

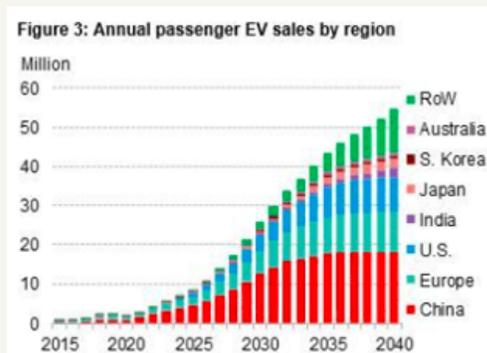
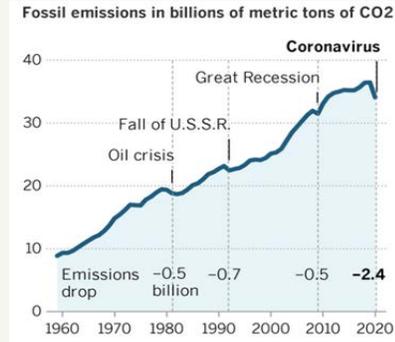
ERTH 102/SUST 113 Quantifying Global & Environmental Change

Instructor: Garrett Apuzen-Ito, POST 810 gito@hawaii.edu

Office hours and recitations sessions: TBA.

Class meetings: Tue and Thurs, noon-1:15 POST 723

ERTH102/SUST113 provides a venue for students to gain skill and confidence in using college-algebra-level mathematics, proficiency in using spreadsheets to analyze data, while also gaining a practical introduction to global and environmental change. This course has the Gen Ed FQ (Quantitative Reasoning Foundations) designation.



Students evaluate, characterize, model, and interpret data related to global warming, greenhouse gas emissions, sea level rise, human population, natural resource supply and consumption, and measures to mitigate global change. The introduction to environmental science is valuable preparation for further study in related topics. Students gain appreciation for the various ways in which human activities impact the Earth system so that they are well informed when making decisions in their professions, in serving their communities, and as voters.

The skills gained are broadly applicable to making well-reasoned, fact-based choices in everyday life. Also, the proficiency developed in data analysis and the use of spreadsheets is beneficial to a huge array of professions.

Textbook: *Introduction to Environmental Science (2nd Edition)* by Zehnder et al. (2018) is open source <https://oer.galileo.usg.edu/biology-textbooks/4/>. Readings from other sources will occasionally be assigned. An example is the open source *Chemistry: Atoms First 2e*, by Flowers et al. (2019) is an open source introductory chemistry textbook. <https://openstax.org/details/books/chemistry-atoms-first-2e>. Reading assignments—some required and some optional—will be posted weekly on Lulima. The power point files used in lecture presentations will also be posted weekly.

The software tool “Google Sheets” (very similar to Microsoft Excel, but free) will help become proficient in a variety of practical applications of math, displaying data in various forms, and in quantitatively analyzing current data relevant to the Earth system and global change. If you are already familiar with another spreadsheet program, it will be easy to adapt to using Google Sheets. However, if you have never used spreadsheets THAT IS OK; you will learn how to in this class.

