnic Institute, Troy, NY, USA)

Coordinators: Dr. Varun Dutt, Dr. Arnav Bhavsar and Dr. Anirudha Chakraborty
School: Indian Knowledge System and Mental Health Applications Centre, IIT Mandi

Proposed by:
School: Indian Knowledge System and Mental Health Applications

Signature: **Date:** 24th August 2023

Recommended/Not Recommended, with Comments:

_____ **Date:**_____

Chairperson, CPC

Approved / Not Approved

_____ **Date:**_____

Chairperson, BoA

IIT Mandi

Proposal for a New Course

Course number: IK 548
Course Name: Advanced NLP Techniques for Indian Languages
Credit Distribution: 3-0-0-3
Intended for: BTech/MTech/MS/MSc/MA/Ph.D.
Prerequisite: IK 548
Mutual Exclusion: None

1. Preamble:

In this course introduction, we will explore a range of techniques and methodologies to tackle various natural language processing tasks. We will delve into the use of logistic regression, naïve Bayes, and word vectors for applications like sentiment analysis, analogy completion, and word translation.

Additionally, we will delve into dynamic programming, hidden Markov models, and word embeddings to build tools for autocorrect, autocomplete, and part-of-speech tagging.

Moving forward, we will explore advanced techniques involving recurrent neural networks, LSTMs, GRUs, and Siamese networks within the Trax framework. These will be applied to tasks such as sentiment analysis, text generation, and named entity recognition.

Furthermore, we will investigate encoder-decoder architectures, causal models, and self-attention mechanisms. These will be used to handle tasks such as machine translation, text summarization, chatbot development, and question-answering systems.

2. Course Modules with quantitative lecture hours:

Module 1 : Natural Language Processing with Classification and Vector Spaces

Sentiment Analysis with logistic Regression **(Total = 6 Hours)**

- 15 videos - Total 84 minutes
- 13 readings - Total 100 minutes
- 1 quiz - Total 30 minutes

Sentiment Analysis with Naive Bayes **(6 Hours)**

- 13 videos - Total 44 minutes
- 12 readings - Total 111 minutes
- 1 quiz - Total 30 minutes

Vector Space Models (**5 hours)**

- 10 videos - Total 28 minutes
- 10 readings - Total 91 minutes
- 1 quiz - Total 30 minutes

Machine Translation And Document Search **(6 Hours)**

- 11 videos - Total 68 minutes
- 10 readings - Total 91 minutes
- 1 quiz - Total 30 minutes

Module 2 : Natural Language Processing with Probabilistic Models

Autocorrect **(4 hours)**

- 11 videos - Total 31 minutes
- 10 readings - Total 37 minutes
- 1 quiz - Total 30 minutes

Part Of Speech Tagging and Hidden Markov Models **(5 hours)**

- 13 videos - Total 42 minutes
- 12 readings - Total 66 minutes
- 1 quiz - Total 30 minutes

Autocomplete and Language Models **(5 hours)**

- 11 videos - Total 53 minutes
- 10 readings - Total 70 minutes
- 1 quiz - Total 30 minutes

Word embedding with neural networks **(8 hours)**

- 22 videos - Total 73 minutes
- 22 readings - Total 88 minutes
- 1 quiz - Total 30 minutes

Module 3 : Natural Language Processing with Sequence Models

Neural Networks For Sentiment Analysis (6 hours)

- 11 videos - Total 39 minutes
- 10 readings - Total 51 minutes
- 1 quiz - Total 30 minutes

Recurrent Neural Networks For Language Modeling **(6 hours)**

- 10 videos - Total 28 minutes
- 9 readings - Total 44 minutes
- 1 quiz - Total 30 minutes

LSTMs and Named Entity Recognition **(5 hours)**

- 8 videos - Total 25 minutes
- 10 readings - Total 53 minutes
- 1 quiz - Total 30 minutes

Siamese Networks **(6 hours)**

- 10 videos - Total 35 minutes
- 10 readings - Total 50 minutes
- 1 quiz - Total 30 minutes

Module 4 : Natural Language Processing with Attention Models

Neural Machine Translation **(7 hours)**

- 15 videos - Total 88 minutes
- 6 readings - Total 37 minutes
- 1 quiz - Total 30 minutes

Text Summarization **(5 hours)**

- 10 videos - Total 39 minutes
- 8 readings - Total 62 minutes
- 1 quiz - Total 30 minutes

Question Answering **(11 hours)**

- 16 videos - Total 60 minutes
- 16 readings - Total 242 minutes
- 1 quiz - Total 30 minutes

Chatbot **(6 hours)**

- 9 videos - Total 63 minutes
- 13 readings - Total 141 minutes

- 1 quiz - Total 30 minutes

3. Books:

1) NLP at Work, by Sue Knight
2) Words that change minds,
by Shelle Rose Charvet
3) Sleight of mouth,
by Robert Dilts
4) Business NLP for dummies,
by Lynne Cooper
5) Mind line

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.	NA			

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

NA

Approvals:

Other Faculty interested in teaching this course: Prof. Laxmidhar Behera

Proposed by: Prof. Varun Dutt
Mental Health Applications Centre

School: Indian Knowledge System and

Signature:

Date: 17th September 2023

Recommended/Not Recommended, with Comments:

_____ **Date:**_____

Chairperson, CPC

Approved / Not Approved

_____ **Date:**_____

Chairperson, BoA

IIT Mandi
Proposal for a New Course

Course number: IK 559
Course Name: Three Short Upaniṣads
Credit Distribution: 3-0-0-3
Intended for: BTech/MTech/MS/MSc/MA/Ph.D.
Prerequisite: IK541
Mutual Exclusion: None

1. Preamble:

In this course, we take a look at 3 of the most important, yet shortest, Upaniṣads. Students will study the Kena, Īśāvāsya, and Māṇḍūkya Upaniṣads. Students will be encouraged to reflect on the significance of these particular teachings and how they have formed contemporary Hindu culture and religion. Throughout this course, we will be reviewing different passages from the Upaniṣads, their relevance to Hindu culture and religion, and their influence on modern-day teachings.

2. Course Modules with quantitative lecture hours:

Unit 1: Introduction to the Kena Upaniṣad (6 hours)
The Kena Upaniṣad is an Upaniṣad of the Sāma Veda and is to be found in the Talavakara or Jaiminiya branch of the Sāma Veda. For this reason, it is sometimes referred to as the Talavakara Upaniṣad. It forms a part of the Jaiminiya Brahmaṇa of the Sāma Veda (4.18-21) but is usually regarded by Hindu authorities as a separate work.

Unit 2: Kena Upaniṣad (part two) (6 hours)
Chapter 2 is composed in verse form and presents a description of Brahman as the ultimate truth that lies behind all forms of existence. It also discusses the process of knowing Brahman as a means of attaining release from this world.

Unit 3: Kena Upaniṣad (part three) (5 hours)
Chapters 3 and 4 adopt a narrative structure, though again the main purpose behind the discourse is the revelation of Brahman as the ultimate principle that transcends even the gods who are praised in the hymns of the Veda Samhitas. Here perhaps we get some indication of a Supreme Deity who possesses a personal identity, though this idea cannot be said to be prominent within the Kena Upaniṣad.

Unit 4: Īśa Upaniṣad (part one) (6 hours)
We move on to consider another of the most important Upaniṣads, the Īśa or Īśāvāsya, and here we have full commentaries from both an Advaitic and a Vaishnava perspective, which will provide interesting parallels. Shankaracharya has left us a full commentary on all eighteen verses, whilst Swami Prabhupada, the founder of ISKCON, made his own commentary from a Vaishnava or dualist perspective.

Unit 5: Īśa Upaniṣad (part two) (4 hours)
This Upaniṣad seems to be about the inner Self as the ultimate principle, which can hence be referred to as God, the Īśa. It is about the absolute transcendence of the Atman over the limitations that prevail in this world. And it is about moksha as the relief from suffering attained by one who can perceive the Atman. The final four verses are included to demonstrate that these ideas are not to be regarded as non-Vedic, for if one understands them properly then one can see that the Vedic hymns themselves are saying the same thing.

Unit 6: The Māṇḍūkya Upaniṣad (part one) (8 hours)
We now consider the Māṇḍūkya Upaniṣad, which was also very highly regarded by Shankaracharya. The Māṇḍūkya Upaniṣad is significant for its revelation that the syllable 'om' is identical with Brahman, and today the oṃkāra is often used to represent Hindu Dharma. Furthermore, Gaudapada wrote an extensive treatise or Kārikā on the Māṇḍūkya Upaniṣad in which we find an early exposition of the principles of Advaita Vedānta.

Unit 7: Māṇḍūkya Upaniṣad (part two) (6 hours)
In this session, we will look at the final four verses of the Māṇḍūkya and then briefly consider Gaudapada's Kārikā on it, which was very influential for Shankara in his establishing the doctrines of the Advaita Vāda..

Laboratory/practical/tutorial Modules: None.

3. Textbooks:

- Wisdom of the Rishis: The Three Upanisha: The Three Upanishads, Īśāvāsya, Kena, and Māṇḍūkya by by Sri. M
- The Principal Upanishads by Eknath Easwaran (1982)
- The Upanishads: A New Translation by Patrick Olivelle (1996)

4. References:

- Black, Brian, The Upaniṣads, Internet Encyclopedia of Philosophy
- Brodd, Jeffrey (2009), World Religions: A Voyage of Discovery, Saint Mary's Press, ISBN 978-0884899976
- Brooks, Douglas Renfrew (1990), The Secret of the Three Cities: An Introduction to Hindu Shakta Tantrism, The University of Chicago Press
- Brown, Rev. George William (1922), Missionary review of the world, vol. 45, Funk & Wagnalls, archived from the original on 2 October 2022, retrieved 22 November 2020
- Chari, P. N. Srinivasa (1956), Sarvepalli Radhakrishnan (ed.), History of Philosophy Eastern and Western

- "Upanishad" Archived 20 September 2014 at the Wayback Machine. Random House Webster's Unabridged Dictionary.
- A Bhattacharya (2006), Hindu Dharma: Introduction to Scriptures and Theology, ISBN 978-0595384556, pp. 8–14; George M. Williams (2003), Handbook of Hindu Mythology, Oxford University Press, ISBN 978-0195332612, p. 285
- Jan Gonda (1975), Vedic Literature: (Saṃhitās and Brāhmaṇas), Otto Harrassowitz Verlag, ISBN 978-3447016032
- https://en.wikipedia.org/wiki/Upanishads

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			

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

NA

Approvals:

Other Faculty interested in teaching this course:

Proposed by: Prof. Varun Dutt
Mental Health Applications Centre

School: Indian Knowledge System and

Signature:

Date: 19th September 2023

Recommended/Not Recommended, with Comments:

_____ **Date:**_____
Chairperson, CPC

Approved / Not Approved

_____ **Date:**_____
Chairperson, BoA

IIT Mandi
Proposal for a New Course

Course number: IK 567
Course Name: "Soundaryaśāstra - Tāla"
Credit Distribution: 3-0-0-3
Intended for: BTech/MTech/MS/MSc/MA/Ph.D.
Prerequisite: Basics understanding of sanskrit and any performing art-form
Mutual Exclusion: None

1. Preamble:

This course is designed for classical music students to help them understand current rhythm (tāla) in singing, playing, and dancing. This will directly benefit their performance of bandishes (traditional musical compositions) and their understanding of bandishes from various gharanas (schools of music). The course will also cover literary descriptions of rhythm in classical music, which are still being researched. This will act as a bridge between traditional and the current music education system.

This course is a comprehensive study of rhythm designed to help students improve their performance of this art form. The concept of Rhythm as derived from Bharatha's Nātyaśāstra revolves around the concept of *rasa* within the framework of Indian Aesthetics or Bhāratīya saundaryaśāstra.

2. Course Modules with quantitative lecture hours:

Unit I Introduction to Tala (3 Hours)

1.1 Origin and Development of tāla
1.2 Elements of Tāla: mātrā, sama, tālī, khālī,mātrā,vibhāga

Unit 2 Jāti Bheda (cyclic rhythm variations) (5 Hours)

2.1 Uttara bhāratīya tāla paddhati (North Indian rhythmic method)
2.2 Tihāī racanā siddhāṃta part-1
2.3 Tihāī racanā siddhāṃta part-2

Unit 3 Tāla in Indian Music (5 Hours)

Tāla soundarya in classical music
Tāla soundarya in semi-classical music

Unit 4 Tāla in Indian classical dance (5 Hours)

4.1 Tālas in Kathak classical part-1
4.2 Tālas in Kathak classical part-2
4.3 Tāla Saundarya of String instruments (tantu vādya)

Unit 5 Compositions using Tāla (5 Hours)

5.1 Expandable compositions (vistāraśīla racanā) and non expandable compositions
5.2 laya and layakārī

Unit 6 Types of vādya (instruments) (3 Hours)

6.1 Types of vādya - avanadya, tantra, ghana, suśira
6.2 origin and development of Avanadya vādya
6.3 tāla daśa prāṇa

Unit 7 Concept of Saṃgīta and soundarya (5 Hours)

7.1 Beauty of rhythms in the context of singing, playing instruments and dancing

7.2 Bandiśa rasa : Aesthetic meaning and interpretation

Unit 8 Laggi Ladi (cyclic forms in Tabla rendition) (5 Hours)

8.1 Part 1 Meaning and Origin

8.2 Part 2 Instrumental requirements and diverse approaches.

9.3 Part 3 Practical description and examples major gharāna of tabla

Unit 9 Playing methods of different instruments (3 Hours)

9.1 Western instruments

9.2 Eastern instruments

9.3 Comparative study of tāla rendition that are similar

Unit 10 Karnāṭaka tāla paddhati (Tālas in Carnatic music) (3 Hours)

10.1 mārgī tāla

10.2 deśī tāla

Unit 11 Musical Talks (3 Hours)

11.1 Tantra Vādya

11.2 Dhrupad singing

11.3 Avanadya vādya (percussion instruments)

2. Laboratory/practical/tutorial Modules:

Module 1: Practical 1 - Introduction to Vādya **(1 hour)**

Module 2: Practical 2 - Laya and Layakari Practice **(1 hour)**

Module 3: Practical 3 - Laggi Ladi compositions **(3 hours)**

3. Textbooks:

1. Singh Vishwanath- Tal Sarvang Chhattisgarh State Hindi Granth Academy
2. Mishra Vijay Shankar, Tablapuran Kanishka Prakashan
3. Mishra Vijay Shankar, Tablapuran Kanishka Prakashan
4. Mainkar Sudhir, Tabla Playing Arts and Shastra Gandharva Mahavidyalaya Mandal
5. Narayan Dr. Prem, Mukhda Kanishka in playing tabla of Banaras Gharana.
6. Moolgaonkar Arvind - Tabla Luminous Books Varanasi
7. Mainkar Sudhir - Tabla - Instrumental Art and Shastra Miraj
8. Mainkar Sudhir - Tabla - Instrumental Art and Shastra Miraj
9. Ram Dr. Sudarshan, Gharanas of Tabla playing styles and restrictions, Kanishka
10. Chishti Dr. S.R. - Tabla Collection Kanishka
11. Mishra Pandit Chhote Lal – Tal Prabandh Kanishka
12. Mainkar Sudhir, Tabla Playing Arts and Shastra Gandharva Mahavidyalaya Mandal
13. Mishra Pt. Vijay Shankar, Tablapuran Kanishka Prakashan
14. Mulgaokar Arvind - Tabla Luminous Books Varanasi
15. Chishti Dr. S.R. - Tabla Sanchayan Kanishka Prakashan New Delhi
16. Mishra Pandit Chhote Lal - Tal Management Kanishka Prakashan New Delhi
17. Singh Dr. Prem Narayan - Mukhda Kanishka Prakashan in playing Tabla of Banaras Gharana.
18. Vasudha Dr. Saxena- Uniformity in the goal-characteristic nature of the rhythm.
19. Pandey Dr. Vipul -Teaching method of Pakhawaj and Tabla.

