**Climates of the Past and Future**

**Day 1:**

1. **Climate of a Planet**
	1. Radiation and energy
	activity: rainbow glasses
	2. Albedo
	3. Blackbodies and thermal IR radiation
	activity: thermal camera
	exercise: cooling rates
	4. Molecules and absorption
	5. Planetary energy budgets
	activity: UCAR planet interactive
	activity: glass plates
	6. Climate Sensitivity
	exercise: Arrhenius calculation
2. **Climates of the Past**
	1. Geologic time
	2. Origin of the Earth and atmosphere
	3. Plate tectonics & climate change
	activity: plate movies
	4. The faint young sun paradox
	5. Geologic carbon cycle
	activity: fizzy water
	6. Ice ages
	activity: Ice core movie
	exercise: Milankovitch calculator
		1. How glaciers work
		2. Ice sheet time scales
		3. Ice age cycles
		4. Ice sheet collapse
	7. Deglaciation and the Early Holocene
	8. Medieval Warm Period and Little Ice Age
	activity: UCAR tree ring builder
	exercise: last millennium calculator
	9. 20th Century warming
	exercise: historical climate records
	10. Climate variability: ENSO, volcanoes, & the Sun

Day 2:

1. **Climates of the Future**
	1. The Discovery of Global Warming
		1. Fourier (1820’s)
		2. Agassiz (1830’s)
		3. Tyndall (1860’s)
		4. Arrhenius (1890’s)
		5. Callendar (1930’s)
		6. Keeling (1950’s)
	2. Climate forcing, response, sensitivity, and feedback
	exercise: climate sensitivity calculator
	3. Where does global warming go?
	exercise: observations and data
	4. Perturbed carbon cycle
	5. Simple climate model
	activity: Earth:carbon calculator
	6. Earth System Models
	7. IPCC Process
	8. Emissions, energy, and the Kaya Identity
	activity: emissions calculator
	9. Climate projections for 21st Century and beyond
	10. Climate impacts
		1. Global
		2. Regional
		3. Local
	11. Solutions
	activity: climate wedges
		1. Energy
		2. Economics
		3. Policy
	12. Simple, Serious, and Solvable