

GEO 2530: The Future of Energy (3 credits)

Quest 2

I. General Information

Prerequisites

- Any Quest 1 course completed with a minimum grade of C.

Class Meetings

- Monday 12:50-1:40, Wednesday 12:50-2:45
- Classroom: Turlington 3012

Instructor

- Dr. Johanna Engström
- Office: Turlington Hall 3206
- Office hours: Mondays 10:30-11:30, Thursdays 1-3 pm
- Email: joem@ufl.edu

Course Description

Exploration of the history of energy use, issues associated with different technologies, and future challenges and opportunities. Analyzes geographic differences between different states, countries and societies as factors that contribute to shaping the energy landscape now and in the future.

This course brings up pressing questions such as *Is Renewable Energy Always Sustainable? Are Renewable Energies Always a Better Option for the Environment?* and *What does a future sustainable energy situation look like?* and challenges the students to find the answers to these questions via a combination of readings, lectures, discussions and reflection. Student class performance is evaluated using a range of different assessments, recognizing each student's individual learning style.

Quest and General Education Credit

- Quest 2
- Physical Sciences (P)
- International (N)
- This is a 3-credit course

This course accomplishes the [Quest](#) and [General Education](#) objectives of the subject areas listed above. A minimum grade of C is required for Quest and General Education credit. Courses intended to satisfy Quest and General Education requirements cannot be taken S-U.

Writing Requirement

This class meets the 2,000 word Writing Requirement. The Writing Requirement (WR) ensures students both maintain their fluency in writing and use writing as a tool to facilitate learning. The instructor will evaluate and provide feedback on all of the student's written assignments with respect to grammar, punctuation, clarity, coherence, and organization.

Students are expected to properly cite all references using [APA citation style](#). Instructions and guidelines for how to write using the APA citation style will be shared in class. Your ability to use this style is part of the demonstration of your writing competency. All submissions will be scanned for *plagiarism*, -the practice of using someone else's work (or words!) and presenting them as your own. Plagiarism is against the UF Student Honor Code.

Course grades have two components. To receive writing requirement credit, a student must receive a grade of C or higher and a satisfactory completion of the writing component of the course.

Required Readings and Works

All readings and works are available in Canvas.

Instructional materials for this course consist of only those materials specifically reviewed, selected, and assigned by the instructor(s). The instructor(s) is only responsible for these instructional materials

Materials and Supplies Fees: n/a

Policy on the use of Artificial Intelligence (AI)

Students are expected to complete written assignments using their own words and refrain from using AI assistance. While AI tools like Chat GPT can be efficient, students should be critical of it as in any other source of information. It may interpret technical information poorly, may get facts wrong, and does not appropriately credit sources. Be very careful in its application and credit and paraphrase it as you would any other sources. Good writing integrates multiple sources and aims for engaging readers with the content which Chat GPT can fail to do. Direct copy-paste of text or minimal revision of artificially generated is a form of plagiarism, and will be graded accordingly.

II. Graded Work

Description of Graded Work

Exam 1: 15%

Exam 2: 15%

Exam 3: 15%

Essays: 20%

Exercises: 15%

In-class debate: 10%

Attendance: 10%

Exams

The three exams are completed during the normal class meeting time and constitute 45% of the final grade. The exams are made up of a combination of multiple choice and short answer questions. The exams are non-cumulative. If students for whatever reason miss or fail (<60%) an exam, they get the opportunity to make-up the exam on April 30th, 2026.

Essays

Students will complete four essays in this class, three short essays (400-500 words) and one longer (1000-1200 words) essay, all worth 5% each. These four essays are discussions, reviews, or summaries of data, but also contains a reflective aspect where students are expected to put the facts at hand into a larger perspective. The students will be informed in class/Canvas what type of essay is expected. The essays are completed as homework and submitted via Canvas.

Exercises

Students will complete three hands-on exercises, each worth 5%. Exercise 1 is related to energy units and is aimed to help conceptualize how much energy you get from common units, such a Joule, Watt, etc. as well as how much you use. Exercise 2 and 3 are mapping exercises where the class will create a global map of energy installations.

