AS.425.647.81
Energy and Water Security in South Asia
Fall 2018

Instructor: Amardeep Dhanju, Ph.D.

Instructor contact information: adhanju@jhu.edu; I will strive to respond to your emails within 24-48 hours of receipt. If you would like to speak over the phone or via a video link, we can try to work a suitable time.

Note: All emails from me to you will use the JHU system. If you use a different email system, make sure to forward your JHU account to that other address.

Course blackboard page: https://blackboard.jhu.edu
Assignments and course content (slides, student presentations, etc.) will be posted on the Blackboard.

Course Description
South Asia (India, Pakistan, Bangladesh, Afghanistan, Nepal, Sri Lanka, Bhutan and Maldives) is home to more than 1.7 billion people (nearly 25% of the global population). It is also a region of rapidly growing economies, rising energy consumption, and increasing environmental stress. Fossil fuels, particularly coal is the major source of electricity in the region, contributing to rising greenhouse gas emissions and worsening air quality. India in particular is promoting the use of indigenous coal to power its economic growth. At the household level, inefficient use of biomass for cooking and heating continues to be a major health and environmental hazard. Moreover, fresh water stress and pollution has reached alarming levels in the region with far reaching impacts on agriculture and human health.

South Asia is uniquely vulnerable to climate change impacts. On the one hand, receding Himalayan glaciers in Nepal, India, Pakistan and Bhutan are exacerbating water stress and threatening food security for more than a 1 billion people. And on the other hand, Bangladesh and Maldives are prone to sea level rise and coastal flooding from powerful tropical storms.

Creating a sustainable energy and freshwater pathway is intrinsically linked to innovative development approaches tailored to local and regional variabilities. In order to curb growing emissions, the region is promoting renewable energy sources such as solar, wind, and micro hydro power. However, the unmet demand for energy, particularly electricity remains so large in South Asia that fossil fuels are expected to be a major part of the future energy mix. Water stress is being managed through a mix of traditional and modern techniques.
Given the demographic size of the region and the pent-up energy demand, it can be argued that the success of global climate change initiatives (such as the 2015 Paris agreement) in large part is contingent on creating a low-carbon and sustainable energy future in South Asia. The challenges are national and regional, but the implications are clearly global.

Course Overview
This course will provide a broad overview of the energy, freshwater and climate change challenges in South Asia. At the end of the course, the students will be conversant with the current energy scenario and its environmental implications, future energy mix projections, and the policy and technical initiatives to balance the growing energy demand with a low carbon energy pathway. In addition, you will also learn about increasing freshwater stress and challenges in addressing severe water pollution. The students will also benefit from a greater understanding of the unique climate change vulnerabilities of the region and initiatives to minimize impacts.

Course Prerequisites
There are no prerequisites.

Course Learning Objectives
By the end of the course, students will be able to:
- Discuss pressing energy, water and climate change concerns in South Asia
- Explain the current energy mix and its environmental implications
- Analyze future energy projections, policy and technical initiatives towards a low carbon energy pathway
- Recognize freshwater stress and water pollution challenges

Course Format
This course will consist of 14 modules that will include lecture presentations, readings, analytical exercises, and online discussions, all of which will help integrate materials that you will be learning. The course will also include online documentaries and other media on energy and water topics as appropriate. The final module will involve student presentations on the term paper topics.

Course Materials
There is no required textbook for the course. All the course readings will be made available on EReserves which can be accessed under the left navigation tab on Blackboard.

Course Requirements
Class Participation: Students are expected to complete all the assigned readings, and each one will be expected to actively participate in discussion boards.
Assignments
There will be six assignments in the course. Some assignments contain multiple parts. Please make sure to complete all parts of an assignment. All assignments will be due 11:59 pm ET of the day of submission.

The instructor will strive to grade the assignments within two weeks of the submission deadline and provide feedback via Blackboard.

1. Online Discussion Forums (100 points – see dates below)
There will be four online discussion forums that students will be required to participate. The discussion questions will relate to the modules already covered in the course. Students will have six days to participate in the discussion forum after which the topic will be closed. Grading will be based on participation and the quality of engagement. Students are encouraged to use materials beyond the prescribed readings. Please make sure to properly reference the use of such materials.

