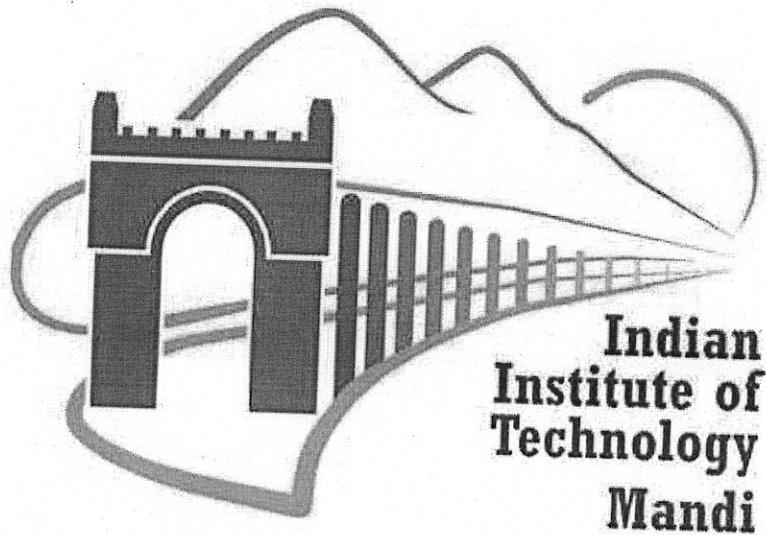


**INDIAN INSTITUTE OF TECHNOLOGY MANDI**  
**KAMAND, DISTT. MANDI – 175005 (HIMACHAL PRADESH)**



**MINUTES OF 24<sup>TH</sup> BOARD OF ACADEMICS MEETING**

VENUE : A-4 CONFERENCE ROOM, KAMAND)  
DATE : 19<sup>TH</sup> APRIL, 2018 (THURSDAY)  
TIME : 04:00 P.M.

**Following members attended the meeting**

Sl.No.		Name	
1.	Dean Academics	Prof. B.D. Chaudhary	<b>Chairman</b>
2.	Associate Dean (Research)	Dr. Venkata Krishnan	Member
3.	Associate Dean (Courses)	Dr. Pradeep Parameswaran	Member
4.	Chairman Library Advisory Committee	Dr. Astrid Kiehn	Member
5.	Chairman Course Proposal Committee + Course Coordinator M.Sc. (Chemistry)	Dr. Shail Shankar	Member
6.	Course Coordinator (IC Courses)	Dr. Aniruddha Chakraborty	Member
	Course Coordinator (SHSS Courses) + Nominee (SHSS)	Dr. Shyamasree Dasgupta	Member
7.	Course Coordinator (B.Tech.-ME)	Dr. Arpan Gupta	Member
	Course Coordinator (B.Tech.-CE)	Dr. Deepak Swami	Member
8.	Course Coordinator (M.Tech.- (Energy Engg. (Materials)))	Dr. Atul Dhar	Member
9.	Course Coordinator (M.Tech.-(Mechanical Engg. (Energy Systems)))		Member
10.	Course Coordinator (M.Tech.-(Power Electronics and Drives))	Dr. Narsa Reddy Tummuru	Member
11.	Course Coordinator (M.Tech.-Biotechnology)	Dr. Shyam K Masakapalli	Member
12.	Course Coordinator (M.Sc.-Applied Maths)	Dr. Nitu Kumari	Member
13.	Nominee-1: School of Engineering	Dr. Rajesh Ghosh	Member
14.	Nominee-2: School of Engineering	Dr. Venkata Uday Kala	Member
15.	Nominee-1: School of Computing & Electrical Engineering	Dr. Kunal Ghosh	Member
16.	Nominee-1: School of Basic Sciences	Dr. Syed Abbas	Member
17.	Nominee-2: School of Basic Sciences	Dr. Prosenjit Mondal	Member
18.	Research Affairs Secretary	Ms. Manushree	Member
19.	Assistant Registrar (Academics): Secretary	Mr. Suresh Rohilla	Secretary

**Following members could not attend the meeting**

Sl.No.		Name	
1.	Course Coordinator (B.Tech.-CSE)	Dr. Dileep A D	Member
2.	Course Coordinator (B.Tech.-EE)	Dr. Subashish Datta	Member
3.	Course Coordinator (M.Tech.-(VLSI))	Dr. Satinder Sharma	Member
4.	Course Coordinator (M.Tech.-(Communication and Signal Processing))	Dr. Renu M Rameshan	Member
5.	Course Coordinator (M.Sc.-Physics)	Dr. Chander Shekhar Yadav	Member
6.	Course Coordinator (I-Ph.D.(Physics))	Dr. Hari Varma	Member
7.	Nominee-2: School of Computing & Electrical Engineering	Dr. Aditya Nigam	Member
8.	Nominee-1: School of Humanities & Social Sciences	Dr. Ashok Kumar	Member
9.	Academic Affairs Secretary	Mr. Abhishek	Member
10.	Industry Member - 1	Dr. Nadeem Akhtar	Member

### Special Invitee

Sl.No.	Name	
1.	Dr. Shubhajit Roy Chowdhury	Asst. Prof., SCEE
2.	Dr. Ramna Thakur	Asst. Prof., SHSS
3.	Dr. Surya Prakash	Asst. Prof., SHSS
4.	Dr. Himanshu Pathak	Asst. Prof., SE
5.	Dr. Pradeep Kumar	Asst. Prof., SE

### PART-A

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

At the outset of meeting, the BoA Chairman Prof. B. D. Chaudhary welcomed new Chairman Dr. Pradeep C Parameswaran (Ex-officio Dean (Academics)) taking over with effect from 20<sup>th</sup> April 2018. The Board extended its gratitude to the outgoing Chairman and placed on the record.