In-class debate

Students are required to participate in one out of the two debates organized during the semester. A sign-up sheet will be made available early in the semester, to allow students to sign up for the debate topic that they are the most interested in. Students will be assigned a position and prepare themselves with relevant readings. The classroom will be set up as a court and students will need to argue for their stance, while also recognizing the opposing side's interests and meet those arguments.

Attendance

Students are expected to regularly attend class and to actively engage in the lectures and classroom activities. Attendance is worth 10% of the course grade, and will be taken using spot attendance calling at 10 selected class meetings, worth 1% (1 point) each, throughout the semester, including the guest lecture and at the field trip. An unexcused absence will be rewarded with a zero for that class meeting. Absences for [university-sanctioned reasons](#) will not be penalized.

Grading Scale

For information on how UF assigns grade points, visit: <https://catalog.ufl.edu/UGRD/academic-regulations/grades-grading-policies/>

A	94 – 100%		C	74 – 76.9%
A-	90 – 93.9%		C-	70 – 73.9%
B+	87 – 89.9%		D+	67 – 69.9%
B	84 – 86.9%		D	64 – 66.9%
B-	80 – 83.9%		D-	60 – 63.9%
C+	77 – 79.9%		E	<60

Grading Rubrics

Essay Rubric

Criteria	Target (3 pts)	Near Target (2 pts)	Below Target (1 pts)
Communication - Clarity and Organization: Logical, clear and cohesive flow of ideas including all needed components (purpose and scope, methods, results, conclusions, etc.)	Integrates all necessary components to create a logical, clear and cohesive flow of ideas.	The paper may include all necessary components, but they are not fully developed or presented logically, diminishing clarity and cohesion of some ideas.	Ideas are not presented separately, lack a logical flow, or are sometimes ambiguous, or non-specific. The assigned style is not addressed or so inconsistent that it impedes the reader.
Content: Appropriately and substantially covers the purpose and scope.	Addresses key concepts appropriate for the purpose and scope. Information is accurate and sufficiently supported by appropriate evidence.	Does not fully address key concepts or is missing a key concept appropriate for the purpose and scope. Some information is missing, and/or not adequately supported by appropriate evidence.	Does not adequately address key concepts appropriate for the purpose and scope. Frequently information is missing and/or not adequately supported by appropriate evidence.
Critical Thinking: Analyzes and evaluates issues, evidence, and diverse sources to form a conclusion (judgment or new idea).	Conclusions are logical and address all important ideas. Evidence provides rationale for the conclusion, covers multiple viewpoints, and includes an adequate evaluation of context, perspectives of self and sources, and limitations.	Conclusions are logical and address the most important ideas. Lacks incorporation of a key perspective or adequate evaluation thereof.	Conclusions may be logical but not necessarily focused on primary ideas. Lacks incorporation of some key perspectives or adequate evaluation thereof.
Formatting: Correct formatting as per assignment guidelines.	Includes a title that correctly reflects the content of the essay and the assignment. Abbreviations and acronyms are defined before they are used. References are correctly used throughout the text and listed in the references section at the end. No extensive quotes.	Provides some statements without references (incomplete referencing). More than 10% above/below the word limit.	Missing references, reference list, essay title, and/or use of extensive quotes.

Debate Rubric

	HIGH QUALITY	AVERAGE	NEEDS IMPROVEMENT
CONTENT (40%)	Presents facts from reputable sources, which also are cited/referred to.	Presents facts, sources unknown.	Fails to present facts.
ARGUMENT AND SUPPORT (40%)	Can use facts to support arguments for their stance.	Presents arguments, but direct link to facts is vague.	Limited arguments or no connection to facts presented.
PROFESSIONALISM (20%)	Presents facts and arguments and meet opposing arguments in a professional way.	Struggles to meet opposing arguments in a professional way.	Fails to keep involvement in the debate professional.

