Preventing Human Extinction

THINK 65 — Spring 2020

Lecture location	Zoom via Canvas
Lecture time	Spring Quarter 2020, Mondays and Wednesdays, 12:30 PM to 1:20 PM
Units	4, with 2 weekly discussion sections

Instructors

Prof. Paul Edwards

Virtual office Hours — Tuesdays 2:30-3:30 by Zoom, or by email appointment: pedwards@stanford.edu

Prof. Steve Luby

Office Hours — Fridays 4PM - 5PM by Zoom or by appointment: sluby@stanford.edu

Thinking Matters Fellows (note that all times are in PDT)

Dr. Kristyn Hara	**Section 02: MW, 2:30-3:20 pm** **Section 03: MW, 3:30-4:20 pm**
Virtual Office Hours	By appointment
Email	krishara@stanford.edu
Dr. Jennifer Greenburg	**Section 04: MW, 2:30-3:20 pm**
Virtual Office Hours	By appointment
Email	jennifer_greenburg@stanford.edu
Dr. Lexi Neame	**Section 05: TTh, 12:00-12:50 pm** **Section 06: TTh, 1:30-2:20 pm**
Virtual Office Hours	By appointment
Email	neame@stanford.edu
Dr. Jonathan Tang	**Section 08: TTh, 10:30-11:20 am**
Virtual Office Hours	By Appointment
Email	jmtang1@stanford.edu
Dr. Alison Laurence	**Section 09: TTh, 12:00-12:50 pm**
Virtual Office Hours	By Appointment
Email	alaurenc@stanford.edu

COURSE DESCRIPTION

99.9% of all species that have ever inhabited Earth are now extinct. Yet the subject poses deeply disturbing implications for the only species that can anticipate its own demise, namely we ourselves. This course will explore several plausible scenarios by which human extinction (or near-extinction) could occur within the next 100 years. We'll study the psychological, social,

and epistemological barriers that frequently derail efforts to avert these catastrophes. We will explore approaches to assessing these risks, strategies that could reduce them, and better ways to think and act as we move toward an uncertain future. Students will engage these issues through academic reading, apocalyptic fiction, group discussion, writing, and role-playing. We will consider the role of human agency in the evolution of these risks and their prevention, and our responsibilities as 21st-century citizens.

LEARNING GOALS FOR THINKING MATTERS

Students in *Thinking Matters* courses will:

- Develop a sense for what a genuine question or problem is, and what it means to think about an important idea with the sort of disciplined, creative, and critical reasoning characteristic of a university-trained mind.
- Develop broad, transportable skills that are required in (almost) any branch of university work, including: analytical, expository writing; careful, critical reading; analytical and critical reasoning; and capacities for effective oral communication including active listening and responsive discussion.

COURSE-SPECIFIC GOALS

By the end of the quarter, students will have confronted several major phenomena that could result in imminent human extinction or near-extinction. They will understand the historical, social, scientific and technical processes that underlie these threats. They will appreciate the uncertainty in forecasting specific events, as well as the human cognitive processes, habits of mind, and socio-political forces that undermine serious consideration of these risks. They will have considered strategies to mitigate these risks and be able to reflect critically on the advantages and disadvantages of various courses of action. This course will develop historical thinking skills, meta-level assessment of sources, and validity of cognition and scientific analysis.

Ways of Thinking/Ways of Doing Breadth Requirement

This course satisfies the following WAYS requirement areas

- Scientific Method and Analysis (SMA)
- Social Inquiry (SI)

COURSE MATERIALS

Required texts

- Kahneman, D. 2011. *Thinking, Fast and Slow.* New York: Macmillan.
- Tegmark, M. 2017. *Life 3.0: Being Human in the Age of Artificial Intelligence.* New York: Vintage.

During the covid-19 crisis period, libraries and bookstores are closed, but both texts are available online. The Kindle edition or a used copy of either text can be purchased from Amazon for about $12.00. Kindle readers exist for most smartphones, tablets, and computers; you need not own a Kindle device. We will also be making the assigned portions of these texts available on Canvas if you are unable to acquire a digital version.

