INDIAN INSTITUTE OF TECHNOLOGY MANDI

KAMAND, DISTT. MANDI – 175075 (HIMACHAL PRADESH)

MINUTES OF 45TH BOARD OF ACADEMICS MEETING

VENUE	:	A-4 (SC) and GUEST HOUSE (NC) CONFERENCE ROOM + ONLINE
DATE	:	18th FEBRUARY, 2022 (FRIDAY)
TIME	:	03:00 P.M.

Following members attended the meeting

Sl. No	Responsibilities	Name
1	Dean Academics	Prof. Rahul Vaish
2	Associate Dean (Research)	Prof. Chayan K Nandi
3	Associate Dean (Courses)	Dr. Srikant Srinivasan
4	Chairman Library Advisory Committee	Dr. Rajeshwari Dutt
5	Chairman Course Proposal Committee	Dr. Venkata Uday Kala
6	Course Coordinator (IC Courses)	Dr. Hitesh Shrimali
7	Course Coordinator (HSS Courses)	Dr. Rajeshwari Dutt
8	Course Coordinator (B.Tech.-CE)	Dr. Maheshreddy Gade
9	Course Coordinator (B.Tech.-CSE)	Dr. Jinesh Machchar
10	Course Coordinator (B.Tech.-EE)	Dr. Rahul Shrestha
11	Course Coordinator (B.Tech.-ME)	Dr. Himanshu Pathak
12	Course Coordinator (B.Tech.-EP)	Dr. Pradeep Kumar (SBS)
13	Course Coordinator (B.Tech.-M.Tech. Integrated Dual Degree in Bio-Engg.)	Dr. Shubhajit Roy Chowdhury
14	Course Coordinator (M.Tech.-(Mechanical Engg. (Energy Systems)) (MES)	Dr. Rajeev Kumar
15	Course Coordinator (M.Tech.-(Structural Engg.))	Dr. Sandip Kumar Saha
16	Course Coordinator (M.Tech.-(Fluid and Thermal Engg.))	Dr. Gaurav Bhutani
17	Course Coordinator (M.Tech.-(Communication and Signal Processing))	Dr. Siddartha Sarma
18	Course Coordinator (M.Tech.-(Power Electronics and Drives))	Dr. Himanshu Misra
19	Course Coordinator (M.Tech.-(Computer Science and Engg.))	Dr. Sriram Kailasam
20	Course Coordinator (M.Tech.-Biotechnology)	Dr. Amit Prasad
21	Course Coordinator M.Sc. (Chemistry)	Dr. Bhaskar Mondal
22	Course Coordinator (M.Sc.-Applied Mathematics)	Dr. Muslim Malik
23	Course Coordinator (M.Sc.-Physics) + (I-Ph.D. (Physics))	Dr. C.S.Yadav
24	Course Coordinator (MA Dev.Studies)	Dr. Devika Sethi
25	Nominee-1: School of Engineering	Dr. Arpan Gupta
26	Nominee-2: School of Engineering	Dr. Mousumi Mukherjee
27	Nominee-1: School of Computing & Electrical Engineering	Dr. Renu M Rameshan
28	Nominee-2: School of Computing & Electrical Engineering	Dr. Manas Thakur
29	Nominee-2: School of Basic Sciences	Dr. Girish Sharma
30	Nominee-1: School of Humanities & Social Sciences	Dr. Suman
31	Nominee-2: School of Humanities & Social Sciences	Dr. Saumya Dixit
32	Academic Affairs Secretary	Mr. Bhumanyu Goyal
33	Assistant Registrar (Academics): Secretary	Mr. Vivek Tiwari

Following members could not attend the meeting

Sl. No.		Name	
1	Course Coordinator (B.Tech.-DSE)	Dr. Manoj Thakur	Member
2	Course Coordinator (M.Tech.- (Materials and Energy Engg.)) (MEE)	Dr. Sudhir K Pandey	Member
3	Course Coordinator (M.Tech.-(VLSI))	Dr. Srinivasu Bodapati	Member
4	Nominee-1: School of Basic Sciences	Dr. Tulika Srivastava	Member
5	Industry Member – 1	Dr. Nadeem Akhtar	Member
6	Research Affairs Secretary	Mr. Adesh Singh	Member

Special Invitee

Sl. No.	Name	
1.	Dr. Neha Kaushik	Asst. Prof. SHSS
2.	Dr. P. Anil Kishan	Asst. Prof. SE

PART-A

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

45.1 Confirmation of the minutes of 44th meeting of Board of Academics:

The minutes of the 44th Board of Academics meeting held on 24th November, 2021 were confirmed.

45.2 To consider amendments for Minor B.Tech-M.Tech (Dual Degree) (Bioengineering) Students:

The BoA resolved that all the regulations/norms of B.Tech shall be applicable for B.Tech-M.Tech (Dual Degree (Bioengineering)) students, until otherwise stated separately.

45.3 To consider a policy across the institute regarding Academic Dishonesty Policy:

Dr. P Anil Kishan, Chair of the committee presented the proposal regarding Academic Dishonesty Policy/Plagiarism etc. After due deliberations, the BoA recommended the proposal with minor modifications for consideration of the Senate and its approval. The modified proposal is placed as **Annexure-A.**

45.4 To consider revisions in the Regulations for the MS and PhD programme.

Prof. Chayan K Nandi, Associate Dean (Research) presented the proposal regarding modification in the Regulations for MS and PhD programme. i.e.,

(i) (R2.1.1) Minimum Eligibility for Ph.D in Engineering
(ii) (R2.1.2 MS, R3-PhD) International students
(iii) (R11) Course work
(iv) (R12) Progress Report
(v) (R13) Comprehensive examination
(vi) (R18) Cancellation of Registration
(vii) (R24) Thesis Report
(viii) JRF to SRF conversion

After brief discussion, the BoA suggested further modification in the proposal for JRF to SRF conversion. Further, the BoA recommended the other proposals for consideration of the Senate and its approval. The modified proposal is placed as **Annexure-B.**

45.5 To consider approval of the courses presented by the Course Proposal Committee (CPC):

The Chairperson, Course Proposal Committee (CPC) presented the following courses for consideration and approval of the Board of Academics. After brief discussion, the BoA approved the courses with minor modifications, as placed at **Annexure – C**.

Sl.No.	Course Code	Course Title	L-T-P-C
1	BE 506	Biological Modelling and Simulation	2-0-2-3
2	CE 514	Rock Mechanics	3-0-0-3
3	CE 602	Blast Engineering	3-0-0-3

4	CS 542	Design Patterns for Scalable Systems	3-0-0-3
5	CY 515	Advanced Inorganic Spectroscopy	3-0-0-3
6	HS 542	Ethnicity, State and Nationalism in India	3-0-0-3
7	HS 545	Applied Forensic Psychology	3-0-2-4
8	MA 516	Topology	3-1-0-4
9	IC 231	Measurement and Instrumentation	2-0-2-3

45.6 Any other item with the permission of the Chair.

With the permission of the Chairman, the BoA deliberated on the following points:

(i) **To consider the proposal for Conversion from Master of Technology (M.Tech.) Program to Master of Science by Research (M.S.) Program:**

Dr. Sandip Kumar Saha, Chair of the committee presented the proposal for conversion from Master of Technology (M.Tech.) Program to Master of Science by Research (M.S.) Program. After due deliberations, the BoA recommended the proposal with minor modifications for consideration of the Senate and its approval. The modified proposal is placed as **Annexure-D.**

(ii) **To consider the modifications in Minor in German:**

Dr. Rajeshwari Dutt, Course Coordinator, SHSS presented a proposal for modification in Minor in German. After due deliberations, the BoA recommended the modification for consideration of the Senate and its approval. The modified proposal is placed as **Annexure-E.**

PART-B

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

-NIL-

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

Secretary, Board of Academics

Chairman, Board of Academics

ANNEXURE - A

Academic Dishonesty Guidelines

What is not Academic Dishonesty?

- A student submitting the work done alone or in the knowledge of Course Instructor.
- Submitting a single group project wherever permitted.
- Students discussing the methodology of solution.
- Students discussing the course material for understanding.

Academic Dishonesty and Suggested Penalties

Offense	Punishment
Cheating • Carrying *cheat sheets* or *chits* during exams. The student may or may not use the sheets during the exams. But possessing the chits will be treated as cheating [Severe]. • Keeping books/chits etc. in toilets [Severe]. • Possessing the electronic items/gadgets (smart phones, smart watches, tablets, similar items) during the exam. Calculators, wherever permitted, can be carried for the exam. • Using the electronic items/gadgets (smart phones, smart watches, tablets, similar items) during the exam. [Severe]. • Exchanging the answer books or question papers with some of the answers on it [Severe]. • Sharing answers, soliciting answers, peeking into the answer sheets of others.	**Cheating** • Expel from the examination hall • Award 0 (zero marks) for the exam component. • "F" grade, if it is end exam. • No makeup Exam. • "F" grade for all serious offences. • Disciplinary action to be taken for severe issues, in addition to the punishments / penalties.

