



The Future of Climate Education at Harvard University

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Report process and timeline

Charge to the Committee on Climate Education from Vice Provost for Climate and Sustainability

Climate change is already posing profound challenges to human and social systems, and the damages from climate change will only get worse. Confronting these challenges will require remaking the global energy system and addressing the harmful consequences of climate change to human societies and ecosystems, only some of which are known. A Harvard education must prepare its students for leadership in a world with a changing climate.

The Committee on Climate Education at Harvard will answer two sets of questions.

1. What should climate education at Harvard look like in 2030, and what are the implications of this vision for undergraduate, professional, and doctoral education at Harvard? Although the answers to these questions will differ by School, climate change spans School professional and disciplinary boundaries and so could Harvard's climate educational offerings. And because Harvard has both an opportunity and a responsibility to educate more broadly on campus, this vision should include both on-campus learning and programs and potential online offerings that would be more broadly available.
2. What are priorities for initial steps that can be taken, either by the Schools or at the University level with modest additional resources, to improve climate education at Harvard in the short run?

Membership:

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Jerold Kayden, Professor of Urban Planning and Design, Harvard Graduate School of Design

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Karen Thornber, Harry Tuchman Levin Professor in Literature and Professor of East Asian Languages and Civilizations

Dustin Tingley, Professor of Government, Contin Ed/Spec Prog Instructor, Deputy Vice Provost for Advances in Learning, Faculty of Arts & Sciences (co-chair)

Gunnar Trumbull, Professor of Business Administration, Harvard Business School

Lindi von Mutius, Director, Graduate Sustainability Program and Global Development Practice, DCE

Courtney Ackerman, Project Manager, Office of the Provost (staff)

Committee Co-chair Meetings

The committee co-chairs met with many existing Harvard groups who were recommended to the committee, or who the committee believed to be essential to this work, though some groups were inevitably missed, unintentionally.

Thanks to the broad network of faculty committee members, the co-chairs entrusted the School or academic discipline-based subcommittees to connect with relevant groups in their home Schools/units. The core committee's focus was then directed towards the spaces in between: the existing University-wide climate and sustainability efforts, non-School based departments, and programs that support the vibrant student community both in and out of the classroom.

Once a relevant group was identified, the core committee met with the group lead to share the mission and charge of the committee and to brainstorm on ways that said group could contribute to this report. The committee co-chairs developed a rubric that would provide a cohesive structure to all group memo submissions and ensure consistency. Each group was given approximately one month to conduct research and bring stakeholders into the conversation before submitting their final memo.



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The committee chairs also held meetings with:

Harvard College Residential and Academic Leadership - Rakesh Khurana, Katie O'Dair, Amanda Claybaugh

Office for the Arts and Harvard Art Museums - Jack Megan and Laura Muir

Harvard Athletics - Erin McDermott, Nathan Fry, Duane Reeves

Harvard College Undergraduate Council Leadership: Michael Y. Cheng '22, Emmett de Kanter '24

Harvard Sustainability co-chairs: Jody Freeman, Mike Toffel

Council of Student Sustainability Leaders - Angela Zhong, Sophia Zhou '24, Social Studies

FAS Government Department students

Robert Newman '23, Mechanical Engineering and Material Sciences

Navin Durbhakula '25, Special Concentration in Enviro and Mindfulness

Expository Writing Program - Tom Jehn, Karen Heath, Tad Davies, Jim Engell

Harvard Alumni for Climate and the Environment (HACE) - Sanjay Seth, Daniel Bicknell

Harvard Extension School Sustainability Graduate Program - Lindi von Mutius

[The Harvard Gazette](#) - Gray Milkowski

[Office for Sustainability](#) - David Havelick

Report Rubric for Committee on Climate Education at Harvard

Below we list a potential structure with three sections and an appendix. Within each section we list some questions for you to consider. You do not need to answer the questions line by line; these questions are just suggestions to get you started.

We expect memos to be around 3-5 pages.

Current state of play

- What is the current state of climate education in your community at Harvard? This can range from courses, to workshops and seminar series, to other, perhaps more informal, learning communities?
- Are there any dead ends or lessons learned from prior efforts?

