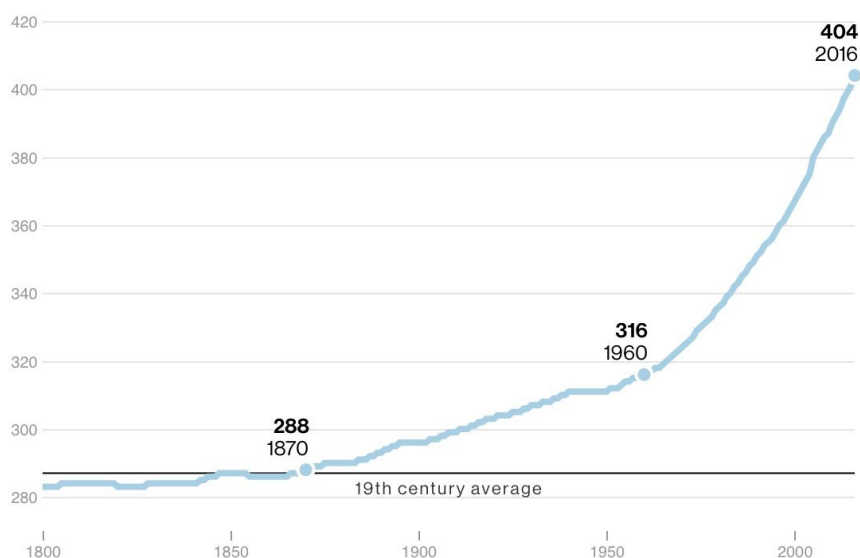


Energy, Environment, & Climate

ATMOSPHERIC CARBON DIOXIDE, 1800-2016, IN PARTS PER MILLION



Instructor

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<http://www.depauw.edu/academics/departments-programs/geosciences/>

Class

1:40-2:40 pm MWF

Office Hours

10:20-11:20 am MWF or by appt

Text

Energy, Environment, and Climate
Wolfson, (2018, 3rd ed., W.W. Norton)
ISBN-13: 978-0393622911

Materials

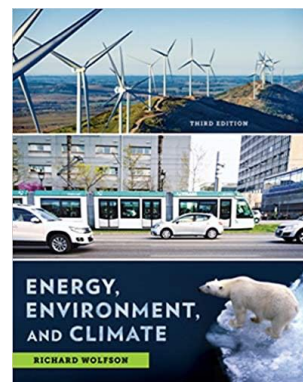
Calculator, ruler, & USB drive

COURSE TOPIC

The era of cheap, abundant energy provided by fossil fuels will likely end during your lifetime. Major changes in human society will occur as we strive to make the transition from non-renewable, polluting fossil fuels to renewable and sustainable alternatives. Some very smart people doubt that we can make this transition and predict that modern industrialized societies will begin to collapse in the not too distant future. Others believe that technological innovation, that has been the hallmark of human existence, will enable us to make this transition successfully. Whatever the outcome, make no mistake about it, the way we live, work, play, and interact is going to change drastically during this century.

The present energy landscape is changing rapidly. Emerging economies are consuming an increasing supply of the world's energy resources that are presently provided mostly by nonrenewable fuels (oil, coal, natural gas, and uranium). Most of the increase in demand for energy during the next 30 years will come from developing countries. Although progress has been made in the development of renewable, non-polluting energy resources, new technologies such as horizontal drilling and hydraulic fracturing ("fracking") have opened up vast new reserves of relatively cheap natural gas and oil that were previously thought to be inaccessible. Whereas this may bode well for energy security for the near future, the environmental consequences (e.g., the effects on Earth's climate) of continuing to rely mostly on fossil fuels for our energy to power modern industrialized economies could be disastrous.

This is an interdisciplinary topic. It involves science, mathematics, politics, economics, sociology, demographics, and many other disciplines at the heart of a liberal arts education. No matter what your interests are, you have to be interested in this...



COURSE GOALS

After completing this course, you should know...

- ✓ the present sources of energy & how different energy sources are used in industrialized societies.
- ✓ how energy resources form & the difference between renewable & nonrenewable energy resources.
- ✓ the difference between an energy source & carrier.
- ✓ the environmental impacts of using energy resources.
- ✓ the facts about climate change.
- ✓ how to do basic calculations related to energy resources & the environment.
- ✓ future scenarios for energy resources & sustainable societies.

