CLASS OVERVIEW

BEE 6940 LECTURE 1   JANUARY 23, 2023
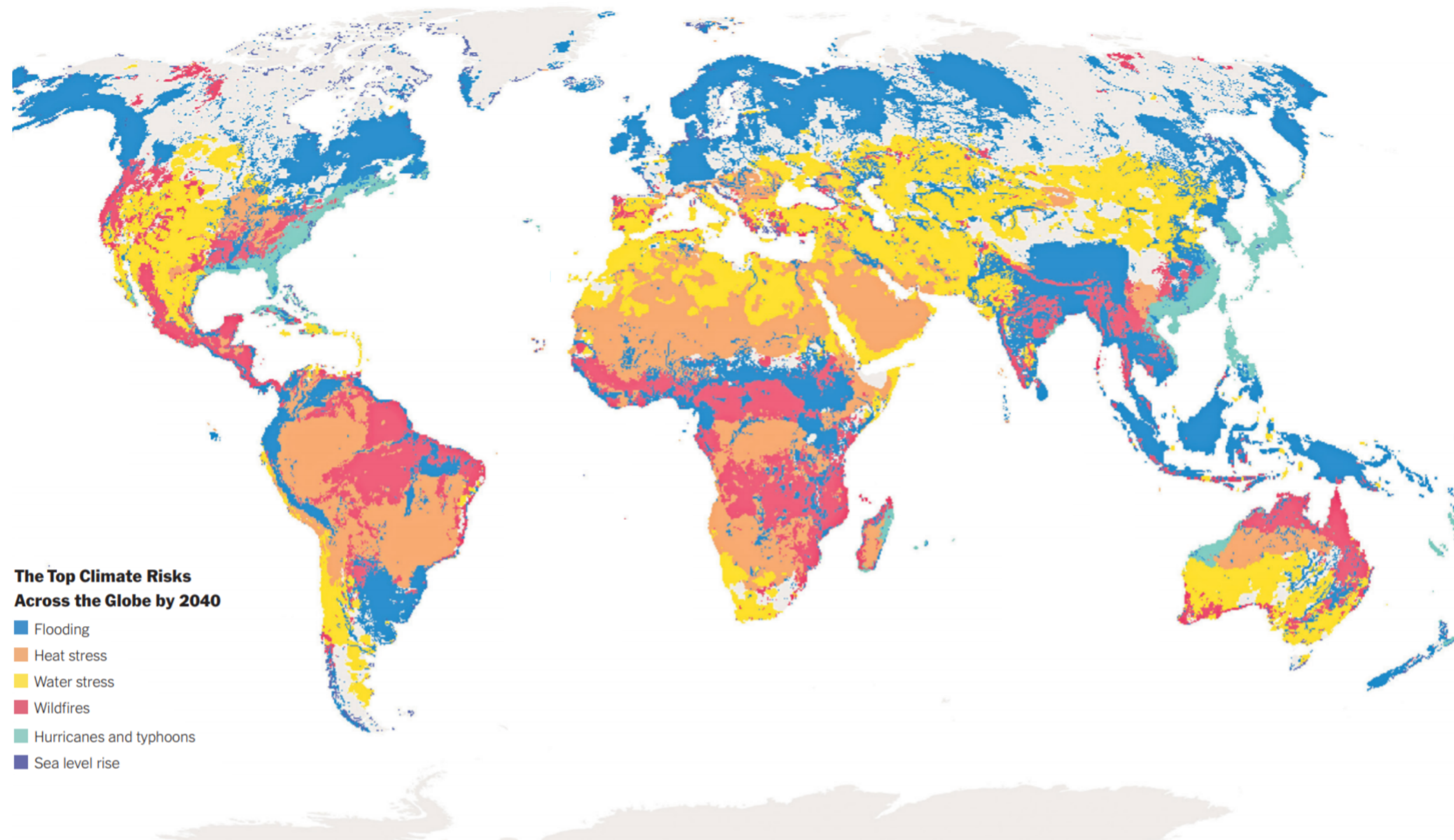
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CLASS OVERVIEW

CLIMATE RISKS ARE DIVERSE AND GROWING

The Top Climate Risks Across the Globe by 2040

- Flooding
- Heat stress
- Water stress
- Wildfires
- Hurricanes and typhoons
- Sea level rise

Source: Four Twenty Seven and the New York Times

MOTIVATING QUESTIONS

1. What are the potential impacts of climate change?

2. What can we say about their uncertainties?

3. What are the impacts of those uncertainties on the performance of risk-management strategies?

POLL

What are you hoping to get out of this course?