#### **24.1 To consider approval of courses presented by the CPC:**

The Chairperson i/c, CPC presented following courses for consideration and approval of BoA. After due deliberations the BoA recommended all courses to the Senate for its consideration and approval with suggested minor modification in them. The final course descriptions after incorporating the suggested changes are placed at Annexure-“A”:

- HS 529 course name ‘Topics in Engineering and Basic Sciences for HSS’ to be changed to ‘

Sl. No.	Course No.	Course Name	Credits	Proposed by	School
1	HS 526	Human Geography: A Regional Perspective	3-0-0-3	Dr. Devika Sethi and Dr. Ramna Thakur	SHSS
2	HS 528	Technology and Development	3-0-0-3	Dr. Varun Dutt and Dr. Shubhajit Roy Chowdhury	SHSS
3	HS 529		3-0-0-3	Dr. Atul Dhar, Dr. Shyam Masakpalli and Dr. Satvasheel Powar	SE, SBS, SCEE

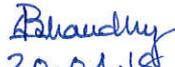
Sl. No.	Course No.	Course Name	Credits	Faculty	School
4	HS 530	Planning, Welfare and Development	3-0-0-3	Dr. Surya Prakash and Dr. Manu Devadevan	SHSS
5	HS 532	Sustainable Development and Environmental Protection	3-0-0-3	Dr. Shyamasree Dasgupta	SHSS
6	HS 533	Urban Development	3-0-0-3	Dr. Surya Prakash and Dr. Manu Devadevan	SHSS
7	HS 534	Economics of Climate Change	3-0-0-3	Dr. Shyamasree Dasgupta	SHSS
8	ME 512	Advanced Engineering Mathematics	3-1-0-4	Dr. Pradeep Kumar	SE
9	CE 252	Geology and Geomorphology	2-0-2-3	Dr. Dericks P Shukla	SE

#### 24.2 To Any other item with the permission of the Chair:

Dr. Rajeev, Chairperson SE presented a plan for new M.Tech. programme in Mechanical Engineering with specialization in Machine Design. The Board deliberated and appreciated the initiative of the School of Engineering. Further it suggested some modifications and advised to place it in next meeting of BoA.

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

  
Secretary, Board of Academics

  
 20.04.18

Chairman, Board of Academics

**IIT Mandi**  
**Proposal for a New Course**

<b>Course Number</b>	: HS526
<b>Course Name</b>	: <b>Human Geography: A Regional Perspective</b>
<b>Credits</b>	: 3-0-0-3
<b>Prerequisites</b>	: None
<b>Intended for</b>	: Post graduate students, 3 <sup>rd</sup> and 4 <sup>th</sup> Year B.Tech students (with instructor's permission)
<b>Distribution</b>	: Core course for M.A. in Development Studies, Elective for others
<b>Semester</b>	: Even/Odd

**1. Preamble:**

This course has been designed to familiarize students with the dynamic interaction between geography and the natural environment on the one hand, and the human experience (history, economy and society and culture) on the other. By studying human activities at the global and regional (such as Himachal Pradesh or Western Himalayan) scales, students will learn to observe and analyse patterns in human geography. This course will include a survey of human engagement with natural resources, animals, agriculture, economic activity, urbanization as well as natural disaster, with special reference to areas in present-day Himachal Pradesh/ Western Himalaya. This course will also include an investigation of the impact of these engagements on human social and cultural formations.

**2. Course Modules:**

**Module 1: Why does Human Geography Matter? (4 hours)**

Defining 'Human Geography': Themes and relevance

Introduction to a spatial perspective: 'regional' and 'global'

What are the basic geographic questions?

'Environmental Determinism': debates

**Module 2: Economic Geography (8 hours)**

Geography of the world economy: Measurement and problems

Trends in agriculture (India/Himachal Pradesh/Western Himalaya)

Food production and food security (Himachal Pradesh/ Western Himalaya)

Worlds of consumption: Global and local geographies of consumption

**Module 3: Population Geography (8 hours)**

Geography of health

Population dynamics

Migration: push and pull factors

India's demographic profile and National Population Policy

**Module 4: Geography across Global and Regional History: Urbanization (5 hours)**

Urbanization: A global survey of trends and patterns

Case Study: Imperial and Post-Colonial Shimla

**Module 5: Humans and Nature (6 hours)**

Natural Disasters and Human Intervention (19th-20th century India)

Human-Animal Conflict and Cooperation in India (Ancient to Contemporary India)

**Module 6: Cultural Geography: Space and Society (5 hours)**

Language: Linguistic Nationalism in India

Religion and the cultural landscape in Himachal Pradesh/ Western Himalaya

**Module 7: Case Study (6 hours)**

1. Change and Continuity in Himachal Pradesh/ Western Himalaya (19<sup>th</sup>-20<sup>th</sup> centuries) from the perspective of Human Geography

**3. Textbooks:**

1. Fouberg, Erin H. et al. *Human Geography: People, Place, and Culture*. 11th ed. Hoboken: Wiley, 2015.
2. Cloke, Paul et al. *Introducing Human Geographies*. 3<sup>rd</sup> ed. Oxon: Routledge, 2014.

**4. References:**

1. Alam, Aniket. *Becoming India: Western Himalaya under British Rule*. New Delhi: Cambridge University Press, 2008.
2. Coe, Neil et al. *Economic Geography: A Contemporary Introduction*. Hoboken: Wiley, 2013.
3. Diamond, Jared. *Guns, Germs and Steel: The Fate of Human Societies*. 20<sup>th</sup> anniversary ed. New York City: WW Norton, 2017.
4. Elmore, Mark. *Becoming Religious in a Secular Age*. Oakland: University of California Press, 2016.
5. Guha, Ramachandra, *Environmentalism: A Global History*. New Delhi: Penguin Random House India, 2016.
6. Roy, Tirthankar. *Natural Disasters and Indian History*. New Delhi: Oxford University Press, 2012.
7. Singh, Chetan. *Natural Premises: Ecology and Peasant Life in the Western Himalaya, 1800-1950*. New Delhi: Oxford University Press, 1998.

**5. Similarity Content Declaration with Existing Courses: None**

S.N.	Course Code	Similarity Content	Approx. % of Content

6.

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

**Approvals:**

**Proposed by: Devika Sethi and Ramna Thakur**

**School: SHSS**

**Other Faculty interested in teaching this course: NA**

**Signature:** \_\_\_\_\_

**Date:** \_\_\_\_\_

**Recommended/Not Recommended, with Comments:**

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**Date:** \_\_\_\_\_

**Chairman, CPC**

*Approved/Not Approved*

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**Date:** \_\_\_\_\_

**Chairman, Senate**

**IIT Mandi**  
**Proposal for a New Course**

<b>Course Number</b>	: HS528
<b>Course Name</b>	: <b>Information Technology and Development</b>
<b>Credits</b>	: 3-0-0-3
<b>Prerequisites</b>	: None
<b>Intended for</b>	: Post graduate students, 3 <sup>rd</sup> and 4 <sup>th</sup> Year B. Tech. students (with instructor's permission)
<b>Distribution</b>	: Core course for M.A. in Development Studies, Elective for others
<b>Semester</b>	: Even/Odd

**1. Preamble:**

This course focuses on how contemporary information and communication technologies (e.g., the Internet and mobile phones) are being used to fuel development in countries like India. The course discusses how technology helps the development of healthcare, education, good governance, environmental sustainability, and disaster management. Also, it discusses the pitfalls of technology and its applications. This course intends to provide students an in-depth view on how technology can play a positive role in promoting development.