Each online discussion will carry 25 points.

Discussion forum timeline:
- Discussion 1: Sept 26, closes Oct 2 (week 4 Wed-Tue)
- Discussion 2: Oct 10, closes Oct 16 (week 6)
- Discussion 3: Oct 31, closes Nov 6 (week 9)
- Discussion 4: Nov 28, closes Dec 4 (week 12)

2. Take Home Assignment I (40 points)
Available Week 1: Opens Sept 5, due Sept 18 (weeks 1 & 2)
Students will review the World Bank Climate Change Portal and explore climate change risks and vulnerabilities for Bangladesh. This assignment requires an assessment of projected changes in temperature and rainfall trends on agriculture, water and human health sectors, and discuss adaptation strategies for these sectors.

After submitting the assignment, the students will post a brief blog writeup based on their findings on the Blackboard and participate in an online discussion Sept 19-25.

3. Take Home Assignment II (40 points)
Available Week 6: Opens Oct 10, due Oct 23 (weeks 6 & 7)
This assignment will focus on water pollution due to untreated industrial and domestic effluent discharge in rivers and water bodies. The students will assess pollution in Satluj river in north India as it flows through the city of Ludhiana in the state of Punjab. The assignment also requires
an analysis of the downstream impact of pollution on the Indira Gandhi canal, one of the largest canal systems in Asia.

After submitting the assignment, the students will participate in an online discussion on the Blackboard from Oct 24- Nov 1.

4. News Item Presentation (40 points)
On a pre-arranged, randomly determined date, each student will locate a news item on energy and water issues in South Asia using one of the sources listed below and prepare a 7-10 min presentation in VoiceThread (using PowerPoint format) on the news item. You should utilize the direct source as well as other related sources, such as scientific papers or policy decisions/discussions on which the article is based, or other articles/materials that relate to the news item. These presentations will start from the third week of the class – third week of the class – September 19.

Students will post the presentation on the course VoiceThread tool in Blackboard (https://blackboard.jhu.edu) available on the left menu. A schedule of the presentations will be shared on Blackboard on the News Item Presentation wiki. The wiki includes instructions for posting the title and a PDF or link of your article. Your choice of the article is due to me via email including the title and link or copy of the article by 11:59 PM ET the Wednesday before the presentation. Once approved, you will post the title and upload a copy of the article on the wiki page.

Your article should preferably have been published within the last 5 years. Presentations will be evaluated based on the following metrics: clarity (which includes organization) [8 points], timing (keep it to ten minutes) [4 points], demonstrated knowledge of the topic [24 points], and ability to engage class with materials and presentation [4 points].

The presenters will concurrently lead a discussion on the Blackboard. Students are encouraged to participate and post at a minimum one unique comment and two responses on the discussion board.

News article presentation resources
Center for Science and Environment  www.cseindia.org
Down to Earth  www.downtoearth.org.in/
Energy + Environmental Policy Databases @ Johns Hopkins Libraries http://databases.library.jhu.edu/databases/subject/energy-environmental-policy
Environmental News Network http://www.enn.com/
Forbes www.forbes.com/
Google News http://news.google.com/
India Environment Portal http://www.indiaenvironmentportal.org.in
India Spend  www.indiaspend.com
Science Daily [http://www.sciencedaily.com/]
The Wire (Energy Section) [https://thewire.in/category/economy/energy/]

5. **Stakeholder Position Paper (50 points)**
(2-4 pages, double spaced, 12 pt font size)
Students will be randomly assigned a stakeholder identity (e.g. fishing community, farmers etc.) in **Week 4** of the course, **September 26** (Stakeholder Assignments will be posted in the **Assignment Guidelines** section of Blackboard). Based on the stakeholder identity, students will prepare a position paper to communicate stakeholder equity, interests and opinions on technical and policy issues regarding a large hydroelectric project proposed in western India. The case scenario that will be presented by the instructor. The paper will be due via Blackboard **October 30**.