DESCRIPTION

This course employs a variety of teaching approaches to maximize student learning of geoscience content in a classroom where different students optimally learn material in different ways. Specifically, of the ~3 hrs/wk

of class time that we are together, *most of the time will be devoted to lecture/discussion and/or active-learning activities involving calculations and problem-solving.*

I provide my slides as PDFs on Moodle, so that ideally students can print them out before class and annotate them with notes during class. That way, students aren't scrambling to write down every single word on a slide, allowing them to focus on the content and to participate in the discussion. If this is not possible, I will post the notes to Moodle as soon as I can. To facilitate discussion, students must R & R before class (no, this is not "rest & relaxation", but rather "read & retain" the chapter text). The best discussions often arise from student questions about the material (and/or current events highlighted in the media).

To get the most out of this course, I can't overemphasize the importance of reading the textbook chapters, taking good notes, working the problems, and participating in the class discussions.

GRADES

The basis for final grades is described in the table below. *Make-up exams/quizzes will not be given unless there is a documented emergency or unless we have arranged a make-up in advance because of exceptional circumstances.*

All materials to be turned in for a grade must be turned in on time, be clearly written (or typed), use the prescribed file naming convention, and be in order (in sequence, pages not backwards or rotated, etc.). Work that fails to meet these criteria will not be accepted and will receive a "0". Quizzes may be announced/unannounced and may cover material from assigned readings, lecture, and/or assignments (*I may have you turn in some assignments for a quiz grade to show that you completed the work, but possibly not for an explicit check of your answer(s)*).

Participation. Participation/engagement grades for this course will be based on a "standard" - "sub-standard" system. Everyone starts out with a "standard" grade, and I expect that most of you will finish the semester with this grade. A "standard" grade means you are attending class consistently, and you are participating in a reasonable way during most class sessions. If I judge your participation to be falling into the "sub-standard" range (e.g., excessive absences/tardiness, consistent lack of preparation or participation in activities, electronic distraction, sleeping/lack of attention, frequently getting up in class, improper mask wearing, etc.), I will explain the issue to you without penalty and will work with you to develop a plan for improvement. If an issue persists, I will explain the issue again and will assign a sub-standard participation grade. Each such sub-standard grade will result in lowering your final course grade by one percentage point.

Percent of Final Grade		Grading Scale	
Exams 1-4 (you may drop your lowest exam score, so each exam will ultimately be 30% x 3= 90%)	90%	88% to 100.0% = A- to A	(90%-100.0%)
		78% to 87.9% = B- to B+	(80%-89.9%)
		68% to 77.9% = C- to C+	(70%-79.9%)
Assignments/Projects/Quizzes	10%	58% to 67.9% = D- to D+	(60%-69.9%)
		00% to 57.9% = F	(00%-59.9%)
Q grade: 70% or better on the total course grade.			

KEYS TO SUCCESS IN THIS COURSE

1. **Read the Assigned Chapter** in a distraction-free environment and in advance of lecture over that material. As you're reading, carefully note any questions that you have.
2. **Take Good Notes**. Students with complete notes seem to do better in class. If possible, print out the lecture slides before class and annotate them from the lecture/discussion (including sketches from the whiteboard). Rewriting your notes will make them more legible and orderly, plus it will help you focus on areas that are still unclear. Be careful of falling into "TV-watching mode", as it is easy to look at the pictures and not take down any notes.
3. **Ask Questions**. The only "bad" question is one that is unasked. Because you will be responsible for material in each assigned chapter whether that material is specifically covered during lecture or not, it is essential to ask questions to clarify any concepts that you do not understand. If I forget to call on you while I am in the middle of explaining something in lecture, PLEASE remind me as I most certainly want to answer your questions!
4. **Know the Key Terms** associated with each chapter. If I use a term that you don't understand, PLEASE ASK me to define it.
5. **Refer to the Materials in the Back of the Book/Inside the Book Covers** (e.g., Appendices, Glossary, Answers to Odd-Numbered Questions & Exercises, Equations, Units, etc.).
6. **Do the Assignments** in a timely manner (i.e., start them early so that you can ask questions). If you don't understand something, PLEASE ASK.
7. **Check out the Internet**. There is a world of information on energy, climate change, & other topics covered in the course on the Web. You also might use a search engine to find web sites of interest.
8. **Use the library**. There are many books & articles in the library that pertain to the specific topics covered in the course (we also have a great interlibrary loan system for other materials that our library does not carry). Also, you will find introductory geology textbooks in the library, which will provide helpful information about geologic features and processes. If you are not on campus, PDFs can be sent to you digitally.
9. **Create your own Study Aids**. Some people like to highlight text in the chapter, others like to make flash cards, and still others like to study in groups and discuss the material. Feel free to experiment with what works for you. In addition, the Academic Resource Center in 115 Asbury Hall has Q tutors and trained people available to help you refine and improve your study habits and techniques.
10. **Study the Material on a Regular Basis**. It is important that everyone maintain good study habits by regularly working with the assigned material. Procrastination and cramming just don't work for most of us...it is best to get comfortable with the material as we go along so that you don't fall behind.
11. **Study for the Exam** as an individual and then as a group. Again, different people study in different ways. I've found that it helps to study as an individual first (thinking about what important concepts were emphasized in each chapter & lecture), then get together with others and study as a group (e.g., asking each other questions, brainstorming about what will be on the test, etc.).