Plagiarism ● Submitting a portion or portions or all the work done by someone else's works, without proper citation or quotation marks. ● Rephrasing/paraphrasing the original source, without proper citation. ● Presenting existing idea/ source as own idea. [severe]	**Plagiarism** ● Rewriting the journal article. ● Redoing the assignment, without support from others. ● The plagiarism discussed are mainly related to exams and college projects. ● Dean Academics will handle the situation, related to submissions to the journals ● Students are sensitized regarding the Plagiarism, using the document provided.
Information Falsification or Fabrication ● Falsification of data. [severe] ● Date fabrication. [severe]	**Information Falsification or Fabrication** ● Students are warned and scholarship may be temporarily stopped for a period of time ● Student need to attend workshop on "Academic Honesty . ● These issues will be handled by Dean Academics separately.
Facilitation of Academic Dishonesty **(Applicable to TAs also)** ● Providing the materials or others to the students without permission. ● Providing the question papers or others to the students without permission. [severe]	**Facilitation of Academic Dishonesty** **(Applicable to TAs also)** ● TAs are warned and their scholarship may be suspended for a 6 months of time. ● The students (both student and TA) may be suspended for next semester, or the student is not allowed to register for the next semester. ● If the TA is the main culprit, s/he may be given more punishment.
On-line Cheating ● Creating instant Whatsapp or other groups and sharing the answers or solutions. [Severe] ● Participating in Whatsapp or other groups while being aware that the group is used for dishonest academic	**On-line Cheating** ● Award 0 marks for the whole group or class. ● Fail the student. Disciplinary actions, including suspension may be taken. ● Makeup Exam is not offered.

purposes [Severe]. ● Impersonation. [Severe] ● Online screen sharing ● Exchange answers with others. [Severe] ● At the beginning, exchange pdfs to verify the sets. [severe] ● Keeping phones, books etc. out of camera region. [severe]	
Others ● Faking identities to get third party assistance. [severe] ● Impersonation (both online and offline). [severe]	**Others** ● Disciplinary action will be taken ● Exam component is cancelled ● Suspension / stopping scholarship for a period of time
Severe Issues ● Student impeding the investigation on academic dishonesty ● More than one incidents ● Forging signatures of a faculty/staff member ● Tampering or modifying the evaluated answer sheets. ● Leakage of Question Papers ● Data Fabrication	**Severe Issues** ● Redoing/re-attending the course, in subsequent year. All the assignments, tests, quizzes etc. need to be submitted afresh. ● For TAs, scholarship may be suspended for a period of time. ● The student may be suspended for next semester, or the student is not allowed to register for the next semester. ● Mandatory attendance in academic honesty workshop. ● Academic and/or disciplinary probation ● A "FX" grade will be placed in transcript, to indicate that the student has failed due to violation of Academic Dishonesty. ● An intimation regarding the student's academic dishonesty will be sent to the parents. ● "F" grade in all registered courses ● Student is not allowed to fill the teacher and course feedback. ● Barring from contesting in elections, applying for internships, placements etc.

Some More Comments:

- **The items mentioned are some general issues. List can be exhaustive. Faculty / committee will take the relevant action upon the incident.**
- **All the serious issues to be should be authorized or to be penalized by the concern committee appointed by Dean Academics.**
- **Serious issues should attract disciplinary actions, in addition to the above mentioned academic penalties.**
- **Issues related to Plagiarism related to external submissions, Data fabrication etc. should be handled by the Dean Academics through a different committee, specific to the case.**
- **All serious issues attract more than one punishment.**
- **Institute needs to sensitize the students about plagiarism, ethics, academic honesty etc., during the orientation programs. This document should be made available on the intranet.**

PLAGIARISM

WHAT IS PLAGIARISM

Stealing someone else's ideas and words and passing it on as your own.

WHY IS PLAGIARISM WRONG?

- Plagiarism defeats the purpose of writing assignments. When you plagiarise you are using someone else's ideas and words. These actions do not help you build any skills (other than that of copy-pasting). Thus in committing plagiarism the person you are really cheating is yourself.
- Plagiarism is like lying. When you pass someone else's work as your own you are engaging in unethical behavior. This can also destroy the mutual respect which exists between a professor and a student.
- The basis of academia is trust. When we read an academic piece we trust that the author has represented facts to the best of his ability. Plagiarism undercuts this very foundation of trust.
- Plagiarism defeats the purpose of scholarship, i.e., your ability to learn and grow

Source: University of Oklahoma, Academic Integrity website

TYPES OF PLAGIARISM

One of the most common types of publication misconduct is plagiarism–when one author deliberately uses another's work without permission, credit, or acknowledgment. Plagiarism takes different forms, from literal copying to paraphrasing some else's work and can include:

- Data
- Words and Phrases
- Ideas and Concepts

Source: ethics.elsevier.com

Action	What is it?	Is it unethical?	What should you do?
Literal Copying	Reproducing a work word for word, in whole or in part, without permission and acknowledgment of the original source.	**Yes**. Literal copying is only acceptable if you reference the source and put quotation marks around the copied text.	· Keep track of sources you used while researching and where you used it in your paper. · Make sure you fully acknowledge and properly cite the original source in your paper. · Use quotation marks around word-for-word text and reference properly
Substantial copying	This can include research materials, processes, tables, or equipment	**Yes**. "Substantial" can be de-fined as both quantity and quality of what was copied. If your work captures the essence of another's work, it should be cited.	· Ask yourself if your work has benefited from the skill and judgment of the original author? · The degree to which you answer “yes” will indicate whether substantial copying has taken place. · If so, be sure to cite the original source.

Paraphrasing	Reproducing someone else's ideas while not copying word for word, without permission and acknowledgment of the original source.	**Yes**. Paraphrasing is only acceptable if you properly reference the source and make sure that you do not change the meaning intended by the source.	· Make sure that you understand what the original author means. · Never copy and paste words that you do not fully understand. · Think about how the essential ideas of the source relate to your own work, until you can deliver the information to others without referring to the source. · Compare your paraphrasing with the source, to make sure you retain the intended meaning, even if you change the words.
Text-recycling	Reproducing portions of an author's own work in a paper, and resubmitting it for publication as an entirely new paper.	**Yes**. See our separate factsheet on duplicate submission.	· Put anything in quotes that is taken directly from a previously published paper, even if you are reusing something in your own words. · Make sure to reference the source accordingly

Source: https://www.elsevier.com/__data/assets/pdf_file/0008/653885/Ethics-in-research-and-publication-brochure.pdf

PLAGIARISM-SOURCES NOT CITED

- The author submits an assignment copied word for word from a source different from his or her own

- The author uses some of his or her own words in his or her submission, but substantial parts are taken without modification from a single source
- The author tries to pass off a work as his or her own that has been stitched together from various sources with a few words being altered here and there to try to disguise the original phrasing.
- The author tries to cover his or her lifting of the essential content of a source by minimally altering key words and phrases.
- The author meticulously changes all phrases and words from one source into his or her own but neglects to cite the source.

https://www.slideshare.net/aewinger/plagiarism-types?qid=0b5e4ab0-2a5e-4dab-a163-43b7b0bf7429&v=default&b=&from_search=1

SOURCES CITED (BUT STILL PLAGIARIZED)

- The author notes a source but does not include a specific in-text citation that leads to a reference citation that denotes the exact bibliographic information from the text. Therefore, the link between the in-text citation reference and reference page reference is broken.
- The author scrambles information so that inaccurate information regarding the sources is noted. This makes the source impossible to find and accuracy cannot be determined.
- The writer inserts a direct quote but tries to pass it off as a paraphrase because he or she did not put the direct quote in quotation marks but DID supply an in-text citation.
- The writer accurately cites all paraphrases and gives credit where it is due, but the author neglected the requirement of submitting original work. Remember that all paraphrases should be based on excerpts from expert sources, not the entire source. Paraphrases, after being accurately cited, should also be accompanied by the writer's personal analysis of the paraphrase.
- In this situation of plagiarism, large sections of the author's work are original but interspersed within the original are sections of un-cited paraphrases. In this way, the paraphrased material is passed off as the writer's own.

https://www.slideshare.net/aewinger/plagiarism-types?qid=0b5e4ab0-2a5e-4dab-a163-43b7b0bf7429&v=default&b=&from_search=1

HOW TO PREVENT PLAGIARISM

Take good notes. Whenever you are reading a book or article for an assignment keep notes of the citation information and put in quotation mark any direct quotes

Take time to think. When you are writing your report, think about the topic and your findings, results and analysis. When you understand what you are doing you will be able to express yourself in your own words.

Begin writing. Remember writing is an art. You need to be able to write multiple drafts. With each iteration your work will get better. Remember that grammatical error and spelling mistakes are easy to fix. As instructors we don't mind if your English is a little weak, but plagiarism under any circumstances is unacceptable

Follow proper citation methods.

