

## Term Information

Effective Term Spring 2020  
[Previous Value](#) Autumn 2013

## Course Change Information

### What change is being proposed? (If more than one, what changes are being proposed?)

We propose to change the course title of Geog 5801 from "Environmental Conservation" to "Sustainable Energy Systems".

Also propose to change course description and learning objectives to align with course content.

### What is the rationale for the proposed change(s)?

Energy system is a fundamental driver of our society development, while also a primary reason of social and environmental problems, such as social inequality, local water stress, regional air pollution, and global climate change. The geospatial mismatch of energy production and consumption, temporal evolution of energy systems transition and energy technology development, domestic and international energy policies, and the impacts of energy systems on different population groups will affect many aspects of energy security and sustainable development. Therefore, it is critical for our undergraduate and graduate students to have a better understanding of the spatial and temporal patterns of different energy systems, as well as their corresponding social and environmental impacts.

### What are the programmatic implications of the proposed change(s)?

(e.g. program requirements to be added or removed, changes to be made in available resources, effect on other programs that use the course)?

We do not foresee any program changes.

Is approval of the request contingent upon the approval of other course or curricular program request? No

Is this a request to withdraw the course? No

## General Information

Course Bulletin Listing/Subject Area	Geography
Fiscal Unit/Academic Org	Geography - D0733
College/Academic Group	Arts and Sciences
Level/Career	Graduate, Undergraduate
Course Number/Catalog	5801
Course Title	Sustainable Energy Systems
<a href="#">Previous Value</a>	<a href="#">Environmental Conservation</a>
Transcript Abbreviation	Sustainable Energy
<a href="#">Previous Value</a>	<a href="#">Environ Conserv</a>
Course Description	Sustainable development; Energy systems; Energy production, consumption, and conservation; Environmental and societal impacts.
<a href="#">Previous Value</a>	<a href="#">Conservation of nature; nature-society theory; conflicts around environmental change and contemporary conservation programs and strategies.</a>
Semester Credit Hours/Units	Fixed: 3

## Offering Information

Length Of Course	14 Week, 12 Week
Flexibly Scheduled Course	Never
Does any section of this course have a distance education component?	No
Grading Basis	Letter Grade

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Repeatable	No
Course Components	Lecture
Grade Roster Component	Lecture
Credit Available by Exam	No
Admission Condition Course	No
Off Campus	Never
Campus of Offering	Columbus

## Prerequisites and Exclusions

Prerequisites/Corequisites	
Exclusions	Not open to students with credit for 630.
Electronically Enforced	Yes
<i>Previous Value</i>	<b>No</b>

## Cross-Listings

Cross-Listings

## Subject/CIP Code

Subject/CIP Code	03.0103
Subsidy Level	Doctoral Course
Intended Rank	Junior, Senior, Masters, Doctoral

## Requirement/Elective Designation

The course is an elective (for this or other units) or is a service course for other units

## Course Details

Course goals or learning objectives/outcomes	<ul style="list-style-type: none"><li>• Understand spatial and temporal patterns of different energy systems in complex social and environmental systems</li></ul> Appraise social and environmental changes associated with global and regional energy industries
<i>Previous Value</i>	Apply academic knowledge in society

**Content Topic List**

- Part I: Primary and Secondary Energy (1 week)
- Part II: Global and National Coal System (2 weeks)
- Part III: Global and National Natural Gas System (2 weeks)
- Part IV: Global Oil (1 week)
- Part V: Nuclear Energy (1 week)
- Part VI: Hydroelectricity (1
- Part V: Nuclear Energy (1 week)
- Part VI: Hydroelectricity (1 weeks)
- Part VII: Wind Energy (1 week)
- Part VIII: Solar Energy (1 week)
- Part IX: Other Renewables (1 week)
- Part X: Carbon Capture and Storage (1 week)
- Part XI: Energy Efficiency (1 week)
- Part XII: Electricity and Grids (1 week)

**Previous Value**

- *Conservation of nature*
- *Conflicts around environmental change*
- *Nature-society theory*
- *Contemporary conservation programs and strategies*

**Sought Concurrence**

No

**Attachments**

- 2019Sep24\_ Tentative Syllabus Sustainable Energy Systems Proposed GEOG 5801 Change.docx: GEOG 5801 Sustainable Energy Syllabus  
*(Syllabus. Owner: Coscia,Nancy Beth)*