Assigned readings

Articles, chapters, and videos listed under the "Assigned Readings" column of the course schedule are available online with their titles hyperlinked. This will lead to the item (a) in SUL's electronic collection; (b) as a resource found on the web; or most often (c) on the course Canvas site. If you are off campus and you encounter a "paywall," there are several ways to gain access. The library offers instructions here. A simple solution is to enter the following prefix before the URL of the item: https://stanford.idm.oclc.org/login?url= (with no space between the prefix and the item's URL). You can also search for the article using the SUL's Articles+ service or look for them (listed by author) in the Files folder of the Canvas course site. Contact Alison Laurence if you are unable to resolve challenges in accessing assigned readings even after trying pretty hard.

Third-party software policy

Course assignments may make use of third-party software (i.e. web applications that are not on Stanford's servers). For privacy reasons, students have the option to alternatively use a Stanford-protected system (e.g. email or Canvas) to complete such assignments rather than use the third-party software.

FERPA: Student Record Privacy Policy

http://studentaffairs.stanford.edu/registrar/students/ferpa

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Course Evaluation

1. Lecture attendance	10%
2. Section attendance & participation	30%
3. Written assignments	60%
Total	100%

Also, see attendance and deadline expectations below.

A	93%-100%
A-	90%-92%
B+	87%-89%
B	83%-86%
B-	80%-82%
C+	77%-79%
C	73%-76%
C-	70%-72%
D+	67%-69%
D	63%-66%
D-	60%-62%
NP	0%-59%

Attendance Policy

Attendance will be taken at each lecture and section class. In extenuating circumstances, such as a medical or personal emergency, or university-related travel, students' absences will be excused. Where possible, students should notify their Section Leader in advance. In the case of missed sections, Teaching Fellows may assign make-up work. A second option is to attend another section (see ExploreCourses) during the same week by contacting that section's leader and your section leader at least twenty-four hours in advance to seek permission to attend and gather any instructions for the session. After attending the section, email **both** section leaders to confirm your attendance. Dropping into another section unannounced is not acceptable. Please note that more than 2 unexcused absences from section will result in a drop in one letter grade of your total grade in the course.

1. Lecture Attendance

Date due: Ongoing. Grade 10%

Thinking Matters lectures are mandatory. Lectures in this course make some use of course readings, but they also cover a great deal of other material. Now that the course has moved to an online format, you will have the opportunity to participate live, if your schedule permits. If you can't, you will need to watch the recorded lecture. Both live participants and those watching the recording will need to take a short quiz on Canvas after each lecture, which should be completed before the date of the next lecture. .

2. Section Attendance and Participation

Date due: Ongoing. Grade: 30%

Thinking Matters courses encourage vigorous intellectual exchange, the expression of various viewpoints, and the ability to speak effectively and cogently. As with the lectures, we will offer the opportunity to participate live, but we will also offer alternative modes for those unable to

make the scheduled meeting. As part of the participation grade, teaching fellows may assign activities and written assignments such as individual or group presentations, online forum entries, reading responses, lecture summaries, problem sets, debates, etc.

3. Written Assignments

Writing assignments will be sequential phases of a single, term-length project. Details will be distributed in a separate document. Due dates TBA. Grade: 60%

Completion of all major graded assignments is required for students to satisfy the Thinking Matters requirement. Students will complete writing assignments in phases that include peer review and responding to instructor feedback over the course of the term.

Assignment Deadlines
Deadlines are designed to help students, section leaders, and professors pace their work and allow time for feedback and revision. Students are expected to submit assignments by the deadline date at 5pm and to have completed assigned readings before their scheduled section, unless other instructions are given. Grades for work submitted after the deadline will be reduced by 1.5% of course grade per day, unless otherwise arranged with the Section Leader. Submit all make-up work to your Section Leader.

The Honor Code
Violating the Honor Code is a serious offense, even when the violation is unintentional. The Honor Code is available here. Students are responsible for understanding the University rules regarding academic integrity. In brief, conduct prohibited by the Honor Code includes all forms of academic dishonesty, among them copying from another's exam, unpermitted collaboration, and representing as one's own work the work of another. If students have any questions about these matters, they should contact their teaching fellow.