URL:
https://pollev.com/vsrikrish

Text: **VSRIKRISH** to 22333, then message

Course Goals

- Identify sources of uncertainties impacting climate risk assessment and management.

- Apply *appropriate* uncertainty quantification and characterization methods.

- Understand how uncertainty can impact decision-making.

Course Organization

1. Introduction to Climate Risk

    i. Overview of Risk and Uncertainty

    ii. Climate Uncertainty and Scenarios

2. Uncertainty Quantification

    i. Calibrating Models to Data

    ii. Model Selection

3. Impacts of Uncertainty on Decision-Making

Motivating Example: Coastal Flood Risk

Course Logistics and Policies

CLASS STRUCTURE

Instructor: Vivek Srikrishnan (viveks@cornell.edu)

TA: Chloe Darnell (ced227@cornell.edu)

Website: https://viveks.me/climate-risk-analysis

Meetings: MW 1-2:15pm, 225 Riley-Robb Hall

- Mondays: primarily lecture

- Wednesdays: primarily lab/discussion mixture

Office Hours: By appointment (or come chat after class)

CLASS STRUCTURE

Mondays

- Lecture-focused

- Slides available ahead of time on website

CLASS STRUCTURE

Wednesdays

- Computation and discussion focused

- Notebooks will be made available on GitHub / website.

- Bring laptop and clone relevant repositories ahead of class.

- If unable to bring laptop, can work with others.

CLASS POLICIES

Accommodations

If you encounter any obstacles or access barriers in this class, let me know ASAP.

If special accommodations would help, reach out to me with your SDS letter as early as possible.

Class Policies

Diversity and Inclusion

Goal: Foster an inclusive learning environment.

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Diversity and Inclusion

Goal: Foster an inclusive learning environment.

- Please be open and respectul of others' backgrounds, beliefs, and viewpoints.

- Communicate in a respectful manner, and be aware that how we come off in writing does not always reflect intent.

- Miscommunications and misinterpretations happen, assume good faith!

CLASS POLICIES

Attendance and Participation

- Not required, but not attending might reduce ability to complete notebooks and homeworks.

- **Please do not come to class if sick!** Email me and I will send you a Zoom link.

- Masks not required, but *please be thoughtful*!

- **Please ask questions!** If you're struggling to understand something, it's likely my fault, not yours!

CLASS POLICIES

Grading

- Readings: 20%

- In-Class Lab Notebooks: 25%

- Homework Assignments: 30%

- Final Project: 25%

Class Policies

Readings

Weekly assigned readings (starting next week). Typically a journal article.

Interacting with readings will be broken into two components:

- Social annotations

- Written "responses"

CLASS POLICIES

Reading Annotations

- Social annotation "assignments" on Canvas using Hypothesis.

- Annotation grade involves annotating / interacting with other's annotations in a meaningful fashion showing engagement.

- Grade based on annotations prior to Wednesday's lab day, but can add later for broader use.

CLASS POLICIES

Reading Responses

- Other grade component related to readings is one-page written "responses".

    - What are your key takeaways, critiques, thoughts on next steps, etc?

- Submit PDFs to Gradescope prior to next Monday's class.

- Grade based only on completion.

- I'll drop two of these. Life happens!

CLASS POLICIES

Lab Notebooks

- Typically one every Wednesday, based on the week's topic.

- Available via GitHub, repositories linked from the class schedule.

- Intended to gain familiarity with the *how* — applying the methods from class.

- Submit PDF of notebook to Gradescope by the end of the weekend, 10% off per day late.