**2. Course Modules:**

**Module 1: Introduction to technology and development (8 hours)**

Definitions of technology, Systemic views of Technology-Society relationships, Development paradigms, Social and commercial mechanisms for linking technology to developmental needs; (Certain example cases could include: a case study on same language subtitling (SLS) for improving reading ability in India; a case study on hole-in-the-wall project in India, Bhutan, Cambodia, and Africa and how it encourages children to learn via entertainment; self-organized learning and mediated environments in India and Oscar-winning movie Slumdog Millionaire; failure of little intelligent community based ICT in Central America.)

**Module 2: Overview of ICT for development (12 hours)**

Development agenda and positioning of ICT for development; information and knowledge society; technological interests and social change; real-world applications of ICT in development; the role of technology in reducing poverty (e.g., computer aided learning and Mille.org); the role of ICT in overcoming healthcare challenges (e.g., telemedicine, information gathering, and low-cost point of care testing medical devices- translating health care from bench to bedside); the role of technology in causing agricultural innovation (e.g., telecentres and digital Green like the green-

wifi.org and the e-sagu project); role of ICT in surveillance and good governance, communications, infrastructure, and user-interface design.

**Module 3: Participatory methods in technology and development (5 hours)**

Discussion on participatory methods (e.g., documentary “Water of Ayolé” (Sandra Nichols)); different principles and modes of participation; contributors to ICT projects failures; role and issues in community-based participatory research (e.g., case of the African Digital Renaissance).

**Module 4: Networking, access, mobile technologies, and development (5 hours)**

Access to hardware, software, information and services; WiMax and Internet backbone; role of TCP/IP and other protocols; (Certain example cases could include the case of the last 10km in Rwanda; case of microwave in rural Alaska; role of cellular – voice and data; case of M-PESA in India and Kenya.)

**Module 5: Block chain in technology and development (3 hours)**

Role and issues in block chain technology; (Certain example cases could include the case of block chain technology eating wall street; case of coin desk block chain; case of bit coin and how block chain helps); limitations of block chain technology.

**Module 6: User interface design, cloud computing, HCI and development (4 hours)**

Role of cloud computing in promoting development; configuring Wikispaces and a website; role of HCI in development since its emergence in 1980s; symbiotic relationship between humans and computers (example, the case of spoken web: using voice as an accessibility tool for disadvantaged people in developing countries); grand challenges in HCI for development.

**Module 7: New devices, sensor networks in development (5 hours)**

Role of sensor and IoT revolution and how it aids development (examples of IoT for farming and natural disasters); notion of wearable computing devices and its impact on sustainable development; wireless sensor networks and their role in development; influence of IoT on different policy areas.

**3. Textbooks:**

1. Heeks, R. (2017). *Information and Communication Technology for Development (ICT4D)*. Routledge, London, UK.
2. Seth, K. (2016). *Computers, Internet And New Technology Laws-A Comprehensive Reference Work With Special Focus On Developments In India*. Lexis Nexis

**4. References:**

1. Barrat, J. (2013). *Our final invention: Artificial intelligence and the end of the human era*. Macmillan.
2. Cooper, C. (2017). *Technology and development in the Third industrial revolution*. Routledge.

3. Cornwall, A., & Jewkes, R. (1995). What is participatory research?. *Social science & medicine*, 41(12), 1667-1676.
4. Dodson, L. L., Sterling, S., & Bennett, J. K. (2012, March). Considering failure: eight years of ITID research. In *Proceedings of the fifth international conference on information and communication technologies and development* (pp. 56-64). ACM.
5. Garrity, J. (2015). Harnessing the Internet of Things for Global Development. *SSRN Electronic Journal*. doi:10.2139/ssrn.2588129.
6. Ho, M. R., Smyth, T. N., Kam, M., & Dearden, A. (2009). Human-computer interaction for development: The past, present, and future. *Information Technologies & International Development*, 5(4), pp-1.
7. Kendall, J., & Voorhies, R. (2014). The mobile-finance revolution: How cell phones can spur development. *Foreign Affairs*, 93(2), 9-13.
8. Kumar, A., & Agarwal, S. K. (2012). Spoken web: using voice as an accessibility tool for disadvantaged people in developing regions. *ACM SIGACCESS Accessibility and Computing*, (104), 3-11.
9. Mandal, G. C. (2010). *Social Impact of Banking, Technology and Development In Village India*. Rajat Publications.
10. Mas, I., & Radcliffe, D. (2010). Mobile payments go viral: M-PESA in Kenya. *The Capco Institute Journal of Financial Transformation*, 169-182.
11. Padma, S. R., Rathakrishnan, T., & Thomas, M. (2012). *Participatory Technology Development: A Technique for Indigenous Technical Knowledge Refinement*. Scientific Publisher.
12. Pannu, P., & Tomar, Y. A. (2012). *Communication Technology for Development*. I K International Publishing House Pvt. Ltd.
13. Raina, R. S. (2015). *Science, Technology and Development in India: Encountering Values*. Orient Longman.
14. Sankar, S. (2012). The rise of human-computer cooperation. In *TED Talk Lesson, TED Conferences, junho de*.
15. Smith, M. L., Spence, R., & Rashid, A. T. (2011). Mobile phones and expanding human capabilities. *Information Technologies & International Development*, 7(3), pp-77.
16. Toyama, K. (2011). On turbocharged, heat-seeking, robotic fishing poles. *Communications of the ACM*, 54(12), 29-31.
17. Unwin, T. (2008). *ICT4D: Information and Communication Technologies for Development*. Cambridge University Press, Cambridge.

**5. Similarity Content Declaration with Existing Courses: None**

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

**Approvals:**

**Other Faculty interested in teaching this course:**

**Proposed by: Varun Dutt and Shubhajit Roy Chowdhury**

**School: SHSS and**

**SCEE**

**Signature: \_\_\_\_\_**

**Date: \_\_\_\_\_**

**Recommended/Not Recommended, with Comments:**

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**Chairman, CPC**

**Date:** \_\_\_\_\_

*Approved/Not Approved*

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**Chairman, Senate**

**Date:** \_\_\_\_\_

**IIT Mandi**  
**Proposal for a New Course**

<b>Course Number</b>	: HS 529
<b>Course Name</b>	: Natural Resources and their Management for Development
<b>Credits</b>	: 3-0-0-3
<b>Prerequisites</b>	: None
<b>Intended for</b>	: Post graduate students only in SHSS
<b>Distribution</b>	: Core course for M.A. in Development Studies
<b>Semester</b>	: Even/Odd

**1. Preamble:**

Understanding Natural resources and their management in the context of solving the development challenges is an important area. This course introduces the students about the natural resources, their role in energy generation with a focus on renewable energy, environmental impacts (in terms of waste water, solid waste, air pollution) due to uncontrolled utilisation of natural resources, and biodiversity as an important natural resource for human development. It looks into the biodiversity conservation and its role in poverty alleviation, policies and practices with case studies. Concepts supported by selected topics from basic sciences, social sciences and engineering will provide better insights and play a significant role in developing future development practitioners aware of these important sectors. Overall, the course will allow the students to better manage these resources in parallel to development. This course will be taught by the faculties from the School of Basic Sciences and the School of Engineering of the institute.