**Comments**

**Workflow Information**

Status	User(s)	Date/Time	Step
Submitted	Coscia,Nancy Beth	09/27/2019 01:14 PM	Submitted for Approval
Approved	Munroe,Darla Karin	09/27/2019 01:16 PM	Unit Approval
Approved	Haddad,Deborah Moore	09/27/2019 03:29 PM	College Approval
Pending Approval	Jenkins,Mary Ellen Bigler Hanlin,Deborah Kay Oldroyd,Shelby Quinn Vankeerbergen,Bernadette Chantal	09/27/2019 03:29 PM	ASCCAO Approval

**Energy Geography (GEOG 5194)**  
**The Ohio State University**  
**Spring 2020**

Instructor: Dr. Yue QIN  
Office: 1123 Derby Hall  
E-mail: [qin.548@osu.edu](mailto:qin.548@osu.edu)  
Phone: 609-865-5698  
Office Hour: TBD  
Lecture Time: TBD  
Lecture Location: TBD  
Course URL: <http://carmen.osu.edu>

**Course Description:**

Energy consumption is a fundamental driver of societal development. Meanwhile, it is one of the primary reasons for social and environmental problems. The geospatial mismatch of energy production and consumption, the temporal evolution of energy systems, and energy technologies development will directly affect the ultimate goal of sustainable development. This course will introduce students to the geography of global and regional energy systems. In this course, we will cover various energy resources, including both fossil fuels (coal, natural gas, oil) and non-fossil energy (nuclear, hydro, wind, solar and et al.). We will introduce the geographic distribution of different energy sources (e.g., where they are produced and consumed, and the fundamental geographic mismatch). We'll explain the changing patterns in each energy system and the major drivers for different changes. For each energy system, we'll introduce its life stages, from production, processing, transmission, distribution, and end-use consumption, domestic and international trades, as well as the development of different energy technologies, energy policies, and the resulting social and environmental impacts. Case studies will be used to better understand different energy systems.

**Learning Objectives:**

- 1) Understand the spatial and temporal patterns of different energy systems in complex social and environmental systems
- 2) Learn to appraise social and environmental changes associated with global and regional energy industries
- 3) Learn the application of academic knowledge in society and the resulting impacts
- 4) Be able to effectively share and receive knowledge by engaging with the whole class
- 5) Recognize the value and culture differences across different countries towards different energy systems

## **Text Books and Other Materials:**

### ***Textbook:***

'[Our energy future: resources, alternatives, and the environment](#)', Christian Ngô, Joseph B. Natowitz, Hoboken, New Jersey: John Wiley & Sons, Inc., [2016]

### ***Recommended readings:***

- 1) The great transition: shifting from fossil fuels to solar and wind energy / Lester R. Brown with Janet Larsen, J. Matthew Roney, and Emily E. Adams, Earth Policy Institute
- 2) Energy and global climate change: bridging the sustainable development divide / Anilla Cherian
- 3) IEA, World Energy Outlook.
- 4) Additional literatures

## **Evaluation**

Standard OSU grading scale will be used for evaluation. Grading will be based on four elements

- **Participation (15%)**

Your attendance and in-class participation. You have to show up for at least one of the lectures in the first week to stay enrolled in this course. For each class found missing, you lose 0.4 points for the final grade. Exceptions may be granted in cases such as serious illness, family emergency, or career opportunities, if requests were made before class starts with solid proofs.

- **Assignments (15%)**

Multiple assignments during the semester. Please refer to the policy on **Late papers** below.

- **Quiz (20%)**

We will have 1 in-class quiz (80 minutes) during the semester to evaluate your understanding of this course.

- **Mid-term individual presentation (20%):**

Individual presentation in the energy field. Select an energy topic and conduct an independent literature review (~10 classical/impactful/latest publications). You have to demonstrate your understanding of a field, such as its most important and emerging questions, methodologies, and major findings in the field. Each student will have ~10 minutes (TBD), including Q&A.