After the submission, students will be expected to discuss the assignment on the Blackboard. The discussion forum will open on the Blackboard from **October 31-November 8**.

6. **Final Term Paper and Presentation (130 points) [Term Paper: 100 pts; Presentation 30 pts]** (12-15 pages, double spaced, 12 pt font size)
Students will prepare a term paper on an energy, water or climate change topic focused on South Asia. This paper is an opportunity to explore in-depth a policy, science or technology issue of interest. Students can assume the role of a policy maker, and use the paper to advocate for a specific policy or technical approach. The goal is to prepare a final report of 10-15 double-spaced pages exclusive of abstract, references and appendices. Students will follow these steps:

**A. Term Paper Topic Proposal**
Submit a brief (1-paragraph) topic proposal identifying a problem/issue that will be analyzed in the term paper to the instructor for approval by **September 19**.

**B. Term Paper Outline**
Create a full outline of the term paper and submit it to the instructor by **October 23**.

**C. Final Term Paper** will be due in Blackboard in **PDF format** on **December 17**.

**D. PowerPoint Presentation (30 points)**
Based on the term paper, students will present their research and finding to the class via a PowerPoint presentation. These presentations should be uploaded on the Blackboard using VoiceThread by **December 12 (last week of the class)** for the class to access and review.
Grading

<table>
<thead>
<tr>
<th>Assignment</th>
<th>Points</th>
</tr>
</thead>
<tbody>
<tr>
<td>Online Discussions (4 @25 points each)</td>
<td>100 points</td>
</tr>
<tr>
<td>Assignment 1</td>
<td>40 points</td>
</tr>
<tr>
<td>Assignment 2</td>
<td>40 points</td>
</tr>
<tr>
<td>News Topic Presentation</td>
<td>40 points</td>
</tr>
<tr>
<td>Stakeholder Position Paper</td>
<td>50 points</td>
</tr>
<tr>
<td>Final Term Paper</td>
<td>100 points</td>
</tr>
<tr>
<td>Final Term Paper Presentation</td>
<td>30 points</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>400 points</strong></td>
</tr>
</tbody>
</table>

The following grading scale will be used in this class (the JHU-AAP grading scale):

- 98–100%  A+
- 94–97.9%  A
- 90–93.9%  A-
- 88–89.9%  B+
- 84–87.9%  B
- 80–83.9%  B-
- 70–79.9%  C
- <70%      F

Extra credit will not be available.

Course etiquette

Students are expected to behave professionally and be respectful of the learning process during the course. Communication in discussion groups with classmates and any communication with the instructor should be conducted in a professional manner. Feel free to reach out to me and other resources available in the program for assistance. As your instructor, I want to ensure you have all the assistance available to make the most of this course.

Late Assignment Policy

If a student is unable to complete an assignment on time, please contact the instructor immediately. Points will be deducted from the assignments submitted after due date without prior approval from the instructor. Three (3) points will be subtracted from the assignment grade for every day an assignment is turned in after the due date.

Readings

Instructor will make reading available via Blackboard. Any changes and updates to the reading list will be communicated via email and Blackboard to the class.
Websites and Links Relevant to the Course

http://www.atree.org/  Ashoka Trust for Research in Ecology and the Environment
www.adb.org  Asian Development Bank
www.brookings.edu/center/brookings-india/  Brookings Institute – India
http://www.beeindia.gov.in/  Bureau of Energy Efficiency (India)
http://www.cprindia.org/  Center for Policy Research (India)
www.cseindia.org  Center for Science and Environment
http://cpec.gov.pk/  China Pakistan Economic Corridor (CPEC)
http://ceew.in/  Council on Energy, Environment and Water
www.diis.dk/en/region/asia  Danish Institute for International Studies
https://ejatlas.org/  Environmental Justice Atlas
https://https://www.ifri.org/  French Institute of International Relations (IRFI) Research -> Regions-> Asia-> India and South Asia
http://www.gatewayhouse.in/  Gateway House – Indian Council on Global Relations
http://www.grida.no/  Grid Arendal
www.iea.org/  International Energy Agency
http://www.iiwm.res.in/  Indian Institute of Water Management
http://www.iwmi.cgiar.org/  International Water Management Institute
http://www.kalpavriksh.org/  Kalpavriksh Environmental Action Group
https://powermin.nic.in/  Ministry of Power – Government of India
https://www.sdpi.org/  Sustainable Development Policy Institute (SDPI)
http://www.prayaspune.org/  Prayas (Energy Tab)
https://solarrooftop.gov.in  Rooftop Solar Calculator
http://www.saarcenergy.org/  SAARC Energy Center
https://sandrp.wordpress.com/  SANDRP (South Asia Network on Dams, Rivers and People)
http://www.teriin.org/  The Energy and Resources Institute
https://think-asia.org/  Think-Asia
(Go to knowledge from Asia’s top think tanks)
www.thethirdpole.net  The Third Pole: Understanding Asia’s Water Crisis
Databases, Mapping Tools and Knowledge Management Systems