Shorter term/actionable opportunities

2. What are the most important opportunities to expand climate education in your community at Harvard?
3. Why might students be excited about these opportunities? How will it enhance your field/school?
4. What is the curricular and/or programmatic problem(s) that stand in the way of achieving your vision?
5. What might an implementation strategy roughly look like?
6. What sorts of resources could help achieve your goals?
7. Who are the stakeholders/partners at Harvard and beyond that can facilitate?
8. How does this connect with aspirations and opportunities at other Harvard schools, and beyond?
9. What role could digital resources play, if any?

Longer term/less constrained (resources/institutional) opportunities



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- What should climate education at Harvard look like in 2030?
- Why might the students of the future be excited about this vision?
- Are there refinements or changes to Harvard's institutional structure that would facilitate this vision?
- Who are the stakeholders/partners at Harvard and beyond that can facilitate such a transformation?
- What role could digital resources play, if any?

Implementation and Barriers

- What would you need in order to accomplish these goals?
- What barriers do you envision coming up against? i.e. Regulatory culture, internal culture, resources.

Appendix

- 1) Audiences consulted: relevant administrators, faculty, students.
- 2) Relevant activities at other educational institutions/professional associations in your field/school, broadly defined.

Timeline for Climate Education Committee

The following timeline was provided to the committee at the outset of the semester. We leveraged a private Microsoft Teams channel to share materials within the committee. The co-chairs and project manager collaborated to draft and distribute weekly email newsletter updates to ensure the full committee was informed of the timeline, deliverables, successes, and major milestones.

January 20, 2022 – Kickoff Meeting

- [Initial individual charge](#): Brainstorm with your subgroups and devise a plan to speak with your community. We encourage you to [keep track](#) of your engagement with notes, suggestions, ideas, and who you spoke with via the linked Qualtrics form (you can also email your notes to Courtney).
- Suggested timeline for the next 6 weeks:
 - **January 20 – January 28** – Initiate outreach to the administrative dean(s) at your School
 - **January 31 – February 18** – Initiate outreach to faculty in your School
 - **February 21 – March 4** – Focus groups/student input

March 7, 2022 – First Round of Informal Notes Due

- Finalize discussions within your community and submit notes to Courtney by EOD.

March 15, 2022 – First Round of Notes Shared

- Dustin and Missy will circulate a compilation of notes received from all committee members.

April 5, 2022 – Second Full Committee Meeting 1:00 – 2:00pm

April 12, 2022 – First Draft of School-Level Memos Circulated

- Committee members should refer to the report rubric for guidance on memo structure.

April 26, 2022 – Final School-Level Memos Due

May 10, 2022 – First Draft of Report from Dustin and Missy

- Feedback shared



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May 17, 2022 – Final Meeting/Presentation 12:00 – 1:00pm

- Full committee meeting for plenary discussion and presentation.

May 23, 2022 – Final Draft of Report Due to Jim Stock

University-wide survey

The committee designed a survey that contained a set of common questions as well as school specific questions. A [Harvard Gazette](#) article introduced the survey to the Harvard community. The survey received close to 1000 responses and informed the University and school level reports.

Committee on Climate Education sub-Committee reports ([Group memo Appendices](#))

Harvard Business School

Authors: Bharat Anand, Shawn Cole, Forest Reinhart, Gunnar Trumbull, Lynn Schenk

Current State of Play

Harvard Business School's "Business and Environment Initiative" aims to drive, aggregate, and amplify the School's activities on climate change. Towards that end, the BEI keeps close track of climate-related activities at the School and regularly engages with key stakeholders including students, faculty, staff (including career and professional development and external relations), alumni, and, increasingly, similar communities across Harvard. This engagement provides the basis for information in this report.

The current state of climate education at HBS is generally strong, with an increasing eye towards improvement and greater amplification, especially with the ambition to reach a wider audience. HBS intentionally leverages a number of its unique assets to support climate education, such as case studies and other publications, second year elective courses, Short Intensive Programs (SIPs) for MBAs, independent student projects, student-alumni mentorship connections, high profile alumni convenings, and the Climate Rising Podcast.

