

ENT – 2035 – CL- AI- MATE

SUSTAINABILITY SCIENCE AND PEOPLE-CENTRIC ENERGY TRANSITION

Name of the Faculty:	Dr. Anandajit Goswami and Mr. Vaibhav Chowdhary
Teaching Area: (People Centric Energy Transition, Sustainability Science, Climate Vulnerability)	Climate Change, Energy and Sustainability Science
This course may be offered to: (UG/PG/Doctoral/YIF)	UG, PG, YIF
Credits (No. of hours): (4 credits=39 classroom hours/ 2 credits=18 classroom hours)	4 credits (39 hours)
Semester – Academic Year: (Monsoon Sem - <AY> / Spring Sem - <AY>)	Monsoon Semester – AY 2025-26
Course Type: (Core or Elective)	Elective
Grading Rubric	CP - 15% (Individual) In-class case presentation - 10% (Group) AI-ML-based Simulation Game and presentation - 5% (Group) Quiz 1 - 20% (Individual) Quiz 2 - 20% (Individual) Market & Lab visits for final presentation - 30% (Group)

Course Summary

Climate change is considered the greatest risk to humanity, posing a significant challenge to energy, water, public infrastructure, and food. Across the world, governments and businesses are struggling to mitigate their impact, which threatens our long-term existence. As these impacts of climate change intensify, there is a growing need to estimate their potential risks and co-design workable strategies. The advent of gen-AI can be a game changer in minimizing

such future climate impact. This proposed course will outline the pedagogy, methodological approach, and development of an AI-ML-based tool to assess the vulnerability of energy, water, infrastructure, and food sectors in India and other developing countries due to climate change. The proposed course will integrate climatic, agricultural, market, regulatory, and policy aspects to provide precise long-term predictions and risk assessments using AI and ML Tools. These tools will support evidence-informed decision-making, promote private investments, provide future-proof infrastructure, and enhance food and energy security to address sustainability concerns.

On one hand, the course will address the methodological AI-ML approaches to understand the issues of climate vulnerability and its impact on energy, water, infrastructure, agriculture, and other sectors like food, and it will not limit itself to such a domain. On the other hand, the course will also explore how AI-ML approaches can be brought in to assess the degree, orientation, and essence of people-centricity in the people-centric energy transition. Therefore, it also analyses the social domains of sustainability and people-centric energy transition.

Hence, the primary goal of the course will be to – a) Understand and assess how AI ML approaches can be ascertained to understand issues of climate vulnerability on agriculture, infrastructure, energy, food systems, and on social domains of sustainability, people-centric energy transition.

The course is based on the belief that in today's world of digital, energy, societal, and sustainability transitions, it is important to understand and assess how AI and ML approaches can understand and predict the implications of people-centric energy and sustainability transitions in terms of climate vulnerability changes on social domains of sustainability.

Learning Objectives

This course is designed as an overview, and not as a foundational AI and ML Application course, and does not require any prior AI, ML, or coding exposure. Success in the course depends largely on interdisciplinary and transdisciplinary critical thinking, and the ability to be intellectually open and curious about new challenges of the future domains of sustainability transition. Students from different backgrounds with a transdisciplinary thinking ability and curiosity can excel and gain significant value from the material, sometimes outperforming the average.

We make sufficient arrangements (using external resources, practical experts, remedial classes from thought leaders) to enable students from different backgrounds to self-learn basic concepts of AI and ML applications within the first 4 sessions of the course.