CITATION

Crediting the work of others (including your advisor's or your own previous work) by citation is important for at least three reasons:

- It places your own work in context, and
- It acknowledges the findings of others on which you have built your research
- It maintains the credibility and accuracy of the scientific literature

Examples:

- Previously we (Attwood and Florence, 2002) reported that the…
- The work of Illumand Davis (1988) drew attention to ….
- According to Ilumand Davis (1988)….

"Plagiarism" Presented by: Alexander T Florence, Elsevier

DATA

Data, statistics, illustrations also need to be cited. If something is common knowledge it need not be cited. But any time specific data is used which is not part of common knowledge it needs to be cited.

ANNEXURE -B

2.1.1 Ph.D. in Engineering

(a) Candidates with a Master's degree in Engineering/Technology with a good academic record or a Master's degree by Research in Engineering/ Technology disciplines, with a good academic record.

or

(b) Candidates with Master's degree in Sciences with a good academic record and of exceptional merit are eligible for the relevant Engineering discipline and with a valid GATE score or UGC/CSIRNET/ NBHM or equivalent qualification in the relevant area tenable for the year of registration. In the case of candidates with more than 5 years of relevant experience after the Master's degree, the requirement of a test score may be waived by the Selection Committee.

Or

(c)Candidates who have qualified for the award of Bachelor's degree in Engineering/Technology with exceptionally good academic record in an eligible discipline will be considered for direct admission **(without previous Master's Degree)** to Ph.D. Programme as a regular full time scholar subject to the following conditions:

(i) B.Tech/BE degree from Centrally Funded Technical Institutes (CFTIs), with a minimum CGPA of 8.0 on a 10.0 point scale

(ii) Bachelor's degree in Engineering/Technology from Non-CFTIs with valid GATE or other equivalent national exam qualification (Validity required at the time of joining) and CGPA of at least 8.0 out of 10.0 (or equivalent).

(iii) Bachelor's degree holder in Engineering/ Technology, serving for two years or more in a reputed R & D organization and having a proven research record.

R2 (2.1.2) M.S./R.3 (Ph.D.) International Students

Foreign nationals can only register as regular fulltime scholars. Foreign nationals with degree from Indian Universities will be treated on par with Indian nationals for admission purposes. Foreign nationals with foreign degrees must meet the minimum educational requirements as given in **R.2.1** equivalent to a Indian Master's degree **or Bachelor degree** in the relevant disciplines, **they should fulfill the requirement of sanctioning agency/authority.**

R.11 Course Work

A research scholar admitted on the basis of Master's degree will have to complete minimum 12 credits **of course work**. The courses shall be postgraduate level courses of the Institute. In addition, scholar must take a course on 'Research Methodology'. **The Doctoral Committee will have to certify the suitability of the courses towards research area and may prescribe additional courses for a scholar wherever found necessary.**

(a) In cases where the scholar is directly admitted to the Ph.D Programme with a Bachelor's or where the research scholar converts registration from M.S/M. Tech programme to Ph.D programme, the scholar should successfully complete **24 credits (shall be postgraduate level courses of the Institute)**, prescribed by the Doctoral Committee .

In the case of a scholar converting to the Ph. D Programme in Engineering from the M.S/M.Tech Programme at IIT Mandi, the courses already successfully completed by the scholar in the Master's Programme may be considered by the Doctoral Committee for the course work requirements. Changes in prescribed courses shall be made only by the Doctoral Committee. The Doctoral Committee may prescribe additional courses for a scholar wherever found necessary.

(b) On the recommendations of the Doctoral Committee, the Dean (Academics) may waive off the course requirements of an scholar subject to the following conditions:

i The scholar should have completed M.Tech./M.A./M.Sc./PG programme from IITs, IISc, IISER and, MBA from IIM and having CGPA 8.0 or more and shall register for the PhD within two years of the completion of the previous programme. However, the student should complete Comprehensive Examination and Research Methodology.

ii The waiver will be applicable if admission is sought within the relevant stream or discipline with respect to the post-graduate degree.

iii In case of any active MoU with a reputed institute in India (like , specifically having the provision of waiver of course work, the coursework waiver may be extended to students enrolled in the duration of MoU graduated from such institute.

Scholar may be required to do additional course, if the DC recommends.

R.12 Progress Report

(a) A registered research scholar shall submit a written report to the Doctoral Committee (DC) **forwarded by the thesis supervisor** in the required format, annually for the first **five** years and every six months thereafter.

(b) The progress made by a research scholar shall be reviewed by the Doctoral Committee (DC) **in a meeting and will provide recommendation based on the written report. If desired, DC, may conduct presentation**. Continuance of registration and award/continuance of scholarship/Research Assistantship will be based on the recommendation of the Doctoral Committee.

(c) **Additional DC meeting could be conducted anytime throughout the year based on the requirement.**

(d) Two consecutive "unsatisfactory performance" in the progress report at any point of time will lead to the cancellation of registration

In the case of research scholars working on a part time basis, the Doctoral Committee will pay particular attention to the quantum of effort put in by the scholar towards doctoral studies for its progress. Inadequacy of effort/progress can be a reason for cancellation of registration.

R.13 Comprehensive Examination

(a) Every Ph.D scholar shall take and perform satisfactorily in a Comprehensive Examination in his/her school. The Comprehensive Examination shall be conducted by a Comprehensive Examination Committee of the school.

(b) Prior to appearing in the Comprehensive Examination, the scholar should have successfully completed all the course work with the minimum grades and CGPA as specified under R.11.

(c) If the performance of a research scholar in the Comprehensive Examination in the first attempt is not satisfactory, he/she will be given one more opportunity to appear for the comprehensive examination.

The registration of a research scholar who fails to complete successfully the Comprehensive Examination in both attempts, may be allowed to convert his/her registration from Ph. D to M.S. programme if he/she so desired, with the consent of the guide and the approval of the Doctoral Committee, otherwise his/her registration will be cancelled.

(c) The objective of the Comprehensive Examination is to test the general capability of the research scholar and the breadth of his/her knowledge in his/her discipline and areas related to his/her field of research. The Comprehensive Examination will usually consist of a written test and/or oral examination. Exam will be conducted as per the Comprehensive Examination Committee guidelines.

The Comprehensive Examination Committee shall intimate to the research scholar sufficiently in advance the scope of the Comprehensive Examination, so as to enable the scholar to prepare adequately for it.

(d) The Ph. D research scholars are normally expected to complete successfully the Comprehensive Examination within a year after his/her registration in the Ph. D programme and in any case not later than two years after his registration in the Ph. D programme.

R.18 Cancellation of Registration

Registration in the programme can be cancelled, if:

(a) **The Progress of a research scholar** is not found to be satisfactory by the Doctoral Committee

(b) The research scholar **does not pay the prescribed fee and/or** does not enroll in **any given** semester.

(c) The research scholar has not submitted his/her thesis before the end of the maximum permissible period will be cancelled automatically.

(d) the scholar absents him/herself without prior intimation/sanction of leave.

(e) the scholar does not clear the comprehensive examination and process as stipulated under R.13 & R.20.

(f) the CGPA is below 6.50 at any time (after first semester)

(g) the scholar is found involved in an act of misconduct and/or indiscipline and termination is recommended by a competent authority.

(h) Cooling Off period of minimum one year for scholar(s) who was terminated from the programme due to any reason.

R.24 Thesis Report

(a) The examiner is expected to send the report on the thesis within **6 weeks** from the date of receipt of the thesis.

(b) If one of the two thesis examiners declares the thesis as not recommended, the thesis **evaluation report** shall be **put up to the Doctoral Committee before referring it** to a third examiner from the panel for his/her evaluation.

(c) If an examiner suggests resubmission of the thesis, after revision, the research scholar will be allowed to resubmit the thesis within the time stipulated by the Doctoral Committee failing which the revised thesis will not be accepted and his/her registration will be cancelled.

(d) If two examiners, report the thesis as not recommended, the registration of the scholar shall stand cancelled.

(e) If reports of two examiners~~,~~ declare the thesis as 'recommended' the Doctoral Committee will consider the reports and recommend for conduct of viva voce (Moved to R.25)

(f) In all other cases, not covered by the above Regulations the matter will be referred to the Doctoral Committee for consideration.