Some basic statistics include:

HBS Teaching on Business and Environment

In the Classroom: AY 2021-22:

- Some integration into required first-year curriculum, with a few cases with a primary focus on climate change;
- **11** elective second-year courses with primary focus on Business and Environment topics, (including partial or exclusive focus on climate change, as outlined in **appendix 1**);
- **15** additional elective courses with Business & Environment content



Student and Alumni Engagement

- **875+ (~50%)** MBA Students have included Business & Environment in their list of interests (in Class Cards)
- **100+** Student Alumni Connections through mentorship programs, annually
- **500+ (~25%)** Students engaged in climate-related clubs (Energy & Environment, Sustainability, Food Ag and Water, HU Sustainability, HU Circular Economy Symposium, NucleateEco)
- **50+** Alumni *actively* participating as webinar, conference, or career panelists, or as case protagonists or class guests on climate-related topics.
- **8,000+** Alumni reached through BEI blog, newsletter and/or LinkedIn and alumni programming

While the numbers reached are large, given the complexity and magnitude of the climate problem, the School *must* continuously strive to do more. Faculty and staff are working to strengthen topical research workstreams and efforts around **decarbonization, resilience and adaptation, climate finance, and entrepreneurship and innovation.**

This work includes:

- **Developing more efficient and far-reaching curriculum delivery mechanisms:** A significant effort to develop greater and more efficient online course development capability, as well as data-driven labs in partnership with the digital transformation efforts underway at HBS (currently known as “D3”).
- **Embedding climate change into core management curriculum and developing more in depth and specialized offerings:** Faculty are in ongoing discussions about including more content on climate education in the required core curriculum (RC) in a specific, focused effort, to cover risk management, valuation, and managerial decision-making processes that take climate change into account. Faculty continue to grow the offerings in the second year Elective Curriculum (EC), as well as increase supports for climate entrepreneurs.

HBS leadership and faculty recognize **the power of collaboration across Harvard** on this complex topic; the sections that follow are in that spirit.

Shorter Term/Actionable Opportunities

Climate Change is a multi-stakeholder, multi-sectoral, and multi-disciplinary problem. The most powerful and effective vision for curriculum in 2030 is one that reflects the multi-faceted nature of the climate challenge and therefore is one that is deeply collaborative across schools, taking advantage of each schools’ specific competencies and expertise. The HBS climate curriculum committee group’s recommendations therefore focus on curriculum activities that meet the following criteria:

- Involve at least two schools;
- Have potential to reach an audience beyond the Harvard student community; and
- Are “living” and constantly adapted and updated (i.e. are not static).

Below, we identify some key, and perhaps immediate, building-block projects that can help advance curriculum goals for HU schools overall. We recognize that these suggestions have no specific “owners” at this stage.

1. **Co-development of scalable, multi-disciplinary teaching material and delivery mechanisms** that reach an audience beyond (yet inclusive of) the HU student community. These efforts will leverage existing HBS + HU strength in building teaching materials, as well as our ability to deliver content to a diverse set of audiences, through a



variety of channels, and building on areas of strength, particularly digital ones. It is important to note that these efforts *truly* require a cross-university effort because they are all time, research and expertise intensive.

- a. **Online multi-disciplinary courses** with modules taught by faculty from different schools, tied together with a cohesive thread.
 - i. There is momentum for this already, we propose to build on that.
 - ii. There are a few viable platform delivery options, including, HBSOnline, and a new HarvardOnline platform being built in partnership between HBS, VPAL, and HUIT.

- b. **The creation and compilation of simulation exercises with real-world climate issues** that create engaging, immersive learning experiences and use the strengths across all Harvard schools (e.g., business, design, policy, law, public health, education, history and humanities) to educate and empower students to solve difficult problems. A working group might identify a few key general examples that draw on the various disciplines, and partner with existing groups and infrastructure at HU (e.g., the Program on Negotiations) to develop a series of simulations usable by a range of academic and organizational audiences. Some examples could include:
 - i. A city or state facing certainty of climate perils (heat, drought, flooding) – how to protect citizens; how to incorporate topics of environmental justice, business negotiations, policies, community engagement, and design
 - ii. Simulations across sectors, locations, topics that address environmental justice specifically.
 - iii. Rebuilding assets like HWY 1 in CA, which assets to protect and how
 - iv. City of Lagos 30 million people, facing tremendous flood risk, waste and sewage management challenges.
 - v. Bangladesh and migration, examining local plans to adapt, global plans to absorb climate refugees, in the context of global policies on adaptation, etc.
 - vi. A corporate board vote on a particular issue, with various shareholder and public perspectives weighing in.