**2. Course module:**

**Module 1: Natural resources and their role in sustainable energy (14 hours)**

Introduction: Natural Resources – renewable vs non-renewable. What is renewable energy? Why do we need renewable energy? Different renewable energy sources. (3 hours)

Solar energy: potential of solar energy reaching earth surface, collecting sunlight, solar photovoltaic and solar thermal techniques, solar power plants, solar water desalination, solar dryers, future challenges (3 hours)

Wind energy: Wind energy availability and basic working principle of wind turbines, resource assessment overview, modern wind turbines, installations and wind farms, advantages and limitations of wind farms (3 hours)

Biomass energy: Organic matters available on renewable basis like forests, agricultural, mill and industrial wastes etc., direct fired plants, co fired power plants, gasification (3 lectures)

Limitations of renewable sources. (2 hours)

## Module 2: Sustainable Development and Pollution Prevention (14 hours)

Natural Cycles: Water cycle, oxygen cycle, phosphorous cycle, Appreciation of disturbance in these cycles as cause of pollution. (2 lectures)

Water Pollution Control and Technologies: Indian potable water and treated waste water standards , Health impact of potable drinking water, sources of water pollutants for urban and rural habitats, Waste water treatment technologies (4 lectures)

Air Pollution Control Technologies: Gaseous and particulate emissions, Health impact, sources of gaseous pollutants for urban and rural habitats, Air pollution control technologies (4 lectures)

Solid Waste Management: Case Studies on Best Practices of Domestic Solid Waste Management/ Case Studies on Electronic Waste Management Practices (4 lectures)

## Module 3: Introduction to Biodiversity and Conservation (14 hours)

The key concepts of biodiversity, its definition, meaning and functional significance (2 lectures)

Conservation of natural resources - Water, Soil, Flora, Fauna, endangered species etc.; In-situ and Ex-situ conservation (2 lectures)

International and National conventions (2 lectures)

Biodiversity and Conservation for Development - Poverty alleviation (2 lectures)

Critical approaches to Biodiversity conservation - policy and practice (1 lecture)

Biodiversity Technologies for Conservation (2 lectures)

Selected Case studies (3 lectures)

### 3. Textbooks:

1. Ruth Weiner Robin Matthews, Environmental Engineering 4th Edition, Elsevier 2003, ISBN 9781493302925
2. 1. Aldo V.da Rosa, Fundamental of Renewable Energy Processes, Elsevier Press(2009)
3. Biodiversity and Conservation (Routledge Introductions to Environment series) 2nd Edition by Michael J Jeffriesby, 2006, ISBN-10: 0415343003.

### 4. References:

1. Gautam, A., De, S., Dhar, A., Gupta, J.G., Pandey, A. (Eds.), Sustainable Energy and Transportation, Springer Singapore, 2018, ISBN 978-981-10-7508-7
2. <http://worldhappiness.report/ed/2017/>
3. <http://www.epa.ohio.gov/ocapp/p2/sustainable.aspx#124473580-practices>
4. Jahangir Hossain, Mahmud Apel, Large Scale Renewable Power Generation: Advances in Technologies for Generation, Transmission and Storage (Green Energy and Technology), Springer; (2014)

**5. Similarity Content Declaration with Existing Courses: None**

S.N.	Course Code	Similarity Content	Approx. % of Content
1	EN502	Pollution control	~33%

6.

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

**Approvals:**

**Proposed by: Dr. Atul Dhar (SE), Dr. Shyam K. Maskapalli (SBS) and Satvasheel Powar (SCEE)  
School:**

**Other Faculty interested in teaching this course: NA**

**Signature: \_\_\_\_\_ Date: \_\_\_\_\_**

**Recommended/Not Recommended, with Comments:**

----- **Date: \_\_\_\_\_**  
**Chairman, CPC**

*Approved/Not Approved*

----- **Date: \_\_\_\_\_**  
**Chairman, Senate**

**Comments from BoA:**

**IIT Mandi**  
**Proposal for a New Course**

**Course Number** : HS530  
**Course Name** : Planning, Welfare and Development  
**Credits** : 3-0-0-3  
**Prerequisites** : None  
**Intended for** : Postgraduate students, 3<sup>rd</sup> and 4<sup>th</sup> Year B.Tech students (with instructor's permission)  
**Distribution** : Core course for M.A. in Development Studies, Elective for others  
**Semester** : Even/Odd

**Comment [1]:**  
earlier this course had overlaps with another core course: Public Policy and Governance. Now the course on Public Policy and Governance has been modified and removed to the elective pool from core.

**1. Preamble:**

The course envisages to help students explore the intersections of social structure and how these structural realities interact with political culture and economic planning regimes. The course explores the history and agencies of planning in independent India beginning with Nehru's vision of planning and agencies/bodies that dealt with planning; how and why these bodies transformed under open market system and liberal economy; and, how global discourses of development changed the nature, agents and agencies of planning. It also helps students explore legal aspects of planning and development and how the larger idea of welfare is undergoing changes over the period of time.

**2. Course modules:**

**Module 1: Theories and Concepts (7 Lecture Hours)**

Concepts and Discourse: Planning; Welfare; Development

History of development planning in Independent India

- Nehruvian Era
- Neoliberal India

**Module 2: Planning: Strategies, Policy Formulation and Implementing Bodies (10 Lecture Hours)**

Institutions: State; Market; Civil Society

Policy making, state and stake holders

- Legislative practices and law making
- New public management

Multi-level Planning

- Local Bodies: PRIs and ULBs
- Planning Commission and NITI Aayog
- Global Regimes

**Module 3: Policy, Governance and Development (9 Lecture Hours)**

Idea and Discourse of Development

- Infrastructural development

- Social development
- Inclusive Development
- Multi-level Governance
- Local governance
- Global governance

**Module 4: Politics of Development: Dispute and Resolution (9 Lecture Hours)**

Property

- Property Laws
- Customary laws
- Public property v/s private property
- Common property and its privatization

Dispute

- Contested development
- Judicial resolution
- The role of local bodies in dispute resolution

**Module 5: International agencies and development (3 Lecture Hours)**

Donor Agencies: World Bank; IMF; ADB

Agencies that influence policies: GATT and WTO

**Module 6: Measuring development (4 Lecture Hours)**

Idea and discourse of index

Popular indices

Aspects of measurement

- Data generation and data mining
- Variables and classifications
- The politics behind measurement

**3. Textbooks: None**

Textbooks for this course is not suggested. Select Journal articles and book chapters will be used for the topics. Since the focus of the course is to look at various intersections of politics, economy and social structures, the readings that provide such insights will be highly useful.

