

Department of Computer Science

# PMU199H1F: Computing the Climate

### **Prof. Steve Easterbrook**

**University of Toronto** 

Course website: http://www.cs.toronto.edu/~sme/PMU199-climate-computing

My blog: http://www.easterbrook.ca/steve

## **Course Goals**

To give you a new perspective on what climate science is and how it is done

- To explore how scientists use (computer) models to help find answers to complex questions
- To practice your communication skills
- To give you new critical thinking tools

## **About the Course**

### **Course Website:**

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## Key Books:



Andrew Dessler An Introduction to Modern Climate Change

### Free Books:

The Copenhagen Diagnosis online at copenhagendiagnosis.com





IPCC Reports 2014 online at www.ipcc.ch

Plus lots of online readings. Some web-searching required.



Thinking in Systems

Donella Meadows Thinking in Systems: A Primer

## **Course Outline**

#### Part 1: Early Models

Week 1: The discovery of the Greenhouse Effect Week 2: Arrhenius' Energy Balance Model

#### Part 2: Weather versus Climate

Week 4: Global Circulation Models and how they work Week 5: Chaos Theory and Predictability

#### **Part 3: Models and Experiments**

Week 6: How do scientists use computer models? Week 7: What questions can we ask of a climate model? Week 8: What are the challenges in building an earth system model?

#### **Part 4: Decision-Making and Uncertainty**

Week 9: How do climate models support the policy-making process? Week 10: How do we manage risk?

#### Part 5: Climate Solutions

Week 11: Enough talk, time for action! Week 12: How do we know what will work and what won't?

## Assignments

### **Three assignments:**

- 1. Research a topic related to the course and write a short article about it. Style: magazine/blog. Max 1000 words + references and figures Due Oct 14th. Worth 20%
- Research a topic related to the course and write a short article about it. Style: open. Max 1000 words + references and figures Due Nov 4th. Worth 20%
- 3. Final Essay

Due Nov 25th. Worth 40%

10% of the course marks for weekly reading reflections

10% of the course marks for participation in class discussions

### Due dates are firm

Submit by email, by midday (12pm noon) on the due date We'll be using a peer review process to give you feedback to improve your work

### Notes:

Write in your own words. Attribute direct quotes properly.

## The "Six Americas" Study



#### Figure 12: Timing of harm to people in U.S.





### **Global Average Surface Temperature (last 2000 years)**



Source: http://www.realclimate.org/index.php/archives/2013/09/paleoclimate-the-end-of-the-holocene/



## Has this happened before?



## Has it ever been this warm?