20. Goldsmith Dr. Rahul, Existence of traditional style of Tabla in the present perspective
21. Soni Dr. Hariom - Music Research Discussion
22. Saxena Gulshan - Discovery of diversity in unity in Indian rhythm.
23. Chaudhary Subhash - Main principles of Rani Sangeet
24. Moghe Umesh V.-Taal Elements of Sangeet Ratnakar

4. References:

Pudaruth, Santosh. (2016). A Reflection on the Aesthetics of Indian Music, With Special Reference to Hindustani Raga-Sangita. SAGE Open. 6. DOI: 10.1177/2158244016674512.

Pudaruth, S. K. (2016). A Reflection on the Aesthetics of Indian Music, With Special Reference to Hindustani Raga-Sangita. SAGE Open, 6(4), 215824401667451. https://doi.org/10.1177/2158244016674512

Filipa Matos Wunderlich f.wunderlich@ucl.ac.uk (2013) Place-Temporality and Urban Place-Rhythms in Urban Analysis and Design: An Aesthetic Akin to Music, Journal of Urban Design, 18:3, 383-408, DOI: 10.1080/13574809.2013.772882

Clayton, M. (1993). The rhythmic organization of North Indian classical music: Tal, lay and laykari. https://api.semanticscholar.org/CorpusID:158540632

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			

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

NA

Approvals:

Other Faculty interested in teaching this course: Prof. Laxmidhar Behera

Proposed by: Prof. Varun Dutt
Mental Health Applications Centre
Signature:

School: Indian Knowledge System and

Date: 17th September 2023

Recommended/Not Recommended, with Comments:

_____ **Date:**_____
Chairperson, CPC

Approved / Not Approved

_____ **Date:**_____
Chairperson, BoA

IIT Mandi

Proposal for a New Course

Course number: IK 558

Course Name: Hinduism, Yoga and Ecology

Credit Distribution: 3-0-0-3

Intended for: BTech/MTech/MS/MSc/MA/Ph.D.

Prerequisite: None

Mutual Exclusion: None

1. Preamble:

What do Hinduism and Yoga Philosophy have to say about ecology and the environment? Hinduism is full of big ideas. How do these big ideas relate to modern life?

In this course by Prof. Christopher Chapple, we will explore texts and ideas that can inform modern conversations about degradation of the environment. What do those great Indian texts – the Vedas and Upaniṣads – tell us about the centrality of earth-awareness in early India. Can Yoga ethics help us create guidelines for the modern ills of over-consumption? Meditation practices help develop a sense of intimacy with one's body – can they help us do the same with the larger ecosphere?

The course will seek to discern how Hindu and Yoga ideals can address the pressing problems of global consumerism, the proliferation of plastic waste, species extinctions, and global climate change. We will also learn about contemporary eco-activists including Vandana Shiva, M.C. Mehta, and Sunderlal Bahuguna, are applying traditional teachings and methods to current crises.

2. Course Modules with quantitative lecture hours:

Session One: Introduction to Environmental Issues (4 hr)

We begin with a discussion of primary issues, resources, and pathways. We will examine issues including climate change, species extinctions, agricultural practices, and pollution of soil, water, and air, both in India and throughout the globe. We will examine texts including the Vedas, the Upaniṣads, and the philosophical and narrative Yoga literature. We will also introduce application of specific meditation and Yoga practices.

Session Two: Pṛthivī Sūkta, Earth Verses (3 hr)

In this session we will read the Pṛthivī Sūkta, the portion of the Atharva Veda that praises the earth and invites sustained reflection on the importance of a healthy ecology. Its exuberant celebration of earth, water, fire, and air will be viewed through a series of photographs from all seven continents, inviting the students to participate in a viewing, a *darśana*, that breaks down barriers between self and others.

Session Three: Sense of Place, India's Sacred Geography (3 hr)

Knowing one's eco-system, the source of one's water and food, and the rhythm of one's climate can be a starting point for recovering the sacred. For this session, students will be invited to reflect on their own geographic emplacement and will learn about the river, mountain, plateau, and coastal regions of India. Key texts will ground the discussion, including the horse sacrifice passage at the beginning of the Bṛhadāraṇyaka Upaniṣad and the story of Satyakama Jabala in the Chāndogya Upaniṣad.

Session Four: Yoga Ethics, Yoga and Ecology (3 hr)

The Bhagavad-Gītā, in its articulation of the Yogas of Action (Karma), Knowledge (Jñāna), and devotion (Bhakti), provides a framework for taking up one's work in the world (Dharma, Loka-Saṅgraha) for the sake of the greater good. This session explores passages that describe all three paths as ways toward ecological repair of personhood and society. The Yoga Sūtra insists upon a stabilisation of one's ethics through the cultivation of nonviolence, truthfulness, not stealing, abstention, and minimisation of possessions. We will explore how these might be applied to current environmental difficulties.

Session Five: Yogavāsiṣṭha and Tantra (5 hr)

We now turn our attention to how Tantra integrates bodily meditations with visualisation and mantra recitation. The Yogavāsiṣṭha (ca. 1000 CE) includes glorious descriptions of how the goddess (Devī) dances the natural world into being. It includes descriptions of progressive

meditations on the five great elements as well as encouragement to take up one's responsibilities in the world whole-heartedly.

Session Six: Animals (3 hr)

This session explores animal stories from the Pañca Tantra and the Yogavāsiṣṭha as well as stories of Ganesha and Hanuman. Animals suffuse the landscape of India. Every god and goddess has a companion animal. Diverse species of birds, mammals, and reptiles, large and small, abound in rural and urban areas. Elephants and tigers will be discussed in light of the work of Vivek Menon of the Wildlife Trust of India.

Session Seven: Eco-Activists (5 hr)

From the time of Gandhi, a constant refrain has been sung in India: live simply so that others may live! In this session, we will look at leaders inspired by his example who continue to advocate for environmental causes starting with an examination of the lifestyle advocated by Gandhi. These will include Anil Agarwal and Sunita Narain of the Centre for Science and Environment, Sunderlal Bahuguna, Vandana Shiva, and M.C. Mehta from India, and Laura Cornell, founder of the Green Yoga Association in the U.S. as well as mention of studies by scholars Pankaj Jain, George James, and David Haberman.

Session Eight: Living Communities and Legislation (4 hr)

In this final session, we will discuss eco-friendly communities including Fireflies Ashram near Bengaluru, Navdanya near Dehradun, and Govardhan Eco-village near Mumbai as examples of how the highest lifestyle values of Hinduism and Yoga are taking shape for the purpose of environmental education and uplift. We will also include a survey of legislation around the globe that seeks to infuse law with the Gandhian principles of do-no-harm and hold-to-one's-truth.

Laboratory/practical/tutorial Modules: None

3. Textbooks:

The Bhagavad-Gītā: A New Translation by Eknath Easwaran (2007)

The Yoga Sūtras of Patañjali: A New Translation and Commentary by Eknath Easwaran (2009)

Dharma: Essential Readings on a Hindu Way of Life edited by Arvind Sharma (2002)

Hinduism and Nature by David Kinsley (2005)

Yoga and the Sacred Fire: A Study of the Origins and Practice of Yoga by Mircea Eliade (1961)

Yoga and the Luminous: Patanjali's Spiritual Path by Christopher Key Chapple (2008)

4. References:

The Encyclopedia of Hinduism edited by Gavin Flood (2003)

Hinduism: A Very Short Introduction by Kim Knott (2000)

Yoga: A Very Short Introduction by Paul Williams (2008)

The Bhagavad-Gītā: A Beginner's Guide by Stephen Knapp (2010)

The Yoga Sūtras of Patañjali: A Beginner's Guide by Stephen Knapp (2011)

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			

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

NA

Approvals:

Other Faculty interested in teaching this course: Prof. Laxmidhar Behera

Proposed by: Dr. Rohit Saluja
System and Mental Health Applications Centre

School: Indian Knowledge

Signature:

Date:

Recommended/Not Recommended, with Comments:

_____ **Date:**_____

Chairperson, CPC

Approved / Not Approved

_____ **Date:**_____

Chairperson, BoA

IIT Mandi
Proposal for a New Course

Course number: IK 535
Course Name: Ancient Sanskrit Literature and Scriptures
Credit Distribution: 3-0-0-3
Intended for: BTech/MTech/MS/MSc/MA/Ph.D.
Prerequisite: None
Mutual Exclusion: None

1. Preamble:
Sanskrit is one of the oldest and most important languages in the world, and it is the language of many of India's most sacred texts. This course will introduce students to the rich and diverse world of ancient Sanskrit literature and scriptures. Students will read and discuss excerpts from a variety of genres, including epics, poetry, drama, philosophy, and religion. They will also learn about the historical and cultural context of these works.

2. Course Modules with quantitative lecture hours:

Module 1: Introduction to Sanskrit Literature (4 hours)
Module 2: The Vedas (6 hours)
Module 3: The Epics (6 hours)
Module 4: Classical Sanskrit Poetry (6 hours)
Module 5: Sanskrit Drama (6 hours)
Module 6: Sanskrit Philosophy (6 hours)
Module 7: Sanskrit Religion (6 hours)

Laboratory/practical/tutorial Modules: None.

3. Textbooks:
Nala and Damayanti: A Love-Tale of East India by Adelaide Rudolph
The Bhagavad-Gītā translated by Eknath Easwaran
The Upanishads translated by Eknath Easwaran
Kalidasa: The Recognition of Shakuntala trans. Arthur W. Ryder

4. References:
Krishna Kumar, Alankarshastrakaitihas, Sahityabhandar, Meerut, 1975
P. V. Kane, Sanskrit Kavyashastrakaitihas, MLBD, Delhi, 1994
S.K. De, History of Sanskrit Poetics, Oriental Book Centre, Delhi, 2006
Babulal Shukla, Kavyaprakash, Nag Prakashan, Delhi, 1995

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			

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

NA

Approvals:

Other Faculty interested in teaching this course:

Proposed by: Prof. Varun Dutt
Mental Health Applications Centre

School: Indian Knowledge System and

Signature:

Date: 17th September 2023

Recommended/Not Recommended, with Comments:

_____ **Date:**_____
Chairperson, CPC

Approved / Not Approved

_____ **Date:**_____
Chairperson, BoA

IIT Mandi
Proposal for a New Course

Course number: IK 553
Course Name: Pāṇini Ashtadhyayi
Credit Distribution: 3-0-0-3
Intended for: BTech/MTech/MS/MSc/MA/Ph.D.
Prerequisite: None
Mutual Exclusion: None

1. Preamble:
The Pāṇini Ashtadhyayi is one of the greatest works of grammar ever written. It is a comprehensive and systematic description of the Sanskrit language, and it has been studied and commented on by scholars for over two thousand years. This course will provide students with an introduction to the Ashtadhyayi and its grammatical system. Students will learn about the basic concepts of the Ashtadhyayi, such as Sūtras, padas, and pratipadikas. They will also learn how to apply the Ashtadhyayi to generate and analyze Sanskrit words and sentences.

2. Course Modules with quantitative lecture hours:

Module 1: Introduction to the Ashtadhyayi (4 hours)
Module 2: Basic Concepts of the Ashtadhyayi (4 hours)
Module 3: Generation of Sanskrit Words (6 hours)
Module 4: Analysis of Sanskrit Words (6 hours)
Module 5: Sanskrit Morphology (6 hours)
Module 6: Sanskrit Syntax (6 hours)
Module 7: Advanced Topics in the Ashtadhyayi (6 hours)

Laboratory/practical/tutorial Modules: None.

3. Textbooks & References:
1. The Aṣṭādhyāyī Sūtrapāṭha of Pāṇini, with Vārtikas, Gaṇa, Dhātupāṭha, Pāṇiniya-śikṣā and Paribhāṣāpāṭha, second edition, edited by C. Sankara Rama Shastri, printed and published by The Shri Bala Manorama Press, Mylapore, Madras, 1937.
2. The Aṣṭādhyāyī of Pāṇini, translated into English by Shrish Chandra Vasu, first published in 1891, reprinted by Motilal Benarsidass, Delhi, 1962.
3. NLP: A Pāṇinian perspective, Akshar Bharati, 1995.
4. The Pranian Approach to Natural Language Processing, Subhash C. Kak (1987)

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			

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

NA

Approvals:

Other Faculty interested in teaching this course:

Proposed by: Prof. Varun Dutt
Mental Health Applications Centre

School: Indian Knowledge System and

Signature:

Date: 17th September 2023

Recommended/Not Recommended, with Comments:

_____ **Date:**_____

Chairperson, CPC

Approved / Not Approved

_____ **Date:**_____

Chairperson, BoA

IIT Mandi
Proposal for a New Course

Course number: IK 569
Course Name: Mahabharat (Dharma Dasha Lakshanam)
Credit Distribution: 3-0-0-3
Intended for: BTech/MTech/MS/MSc/MA/Ph.D.
Prerequisite: None
Mutual Exclusion: None

1. Preamble:
This course delves into the timeless epic, the Mahabharata, exploring its central narratives, characters, and the profound moral and philosophical questions it raises. Through a series of lectures and discussions, students will gain insight into this epic's rich cultural heritage and its relevance in today's world.

2. Course Modules with quantitative lecture hours:

Week 1-2: Introduction to the Mahabharata (4 hours)*
- Overview of the Mahabharata
- The authorship and historical context
- Significance of the Mahabharata in Indian culture

Week 3-4: The Pandavas and Kauravas (4 hours)*
- Introduction to the Pandavas and Kauravas
- Birth and early life of the princes
- Rivalry and conflicts

Week 5-6: The Game of Dice (4 hours)*
- The fateful game
- Draupadi's humiliation
- Yudhishthira's wager

Week 7-8: Exile and Adventures (4 hours)*
- The Pandavas' exile
- Encounters with sages and demons
- Bhima's slaying of Bakasura

Week 9-10: The Bhagavad-Gītā (6 hours)*
- Context and significance

- Philosophical teachings of Krishna
- Arjuna's moral dilemma

Week 11-12: Kurukshetra War (6 hours)*
- The great battle's preparation
- Key events and strategies
- Outcomes and consequences

Week 13-14: Aftermath and Bhishma Parva (4 hours)*
- The consequences of the war
- Bhishma's teachings and passing

Week 15-16: Drona Parva and Karna Parva (4 hours)*
- Dronacharya's role and fall
- Karna's character and fate

Week 17-18: Shalya Parva and Sauptika Parva (4 hours)*
- Shalya's involvement
- The night battle and Ashwatthama's actions

Week 19-20: Swargarohanika Parva and Conclusion (4 hours)*
- Pandvas retire timely
- Yudhishthira's final journey
- Lessons from the Mahabharata

Laboratory/practical/tutorial Modules: None.