III. Annotated Weekly Schedule

This is a tentative weekly schedule. Dates may change, due to guest lecture and field trip guides' availability, as well as other unforeseen circumstances.

Week	Topics, Homework, and Assignments
Week 1	<ul style="list-style-type: none"> • Topic: Syllabus and History of energy use • Summary: An introduction to the course. Energy doesn't always equal electricity. Humans have harnessed the power of nature for millennia. This week covers major milestones in humans' use and taming of energy from a global perspective. • Required Readings: N/A • Assignment: N/A
Week 2	<ul style="list-style-type: none"> • Topic: Energy Profile of the United States • Summary: Where does the U.S. energy come from, and how does it vary geographically and over time? • Required Readings: Energy In The 21st Century (3rd Edition) by John R Fanchi (2013) Chapter 1 (pages 1-23). Available for free online via UF Libraries, (please note that you need to be logged in to your Gatorlink account or on campus to access the text). • Assignment: Essay 1: Compare the U.S. Energy Profile with that of other countries (homework due Friday Jan 23rd, 11:59 pm).
Week 3	<ul style="list-style-type: none"> • Topic: How much energy? and What is sustainable energy? • Summary: BTUs, MWh, Joule... what do the units stand for and how much do you use? • Required Readings: "Watts' the mystery? The energy units that power our lives" and "What is sustainability?" (pdf available in Canvas) • Assignments: Exercise 1: Calculate your energy use, and that of different states and countries. How many powerplants would be needed to cover that need? (in class) Essay 2: Discussion on a sustainable vs. a non-sustainable energy option for your home state/country. Due Friday Jan 29th at 11:59 pm.

Week	Topics, Homework, and Assignments
Week 4	<i>Catch-up, Review and Exam 1 (Feb 4th)</i>
Week 5	<ul style="list-style-type: none"> • Topic: Renewable Energy around the World, Part 1: Power derived from water • Summary: Why do different countries have different energy mixes? Why are there no hydropower plants in Florida? Which countries have the most hydropower and why? • Required Readings: Energy In The 21st Century (3rd Edition) by John R Fanchi (2013) (pages 184-204). <i>Available for free online via UF Libraries.</i> • Assignment: N/A
Week 6	<ul style="list-style-type: none"> • Topic: Renewable Energy around the World, Part 2: Wind, Solar and Bioenergy • Summary: Why do different countries have different energy mixes? Why are there no wind turbines in Florida? Why are there no solar panels in the Sahara Desert? Which countries have the most wind power and why? • Required Readings: Energy In The 21st Century (3rd Edition) by John R Fanchi (2013) (pages 132-179, 208-231). <i>Available for free online via UF Libraries.</i> • Assignment: Exercise 2: Class project: Make a global map of renewable powerplants (in class)
Week 7	Guest lectures: Duke Energy and Program for Resource Efficient Communities (tentative)
Week 8	<ul style="list-style-type: none"> • Topic: Are renewable energies always better for the environment? • Summary: Renewable energies are often being promoted as a more environmentally friendly option but can have detrimental impacts. This week environmental impacts of different power sources are compared and discussed. • Required Readings: Pick 2, one from Category A, and once from Category B: <i>Category A:</i> Panwar, N. L., Kaushik, S. C., & Kothari, S. (2011). Role of renewable energy sources in environmental protection: A review. <i>Renewable and sustainable energy reviews</i>, 15(3), 1513-1524. Saidi, K., & Omri, A. (2020). The impact of renewable energy on carbon emissions and economic growth in 15 major renewable energy-consuming countries. <i>Environmental research</i>, 186, 109567. <i>Category B:</i> Energy In The 21st Century (3rd Edition) by John R Fanchi (2013) (pages 180+224-231). <i>Available for free online via UF Libraries.</i> EPA (2020) The Sources and solutions: Fossil Fuels. • Assignment: In-class debate 1 (in class). Students not participating in the debate will write a 1000-1200 word essay on the topic (homework).
Week 9	<i>Catch-up, Review and Exam 2 (Mar 11th)</i>
Week 10	SPRING BREAK
Week 11	<ul style="list-style-type: none"> • Topic: New technologies • Summary: Case studies of up-and-coming energy technologies from around the world. • Required Readings: Energy In The 21st Century (3rd Edition) by John R Fanchi (2013) (pages 340-347). <i>Available for free online via UF Libraries</i> • Assignment: Exercise 3: Class project: Make a global map of energy pilot projects (in class).
Week 12	<ul style="list-style-type: none"> • Topic: Future energy Part 1: Storage and Limiting Energy Use

