

Technion – Israel Institute of Technology, Faculty of Architecture and Town Planning

**CLIMATE CHANGE: SCIENCE, POLICY, AND PLANNING
02060972**

Winter semester, 2024. Mondays, 11:30-14:20

Assoc. Prof. Daniel Orenstein
Office Hours: Sundays, 14:00-16:00, 409 Sego Bldg.

COURSE SUMMARY AND OBJECTIVES:

Anthropogenic climate change has become one of the most profound challenges facing humanity. It is imperative that the next generation of society's leaders has a solid scientific understanding of the challenge to both address the socio-economic drivers of greenhouse gas emissions and land use/land cover change and propose and initiate the social and technological changes needed to mitigate the threat. This course is designed for Technion students who desire a scientific foundation for understanding anthropogenic climate change, and who wish to apply their professional and academic expertise towards developing solutions – particular in the planning and policy arena. The course is divided into three parts – science, public policy, and planning. The first part of the course is the mechanisms of anthropogenic climate change, the development of the empirical foundation of the theory that humans are responsible for observed warming in the 20th and 21st centuries, alternative theories, and discussion of climate change in the public sphere. The second part investigates what policies have been and can be implemented to decrease greenhouse gas emissions and increase carbon sequestration, focusing on global agreements and on Israel's domestic policies. In the third part, students will explore the direct (e.g., food and energy systems) and indirect (e.g., population growth and consumption patterns) drivers of greenhouse gas emissions and consider how urban and regional planning can respond to this growing challenge. Finally, students will be tasked with proposing solutions to anthropogenic climate change through the lens of their disciplinary focus in a day long public 'climate solutions' forum.

COURSE GRADE

The course is highly interactive and thus a significant portion of the grade is designated to class participation. This includes attendance and participation in classroom activities and discussions (30%), and presentation of one research article (20%). The remaining portion of the grade (50%) is divided between 5 short quizzes on the lecture and reading material (5 * 10% each).

<i>Component</i>	<i>Percentage</i>	<i>Date</i>
Attendance/Participation	20%	Throughout course
Article presentation	20%	25 November
5 Quizzes	50%	2 Dec; 9 Dec; 16 Dec; 6 Jan; 20 Jan

COURSE READINGS

- Dessler, A.E. and E. A. Parson. 2019. The Science and Politics of Global Climate Change: A Guide to the Debate. Cambridge University Press. Cambridge, England.
- Other required readings are listed under the lecture date. Those readings are meant to be read prior to coming to class that day. Readings marked with *** are supplementary (optional readings).
- Videos and podcasts. Several of the readings are supplemented with videos and podcasts. Links are provided.

CLASS STRUCTURE

Introductory cartoon
Key concepts and terminology (10 minutes)
Topic #1 – lecture (35 minutes)
Break – 20 minutes
Topic #2 – (lecture 25 minutes)
Break – 15 minutes
Class activity/guest (35 minutes)
Meeting the author and closing remarks – 25 minutes

SYLLABUS

PART 1: THE SCIENCE OF CLIMATE CHANGE

11 November. Lecture 1: The Science (Part 1): Climate, carbon, and energy

- Topic 1: Course overview
- Topic #2: The scientific method and other sources of information
- In class exercise (*time permitting*): Criteria for assessing source reliability

Readings:

- *Dessler and Parson (Chapter 1)*

18 November. Lecture 2: The Science, Part II: Climate change, ancient and modern

- Topic #1: The sun, the atmosphere, and global carbon cycling (and other atmospheric gasses)
- Topic #2: Reconstructing climate histories, the industrial revolution and 20th century warming
- In class exercise (*time permitting*): Worksheet on Paleoclimate

Readings:

- *Dessler and Parson (Chapter 3, pp 65-97)*
- *Students choose a single article from [the list provided](#) on this site and prepare a 5 minute, 4 slide presentation for the class on the ideas presented in the article (instructions in the second tab of the linked file)*

*** IPCC 2021. *Paleoclimate In: Climate Change 2021: The Physical Science Basis. Technical Summary*. Pp. 45-52

25 November. Lecture 3: The Science, Part III – The state of knowledge, from the 1800s until today

- Topic #1: Historical development of the idea
- Topic #2: Alternative explanations
- In class exercise: Student presentations
- Meet the author: **Prof. Andrew Dessler**.