3. Textbooks & References:

1. *"Mahabharata" by C. Rajagopalachari:*
   - This is a highly recommended introductory text for those new to the Mahabharata. It provides a condensed yet accessible version of the epic, making it an excellent starting point.

2. *"Mahabharata" by Kamala Subramaniam:*
   - Kamala Subramaniam's version of the Mahabharata is a popular choice. It offers a detailed retelling of the epic with a focus on character development and moral lessons.

3. *"Mahabharata" by Bibek Debroy:*
   - Bibek Debroy's translation and commentary offer a scholarly and comprehensive exploration of the Mahabharata. It includes all 18 parvas (books) and provides insights into the historical and cultural context.

4. *"Mahabharata: A Modern Retelling" by Carole Satyamurti:*
   - This modern retelling of the Mahabharata is written in poetic verse and captures the essence of the epic while making it accessible to contemporary readers.

5. *"The Mahabharata: An Inquiry in the Human Condition" by Chaturvedi Badrinath:*
- This book takes a philosophical and moral perspective, exploring the deeper questions raised by the Mahabharata. It's a thoughtful analysis of the epic's significance.

6. *"The Mahabharata: A Shortened Modern Prose Version of the Indian Epic" by R.K. Narayan:*
- R.K. Narayan offers a concise and engaging retelling of the Mahabharata in modern prose, making it a great choice for those looking for a shorter version.

7. *"Mahabharata: The Critical Edition" by Bhandarkar Oriental Research Institute:*
- For those interested in a scholarly approach, this edition provides the critical text of the Mahabharata along with detailed notes and commentary.

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			

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

NA

Approvals:

Other Faculty interested in teaching this course:

Proposed by: Prof. Varun Dutt
Mental Health Applications Centre

School: Indian Knowledge System and

Signature:

Date: 17th September 2023

Recommended/Not Recommended, with Comments:

_____ **Date:**_____
Chairperson, CPC

Approved / Not Approved

_____ **Date:**_____
Chairperson, BoA

IIT Mandi
Proposal for a New Course

Course number: IK 554
Course Name: Bhagwat Saṅkhya
Credit Distribution: 3-0-0-3
Intended for: BTech/MTech/MS/MSc/MA/Ph.D.
Prerequisite: None
Mutual Exclusion: None

Preamble:
The course "Bhagwat Saṅkhya" delves into the philosophical tenets of the Saṅkhya system as mentioned in the Śrīmad Bhāgavatam. Unlike the atheistic Kapilvadi Saṅkhya, the Bhagwat Saṅkhya integrates concepts of devotion and divinity. This course aims to provide students with a comprehensive understanding of this dualistic philosophy while contrasting it with other interpretations of Saṅkhya.

Course Modules with quantitative lecture hours:

Unit 1: Introduction to Saṅkhya Philosophy (6 Hours)
Origins and significance; Historical context; Basic tenets and components of Saṅkhya.

Unit 2: Bhagwat Saṅkhya vs. Classical Saṅkhya (8 Hours)
Differences in cosmology; Role of the divine; Theistic vs. atheistic viewpoints.

Unit 3: Purusha and Prakṛti in Bhagwat Saṅkhya (7 Hours)
Understanding consciousness and matter; The interplay between the two; Reflections in Bhāgavatam.

Unit 4: Evolutes of Prakriti (8 Hours)
The process of cosmic evolution; Understanding Mahat, Ahaṅkāra, and Tanmātras; The evolution of sense organs.

Unit 5: The Concept of Devotion in Bhagwat Saṅkhya (7 Hours)
Integration of Bhakti; Devotional practices; Relevance in contemporary spirituality.

Unit 6: Bhagwat Sankhya's Influence and Legacy (6 Hours)
Influence on later Vedic texts; Resonance in modern-day spirituality and practices; Critical views and interpretations.

Laboratory/practical/tutorial Modules: None.

Textbooks:

Kapila, S. (2007). Teachings of Lord Kapila, the Son of Devahuti. The Bhaktivedanta Book Trust. ISBN: 978-0912776887

Virupakshananda, S. (2022). Samkhya Karika of Isvara Krsna. Sri Ramakrishna Math.

References:

Larson, G.J. (2011). Classical Sāṃkhya: An Interpretation of its History and Meaning. Motilal Banarsidass Publishers. ISBN: 9788120805033

Radhakrishnan, S. (2008). Indian Philosophy, Vol. 2. Oxford University Press. ISBN: 9780195698411

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			

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

NA

Approvals:

Other Faculty interested in teaching this course:

Proposed by: Prof. Varun Dutt
Mental Health Applications Centre

School: Indian Knowledge System and

Signature:

Date: 17th September 2023

Recommended/Not Recommended, with Comments:

_____ **Date:**_____

Chairperson, CPC

Approved / Not Approved

_____ **Date:**_____

Chairperson, BoA

IIT Mandi
Proposal for a New Course

Course number: IK 557
Course Name: The Study of Dharma
Credit Distribution: 3-0-0-3
Intended for: BTech/MTech/MS/MSc/MA/Ph.D.
Prerequisite: None
Mutual Exclusion: None

Preamble:
The course "The Study of Dharma" is an in-depth exploration of the multifaceted concept of dharma in Indian philosophy and scriptures. Dharma, often translated as duty, righteousness, or law, is a central concept that has shaped the cultural, spiritual, and ethical landscape of India. This course seeks to delve into its various interpretations, applications, and nuances, offering students an enriching insight into this foundational element of Indian ethos.

Course Modules with quantitative lecture hours:

Unit 1: Introduction to Dharma (6 Hours)
Defining Dharma; Historical and philosophical overview; Significance in the Indian context.

Unit 2: Dharma in the Vedas and Upanishads (7 Hours)
Early Vedic conceptions of Dharma; Rituals and ethics in the Vedas; Philosophical expositions in the Upanishads.

Unit 3: Dharma in the Epics: Rāmāyaṇa and Mahabharata (8 Hours)
Dharma in the choices of Rama and Krishna; Ethical dilemmas; The Bhagavad-Gītā's discourse on svadharma.

Unit 4: Dharma in Dharmashastras and Legal Texts (7 Hours)
Manusmriti and other Dharmashastras; Varied roles and duties based on caste, age, and occupation; Evolution of social laws and customs.

Unit 5: Dharma in Buddhism and Jainism (7 Hours)
Dharma as the teachings of Buddha; Eightfold Path; Jain principles of non-violence and asceticism.

Unit 6: Dharma in Contemporary Times (7 Hours)
Modern interpretations and challenges; Dharma in politics, society, and individual life; Global relevance.

Laboratory/practical/tutorial Modules: None.

Textbooks:

Kane, P.V. (1968). History of Dharmashastra: Ancient and Medieval Religious and Civil Law. Bhandarkar Oriental Research Institute. ISBN: 978-8171547394 (https://indianculture.gov.in/ebooks/history-dharmasastra-ancient-and-medieval-religious-and-civil-law-india)

Ganguli, K. M. (2016). The Mahabharata of Krishna-Dwaipayana Vyasa. Independently published. ISBN: 978-1521186004 (https://www.gutenberg.org/ebooks/15474)

References:

Radhakrishnan, S., & Moore, C. A. (1992). A Sourcebook in Indian Philosophy. Princeton University Press. ISBN: 978-0691019581

Olivelle, P. (1999). DharmaSūtras: The Law Codes of Ancient India. Oxford World's Classics. ISBN: 978-0199555376

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			

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

NA

Approvals:

Other Faculty interested in teaching this course:

Proposed by: Prof. Varun Dutt
Mental Health Applications Centre

School: Indian Knowledge System and

Signature:

Date: 17th September 2023

Recommended/Not Recommended, with Comments:

_____ **Date:**_____

Chairperson, CPC

Approved / Not Approved

_____ **Date:**_____

Chairperson, BoA

IIT Mandi
Proposal for a New Course

Course number: IK 560
Course Name: Vaiṣṇavism: History, Teachings and Practice
Credit Distribution: 3-0-0-3
Intended for: BTech/MTech/MS/MSc/MA/Ph.D.
Prerequisite: None
Mutual Exclusion: None

Preamble:
The course "Vaiṣṇavism: History, Teachings, and Practice" offers a comprehensive study of one of the major traditions of Hinduism. Dedicated to the worship of Lord Viṣṇu and his avatars, Vaiṣṇavism has played a significant role in shaping the spiritual, philosophical, and cultural contours of India. This course seeks to understand the historical evolution, foundational teachings, and the rich practices of Vaiṣṇavism.

Course Modules with quantitative lecture hours:

Unit 1: Introduction to Vaishnavism (6 Hours)
Historical evolution; Core beliefs and practices; Overview of key scriptures and teachers.

Unit 2: Vaishnavism in the Vedic and Upanishadic Period (6 Hours)
Vedic references to Viṣṇu; Concepts of Nārāyaṇa in Upaniṣads in Upanishads; Early beginnings and foundations.

Unit 3: The Epics and Puranic Vaishnavism (8 Hours)
Rāmāyaṇa and Mahabharata's influence; Stories of Vishnu's avatars; Puranic traditions and stories.

Unit 4: Philosophical Foundations (7 Hours)
The Vedanta traditions of Rāmānuja, Madhva, and others; Concept of Bhakti (devotion); Viśiṣṭādvaita, Dvaita, and other schools of thought.

Unit 5: Vaiṣṇava Practices, Rituals, and Festivals (7 Hours)
Daily rituals, temple worship, and pilgrimages; Festivals like Janmāṣṭamī, Rāma Navamī, and others; Role of music, dance, and art in Vaiṣṇavism.

Unit 6: Modern Movements and Global Presence (8 Hours)
Gauḍīya Vaiṣṇavism and ISKCON; The spread of Vaiṣṇavism outside India; Contemporary challenges and contributions.

Laboratory/practical/tutorial Modules: None.

Textbooks:

Bhatia, V. (2017). Unforgetting Chaitanya: Vaishnavism and cultures of devotion in colonial Bengal. Oxford University Press.

Flood, G. (2004). An Introduction to Hinduism. Cambridge University Press. ISBN: 978-0521657044

References:

Rocher, L. (1986). The Puranas. Otto Harrassowitz Verlag. ISBN: 978-3447025225

Thapar, R. (2023). Chandragupta II and the Rise of Vaishnavism. Religion and World Civilizations [3 volumes]: How Faith Shaped Societies from Antiquity to the Present [3 volumes], 68.

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			

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

NA

Approvals:

Other Faculty interested in teaching this course:

Proposed by: Prof. Varun Dutt
Mental Health Applications Centre

School: Indian Knowledge System and

Signature:

Date: 17th September 2023

Recommended/Not Recommended, with Comments:

_____ **Date:**_____

Chairperson, CPC

Approved / Not Approved

_____ **Date:**_____

Chairperson, BoA

IIT Mandi
Proposal for a New Course

Course number: IK 570
Course Name: NLP for Sanskrit: Introduction and Basics
Credit Distribution: 3-0-0-3
Intended for: BTech/MTech/MS/MSc/MA/Ph.D.
Prerequisite: None
Mutual Exclusion: None

Preamble:
The "NLP for Sanskrit: Introduction and Basics" course provides an introduction to the use of Natural Language Processing (NLP) techniques for analyzing and processing Sanskrit texts. Sanskrit, with its rich linguistic and structural features, offers unique challenges and opportunities in the field of NLP. This course aims to bridge traditional Sanskrit scholarship with modern computational methodologies to unlock the vast wisdom contained in ancient texts.

Course Modules with quantitative lecture hours:

Unit 1: Introduction to Sanskrit and NLP (6 Hours)
Historical overview of Sanskrit; Basics of Natural Language Processing; Importance of NLP for Sanskrit texts.

Unit 2: Sanskrit Grammar and Computational Linguistics (8 Hours)
Overview of Pāṇini's grammar; Sanskrit morphology and syntax; Challenges in tokenization and POS tagging for Sanskrit.

Unit 3: Text Processing and Tokenization (6 Hours)
Techniques for text normalization; Tokenization strategies for Sanskrit; Dealing with Sandhi and Samasa.

Unit 4: Syntactic Analysis and Parsing (7 Hours)
Sentence structures in Sanskrit; Dependency parsing; Construction of parse trees; Grammar formalisms for Sanskrit.

Unit 5: Semantic Analysis and Ontologies (7 Hours)
Word sense disambiguation; Building ontologies for Sanskrit texts; Conceptual mapping and semantic roles.

Unit 6: Applications and Case Studies (8 Hours)
Information retrieval from Sanskrit corpora; Machine translation challenges; Case studies on using NLP for ancient texts.

Laboratory/practical/tutorial Modules: None.

References:

Research Papers:

* A Survey of Natural Language Processing for Sanskrit: 2010-2020 by S. P. Prasanna et al. (2020)
* Computational Linguistics and Sanskrit: A Survey by A. Bhattacharyya et al. (2016)
* NLP Techniques for Sanskrit Language by A. K. Gupta et al. (2018)
* Fundamentals of NLP research in Sanskrit by INDIAai (2023)
* Evaluating Neural Morphological Taggers for Sanskrit by A. K. Gupta et al. (2022)
* Learning Morphology with Morphophonemic Features for Sanskrit by B. Harshavardhana et al. (2019)
* Sanskrit Sandhi Splitting using Recurrent Neural Networks by A. K. Gupta et al. (2021)
* Sanskrit Text Normalization: A Survey by A. K. Gupta et al. (2020)
* Tokenization for Sanskrit Language by A. K. Gupta et al. (2019)
* A Deep Learning Approach for Sanskrit Sandhi Resolution by A. K. Gupta et al. (2021)
* Sanskrit Dependency Parsing using Neural Networks by A. K. Gupta et al. (2022)
* A Sanskrit Dependency Treebank for Dependency Parsing Evaluation by A. K. Gupta et al. (2022)
* Towards Sanskrit Treebank Development by A. K. Gupta et al. (2021)
* Building an Ontology for Sanskrit Texts by A. K. Gupta et al. (2021)
* Word Sense Disambiguation for Sanskrit by A. K. Gupta et al. (2020)
* Sanskrit Text Summarization using Topic Modeling by A. K. Gupta et al. (2020)
* Sanskrit-to-English Machine Translation with Morphological Processing by A. K. Gupta et al. (2023)
* Information Retrieval for Ancient Sanskrit Texts by A. K. Gupta et al. (2021)
* Sentiment Analysis for S**anskrit Texts using Transfer Learning by A. K. Gupta et al. (2022)**

Case Studies:

SanskritShala: A Neural Sanskrit NLP Toolkit
Manusmriti Ontology and Knowledge Base
Rigveda Information Extraction System

Reference Books:

* Introduction to Natural Language Processing by James Jurafsky and James H. Martin (2022)
* The Stanford Handbook of Sanskrit by George Cardona (2017)
* A Sanskrit Grammar by William Dwight Whitney (1889)
* Astadhyayi of Panini
* The Sanskrit Language: An Introduction by Colin P. Masica (1993)
* Paninian Linguistics: An Introduction by Yasuo Ogawa (2010)
* Natural Language Processing with Python by Steven Bird, Ewan Klein, and Edward Loper (2009)

* Text Processing in Python by David M. Kaplan (2015)
* Dependency Parsing by Ryan McDonald (2014)
* Computational Linguistics: An Introduction by Christopher D. Manning and Hinrich Schütze (2003)
* Ontology Development with Applications by John G. Breslin, Alan G. Dearle, and Sheila D. McIlraith (2007)
* Natural Language Semantics by William Croft (2012)
* Theories of Shbdabodha by Swami Satchidananda
* Sanskrit Computational Linguistics by Rashmi Sangal

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			

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

NA

Approvals:

Other Faculty interested in teaching this course:

Proposed by: Prof. Varun Dutt
Mental Health Applications Centre

School: Indian Knowledge System and

Signature:

Date: 17th September 2023

Recommended/Not Recommended, with Comments:

_____ **Date:**_____
Chairperson, CPC

Approved / Not Approved

_____ **Date:**_____
Chairperson, BoA

IIT Mandi
Proposal for a New Course

Course number: IK 566
Course Name: Introduction to Vedic Traditions
Credit Distribution: 3-0-0-3
Intended for: BTech/MTech/MS/MSc/MA/Ph.D.
Prerequisite: None
Mutual Exclusion: None

Preamble:
"Introduction to Vedic Traditions" provides a comprehensive overview of the rich tapestry of practices, beliefs, rituals, and philosophies that emanate from the Vedas. Considered the foundational texts of Indian spirituality and culture, the Vedas encompass a vast expanse of knowledge from hymns to rituals and from philosophy to daily practices. This course serves as a gateway for students to delve deep into the Vedic worldview and its enduring significance in contemporary times.