(g) **A new proposal: The scholar should appear in the Viva Voce Examination within *3 months* of receipt of the satisfactory report of the 2nd examiner, else the scholar will have to pay full fee and other conditions as specified by the DC/Academic Office.**

ANNEXURE - C

Course number : BE 506
Course Name : Biological Modelling and Simulation
Credit Distribution : 2-0-2-3
Prerequisite :Understanding Biotechnology and its applications (IC136), and Bioinformatics (BE304), Computational Biology (BE505), or with permission of the instructor.
Intended for : Core for Integrated Dual Degree Bioengineering students with Specialisation in Computational Bioengineering, elective for other B.Tech and Mtech students, Elective for other UG, PG
Mutual Exclusion : None

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1. Preamble:

The course is intended to teach students how to reason about developing formal mathematical models of biological systems that are amenable to computational analysis. The course will broadly cover useful models, algorithms, and theoretical analysis tools normally used for biological systems in numerous subfields of biology. The course topics provide a general framework for learning how to formulate mathematical models of biological systems, what techniques are available to work with these models, and how to fit the models to particular systems. The course will include practical sessions for the students to help them master some of the advanced techniques from hands-on experience. The course will cover the following broad topics:

2. Course Modules with quantitative lecture hours: (28 hours)

A. Modelling biomolecular structure, interactions and dynamics using atomistic simulations (13 hours) ***(Dr. D. Mohanty, NII)***

Introduction to Molecular Modelling, Molecular Mechanics (MM) Forcefields & empirical energy functions, Potential energy surface & Energy minimization algorithms, Molecular dynamics (MD), Explicit solvent simulations & Water models, Calculation of energy (E), temperature (T), Pressure (P) and Volume (V). Temperature control by velocity scaling and coupling to heat bath, Equilibration vs Production Dynamics, MD at higher temperatures for enhanced sampling & Simulated Annealing, Analysis of MD trajectories by Principal Component Analysis (PCA) and essential dynamics, MD Simulations in membrane environment, Calculation of Free Energy changes from explicit solvent MD by Free Energy Perturbation (FEP) approach, Monte Carlo (MC) Simulations, Atomistic vs coarse-grained dynamics.

B. Systems Biology & Biological Networks (2 hours) ***(Prof James Gomes, IIT Delhi)***

C. Simulation of cellular subsystems (11 hours)

Simulation & Analysis of Biochemical Network Models (3 Hours) ***(Prof James Gomes, IIT Delhi)***

Simulation of Genome-Scale Metabolic (GSM) Networks, Flux-Balance Analysis (FBA) & Constraint based models (5 Hours) ***(Dr. Karthik Raman, IIT Chennai)***

Introduction to Boolean Network Modeling of Gene Regulation (2 hours) ***(Dr D. Mohanty, NII)***

D. Population models (3 hours) ***(Dr. Tulika P Srivastava, IIT Mandi)***

Lab Course content: **(28 hours)**

The below mentioned 10 topics will be covered over the 14 weeks:

A. **Atomistic Simulations 12 hours** ***(Dr. D. Mohanty & Tulika P. Srivastava)***

1. Visualization and analysis of 3D structures of bomolecules and Model building.
2. Energy minimization.
3. Molecular Dynamics Simulation of a Protein using GROMACS.
4. Analysis of MD trajectory & Principal Component Analysis (PCA) of MD trajectory.
5. Calculation of Free Energy (solvation of methane or amino acids in water) using explicit water simulations.
6. MD simulations of a Protein-Ligand complex.
7. MD simulation of a model transmembrane peptides in lipid bilayers.

B. Analysis of biological networks 3 hours

1. Visualization of biological networks and calculation of network parameters using Cytoscape.

C. Simulation of cellular subsystems 8 hours

1. Simulation & Analysis of biochemical network models using differential equations (COPASI).

2. Flux Balance Analysis using COBRA Tool for simulation of genome scale metabolic networks: Applications to central metabolism of *E. coli*.

D. Population models 5 hour

1. Predator-Prey Simulation
2. Modeling spread of infectious disease: COVID19.

3. Text books:

1. **Molecular Modelling. Principles and Applications (2nd Edition) by Andrew R. Leach (**ISBN 978-0582382107).
2. **An Introduction to Computational Systems Biology Systems-Level Modelling of Cellular Networks**. *By* *Karthik Raman* (ISBN 9781138597327 Published May 31, 2021 by Chapman and Hall/CRC).

4. References:

1. Dynamics of Proteins & Nucleic Acids (JA McCammon & SC Harvey) Cambridge University Press online ISBN 9781139167864.

5. Similarity Content declaration with existing courses:

S. No.	Course Code	Similarity Content	Approx. % of Content
1	BY504	Constraint based flux analysis.	15%

6. Justification of new course proposal if cumulative similarity content is >30%: Not Applicable

Course number : CE514
Course Name **:** Rock Mechanics
Credit Distribution **:** 3-0-0-3
Intended for **:** UG elective and PG elective
Prerequisite **:** Geotechnical Engineering (CE 302) or Equivalent
Mutual Exclusion **:** None

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1. Preamble:

India is rapidly marching towards modern and sustainable infrastructure. Most of the signature projects are being developed in hilly regions which include bridges (e.g., Chenab Bridge), tunnels (e.g., Rohtang Atal Tunnel), dams, buildings, etc. All these structures are either founded on rocks or are constructed in rocks. In view of this, it has become necessary to include a dedicated course on rock mechanics in the civil engineering curriculum. Therefore, a course on 'Rock Mechanics' is being proposed with the following objectives: (i) to understand the engineering behaviour and properties of rocks, (ii) to broaden the view-point of geotechnical/structural engineering students who have already done a course on soil mechanics, (iii) to explain the challenges faced by geotechnical as well as structural engineers while designing/constructing structures in or on rocks, and (iv) to get the benefit of special location of IIT Mandi campus and initiate the process of developing IIT Mandi as a rock mechanics centre of excellence in future.

2. Course Modules with quantitative lecture hours:

Module 1: Introduction to rock engineering, basics of geology for rock engineers, engineering and index properties of intact rocks, demonstration of laboratory techniques, design implication of different properties of intact rocks. **[5 hours]**

Module 2: Discontinuities in rocks, engineering behaviour and characterization of discontinuities, types and description of discontinuities, orientation and spacing, discontinuity modelling, roughness, aperture, joint stiffness, RQD estimation. [**5 hours]**

Module 3: Various geological features of rock-mass and their application in rock-mass classification (RMR, RMi, Q, GSI), correlation between different rock-mass classifications, weathering of rock-mass and its classification. **[5 hours]**

Module 4: Deformability characteristics of jointed rock-mass, different types of moduli, challenges/issues with in-situ deformability measurement, design implications, anisotropy in rock-mass deformability, scale-effect, empirical methods, and equivalent continuum approach. **[8 hours]**

Module 5: Shear strength characteristics of jointed rock-mass, different rock failure criteria and strength models, anisotropy in strength, scale-effect, empirical methods, equivalent continuum approach. **[8 hours]**

Module 6: In-situ stresses in rock-mass and their importance in design of underground caverns and tunnels, permeability of rock-mass. **[3 hours]**

Module 7: Application of rock mechanics to key rock engineering problems such as rock slope failure and stability analysis, foundations on rocks, and application of rock-mass classification in preliminary tunnel support system design. **[8 hours]**

3. Text book:

- Aydan, Ömer. Rock Mechanics and Rock Engineering: Volume 1: Fundamentals of Rock Mechanics. CRC Press, 2019.
- Bieniawski, Zdzislaw T. Design methodology in rock engineering. CRC Press, 2020.

4. References:

- Jaeger, John Conrad, Neville GW Cook, and Robert Zimmerman. Fundamentals of rock mechanics. John Wiley & Sons, 2009.
- Sivakugan, Nagaratnam, Sanjay Kumar Shukla, and Braja M. Das. Rock mechanics: an introduction. CRC Press, 2013.
- Goodman, Richard E. Introduction to rock mechanics. Vol. 2. New York: Wiley, 1989.
- Hudson, John A., and John P. Harrison. Engineering rock mechanics: an introduction to the principles. Elsevier, 2000.
- Ramamurthy, T., ed. Engineering in rocks for slopes, foundations, and tunnels. PHI Learning Pvt. Ltd., 2010.
- Pariseau, William G. Design analysis in rock mechanics. CRC Press, 2006.
- Zhang, Lianyang. Engineering properties of rocks. Butterworth-Heinemann, 2016

5. Similarity with the existing courses:

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

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

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

Course number : CE602
Course Name : Blast Engineering
Credit Distribution : *3-0-0-3*
Intended for : UG/PG elective
Prerequisite : Structural Dynamics (CE511) or Soil Dynamics (CE 560) or equivalent
Mutual Exclusion : None

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1. Preamble:

The critical infrastructure such as army facilities, key government buildings, nuclear power plants, and life-line bridges, tunnels, and hospitals must also be designed for abnormal loading such as blast and impact. The blast loads are short-duration high-magnitude impulsive loads and the structural response to such loads requires a proper understanding. Therefore, this course on 'Blast Engineering' is being proposed with the following objectives: (i) to understand the sources and characteristics of the blast loads, (ii) to apply the knowledge of structural dynamics in determining the structural response, (iii) to learn the different design aspects of the protective structures, and (iv) to get acquainted with different industrial practices. This course would be useful for those who wish to practice structural engineering or research in the field of protective structures.

