INDIAN INSTITUTE OF TECHNOLOGY KANPUR

Proposal for a New Course

1. Course No.	SOC XXX (Level 2)
2. Course Title	Just Transition in Energy and Artificial Intelligence Systems
3. Contact Hours / Credits	3 Lectures Per Week Duration: Full Semester

4. Proposing Dept / IDP	Department of Humanities and Social Sciences (HSS)
Other Depts / IDPs Interested	Computer Science and Engineering (CSE); Economic Sciences (ECO)
Other Faculty Interested	TBC

5. Proposing Instructor	Prof. Pradip Swarnakar

6. Course Description

A) Objectives

Energy infrastructure systems and AI-based digital systems are undergoing large-scale transformation. These transitions change how work is organised, how institutions function, and how communities sustain livelihoods. Sociology studies how such large technical systems reshape social relations, labour arrangements, and everyday life. This course examines these changes through the concept of just transition.

Engineers and technology managers increasingly make decisions that extend beyond technical performance. Site selection, system architecture, automation level, data use, labour arrangements, and user access conditions all influence project viability. Projects can fail not because the technology does not work, but because social, institutional, or regulatory conditions were not anticipated during planning.

This course introduces students to methods for analysing technology deployment in real operating environments. Using cases from India and international contexts, students will examine how energy infrastructure, digital platforms, and AI systems interact with labour markets, local economies, and governance frameworks. The course connects technical decisions to practical constraints such as land acquisition, workforce transition, compliance requirements, and reputational risk.

Students will learn to:

- identify stakeholders affected by technology deployment
- analyse distribution of costs, benefits, and risks
- understand how regulation and institutional structure affect engineering choices
- evaluate trade-offs between efficiency, reliability, and social impact
- prepare structured deployment analyses for real-world applications

The course uses examples including coal region transition, renewable energy siting, platform work, and AI-enabled services. No prior background in social science is required.

B) Contents (8 broad modules)

S. No	Broad Title	Topics	Lectures
1	**Framing Just Transition**	What is just transition? Origins in the labour movement; ILO (2015) definition. Energy and AI as two co-occurring technology transitions. Why technologists must care. Key concepts: distributional justice, procedural justice, recognitional justice, stranded assets, externalities.	3
2	**Seeing What Markets Hide: Analytical Toolkit**	The module opens with three concrete cases: a large solar park displacing farming communities, an automated call centre removing jobs, and a coal mine closure leaving a district without tax revenue. These cases establish what standard technical and market analysis does not capture. Students are then introduced to three analytical frameworks as tools for explanation: how systems produce winners and losers (Marx on capital and labour); how status and institutional power determine who absorbs risk (Weber); and how cultural and social capital shape access to transition opportunities (Bourdieu). Welfare economics and externality theory as complementary tools. Introduction to key datasets: IEA, ILO, IRENA, PLFS, Census.	3
3	**Energy Systems and Coal Communities**	India's energy mix; NDC targets (500 GW renewable energy by 2030; net zero by 2070). Coal-dependent states: Jharkhand, Chhattisgarh, Odisha, Madhya Pradesh. CIL employment (approximately 233,000 direct; approximately 1.2 million total indirect). Fiscal role of coal in state economies. District-level transition exposure mapping. Informal and contract workers: the invisible majority.	6

S. No	Broad Title	Topics	Lectures
4	**Renewable Energy Deployment: Jobs, Land, and Community**	RE employment intensity (jobs per MW, jobs per GWh). Land acquisition and siting: who bears the cost of solar parks. Community benefit-sharing mechanisms and their absence in India. Rooftop solar versus utility-scale solar: distributional implications. Case: Rajasthan and Gujarat solar expansion and affected communities.	5
5	**Industrial Decarbonisation and Hard-to-Abate Sectors**	Steel, cement, aluminium: technology pathways and employment implications of decarbonisation. Green Hydrogen Mission. EV supply chains and critical mineral concerns (lithium, cobalt, nickel). Carbon leakage. Production Linked Incentive (PLI) schemes examined through a just transition perspective.	4
6	**AI Systems, Work, and Social Organisation**	AI and task-based displacement: the Acemoglu and Restrepo framework. How AI interacts with and amplifies existing inequalities of caste, gender, class, and geography in India. Automation exposure by occupation using PLFS data. Algorithmic management and the erosion of worker agency. AI's physical footprint: data centres, energy, water, critical minerals. The invisible workforce: data annotators, content moderators, and platform workers, who they are and what they earn. Concentration of AI ownership and its implications for global governance. What future technology leaders need to understand about structural inequality in AI systems.	10
7	**Governance, Finance, and International Comparators**	India's governance structure: MNRE, CEA, BEE, NITI Aayog AI strategy, Digital Personal Data Protection Act 2023. Social protection, retraining, and community transition funds. Transition finance: World Bank Coal-to-Clean, EU JTF, JETP. International comparators: Germany Kohleausstieg, South Africa PCC Just Transition Framework, EU AI Act (2024), US Appalachia, Latrobe Valley (Australia). What works, what does not, and what can be applied in India.	6
8	**Technology Systems and Social Organisation and Course Synthesis**	Do artifacts have politics? (Winner 1980). Design parameters that shape justice outcomes: scale, ownership, sourcing, labour contracting. Distributed versus centralised architectures in both renewable energy and AI.	3

