

## ERTH 102/SUST 113 Quantifying Global & Environmental Change

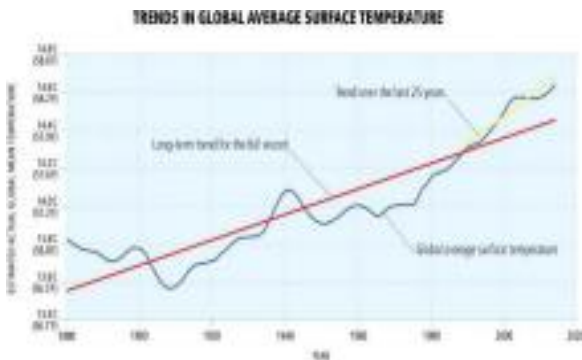
**Instructor:** Martin Pepper HH180F pepperm@hawaii.edu

**Office hours in HH180F:** TBA. These are a great setting to get help with remembering math that we use in class that you may have forgotten.

**Class meetings:** Tue and Thurs, 12:00-1:20

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 issues of global and environmental change. Through practice and application, students gain a strong foundation in quantitative reasoning, meeting the UHM FQ (Quantitative Reasoning Foundations) learning objectives (see p. 2 below).

The practical and meaningful application is in evaluating, characterizing, modeling, and interpreting quantitative data related to global warming, greenhouse gas emissions, sea level change, human population, natural resource supply and consumption, and measures to mitigate global change. Students will see that the quantitative 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.



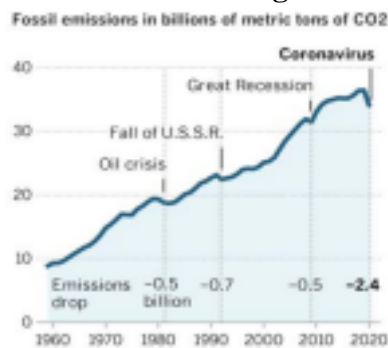
The introduction to numerous concepts of earth and environmental science is valuable preparation for further study of these topics; moreover, it instills appreciation for the various ways in which human activities impact the Earth system so students are well informed when making decisions in their professions, in serving their communities, and as voters. The course is designed to be accessible for all students at UHM, including those who are pursuing non-science or non-technical degrees.

**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.

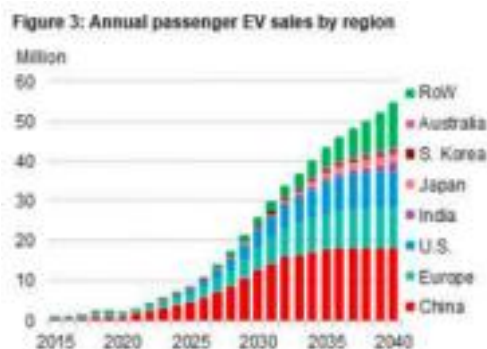
**Reading:** Will be assigned weekly. All material is free

### To succeed in this course, you will:

1. Learn to recast written formulae as equations in spreadsheets, understanding both the inputs and outputs. This will be accomplished by comparing real environmental data to simple models, and assessing the usefulness of the models, as well as their shortcomings.
2. Learn how to represent quantitative data in various types of graphs and charts, as well as interpret and evaluate the results. You will also learn to read and interpret those graphs and charts presented in in weekly reading assignments.
3. Demonstrate the ability to describe and explain graphs, and the associated data, using words.



4. Become proficient at converting among the varied units of measure used in Earth and environmental science so that mathematical formulae can be applied and meaningful comparisons can be made.
5. Become proficient in using scientific notation to express very large and very small numbers.
6. Demonstrate the ability to use mathematical functions to describe or model data for characterizing and/or making predictions about different behaviors and systems.
7. Explain different ways in which human population, human's activities (especially consumption of natural resources, food production, and energy), Earth's carbon cycle and Earth's climate system are interconnected.



**FQ Learning Objectives. Students will be able to:**

1. Select an appropriate mathematical approach for a given problem or practical application and identify relevant quantities or other information for the selected approach;
  - Herein, a “mathematical approach” refers to a set of formulas, models, algorithms, or other mathematical or statistical methods.
  - Selection includes verifying that the assumptions and limitations of a mathematical approach are appropriate for a particular practical problem.
2. Convert relevant quantities/information into the necessary symbolic, numerical, or graphical form as needed for the selected approach;
  - Conversion includes understanding the meanings of individual variables in a given context, and the correct association of quantities with their corresponding variables.
3. Use mathematical approaches successfully, including performing correct chains of algebraic steps, symbolic manipulations, and/or numerical calculations;
  - Successful use also includes knowing the names and understanding the meanings of operational symbols and using them correctly in a given context.
4. Evaluate the validity of a mathematical approach and its conclusions;
  - Evaluation may include: verifying correctness of solutions, where possible; reexamining initial assumptions; assessing reasonableness of numerical results in practical applications or physical contexts; applying other accepted methods of judgment within particular disciplines.
5. Communicate final conclusions in appropriate formats.
  - Appropriate formats may include symbolic expressions, graphs, or written statements.
  - Final conclusion statements should reflect the outcome of deductive or statistical reasoning

**Grading:** 15% Class participation and exercises, 50% homework , 35% exams (10% 1st midterm, 10% 2nd midterm 15% final)

**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. Homework is due on the specified due date. Late homework may be turned in within a week with a 50% late fee; homework will not be accepted later than that.

**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 get 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 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 and outside of class, but all work turned in must be yours, and yours alone. Everyone must strive to contribute in a balanced manner.
- Cheating and plagiarism (including copying a classmate's work) will not be tolerated, and everyone is responsible for upholding our honor code. Unless specifically designated, there will be no collaborations during exams.

### **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](mailto:t9uhm@hawaii.edu).