2. Course Modules with quantitative lecture hours:

Module 1: Risks, Threat, and vulnerability Assessment, different scenarios: accidental or terrorism, chemical, or nuclear, sources of explosion and explosive devices, introduction to different types of problems through case-studies. **[5 hours]**

Module 2: Basic physics of shock/explosion phenomena, internal and external explosions, nuclear and chemical explosions, characteristics of blast loads, ideal and non-ideal blast waves, penetration (in concrete, rock, soil), fragmentation, ground shocks, shock wave propagation, cratering and ejecta phenomena. **[10 hours]**

Module 3: Blast load on buried structures, above ground structures, surface-flush and mounded structures, nuclear loads, soil arching, computing pressure-time curves for different structural components, dynamic behavior of materials (concrete, steel, rock, soil), dynamic response of idealized systems to blast loads (SDOF, MDOF, continuous systems, practices in design codes, equivalent SDOF approach, dynamic flexure and shear behavior), brief introduction to advanced computational tools (such as hydrocodes, LS-DYNA, AUTODYN, DYNA-2D) and methods. **[12hours]**

Module 4: Shock spectra, Pressure-impulse diagrams, their application in design, closed-form solution, energy balance approach, dynamic models (flexure, shear, resistance function, failure modes) and design/construction aspects for protective structures (connections, openings, site-selection, shock isolation, equipment protection, etc.), progressive collapse under blast load. **[10 hours]**

Module 5: Current design practices, design and safety considerations as per national and international standards challenges, issues & prospects, industrial needs, interaction with industry/field experts. **[5 hours]**

3. Text book

1. Prasad, BK Raghu. *Structural Dynamics in Earthquake and Blast Resistant Design*. CRC Press, 2020.
2. Hetherington, John, and Peter Smith. *Blast and ballistic loading of structures*. CRC Press, 2014.

4. References:

- Ramamurthi, K. (2010). *Explosions and Explosion-Safety*. Tata McGraw-Hill Education.Dusenberry, Donald O., ed. *Handbook for blast resistant design of buildings*. John Wiley & Sons, 2010.
- Mays, Geoffrey, Peter Desmond Smith, and Peter David Smith, eds. *Blast effects on buildings: Design of buildings to optimize resistance to blast loading*. Thomas Telford, 1995.Baker, Wilfred Edmund, P. A. Cox, J. J. Kulesz, R. A. Strehlow, and P. S. Westine. *Explosion hazards and evaluation*. Elsevier, 2012.
- Krauthammer, T. Modern protective structures. CRC Press, Taylor & Francis, USA, 2008
- Bangash, Mohammad Yusaf Hassan. Shock, impact and explosion: Structural Analysis and Design. Springer Berlin Heidelberg, 2009.
- UFC (Unified Facilities Criteria). 2008. Structures to resist the effects of accidental explosions. Rep. No. UFC 3-340-02. Washington, DC: US Army Corps of Engineers, Naval Facilities Engineering Command, Air Force Civil Engineer Support Agency.
- ASCE. 1985. Design of structures to resist nuclear weapons effects. Manual of Practice 42. Reston, VA: ASCE
- IS 4991: 1968 (reaffirmed 2003): Criteria for Blast Resistant Design of Structures for Explosions Above Ground.

5. Similarity with the existing courses:

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

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

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

Course number : CS542
Course Name : Design patterns for scalable systems
Credit Distribution : 3-*0*-*0*-*3*
Intended for : B. Tech./Masters/Ph.D.
Prerequisite : CS310 and CS309 or equivalent courses covering basics of computer networks, databases and operating system
Mutual Exclusion : NA

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1. Preamble:

Most of the applications we encounter in the present-day are Internet-scale distributed applications. Their requirements are quite different from traditional applications: 24/7 availability, ability to handle huge volumes of data, being responsive even in the midst of load variations and failures, etc. Design patterns describe recurring problems in software design and offer solution templates that can be reused by the designer. In traditional software design, these non-functional requirements were not factored at the design time but added as features later on. However, at this Internet-scale, these aspects become very complex to address after system design. This course discusses design patterns for reactive systems that incorporate these requirements at the design stage. The core features of such reactive systems are that they are event-driven, scalable, resilient and responsive. This course includes practical assignments/projects based on designing and implementing parts of a scalable system in addition to covering concepts in theory.

2. Course Modules with quantitative lecture hours:

Unit 1: Introduction to design patterns and reactive systems **(5 hours)**
Software design: functional and non-functional requirements, design patterns, changing landscape: web-scale responsive applications, design approach: monolithic vs microservices, horizontal vs vertical scaling, walk-through of the reactive manifesto

Unit 2: Review of concurrency in practice **(6 hours)**
Threads in OS, notions of parallelism: tasks, functions, and loops, synchronization and data flow concepts, consistency protocols, transition from parallel to distributed systems: distributed memory architectures, CAP theorem, distributed state: sharding and conflict free replicated data types

Unit 3: Review of functional programming concepts **(5 hours)**
Immutability, pattern matching, partial functions, collections, futures

Unit 4: Actor model **(7 hours)**
Asynchronous programming, Actor model, message processing semantics, designing and testing Actor models

Unit 5: Design patterns for high availability **(14 hours)**
Fault-tolerance and recovery patterns, replication patterns, resource management patterns, state management and persistence patterns

Unit 6: Design patterns for effective communication **(5 hours)**

Message flow patterns, flow control patterns

Laboratory/practical/tutorial Modules: None

3. Text books:

1. Roland Kuhn, Brian Hanafee and Jamie Allen, Reactive Design Patterns, Manning Publications Co., NY, 2017.
2. Erich Gamma, Richard Helm, Ralph Johnson and John Vlissides, Design Patterns: Elements of Reusable Object-Oriented Software, Addison-Wesley, 1995.

4. References:

1. Clement Escoffier and Ken Finnigan, Reactive Systems in Java, 1st edition, O'Reilly, CA, 2021.
2. Martin Kleppmann, Designing Data-Intensive Applications, 17th release, O'Reilly, CA, 2021.
3. Chris Richardson, Microservices Patterns with examples in Java, Manning Publications Co., NY, 2018.
4. Jonas Boner, Reactive Microsystems: The Evolution of Microservices at Scale, 1st edition, O'Reilly, CA, 2017.
5. Thomas Anderson and Dahlin, Operating Systems: Principles and Practice, 2nd edition, Recursive books 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.	Software Design Patterns	CS545	Introduction to design patterns, discussion of a few OO patterns	10%

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

Course number : CY-515
Course Name : Advanced Inorganic Spectroscopy
Credit Distribution :*3-0-0-3*
Intended for : PG and PhD level
Prerequisite : Basic understanding of physical chemistry and preliminary knowledge of quantum mechanics, or with instructor's approval.
Mutual Exclusion : None

1. Preamble

Elucidation of chemical and electronic structure of molecules using spectroscopic techniques is one of the most significant aspects of chemistry. Spectroscopy provides conclusive evidence about structure and reactivity. This course enables the students to learn fundamental principles of advanced inorganic spectroscopic techniques that are frequently used in chemistry.

2. Course Modules with quantitative lecture hours

Module 1: Electron Paramagnetic Resonance Spectroscopy (10 hours)

Origin of EPR signals, g-factor, Presentation of the EPR spectrum, Hyperfine splitting: from protons and from Nuclei I > 1/2, Origin of hyperfine interaction, Contributions to the hyperfine interactions in isotropic systems, Anisotropic Effects: Anisotropy in the g value, EPR of triplet states, nuclear quadrupole interaction, line widths, Experimental considerations and application of EPR.

Module 2: Magnetic Circular Dichroism Spectroscopy (6 hours)

Differences with CD, Theoretical Framework: Definition of MCD Terms, Measurement of MCD Spectra, The Interpretation of MCD Spectra, Case Studies; Diamagnetic Systems (A and B terms) and Paramagnetic Systems (C Terms) Magnetic Vibrational Circular Dichroism (MVCD) and X-Ray magnetic Circular Dichroism (XMCD), Application.

Module 3: Nuclear Quadrupole Resonance Spectroscopy (6 hours)

Nuclear quadrupole moment, Energies of nuclear quadrupole transitions, Effect of magnetic field on the spectra, Relationship between electric field gradient and molecular structure, Applications, Interpretations of structural information from NQR spectra.

Module 4: Mössbauer Spectroscopy (7 hours)

The Mössbauer effect, Line width, Recoil energy, Mössbauer active nuclei, Isomer shift, Quadrupole splitting, Magnetic hyperfine interactions, Mossbauer spectroscopy vs. Chemical bond, Structure determination and Analytical applications.

Module 5: Photoelectron Spectroscopy (6 hours)

Auger electron spectroscopy, Photoionization process, Spin-orbit Coupling, X-ray Photoelectron spectroscopy, Electron Energy Loss Spectroscopy (EELS).

Module 6: X-ray Absorption and Emission Spectroscopy (7 hours)

Introduction of X-ray absorption spectroscopy (XAS), X-ray emission spectrum (XES), X-ray Absorption spectrum, Theory of X-Ray Absorption Near Edge Structure (XANES) and Extended X-ray Absorption Fine Structure (EXAFS), Application.