- c. **Increase development and marketing of climate-focused modules and course materials on HBP** and other educational materials platforms in our domain. HBS owns this asset with massive global reach to educators across disciplines. This effort, already underway between HBS BEI and HBP can significantly influence how climate change is incorporated in management and other education across the world. Other HU schools should find a home for their teaching materials in HBP and can help maximize the reach and impact of these materials. With this platform we can contextualize, advertise, and disseminate climate-related teaching materials globally. Leveraging the HBP platform has massive potential impact not only for management education but for higher education in general.



2. **Development of a Climate Course: Experimentation and/or a building block approach.** There are two possible approaches to answering the question of what a proper, effective climate change course looks like. The goal of these ideas around climate courses is not only to educate students specifically interested in climate change, but also to provide a range of opportunities for students of multiple disciplines to discover how climate change impacts their present and future, regardless of occupation or field of study:
 - a. **Experimentation:** launch a course immediately that would provide a test platform for climate teaching material, and targeting a university-wide audience. The platform would allow us to slot in new ideas and materials and see how they work in practice. As a side benefit, it would be a practical forum for colleagues across schools and disciplines to engage on climate change classroom content.
 - b. **Building-block approach:** Focus on a series – many short-courses (like the SIPs at HBS in January), shorter-form modules, topical lecture series, and convenings – with multiple schools to develop a set of building blocks that can be more readily assembled into more bespoke courses and that educate participants in the HU community and beyond in the near-term. Note there is already a Harvard series in the works that could serve as a foundation.
3. **Drive intentional, curated, cross-registration strategies.** This includes two parts:
 - a. **Formally study the barriers:** What are the barriers to cross-registration? How can they be removed?
 - b. **Identify topic-based clusters of courses across schools** to drive students to pursue a multi-school portfolio of courses in an elective year.
 - i. For example, could SEAS, HKS, HBS (and other!) identify courses from each school focused on energy transition, “package” it for students, and also actively attempt to remove barriers identified in step a above, in order to leverage the strength of a multi-school approach to a critical topic in a coordinated fashion? This approach maximizes the opportunity to draw on the unique excellence of each school and to provide a targeted, multidisciplinary approach to a specific topic.
 - ii. Barriers identified in 3a above will need to then be removed to enable cross-registration for these clusters.
4. **Expand learning opportunities from Harvard as Living Lab, leveraging HBS (and other HU) alumni, encouraging cross-student interaction and student-alumni interaction**
 - a. Develop of project teams for real projects, either local or connected to alumni clubs or HBS Global research centers, including HU alumni that involve students from each school, including the College. For example, electric school bus implementation in Boston, Cambridge and other cities. HBS alumni are keen to identify and lead and consult on projects that have real, direct impact. BEI can identify alums for this purpose.
 - b. Study whether more case studies and other teaching materials, and podcast episodes (like the April 6 2022 episode on Harvard’s offsets plan) could be developed to reflect Harvard’s own journey, and used directly in the classroom.



- c. Demonstrate environmental justice prioritization to Harvard's work.
- d. Establish more topic-focused cross school clubs (like the Harvard Energy Journal, the Circular Economy Symposium) that draw from multiple schools including the College and attract PhD students.
- e. Push more intentional marketing and promotion of HLS Climate Solutions Lab.

5. Cross-promote podcasts – central HU climate podcast hub?

- a. Several Harvard schools have strong, educational podcasts on climate-related topics from different disciplinary perspectives. These should be advertised in a central resource (on a Harvard Climate page) and further cross-promoted by each podcast.
- b. This has potential to reach students in different classroom settings as pre-reads or discussion documents, at HU and beyond.

Longer Term/Less Constrained (resources/institutional) Opportunities

Climate education at Harvard in 2030 should be coordinated across schools, multidisciplinary, and intentionally embedded in core courses across every school. Faculty across schools should also be further informed and educated about how the various and complex aspects of climate change fit into their area of study, regardless of that particular area. HBS can also lead with its own curriculum efforts. With collaboration and attention to immediate wins – i.e., things we can start on today, these aspirations should be attainable by 2030, if not sooner. In fact, many of these activities could be completed in the next 2-3 years with an intentional effort and designated leaders, and may as easily be included in section II above.