The course offers:

- Insights into various AI and ML frameworks, to understand their applications on issues of climate vulnerability, agriculture, food, energy, people-centric energy transition, and social domains of sustainability transitions.
- Diverse perspectives from different thought leaders and decision makers on the larger futuristic issues of climate vulnerability, agriculture, food, energy, people-centric energy transition, and social domains of sustainability transitions and their association with AI and ML frameworks.
- Exploration of problem-solving techniques to understand the future issues of climate vulnerability, social impacts of sustainability transitions, and people-centric energy transitions.
- Discussion on the key factors that shape the AI and ML frameworks to understand their applications for future issues of climate vulnerability, social impacts of sustainability transitions, and people-centric energy transitions.
- Tools and knowledge to help students identify opportunities and make well-informed decisions on future issues of climate vulnerability, social impacts of sustainability transitions, and people-centric energy transitions.
- If time allows, the course will also present the policymakers' and decision makers' perspectives at each of these stages.

Pedagogy

- **Class Structure:** The course consists of 15 sessions, each lasting 180 minutes. You are expected to actively contribute to class, complete all assigned readings *before* the session, and be prepared to discuss them.
- **Assignment Submissions:** Students will work in groups of 2-5 and submit group assignments for every session. Students will be expected to dedicate at least 2-3 hours per session to outside reading and group projects.
- **Fireside Chats:** All guest speakers and external resource experts are tentative and subject to scheduling confirmation. These guest sessions will range from 45 to 75 minutes in a fireside chat format, led by pre-assigned student groups. The student will host a panel and pre-curate the questions, focusing on the key learning outcomes for the session.

Course Structure

Week 1: Overview & Introduction of AI and ML Approaches – Why This Course, Benefits of Attending This Course, Foundational Context of ACPET (About us, experts, external experts), Video Lecture

Week 2: Foundational Concepts of AI-ML Frameworks and their connection to issues of Climate Vulnerability, People Centric Energy Transition, and Social Aspects of Sustainability Transitions, Applications of Spatial Data

Week 3: AI-ML Frameworks, Approaches, and Climate Vulnerability

Week 4: Specific Case Studies on Intersectionality

Week 5: Ice Breaking with a particular problem analysis and statement

Week 6-7: Machine Learning Approaches and People-Centric Energy Transition

Week 8: Why and How Various Transdisciplinary Approaches are required to understand People Centric Energy Transition

Week 9: Why are multiple approaches important for Understanding Sustainability Science and its connection with AI and ML Frameworks?

Week 10: Specific Case Study Based on Design Thinking on AI and ML Approaches for Sustainability Science

Week 11: Discussion Sessions with Practitioners, Experts (Veenu, Atul, and many more)

Week 12: Future Gap Identifications

Week 13-14: Final Presentations

Prerequisites

No prerequisites required for this course.

Detailed Session Plan

SYLLABUS IS SUBJECT TO CHANGE BY INSTRUCTOR, W/T ADVANCED NOTICE

Session	Topic	Readings
1. A	Overview & Introduction of AI and ML Approaches	Introduction to AI ML Concepts – A Bicycle for the Mind. https://mimo.mit.edu/wp-content/uploads/2023/03/mimoDLW23.pdf
1. B	Foundational Concepts of AI and ML Frameworks	<ul style="list-style-type: none"> Artificial Intelligence/Machine Learning Explained. https://gordianknot.stanford.edu/sites/g/files/sbiybj22971/files/media/file/Artificial%20Intelligence-Machine%20Learning%20Explained.pdf
2	AI ML Framework, Intersectionality Connections to Issues of Climate Vulnerability, People Centric Energy	<ul style="list-style-type: none"> Enabling people-centric climate action using human-in-the-loop artificial intelligence: a review. https://www.sciencedirect.com/science/article/pii/S2352154625000014