Laboratory/practical/tutorial Modules:0

3. Text books:

1. **D. N. Sathyanarayana.,** Handbook of Molecular Spectroscopy: From Radio waves to gamma rays, I. K. International Publishing House Pvt. Ltd. 2019.
2. **Russell S. Drago,** Physical Methods in Inorganic Chemistry, Publishers:Van Nostrand Reinhold, 2016.

4. References:

1. **Jack D. Graybeal,** Molecular Spectroscopy, McGraw Hill Education Private Limited, 1988.
2. **G. Aruldhas,** Molecular Structure and Spectroscopy PHI Learning Private Limited, Delhi, 2019.
3. **Editor(s): Jeroen A. Van Bokhoven, Carlo Lamberti,** X- Ray Absorption and X- Ray Emission Spectroscopy: Theory and Applications, John Wiley & Sons, Ltd, 2016.
4. **Editors: Edward I. Solomon, A. B. P. Lever,**Inorganic Electronic Structure and Spectroscopy, Volume I: Methodology and Volume II: Application and Case Studies, John Wiley & Sons, Inc., 2006.
5. **Skoog, West and Holler,** Fundamentals of Analytical Chemistry Publishers: Saunders's College publishing, 2013.
6. **W. Roy Mason,** A Practical Guide to Magnetic Circular Dichroism Spectroscopy, Wiley-Interscience, 2007.

5. Similarity with the existing courses: NA

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

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

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

Course number : HS542
Course Name : Ethnicity, State, and Nationalism in India
Credit Distribution : 3-*0*-*0*-*3*
Intended for : UG/PG
Prerequisite : None
Mutual Exclusion : None

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1. Preamble:

The course discusses issues of ethnicity, nation, and nationalism in India. Drawing upon theoretical perspectives aided by empirical illustrations, the course provides a holistic understanding of the debates concerning these concepts in the Indian context. The course draws upon the broader meanings of these concepts and it's applicability to understand Indian situation. The first part of the course maps the basic concepts to equip students with theoretical understanding. In the second section the course devotes itself to understand Indian experiences by drawing upon issues of multiculturalism and pluralism, and varied forms of ethnic formations. The course will discuss the various manifestations of ethnic issues such as regionalism, ethnic strife, growth and proliferation of ethnic parties with a stated objective to understand how ethnic claims confront the state in myriad ways.

2. Course Modules with quantitative lecture hours:

Module 1: Basic Concepts **(4 hours)**

- State
- Nation
- Nationalism
- Ethnicity

Module 2: Theories of ethnicity **(12 hours)**

- Ethnicity, State and Nation
- Civic and Ethnic nationalism
- Approaches to understand ethnicity-
- Structure-functional
- Weberian
- Marxist and Neo-Marxist,
- Primordialist/Instrumentalist,
- Postmodernist and Social Constructionist

Module 3: Theoretical Approaches to Nation and Nationalisms **(10 hours)**

- Growth of nation-state in Europe
- Nation, Modernity and Capitalism
- Nationalist awakening in Colonial India
- Ideas of Nationalism in post-colonial India
- Post-Nationalism

Module 4: Ethnicity and sub-nationalism **(8 hours)**

- Ethnic Minorities and the state in India

- Ethnicity and ethnic violence
- Ethnic violence, Minorities and Women
- Ethnic conflict in North-east India: ethno-territoriality, conflicts, and movements for self-determination

Module 5: Managing Diversity in India (8 hours)

- Integration and Assimilation
- Issues of pluralism, multiculturalism,
- Ethnic identity, Identity claims and Ethnic resurgence
- State's effort in managing difference and its consequences

3. Laboratory/practical/tutorial Modules: NA

4. Textbooks:

1. Baruah, Sanjib. 2009. *Beyond Counterinsurgency: Breaking the Impasse in Northeast India*. New Delhi: Oxford University Press.
2. Brubaker, Roger. 2010. *Ethnicity without Groups.* Harvard: Harvard University Press.

5. References:

1. Chatterjee, Partha. 1986. *Nationalist Thought and the Colonial World: A Derivative Discourse*. Tokyo: Zed Books.
2. Chatterjee, Partha. 1993. *Nation and its fragments: Colonial and Postcolonial Histories*. Princeton: Princeton University Press.
3. Gellner, Ernest. 1983. *Nations and Nationalism.* New York: Cornell University Press.
4. Hutchinson, John and Anthony D. Smith (eds). 1996. *Ethnicity*. Oxford: Oxford University Press.
5. Hutchinson, John and Anthony D. Smith (eds). 1994. *Nationalism*. Oxford: Oxford University Press.
6. Jayal, Niraja Gopal. 2006. *Representing India: Ethnic Diversity and the Governance of Public Institutions.* Switzerland: Palgrave Macmillan.
7. Mann, Michael. 1995. *The dark side of Democracy: Explaining Ethnic Cleansing.* New York: Cambridge University Press.
8. Phadnis, Urmila and Rajat Ganguly. 1991. *Ethnicity and nation-building in South Asia*, New Delhi: Sage.
9. Shneiderman, Sara. 2015. *Rituals of Ethnicity: Thangmi Identities between Nepal and India.*
10. Philadelphia: University of Pennsylvania Press.
11. Anderson, Benedict. 1991. *Imagined Communities: Reflections on the Origin and Spread of Nationalism.* London and New York: Verso.

***Note:** Any other text/Article suggested by the subject teacher from the list of reference listed below.

******The course will try to complement theoretical readings with some documentaries and films on the subject.

5. Similarity Content Declaration with Existing Courses.

S.N.	Course Code	Similarity Content	Approx. % of Content
1	HS524 India in the 1950s: Biography of a Foundational Decade	Ethnic Minorities and the state in India	5%
2	HS255 India Since Independence	Issues of Identity	5%
3	HS 263 Popular Culture in Modern India: A Historical Perspective	Nation-building in popular imagination	5%
4	HS-401 Tribal India, Indigenous Latin America	Post-colonial nation-making and issues of tribes	5%
			20%

6. Justification for new course proposal if cumulative similarity content is > 30%: N/A

Course number : HS 545
Course Name : Applied Forensic Psychology
Credit Distribution : *3-0-2-4*
Intended for : B.Tech/Masters/PhD
Prerequisite : Basic Knowledge of Psychology and cognitive processes (Advised to enroll for Introduction to Psychology (HS252) course before joining this course), or Consent of the Instructor.

Mutual Exclusion: None

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1. Preamble:

This course is meant for those with an inherent interest in psychology and/or criminal investigation. It aims to develop scientific understanding of the aetiology of crime scene and recent psychological and neuropsychological techniques used for understanding of criminal behaviour. It would be helpful to aspiring engineers as they can synthesise their knowledge of engineering with psychological and legal understanding in developing gadgets and tools to investigate criminal behaviour.

The course will have lectures and practical demonstration of Forensic Neuropsychology techniques used for testing suspects and accused persons, such as polygraph, electroencephalography, eye tracking, Galvanic skin conductance responses, heart rate, etc. Changing concepts of crime and crime scenarios will be discussed. The merits and disadvantages of these techniques will also be discussed in detail. This course covers all the core areas of forensic psychology, with a particular focus on applying theory, content and knowledge to eyewitness testimony.

Under the broader umbrella of forensic science, the emphasis of this course will be on eyewitness testimony that remains a critical component of criminal investigations. Psychological research has revealed dangers of relying on this testimony because of the cognitive constructive and reconstructive processes at work while storing information, and how careful the police must be when questioning witnesses. Using case files from police investigation, this course would deeply explore the psychology of eyewitness testimony. The students would get chance to test their own cognitive skills and see if their investigative powers are as good as police officers.

2. Course Modules with quantitative lecture hours:

Module 1: Overview of Forensic and Criminal Psychology (8 hours)

- Forensic Psychology: Major areas, Scope, State of art
- Role of Forensic psychologist: Educational and certification requirements
- Theories of crime:
- Lombroso approach to understand crime, its causes and remedies
- Moral reasoning Theory
- Social information-processing Theory

- Developmental and psychological theories of offendin
- Developmental propensity theory
- Propensity Theory
- Social learning Theory
- Lifestyle Theory
- Integrated Cognitive Antisocial Potential theory
- Recent Psychological research and police investigations: Does the research meet the needs?
  Victims of crime

Module 2: Eyewitness testimony (6 hours)

- Eyewitness testimony as a central issue in criminal and forensic psychology
- Accuracy of the witness evidence: Role of System and Estimator variables
- Eyewitness evidence in courts
- Children as witnesses
- Factors that lead to criminal behaviour, criminal profiling
- Scope for psychological assessments of suspects for facilitating understanding of the crime committed

Module 3: Witness memory: encoding, storage and retrieval factors (6 hours)

- Mistaken identity
- Perceiving event
- Retaining information in memory and retrieving the same Inattentional blindness

Module 4: Visual Identification (6 hours)

- Perceiving events
- Recognizing people and facial recognition
- Individual differences in eyewitness testimony

Module 5: Profile Analysis: (6 hours)

- The origin of offender's profile
- The process of police investigation
- Type of profiling: Inductive and deductive
- Profiling and personality
- What research speaks about profiling: whether it works?