Some specific activities that could help achieve the bigger picture goals include:

HBS-Specific Activities (note these are goals and not commitments at this stage):

1. **Full integration of climate change into management education.** The goal of this approach is that *every* student of business (and eventually of every discipline) understands the impact of climate change from both risks and opportunities perspectives. This entails two major streams:
 - a. **A (new) systems-thinking approach to business education** that incorporates climate change. *“The system of management education might need to be changed to confront [climate] over the next decade: what is the system of management education within which HBS operates and can the system be changed materially to confront this crisis.”* - Peter Tufano
 - b. **A full review and update of course materials** in the MBA core required curriculum (RC) and in the core Executive Education long programs (AMP, OPM, GMP) at HBS. This includes decisions to update, revise, supplement, or replace materials to ensure they reflect:
 - i. Current/up-to-date data and cost curves when used for comparative analysis and valuations



- ii. A range of companies and case protagonists that represent the current matrix and mix of technologies and leaders in energy, food systems, etc.
- iii. Current, modern perspective of the risks and opportunities that climate change presents to every company in every sector in every geography.

Harvard-Wide Activities

2. HU Climate Course Catalogue (or research and teaching guide) by School

- Each school would independently track. HBS/BEI could serve as a guide/model and help other schools build this tracking capacity: ([BEI Annual Report 2021 FINAL.pdf \(hbs.edu\)](#)); [Curriculum - Business & Environment - Harvard Business School \(hbs.edu\)](#)
- Develop an online climate curriculum guide with reports from each school (Vice Provost Office to consolidate the curriculum tracking efforts at each school)
 - *Note: This can significantly help advance the cross-school topic clusters discussed in II.3.b. above.*

3. Development of a more robust, central, accessible climate resource guide

- a. MIT example: [Home | MIT Climate Portal](#) provides comprehensive resources for students + “[explainers](#)” providing general education for a mass audience

4. Educate ALL faculty in a school-by-school coordinated faculty climate education series:

- Each school has a faculty champion to undertake an education campaign – how does climate change impact your area of [business, medical, legal...etc.] education?

Implementation and Barriers

We believe there is a strong collaborative will across schools, even with some differing viewpoints on priority areas of focus. However, the biggest barrier, from our perspective, is the faculty time and space to focus deeply on these efforts, with so many competing obligations, and perhaps a lack of recognition of the ability of senior staff members to develop, coordinate, and lead many key projects. The next biggest barrier at a general level, is likely the *consistent and coordinated will* from each Dean of each Harvard school to drive the importance of the topic.

With the backing and collaboration of this committee, Harvard should identify a set of immediate, pilot-scale, collaborative projects that can be showcased, used as examples and then amplified. For example, curriculum clusters around topics, the course catalog, and idea generation around collaborative teaching materials. Many of these things can happen now through relationship and connection to each other, with help from staff to define, guide, coordinate and move efforts forward. HBS (including BEI staff) would be keen to stay involved and help drive a number of efforts and prioritize this work.

Harvard Chan School of Public Health

Authors: Erin Driver-Linn, James K. Hammitt



Current State of Play

The students, faculty, staff, and alumni at Harvard Chan are keenly interested in building upon current strengths we have in climate-related research to improve climate education at the School and for the University. We heard this through our discussions, and it is apparent in the strong response we had to the Climate Education survey conducted this spring.

In terms of course offerings, at present, there is only one course at Harvard Chan that is primarily about climate – Human Health and Global Environmental Change taught by Ari Bernstein and listed jointly with HMS and Harvard Extension. Our students can also take Dan Schrag’s cross-listed university-wide course. However, many of our courses are relevant to understanding climate, in particular the effects of climate and other environmental factors on human health. Some of these courses examine climate as part of the course. Examples include courses on epidemiology, exposure assessment, atmospheric sciences, nutrition, and risk assessment. Other relevant courses include those on environmental justice, social determinants of health, and methods for evaluating policies and interventions that affect human health. In addition, C-CHANGE (Center for Climate, Health and the Global Environment) is based at Harvard Chan. It offers educational programming to a range of audiences from high-school students to practicing physicians including a 7-week online HarvardX course on health effects of climate change.

While the 334 responses to the Climate Education survey are of course not representative of our entire community, there was strong agreement across faculty, students, staff, and alumni that the School should offer more courses related to climate and health and should better integrate evolving climate science throughout the curricula at the School.