Week	Topics, Homework, and Assignments
	<ul style="list-style-type: none"> • Summary: With continued development and electrification of society, the demand for power is ever growing. At the same time some regions experience a discrepancy between where the power is generated vs. where it's needed. • Required Readings: Forbes (2020) What's next for Energy Storage Technology? • Assignment: Attendance at guest lecture: Program for Resource Efficient Communities (PREC)/UF Office of Sustainability (in class).
Week 13	<ul style="list-style-type: none"> • Topic: Future Energy Part 2: Policy and Economics • Summary: Aspects of policy and economics that guide energy production, consumption and development. • Required Readings: Energy In The 21st Century (3rd Edition) by John R Fanchi (2013) (pages 314-330). <i>Available for free online via UF Libraries</i> Gustafson, A., Goldberg, M. H., Kotcher, J. E., Rosenthal, S. A., Maibach, E. W., Ballew, M. T., & Leiserowitz, A. (2020). Republicans and Democrats differ in why they support renewable energy. <i>Energy Policy</i>, 141, 111448 • Assignment: TBA
Week 14	<ul style="list-style-type: none"> • Topic: Bringing it all together: is it possible to cover the world's energy needs with renewable energies alone? • Summary: The physical as well as economic and political potential for sustainable renewable energies varies throughout the world. What are the threats and opportunities to a sustainable energy future? • Required Readings: Moriarty, P., & Honnery, D. (2016). Can renewable energy power the future?. <i>Energy policy</i>, 93, 3-7. Jacobson, M. Z. (2017). Roadmaps to transition countries to 100% clean, renewable energy for all purposes to curtail global warming, Air Pollution, and Energy Risk. <i>Earth's Future</i>, 5(10), 948-952. • Assignment: In-class debate 2 (in class). Students not participating in the debate will write a 1000-1200 word essay on the topic (homework).
Week 15	<i>Catch-up, Review and Exam 3 (April 22nd)</i>
Week 16	MAKE UP EXAM April 30 th

IV. Student Learning Outcomes (SLOs)

At the end of this course, students will be expected to have achieved the [Quest](#) and [General Education](#) learning outcomes as follows:

- **Content:** *Students demonstrate competence in the terminology, concepts, theories and methodologies used within the discipline(s).*
 - Describe the basic principles of sustainability in general and sustainable energy in particular (Quest 2, N) Assessment: Exams, essays.
 - Describe and explain how different types of energy production works, as well as their pros and cons (Quest 2, P) Assessment: Exams, essays.
- **Critical Thinking:** *Students carefully and logically analyze information from multiple perspectives and develop reasoned solutions to problems within the discipline(s).*

- Identify, analyze and evaluate geographic differences in energy production and demand (Quest 2, N, P) Assessment: Exams, essays.
- Analyze the concept of sustainable energy, is it permanent and the same in all geographic settings? (Quest 2, N) Assessment: Exams, essays.
- **Communication:** *Students communicate knowledge, ideas and reasoning clearly and effectively in written and oral forms appropriate to the discipline(s).*
 - Communicate orally and in writing on the opportunities and threats associated with renewable energy development (Quest 2, N, P) Assessment: In-class debate, essays
 - Communicate orally on the opportunities and threats to the development of a society powered by sustainable energies (Quest 2, N, P) Assessment: In-class debate
- **Connection:** *Students connect course content with meaningful critical reflection on their intellectual, personal, and professional development at UF and beyond.*
 - Reflect on how you as an individual and your community can contribute to a sustainable energy situation, considering not only the three pillars of sustainability, but also energy sources, demand, and policy (Quest 2) Assessment: In-class debate, essays.