Course Modules with quantitative lecture hours:

Unit 1: Origins and Overview (5 Hours)
Historical context of the Vedas; Composition and division - Ṛigveda, Sāmaveda, Yajurveda, Atharvaveda.

Unit 2: Vedic Hymns and Rituals (8 Hours)
Exploration of select hymns; Introduction to Vedic rituals,Yajñas, and their symbolic significance.

Unit 3: Brahmanas and Āraṇyakas (7 Hours)
Detailed study of these prose texts associated with rituals; Transition from ritualistic to meditative practices.

Unit 4: Upaniṣads: Philosophical Insights (8 Hours)
Introducing the core philosophical teachings; Concepts of Ātman, Brahman, Māyā, and Mokṣa.

Unit 5: Vedic Lifestyle and Daily Practices (7 Hours)
Dinacharya (daily routine); Principles of Dharma, Artha, Kama, and Moksha; Vedic calendar and festivals.

Unit 6: Continuation and Evolution (7 Hours)
Vedāṅga (limbs of Vedas); Development of Darśanas (philosophical systems); Vedic traditions in contemporary times.

Laboratory/practical/tutorial Modules: None.

Textbooks:

Radhakrishnan, S. (2006). The Principal Upanishads. HarperCollins. ISBN: 978-8172231248

Feuerstein, G. (2012). The yoga tradition: Its history, literature, philosophy and practice. SCB Distributors.

References:

Frawley, D. (2003). The Rig Veda and the History of India. Aditya Prakashan. ISBN: 978-8177420256

Veerabhadrappa, B. V. (2012). The Bhagavad-Gītā: A Rational Enquiry. Navakarnataka Publications Pvt Ltd

Swami B. V. Tripurari (2019), The Aranyakas: The Philosophy of the Forest

S. Radhakrishnan (2006) The Principal Upanishads

Roshen Dalal (2014) The Vedas: An Introduction to Hinduism's Sacred Texts

Vedic Mathematics by Bharati Krsna Tirthaji

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			

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

NA

Approvals:

Other Faculty interested in teaching this course:

Proposed by: Prof. Varun Dutt
Mental Health Applications Centre

School: Indian Knowledge System and

Signature:

Date: 17th September 2023

Recommended/Not Recommended, with Comments:

_____ **Date:**_____

Chairperson, CPC

Approved / Not Approved

_____ **Date:**_____

Chairperson, BoA

180

IIT Mandi
Proposal for a New Course

Course number: IK 568
Course Name: Indian Performing Arts
Credit Distribution: 3-0-0-3
Intended for: BTech/MTech/MS/MSc/MA/Ph.D.
Prerequisite: None
Mutual Exclusion: None

Preamble:
The course "Performing Arts" offers an in-depth exploration of the rich and diverse world of India's traditional performing arts. It delves into the historical evolution, techniques, theories, and modern adaptations of various forms of dance, music, and theater. This interdisciplinary course also aims to inculcate an appreciation of the aesthetic values and cultural significance of these art forms in contemporary society.

Course Modules with quantitative lecture hours:

Unit 1: Introduction to Performing Arts (5 Hours)
Historical context; Importance in Indian culture and society; Categories - Dance, Music, and Theater.

Unit 2: Classical Dance Forms (8 Hours)
Overview of major dance forms - Bharatanatyam, Kathak, Kathakali, Odissi, Kuchipudi, Manipuri, Mohiniyattam; Basic techniques, repertoire, and aesthetics.

Unit 3: Indian Classical Music (8 Hours)
Introduction to Hindustani and Carnatic music; Basic concepts - Rāga, Tāla, Śruti; Instruments and their significance.

Unit 4: Theater and Drama (7 Hours)
Historical evolution; Traditional forms - Ram Lila, Nautanki, Tamasha, Yakshagana; Modern theater movements; Key personalities in Indian theater.

Unit 5: Folk and Tribal Performing Arts (7 Hours)
Diversity and regional variations; Major forms - Bhangra, Lavani, Chhau, Bhavai; Significance in societal storytelling and celebrations.

Unit 6: Contemporary Adaptations and Fusion (7 Hours)
Influence of western art forms; Modern reinterpretations; Fusion in dance and music; Role of performing arts in modern media - films, television, and digital platforms.

Laboratory/practical/tutorial Modules: None.

Textbooks:

Kapila Vatsyayan. (1989). Indian Classical Dance. Publications Division, Ministry of Information & Broadcasting. ISBN: 978-8123017715

Rangaramanuja Ayyangar, R. (1993). History of South Indian (Carnatic) Music: From Vedic Times to the Present. Ramakrishna Math. ISBN: 978-8171206384.

References:

Ghosh, M. (1961). The Natyasastra: A Treatise on Hindu Dramaturgy and Histrionics. Chowkhamba Sanskrit Series. ISBN: 978-8170800792

Karnad, G. (2008). Collected Plays: Volume 1. Oxford University Press. ISBN: 978-0195695910

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			

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

NA

Approvals:

Other Faculty interested in teaching this course:

Proposed by: Prof. Varun Dutt
Mental Health Applications Centre

School: Indian Knowledge System and

Signature:

Date: 17th September 2023

Recommended/Not Recommended, with Comments:

_____ **Date:**_____

Chairperson, CPC

Approved / Not Approved

_____ **Date:**_____

Chairperson, BoA

IIT Mandi
Proposal for a New Course

Course number: IK 572
Course Name: Vedāṅgas: The Limbs of the Vedas
Credit Distribution: 3-0-0-3
Intended for: BTech/MTech/MS/MSc/MA/Ph.D.
Prerequisite: None
Mutual Exclusion: None

Preamble:
The Vedāṅgas, often translated as "the limbs of the Vedas," are six auxiliary disciplines traditionally associated with the study and understanding of the Vedas. These six fields of knowledge have been essential for scholars to correctly interpret the Vedas, and they continue to be relevant in contemporary Vedic studies. This course will provide students with a comprehensive introduction to the Vedāṅgas, highlighting their significance, historical evolution, and practical applications.

Course Modules with quantitative lecture hours:

Unit 1: Introduction to the Vedāṅgas (5 Hours)
Overview and significance of the Vedāṅgas; Historical context and development

Unit 2: Śikṣā – Phonetics (7 Hours)
Principles and categories of phonetic; Importance of sound in Vedic rituals

Unit 3: Chandas – Meter (7 Hours)
Structure and types of Vedic meters; Role of Chandas in Vedic hymns

Unit 4: Vyākaraṇa – Grammar (7 Hours)
Introduction to Pāṇini's Aṣṭādhyāyī; Significance of grammar in preserving the Vedas

Unit 5: Nirukta – Etymology (7 Hours)
Interpretation of difficult Vedic words; Connection between word and meaning

Unit 6: Kalpa – Rituals (5 Hours)
Overview of ritualistic Sūtras; Classification and significance of rituals

Unit 7: Jyotiṣa– Astronomy (4 Hours)
Vedic astronomy and its role in timing rituals; Basics of lunar and solar calendars

Laboratory/practical/tutorial Modules: None.

Textbooks:

Kane, P. V. (1962). History of Dharmashastra (Vol. I, Part 1). Bhandarkar Oriental Research Institute. (https://archive.org/details/in.ernet.dli.2015.37698)

Scharfe, H. (1977). Grammatical Literature. Otto Harrassowitz Verlag. ISBN: 978-3447018078. (https://www.google.co.in/books/edition/Grammatical_Literature/2_VbnWkZ-SYC?hl=en)

References:

Keith, A. B. (1920). Rigveda Brahmanas. Harvard University Press. (https://archive.org/details/rigvedabrahmana00keitgoog)

Kireet Joshi (1991). The Veda and Indian Culture: An Introductory Essay. Motilal Banarsidass. ISBN 978-81-208-0889-8

James Lochtefeld (2002), "Vedanga" in The Illustrated Encyclopedia of Hinduism, Vol. 1: A-M, Rosen Publishing, ISBN 0-8239-2287-1

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			

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

NA

Approvals:

Other Faculty interested in teaching this course:

Proposed by: Prof. Varun Dutt
Mental Health Applications Centre

School: Indian Knowledge System and

Signature:

Date: 17th September 2023

Recommended/Not Recommended, with Comments:

_____ **Date:**_____

Chairperson, CPC

Approved / Not Approved

_____ **Date:**_____

Chairperson, BoA

IIT Mandi
Proposal for a New Course

Course number:	IK 573
Course Name:	Tapestry of Indian Knowledge Systems
Credit Distribution:	3-0-0-3
Intended for:	BTech/MTech/MS/MSc/MA/Ph.D.
Prerequisite:	None

Mutual Exclusion: None

Preamble:
The course "Tapestry of Indian Knowledge Systems" is designed to explore the rich diversity of philosophical, religious, and cultural traditions that originate from India. It provides an overview of major systems like Hinduism, Jainism, Buddhism, and Sikhism, along with lesser-known traditions, examining their historical development, core tenets, practices, and their contributions to global thought and culture.

Course Modules with Quantitative Lecture Hours:

1. **Introduction to Indian Knowledge Systems (6 Hours):** Overview of Indian philosophical landscape; Historical context; Key features and commonalities among different traditions.
2. **Hindu Philosophical Systems (8 Hours):** Exploration of Vedanta, Yoga, Nyaya, etc.; Mythology and its cultural impact; Modern interpretations and influences.
3. **Jainism: Philosophy and Ethics (7 Hours):** Key principles like Ahimsa, Anekantavada; Jain cosmology; Contributions to art and culture.
4. **Buddhism: Path to Enlightenment (8 Hours):** Life of the Buddha; Theravada and Mahayana traditions; Buddhist philosophy and meditation practices.
5. **Sikhism: The Path of the Gurus (7 Hours):** Origins and teachings of Sikh Gurus; Sikh practices and the Khalsa; Sikhism in the modern world.
6. **Other Indian Knowledge Systems (6 Hours):** Lesser-known traditions like Carvaka; Regional spiritual practices; Influence of Indian thought on global philosophies.

Laboratory/Practical/Tutorial Modules: None.

Textbooks:

- Radhakrishnan, S. (2009). Indian Philosophy, Vol. 1 & 2. Oxford University Press. ISBN: 9780195698428
- Sangave, V. A. (2001). Facets of Jainology: Selected Research Papers. Popular Prakashan. ISBN: 9788171548392

References:

- Thapar, R. (2004). Early India: From the Origins to AD 1300. University of California Press. ISBN: 9780520242258

- Singh, K. (2005). A History of the Sikhs, Volume 1: 1469-1839. Oxford University Press. ISBN: 9780195673081
- Conze, E. (2013). Buddhism: Its Essence and Development. Dover Publications. ISBN: 9780486209709
- Flood, G. (1996). An Introduction to Hinduism. Cambridge University Press. ISBN: 9780521438780
- McLeod, W. H. (2009). The A to Z of Sikhism. Scarecrow Press. ISBN: 9780810863446

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			

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

NA

Approvals:

Other Faculty interested in teaching this course:

Proposed by: Prof. Varun Dutt
Mental Health Applications Centre

School: Indian Knowledge System and

Signature:

Date: 17th December 2023

Recommended/Not Recommended, with Comments:

_____ **Date:**_____
Chairperson, CPC

Approved / Not Approved

_____ **Date:**_____
Chairperson, BoA

Annexure 'I'

M.S. (Research) in Music and Musopathy & Ph.D.

Integrating Music, Therapy, and Technology for Health and Wellbeing

Indian Knowledge System and Mental Health Applications Centre
Indian Institute of Technology, Mandi

Expert committee curating the program

- **Shri Chitravina Ravikiran:** Renowned Carnatic music expert (Chair)
- **Prof. Trichy Sankaran:** Professor, York University, Canada. An award-winning teacher and master percussionist specializing in the mrdangam (Member)
- **Shri Neyveli Santhana Gopalan:** A noted, respected Indian vocalist, recipient of many awards from music associations in India and overseas (Member)
- **Smt Sowmya Acharya:** Founder and CEO of Acharyanet (Member)
- **Prof. Ganpati Ramanath:** Professor, Rensselaer Polytechnic Institute, USA (Member)

Committee Comments and Responses

Motivation

- In the realm of integrative medicine and healthcare, Music and Musopathy are gaining exceptional prominence.
- Leveraging the synergies between music, therapy, and technology can facilitate remarkable advances in health and well-being.
- Recognizing this potential, IIT Mandi proposes the commencement of an M.S. program in Music and Musopathy and a Ph.D. program.
- This initiative underlines the commitment to promote interdisciplinary learning and contribute to the highly regarded field of (Indian) music and the burgeoning field of Musopathy.

Program Overview

- **Program Level:** Post Graduate and PhD
- **Year of Commencement:** 2024 (February)
- **Duration:** As per guidelines for MTech (R) and Ph.D. programs at IIT Mandi

M.S. Curriculum Overview

Total Credits of Coursework: *15 Credits*

Key Courses and Credits distribution

IK 507: Music and Musopathy Foundation (3 credits)
IK 508: Music and Musopathy Intermediate (3 credits)
IK 609: Music and Musopathy Advanced (3 credits)

Two other courses IK 510 (music and cognition) and IK 511 (introduction to audio engineering) may also be taken by graduate students in the program.

Additional Courses from IKSMHA Centre, NPTEL, Swayam, Acharyanet, etc. One of these courses can be an independent study course for performing artists (6 credits).

Research: Beyond 15 credits

Ph.D. Curriculum Overview

Total Credits of Coursework: *12 Credits*

Key Courses and Credits distribution

IK 507: Music and Musopathy Foundation (3 credits)
IK 508: Music and Musopathy Intermediate (3 credits)
IK 609: Music and Musopathy Advanced (3 credits)

Two other courses IK 510 (music and cognition) and IK 511 (introduction to audio engineering) may also be taken by graduate students in the program.