Beyond courses, students indicated there should be more climate related research and internship opportunities, as well as other field and practicum experiences. Indeed, the faculty determined during retreats over the past couple of years that Climate Change is one of three school-wide priority areas (the other two being Health Inequity, and Pandemic Preparedness). We anticipate that research and internship opportunities for students will increase given this prioritization.

Finally, in both survey responses and through our discussions, our community suggested that the School should introduce formal tracks or concentrations in climate-health. Related to the idea of a concentration, a few years ago Environmental Health proposed to establish a program in planetary health. While there was strong student demand and faculty interest, no faculty member was given sufficient authority and resources to oversee the program and so development has been limited. A lesson from this experience is that new educational programs require leadership with sufficient resources and authority to modify or develop suitable courses.

Shorter term/actionable opportunities

- a. Conduct a systematic curriculum audit to identify the gaps and opportunities for climate health courses and content within courses.
- b. Develop one or more short courses to provide for student, faculty, alumni, and executive audiences a foundational and broad literacy about climate and its interactions with public health. Short courses with related resources could be used modularly within other courses and elsewhere. In part, these materials would be about the relationship between climate and health, but also about environmental



- justice, public communication, and basic scientific, economic, social, and other aspects of anthropogenic climate change. This would also provide a mechanism for introducing more multidisciplinary analysis and systems thinking for grappling with climate.
- c. Develop a program of public lectures on climate topics by academics, advocates, government officials, and others. Such a program could be sponsored by the Dean, for example, and would require only modest resources for organization, planning, and travel support for speakers. Alternatively, this program could be organized through HUCE with input from the Chan school faculty and students and a significant share of the presentations taking place on the Longwood campus.
 - d. Supplement public talks by organizing meetings of the speakers with students or by having speakers participate in selected courses.
 - e. Provide partial or full financial support for student research assistants/collaborators administered through HUCE, C-Change, or other units, similar to the existing program that supports summer research projects by undergraduates and building on C-Change's Student Ambassador Program.
 - f. Develop a web-based funneling or match-making mechanism related to climate project opportunities (faculty seeking research assistance and students seeking projects could post) and meetings at which students and faculty could briefly present research ideas.
 - g. Offer a climate and health focused Career Fair.
 - h. Work with our Career and Professional Development and Alumni offices to develop networking and mentoring opportunities that could, among other activities, identify climate related internships, practicum, and field experience opportunities. Projects could be done on campus and/or at the client's site and could be supervised/advised by a Chan faculty member. Benefits would include learning about the issue, experience contributing to a solution, and expanding of professional contacts.
 - i. Reinvigorate the previously proposed program in Planetary Health. This could be accomplished with some modest resources and increased visibility and bridge-building, such as broadening the effort to include more participation from other departments (in addition to Environmental Health). For example, the Nutrition department could play an important role, together with the faculty working on infectious disease (e.g., malaria), recognizing that climate change (together with land use and other changes) will alter the conditions in which vectors spread.

Longer term/less constrained (resources/institutional) opportunities

Climate change is likely to have profound effects on human health, both directly (e.g., extreme heat waves) and indirectly (e.g., effects on food production and nutrition, human conflict and displacement). As such, we expect effects on health to be a primary organizing principle for research and education on climate.

For Harvard to be a leader in research and education related to the impact climate change will have on health, we need to both better optimize our existing expertise and perhaps invest in additional faculty positions. We have heard in our discussions and through our survey responses that programs on climate and planetary health need to be genuinely multidisciplinary. Funds that incentivize people to work together on multidisciplinary climate projects (involving faculty, research associates, and students) will help. With the right leadership and funding, we could develop a stronger nexus for climate-health research (and, as has been observed at other institutions, there may be opportunities to consider industry money). We also heard in our discussions that at least some departments believe hiring new primary



faculty in specific areas of climate-related expertise not currently represented at Harvard Chan would help to strengthen what can be accomplished for both research and education.

We would like to consider a new degree program, a more focused and intensive educational opportunity than the above-mentioned concentration or track. We envision a PhD program that is multidisciplinary, modelled somewhat like that in health policy established around 30 years ago that incorporates faculty from a half-dozen schools. Like the health policy program, a program in climate and health could have concentrations or other specializations so students could be competitive with PhD graduates from disciplinary programs. We note that Columbia has a PhD in sustainable development, where students take courses in economics, qualitative analysis, natural sciences, and social science.