**4. References:**

1. Darooka, Priti. 2016. *Roads to Rights: Women, Social Security and Protection in India*. New Delhi: Sage.
2. Maheswari, S.R. 2004. *Local Government in India*. Hyderabad: OrientLongman.
3. Bhattacharya, Mohit. 2011. *New Horizons of Public Administration*. New Delhi: Jawahar Books.
4. Kohli, Atul. 2013. *Democracy and development in India: from socialism to pro-business*. New Delhi: Oxford University Press. pp 140-252.
5. World Bank. 2011. *Perspectives on poverty in India*. Washington: World Bank
6. Dreze, Jean and Amartya Sen. 2014. *India: development and participation*. New Delhi: OUP.
7. Kohli, Atul. 2012. *Poverty amid plenty in the new India*. New Delhi: Cambridge Uni Press.
8. Guha, Ramachandra and Jonathan Parry (eds.). 2012. *Institutions and inequalities: essays in honour of Andre Beteille*. New Delhi: Oxford University Press.
9. Sen, Amartya. 2014. *Development as freedom*. New Delhi: OUP
10. Dreze, Jean and Amartya Sen. 2013. *An uncertain glory: India and its contradictions*. New Delhi: Penguin.

11. Ghertner, D. Asher. 2015. *Rule by aesthetics: world-class city making in Delhi*. New Delhi: OUP.
12. Mishra, Ramesh and John Berry. 2018. *Ecology, Culture and Human Development*. New Delhi: Sage.
13. Shanmugam, K.R. and K.S. Kavi Kumar. 2016. *Environment and Development*. New Delhi: Sage.
14. Chalam, K.S. 2017. *Social Economy of Development in India*. New Delhi: Sage.

**5. Similarity Content Declaration with Existing Courses: NONE**

S.N.	Course Code	Similarity Content	Approx. % of Content
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6.

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

**Approvals:**

**Other Faculty interested in teaching this course: NA**

**Proposed by: Surya Prakash Upadhyay and Manu V Devadevan      School: SHSS**

**Signature: \_\_\_\_\_ Date: \_\_\_\_\_**

**Recommended/Not Recommended, with Comments:**

----- **Date: \_\_\_\_\_**

**Chairman, CPC**

*Approved/Not Approved*

----- **Date: \_\_\_\_\_**

**Chairman, Senate**

**IIT Mandi**  
**Proposal for a New Course**

<b>Course Number</b>	: HS532
<b>Course Name</b>	: <b>Sustainable Development and Environmental Protection</b>
<b>Credits</b>	: 3-0-0-3
<b>Prerequisites</b>	: None
<b>Intended for</b>	: Post graduate students, 3 <sup>rd</sup> and 4 <sup>th</sup> Year B.Tech students (with instructor's permission)
<b>Distribution</b>	: Core course for M.A. in Development Studies, Elective for others
<b>Semester</b>	: Even/Odd

**1. Preamble:**

'Sustainable Development' is 'development that meets the needs of the present without compromising the ability of future generations to meet their own needs'. One of the greatest challenges of the time is to convert the concept to the practice and to measure the effects of policies and practices that are in place. The purpose of the course is to bring out several perspectives of sustainable development in general with an emphasis on the role of environmental protection. It provides an understanding of the genesis of the concepts, indicators of sustainable development based on several intellectual underpinning and the process of measurements. The implications of sustainable development vary across sectors. The course therefore aims to develop an understanding of sustainable development issues with respect to different sectors: livelihood, energy, forest resources, and climate change. Finally, the course devotes a module with special reference to the sustainable development challenges in Himalayan region.

**2. Course Modules:**

**Module I: Precursors of 'sustainable development' (8 Hours)**

Limits to Growth (1972); Stockholm Conference on Environment and Development (1972); Earth Summit/ Rio Conference (1989); World Conservation Strategy (1990)  
World Commission on Environment and Development (1997): Our Common Future  
Debates and intellectual underpinnings: Basic Needs Approach, Entitlement Analyses, Human Development; Capabilities Approach

**Module II: Measuring Sustainable Development (12 Hours)**

Measuring well-being; Policy based indicators and Capital based indicators: Financial capital, Produced Capital, Human Capital, Natural Capital and Social Capital; Human Development Index, World Development Index, Inclusive Wealth Index.  
From Millennium Development Goals to Sustainable Development Goals  
System of National Accounts (SNA) and System of Environmental and Economic Accounts (SEEA)

The role of discounting

**Module III: Exploring the agenda for sustainable development (12 Hours)**

- Inclusive growth, poverty eradication and sustainable livelihoods
- Access to education and health
- Environment: Energy, Forest and Water resources
- Sustainable city and urban common
- Climate Change

**Module IV: Environmental Protection in Indian Himalayan Region (10 Hours)**

National Mission on Sustainable Himalayan Ecosystem

Vulnerability, exposure and risk assessment of Indian Himalayan Regions

**3. Textbooks:**

1. Sachs, D. Jeffrey, 2015. The Age of Sustainable Development. Columbia University Press. ISBN: 9780231173155

**4. References:**

1. Rogers, P. P., Jalal, K. F., Boyd, J. A. (2012). An Introduction to Sustainable Development. Earthscan. UK and USA.
2. Office of the Resident Coordinator of India, United Nations. (2016). Sustainable Development Goals: A Handbook.
3. Original reports pertaining to the Stockholm Declaration on the Human Environment, World Conservation Strategy, The Brundtland Report and Agenda 21
4. <https://sustainabledevelopment.un.org/memberstates/india>
5. Selected journal articles

**5. Similarity Content Declaration with Existing Courses:**

S.N.	Course Code	Similarity Content	Approx. % of Content
1	HS653: Environmental Economics	Sustainable Development: Concepts and Stakeholders; Global System for Sustainable Development- World Development Reports, United Nations and Sustainable Development; UNDP Millennium Development Goals	~10%
2	HS525: History of Development Thought	Introduction to the concept of Sustainable Development	~2%
3	HS534: Economics of Climate Change	National Mission for Sustaining the Himalayan Ecosystem under National Action Plan on Climate Change	~5%