Module 6: Lies, Lie detecting and act of deception: Technological and non-technological involvement (6 hours)

- Brain development and the parts of the brain underpinning social and antisocial behaviours
- Ekman's theory of lie detection
- Improving lie detection hit rates: Cognitive overload
- The strategic use of evidence technique

- The polygraph process and its validity, Alternatives to the polygraph
- Layered Voice Analysis (LVA)
- Suspect Detection System (SDS)
- Brain Electrical Oscillations Signature (BEOS)
- Gait analysis
- Handwriting analysis
- Use of Eye tracker and electroencephalograph in investigations
- Non-technological forensic assessments/investigations: MMPI, PCL-R, TAT, Expert testimony

Module 6: Interviewing/interrogating witnesses and suspects (8 hours)

- Methods of interviewing witnesses and suspects:
- Cognitive interview
- Interviewing assailable witnesses such as children, elderly people and people with intellectual disability
- Working with the courts: Judicial processes
- Presentation of evidences in courts
- Judges as decision makers
- Advice for expert witnesses
- Case studies of criminals with concluding judgments and convictions

Laboratory/practical/tutorial Modules: **(10 hours)**

Laboratory and practical sessions will be distributed into different modules (module, 2, 3, 4, 5 and 6). Students will be introduced to some of the forensic assessment tools, such as Rorschach Ink Blot, Personality Big-5, Psychopathic Checklist-Revised (PSL-R), Minnesota Multiple Personality Inventory-3, Electroencephalography, Thematic Apperception Test, Galvenic skin conductance etc. Additionally, expert testimony will also be included in the syllabus.

Part 1: Personality test introduction and administration (paper-pencil based)
Part 2: Electroencephalography and Galvanic skin conductance/lie detection tools introduction and administration
Part 3: Field work, visiting police stations, courts interacting with police personnel and people in judiciary system to know the nature of criminal investigation and proceedings

3. Text books:

I. Graham. M. Davies and Anthony R. Beech, *Forensic psychology: Crime, justice, law, interventions*. 3rd Edition, John Wiley & Sons, West Sussex, United Kingdom, 2018.

4. Curt R. Bartol and Anne M. Bartol, Introduction to Forensic Psychology, 5th Edition, Sage Publication, Thousand Oaks, California, 2018.**References:**

I. Mickes, L. (2015). Receiver operating characteristic analysis and confidence-accuracy characteristic analysis in investigations of system variables and estimator variables that affect eyewitness memory. *Journal of Applied Research in Memory and Cognition, 4*, 93-102.

II. Sridhar Ramamurty, David E. Morrison III, Joseph W. Koletar and Kelly R. Pope, *A.B.C.'s of Behavioral Forensics: Applying Psychology to financial fraud and detection*, John Wiley & Sons, Hoboken, New Jersey, 2013.

III. Philip H. Melanson, *The Murkin Conspiracy: An Investigation into the Assassination of Dr. Martin Luther King Jr., Praeger Publication, New York, USA,* 1989. Dennis Howitt, *Introduction to forensic and criminal psychology*. 6th Edition, Pearson Education, London, United Kingdom, 2006.
IV. Lombroso, C., *Crime, its causes and remedies* (Vol. 3). The University Press, Cambridge, USA, 1911
V. Elizabeth F. Loftus, *Eyewitness Testimony,* Harvard University Press, London, United Kingdom, 1979

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

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

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

Course number : MA 516
Course Name : Topology
Credit Distribution : 3-1-0-4
Intended for : UG/PG
Prerequisite : MA-511(Real Analysis)
Mutual Exclusion : None

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1. Preamble:

This is a basic course on Topology. The main objective of this course is to introduce the basic concepts of Topology. It is a field that has great importance in mathematics and has tremendous applications in various fields of Science and Technology, like applications to Biology, Robotics, Engineering, Computer Sciences, etc. This course will provide the students an opportunity to learn the fundamental concepts of topology, which will be useful for them to learn advanced courses like Algebraic Topology, Algebraic Geometry, etc.

2. Course Modules with quantitative lecture hours:

Module 1: Topological Spaces: open sets, closed sets, neighbourhoods, bases, subbases, limit points, closures, interiors, continuous functions, homeomorphisms. **[7Hours]**
Module 2: Examples of topological spaces: subspace topology, product topology, metric topology, order topology. **[5 Hours]**
Module 3: Compactness: compact spaces and its properties, locally compact spaces, one point compactification, paracompactness, Tychonoff theorem. **[7 Hours]**
Module 4: Countability Axioms: first countable spaces, second countable spaces, separable spaces, Lindeloff spaces. **[4 Hours]**
Module 5: Separation Axioms: Hausdorff, regular and normal spaces, Urysohn's lemma, Uryohn's Metrization theorem, Tietze extension theorem, partition of unity. **[6 Hours]**
Module 6: Connectedness: connectedness, path connectedness, connected subspaces of the real line, components and local connectedness. **[5 Hours]**
Module 7: Quotient topology: examples of quotient topology: construction of cylinder, cone, suspension, Mobius band, torus, topological groups, orbit spaces. **[5 Hours]**

Module 8: Algebraic Topology: homotopy, deformation retract, contractible spaces, path homotopy, fundamental group. **[3 Hours]**

Laboratory/practical/tutorial Modules:

3. Text books:

1. G. F. Simmons, *Topology and Modern Analysis*, Tata McGraw-Hill, 2004.
2. A. Hatcher, Algebraic Topology, Cambridge University Press, 2002.

4. References:

1. J. Dugundji, *Topology*, McGraw-Hill Inc., 1988. J. R. Munkres, *Topology:A First Course*, Prentice-Hall, 1975.
2. M. A. Armstrong, *Basic topology*, McGraw-Hill Book Co. (UK), Ltd., London-New York, 1979

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.	Real Analysis	MA-511	4 Hours	10%

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

Course number : **IC231**
Course Name : **Measurement and Instrumentation**
Credit Distribution : **2-*0*-*2*-*3***
Intended for : **All the B.Tech branches**
Prerequisite : IC152 Data Science I/Computer and Data Science, IC161 Applied Electronics, IC161P Applied Electronics Practicum
Mutual Exclusion : **None.**

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1. Preamble:

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

Upon completion of this course, the students will be able to

1. ***Identify*** and ***differentiate*** between different classes of sensors and actuators and choose the right component for application-specific purposes.
2. ***Use*** commonly used open-source microcontroller and microcomputer platforms for signal generation, sensor data acquisition, device actuation and automation.
3. ***Analyze*** and ***compare*** design approaches and architectures of real-world measurement systems, and identify key parameters for assessing their performance.
4. ***Design*** open and closed loop actuation, automation and measurement systems for their own discipline specific applications.

2. Course Modules with quantitative lecture hours:

Topic 1: Measurement fundamentals – Fundamental and derived quantities: static and dynamic, understanding, sensitivity, stability, resolution, accuracy, precision, calibration, and types of errors. (2 Hours)

Topic 2: Microcontroller and microcomputer-based data acquisition and automation – Introduction to microcontroller and microcomputer (e.g., Arduino, Raspberry Pi), interfacing considerations (e.g., communication protocols, use of multiplexers), device control and data acquisition using Python, simple routines for signal processing and analysis examples. (4 Hours)

Topic 3: Principles of Instrumentation – Sensor interrogation principles - e.g., using bridge circuits, signal amplification, signal conditioning (transduction, linearization), phase measurements, active and passive filters, isolation and shielding, elements of control theory, digital data acquisition principles using ADC/DACs. (6 Hours)

Topic 4: Sensors and Actuators – Sensor classification, static and dynamic characteristics, Sensor examples from different domains – mechanics (e.g., strain gauge,

accelerometer, LVDT), thermodynamics (e.g., thermistors, thermocouples), fluidics (e.g., venturimeter, ultrasonic flowmeter), biomedical (e.g., electrodes), electromagnetics (e.g., Hall sensor). Actuator examples – piezo-electric transducer, stepper motor. (10 Hours)

Topic 5: Measurement System Examples – Systems approach to design, Noise and SNR considerations (e.g. application of Friis equation), Analysis of design of real-world measurement systems – for e.g. structural health monitoring, biomedical systems (e.g. ECG, EMG, EEG), air-quality monitoring using electrochemical sensors, LIDAR, contact-based (e.g LVDT) and non-contact (e.g. ultrasonic, optical) distance measurement systems (6 Hours)

Laboratory/practical/tutorial Modules: (28 hours)

1. Stepper motor controller
2. Temperature measurement using thermal sensors,
3. Flow measurement,
4. Experiment on LVDT,
5. Level/distance measurement using contact-less sensor,
6. Vibration/Sound measurement and FFT based analysis,
7. Chemical composition detection,
8. Bio-signal measurement,
9. Project.

3. Text books:

1. Fraden, Jacob. "Handbook of modern sensors." Springer Science+Business Media, 2010.
2. Khandpur, R, "Handbook of Biomedical Instrumentation." 3/e, Tata McGraw Hill, 2014.