Readings:

- *Dessler and Parson (Chapter 3, pp 98-112)*
- *Selected historical readings (one per student)*

2 December. Lecture 4 (14 November): The Science, Part IV: Impacts of climate change

- Topic #1: Global impacts
 - Ecological and Hydrological
 - Economic and Political
- Topic #2: Spotlight on Israel and the Middle East
- Quiz #1

Readings:

- IPCC, 2021: *Summary for Policymakers*. In: *Climate Change 2021: The Physical Science Basis. Contribution of Working Group I to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change* [Masson-Delmotte, V., et al (eds.)]. Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA, pp. 3–32, doi:10.1017/9781009157896.001
- Drori, R., B. Ziv, H. Saaroni, A. Etkin, E. Sheffer. 2021. Recent changes in the rain regime over the Mediterranean climate region of Israel. *Climate Change*. 167:15.
- Listen: "[2020: A Year of Extremes](#)", *The Climate Question*, BBC

9 December. Lecture 5: The Science, Part V: Alternative theories, from science to the public discourse

- Topic #1: Alternative [scientific] explanations to 20th and 21st century warming
- Topic #2: Scientific discourse in and out of academia
- Quiz #2
- Meet the Author: Prof. Stephan Lewandowsky (unconfirmed)

Readings:

- Lewandowsky. 2021. *Climate Change Disinformation and How to Combat It*. *Annual Review of Public Health*. 42:1, 1-21
- Watch: [Fact vs. fake – Why don't we trust science anymore? Deutsche Welle](#).
- Watch: Shaviv, N. 2015. [Where the IPCC has Gone Wrong](#).
- *** Dessler and Parson (Chapter 2)
- *** Inhofe, Senator James. 2006. ["A Challenge to Journalists Who Cover Global Warming"](#) US

PART 2: CLIMATE CHANGE POLICY

16 December. Lecture 6: Policy, Part I: Israel and climate: Impact and policies

- Topic #1: Impact of climate change in Israel
- Topic #2: Israel's local and international policies
- Activity: Addressing policy makers and the public on climate change ("I oughta write a letter")
- Quiz #4
- Meet the author: **Prof. Alon Tal**.

Readings

- Tal, A. 2020. *Unkept Promises: Israel's Implementation of Its International Climate Change Commitments*. *Israel Journal of Foreign Affairs*.
- Tal, A. 2021. *Israel's Response to the Global Climate Crisis*, *Israel Journal of Foreign Affairs*, 15:3, 409-414
- *** Negev, M. et al. 2022. *Multidimensional hazards, vulnerabilities, and perceived risks regarding climate change and Covid-19 at the city level: An empirical study from Haifa, Israel*. *Urban Climate*. 43:101146

23 December. Lecture 7: Policy, Part II: International and Regional Politics and Policies on Climate Change

- Topic #1: International accords on climate change from Kyoto to Sharm el Sheikh
- Topic #2: Climate change and the business community
- Activity: The Politics of Climate Change Negotiations (*Role play*)
- Meet the author: Prof. Edward Parson (unconfirmed).

Readings:

- Dessler and Parsons, Chapter 4
- IPCC, 2007. *Climate change 2007: Mitigation. Contribution of Working group III to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change* [B. Metz, O. R. Davidson, P. R. Bosch, R. Dave, L. A. Meyer (eds)], Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA.