V. Quest Learning Experiences

1. Details of Experiential Learning Component

In this course the students will visit and get a guided tour of a local (exact location TBD). The aim is to do this visit during the usual class meeting time. After the visit students are required to complete a brief report on the field trip, which will count towards the *Essay*-part of the grade. Students who can present documentation supporting a valid excuse for not attending will get the opportunity to watch a video recording of the visit and base their report on that.

2. Details of Self-Reflection Component

The course promotes self-reflection through

1. Reflective essays. The assigned *Essays* vary in nature, from pure reports/summaries to discussions and reflections, challenging the students to put the topic at hand into a larger perspective, while also making the connection to their own life and experiences.
2. In-class debates where students need to pick a position and develop arguments for their stance.

VI. Required Policies

This course complies with all UF academic policies. For updated information on those polices and for resources for students, please see [this link](#). Selected UF policies, as well as course specific policies are listed below.

Late submissions

Course work submitted late without valid reason

(<https://catalog.ufl.edu/ugrad/current/regulations/info/attendance.aspx>) being presented to the instructor will receive a grade penalty of -10% per day.

Students Requiring Accommodation

Students with disabilities who experience learning barriers and would like to request academic accommodations should connect with the Disability Resource Center by visiting <https://disability.ufl.edu/students/get-started/>. It is important for students to share their accommodation letter with their instructor and discuss their access needs, as early as possible in the semester.

UF Evaluations Process

Students are expected to provide professional and respectful feedback on the quality of instruction in this course by completing course evaluations online via GatorEvals. Guidance on how to give feedback in a professional and respectful manner is available at <https://gatorevals.aa.ufl.edu/students/>. Students will be notified when the evaluation period opens, and can complete evaluations through the email they receive from GatorEvals, in their Canvas course menu under GatorEvals, or via <https://ufl.bluera.com/ufl/>. Summaries of course evaluation results are available to students at <https://gatorevals.aa.ufl.edu/public-results/>.

University Honesty Policy

UF students are bound by The Honor Pledge which states, “We, the members of the University of Florida community, pledge to hold ourselves and our peers to the highest standards of honor and integrity by abiding by the Honor Code. On all work submitted for credit by students at the University of Florida, the following pledge is either required or implied: “On my honor, I have neither given nor received unauthorized aid in doing this assignment.” The Honor Code (<https://www.dso.ufl.edu/sccr/process/student-conduct-honor-code/>) specifies a number of behaviors that are in violation of this code and the possible sanctions. Furthermore, you are obligated to report any condition that facilitates academic misconduct to appropriate personnel. If you have any questions or concerns, please consult with the instructor.

Academic Resources

E-learning technical support: Contact the UF Computing Help Desk at 352-392-4357 or via e-mail at helpdesk@ufl.edu.

Teaching Center: General study skills and tutoring. Broward Hall, 352-392-2010 or to make an appointment 352- 392-6420.

Health and Wellness

U Matter, We Care: If you or someone you know is in distress, please contact umatter@ufl.edu, 352-392-1575, or visit U Matter, We Care website (<https://umatter.ufl.edu/>) to refer or report a concern and a team member will reach out to the student in distress.

Counseling and Wellness Center: Visit the Counseling and Wellness Center website or call 352-392-1575 for information on crisis services as well as non-crisis services.

Student Health Care Center: Call 352-392-1161 for 24/7 information to help you find the care you need, or visit the Student Health Care Center website (<https://shcc.ufl.edu/>).

University Police Department: Visit UF Police Department website (<https://police.ufl.edu/>) or call 352-392-1111 (or 9-1-1 for emergencies).

GatorWell Health Promotion Services: For prevention services focused on optimal wellbeing, including Wellness Coaching for Academic Success, visit the GatorWell website (<https://gatorwell.ufsa.ufl.edu/>) or call 352-273-4450.