Students with Documented Disabilities
Students who may need an academic accommodation based on the impact of a disability **must initiate** the request with the Office of Accessible Education (OAE). Professional staff will evaluate the request with required documentation, recommend reasonable accommodations, and prepare an Accommodation Letter for faculty dated in the current quarter in which the request is being made. Students should contact the OAE as soon as possible since timely notice is needed to coordinate accommodations. The OAE is located at 563 Salvatierra Walk (phone: 723-1066, URL: http://oae.stanford.edu).

COURSE SCHEDULE

UNIT	DATE	FOCUS	ASSIGNED READINGS
Thinking about existential threats Steve Luby Paul Edwards	Week 1 M, 4/06	Approaching existential threats • Overview of the course • ·Scenarios for 2100 • Exponential technology development	Before coming to the very first class, please read the following brief pieces: □ The THINK65 syllabus (this very document). □ Hughes, J. 2008 "Millennial tendencies in responses to apocalyptic threats." Chapter 4 in Nick Bostrom and Milan M. Ćirković, eds., *Global Catastrophic Risks*, 73-85
Thinking about existential threats Paul Edwards	Week 1 W, 4/08	Wicked problems • No easy or permanent solutions • Obstacles to clear thinking • Leadership really matters • A framework for this course	□ Waddock, S. 2013. "The Wicked Problems of Global Sustainability Need Wicked (Good) Leaders and Wicked (Good) Collaborative Solutions." *Journal of Management for Global Sustainability* 1: 91–111
TUTORIAL #1	Week 2	Consultation with your Section Leader	
Global pandemics Steve Luby	Week 2 M, 4/13	Infectious disease risks • Impact of infectious diseases on human history • Genetic basis of ongoing risk • Troubling natural scenarios	□ Humphreys, M. 2018. "The influenza of 1918: Evolutionary perspectives in a historical context." *Evolution, Medicine, and Public Health* [2018] pp. 219–229 □ Quammen, David. *Spillover: Animal Infections and the Next Human Pandemic*. (pp. 289-298). Chapter 62 & 63 □ Kamiya G. 2015. "A city of masks: When the flu tore through San Francisco" San Francisco Chronicle.
Global pandemics Steve Luby	Week 2 W, 4/15	Synthetic biology risks • Synthetic biology breakthroughs • Scenarios of concern • How might we counteract low-cost, widely available threats?	□ Kupferschmidt K., "How Canadian researchers reconstituted an extinct poxvirus for $100,000 using mail-order DNA." *Science Magazine* July 6, 2017 □ Baumgaertner E. "As DIY gene editing gains popularity, 'Someone is going to get hurt'" *New York Times* May 14, 2018.
Nuclear war Paul Edwards	Week 3 M, 4/20	Nuclear weapons, the Cold War, and nuclear winter • Nuclear weapons: history, dangers • Deterrence, then and now • Prisoner's Dilemma and game theory • Nuclear winter	□ Future of Life Institute (2016), "Accidental Nuclear War: A Timeline of Close Calls." Best viewed in full-screen mode. Please read all entries — and note that the timeline continues through 2016. □ Robock, A., and O. B. Toon. 2012. "Self-Assured Destruction: The Climate Impacts of Nuclear War." *Bulletin of the Atomic Scientists* 68 (5): 66–74 □ Trust and arms control & Prisoner's Dilemma activity, Davis Center for Russian and Eurasian Studies, Harvard University. Read the short text on this page first. Then watch both videos (about 10 minutes total) □ Bradbury, R. (1950) "There Will Come Soft Rains," *Collier's*
Nuclear war Paul Edwards	Week 3 W, 4/22	Arms control, non-proliferation treaties, and enforcement issues • Will deterrence always work? • Arms control agreements • The non-proliferation treaty • Post-Soviet denuclearization • Current and future threats	□ Council on Foreign Relations, US-Russia Nuclear Arms Control, 1949-2010. This is only a brief timeline of key moments; not everything important is here. □ Commander Robert Green (2017) "The insanity of nuclear deterrence" (video, 20 minutes) □ Obama White House Archives (2017) "FACT SHEET: The Prague Nuclear Agenda." □ Tannenwald, N. (2018) "How Strong is the Nuclear Taboo Today?" *The Washington Quarterly* 41(3): 89-109