National Power Portal (India) http://npp.gov.in/

Prayas Renewable Energy Data Portal (India) http://www.prayaspune.org/peg/re.html
Course Topics, Activities and Schedule

Note: This schedule is subject to change; any changes will be announced by the instructor at least one week in advance.

September 5 (Week 1): Introduction to South Asia, course outline, assignments and grading
- Course introduction, overview and assignments
- South Asia: Introduction and history
  - Geography and climate
  - Political units and demographics
- Overview of energy, freshwater and climate change issues

September 12 (Week 2): Electricity generation, transmission and distribution, institutional framework
- Electricity generation mix in South Asia
  - Conventional
  - Renewable resources
- Electricity transmission and distribution infrastructure
- Institutional framework
- Off-grid and micro grid initiatives
- Role of captive power (industrial sector)

September 19 (Week 3): Coal, Oil and Natural Gas production, consumption, geopolitical issues, biomass energy, transportation sector
- Hydrocarbon use trends in the region
- Oil and gas reserves, production and imports
- Refining and distribution infrastructure
- Geopolitics of oil and gas pipelines
- Oil and gas leasing and exploration framework
- Coal mining and use
- Energy in transportation sector – road, railways, water transportation and aviation
- Biomass – a major energy source

September 26 (Week 4): Energy Policy, Economics and Access
- Energy Policy challenges in the region
- National energy policies
- Energy access, quality and energy poverty
- Energy subsidies and fiscal implications
- Rural electrification and hydrocarbon distribution network

- Energy related emissions
  - Greenhouse gases and criteria pollutant emissions – current trends and projections
  - Impact on global carbon budget
  - Regional air quality assessments and implications
- Greenhouse gas mitigation
- Decarbonization through energy efficiency and renewable energy

October 10 (Week 6): Freshwater availability and usage

- Freshwater availability
  - Rainfall trends (monsoon, western disturbances)
  - Importance of Himalayan glaciers and river systems
  - River systems in peninsular India
  - Groundwater resource
- Water use trends in urban, agricultural and industrial sectors

October 17 (Week 7): Water Stress, Conservation and Watershed Management

- Water stress, droughts and scarcity – natural variability & human induced stress
- Social, environmental and economic impacts of water scarcity
- Water conservation practices – traditional and modern
- Watershed management and rainwater harvesting

October 24 (Week 8): Water Conflicts and Transboundary Treaties, Pollution and Wastewater Management

- Shared freshwater resources and conflicts
- Transboundary water treaties
- Water pollution – environmental and human implications
- Waste water management

Oct 31 (Week 9): Water Policy and Management, Energy-Water and Water-Food Interface

- Dams, reservoirs and canal systems – legacy and new infrastructure
- A case against big dams in the region
- Social and financial management of water resources (local and regional)
- Water scarcity and stranded energy resources
- Food-water interface
November 7 (Week 10): Climate Change Vulnerability and Impacts
- Climate change vulnerability in the region
- Potential loss of Himalayan glaciers, droughts, desertification
- Monsoon variability and rainfall trends
- Heat wave intensity
- Human dimension of climate change in South Asia

November 14 (Week 11): Environmental Governance in South Asia
- Guest Lecture – Kanchi Kohli, legal research director, Environmental Justice based in New Delhi, India

Thanksgiving Break

November 28 (Week 12): Other Major Environmental Issues
- Rapid urbanization and related impacts
- Solid waste management
- Forests and wildlife
- Regional environmental trends

December 5 (Week 13): A framework for economic development, energy and water use and climate change mitigation in the context of South Asia
- Guest Lecture - Dr. Manu Mathai, Assistant Professor of Environment and Education, Azim Premji University, Bengaluru, India.