FAQ:

Are lecture notes from the slides provided? PDF's of the lecture notes will be available in Moodle. If they are available, please bring printouts to class, so that you can annotate them (I commonly go more in-depth than what is on the slides, so you will be responsible for knowing that detail on the exams). Please note that if I post notes from the last time the course was offered or if I don't post the notes before lecture, I will post the final PDF's of the lecture notes before the next corresponding exam.

Will worked answers to the assignments be provided? No. To best learn the material and to best facilitate the development of your problem-solving skills, you need to work the assigned problems. However, I am more than happy to answer questions as you are working through the material. Answers to odd questions are provided in the book.

Can we have an exam review sheet? I have found it much more effective to highlight topics as a preface for each slide set with a "Learning Objectives" slide, so that you are aware of important topics prior to me going over them. While not comprehensive, these Learning Objectives slides are a good first-order framework for assimilating the material.

When will get feedback on our graded work? I usually need at minimum of a week to return graded work (although I'm often much quicker). While I might not always write detailed explanations on graded work, I will orally go over the answers and/or work the problems in class (usually based on student requests). Please ask questions in class or stop by my office/set up a virtual chat if a concept is not clear or if you have a question on how I graded your work. Additionally, you need to give me feedback about how the course is going. It is important that you "rein me in" if I go too fast or if I haven't explained something to where you understand it. Ask questions!!!

ORDER OF TOPICS

Week Starting	Lecture Topics <i>last day to withdraw - 3/25</i>	Reading Assignments
01: 01/31	A Changing Planet	Ch. 1
02: 02/07	High-Energy Society	Ch. 2
03: 02/14	Energy: A Closer Look	Ch. 3
04: 02/21	Energy & Heat Exam #1-02/25 (est)	Ch. 4
05: 02/28	Fossil Fuels	Ch. 5
06: 03/07	Fossil Fuels	Ch. 5
07: 03/14	Environmental Impacts of Fossil Fuels	Ch. 6
08: 03/21	Environmental Impacts of Fossil Fuels Exam #2-03/23 (est)	Ch. 6
09: 03/28	Spring Break (March 26-Apr 03)	
10: 04/04	Nuclear Energy	Ch. 7
11: 04/11	Solar Energy	Ch. 9
12: 04/18	Water, Wind, and Biomass Energy Exam #3-04/22 (est)	Ch. 10
13: 04/25	Geothermal & Tidal Energy Energy Carriers: Electricity & Hydrogen	Ch. 8 Ch. 11
14: 05/02	Climate Science/Forcing	Ch. 12 & 13
15: 05/09 <i>(last day of class 05/12)</i>	Climate Change	Ch 14 & 15
Exam #4: Mon, May 16 @ 8:30-11:30 am		
This syllabus is meant to provide an outline for the general flow of the course. At my discretion, I will add or omit topics and/or modify the timetable. Exam times are only estimates and may be moved earlier or later (you will receive a week's notice).		

Policy Page

ADA STATEMENT

It is the policy and practice of DePauw University to provide reasonable accommodations for students with properly documented disabilities. Written notification from Student Accessibility Services is required. If you are eligible to receive an accommodation and would like to request it for this course, please contact Student Accessibility Services. Allow one week advance notice to ensure enough time for reasonable accommodations to be made. Otherwise, it is not guaranteed that the accommodation can be provided on a timely basis. Accommodations are not retroactive. Students who have questions about Student Accessibility Services or who have, or think they may have, a disability (psychiatric, attentional, learning, vision, hearing, physical, medical, etc.) are invited to contact Student Accessibility Services for a confidential discussion. Student Accessibility Services can be reached by phone at 765-658-6267 or studentaccessibility@depauw.edu. Meetings with SAS staff will be conducted virtually this semester.