Assignment 1 (Annotated Bibliography) DUE April 26 by 11:59 pm on Canvas			
Planetary boundaries: environmental destruction Paul Edwards	Week 4 M, 4/27	Planetary boundaries • Limits to Earth's carrying capacity • Climate change • Ocean acidification • Phosphorous • Fresh water	□ Foley, J. 2010. "Boundaries for a Healthy Planet." *Scientific American* 302 (4): 54–57 □ Intergovernmental Panel on Climate Change. (2018). *IPCC Special Report "Global Warming of 1.5°C" — Summary for Teachers.* Read pp. 7-22. Ignore the "School Activity" sections; just read the body text. The full report is here, but the Summary for Teachers is more clearly presented. □ Scranton, Roy. 2013. "Learning How to Die in the Anthropocene," *The Stone* (*New York Times* forum)
Planetary boundaries: environmental destruction Paul Edwards	Week 4 W, 4/29	Coping with climate change • Super wicked problems • An urgent present vs. an urgent future • Powers and limits of law • Powers and limits of international agreements • Adapting to climate change	□ Levin, K., B. Cashore, S. Bernstein, and G. Auld. 2012. "Overcoming the Tragedy of Super Wicked Problems: Constraining Our Future Selves to Ameliorate Global Climate Change." *Policy Sciences* 45 (2): 123–52 □ Hecht, Gabrielle (2018) "The African Anthropocene," *Aeon* □ Haff, P. K. (2014) "Technology as a Geological Phenomenon," in *A Stratigraphical Basis for the Anthropocene*. □ RECOMMENDED: Haff, P. K. (2014) "Humans and Technology in the Anthropocene," *The Anthropocene Review*, 1-11. □ RECOMMENDED: Edwards and Hecht (2016) "Taking on the Technosphere: A Kitchen Debate," *Technosphere Magazine*.
Artificial intelligence Steve Luby	Week 5 M, 5/04	Prospects for narrow, general and super artificial intelligence • Risks from narrow artificial intelligence • Prospects for artificial general intelligence • Can an artificial intelligence have goals? • Pathway to artificial super-intelligence	□ Piper, K. "Death by algorithm: the age of killer robots is closer than you think. *Vox*. 2019. □ Kania E. China's ambition in artificial intelligence: A challenge to the future of democracy? *Power 3.0* 2018. Best accessed online (because of informative links)
Cognitive biases in thinking about extinction Steve Luby	Week 5 W, 5/06	Why don't we take extinction scenarios more seriously? • Human disposition to availability, optimism, and short-term bias • Implications for existential risks • How might we address existential risk in the face of these biases?	□ Sunstein C. "The availability heuristic, intuitive cost-benefit analysis, and climate change." *Climatic Change* (2006) 77: 195–210.Students may find the whole article informative, but at a minimum to prepare for the discussion section, the students should read part 3, 'The Availability Heuristic', pp 197 – 203 □ Bulley A. "Prospection and the Present Moment" Review of General Psychology (2016) 20: 29-47. Read pages 33 - 34 "The role of Episodic Foresight in Modifying Intertemporal Choice:"
Assignment 2 (Pathway + Obstacles Essay) DUE May 10 by 11:59pm on Canvas			
Artificial Intelligence Steve Luby	Week 6 M, 5/11	Prospects and pitfalls in shaping an emerging artificial super-intelligence • Potential outcomes of an artificial super-intelligence • Myths about artificial super-intelligence • Limited opportunity to learn from experience with artificial super-intelligence • What to do?	□ Tegmark, M. (2017) *Life 3.0: Being Human in the Age of Artificial Intelligence.* Vintage • Prelude: The tale of the Omega team • Chapter 4: Totalitarianism & Prometheus takes over the world