4. References:

1. Doeblin, E. O., Manik, D. N., "Measurement Systems", 6/e, Tata McGraw Hill India, 2011.
2. Singh, S. K., "Industrial Measurement and Control", 2/e, Tata McGraw Hill India, 2003.
3. Webb, A. G., "Principles of Biomedical Instrumentation", Cambridge University Press UK, 2018.

5. Similarity with the existing courses:

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

S. No.		Course Code	Similarity Content	Approx. % of Content
1.	Applied Electronics	IC161	Sensors and Actuators	10%
2.	Measurement and Instrumentation	EE313 (Discipline Elective)	Fundamentals, Strain gauge, accelerometer thermocouples, bridge circuit	15%

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

ANNEXURE - D

Conversion Mechanism for Master of Technology (M.Tech.) Program to Master of Science by Research (M.S.) Program

Conversion Mechanism

- Students can apply for conversion after completion of the first semester and end of the third semester of the M.Tech. program.
- There should be at least one faculty from the concerned School willing to supervise the student for her/his MS thesis.
- Minimum CGPA to be eligible for this conversion is 8.0 with no F grade in any subject registered until the time of application. However, School may choose to increase the cut off as per number of applications received and seat/facility availability.
- There should not be any pending academic or other disciplinary action against the student.

Ordinance and Regulation

- Existing ordinance and regulations for M.S. program will be applicable from the day of the conversion.
- The course credits earned till the time of application will be counted towards the credit requirements of the MS program. However, APC may recommend additional course works based on the research topic opted for the MS thesis.
- Financial assistantship will be available for 3 years from the date of registration for the M.Tech. program at IIT Mandi.

ANNEXURE - E

Minor in German Language (earlier version)

The minor stream in German Language is intended to encourage B. Tech. students to acquire adequate skills in reading comprehension, writing and oral expression conforming to the B 2 level of the Common European Frame of Reference (CEF)*. The program seeks to equip students for intercultural understanding; also, it offers sufficient value-addition to professional prospects in terms of international language competence; besides, it facilitates student exchange with TU-9 partner universities of the IIT Mandi.

Students are expected to take three of the following courses in order to qualify for a minor.

1. HS 352 German II
2. HS362 German III
3. HS 372 German IV
4. HS 373 Readings from German History
5. HS 363 Post-War Germany: A Literary Perspective

*** B 2.** Can understand the main ideas of complex texts on both concrete and abstract topics, including technical discussions in his/her field of specialization. Can interact with a degree of fluency and spontaneity that makes regular interaction with native speakers quite possible without strain for either party. Can produce clear, detailed text on a wide range of subject and explain a viewpoint on a topical issue giving the advantages and disadvantages of various options.

Proposal:

To Include HS 'HS539 - Post-War Germany' in the German Minor basket.

The course seeks to develop an understanding of German history though reading, discussing and analysing various texts, newspaper articles, stories, novels as well as movies. This allows students to test their language skills, if they are already learning German, since a few posters or movies are in German language.

NEW PROPOSED BASKET OF COURSES FOR GERMAN MINOR

1. HS 352 German II
2. HS362 German III
3. HS 372 German IV
4. HS 373 Readings from German History
5. HS 363 Post-War Germany: A Literary Perspective
6. HS 539 Post War Germany: Politics, Society and Culture

Approval: 23rd Senate Meeting

Course Number : HS-539
Course Name : Post-War Germany: Politics, Society, and Culture
Credits : 3-0-0-3
Prerequisites : None
Intended for : Ph.D./Masters/B.Tech. (3rd and 4th year)
Distribution : HSS Free Elective
Semester : Odd/Even

1. Preamble:

The course will introduce the students to a brief social and cultural history of Germany during the second half of the twentieth century. The students will gain an insight into the political and economic situation prevalent at the time, beginning with the post-war period, which saw Germany being divided into the FRG and GDR, and ending with the reunification of the two in 1990. A brief overview of the history of the European Union is also given to facilitate an understanding of present-day Europe so that the students have a broad understanding of culture and diversity as a whole. In addition, students will examine contemporary issues that impact Europe like the current migrant crisis in Germany, the debate around Brexit, rise of Eurosceptic parties in addition to the far-right ones.

2. Course Modules:

Module I: (2 hours)

This module provides the students with a background on the events leading up to the Second World War, briefly outlining topics like the First World War, Weimar Republic, and National Socialism among others.

Module II: Allied Occupation of Germany (4 hours)

- Zero hour/*Stunde Null*
- Denazification
- Four occupation zones

Module III: Germany-US relations (2 hours)

- Bizone/Trizone
- Berlin Blockade
- European Recovery Program/Marshall Plan

Module IV: GDR and FRG (12 hours)

- Formation of GDR and FRG
- Comparison of political and economic systems. Basic Law
- Democratisation of education
- NATO and Warsaw Pact
- Adenauer era
- Brandt's Ostpolitik

Module V: Anti Government Protests (2 hours)

- East German uprising
- Students' movement
- Green movement (anti-nuclear movement, environmentalism)

Module VI: Migrants in Germany (4 hours)

- Gastarbeiter/'Guest Worker'
- Debate over Multiculturalism
- Current migrant crisis
- Emergence of far-right parties like AfD

Module VII: The reunification of Germany (2 hours)

- Fall of the Berlin Wall
- Reunification
- Problems in the process of internal integration

Module VIII: Post-War German Cinema/Literature (6 hours)

The students will engage with selected works of German literature/cinema, which will offer them a historical as well as a cultural perspective of the German society as it existed during the postwar period. It will include dealing with themes like *Heimat* ('homeland'), *Vergangenheitsbewältigung* ('coming to terms with the past'), and *Wende* ('turn').

Module IX: European Union as it exists today (8 hours)

- European Integration (ECSC, EEC)
- Expansion of the EU (1993 – today)
- Germany's role within the EU
- Euroscepticism
- Brexit

3. Textbooks:

- Judt, Tony: Postwar. *A History of Europe since 1945*, New York, Penguin Press, 2005
- Staab, Andreas: *The European Union Explained: Institutions, Actors, Global Impact*, Bloomington, Indiana University Press, 2008

4. Reference:

- Braunthal, G, *Right-Wing Extremism in Contemporary Germany*, Palgrave Macmillan UK, 2009
- Childs, David, *The Fall of the GDR: Germany's Road To Unity*, Longman, 2001
- Dennis, Mike, *The Rise and Fall of the German Democratic Republic 1945-1990*, London: Routledge, 2000
- Dinan, Desmond: *Europe Recast: A History of European Union*, Boulder, Lynne Rienner Publishers, 2014
- Fulbrook, Mary, *A History of Germany 1918-2014: The Divided Nation*, Wiley-Blackwell 2014
- Gilbert, Mark: *European Integration: A concise History*, Rowman & Littlefield, 2012

- Göktürk, Deniz, David Gramling and Anton Kaes (eds.), *Germany in Transit: Nation and Migration, 1955-2005*, California: University of California Press, 2007
- Hofmann, Arne, *The Emergence of Détente in Europe: Brandt, Kennedy and the Formation of Ostpolitik*, London, New York: Routledge: 2007.
- Jones, Erik, Anand Menon and Stephen Weatherill (eds.): *The Oxford Handbook of the European Union*, Oxford, Oxford University Press, 2012
- Kitchen, Martin: *A History of Modern Germany 1800-2000*, Malden, Blackwell, 2006
- Maier, C.S. and G. Bischof (eds.) *The Marshall Plan and Germany: West German Development within the Framework of the European Recovery Programme*, Oxford: Berg, 1991.
- McCormick, John: *Understanding the European Union*, New York, Palgrave, 2008
- Müller, Jan-Werner (ed.): *German ideologies since 1945; studies in the political thought and culture of the Bonn republic*, New York 2003
- Pulzer, Peter: *German Politics 1945-1995*, New York, Oxford University Press, 1996
- Smith, Helmut Walser (ed.): *The Oxford Handbook of Modern German History*, Oxford, 2011
- Vorländer, Hans, Maik Herold, Steven Schäller, *PEGIDA and New Right-Wing Populism in Germany*, Palgrave Macmillan, 2018.
- Warleigh-Lack, Alex: *European Union: The Basics*, London, Routledge, 2008
- Wilhelm, Cornelia (ed), *Migration, Memory and Diversity: From 1945 to the Present*, New York: Berghahn Books, 2016.

5. Similarity Content Declaration with Existing Courses

S.N.	Course Code	Similarity Content	Approx. % of Content
	HS363: Post-war Germany: A Literary Perspective	The course examines the trajectory of German history from the 'Stunde Null' or 'Zero Hour' in 1945 to the Fall of the Wall in 1989 through its literary reflexes. It focuses on advanced reading comprehension by a thorough study of select short stories and poems besides short excerpts from novels that dwell on major defining moments in post-war Germany.	**5%**

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

NA