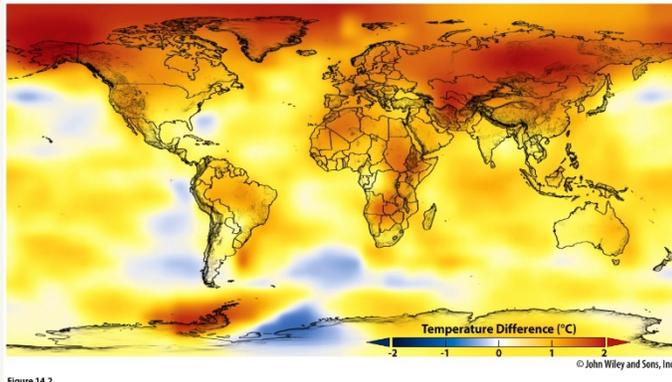


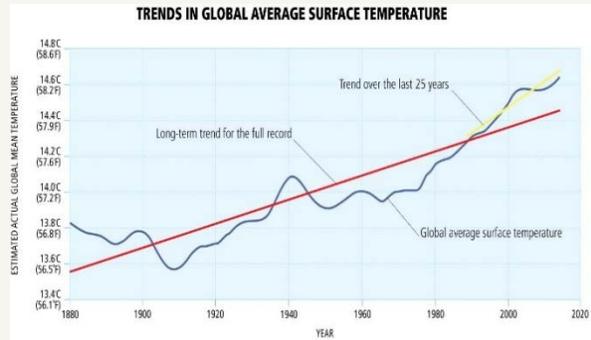
Figure 14.2

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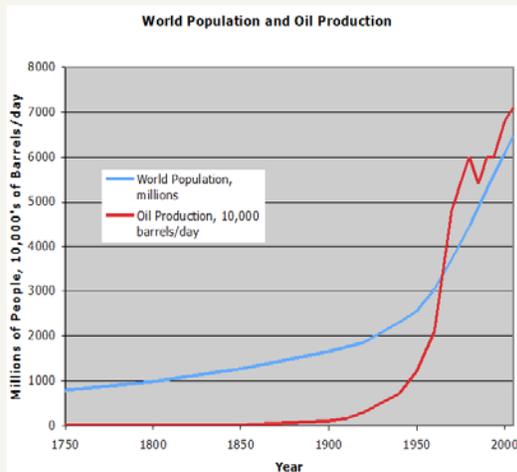
Grading: Class participation and exercises 15%, homework 50%, 1st midterm 10%, 2nd midterm 10%, final 15%

Pre-class reading and self-assessment:

Reading assignments will be assigned prior to each class, followed by a short exercise for practice and self-assessment (due by the start of class). These exercises graded based only on completion, not on getting the right answers. Having done these, you will be well prepared for fortifying your understanding in class by asking informed questions and practicing solving problems (including homework).



Class Format: A combination of lectures, peer discussion, exercises, and self-assessment. In-class exercises, supported by peer discussions, will provide you with regular practice as well as frequent two-way feedback between you and the instructor.



Homework assignment will be short-answer, short calculations and/or spreadsheet exercises. These assignments will typically consist of a computation reinforcing content from lecture &/or the reading, and producing, interpreting, and evaluating graphs.

Exams: Three examinations will ensure that you have ample opportunities to review and fortify your knowledge as well as provide frequent feedback in your ability to meet the learning objectives. There are two mid-terms and a final. Make-up exams will only be given in unusual circumstances and a legitimate reason for missing the exam must be documented. Students caught cheating on any exam will zero credit for the exam.

Computers & tablets: Students are required to join class using a device that is suitable for using google sheets. Laptops are best, tablets are cumbersome and not recommended, phones do NOT work.

Honor code and class culture

- Our class culture will be built upon supportive and respectful interaction, and appreciation for diversity in all of what makes us who we are including race, culture, sexual orientation, gender identity, spiritual perspectives, academic ability/preparedness, etc.
- You are encouraged to work together during class and outside of class, but all work turned in for grading must be yours, and yours alone. Everyone must strive to contribute in a balanced manner.

Unless specifically designated, there will be no collaborations during exams. Cheating will not be tolerated, and everyone is responsible for upholding our honor code.

Content by week

Week	Topic
1	Warming & Rising CO ₂ in our atmosphere, & introduction to spread sheets.
2	Global energy consumption and greenhouse gas emissions & introduction to spreadsheets.
3	Global energy consumption and greenhouse gas emissions: Global carbon cycle and combustion reactions.
4	Energy and Earth's energy budget: Conservation of energy, radiative forcing, and energy flow in the Earth system.
5	Human population: Factors influencing population through time.
6	More complex models describing growth (population and atmospheric CO ₂).
7	Times scales of atmospheric methane variation. The carbon cycle revisited – seasonal changes in CO ₂ levels.
8	Mineral Resources and transformative technology.
9	Carbon sequestration and negative carbon emissions – what is the likely cost.
10	Sea-level rise: Causes, rates, implications, and adaptation.
11	Ocean Acidification: CO ₂ affects more than temperature.
12	Ocean Deoxygenation: An emerging concern.
13	Open week to be used for catch-up.
14	Uncertainty and decisions making – a very simple application of probability.
15 &16	Cap and trade as an approach to limiting greenhouse gas emissions.

Title IX and Sex Discrimination is a Federal Law

The University of Hawai'i is committed to providing a learning, working and living environment that promotes personal integrity, civility, and mutual respect and is free of all forms of sex discrimination and gender-based violence, including sexual assault, sexual harassment, gender-based harassment, domestic violence, dating violence, and stalking. If you or someone you know is experiencing any of these, the University has staff and resources on your campus to support and assist you. Staff can also direct you to resources that are in the community. Here are some of your options:

As members of the University faculty, your instructors are required to immediately report any incident of potential sex discrimination or gender-based violence to the campus Title IX Coordinator. Although the Title IX Coordinator and your instructors cannot guarantee confidentiality, you will still have options about how your case will be handled. Our goal is to make sure you are aware of the range of options available to you and have access to the resources and support you need.

If you wish to remain ANONYMOUS, speak with someone CONFIDENTIALLY, or would like to receive information and support in a CONFIDENTIAL setting, use the **confidential resources available here:** <http://www.manoa.hawaii.edu/titleix/resources.html#confidential>.

If you wish to directly REPORT an incident of sex discrimination or gender-based violence including sexual assault, sexual harassment, gender-based harassment, domestic violence, dating violence or stalking as well as receive information and support, contact: Dee Uwono Title IX Coordinator (808) 956-2299 t9uhm@hawaii.edu.