- **Final group project (30%):**

Students must form their group and submit a proposal about the final project by the end of the 10<sup>th</sup> week. Students will choose an energy topic to conduct an independent project. You should conduct a literature review to understand the emerging questions in the subfield, based on which to design a project, collect data, analyze the data, to present the results (e.g., mapping the spatial and temporal patterns, revealing the driving factors for changing trends, and characterizing the societal and environmental implications). A final group presentation should be done by each of the students in the group, and a final group paper is expected (should be in the format of a peer-reviewed paper, including major components such as: abstract, introduction, methodology, results and discussion, and figures & tables; word limits: 3000-5000 words).

## **Important Issues**

**Disability Services:** The University strives to make all learning experiences as accessible as possible. If you anticipate or experience academic barriers based on your disability (including mental health, chronic or temporary medical conditions), please let me know immediately so that we can privately discuss options. To establish reasonable accommodations, I may request that you register with Student Life Disability Services. After registration, make arrangements with me as soon as possible to discuss your accommodations so that they may be implemented in a timely fashion. SLDS contact information: slds@osu.edu; 614-292-3307; slds.osu.edu; 098 Baker Hall, 113 W. 12th Avenue.

**Late papers.** Each exercise or project item has a specific deadline. Late submissions will be penalized 10% for each day late. Exceptions may be granted in cases such as serious illness, family emergency, or career opportunities, if requests were made before class starts with solid proofs. All submissions must be made on carmen (no email submissions please).

**Academic Misconduct:** It is the responsibility of the Committee on Academic Misconduct to investigate or establish procedures for the investigation of all reported cases of student academic misconduct. The term “academic misconduct” includes all forms of student academic misconduct wherever committed; illustrated by, but not limited to, cases of plagiarism and dishonest practices in connection with examinations. Instructors shall report all instances of alleged academic misconduct to the committee (Faculty Rule 3335-5-487). For additional information, see the Code of Student Conduct <http://studentlife.osu.edu/csc/>.

**Mental Health Statement:** As a student you may experience a range of issues that can cause barriers to learning, such as strained relationships, increased anxiety, alcohol/drug problems, feeling down, difficulty concentrating and/or lack of motivation. These mental health concerns or stressful events may lead to diminished academic performance or reduce a student’s ability to participate in daily activities. The Ohio State University offers services to assist you with addressing these and other concerns you may be experiencing. If you or someone you know are suffering from any of the aforementioned conditions, you can learn more about the broad range of confidential mental health services available on campus via the Office of Student Life’s Counseling and Consultation Service (CCS) by visiting [ccs.osu.edu](http://ccs.osu.edu) or calling 614- 292-5766. CCS is located on the 4th Floor of the Younkin Success Center and 10th Floor of Lincoln Tower. You can reach an on call counselor when CCS is closed at 614-292-5766 and 24 hour emergency

help is also available through the 24/7 National Suicide Prevention Hotline at 1-800-273- TALK or at [suicidepreventionlifeline.org](http://suicidepreventionlifeline.org).

**Diversity:** The Ohio State University affirms the importance and value of diversity in the student body. Our programs and curricula reflect our multicultural society and global economy and seek to provide opportunities for students to learn more about persons who are different from them. We are committed to maintaining a community that recognizes and values the inherent worth and dignity of every person; fosters sensitivity, understanding, and mutual respect among each member of our community; and encourages each individual to strive to reach his or her own potential. Discrimination against any individual based upon protected status, which is defined as age, color, disability, gender identity or expression, national origin, race, religion, sex, sexual orientation, or veteran status, is prohibited.

Below is a tentative syllabus.

Week	Date	Topics	Notes
1	1/6	Introduction about Energy Geography	<b><u>Chapter #1</u></b> ; Assignment #1- geographic self-introduction (due before the first class next week)
	1/8	Primary and Secondary Energy	
2	1/13	Global Coal System	<b><u>Chapter #4</u></b> ; Spatial and temporal distribution of coal resources, its production, consumption, prices, and international trades
	1/15	Coal Industries	Upstream, midstream, and end-use coal industries; <b>Readings:</b> lifecycle of coal-fired power generation (NREL, Chapter 5)
3	1/20	Coal System in major producing and consuming countries	Importance of coal in major producing and consuming countries, advancement of coal technologies, its societal and environmental impacts; <b>Readings:</b> China's Coal: Demand, Constraints, and Externalities; The true cost of Coal (Chapter 2, 5, 6, 7)
	1/22		
4	1/27	Global Natural Gas Systems	<b><u>Chapter #2 and Chapter #3</u></b> ; Spatial and temporal distribution of gas resources, production, consumption, prices, and international trades
	1/29	Natural Gas Industries	Lifecycle stages of natural gas industries; <b>Readings:</b> Life-cycle analysis of shale gas and natural gas;
5	2/3	Natural Gas systems in major producing and consuming countries	Development of conventional and unconventional natural gas; the shale gas boom in U.S., and the economic, political, and technical barriers for unconventional gas development outside U.S., major natural gas technologies, its societal and environmental impacts;
	2/5		