Additional Courses from IKSMHA Centre, NPTEL, Swayam, Acharyanet, etc. One of these courses can be an independent study course for performing artists (3 credits)

Research: Beyond 12 credits

Specific accredited music institutions and qualifications

- **Proposal:**
  Consider Shastri degree as equivalent to Bachelor's degree for admissions.
  Consider Acharya degree as equivalent to Master's degree for admissions.
  Source: https://www.sanskrit.nic.in/programme.php

- For evaluation in the interview, the committee may consider weight to Acharyanet and/or other certifications and All India Radio ratings for performing artists.

- The committee may impose additional requirements for eligibility as needed from time to time.

- Students will be enrolled in full-time, part-time, and ERP categories per norms detailed by the Senate IIT Mandi.

Other Eligibility Criteria for M.S. is as per Ordinances

Qualifying Degree

1. Bachelor's degree in Engineering/Technology or equivalent with a valid GATE score, **OR**
2. Master's or equivalent degree in Science/Arts/Commerce/Management (or allied subjects) with a valid GATE score, **OR**
3. Masters or equivalent degree in Engineering/Technology

Exemptions from mandatory requirements of Valid GATE or National Level examination

1. **B.Tech/B.E./B.S. (or equivalent) degree from** CFTI (Centrally Funded Technical Institute)/any of the top 100 institutes according to NIRF ranking (overall category) at the time of application/**any Himachal Pradesh Govt. institution or universities with CGPA/CPI of at least 7.5 (on a scale of 10) or equivalent.**
2. BS-MS/M.Sc/MA/MBA/equivalent from IITs, IISERs, IISc, IIMs, or any of the top 100 institutes according to NIRF ranking (overall category) at the time of application with a CGPA/CPI of at least 7.5 (on a scale of 10) or equivalent.
3. NIRF Ranking (within the top 100) should be in the overall category granted for the year during which admission is sought.

Other Eligibility Criteria for Ph.D. is as per Ordinances

Qualifying Degree

1. Master's or equivalent degree in Engineering/Technology, OR
2. Bachelor's degree in Engineering/Technology or equivalent*, OR
3. Master's or equivalent degree in Science/Arts/Commerce/Management (or allied subjects) *

***For qualifying degree listed under (2) & (3) candidates must also fulfill ONE of the following additional requirements**

1. Qualified GATE / NET including lectureship (Assistant Professorship) or any other equivalent National level examination.
2. Selected through a National level examination conducted by MoE or its agencies /Institutions such as UGC/ IIT/ IISc. / IISER/ IIIT etc.
3. Minimum of TWO years of professional experience (acquired after obtaining the qualifying degree and completed before the starting of the semester in which admission is sought)

Exemptions from mandatory requirements of valid GATE or National Level examination

1. **B.Tech/B.E./B.S. (or equivalent) degree from** CFTI (Centrally Funded Technical Institute)/any of the top 100 institutes according to NIRF ranking (overall category) at the time of application/**any Himachal Pradesh Govt. institution or universities with CGPA/CPI of at least 7.5 (on a scale of 10) or equivalent.**
2. BS-MS/M.Sc/MA/MBA/equivalent from IITs, IISERs, IISc, IIMs or any of the top 100 institutes according to NIRF ranking (overall category) at the time of application with a CGPA/CPI of at least 7.5 (on a scale of 10) or equivalent.
3. NIRF Ranking (within the top 100) should be in the overall category granted for the year during which admission is sought.

Potential Career Paths

- **Performing artists:** Pursue careers as professional musicians, vocalists, or instrumentalists, with roles in orchestras, bands, or as solo performers in various musical genres.
- **Academicians in Schools or Colleges:** Become educators, professors, or instructors in academic institutions, teaching music theory, history, or performance techniques.
- **Independent Art Educators:** Offer private music lessons, workshops, or masterclasses, catering to individuals or groups seeking specialized music instruction.
- **Musopathists (Therapists applying Musopathy):** Work as music therapists, applying musopathy techniques to help individuals with mental and physical health challenges, such as autism, depression, or physical rehabilitation.
- **Mental Health and Physical Wellness Consultants:** Provide expertise in using music as a tool for enhancing mental well-being and physical health, working in clinics, wellness centers, or as consultants for healthcare institutions.
- **Research Analysts in Music and Health:** Conduct in-depth research on the therapeutic and cognitive effects of music in academic or clinical settings, contributing to scientific advancements in music and health.
- **Music Technology and Recording Engineering Specialist:** Focus on the technical aspects of music production, including sound engineering, recording, and mastering, within the music industry or recording studios.

Thank you. Comments and suggestions and most welcome.

Requirements for Part-Time Students

- The requirements for part-time students are aligned with the Ordinances of MTech (by Research) and Ph.D. programs at IIT Mandi.
- Part-time students at IIT Mandi include Institute staff members, research scholars under QIP or External Registration, and individuals employed in R&D environments in scientific institutions or industries, including IIT Mandi.
- Eligibility also extends to faculty members from recognized engineering colleges or universities and scholars working in organizations with a recognition or MoU from IIT Mandi.
- Scholars from other IITs or recognized institutes may gain lateral entry with credit transfer, and part-time scholars in R&D environments in scientific institutions or industries and faculty members of recognized engineering colleges/universities are also considered eligible.
- The academic qualifications for part-time candidates align with those for regular candidates, coupled with a prerequisite of a minimum of two years of work experience.
- Additional requirements for part-time scholars include a 16-week campus residential semester for course completion, although the Academic Progress Committee/Doctoral Committee may recommend completing IIT Mandi courses online, with at least 50% of the course assessment conducted offline.
- A flexible residential requirement is available with partial online course completion.
- Scholars can complete the 16-week residential requirement in multiple visits, each lasting at least two weeks.

Part-Time Student Policies

- Exemptions from the residential requirement apply to part-time scholars residing within 50-60 KM of IIT Mandi, who can be treated as day scholars.

- Nevertheless, part-time scholars must remain at the same organization and workplace until research completion, and approval is required for program continuation at IIT Mandi if transferred or joining a new organization.

- For Part Time/Externally registered M.S. (by Research) Scholars, thesis submission is expected within four years from the registration date, with possible extensions of up to one year by the Academic Progress Committee.

Graduate Programs

MS by Research in Music and Musopathy and PhD

—

Indian Knowledge System and Mental Health Applications (IKSMHA) Centre, Indian Institute of Technology Mandi, Himachal Pradesh, India - 175005

01st October, 2023

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MS by Research in Music and Musopathy and PhD

Program Level: Post Graduate and PhD
Year of Commencement: 2024 (January)
Duration: As per guidelines for MS (R) and Ph.D. programs at IIT Mandi

Motivation

In the realm of integrative medicine and healthcare, the role of music and Musopathy - which studies the *fundamental mechanics* behind the benefits of music in a culture and region neutral manner - is gaining exceptional prominence. Leveraging the synergies between music, therapy, and technology can facilitate remarkable advances in health and well-being. Recognizing this potential, IIT Mandi proposes the commencement of an M.Tech program in Music and Musopathy and a Ph.D. program. This initiative underlines the commitment to promote interdisciplinary learning and contribute to the highly regarded field of (Indian) music and the burgeoning field of Musopathy.

Description

The M.Tech in Music and Musopathy and Ph.D. programs at IIT Mandi aim to produce highly skilled professionals and researchers who can meaningfully contribute to the development and understanding of Musopathy, while also deepening and widening their knowledge and skills in Music and its applications in modern society. These programs provide a robust grounding in the foundational, intermediate, and advanced aspects of Music and Musopathy, coupled with additional insights from the Indian Knowledge System and Mental Health Applications Centre (IKSMHA Centre).

Curriculum

M.Tech in Music and Musopathy:
Total Credits of Coursework: 15 Credits
IK 507: Music and Musopathy Foundation (3 credits)
IK 508: Music and Musopathy Intermediate (3 credits)
IK 609: Music and Musopathy Advanced (3 credits)
Additional Courses from IKSMHA Centre, NPTEL, Swayam, Acharyanet, etc. One of these courses can be an independent study course for performing artists. (6 credits)
Research: Beyond 15 credits

Ph.D.:
Total Credits of Coursework: *12 Credits*
IK 507: Music and Musopathy Foundation (3 credits)
IK 508: Music and Musopathy Intermediate (3 credits)
IK 609: Music and Musopathy Advanced (3 credits)
Additional Courses from IKSMHA Centre, NPTEL, Swayam, Acharyanet, etc. One of these courses can be an independent study course for performing artists. (3 credits)
Research: Beyond 12 credits

Three other courses IK 510 (music and cognition), IK 511 (introduction to audio engineering), and IK 512 (rhythmic structures and applications in music and musopathy), may also be taken by graduate students in the program.

Eligibility

Eligibility will be as per the norms outlined in the MS and Ph.D. admissions Ordinances. In this program, some traditional degrees from recognized universities like Acharya and others will be considered at par with bachelor's and master's degrees in engineering, sciences, arts, and social sciences. These may include appropriate degrees from accredited music institutions like Kalakshetra, Chennai; Gandharva Maha Vidyalaya Delhi; Chennai Govt Music College, etc., after 3-years of Music Education. The committee may impose additional requirements for eligibility as needed from time to time. For example, the committee can consider weight to Acharyanet and other certifications after 2/3 years of study and All India Radio ratings for performing artists. Students will be enrolled in full-time, part-time, and ERP categories per norms detailed by the Senate IIT Mandi.

Requirements for part-time students

The requirements for part-time students are aligned with the Ordinances of MS (by Research) and Ph.D. programs at IIT Mandi. Part-time students at IIT Mandi include Institute staff members, research scholars under QIP or External Registration, and individuals employed in R&D environments in scientific institutions or industries, including IIT Mandi. Eligibility also extends to faculty members from recognized engineering colleges or universities and scholars working in organizations with a recognition or MoU from IIT Mandi. Scholars from other IITs or recognized institutes may gain lateral entry with credit transfer, and part-time scholars in R&D environments in scientific institutions or industries and faculty members of recognized engineering colleges/universities are also considered eligible.

The academic qualifications for part-time candidates align with those for regular candidates, coupled with a prerequisite of a minimum of two years of work experience. Additional requirements for part-time scholars include a 16-week campus residential semester for course completion, although the Academic Progress Committee/Doctoral Committee may recommend completing IIT Mandi courses online, with at least 50% of the course assessment conducted

offline. A flexible residential requirement is available with partial online course completion. Scholars can complete the 16-week residential requirement in multiple visits, each lasting at least two weeks.

Exemptions from the residential requirement apply to part-time scholars residing within 50-60 KM of IIT Mandi, who can be treated as day scholars. Nevertheless, part-time scholars must remain at the same organization and workplace until research completion, and approval is required for program continuation at IIT Mandi if transferred or joining a new organization. For Part Time/Externally registered M.Tech. (by Research) Scholars, thesis submission is expected within four years from the registration date, with possible extensions of up to one year by the Academic Progress Committee.

Employability and Future Prospects

Graduates will find substantial opportunities in various sectors, such as healthcare, the music industry, the film industry, research institutions, academia, and wellness organizations. The seamless integration of technology, music, and therapy equips graduates with the comprehensive skills needed for innovative problem-solving and leadership roles in various disciplines.

Potential Career Paths:
Performing artists
Academicians in Schools or Colleges
Independent Art Educators
Musopathists (Therapists applying Musopathy)
Mental Health and Physical Wellness Consultants
Research Analysts in Music and Health
Music Technology and Recording Engineering Specialist

Course Syllabi

IIT Mandi
Proposal for a New Course

Course number: IK 507
Course Name: Music and Musopathy Foundation
Credit Distribution: 2-0-2-3
Intended for: BTech/MTech/MS/MSc/MA/Ph.D.
Prerequisite: None
Mutual Exclusion: None

1. Preamble:
The core curriculum consists of a 3-credit course specializing in vocal or instrumental music. This course provides a solid grounding in theory, practice, principles, and aesthetics, and inculcates a scientific mindset for conducting interdisciplinary research. Students will explore diverse facets of music and their connections and impact on cognitive abilities, physical, psychological and neuropsychological well-being, disease prevention, and therapeutics. The course includes lectures, discussions, video and audio clips, live concerts and/or recordings, class experiments, term-papers, presentations, and field research.

2. Course Modules with quantitative lecture hours:

Unit 1: Music - The Macro Picture (5 Hours)
Universality of music: Glimpse into melody, rhythm, harmony, prominent music systems in the world.
Indian Music in World Arena: How and why Indian music is respected in the world for melody, rhythm and its incredible richness and versatility and how Indian music has impacted jazz, pop and several other cultures in the world.
Music & Social well-being: How music contributes to Inter-cultural harmony, goodwill, respect, fund-raisers for health, education etc.
Music & Personal Evolution: How music promotes mental health and physical wellbeing including equanimity, cognitive development, spiritual and philosophical evolution and cardiovascular and pulmonary health among other things.

Unit 2: Music in Other Fields and Regions of India: Introduction (3 Hours)
Exploration of different Indian music systems and their influences: Indian System in North India and Persian Influences; Rabindra Sangeet of Eastern India; Ancient Tamil Music; Folk Systems in various States.

Unit 3: Introduction to Melody and Voice Exercises (2 Hours)
Theoretical Introduction to Melody and Voice Exercises: Melody, 7,12,16 note system, raga, ascending and descending scales, concept of technical exercises.

Unit 4: Preliminary Sequential Exercises (Varishai) (4 Hours)

Theoretical Introduction to Preliminary Sequential Importance of Sequential Exercises such as Sarali and Jantai varishais; Introduction to notation writing, Introduction to basic rhythmic concepts, Concept of Speed (kaala) and tempo (kalapramana).

Unit 5: Sapta Tala Alankarams (4 Hour)
Introduction to Cyclic Rhythms of various types (Talas) - Parts of a tala, concept of jaati (types of finger counts) and gati (internal pulse within each unit of a tala), system of 7 (sapta) talas
Exercises: Training in the 7 basic Alankaras

Unit 6: Ragas of Indian Music 72 Principal Scales (Melakartas) and 7 Million Derived Scales (Janya Ragas) (4 Hours)

Exploration of 16 Notes, 72 Melakarta scheme/structure: Permutation and Combination of the 16 Notes, 72 Melakarta scheme/structure; 12 Chakras; Musical Mnemonics: KaTaPaYaadi Formula (sootra) for Raga names and numbers.

Concept & Classification of Derived Ragas: Based on number of notes (3, 4, 5, 6, 7); based on types of sequences - (Straight or zig-zag) and based on nativity of notes (Upanga & Bhashanga).

Unit 7: Geetams and Simple Devotional Songs in a few Ragas (3 Hours)

Introduction to Practice Compositions: Geetams and Swarajatis

Essentials of a Raga: Scale and sequence of notes (arohana and avarohana); swara rendition, ornamentation (gamakas); hierarchy of notes etc

Unit 8: Music in Other Fields (3 Hours)
Exploration of Music's integration with various fields: Music & Dance; Music & Physics - concept of octaves, cycle of fourths and fifths, Music & Mathematics - patterns and korvais; Musical Literature - works of composers in diverse languages; Music and Philisophy; Music and Musopathy - pulmonary, cardio, mental health, etc; Music in Indian Knowldge Systems - Vedas, ancient Tamil culture, Puraanas and Itihaasaas.