Cognitive biases in thinking about extinction Steve Luby Paul Edwards	Week 6 W, 5/13	The hard problem of forecasting • Profound epistemological uncertainty • Cognitive biases that impair sound forecasting • Planning amongst these constraints	□ Kahneman D. "The Engine of Capitalism," Ch. 24. *Thinking, Fast and Slow* □ Kahneman D. "The Illusion of Understanding," Ch. 19. *Thinking, Fast and Slow*
TUTORIAL #2	Week 7	Small-group peer review meetings with your Section Leader	
Complex adaptive systems, path dependence, and silver buckshot Paul Edwards	Week 7 M, 5/18	Complex adaptive systems, path dependence, and large-scale, long-term problems • Dynamics of complex systems • Path dependence • Identifying key strategic interventions • Role of individual behavioral change	□ Liu et al. 2015. "Systems Integration for Global Sustainability." *Science* 347 (6225): 1258832-1-9 □ Weber, E. U. 2015. "Climate Change Demands Behavioral Change: What Are the Challenges?" *Social Research: An International Quarterly* 82 (3): 561–80
Complex adaptive systems, path dependence, and silver buckshot Paul Edwards	Week 7 W, 5/20	Silver buckshot, design thinking, and social entrepreneurship • Silver bullets vs. silver buckshot • Finding levers that are "easy to pull, hard to reverse" • Thinking differently about design	□ Cashore, B. (2015) "Paris Could Be Different: But it Requires Policy Makers Apply Path Dependency Analysis to the 'Super Wicked Problem' of Climate Change," Yale University Macmillan Center. □ Project Drawdown (2018), Solutions. Read the top 10 solutions to climate change (click links), including their technical summaries. (They're probably not what you think.) Each one is brief. Videos about some solutions are available on the home page. □ Austin Center for Design (2018), Section One: An Introduction to Wicked Problems (only), *Wicked Problems: Problems Worth Solving* (open access book). Only a little of this repeats what you have already read.
NO CLASS	Week 8 M, 5/25	Memorial Day holiday	
Addressing existential threats Steve Luby	Week 8 M, 5/27	Should we try to prevent human extinction? • the long term future of planet earth and the universe • does it matter if humans go extinct sooner rather than later?	□ Frank, Adam (2018) "Earth will survive. We may not" *New York Times* □ Scheffler, Samuel. "The Importance of the Afterlife," *New York Times* □ Matheny J. "Reducing the risk of human extinction." *Risk Analysis,* 2007; 27(5):1335-1344 □ Mirsky S. "An earth without people." *Scientific American*. July 2007 pp. 76 – 81
Assignment 3 (Revision Memo & Final Paper Outline) DUE by May 24 at 11:59 pm on Canvas			
TUTORIAL #3	Week 9	Consultation with your Section Leader	
Addressing existential threats Steve Luby	Week 9 M, 6/01	Rendering daunting problems tractable • Can we influence the trajectory of the human future? • What is our experience addressing complex system problems?	□ Metlay D, Sarewitz D." Decision strategies for addressing complex, "messy" problems". The Bridge, Fall 2012, p. 6 - 16. □ Ostrom, Elinor. "Polycentric systems for coping with collective action and global environmental change." *Global Environmental Change* 20 (2010) 550–557

From thinking to action Steve Luby Paul Edwards	Week 9 W, 6/03	Promoting resilience against multiple threats • Silver buckshot, again • No-regrets solutions and easy fixes • Adapting to the inevitable	□ Maher T, Baum S. (2013) "Adaptation to and Recovery from Global Catastrophe." *Sustainability* 5(4), 1461-1479 □ Olano, M. V. (2020) A Global Pandemic & A Climate Crisis: Eerily Similar Impacts with Starkly Different Responses, ClimateXChange (a Boston-based NGO) □ Hill, A. and Martinez-Diaz, L. (2020) Adapt or Perish: Preparing for the Inescapable Effects of Climate Change, *Foreign Affairs* 99 (1), 107-117.
Michaela Bronstein	Week 10 M, 6/08	Stories: How Narrative Makes Us Think the Unthinkable	□ Millet, Lydia (2011) "Zoogoing," in Martin, M. (ed.) *I'm with the Bears: Short Stories from a Damaged Planet* (Verso) □"The Siphoners" David Mitchell □"Time Capsule Found on a Dead Planet", Margaret Atwood.
From thinking to action Paul Edwards Steve Luby	Week 10 W, 6/10	Personal pathways • Many potential pathways • Matters for creative choice	
Final Paper DUE by June 12 at 11:59 pm on Canvas			