ATTENDANCE

Regular and on-time attendance is expected and monitored (see the Student Handbook <https://www.depauw.edu/handbooks/academic/>). As stated in the Student Handbook, excessive absences can be grounds for being dismissed from the course. In addition, it has been my experience that learning comprehension improves dramatically when students are present to listen to lectures, to ask questions, and to discuss the material in the classroom setting. In addition, some activities (e.g., field work) require attendance to receive credit. Should you know that you will be absent (e.g., health issue regarding yourself or immediate family, athletic obligation, etc), please contact me in advance (or ASAP afterwards) to make arrangements about assignments.

ACADEMIC INTEGRITY

Any attempt to gain an unfair advantage over other students in the class will be handled in accordance with established University procedures as described in the Academic Handbook section <http://www.depauw.edu/handbooks/academic/> on Academic Integrity.

DePauw Academic Resources on Academic Integrity

<http://www.depauw.edu/academics/academic-resources/academic-integrity/>

Writing Center Information on Plagiarism:

<http://www.depauw.edu/academics/academic-resources/academic-resource-center/w-center/w-center-handouts/>

CELL PHONE/COMPUTER/SMART DEVICE USE

Before class begins, turn off your cell phone (or set it to vibrate) and put it away. Do not check or send voicemail or text messages during class, and do not leave class to check or send messages unless 1) you have an emergency (inform your instructor prior to class starting of special circumstances involving a personal emergency situation that would require you to use your phone when class is in session) or 2) are on an instructor-designated break. In other words, do not use your cell phone in class for any reason at any time unless you have consulted with the course instructor.

If you have a cell phone/smartwatch on your person or on your desk/table during an exam without the instructor's permission, you will receive a 0 on the exam, and you will automatically be considered in violation of DePauw's academic integrity policy on cheating due to unauthorized use of a cell phone/smartwatch. You may not take your cell phone/smartwatch with you on bathroom breaks during exams.

Please read the following: <http://www.insidehighered.com/blogs/just-visiting/open-letter-incoming-freshmen>

Laptops, tablets, smartwatches, and other electronic devices are not allowed to be used in the classroom except for activities directly related to our course as specified by your instructor (e.g., do not check or send emails, chats, or texts, do not use your web browser except for course-sanctioned activities, etc.). Quit all programs not specifically designated by your instructor (not only reducing temptation, but also helping your computer run more efficiently).

Violating the cell phone/computer/smart device use policy is one way students may be considered not engaged/participating in course activities (see the Grades discussion on participation above).

COVID-19 (PART OF PARTICIPATION)

As per university policy (Sp2022), masks must be worn indoors at all times in Julian. Masks must be N95, KN95, KF94, or surgical masks. It is also important that you make sure that your mask is well-fitting and worn correctly (see below; <https://www.olmmed.org/covid-19-information/how-to-wear-a-mask/>). If you are not feeling well, please do not come to class. I provide the lecture notes on Moodle, but it is always a good idea to copy notes from someone in class as I always lecture about more than what is just on the slides.



Policy Page

CLASSROOM BEHAVIOR

- **Early is on time, and on time is late.**
(especially on days with activities).
- **Respect everyone.**
(yourself, your peers, and your instructor).
- **Listen and contribute.** Lecture and discussion portions of our class can quickly morph to lecture only if you are not an active and contributing participant in class.
- **Work to the best of your ability.** True learning is hard work and is constructed and nurtured by you (not simply transferred from the instructor). A strong work ethic will not only serve you well in this course, but in life in general. Do not settle for less than your best effort.
- **Be aware of consequences (positive & negative).**
If you make good decisions (e.g., reading the course materials, taking notes, asking questions, working hard, etc.), you will likely experience good consequences such as enhanced understanding of geoscience processes, improved grades, and general success in life. Conversely, poor decisions (e.g., waiting to cram right before an exam or assignment, pulling an “all-nighter” and coming to class exhausted, relying on energy drinks or other substances, distracting yourself or others with cell phones or laptops, etc.) typically have negative consequences that cause your understanding of course content to suffer.
- **Consider the classroom your workplace.** Once you step inside the classroom, commit yourself to learning as much as you can during that time. Do not routinely get up during class to take care of personal needs (e.g., bathroom breaks, social networking, etc.). Please address these needs during the break between classes. If an emergency occurs, please feel free to leave the classroom to address it.

AUDIO/VISUAL POLICY

- No video, audio, or still picture recordings are allowed during class without the instructor's permission.
- No video recordings, still picture, or other means of duplication (e.g., xeroxing) of homework assignments, labs, exams, etc. are allowed without the instructor's permission.
- ADA accommodations pertaining to recordings of lectures for taking notes are addressed by the instructor providing handouts of lecture slides/materials.