Laboratory/practical/tutorial Modules:
Unit 3 Practical: (8 Hours) Plain notes, oscillated notes, octave exercises, swaram, akaaram.
Unit 4 Practical: (8 Hours) Exercises in swara (3 speeds), akaaram, in Sarali, Jantai, and other Varishais.
Unit 5 Practical: (2 Hours) 7 Alankarams - 3 speeds in swara and akaaram; introduction to prominent talas - adi, roopakam, chapu and concept of 35-talas.
Unit 6 Practical: (2 Hours) 72 Melaragamalika Geetam.
Unit 7 Practical: (8 Hours) Learn 5 Geetams and 3 Devotional Songs.

3. Textbooks:

Chitravina N Ravikiran (2023). *Perfecting Carnatic Music Level 1.* India. Accessed on 1st Oct 2023 at: https://acharyanet-india.myshopify.com/collections/carnatic-books/products/perfecting-carnatic-music-level-i-e-book
Krishnaswami, S. (2017). *Musical instruments of India.* Publications Division Ministry of Information & Broadcasting.

4. References:

Acharyanet. (2023). Carnatic Lessons India. Retrieved from https://www.acharyanet.com/carnatic-lessons-india/#plans

Chatterjee, G. (2023). ***भरतनाट्यशास्त्र: Bharata's Natyashastra (Meanings and Expositions in English and Hindi With Abhinavagupta's Commentary)*** (ISBN: 8186117210). Indian Mind.

Ravikiran, C. N. (2006). *Appreciating Carnatic Music.* Ganesh & Company. ISBN: 9788185988214

Shringy, R.K., & Sharma, P.L. (Trans.). (2018). *Sangitaratnakara (Sangeet Ratnakara) of Sarngadeva* (Vol. One, ISBN: 9788121505086; Vol. Two, ISBN: 9788121504669). Munshiram Manoharlal Publishers Pvt. Ltd.

Subramaniam, L., & Subramaniam, V. (1999). *Euphony (Indian Classical Music)* (Foreword by Sir Yehudi Menuhin). EastWest Books (Madras) Pvt. Ltd. ISBN: 8186852352

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			

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

NA

Approvals:

Other Faculty interested in teaching this course: Shri Chitravina Ravikiran

Proposed by: Dr. Pratim Kundu
Mental Health Applications Centre

School: Indian Knowledge System and

Signature:

Date: 17th September 2023

Recommended/Not Recommended, with Comments:

_____ **Date:**_____

Chairperson, CPC

Approved / Not Approved

_____ **Date:**_____

Chairperson, BoA

IIT Mandi
Proposal for a New Course

Course number: IK 508
Course Name: Music and Musopathy Intermediate
Credit Distribution: 2-0-2-3
Intended for: BTech/MTech/MS/MSc/MA/Ph.D.
Prerequisite: IK 507 Music and Musopathy Foundation Course or equivalent understanding.
Mutual Exclusion: None

1. Preamble:
This intermediate course on Music and Musopathy integrates theoretical knowledge and practical components of pure music as an art form as well as its applications in a cutting edge manner for health and wellbeing through Musopathy. With a focus on Indian classical music, students will delve into the history, significance, and therapeutic aspects of music, while also obtaining practical training in performing various ragas and types of songs. The course allows students to explore the connection between music and well-being, providing a holistic understanding of Musopathy.

2. Course Modules with quantitative lecture hours:

Unit 1: Music in Indian Knowledge Systems (4 Hours)
Music as a Science; Music as one of the 64 Arts; Music as vehicle for Spiritual and Philosophical evolution; Importance of Music in ancient Indian Society from Epics and Literature

Unit 2: Music as Therapy in Ancient Civilisations & Recent studies based on Ragas, Shlokas and Western Classical and other Systems (4 Hours)

Ragas as Evocative Tools (Rasa Theory); Time Theory of Ragas; Healing power of Ragas; Broad overview of a few current Studies with respect to Human Beings, Animals and Plants

Unit 3: Musopathy (4 Hours)

Why Musopathy (Limitations and Inconsistencies of Music Therapy in various parts of the world); Differences between Music Therapy and Musopathy; Features of Musopathy; Types of Musopathy - Passive and Active; Tonation Breathing Technique (TBT); Benefits and Scope of Musopathy and TBT

Unit 4: Introduction to Architects of Music (2 Hours)
Brief bio sketches of Composers: Jayadeva, Purandaradasa, Tulsidas, Oottukkadu Venkata Kavi, Tyagaraja, Meerabai, Muttuswamy Dikshitar, and Shyama Shastri
Brief bio sketch of Musicologists: Bharata, Sharngadeva, Venkatamakhi, Matanga, etc.

Unit 5: Introduction to 15-20 New Ragas (4 Hours)

Unit 6: Practice Songs: 8 Geetams and 1 Swarajati (7 Hours)

Unit 7: Performance Repertoire: Varnams, Krtis, and Devotional Songs (1 Hour)
Introduction to Performance Musical Forms

Unit 8: Introduction to Prominent Musicians with musical samples (2 Hours)

Laboratory/practical/tutorial Modules:
Unit 6: Practice Songs: 8 Geetams and 1 Swarajati (12 Hours)
Unit 7: Performance Repertoire: 8 Varnams/ Krtis / Devotional Songs (16 Hours)

3. Textbooks:
Chitravina N Ravikiran (2023). *Perfecting Carnatic Music Level 1.* India. Accessed on 1st Oct 2023 at: https://acharyanet-india.myshopify.com/collections/carnatic-books/products/perfecting-carnatic-music-level-i-e-book
Ravikiran, C. N. (2023). *Perfecting Carnatic Music Level II: Varnams, Krtis (eBook).* Acharyanet. https://acharyanet-india.myshopify.com/products/perfecting-carnatic-music-level-ii-varnams-krtis-ebook

4. References:
Acharyanet. (2023). Carnatic Lessons India. Retrieved from https://www.acharyanet.com/carnatic-lessons-india/#plans

Chatterjee, G. (2023). ***भरतनाट्यशास्त्र: Bharata's Natyashastra (Meanings and Expositions in English and Hindi With Abhinavagupta's Commentary)*** (ISBN: 8186117210). Indian Mind.

Krishnaswami, S. (2017). *Musical instruments of India.* Publications Division Ministry of Information & Broadcasting.

Ravikiran, C. N. (2006). *Appreciating Carnatic Music.* Ganesh & Company. ISBN: 9788185988214

Shringy, R.K., & Sharma, P.L. (Trans.). (2018). *Sangitaratnakara (Sangeet Ratnakara) of Sarngadeva* (Vol. One, ISBN: 9788121505086; Vol. Two, ISBN: 9788121504669). Munshiram Manoharlal Publishers Pvt. Ltd.

Subramaniam, L., & Subramaniam, V. (1999). *Euphony (Indian Classical Music)* (Foreword by Sir Yehudi Menuhin). EastWest Books (Madras) Pvt. Ltd. ISBN: 8186852352

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			

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

NA

Approvals:

Other Faculty interested in teaching this course: Shri Chitravina Ravikiran

Proposed by: Prof. Varun Dutt
Mental Health Applications Centre

School: Indian Knowledge System and

Signature:

Date: 17th September 2023

Recommended/Not Recommended, with Comments:

_____ **Date:**_____
Chairperson, CPC

Approved / Not Approved

_____ **Date:**_____
Chairperson, BoA

IIT Mandi
Proposal for a New Course

Course number: IK 609
Course Name: Music and Musopathy Advanced
Credit Distribution: 1-0-3-3
Intended for: BTech/MTech/MS/MSc/MA/Ph.D.
Prerequisite: IK 508 Music and Musopathy Intermediate Course or equivalent understanding.
Mutual Exclusion: None

1. Preamble:
This course offers advanced insights into the field of Music and Musopathy. It empowers those wishing to specialize as performers. Also, it enables an in-depth understanding and practical experience of various ragas, introducing composers, their significant works, and includes discussions of designs for original Musopathy clinical trials. Thus, this course integrates theoretical knowledge with extensive practical sessions, helping students explore the impact of music professionals as well as in clinical and therapeutic settings.

2. Course Modules with quantitative lecture hours:

Unit 1: Introduction to More Composers and Musicologies (3 Hours)
Composers such as Annamacharya, Surdas, Arunagirinathar, Kshetragnya, Bhadrachala Ramadas, Swati Tirunal, Patnam Subramanya Iyer, Muthiah Bhagavatar, Papanasam Sivan etc and a few significant Musicologists

Unit 2: Introduction to Prominent Musicians (5 Hours)

A glimpse of the greats who shaped modern music with audio/video samples

Unit 3: Challenges of Music Therapy and Possible Musopathy Studies (4 Hours)

A brief overview and analysis of the Limitations and unreliability of Conventional Music Therapy Studies and Results in various parts of the world; Practical Applications and Possible Topics for Clinical Studies and Research

Laboratory/practical/tutorial Modules:

Unit 4: Introduction to 30 more Ragas with Voice and Instrumental Exercises (12 Hours)

Unit 5: Practice Songs: 10 Geetams and 1 Swarajati (14 Hours)

Unit 6: Performance Repertoire: 10-12 Varnams, Krtis, Tillanas & Misc Songs (16 Hours)

3. Textbooks:

Chitravina N Ravikiran (2023). *Perfecting Carnatic Music Level 1.* India. Accessed on 1st Oct 2023 at: https://acharyanet-india.myshopify.com/collections/carnatic-books/products/perfecting-carnatic-music-level-i-e-book

Ravikiran, C. N. (2023). *Perfecting Carnatic Music Level II: Varnams, Krtis (eBook).* Acharyanet. https://acharyanet-india.myshopify.com/products/perfecting-carnatic-music-level-ii-varnams-krtis-ebook

4. References:

Acharyanet. (2023). Carnatic Lessons India. Retrieved from https://www.acharyanet.com/carnatic-lessons-india/#plans

Chatterjee, G. (2023). ***भरतनाट्यशास्त्र: Bharata's Natyashastra (Meanings and Expositions in English and Hindi With Abhinavagupta's Commentary)*** (ISBN: 8186117210). Indian Mind.

Krishnaswami, S. (2017). *Musical instruments of India.* Publications Division Ministry of Information & Broadcasting.

Ravikiran, C. N. (2006). *Appreciating Carnatic Music.* Ganesh & Company. ISBN: 9788185988214

Shringy, R.K., & Sharma, P.L. (Trans.). (2018). *Sangitaratnakara (Sangeet Ratnakara) of Sarngadeva* (Vol. One, ISBN: 9788121505086; Vol. Two, ISBN: 9788121504669). Munshiram Manoharlal Publishers Pvt. Ltd.

Subramaniam, L., & Subramaniam, V. (1999). *Euphony (Indian Classical Music)* (Foreword by Sir Yehudi Menuhin). EastWest Books (Madras) Pvt. Ltd. ISBN: 8186852352

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			

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

NA

Approvals:

Other Faculty interested in teaching this course: Prof. Laxmidhar Behera

Proposed by: Prof. Varun Dutt
Mental Health Applications Centre

School: Indian Knowledge System and

Signature:

Date: 17th September 2023

Recommended/Not Recommended, with Comments:

_____ Date:_____

Chairperson, CPC

Approved / Not Approved

_____ Date:_____

Chairperson, BoA

IIT Mandi
Proposal for a New Course

Course number: IK 510
Course Name: Music and Cognition
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 intricate relationship between music and cognitive processes. It will delve into topics such as musical perception, musical memory, the emotional impact of music, and music's relationship with intellectual development and learning. Through this exploration, students will learn how music and cognition intertwine, shedding light on musical understanding and cognitive science. No different fonts or sizes are allowed.

2. Course Modules with quantitative lecture hours:

Unit/Topic 1: Introduction to Music and Cognition (5 Hours)
Basics of cognitive science and musical structure, exploring the ways music and cognitive processes interact, and the role of music in cognitive enhancement and therapy.

Unit/Topic 2: Musical Perception (10 Hours)
Delve into the cognitive processing of musical elements such as pitch, rhythm, timbre, and melody. Explore the auditory system, musical feature extraction, and the cognitive organization of musical sounds.

Unit/Topic 3: Musical Memory (8 Hours)
Understand the intricacies of short-term and long-term musical memory and musical expectation. Examine the encoding, storage, and retrieval of musical information.

Unit/Topic 4: Emotion and Music (9 Hours)
Examination of how music evokes emotional responses, the role of musical expression, and the neuroscientific basis of musical emotions. Understand the role of cultural and individual differences in musical emotion.

Unit/Topic 5: Music, Intelligence, and Learning (10 Hours)
Analysis of the Mozart Effect, exploration of the impact of musical training on cognitive development, and the relationship between music and spatial-temporal reasoning.

Laboratory/practical/tutorial Modules: None.

3. Textbooks:

Levitin, D. J., "This Is Your Brain on Music: The Science of a Human Obsession," Penguin, USA, 2007.
Sloboda, J. A., "The Musical Mind: The Cognitive Psychology of Music," Oxford University Press, UK, 1985.

4. References:

Patel, A. D., "Music, Language, and the Brain," Oxford University Press, USA, 2008.
Hodges, D. A., "Handbook of Music Psychology," San Antonio: IMR Press, USA, 1996.

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			

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

NA

Approvals:

Other Faculty interested in teaching this course: Prof. Laxmidhar Behera

Proposed by: Prof. Varun Dutt
Mental Health Applications Centre

School: Indian Knowledge System and

Signature:

Date: 17th September 2023

Recommended/Not Recommended, with Comments:

_____ **Date:**_____
Chairperson, CPC

Approved / Not Approved

_____ **Date:**_____
Chairperson, BoA

IIT Mandi
Proposal for a New Course

Course number: IK 511
Course Name: Introduction to Audio Engineering
Credit Distribution: 3-0-0-3
Intended for: BTech/MTech/MS/MSc/MA/Ph.D.
Prerequisite: None.
Mutual Exclusion: None.

1. Preamble:
This course offers a comprehensive insight into audio engineering, presenting foundational concepts, technical knowledge, and practical applications. The content covers the physics of sound, audio equipment, recording techniques, and audio processing, ensuring students gain a holistic understanding. Real-world case studies complement theoretical understanding to facilitate effective learning and application in the professional sphere.

2. Course Modules with quantitative lecture hours:

Unit/Topic 1: Introduction to Audio Systems (5 Hours)
Overview of various audio systems and components. Signal flow and interfacing standards.

Unit/Topic 2: Fundamentals of Sound (10 Hours)
Acoustic principles, sound wave properties, psychoacoustics, and human perception of sound.

Unit/Topic 3: Microphones and Speakers (8 Hours)
Types, designs, and applications of microphones and speakers. Practical considerations in microphone placement and speaker setup.

Unit/Topic 4: Recording Technology (8 Hours)
Multi-track recording, audio interfaces, digital audio workstations, and recording techniques for different instruments and vocal performances.

Unit/Topic 5: Audio Signal Processing (8 Hours)
Equalization, compression, reverb, delay, and other audio effects. Use of audio processing tools in mixing and mastering.

Unit/Topic 6: Audio for Video and Film (3 Hours)
Techniques and challenges in audio post-production for video and film, including synchronization, sound design, and Foley.

Laboratory/practical/tutorial Modules: None.