	Transition, and Social Aspects of Sustainability Transitions	<ul style="list-style-type: none"> Artificial intelligence-based solutions for climate change: a review. https://link.springer.com/article/10.1007/s10311-023-01617-y Integrating artificial intelligence in energy transition: A comprehensive review. https://www.sciencedirect.com/science/article/pii/S2211467X24003092 How tech companies advance sustainability through artificial intelligence: Developing and evaluating an AI x Sustainability strategy framework. https://www.sciencedirect.com/science/article/pii/S0019850124000488 Deep Learning and Artificial Intelligence in Sustainability: A Review of SDGs, Renewable Energy, and Environmental Health. https://www.mdpi.com/2071-1050/15/18/13493
3	Learning Frameworks, Approaches, and Climate Vulnerability	<ul style="list-style-type: none"> Artificial intelligence and climate risk: A double machine learning approach. https://www.sciencedirect.com/science/article/abs/pii/S105752192500256X AI and climate resilience governance. https://www.sciencedirect.com/science/article/pii/S2589004224010344 Artificial Intelligence (AI)-driven approach to climate action and sustainable development. https://www.nature.com/articles/s41467-024-53956-1
4	Intersectional Approaches and Specific Case Studies	<ul style="list-style-type: none"> AI/ML Models with the Framework of Sustainability: A Comprehensive Study on Environmental, Social, and Economic Factors. https://www.igi-global.com/chapter/aiml-models-with-the-framework-of-sustainability/367251
5	Case Designing and Presentation	<ul style="list-style-type: none"> Case Study Presentation of AI ML Frameworks and Approaches on
6	People Centric Energy Transition Policy: concepts and their significance	<ul style="list-style-type: none"> Participation in Energy Transitions: A Comparison of Policy Styles.

		https://www.sciencedirect.com/science/article/pii/S2214629624003347
7	History and the impact of energy transition policies	<ul style="list-style-type: none"> Historical energy transitions: Speed, prices and system transformation. https://www.sciencedirect.com/science/article/abs/pii/S2214629616301979
8	Energy, climate change, governance paradigms of people-centric energy transition, and scenario implications through AI-ML approach	<ul style="list-style-type: none"> Integrating artificial intelligence in energy transition: A comprehensive review. https://www.sciencedirect.com/science/article/pii/S221467X24003092
9	Clean Energy Transition, Adoption, and AI-ML Approaches to Understand Them	<ul style="list-style-type: none"> Integrating artificial intelligence in energy transition: A comprehensive review. https://www.sciencedirect.com/science/article/pii/S221467X24003092#:~:text=AI%20integration%20enhance%20renewable%20energy,systems%2C%20and%20grid%20safety%20enhancements
Midterm Assignment		Students will work in groups to choose three companies, including the option of presenting their startup. They will analyze the investment potential of these companies, focusing on sectors with available market data. The goal is to justify to an Investment Committee—played by classmates—why one or more of these companies are worth funding. The Committee will challenge their rationale by asking questions and ultimately decide whether to approve or reject the proposal based on the presentation. The exercise aims to develop skills in market analysis and investment strategy.
10	Economic Growth, Sustainable Development, Ecological Conservation, and the Role of Markets – What does the AI-ML Approach Guide Us in this Transformation?	<ul style="list-style-type: none"> Artificial intelligence for sustainability: Challenges, opportunities, and a research agenda. https://www.sciencedirect.com/science/article/abs/pii/S0268401220300967
11	Value of Resources, Justice, Migration, Agriculture, and Sustainability – AI ML	<ul style="list-style-type: none"> Artificial intelligence, systemic risks, and sustainability. https://www.sciencedirect.com/science/article/pii/S0160791X21002165