**6.**

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

**Approvals:**

**Proposed by: Shyamasree Dasgupta**

**School: SHSS**

**Other Faculty interested in teaching this course: Dr.Ramna Thakur**

**Signature:** \_\_\_\_\_

**Date:** \_\_\_\_\_

**Recommended/Not Recommended, with Comments:**

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**Date:** \_\_\_\_\_

**Chairman, CPC**

*Approved/Not Approved*

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**Date:** \_\_\_\_\_

**Chairman, Senate**

**IIT Mandi**  
**Proposal for a New Course**

<b>Course Number</b>	: HS533
<b>Course Name</b>	Urban Development
<b>Credits</b>	: 3-0-0-3
<b>Prerequisites</b>	: None
<b>Intended for</b>	: Post graduate students, 3 <sup>rd</sup> and 4 <sup>th</sup> Year B.Tech students (with instructor's permission)
<b>Distribution</b>	: Elective course for M.A. in Development Studies, Elective for others
<b>Semester</b>	: Even/Odd

**1. Preamble:**

21st Century is going to experience rapid urbanisation. India, as like many other developing countries, is also urbanising and more than 30 percent of population live in cities. It is estimated that by the year 2030 more than half of Indian population will live in the cities. Cities are seen as centres of power, economic and social and cultural experiments. This has formed a hierarchy among the cities. The cities are seen competing each other and have joined to race to become centres of every possible change. At one hand cities offer opportunities for social mobility. On the other, life in cities is full of challenges and stress. The everyday is full with challenges of transit and movement, housing, adequate arrangements of basic urban amenities and so on. Proper urban planning and governance are the requirements of the time. However, this requires a critical engagement with urban world. The course offers ways to understand urban systems and provides tools to arrive at solutions to urban problems. This course will be useful to the students as it equips them with necessary tools to pursue a career in urban development.

**2. Course module with quantitative lecture hours**

**Module 1: Making Sense of Urban (8 Lecture Hours)**

Understanding Urbanisation and Urbanism  
Official Definition and Categorisation of Cities in India  
Trends, Debates, and Trajectories of Urbanisation in India  
Urban Migration and Patterns of Migration

**Module 2: The City as an Object of Study (12 Lecture Hours)**

The Chicago School (Louis Wirth, Robert Park, Ernest Burgess)  
New Urban Sociology (Manuel Castells, David Harvey and debates with early urban sociology)

Cities in the World System: Global Cities (Saskia Sassen) and Spaces of Flows (Manuel Castells)  
The Stranger and the City (George Simmel, Ash Amin)  
Thinking about the city (Davis, Henri Lefebvre, Michel de Certeau, Jane Jacobs)  
Ideas on City: World-class City; Mega City; Global City; Ordinary City, Small Cities

**Module 3: Urban Planning (10 Lecture Hours)**

Origins and Paradigms of Urban Planning in India  
Colonial Capital Cities such as Delhi and Calcutta  
Colonial Port Cities: Bombay and Madras  
Planned Cities such as Chandigarh and Bhubaneswar  
Company Industrial Towns such as Jamshedpur and Bhilai  
Emerging Megacities such as Bengaluru and Hyderabad  
Politics of Land and Infrastructure; Growth of Real Estate  
Failure and Paradox of Planning in India

**Module 4: Informal City (6 Lecture Hours)**

Informal Sector: Concept, Prevalence, Livelihoods and Settlements  
Public Spaces and Contestations  
Logics of Segregation, Resident Welfare Associations, Gated Communities  
Urban Poverty  
Slums

**Module 5: Governing the Indian City (6 Lecture Hours)**

Political Economy of Basic Services Provision and Infrastructure  
Urban Decentralisation/Municipal Arrangement  
Urban Policy Paradigms  
Urban Commons  
Small Town Governance and Subaltern Urbanisation  
Smart City

**3. Textbooks: None**

UGC-INFLIBNET e-Pathshala course Sociology of Urban Transformations is recommended.  
Select Journal Articles and book chapters.

**4. References:**

Abu-Lughod, J. L. & R. Hay, eds. (1979). *Third World Urbanization*. New York; London, Methuen.

Davis, M. (2006). *Planet of slums*. London; New York, Verso.

Bunnell, Tim, and Anant Maringanti. 2010. "Practising Urban and Regional Research beyond Metrocentricity." *International Journal of Urban and Regional Research* 34 (2): 415-20.

Castells, Manuel. *The rise of the network society: The information age: Economy, society, and culture. Vol. 1*. New York: Wiley-Blackwell, 1996.

Amin, Ash, and Stephen Graham. "The ordinary city." *Transactions of the Institute of British Geographers* 22, no. 4 (1997): 411-429.

Maringanti, Anant. "Ordinary entanglements in the world city." *Environment and Planning A* 45, no. 10 (2013): 2314-2317.

Raymond Williams, *Culture and Society: 1780-1950* (Garden City, New York: Anchor Books, 1960)

Roy, Ananya. 2009. "The 21st-Century Metropolis: New Geographies of Theory." *Regional Studies* 43 (6): 819-30.

Frank, Andre Gunder. *The development of underdevelopment*. Boston, MA: New England Free Press, 1966.

Friedmann, John. "The world city hypothesis." *Development and change* 17, no. 1 (1986): 69-83.

Harvey, David. *The condition of postmodernity: An enquiry into the conditions of cultural change*. New York: Wiley, 1992.

Sassen, Saskia. *The Global City: New York, London, Tokyo*. Princeton, NJ: Princeton University Press, 1991.

Gooptu, N. (2001). *The Politics of the Urban Poor in Early Twentieth-Century India*. Cambridge, Cambridge University Press.

Ramsamy, E. (2006). *The World Bank and urban development: from projects to policy*. London, Routledge.

Beall, J. and Fox, S. (2009) *Cities and Development*. Abingdon, Routledge.

**5. Similarity Content Declaration with Existing Courses: NONE**

S.N.	Course Code	Similarity Content	Approx. % ofContent

6.

6.

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

**Approvals:**

**Other Faculty interested in teaching this course: NA**

**Proposed by: Surya Prakash Upadhyay and Manu V Devadevan**

**School: SHSS**

**Signature:** \_\_\_\_\_

**Date:** \_\_\_\_\_

**Recommended/Not Recommended, with Comments:**

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**Date:** \_\_\_\_\_

**Chairman, CPC**

*Approved/Not Approved*

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**Date:** \_\_\_\_\_

**Chairman, Senate**

**IIT Mandi**  
**Proposal for a New Course**

Course Number	: HS534
Course Name	: Economics of Climate Change
Credit	: 3-0-0-3
Prerequisites	: HS202 or equivalent course
Intended for	: Postgraduate Students, Undergraduate (3 <sup>rd</sup> and 4 <sup>th</sup> year)
Elective or Compulsory	: Discipline Elective for M.A. in Development Studies, elective for the rest
Semester	: Odd/Even

**1. Preamble:**

The problem of climate change is multifaceted and the solution requires plurality of methodology. The objective of this course is to see climate change through the lens of economics. In economics, climate change is conceptualized as a problem of externality, with layers of complexities. The transboundary nature of the pollutants and their long atmospheric lifetime lead to the serious question: how to internalize the externality? That is to say how to share the responsibility of historical emissions and how to mitigate the future emissions? Also, how adaptation strategies should be formulated in order to tackle the climate change induced damage that is inevitable? This course is designed to develop an understanding of how to address these questions based on a Microeconomic framework of analysis. It also focuses on the specific issues that are related to Himalayan region in this regard.