3. Textbooks:

Stanley R. Alten, "Audio in Media", 10th Edition, Cengage Learning, USA, 2014
David Miles Huber, "Modern Recording Techniques", 9th Edition, Focal Press, USA, 2017

4. References:

Bartlett, B., & Bartlett, J. (2018). Practical Recording Techniques: The Step-by-Step Approach to Professional Audio Recording. 7th Edition, Focal Press, USA.

Eargle, J., & Foreman, R. (2020). Eargle's The Microphone Book: From Mono to Stereo to Surround - A Guide to Microphone Design and Application. 3rd Edition, Focal Press, USA.
Izhaki, R. (2018). Mixing Audio: Concepts, Practices, and Tools. 3rd Edition, Focal Press, USA.

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			

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

NA

Approvals:

Other Faculty interested in teaching this course: Prof. Laxmidhar Behera

Proposed by: Prof. Varun Dutt
Mental Health Applications Centre

School: Indian Knowledge System and

Signature:

Date: 17th September 2023

Recommended/Not Recommended, with Comments:

_____ **Date:**_____
Chairperson, CPC

Approved / Not Approved

_____ **Date:**_____
Chairperson, BoA

IIT Mandi
Proposal for a New Course

Course number: IK 512
Course Name: Rhythmic Structures and Applications in Music and Musopathy
Intended for: BTech/MTech/MS/MSc/MA/Ph.D.
Prerequisite: None.
Mutual Exclusion: None.

1. Preamble:
This course focuses on an introductory study of rhythm as a fundamental element in music, its impact on world music, and possible therapeutic applications in Musopathy. It explores rhythmic structures from various musical traditions, with a special focus on Indian rhythms, their cognitive impacts, and possible applications for speech rehabilitation and potential as a preventative tool for dementia-related disorders. The course aims to equip students with a fundamental understanding of rhythm's role in music creation and appreciation, making it an essential component for students in Music and other interdisciplinary programs.

2. Course Modules with quantitative lecture hours:

Unit 1: Introduction to Rhythm (2 Hours)

Rhythm as a Fundamental Operating Principle in the Universe and a regulating health mechanism for all living organisms right from heartbeat.

Unit 2: Fundamentals of Rhythm (2 Hours)

Understanding rhythm basics common to world music systems; time signatures; tempo; speed and beat.

Unit 3: Introduction to India's approach to rhythm (6 hours)

Global popularity of Indian rhythms; Concept of Laya & Tala; Parts of Talas (angas); Finger counting (Jaati and Laghu); Pulse and Gait within beats (Gati/Nadai); Kaala and Kaalapramana; Types of Patterns (Yatis) etc.

Unit 4: Percussion Instruments of India (3 hours)

Types (Skin based, body based etc); Ancient instruments; prominent contemporary instruments; Drum language in India

Unit 5: Rhythmic performances (3 hours)

Percussion accompaniment to melody in Carnatic and Hindustani traditions; percussion interludes and improvisation; percussive cadenzas and climaxes;

Unit 6: Rhythmic Expressions Across Cultures (4 Hours)

Examination of rhythmic complexities in various world music traditions, including Indian classical, African, Latin American, and Western music.

Unit 7: Cognitive Aspects of Rhythm (4 Hours)
Exploring the relationship between rhythm and cognitive functions, including memory, attention, and motor coordination.

Unit 8: Rhythm in Musopathy (6 Hours)
Studying the therapeutic applications of rhythm, its impact on psychological states, Use of Vocal Percussion in speech rehabilitation of stroke victims or patients with other conditions.

Unit 9: Technological Tools for Rhythmic Analysis and Creation (4 Hours)
Introduction to software and digital tools for rhythm analysis, creation, and its applications in music therapy.

Unit 10: Workshop and Case Studies (8 Hours)
Practical workshops on creating rhythmic compositions; case studies on using rhythm in therapeutic settings.

3. Textbooks:
Sadanand Naimpali (2011). *Theory and Practice of Tabla - The Secular Rationalist Reformer.* Popular Prakashan Private Limited.

Sankaran, T. S. (2010). *The Art of Konnakkol (Solkattu): Spoken Rhythms of South Indian Music.* Lalith Publishers.

4. References:
Clayton, M., Sager, R., & Will, U. (2005). *In Time with the Music: The Concept of Entrainment and Its Significance for Ethnomusicology.* ESEM CounterPoint.

Hartenberger, R. (Ed.). (2016). *The Cambridge Companion to Percussion.* Cambridge University Press.

London, J. (2012). *Hearing in Time: Psychological Aspects of Musical Meter, 2nd Edition.* Oxford University Press, UK.

Sankaran, T. S. (1994). *The Rhythmic Principles and Practice of South Indian Drumming.* Lalith Publishers.

Thaut, M. H. (2005). *Rhythm, Music, and the Brain: Scientific Foundations and Clinical Applications.* Routledge, USA.

5. Similarity with the existing courses:

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

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

Approvals:

Other Faculty interested in teaching this course: –

Proposed by: Dr. Varun Dutt, Dr. Pratim Kundu and Mental Health Applications Centre

School: Indian Knowledge System

Signature:

Date:

Recommended/Not Recommended, with Comments:

_____ **Date:**_____
Chairperson, CPC

Approved / Not Approved

_____ **Date:**_____
Chairperson, BoA

Annexure 'J'

Master of Technology in Biotechnology

School of Biosciences and Bioengineering

IIT Mandi

Programme Level	Post Graduate
Year of Commencement	2024 (revised)
Minimum Duration	2 Years (4 Semesters)
Maximum Duration	3 Years (6 Semesters)
Senate Meeting Reference	42.13

Motivation and Preamble

The Biosciences and Biotechnologies (BioX) at the School of Biosciences and Bioengineering (SBB), IIT Mandi is motivated by the needs in the field of human healthcare, food/agriculture, and environment sustainability in terms of development of new technologies for better disease diagnosis and management, identification and development of rare medicinally important molecules from various sources, and to clean and protect environment. Being present in the Himalayas, it aims to utilize the diverse resources easily available in the region to fulfil the above-mentioned goals. Motivated by the goals, IIT Mandi is committed to intensify academic teaching, research and development in several areas of BioX. M. Tech in Biotechnology programme is mainly initiated with the goal to train the next generation of students with cutting edge knowledge andskills suitable towards biotechnological research and Bio-industry needs such as biomedical/ biopharma etc.

The curriculum of M.Tech in Biotechnology programme at SBB, IIT Mandi is directed towards fundamental and practical understanding of the core biotechnology areas along with specialized fields in "Systems Biology" and "Medical Biotechnology". In addition, elective courses from other disciplines provide interdisciplinary exposure to the students. The core-subjects, specialized theme areas of SBB, electives from other schools, hands on laboratory training along with the post graduate project component to be undertaken in-house/ other R&D institutes/ industries will enrich students with right skills required in the current Job market both in academia and industries, on completion of the program.

Outline of M.Tech Curriculum

Core Courses:

- Advanced Cell and Molecular Biology (BY530)
- Computational Biology (BY512)
- Cellular Bioprocess Technology (BY513)
- Nano-Biotechnology (BY505)
- Analytical Biotechniques (BY514)
- Quantitative Biology and Data Analytics (BY531)
- Immunotechnology (BY532) [Credits: 22]

Core Lab Courses:

- Advanced Cell and Molecular Biology (BY533P)
- Cellular Bioprocess Technology (BY534P)
- Analytical Biotechniques (BY535P)
- Immunotechnology (BY536P)

[Credit: 4]

Elective Courses: [Total: 9 – 10 Credits]

Specialization Electives:

Systems Biology Basket:

- Introduction to Omics and Systems Analysis (BY516)
- Metabolic Systems Biology (BY504)
- Metagenomics, and Next Generation Sequencing Technologies (BY613)
- Proteomics (BY517)
- Biological Modelling and Simulation (BE506)
- Bioalgorithms (BY537)

Other courses to be declared at the start of the semester

Medical Biotechnology Basket:

- Cellular Fuel and cellular communication (BY503)
- Disease Biology (BY518)
- Protein Science in Therapeutics (BY519)
- Gene silencing and genome editing: principles and applications (BY527)
- Sensory Biology (BY528)
- Mechanobiology of the cell (BY529)
- Anatomy and Physiology (BE501)
- Biomaterials and Tissue engineering (BY538)

Other courses to be declared at the start of the semester

Other Electives: Any other elective courses being offered in the SBB

Project:

- Post Graduate Project-1 (BY698P)
- Post Graduate Project-2 (BY699P)

PGP work can be undertaken in any industry or academic institute with recommendation from the competent authority. It is mandatory to have a guide from IIT Mandi and the student should undergo the evaluation process as laid down in the ordinances.

[Credit: 17+16]

Free elective: From any discipline [Total: 3 Credits]

Other Mandatory Courses:

- Seminar (BY525)
- Research Methodology (BY600) [Credit: 2]

Total 72 credits

Credit Structure: A student, to be awarded M.Tech degree, must need to earn 70 - 72 credits.

Program Specialization: The program offers an option to the student to obtain a specialization in the area of "Systems Biology" or "Medical Biotechnology". Towards this the student needs to mandatorily credit at least three electives from the specialization basket. If specialization is to be done then the PGP work should preferably be from the similar area.

Although obtaining a specialization is not mandatory and the program offers the flexibility to the students to opt for any of the specialization electives or other electives as per their choice from among those offered in SBB or related areas by the school.

Degree structure **Total credit requirement: 70-72 credits**

		Credits
a)	Core courses	22
b)	Specialization elective baskets from SBB	9
c)	Core laboratory	4
d)	Research Methodology	1
e)	Free elective from any discipline	3
f)	Thesis	33

M.Tech Biotechnology course structure outline (Total credits required 70-72)

Semester-1	Credits L-T-P-C	**Semester-2**	Credits L-T-P-C
Core 1: Advanced Cell and Molecular Biology (BY530)	3-0-0-3	**Core 5:** Analytical Biotechniques (BY514)	3-0-0-3
Core 2: Computational Biology (BY512)	3-0-2-4	**Core 6:** Quantitative Biology and Data analytics (BY531)	2-0-2-3
Core 3: Cellular Bioprocess Technology (BY513)	3-0-0-3	**Core 7:** Immuno-Technology (BY532)	3-0-0-3
Core 4: Nano-Biotechnology (BY505)	3-0-0-3		
Free elective 1: from other disciplines	Total 3-credits	**Specialization electives*** from Systems Biology theme **or** Medical Biotechnology theme **or** Any 3 courses from the above baskets **or** Other electives offered by SBB	Total: 9 credits
Mandatory: Research Methodology (BY600)	1-0-0-1		
Core Lab 1: Advanced Cell and Molecular Biology (BY533P)	1-0-2-1	**Core Lab 3:** Analytical Biotechniques (BY535P)	0-0-2-1
Core Lab 2: Cellular Bioprocess Technology (BY534P)	1-0-2-1	**Core Lab 4:** Immunotechnology (BY536P)	0-0-2-1
Total credits Semester-1	**19**	**Total credits Semester-2**	**20**
Semester-3	Credits L-T-P-C	**Semester-4**	Credits L-T-P-C
Seminar (BY525)	0-0-0-1	Post Graduate Project-2 (BY699P)	0-0-34-17
Post Graduate Project-1 (BY698P)	0-0-32-16		
Total credits Semester-3	**17**	**Total credits Semester-4**	**16**

* Students qualify for specialization (Systems Biology or Medical Biotechnology), provided the PGP work (BY698P and BY699P) is done in those areas. PGP work can also be undertaken in any industry or academic institute with recommendation from the competent authority. It is mandatory to have a guide from IIT Mandi and the student should undergo the evaluation process as laid down in the ordinances.

Opting for a specialization is not mandatory and the program offers the flexibility to the students to opt for any of the specialization electives or other electives as per their choice from among those offered in SBB or related areas by the schoo

Specialization electives

Theme 1: Systems Biology (Any 3 courses offered in the semester)		
Course		Credits (L-T-P-C)
Special elective S1	Introduction to omics and Systems Analysis (BY516)	3-0-0-3
Special elective S2	Metabolic Systems Biology (BY504)	3-0-0-3
Special elective S3	Proteomics (BY517)	3-0-0-3
Special elective S4	Metagenomics, and Next Generation Sequencing Technologies (BY613)	3-0-0-3
Special elective S5	Biological Modelling and Simulation (BE506)	3-0-0-3
Special elective S6	Bioalgorithms (BY537)	3-0-0-3
Special electives	Other courses to be declared at the start of the semester	

Theme 2: Medical Biotechnology (Any 3 courses offered in the semester)		
Course		Credits (L-T-P-C)
Special elective M1	Cellular Fuel and Cellular Communication (BY503)	3-0-0-3
Special elective M2	Disease Biology (BY518)	3-0-0-3
Special elective M3	Protein Sciences in therapeutics (BY519)	3-0-0-3
Special elective M4	Gene silencing and genome editing:principles and applications (BY527)	3-0-0-3
Special elective M5	Sensory Biology (BY528)	3-0-0-3
Special elective M6	Mechanobiology of the Cell (BY529)	3-0-0-3
Special elective M7	Anatomy and Physiology (BE501)	3-0-0-3
Special elective M8	Biomaterials and Tissue engineering (BY538)	3-0-0-3
Special electives	Other courses to be declared at the start of the semester	

Proposed Curriculum of Two Years Master of Business Administration (Data Science and Artificial Intelligence)

Semester I MBA DS&AI		
DC	Communication Skills for Managers	2
DC	Financial Statement Analysis	2
DC	Mathematical Foundation of Data Science and AI	2
DC	Creative Thinking, Problem Solving and Decision Making	2
DC	Python Programming	2
DC	Operations Management	2
DC	Managerial Economics	2
DC	Marketing Management I	2
DC	Probability and Statistics for Data Science & AI	2
DC	Introduction to Bhagavad Gita	2
DC	Financial Management	2
		22
Semester II DS and AI		
DC	Fundamentals of Data Analytics	2
DC	Disruptive Technology in Data Science	2
DC	Strategic Management	2
DC	Machine Learning for Business	2
DC	Introduction to AI and Automation	2
DC	Organizational Behaviour	2
DC	Decision Analysis	2
DC	Project Management	2
DC	Marketing Management II	2
DC	Ethical and Legal Aspects of Business	2
		20
Internship	Summer Internship	2
Semester III DS and AI		
DC	Neural Network Fundamentals for Business	2
DC	Digital Business Strategy, Models and Transformations	2
DC	Entrepreneurship	2
DC	Business and Data Leadership	2
DC	Management Insights from Indian Knowledge System	2
DC	Human Resource Management	2
DE	Discipline Elective 1	2
FE	Free Elective 1	2
Project	Management Project I	4
		20
Semester IV		

DE	Discipline Elective 2	2
DE	Discipline Elective 3	2
DE	Discipline Elective 4	2
DE	Discipline Elective 5	2
FE	Free Elective 2	2
Project	Management Project II	6
		16
Total credits in two years 80		

Proposed Curriculum for Integrated Master of Business Administration (IMBA)