	Frameworks to Understand these through case studies	
12	Sustainability and Transition Pathways – Predictive Analytical Framework	<ul style="list-style-type: none"> Carving the transformation pathways to sustainable futures: A novel analytical framework for backcasting in sustainability transitions. https://www.sciencedirect.com/science/article/pii/S2666188825001236
13	Expert Lecture Session and Interaction from Policy Projects	Case Study Discussion
14	Design Thinking Creation Around AI and ML Frameworks for Climate Vulnerability Analysis and Sustainability	<ul style="list-style-type: none"> Design thinking and artificial intelligence: A systematic literature review exploring synergies. https://www.sciencedirect.com/science/article/pii/S2096248724000201
15	Design Thinking Creation Around AI and ML Frameworks for Sustainability Science	<ul style="list-style-type: none"> Integrating Artificial Intelligence into Design Thinking: A Comprehensive Examination of the Principles and Potentialities of AI for Design Thinking Framework. https://www.isjtrend.com/article_199162.html
16	Design Thinking Creation Around AI ML Frameworks for People-Centric Energy Transition	<ul style="list-style-type: none"> Harnessing Artificial Intelligence to Accelerate Energy Transition. World Economic Forum. https://www3.weforum.org/docs/WEF_Harnessing_AI_to_accelerate_the_Energy_Transition_2021.pdf
17	Presentation to Committee	<ul style="list-style-type: none"> Students, in groups, will analyze and present three companies, either unlisted entities (Angel/Seed/VC/PE) or IPOs, with the option to include their startup. The goal is to justify the investment potential of a company based on market data. The rest of the class will act as an Investment Committee, asking questions and deciding whether to approve or reject the proposal.

Required Texts and Readings

The main required readings are mentioned in the detailed course plan and will be shared timely manner with the students with other relevant AV and reading material.

Assessment Methods

Component	Component Type (Individual/Group)	Weightage
Class Participation	Individual	15%
In-Class Case Participation	Group	10%
AI-ML-based Simulation Game and Presentation	Group	5%
Quiz 1	Individual	20%
Quiz 2	Individual	20%
Market Visit Final Presentation	Group	30%

Note: Detailed instructions for individual and group assignments will be made available online.

Grading Criteria

The course is highly practical, intellectually demanding, and requires active participation. While it emphasizes learning outcomes over grades, it adheres to Ashoka's grading standards. Grades will be allocated on a curve based on the overall class's performance, based on the faculty's discretion.

Course Policies

- **Attendance:** Mandatory; more than two unexcused absences will reduce your grade. Excused absences must be communicated to the faculty and TAs in advance.
- **Participation:** Active involvement in class discussions is required.
- **Academic Integrity:** Cheating and plagiarism will result in disciplinary action.
- **Late Assignments:** A 10% penalty per day (including weekends) for late submissions. Assignments more than 3 days late without an excused reason will not be accepted. Excused delays (e.g., medical or family emergencies) require documentation.

Course Calendar

Course Start: 27th August, 2025

Midterm Exam: 14th October, 2025

Final Exam: 26th November, 2025

Reference Readings for the course

- Sovacool, B. K. (2013). Energy Politics. Polity Press.
- Mitchell, C., & Bauknecht, D. (2013). The Political Economy of Sustainable Energy. Palgrave Macmillan.
- Ekins, P., Bradshaw, M., & Watson, J. (2016). Global Energy: Issues, Potentials, and Policy Implications. Oxford University Press.

- Johnson, T., & Hope, C. (2012). Policy to promote the development and deployment of low-carbon technologies. *Energy Policy*, 51, 685-686.
- Sorrell, S., & Dimitropoulos, J. (2008). The rebound effect: Microeconomic definitions, limitations and extensions. *Ecological Economics*, 65(3), 636-649.
- Gillingham, K., Harding, M., Rapson, D., & Wolverton, A. (2016). Energy Efficiency Standards Are More Regressive Than Energy Taxes: Theory and Evidence. *American Economic Review*, 106(12), 3661-3685.
- Kern, F., & Smith, A. (2008). Restructuring energy governance in changing political economies: The case of shifting state–industry–community relations in the UK. *Environment and Planning C: Government and Policy*, 26(1), 79-102.
- Jaffe, A. B., & Stavins, R. N. (1994). The energy-efficiency gap: What does it mean? *Energy Policy*, 22(10), 804-810.
- Sovacool, B. K., & Brown, M. A. (2010). *Energy and American Society: Thirteen Myths*. Springer.
- Jacobson, M. Z., & Delucchi, M. A. (2010). Providing all global energy with wind, water, and solar power, Part I: Technologies, energy resources, quantities and areas of infrastructure, and materials. *Energy Policy*, 39(3), 1154-1169.
- Grubler, A. (2012). *The Energy Transition*. Springer.
- Victor, D. G. (2015). *Global Energy Assessment: Toward a Sustainable Future*. Cambridge University Press.
- Smil, V. (2017). *Energy Transitions: Global and National Perspectives*. Praeger.
- Jordan, A., Huitema, D., Van Asselt, H., Rayner, T. J., & Berkhout, F. (2010). *Climate change policy in the European Union: Confronting the dilemmas of mitigation and adaptation?* Cambridge University Press.
- Meadows, D. H., Meadows, D. L., & Randers, J. (2004). *Limits to Growth: The 30-Year Update*. Chelsea Green Publishing.
- IPCC. (2018). *Special Report on Global Warming of 1.5°C*. Intergovernmental Panel on Climate Change.
- Sustainability Science for Social, Economic, and Environmental Development Copyright: © 2014 |Pages: 23 DOI: 10.4018/978-1-4666-4995-8.ch016. <https://www.igi-global.com/book/sustainability-science-social-economic-environmental/84114>