6 January. Lecture 8: Policy, Part III: Policy Approaches to Climate Change

- Topic #1: Philosophical approaches
 - Radical or reformist?
 - Market-based or regulatory?
- Topic #2: Mitigation, adaptation, and technological fixes
- Quiz #3

Readings:

- Dessler and Parson, Chapter 5
- Watch: (1) [The story of cap and trade](#) (2) [Yuval Noah Harari – the True Cost of Dealing with Climate Change](#)
- *** Fawzy, S., A. Osman, J. Doran, and D.W. Rooney. 2020. *Strategies for mitigation of climate change: a review*. *Environmental Chemistry Letters*. 18:2069-2094.

PART 3: PLANNING FOR CLIMATE CHANGE

13 January. Lecture 9: Planning I: Architecture and Urban Planning

- Topic #1: The sustainable, resilient city
- Topic #2: Architecture, urban planning, and Nature-Based Solutions
- Panel discussion (climate solutions): **Shiran Nadler-Realpe, Hatzav Yofe, Shany Barath**

Readings:

- Frantzeskaki et al. 2019. *Nature-Based Solutions for Urban Climate Change Adaptation: Linking Science, Policy, and Practice Communities for Evidence-Based Decision-Making*. *BioScience*. 69(6):455-466.

- Listen: “[Must our future be cast in concrete](#)” or “[What will it take for cities to go carbon neutral](#)” BBC podcast, *The Climate Question*
- *** Yoffe, H., K.H. Rankin, C. Bachmann, I.D. Posen, & S. Saxe. 2024. Mapping construction sector greenhouse gas emissions: a crucial step in sustainably meeting increasing housing demands. *Environmental Research: Infrastructure and Sustainability*. 4: 025006

20 January. Lecture 10: Planning, Part II: Population, Consumption, Technology

- Topic #1: Demographic change and carbon emissions
- Topic #2: Relative contributions of population growth, material consumption and technologies
- Meet the author: Prof. Niki Franzeskaki (unconfirmed).
- Meet the author: Prof. Brian O’Neill (unconfirmed).
- Quiz #5

Readings:

- Bongaarts, J. and B.C. O’Neill. 2018. Global warming policy: Is population left out in the cold? *Science*. 361(6403):650-652
- Listen: “[What role is overpopulation playing in the climate crisis](#)” BBC podcast, *The Climate Question*
- *** Dodson, J.C. et al. 2020. Population growth and climate change: Addressing the overlooked threat multiplier. *Science of the Total Environment*. 748:141346.
- *** O’Neill, B. 2000. Cairo and Climate Change: A Win-Win Opportunity. *Global Environmental Change*. 10(2):93-96.

27 January. Lecture 11: Planning, Part III: Energy, Food, and Transportation

- Topic #1: Food systems (Guest: **Dr. Dina Safina**)
- Topic #2: The transportation sector
- Topic #3: The energy sector
- In class exercise: Energy for Israel debate (and questionnaire)
- Meet the author: Prof. Edgar Hertwich (unconfirmed).

Readings

- Hertwich, E.G., T. Gibon, E.A. Bouman, et al. 2015. Integrated life-cycle assessment of electricity-supply scenarios confirms global environmental benefits of low-carbon technologies. *PNAS*. 112(20):6277-6282
- Watch: Michael Shellenberger, [Why Renewables Can’t Save the Planet](#)
- Listen: “[Why is Asia embracing nuclear power](#)”, BBC podcast, *The Climate Question*.
- *** Pehl et al. 2017. Understanding future emissions from low-carbon power systems by integration of life-cycle assessment and integrated energy modelling. *Nature Energy*. 2:939-945

3 February. Lecture 12: Planning, Part IV: Bringing it all home

- Topic #1: Individual responsibility (guest lecturer: **Dr. Alik Pelman**)
- Topic #2: Responsibilities of institutions (guest lecturer: **Orly Mulla**)
- Concluding discussion: What are we going to do about it?

Readings:

- Lowrey, A. 2020. [All That Performative Environmentalism Adds Up](#). *The Atlantic*.
- Schendler, A. 2021. [Worrying About Your Carbon Footprint Is Exactly What Big Oil Wants You to Do](#). *New York Times*.
- Watch: [Can YOU fix Climate Change?](#) (Kurzgesagt – In a Nutshell)