December 12 (Week 14): Term Paper Presentations

------------------------------------------------------------------------------------------------------------------
University Policies

General
This course adheres to all University policies described in the academic catalog. Please pay close attention to the following policies:

Students with Disabilities
Johns Hopkins University is committed to providing reasonable and appropriate accommodations to students with disabilities. Students with documented disabilities should contact the coordinator listed on the Disability Accommodations page. Further information and a link to the Student Request for Accommodation form can also be found on the Disability Accommodations page.

Ethics & Plagiarism
JHU Ethics Statement: The strength of the university depends on academic and personal integrity. In this course, you must be honest and truthful. Ethical violations include cheating on exams, plagiarism, reuse of assignments, improper use of the Internet and electronic devices, unauthorized collaboration, alteration of graded assignments, forgery and falsification, lying, facilitating academic dishonesty, and unfair competition. Report any violations you witness to the instructor. Read and adhere to JHU’s Notice on Plagiarism.

Dropping the Course
You are responsible for understanding the university’s policies and procedures regarding withdrawing from courses found in the current catalog. You should be aware of the current deadlines according to the Academic Calendar.

Getting Help
You have a variety of methods to get help on Blackboard. Please consult the resource listed in the "Blackboard Help" link for important information. If you encounter technical difficulty in completing or submitting any online assessment, please immediately contact the designated help desk listed on the AAP online support page. Also, contact your instructor at the email address listed in the syllabus.

Copyright Policy
All course material are the property of JHU and are to be used for the student's individual academic purpose only. Any dissemination, copying, reproducing, modification, displaying, or transmitting of any course material content for any other purpose is prohibited, will be considered misconduct under the JHU Copyright Compliance Policy, and may be cause for disciplinary action. In addition, encouraging academic dishonesty or cheating by distributing information about course materials or assignments which would give an unfair advantage to others may violate AAP’s Code of Conduct and the University’s Student Conduct Code. Specifically, recordings, course materials, and lecture notes may not be exchanged or distributed for commercial purposes, for compensation, or for any purpose other than use by students enrolled in the class. Other distributions of such materials by students may be deemed to violate the above University policies and be subject to disciplinary action.
**Code of Conduct**
To better support all students, the Johns Hopkins University non-academic Student Conduct Code has been integrated and updated to include all divisions of the University. In addition, it is important to note that all AAP students are still accountable for the Code of Conduct for Advanced Academic Programs.

**Title IX**

**Confidentiality and Mandatory Reporting**
As an instructor, one of my responsibilities is to help create a safe and inclusive learning environment on our campus. I also have mandatory reporting responsibilities related to my role as a Responsible Employee under the Sexual Misconduct Policy & Procedures (which prohibits sexual harassment, sexual assault, relationship violence and stalking), as well as the General Anti-Harassment Policy (which prohibits all types of protected status based discrimination and harassment). It is my goal that you feel able to share information related to your life experiences in classroom discussions, in your written work, and in our one-on-one meetings. I will seek to keep information you share private to the greatest extent possible. However, I am required to share information that I learn of regarding sexual misconduct, as well as protected status based harassment and discrimination, with the Office of Institutional Equity (OIE). For a list of individuals/offices who can speak with you confidentially, please see Appendix B of the JHU Sexual Misconduct Policies and Laws.

For more information on both policies mentioned above, please see: JHU Relevant Policies, Codes, Statements and Principles. Please also note that certain faculty and other University community members also have a duty as a designated Campus Safety Authority under the Clery Act to notify campus security of certain crimes, as well as a duty under State law and University policy to report suspected child abuse and/or neglect.