**2. Modules with lecture hours:**

**Module 1: Economic foundation (10 Hours)**

Externality and market failure;  
Public goods, private goods and common property resources;  
Social and private costs and benefits;  
Climate change as a case of 'transboundary negative externality'; "1.5 degree" climate goal.  
Brief introduction of game theory and its application in climate change.

**Module 2: Mitigation policies –theory and practice (12 Hours)**

Command and control, fiscal policy instruments, market based policy instruments; carbon tax or carbon credit?  
Design of national policies – National Action Plan on Climate Change (NAPCC) in India, European Union –Emission Trading Scheme (EU-ETS), United States Cap-and-Trade programme;  
Role of international cooperation: from Kyoto Protocol (Joint Implementation, Clean Development Mechanism, and Emission Trading) to Paris Agreement (Nationally Determined Contribution (NDC)).

**Module 3: Climate change adaptation (12 Hours)**

Defining vulnerability to climate change; role of adaptation;  
Cost and benefit of adaptation;  
Barriers and limits to adaptation.  
Case studies on adaptation in practice in developed and developing countries;

**Module 4: Climate change adaptation and mitigation in Himalayan region (8 Hours)**

Review of National Mission for Sustaining the Himalayan Ecosystem under NAPCC.

Selected case studies on the impact of climate change, mitigation opportunities and adaptation strategies in the Himalayan region.

**3. Textbooks:**

1. Stern, N. *The Economics of Climate Change: The Stern Review*. Cambridge University Press. 2006.

**4. References:**

1. Relevant section of Assessment Reports from Intergovernmental Panel on Climate Change
2. Relevant documents of United Nations Framework Convention on Climate Change
3. Contemporary articles published in relevant journals

**5. Similarity Content Declaration with Existing Courses: None**

S.N.	Course Code	Similarity Content	Approx. % of Content
1	HS534: Economics of Climate Change	National Mission for Sustaining the Himalayan Ecosystem under National Action Plan on Climate Change	~5%

6.

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

**Approvals:**

**Proposed by:** Shyamasree Dasgupta

**School:** SHSS

**Other Faculty interested in teaching this course:** NA

**Signature:** \_\_\_\_\_

**Date:** \_\_\_\_\_

**Recommended/Not Recommended, with Comments:**

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**Date:** \_\_\_\_\_

**Chairman, CPC**

*Approved/Not Approved*

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**Date:** \_\_\_\_\_

**Chairman, Senate**

## Indian Institute of Technology Mandi Proposal for a New Course (REVISED)

**Course Number** : ME 512  
**Course Name** : Mathematics for Mechanical Engineers  
**Credits** : 3-1-0-4  
**Prerequisites** : Solid Mechanics, Vibration, Fluid Mechanics, heat Transfer  
**Intended for** : MTech/MS/PhD of mechanical engineering students  
**Distribution** : Elective  
**Semester** : Odd/Even

**Preamble:** Engineering is all about the mathematical modeling and quantify natural/industrial phenomena. The mathematics helps students to perform necessary calculations for the design, manufacturing and operation of an engineering devices. Often, mathematics involved in the study of engineering devices is not simple, but complex set of equations in the nature of ODE, PDF, linear algebra etc and difficult to get the exact solution. Then they rely on some other mathematical techniques to get data on discrete points or through practical experiment conducted by them. It is therefore, becomes further necessary to the research students that they should be good in mathematics to analyse their data using some mathematical techniques. Although, we realise necessary need of this course and starting as elective for the PG students, but we feel that this course should be compulsory for PG students.

### **Course Modules with Quantitative Lecture Hours:**

1. Ordinary Differential Equations: Initial Value Problems in heat conduction, Methods to solve first order ODE for free falling objects, Homogeneous and non-homogeneous linear 2<sup>nd</sup> order ODE for free and forced oscillations, System of Linear and non-linear ODE, series solutions (Power Series like Taylor Series, Lagrange Polynomials for diffuse radiation, Bessel's Functions for boundary layer problem, Gamma Functions) **(6 hours)**
2. Partial Differential Equations: two-dimensional heat conduction equation, transient heat conduction equation, Euler Equation Wave Equation of Elastic Bar, Some analytical solution of linear PDE through variable separable method, similarity solution, Transformation of PDE's between different coordinates systems. **(8 hours)**
3. First order integral equations – Fredholm, Volterra and Wiener-Hopf equation, Power series solution for integral equations, Integral equations as a generalization of eigenvalue equations like inverse problems in heat transfer and fluid flow. **(4 hours)**
4. Linear Algebra: Vector Spaces, Matrices in multidegree freedom system, Mass stiffness matrix, natural frequency and mode shapes, Linear algebraic equations, Eigenvalues and Eigenvector of matrices, existence and uniqueness of solution, elementary row/column operations, Echelon form, pivoting, LU decomposition and Cholesky method, Gauss-Seidel and Jacobi iterative methods, condition number, minimum norm and least square error solutions, **(9 hours)**

5. Integral Transforms: Laplace Transformations for ODE and PDE in vibration control, heat conduction, Fourier Transformations for ODE and PDE **(6 hours)**

6. Statistical Method in the solving of stochastic ODEs and PDEs: Probability, Random Variables, Discrete and Continuous Probability Distributions, Monte Carlo Method for collimated beam radiation Problem, regression lines analysis and curve fittings for experimental data, Correlation Analysis in heat transfer. **(9 hours)**

**Text Books:**

1. B. Dasgupta, Applied Mathematical Methods, Pearson Education, 2006.
2. Probability and Statistics for Engineers and Scientists, Sheldon M Ross, 5/e, Academic Press, 2014.

**References:**

1. E. Kreyszig, Advanced Engineering Mathematics, John Wiley and Sons, International 10th Revised Edition, 2015.
2. Stanley J. Farlow, Partial Differential Equations for Scientists and Engineers, Dover Publications, 1993.
3. Gilbert Strang, Linear Algebra and Its Applications, 2/e, Hartcourt Brace Javanovich 1980.
4. Peter V. O'Neil, Advanced Engineering Mathematics, CENGAGE Learning Custom Publishing, 2016.
5. R. L. Thomas and G. B. Finney, Calculus and Analytic Geometry, 11/e Addition-Wisley Reading, 2010.
6. Mary L. Boas, Mathematical Methods in the Physical Sciences, 3<sup>rd</sup> Ed, Wiley India, 2009.
7. Michael D. Greenberg, Advanced Engineering Mathematics, 2<sup>nd</sup> Edition, Pearson India, 2007.
8. Hackbusch Wolfgang, Integral equation-Theory and Numerical Treatment , Springer, 1995.