Implementation and Barriers

As above, no degree programs or concentrations at our school are currently focused on climate or planetary health. Because faculty salaries at our school come largely through research grants, there is a sense that primary faculty find it difficult to develop and enhance educational programs. Significant changes to educational programs require dedicated leaders with adequate resources. Further, faculty development and promotion take place within departments that are most often organized around disciplines, making it difficult for individuals to build genuinely multidisciplinary research programs, which a program on climate or planetary health would need to be. Junior faculty are understandably concerned about building a research program that will be recognized and rewarded in their disciplinary homes and senior faculty may be most interested in further developing their disciplinary research programs.

Public health accreditation requirements have recently dropped the requirement for environmental health (in contrast, European requirements include climate literacy). This development was challenged by environmental health department chairs in a recent letter published in the American Journal of Public Health (December 2021).

Harvard Graduate School of Design

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Background

This memorandum is based on multiple group and individual meetings with Harvard Graduate School of Design faculty members, students, and staff, results from a survey questionnaire, and solicitation of some alumni opinion. Broadly speaking, the meetings functioned as brain-storming sessions without any attempt to achieve consensus. The memorandum incorporates a wide variety of comments and suggestions that emerged from the meetings. Debates and multiple pathways are included. If there is a single takeaway, it is that the GSD has promising avenues for enhancing its activities in the climate education space. That means strategic faculty hires, innovation in courses, and creative GSD and pan-Harvard initiatives. The initial consultations described in this memorandum constitute a beginning. The next step would be the creation of some process at the GSD that would permit deeper deliberation as to what merits further action and, more importantly, how to implement it.

Key Takeaways



Like all Harvard schools, the GSD has a unique contribution to make in climate change education. If there is one overarching characterization of the GSD, it is as a school where imagination married to analysis and visualization produces creative, on-the-ground physical outcomes tethered to space and place. When climate change experts discuss managed retreat of individuals and communities from vulnerable coastline and riverine locations, it is architects, landscape architects, planners, and urban designers who can anchor such discussion in physical forms and specific locations. When mitigation strategies addressing greenhouse gas emissions are explored, architects working with engineers can propose energy-consumption solutions for existing and new buildings that produce the elusive net-zero outcomes that the world sooner than later must achieve. GSD faculty, students, staff, and alumni are fully on-board with this calling. They want to build on existing strengths of the school, including its unique studio-based pedagogies, and roll out the school's particular problem-solving approaches to the rest of Harvard and the world. Ideas such as a Consortium of climate-change interested parties within and without the University and a Climate Change Hub can lift climate education and research for everyone and, if there is a schoolwide consensus, it is that thinking big is demanded by the exigencies of the moment.

Existing Conditions

The GSD currently addresses climate education through courses, a research center and office, public programs, and a student organization. The GSD offered 31 courses that dealt in some respect with climate change for the 2020-2021 academic year. The courses divide themselves into three categories: first, a climate change required course; second, climate change addressed within broader required courses; and third, climate change elective courses. The most significant curricular initiative, "Climate by Design," is required for all Master in Landscape Architecture students and is open to other students at the school. The course employs case studies to explore adaptation and mitigation responses to climate change, with special attention paid to the role that landscape architecture methods for critical assessment and visual representation can play.

The GSD's other two departments, Architecture and Urban Planning and Design, have chosen to integrate the study of climate change directly or indirectly within otherwise required core studios and lecture courses. The first term core urban planning studio, for example, takes on climate change by asking "what are the responsibilities of today's planners in mitigating its effects and promoting justice as it impacts the built environment." The third semester architecture core studio addresses "structural systems, envelope design, and environmental and thermodynamic processes," all of which may relate to how buildings contribute to climate change impacts. The Department of Architecture also requires its students to take a two-module sequence, Environmental Systems, to "study selected aspects of the physical environment which directly affect people and their buildings, such as climate, weather, solar radiation and heat gain and loss" and to explore "how environmental factors may be wisely utilized, controlled, and modified as an integral part of the architectural design."