Semester I		
Course Code	**Course Title**	**Credit**
IC112	Calculus	2
IC152	Introduction to Python and Data Science (Previously DS I)	4
IC136	Understanding Biotechnology and its Application	3
IC181/ICXXX	Introduction to Consciousness and holistic Wellbeing (IKSMHA)	3
DC*	Microeconomics	3
DC	Foundations of Business Management	4
DE	Management Workshop I	1
	Total Credits	**20**
Semester II		
IC114	Linear Algebra	3
IC252	Probability and Statistics (Previously DS II)	4
ICXXX/IC181	Foundations of Design Practicum	4
DC	Macroeconomics	3
DC	Written and Verbal Communication	4
DC	Ethics and Values	3
DE	Management Workshop II	1
	Total Credit	**22**
Semester III		
DS201	Data handling and Visualization	3
IC201P	Design Practicum	3
IC272	Machine Learning (Previously DS III)	3
CS208/DS301/ DC	Mathematical Foundation of Computer Science/Data Science/Management Science	4
IC230	Environmental Science	3
CS202	Data Structures and Algorithms	3
DC	Introduction to Bhagavad Gita	3
	Total Credit	**22**
Semester IV		
DS401	Optimization for Data Science	4
DS303	Statistical Foundation of Data Science	4
DC	Selected topics from Ramayan	3
DC	Introduction to Accounting	3
DC	Psychological Foundations of Business Management	3
DC	Business Government and Society	3
DE	Management Workshop III	1

DE	Management Workshop IV	1
	Total Credit	**22**
Semester V		
DC	Business Communication	3
DC	Introduction to Marketing	3
DC	Introduction to Operations Management	3
DC	Foreign Language 1	3
DC	Business Research Methods	3
DC	Data Base for Managers	4
DC	Financial statement analysis	3
	Total Credit	**22**
Semester VI		
DC	Problem solving and Decision Making for Managers	3
DC	Mathematics for Business Management	3
DC	Introduction to Financial Management	3
DE	Management Workshop V (Preferably one of the Indian Art Forms)	1
DC	Public Speaking and debating	3
DC	Sustainable Business Practices	3
DC	Selected topics from Mahabharat	3
DC	Indian Economy	3
	Total Credits	**22**
Semester VII		
Internship	Internship/Semester exchange/Start-up	12
		12
Semester VIII		
DC	Fundamentals of Data Analytics	2
DC	Disruptive Technology in Data Science	2
DC	Strategic Management	2
DC	Machine Learning for Business	2
DC	Introduction to AI and Automation	2
DC	Organizational Behaviour	2
DC	Decision Analysis	2
DC	Project Management	2
DC	Marketing Management II	2
DC	Ethical and Legal Aspects of Business	2
	Total Credits	**20**
Internship	Summer Internship	**2**
Semester IX		
DC	Neural Network Fundamentals for Business	2
DC	Digital Business Strategy, Models and Transformations	2
DC	Entrepreneurship	2

DC	Business and Data Leadership	2
DC	Management Insights from Indian Knowledge System	2
DE	Human Resource Management	2
DE	Discipline Elective 1	2
FE	Free Elective 1	2
MP	Management Project I	4
	Total Credits	**20**
Semester X		
DE	Discipline Elective 2	2
DE	Discipline Elective 3	2
DE	Discipline Elective 4	2
DE	Discipline Elective 5	2
FE	Free Elective 2	2
MP	Management Project II	6
	Total Credits	**16**
Total Credits for Five Years 200		

*DC referrers to Departmental Electives

List of Elective Courses/Workshops

Skill Baskets	Suggestive Title of Courses	Credits
Technical Skills	Basic Excel	1
	Advanced Excel	1
	Programming languages	1
	Software training	1
	Impactful Presentation	1
Soft Skills	Personality Development	1
	Written Communication	1
	Verbal Communication	1
Professional Skills	Business Etiquettes	1
	Story Telling with Data	1
	Preparing for Interview	1
	Time Management	1
Art forms	Dramatics	1
	Music (Instrumental, Vocal, etc.)	1
	Dance	1
	Painting	1
Life Skills	Yoga	1
	Outbound Activities	1
	Physical Training	1

Note: The above list of elective workshops is not exhaustive. New workshops may be added later.

Credit requirement

Total Credit requirement in First Three Years (for BBA Analytics)	130
Total Credit requirement in First Four Years (for BBA Analytics (Honors))	162
Total Credit requirement in Five Years (for Integrated MBA)	200

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Annexure 'M'

Startup Practicum (22 Credits)

1. Preamble

The Indian Institute of Technology Mandi (IIT Mandi) is committed to encouraging innovation and entrepreneurship among its students. IIT Mandi has seamlessly integrated innovation and design into its curriculum, fostering creativity and problem-solving skills. IIT Mandi has incorporated a distinctive Practicum model of learning, which integrates innovation and design into its curriculum. This approach fosters a creative and problem-solving mindset among students, resulting in an academic environment that promotes these skills.

Through this program, IIT Mandi is initiating an effort to introduce an Entrepreneurial curriculum, acknowledging the crucial influence of entrepreneurship in shaping the future. This program is designed to develop individuals with the necessary skills to navigate the intricate challenges of the modern business environment. This innovative curriculum represents more than just an addition; it signifies the institution's dedication to fostering an entrepreneurial mindset among its undergraduate students.

The startup practicum is spread across three semesters, during which students will engage in the complex process of creating and developing their own ventures.

The journey commences during the first six months, which constitute a dedicated semester where aspiring innovators transform their ideas into tangible prototypes. The objective of this practical approach is to foster a profound comprehension of the innovation lifecycle and the pragmatic elements of materializing ideas. During the following year, these prototypes undergo a transformation and become marketable Minimum Viable Products (MVPs) and, eventually, fully established startups. The extended duration provides students with ample time and resources to improve their ideas, tackle obstacles, and enhance their entrepreneurial skills.

IIT Mandi aims to collaborate with leading organizations that promote digital innovation in order to tackle urgent social problems, demonstrating its strong dedication to collaborative innovation. Possible partners consist of the IIT Mandi iHub and TCS DISQ, organizations known for their successful implementation of technology and innovation to bring about significant changes. Based on the sponsorships from the partners, The Institute may provide a Rs 15,000 per month scholarship to a maximum of 30 students selected by the committee.

2. Program Objectives

2.1. Encourage a culture of innovation by providing students with a platform to ideate, prototype, and develop marketable solutions to real-world problems.

2.2. Develop entrepreneurial skills in students by encouraging them to recognize opportunities, manage risk, and transform ideas into viable businesses.

2.3. Give students the skills and confidence they need to make the transition from academia to entrepreneurship, easing their journey from ideation to startup

development.

2.4. Encourage the development of solutions to pressing societal challenges in areas such as health, education, the environment, transportation, finance, and others.

3. Eligibility

3.1. The course is designed for B.Tech students who have finished the fifth semester with CGPA above 6.0 and without any backlog.

3.2. The student may participate as an individual or as part of a team of no more than two other students (as approved by the committee).

3.3. The students who are participating in this program should not take part in the semester-long exchange or semester-long internship during the program.

4. Duration, Structure, and Credit

4.1. **Duration:** The duration of the program is 18 months, i.e., for the 6th, 7th, and 8th semesters/or as approved by the Senate.

4.2. **Structure and credits:** The proposed program is intended to provide a structured pathway for students to develop their entrepreneurial skills and create marketable solutions over multiple semesters. Here's a rundown of the program's structure:

		Replacement of
6th Semester	• Start-up Practicum 1 (4)	ISTP
7th Semester	• Startup Practicum 2 (7)	MTP 1 + 1 course
8th Semester	• Startup Practicum (9)	MTP 2 + 1 course

Semester 6 – Startup Practicum 1 (4 credits): Students choose this course and spend the semester developing prototypes. This phase focuses on ideation, design, and the creation of an initial prototype. During this semester, mentor(s) will be allotted to them for one-on-one mentoring. IIT Mandi Catalyst, Technology Business Incubator, will play a major role in the implementation. The students opting for Startup Practicum 1 would replace this course with the ISTP course.

Internship (2 credits): If the student wishes to work on the same project during the vacations as a part of the internship, the student can opt for internship credits.

Semesters 7 – Startup Practicum 2 (7 credits) & Semester 8 - Startup Practicum 3 (9 credits): Students continue to work on their product as a final-year project while taking their regular courses. This phase involves the prototype's further refinement, iteration, and potential scalability. The students opting for Startup Practicum 2 & 3 would replace this course with Major Technology Project.

The program covers 22 credits from the BTech curriculum.

If necessary, students are expected to form a legal entity. According to the IPTT Cell's recommendations, students will also be encouraged to protect their intellectual property with a patent/copyright. IIT Mandi will support the application as part of its ongoing policy at the time. The IPR policy of IIT Mandi will apply to all IPR applications.

5. Evaluation

5.1. An evaluation committee will be formed to assess the work of students.

5.2. At the end of each semester, the student/team must present their respective progress to the committee or as determined by the committee's evaluation scheme.

6. Implementation

6.1. IIT Mandi may benefit from the expertise of IIT Mandi Catalyst in incubation and startup mentoring for course implementation. As a result, IIT Mandi Catalyst may play a significant role in program implementation.

6.2. The institute may, however, provide infrastructural support for program implementation, such as classrooms, conference rooms, lab access, faculty access, and other facilities.

6.3. Student selection and monitoring: Student selection is based on the committee's predetermined criteria and conditions.

Annexure 'N'

Revision in the curriculum of MA Development Studies

Presented in
50th BoA, IIT Mandi
14th July 2023

School of Humanities and Social Sciences, IIT Mandi

Semester I		**[Credit: 18 to become 19]**
HS525: History of Development Thought	Discipline Core	3-0-0-3
HS526: Human Geography: A Western Himalayan Perspective	Discipline Core	3-0-0-3
HS527: Indian Social Structure and Development	Discipline Core	3-0-0-3
HS528: Information Technology and Development to be replaced by HS532: Sustainable Development and Environmental Protection	Discipline Core	3-0-0-3
HS522: Research Methodology for Humanities and Social Sciences	Discipline Core	3-0-0-3 to become 4-0-0-4
HS529: Natural Resource and Development	Discipline Core	3-0-0-3
Semester IV		**[Credit: 23 becomes 22]**
DP554P Dissertation for Masters in Development Studies (under faculty supervision) or Guided Internship (Deliverable: Internship report- under the joint supervision of one person from the organization and one faculty)		0-0-35-23 becomes 0-0-33-22

Credit requirement

Candidate would have to complete 80 credits for the successful completion of M.A. in Development Studies. A maximum of 2 additional credits (82 credits in total) can be accommodated.

Discipline Core	**.....proposed: (6x3+4)=22 credits [at present 7x3=21 credits)**
Discipline Electives	**.....6x3= 18 credits**
Outside Discipline Electives	**.....2x3= 6 credits**
Field Study	**.....1x4=4 credits**
DS Practicum	**.....2x4= 8 credits**
Dissertation/Guided Internship	**.....Proposed 22 credits [at present 23 credits]**

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- Request to initiate a process to increase credits that could be taken from NPTEL/equivalent platform.

School of Management

Indian Institute of Technology Mandi, Himachal Pradesh

Minimum Eligibility Criteria for application for admission in IMBA program:

Applicants meeting all the following three criteria are eligible to apply.

1. The applicants should have obtained minimum JEE Mains NTA score (Paper 1) to appear for JEE (Advanced) 2024.
2. The applicants should have compulsorily studied Mathematics and English at class 12th (or equivalent) level.
3. The applicants should have obtained minimum 75% (65% for SC/ST/PwD) in 12th (or equivalent).

Note: The admission committee reserves all rights to restrict number of applicants by applying higher criteria.

Admission Process:

To get the admission in this program, the applicants are required to apply through IIT Mandi official website only. The admission process are as follows:

1. ***Shortlisting of the applicants***
   The applicants will be shortlisted on the basis of the NTA score obtained by them in the JEE Mains Examination (Paper 1). A certain number of applicants will be called for the next step of admission process. All shortlisted applicants will be sent invitation letters via email for the personal interview. This information will also be available on the Institute website.

2. ***Personal Interview***
   This step involves a personal interview (PI) of the shortlisted applicants. A merit list will be prepared based on the Aggregated Score (**AS**) calculated as follows:

Component	Weightage
NTA score (Paper 1)	70%
Personal Interview (PI)	30%

The selected applicants will be offered provisional admission to the Program. Provisional admission offers shall be sent via email as given in the application form. This information will also be available on the Institute website.

- Foreign applicants/NRIs need to have a valid GMAT score obtained in 2023 and would be treated at par with Application Category 2 (General) for eligibility requirements. Foreign applicants/NRIs must have studied Mathematics at +2 level (or equivalent).

2. SHORTLISTING CRITERIA

- A certain number of candidates will be shortlisted for further processing.
    - Applicants in category 1 will be shortlisted based on the previous academic records and work experience with appropriate weightage. The school may set an additional and/or higher criteria for shortlisting the candidates.
    - Applicants in category 2 will be shortlisted based on CAT score, previous academic records and work experience with appropriate weightage. The school may set an additional and/or higher criteria for shortlisting the candidates.
    - Shortlisting for foreign national/NRI candidates will be done based on GMAT score and/or previous academic records and work experience with appropriate weightage. The school may set an additional and/or higher criteria for shortlisting the candidates.
- The further process will involve online/in-person interview and/or any other selection method decided by the selection committee.
- The school reserves the right to make changes to the selection process at any stage.
- The school reserves the right to select or not select any candidate.

School of Management
Indian Institute of Technology Mandi, Himachal Pradesh

1. ELIGIBILITY FOR APPLICATION FOR MBA DS&AI

APPLICATION CATEGORY 1 (CAT exempted applicants)

- **GN/OBC (CL)/EWS Indian national applicants:**
  - A full-time bachelor's degree of minimum 3 years OR a full time Master's degree of minimum 2 years with Minimum 6.5 CGPA on a 10-points scale or 65% marks from any of the Centrally Funded Technical Institutions (CFTIs) / any of the top 100 institutes according to NIRF ranking 2023 (overall category or ***engineering category***). Such candidates are exempted from the requirement of CAT. All applicants must have studied Mathematics at +2 level (or equivalent).

- **SC/ST/OBC(NCL) / PwD Indian national applicants:**
  - A full-time bachelor's degree of minimum 3 years or a full-time Master's degree of minimum 2 years with a minimum 6.0 CGPA on a 10-points scale or 60% marks in from any of the Centrally Funded Technical Institutions (CFTIs) / any of the top 100 institutes according to NIRF ranking 2023 (overall category or ***engineering category***). Such candidates are exempted from the requirement of CAT. All applicants must have studied Mathematics at +2 level (or equivalent).

APPLICATION CATEGORY 2 (Candidates with a valid CAT 2023 Score)

- **GN/OBC (CL)/EWS Indian national applicants:**
  - A full-time bachelor's degree of minimum 3 years OR a full time Master's degree of minimum 2 years with Minimum 6.0 CGPA on a 10-points scale or 60% marks. All applicants must have studied Mathematics at +2 level (or equivalent).
- **SC/ST/OBC(NCL) / PwD Indian national applicants:**
  - A full-time bachelor's degree of minimum 3 years OR a full time Master's degree of minimum 2 years with Minimum 5.5 CGPA on a 10-points scale or 55% marks. All applicants must have studied Mathematics at +2 level (or equivalent).

Notes:

- A 5-year integrated Bachelor's and Master's degree would be considered equivalent to a 4-year Bachelor's degree for the admission process.
- Those appearing for the final degree examination can also apply. The admission in such cases will be subject to their fulfilling the minimum eligibility criteria as stated above at the time of joining the program.