Instructor(s) Information



Anandajit Goswami, Email: anandajit.goswami@ashoka.edu.in

Professor Anandajit Goswami is a Director at the School of Behavioural and Social Sciences (SBSS), Research Director at Manav Rachna International Institute of Research and Studies (MRIIRS), and Visiting Research Fellow with the International Foundation for Research and Education, Ashoka Centre for People-centric Energy Transition, Visiting Professor at Ashoka University, Honorary Visiting Professor at IMPRI, and. He obtained his PhD in Energy Policy from the TERI School of Advanced Studies with a master's degree in International Trade and Economics from Jawaharlal Nehru University. He was a faculty member at the TERI School of Advanced Studies and has led projects supported by the United Nations Conference on Trade and Development, UKAID, Asian Development Bank, and World Bank. He was also based in the United Nations Economic Cooperation for Africa, Addis Ababa, where he led the TERI-Africa Initiatives. He has extensively been involved with the Atomic Energy Commission, Government Ministries, and Indian Railways, and has advised them in several important policy decisions through his research work and projects related to SDG 1, 2, 3, 4, 7,8,10, 16, 17. He has also worked as a leading consultant to Niti Aayog, UNIDO, Copenhagen Consensus Centre, WWF India, WWF Uganda, and has advised the Government of Rajasthan, Punjab, and Himachal Pradesh in state-level energy policy making and transition for the future. He has published 52 peer-reviewed publications, 13 fiction books, authored and co-authored 3 award-winning books, and has supervised one PhD thesis, three are under completion, and has supervised and completed 14 Master Dissertation theses. He has more than 12 years at Administrative Staff College, CSSSC, JNU, TERI SAS, ICISA, Ashoka University, amongst many other institutions.

He has been leading his Philanthropic Foundation – “TOHRI Foundation”, which has been chosen as one of the 20 best start-ups of 2023 for working in the space of SDG 1, 2, 3, 4, 5, 12, 16, 17. He has been an Ambassador of the Anti-Tobacco campaign of NADA Foundation across states and has been recognised by All India Human Rights Council, Child Rights and You, WWF India for his contribution in the space of Human, Child, and Animal Rights in India. He has also contributed to climate action movements of Extinction Rebellion, POP Movement, and Fridays for Future through his music for sustainability movement. He has been acknowledged by the National School of Drama, Jashn-E-Adab for his musical contribution to a unique poetry-music theatrical called – “Yuhi Sath Sath Chalte”. Currently, he has curated and edited a mega book project called “A Green Day,” published by Hachette India in 2024, which has been listed and trending as the number 1 book on “Climate and Environment” since April 2024. His works has been showcased at Manorama Literature Festival, Green Lit Festival, International Book Fair, Kolkata, PVLV Literature Festival, The Hindu, The Guardian, The Week, Ei Shomoy, Republic News, Financial Express, Pioneer, and International Association for Media and Communication Research.