Assessment will include conceptual examinations and a substantial applied group project in which students analyse a real technology deployment problem and present an implementation strategy in written and presentation form.

C) Pre-requisites

None. The course is open to all BTech students from any department from the second year onward. No prior background in economics, energy systems, or social science is required. Students who have taken SOC173 or SOC171 (Introduction to Indian Society and Culture or Introduction to Sociology) will find this course builds on that foundation, but it is not a requirement.

D) Short Summary for Courses of Study Booklet

Just Transition: An Inclusive Pathway to Energy and AI Technologies (SOC XXX).

The energy transition and the AI revolution are changing economies, labour markets, and communities at a pace and scale not seen before. Both transitions produce winners and losers. The losers are often those who are already at the margins of economy and society. This course asks: how do technology transitions interact with structural inequalities of class, caste, gender, and region, and what can technology leaders do about it? Using sociology, economics, policy analysis, and data from India and the world, students learn to see what is often hidden: the coal worker, the data annotator, the displaced community, and the platform worker managed by an algorithm. India is the primary case. International cases include Germany, South Africa, the EU, and the United States. The course is designed for students who will lead technology companies, shape national AI and energy policy, and contribute to global technology governance. The course treats energy networks and AI platforms as social systems that organise labour, risk, and access to resources. No prerequisites. Open to all branches from the second year.

7. Recommended Text

Acemoglu, D., & Restrepo, P. (2019). Automation and New Tasks: How Technology Displaces and Reinstates Labor. *Journal of Economic Perspectives*, 33(2), 3-30.

Crawford, K. (2021). Atlas of AI: Power, Politics, and the Planetary Costs of Artificial Intelligence. Yale University Press.

Gray, M. L., and Suri, S. (2019). Ghost Work: How to Stop Silicon Valley from Building a New Global Underclass. Houghton Mifflin Harcourt.

ILO. (2015). Guidelines for a Just Transition towards Environmentally Sustainable Economies and Societies for All. International Labour Organization. [Open access: ilo.org]

Morena, E., Krause, D., and Stevis, D. (Eds.). (2020). Just Transitions: Social Justice in the Shift towards a Low-Carbon World. Pluto Press.

Reference Text:

Heffron, R. J., and McCauley, D. (2018). What is the Just Transition? *Geoforum*, 88, 74-77.

IPCC. (2022). Chapter 17: Accelerating the Transition in the Context of Sustainable Development. In Climate Change 2022: Mitigation of Climate Change (AR6 WG3). Cambridge University Press. [Open access: ipcc.ch]

Mangang, N. N., Swarnakar, P., and Pai, S. (2024). Transitioning Away from Coal: Perspectives of Indian Coal Unions on Achieving a Just Transition. *Energy Research and Social Science*, 118, 103812.

Swarnakar, P., and Singh, M. K. (2022). Local Governance in Just Energy Transition: Towards a Community-Centric Framework. *Sustainability*, 14(11), 6495.

Winner, L. (2017). Do artifacts have politics?. In *Computer Ethics* (pp. 177-192). Routledge.

Note: Module-specific readings will be provided in the Course Handout prepared after course approval.

Dated: Pradip Swarnakar 2 March 2026 _____ Dated: _____

Proposer: Prof. Pradip Swarnakar DUGC Convener: _____

The course is ☐ Approved / ☐ Not Approved

Chairman, SUGC/SPGC

Dated: _____