Energy and Sustainability

(Cross-Elective)

Semester: ~~Spring 2024~~

Course Information

Course Duration:	15 weeks
Credit Hours:	4 hours (3 hours in class + 1 hour tutorial)
Prerequisites:	Basic Environmental Science/Studies (recommended)
Class timings:	
Location:	

Instructor Information

Instructor:	Dr. Abhijit Banerjee
Affiliation:	Professor of Environmental Studies, JSLH
Email:	abhijit@jgu.edu.in
Office:	online consultation and prior appointment

Course Description

Energy is central to our society and economy and this course explores different sources of energy as well as their different applications and uses. We are heavily dependent on fossil fuels but need to urgently move towards carbon free energy sources to avoid catastrophic climate change. Certain alternatives like nuclear are carbon free but have their own drawbacks. The transition to clean renewable energy sources is imperative but can the transition happen fast enough? Many renewable energy technologies are already viable but need massive scaling up; others have their own limitations and are not close to commercial viability. This course engages with the complexities and issue inter-linkages such as energy related geo-politics, energy and poverty, energy and environmental justice, energy and inter-generational equity, energy and economics, energy conservation and behavioural change, etc. Heavy emphasis is placed on the issues affecting developing economies such as India and China, who are crucial players in the energy transition but face unique challenges. Policies that have shaped the status-quo vs. innovative approaches to promote energy transition are critically analysed.

The course is suitable for upper-level undergraduate students from different backgrounds and interests including social sciences/liberal arts, environmental studies/development studies, political science/international relations/global studies, law/public policy, business and economics, etc. Guest speakers and seminars will be an important part of the course; one field trip may be planned.

Course Objectives:

At the end of the course, a student will:

- gain a thorough understanding of the different sources and applications of energy – both conventional and alternative – and their advantages and disadvantages
- learn about the important sources of national and global energy statistics and be able to perform basic energy calculations using appropriate units
- appreciate complexities and issue-linkages such as geo-politics of energy, energy and environmental/climate justice, energy and poverty, etc.
- be able to critically analyze energy policy, with special emphasis on India

Scheme of Evaluation and Grading

Energy Audit Exercise: 20%
Take Home Assignment: 10%
Mid Term Exam: 20%
Final Exam: 30%
Group Project and presentation: 20%

Tentative Session Plan

Session 1	Course overview Energy fundamentals, energy units, energy use trends
Session 2	Fossil fuels: coal, oil and natural gas
Session 3	Nuclear and Hydro
Session 4	Electricity: production, distribution and use
Session 5	Transportation sector
Session 6	Climate change and energy constraints
Session 7	Renewable energy technologies: solar, wind, geothermal
Date TBD	MID TERM EXAM
Session 8	Holi (JGU holiday)
Session 9	Sustainable transportation: Biofuels, Hydrogen, Electric
Session 10	Conservation and energy efficiency, distributed generation, energy storage, smart grids
Session 11	International perspectives on energy transition Global geopolitics of energy
Session 12	India: Challenges and prospects for energy transition
Session 13	Policy innovations and future prospects
Session 14	Group project presentations

Final Exam TBD by Exam Office

Resources

Randolph, J. and Masters, G. (2018). *Energy for Sustainability: Foundations for Technology, Planning and Policy*. Second ed. Washington, DC: Island Press.

Bery, S. et al. (2016). *Energizing India: Towards a Resilient and Equitable Energy System*. New Delhi: Sage.

Harvey, H., Orvis, R. and Rissman, J. (2019). *Designing Climate Solutions: A Policy Guide for Low-Carbon Energy*. Washington, DC: Island Press.

Hawken, P. (Ed.) (2017). *Drawdown: The Most Comprehensive Plan Ever Proposed to Reverse Global Warming*. New York: Penguin.

Sharma, A. (2019). *India's Pursuit of Energy Security*. New Delhi: Sage.

Brown, L. et al. (2015). *The Great Transition: Shifting from Fossil Fuels to Solar and Wind Energy*. New York: W. W. Norton & Co.

Smil, V. (2016). *Energy Transitions: Global and National Perspectives*. 2nd ed. Westport, CT: Praeger.

Aklin, M. and Urpelainen, J. (2018). *Renewables: The Politics of a Global Energy Transition*. Boston: MIT Press.

IRENA. (2021). World Energy Transitions Outlook: 1.5C Pathway. International Renewable Energy Agency.

IRENA. (2020). Global Renewables Outlook: Energy Transformation 2050. International Renewable Energy Agency.

IEA. (2021). World Energy Outlook. International Energy Agency.

Course Policies

Academic Honesty, Cheating, and Plagiarism
In line with JGU policy, JSLH operates a zero-tolerance approach to plagiarism. The unacknowledged use of material by others within your work is a violation of academic integrity and all reported cases will be investigated before potential disciplinary action. Instructors will address methods of citation and presentation within written work.

Participation/Attendance/Late Submission Policy
JSLH conducts all classes on a foundation of professionalism. It is expected that students should be present in every class and be seated within five minutes of the start time. Late entry and/or early exit may lead to student being marked "absent". Attendance will be taken by instructor in every session and those falling below the university cut-off will be de-barred from the final exam. All assignments must be turned in by the deadline as indicated by instructor. Late submissions will receive a penalty proportional to degree of lateness.

Electronic devices
Laptops/tablets may be used to take notes and engage with course material during class. Phones must be on silent mode and put away for the duration of the class. Head/ear phones must not be used.

Medical Leave
Medical leave (and related non-submission of assignments) is not dealt with by the instructor. Necessary medical evidence must be submitted to the Dean's office for approval. Upon approval, the instructor may make necessary arrangements for exams/assignments, but any attendance adjustments are done by the Dean's office.

Disability Support and Accommodation Requirements
JGU endeavors to make all its courses accessible to students. All students with a known disability needing academic accommodations are required to register with the Disability Support Committee dsc@jgu.edu.in. The Committee has so far identified the following conditions that could possibly hinder student's overall well-being. These include: physical and mobility related difficulties; visual impairment; hearing impairment; medical conditions; specific learning difficulties e.g. dyslexia; mental health. The Disability Support Committee maintains strict confidentiality in its discussions.

Grade Definition

Grade	Percentage	GP score
O	80 and above	8
A+	75 - 79	7.5
A	70 - 74	7
A-	65 - 69	6
B+	60 - 64	5
B	55 - 59	4
B-	50 - 54	3
P1	45 – 49.5	2
P2	40 – 44.5	1
F	Below 40	0