**Similarity content declaration with existing courses:**

Sl. No.	Course Code	Similarity Content	Approximate % of Content
1	ME504	Numerical Methods for ODE and PDE	<20.00%

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

Not Applicable.

**Approvals:**

Other faculty interested in teaching this course: P. Anil Kishan, Gaurav Bhutani

Proposed by: Pradeep Kumar  
Signature:

School: School of Engineering (SE)  
Date:

**Recommended / Not  
Recommended, with  
comments:**

Chairman, CPC

Date:

Approved / Not Approved:

Chairman, Senate

Date:

Comments by CIG Members and reply

- (1): Name of the course should be Advanced Engineering Mathematics. Revised as suggested
- (2) Need to reshuffles the number of lectures allocated to different topic of this course. Revised as suggested.
- (3) Statistical book should be different by same author. Revised as suggested.
- (4) Merge the topics of Vector and Tensor Calculus and Tensor Algebra. Revised as suggested.
- (5) Include singularity series solutions and applications. Revised as suggested.
- (6) Numerical method section should be removed as we have one such course for students in mechanical engineering. Revised as suggested.

#### **Comments from External Expert:**

The syllabus is near-perfect.

You may re-phrase, Laplace and Fourier transforms for solving PDEs. Similarly, statistical methods may be covered in the context of solving stochastic ODEs and PDEs.

**This comment has been included**

The course will then look well-knit, with mathematical modelling, ODEs and PDEs at the core.

Numerical methods may be taught at the end as a tool for dealing with nonlinearities in the differential equations. Link matrices to numerical methods.

-Numerical Method has been removed as syllabus getting big.

A suggestion: introduce first order integral equations (a peep into radiation!) soon after O/PDEs.

Topics such as vector calculus may be dropped altogether.

- Included in our syllabus

A suggestion: come up with an extensive list of pre-requisites.

#### **Comments from BOA:**

Not approved. Too basic for PG level course. It needs extensive modification. Reduce the basic and incorporate more advanced course. The logic of recapitulation do not fit in IIT Mandi system, as the students recruits must come with basic knowledge in maths specially for ME.

Neither the syllabus is a recapitulation of what the students study at UG level nor at an elementary level. Only 10 - 15 % of the current syllabus is recapitulation of the UG courses: IC 110, IC 111 and IC210, that are being offered at IIT Mandi. There is a huge gap between the undergraduate core courses (including mathematics) and postgraduate core/elective courses. There is a need to build the gap between the knowledge the students currently have and the courses they study at postgraduate level. The current mathematics syllabus try to fill the gap so that the students can solve the different differential equations arising during the advanced core/discipline courses.

# **Indian Institute of Technology Mandi**

## **Proposal for a New Course (REVISED)**

**Course Number:** CE-252

**Course Name:** Geology and Geomorphology

**Credits:** 2-0-2-3

**Prerequisites:** None

**Intended for:** UG

**Distribution:** Elective

**Semester:** Odd/Even

**Preamble:** All the civil engineering structures need a firm foundation to stand. Such foundation is mostly laid on either soil or rocks. Keeping this in view, the present course is designed which aims at familiarizing the basic concept about geology, rock formation, rock types and geomorphological features and thereby provides the required elementary knowledge for in-depth understanding about the formation of earth surface in later studies.

**Course Outline:** Two different broad themes of geology and geomorphology is being taught in this course. Starting with formation of Earth, plate tectonics, rock types and cycle highlighting the major minerals in the different types of rocks, their occurrence, weakness, and properties etc. In continuity, the formation of different features on surface of earth and the phenomenon governing them.

### **Lecture Modules:**

1. Introduction, importance and significance of Earth Science, General characteristics and origin of the Universe, Solar System and its planets. **(4 hours)**
2. Rock cycle, types and characteristics: Igneous, Sedimentary and Metamorphic rocks and their origin, texture, mineral composition, structure and classification. Rock properties **(5 hours)**
3. Plate tectonic theories, Physiographic sub divisions of India with focus on Himalayas. **(4 hours)**
4. Structural Geology: Dip, strike, faults, folds, joints, emphasizing on Himalayan terrain. **(6 hours)**
5. Basic concepts of Geomorphology, Cycle of erosion, Mountains and relief, river basin, drainage network, drainage types; **(5 hours)**
6. Geomorphic landforms, erosional & depositional: Fluvial, Glacial landforms. **(4 hours)**

### **Practical Modules:**

1. Identifying physical properties of rocks using visual interpretations
2. Estimation of Hardness of rock using Mohr's Scale test

3. Mineral identification using several properties
4. Dip/ Strike measurements using brunton compass in and around campus
5. Geological map reading and interpretations
6. Geomorphological mapping and interpretation of maps
7. Geological field mapping around the campus

**Text Books:**

- a) Lutgens & Tarbicj, 'Essentials of Geology (with CD)', Pearson Education, 2012.
- b) P. Singh, 'Engineering and General Geology', S. K. Kataria and Sons, 2009.

**Reference Books:**

- a) A L. Bloom, 'Geomorphology: A systematic Analysis of Late Cenozoic Landforms - 3<sup>rd</sup> Ed.', Pearson Education, Inc., USA, 2004.
- b) Peter MacLaren Donald Duff, Donald Duff, 'Holme's Principles of physical geology', Chapman & Hall, 1992.
- c) F. G. Bell, 'Engineering Geology', Elsevier, 2007.
- d) V S. Kale, and A. Gupta, 'Introduction to Geomorphology'. Orient Longman Ltd., India, 2001.

**Similarity content declaration with existing courses:**

Sl. No.	Course Code	Similarity Content	Approximate % of Content
1	CE508	Geomorphology and its landforms	< 15%

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

Not Applicable.

**Approvals:**

Other faculty interested in teaching this course: Dr. K V Uday

Proposed by: Dr. Dericks P. Shukla

School: School of Engineering (SE)

Signature:

Date:

**Recommended / Not Recommended, with comments:**

Chairman, CPC

Date:

Approved / Not Approved:

Chairman, Senate

Date:

***Responses to comments received during 23<sup>rd</sup> BOA meeting.***

- (1) The credit of the course has been revised from 2 credits to 3 credits.
- (2) Contents under Laboratory/ Practical session have been included.