Beyond academia, he is a musician and sportsperson, whose music has been featured in Jashn-e-Adab. Goswami's literary contributions, lauded by the Indian Literary Review and The Hindu, mark pioneering strides in Indian Literature. As for his literary pursuits, Goswami has authored seven fiction and six academic reference books. Notably, “Lucy Ebong Shei Trainti” stands out as the first installment in a groundbreaking Bengali science fiction series on sustainability.

Additionally, he has recently come up with historical fiction like – “Siddharth” and a riveting book on climate action called “A Green Day” published by Hachette India which has been showcased by Manorama Art and Literature Festival and Green Lit Festival for his significant contribution on “Non-Fiction on Sustainability and Climate Action.”

Acknowledged by organizations like Johns Hopkins University, All India Human Rights Council, and NADA Foundation for his work on tobacco taxation, human rights, and development, Goswami’s dedication to social empowerment is channeled through his social philanthropy called “The TOHRI Foundation.” Goswami’s commitment extends to child and animal rights through his collaboration with CRY and WWF. His musical endeavors for climate action resonate through the POP Movement, registered with the World Sustainable Development Forum, and through his band “Justajoo” which has released three tracks on Spotify and has been topping the independent music charts for their title track – “Fanaa”.

Social Media Profile and Online Handles of Prof. Anandajit Goswami –

- [Anandajit Goswami - Google Scholar](#)
- [Anandajit Goswami - An Author](#)
- [Prof Anandajit Goswami - Impact And Policy Research Institute \(IMPRI\)](#)
- [Anandajit Goswami | LinkedIn](#)
- [Manav Rachna Vidyatanariksha - Manav Rachna Educational Institutions](#)
- [Ashoka Website](#)
- [Anandajit GOSWAMI | Professor | Doctor of Philosophy | School of Behavioural and Social | Research profile](#)
- [Hachette India](#)
- [Amazon.in](#)
- [Anandajit Goswami | Spotify](#)
- [Manorama Hortus: Celebrates Art and Literature | Kozhikode – 1, 2 and 3rd November, 2024](#)
- [Anandajit Goswami Studies \(0009-0005-1689-9107\) - ORCID](#)
- [\(4\) Facebook](#)



Mr. Vaibhav Chowdhary, Email:

Mr. Vaibhav Chowdhary comes with more than 17 years of experience in the field of energy, climate, and sustainability. He served at various leadership positions across governments, consulting, philanthropies, and think tanks, in India and abroad. He is a visiting Professor of Practice at the Department of Sustainable Energy and Engineering (SEE) at the Indian Institute of Technology (IIT), Kanpur.

In the past, Vaibhav worked as India Lead for an international philanthropy – Clean Air Fund (CAF), wherein he co-designed and delivered large-scale air pollution mitigation programs in partnership with multiple stakeholders. Vaibhav also served as a Director at the Energy Policy Institute at the University of Chicago (EPIC) in India, an empirical research center focused on energy and environment issues. Before UChicago EPIC, Vaibhav worked as the National Energy Adviser to the Government of the UK – at an X-Whitehall team of the Department for International Development (DFID), UK Foreign Office, and the Department of Energy and Climate Change (DECC) – wherein he managed multiple low-carbon growth initiatives in India and beyond. Vaibhav had also worked as a management consultant at PricewaterhouseCoopers and as an instrumentation engineer at Hindustan Zinc Limited (HZL) in the early days of his professional journey.

Vaibhav is a Certified Energy Auditor with a bachelor's in Electronics and Instrumentation Engineering. He holds an MBA (with honors) in Power Management from the National Power Training Institute (NPTI) and is an executive management professional from the Booth School of Business at UChicago, USA. Vaibhav holds multiple postgraduate diplomas in areas of energy and sustainability, IPR, Cyber law, Financial Derivatives, etc, from premier institutes in India and abroad.

Contact Information for Teaching Assistants (if applicable)

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