- Will drop one.

CLASS POLICIES

Homework Assignments

- Less frequent (maybe 5-6?)

- Notebook-based, repositories from GitHub Classroom.

- Submit PDF of notebook to Gradescope by the due date (typically a Thursday at 9PM ET), 10% off per day late.

- Will involve more setup / conceptual work than labs.

- Collaboration encouraged, but give credit to those you worked with.

Class Policies

Term Project

- Work in groups of 2 to apply concepts from class (or beyond!) to a climate risk problem of your choice.

- Poster presentations in class the last week of the semester.

- Submit poster PDF to Gradescope, presentation in class last day.

- Some checkpoints along the way:

  - Proposal
  - Draft of work plan

CLASS POLICIES

Academic Integrity

Hopefully not a concern...

- Collaboration is great and is encouraged!

- Knowing how to find and use helpful resources is a skill we want to develop.

- But don't just copy...learn from others and give credit.

- Submit your own original work.

CLASS POLICIES

Academic Integrity

Obviously, just copying down answers from Chegg or ChatGPT and passing them off as your own is not ok.

But often lines aren't that simple. Let's quickly consider some scenarios (h/t to Tony Wong for these).

CLASS POLICIES

Academic Integrity

Dan searches the internet for relevant code and copy-pastes it into his Jupyter notebook. He properly cites the source of the codes.

CLASS POLICIES

Academic Integrity

Dan searches the internet for relevant code and copy-pastes it into his Jupyter notebook. He properly cites the source of the codes.

Probably Not OK:

- What portion of the work is Dan's? How important were the copied (and cited) codes?

- Did Dan understand what he copied?

Class Policies

Academic Integrity

Matthew and Rhonda work together to figure out how to implement the codes, but each works on their own computer and develops their own software.

CLASS POLICIES

Academic Integrity

Matthew and Rhonda work together to figure out how to implement the codes, but each works on their own computer and develops their own software.

Definitely OK:

- Matthew and Rhonda have collaborated to understand how to solve the problem(s), but has written up their own solution, demonstrating their understanding.

Class Policies

Academic Integrity

Felix and Rachel are working together on a problem involving a derivation. Rachel types it up in LaTeX and sends the code to Felix, who pastes it into his Jupyter notebook.

CLASS POLICIES

Academic Integrity

Felix and Rachel are working together on a problem involving a derivation. Rachel types it up in LaTeX and sends the code to Felix, who pastes it into his Jupyter notebook.

Likely Not OK:

- Did Felix contribute enough to the derivation?
- *Definitely not OK if Felix doesn't give Rachel credit for her contribution.*

SOFTWARE TOOLS

SOFTWARE TOOLS

Julia

This class will use the Julia programming language.

- Powerful, modern, fast

- Demos and tips available on the website (under "Julia Examples").

POLL

What is your programming background?

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Software Tools

Jupyter Notebooks

We will use Jupyter Notebooks for labs and homework assignments.

- Allow us to integrate text (Markdown), math (LaTeX), code, and output.

- However, **be careful**:
    - Notebooks can lead to sloppy habits.
    - We'll discuss this more on Wednesday.

SOFTWARE TOOLS

GitHub

GitHub: Industry-standard version control system.

- Good to incorporate in your research workflow.

- GitHub Classroom will be used to distribute homework assignments.

- Repositories will be kept public to facilitate collaboration.

- Please share repository links when looking for code help, rather than emailing scripts.

POLL

Have you used GitHub before?

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SOFTWARE TOOLS

Gradescope

Gradescope will be used for submitting PDFs of notebooks, reading responses, homework.

TIPS FOR SUCCESS

Tips For Success

- Start assignments early: you should be able to pick away at them early on.

- Ask questions, try to help each other. This course is intended to be collaborative, and we all have different backgrounds, interests, and perspectives.

- Give me feedback!

Upcoming Schedule

Wednesday: Make sure everyone has a GitHub account, is set up with Julia, and work on basic Julia skills notebook.

Next Monday: What is "climate risk"? And for that matter, what is "risk"?