			<p><b>Readings:</b> US Shale Gas Development What Led to the Boom?  Life cycle greenhouse gas emissions of Marcellus shale gas;  Are we entering a golden age of gas? (Section 1 and 2)</p>
6	2/10	Global Oil Systems	<p><b><u>Chapter #2 and Chapter #3;</u></b>  Spatial and temporal distribution of oil resources, production, consumption, prices, and international trades (OPEC)</p>
	2/12	Oil Industries	<p>Lifecycle stages of oil industries and their societal and environmental impacts;  <b>Readings:</b> <i>Life-Cycle Analyses of Energy Consumption and GHG Emissions of Natural Gas-Based Alternative Vehicle Fuels in China;</i>  <i>Just Oil? The Distribution of Environmental and Social Impacts of Oil Production and Consumption;</i>  Assignment #2: Write a one-page memo of your own thoughts about the fossil industry to get prepared for next class discussions.</p>
7	2/17	Discussions on “Pros and Cons of the Fossil industry”: societal, environmental, economic, political impacts for different regions, population groups, shareholders and et al.	
	2/19	Nuclear Energy	<p><b><u>Chapter #11;</u></b>  Fundamentals of nuclear energy, its global and regional development (existing status and prediction); major technologies, societal and environmental impacts.</p>
8	2/24	Midterm- individual presentation (5-10 minutes for each student)	Individual presentation of a chosen topic in the energy field. Select an energy topic and conduct an
	2/26		

			independent literature review. (Refer to 'Evaluation' for details)
9	3/2	Hydroelectricity	<u><a href="#">Chapter #6</a></u> ; Fundamentals about hydroelectricity, and its spatial and temporal development <b>Readings:</b> Hydroelectricity power
	3/4	Implications of Hydroelectricity	Multiple uses for reservoirs, major technologies, societal and environmental concerns of hydroelectricity  <b>Readings:</b> Intensification of hydrological drought in California by human water management; Human–water interface in hydrological modelling: current status and future directions
10	3/9	Wind Energy	<u><a href="#">Chapter #10</a></u> ; Fundamentals about wind energy, and its spatial and temporal development
	3/11	Implications of Wind Energy	Technology, policies, societal and environmental impacts
11	3/16	Solar Energy	<u><a href="#">Chapter #8</a></u> ; Fundamentals about solar, and its spatial and temporal development
	3/18	Implications of Solar	Technology, policies, societal and environmental impacts Assignment #3- write a one-page memo for next class discussions. Writing on behalf of either the solar industry, wind industry, coal industry, oil & gas industry, local residents, NGO to local government for support
12	3/23	Other renewables	<u><a href="#">Chapter #7</a></u> and <u><a href="#">Chapter #9</a></u> ; Introduction of other renewable energy, their spatial and temporal pattern, societal and environmental impacts (e.g., biofuels, geothermal, and waste heat)

	3/25	Debates on government support	Students will represent different stakeholders and convince the 'local government' for financial/policy support (convince the government why your industry needs support, e.g., your importance to local economy, energy security, social equity, environment...)
13	3/30	Quiz	
	4/1	Carbon Capture and Storage	Introduction of CCS, current development status, technologies, costs, geographical and economic barriers
14	4/6	Energy Efficiency	Importance, major technologies, and the economic and environmental implications of energy efficiency
	4/8	Electricity and Grids	<a href="#"><i>Chapter #12</i></a> ; Fundamentals of electricity and their environmental and societal implications
15	4/13	20 minutes group presentations + 5 minutes questions	
	4/15		
16	4/20		