Other GSD courses satisfy curriculum distributional requirements. For example, "Land Use and Environmental Law," which among other things reviews legal responses to climate change, satisfies the "law and institutions" methods requirement for planning students. The Ecologies Domain in the Master in Design Studies program and a course entitled "Energy, Carbon, and Society" in the Master in Design Engineering program also address climate change. The undergraduate architecture track within the Faculty of Arts and Sciences' History of Art and Architecture department is about to launch a course called "The Environment, and The Built" to study climate data and issues of material use and waste in built practices. Intellectual engagements in the classroom are furthered by a bevy of elective courses. Titles such as "The Canary in the Mine: Wildfires and Rural Communities in the Mediterranean Hinterland,"



“Climate Justice,” “Away...Offshore...Adrift. Shifting Landscapes, Uncertain Future,” “Planning for Climate Change,” and “Environment, Economics, Enterprise” suggest the range of offerings delivered through studio, lecture, and seminar pedagogies.

Executive Education currently offers two climate change courses. “Net Zero Cities: Smart City Lab” is about building sustainable cities across the globe, with specific tools and frameworks for design, finance, and urban planning, including new technologies enabling the building of “digital twin cities” to cut emissions and advance sustainability. “Cities at the Frontline: Floods, Storms and Droughts” is a new course taught by the Dutch Water Ambassador, Henk Ovink, a global leader on water and coastlines.

The GSD has one student group expressly addressing climate change. Organizers for Radical Climate Action (ORCA) describes itself as “a student-led group of organizers working to end local, national, and global reliance on fossil fuels by taking thoughtful, swift, and radical action towards a more just and sustainable future.”

Climate change research at the GSD emerges from the work of individual faculty members as well as from two institutional entities. The Harvard Center for Green Buildings and Cities “aims to transform the building industry through a commitment to design-centric strategy that directly links research outcomes to the development of new processes, systems, and products. By strongly emphasizing innovation and multidisciplinary collaboration, the Center will work to promote holistic change within the built environment, namely the creation and continued improvement of sustainable, high performance buildings and cities.” The Office for Urbanization “draws upon the School’s history of design innovation to address societal and cultural conditions associated with contemporary urbanization. It develops speculative and projective urban scenarios through sponsored design research projects.” The Office has conducted research on climate change impacts and potential adaptation responses in Miami, Florida and, more recently, in the Cape Ann region north of Boston.

Opportunities and Challenges

Everyone at the GSD agrees that the school has a central role to play in addressing climate change. The school’s mission, after all, is to teach students how to shape built and natural environments in ways that produce sustainable and just outcomes. The design and planning fields engage the environment at many scales, from building to city to region to world. Whether this engagement takes the form of designing new buildings or retrofitting existing ones to reduce energy consumption, encouraging land use patterns to minimize automobile use, creating hard and soft (nature-based) infrastructures to address sea level rise, or preparing for mass relocations owing to floods, forest fires, droughts, and heat islands, GSD students need to learn a suite of skills and acquire bodies of knowledge to define the problem, imagine responses, and implement a range of solutions.

In all discussions, the first subject was the existing curriculum. If there was any consensus among faculty and students, it was that all students should have some curricular engagement with climate change, but that there are many ways to accomplish this. Indeed, faculty and students discussed multiple curricular approaches without reaching a majority view:

1. a schoolwide required course on climate change
2. degree program-specific required climate change courses
3. climate change as topic within most or all required courses
4. climate change as topic within most or all courses
5. elective climate change courses



6. a mix of the above

Those in favor of a schoolwide course cited the benefits of all students seeing how the GSD's different disciplines and fields tackle the problem and having all students work together toward common solutions. The course could be jointly taught by faculty members with different disciplinary and field backgrounds. It could serve as a jumping off point for subsequent departmentally offered courses, a first step on a curricular trajectory. For some, this course would create a melting pot of GSD students that in itself would be a good thing. One person thought that a schoolwide course would be the fastest way to get something to happen.

A significant number of faculty and students pushed back on the schoolwide course idea and countered with the creation of department-specific required courses as Landscape Architecture has already done. The reasons were not surprising. Each discipline and field have their own methods and approaches to climate change and forcing everyone into one large course could not possibly address each of them with adequate depth. Indeed some feared the very creation of a survey course that might teach a lot at the price of skimming the surface.

If climate education were lodged departmentally, where within a degree program curriculum should it appear? Landscape Architecture has chosen to mount a required lecture course. Some faculty and students suggested that the best place for climate education actually would reside in the required core studios. Studios are king at the GSD, said some, the place where the most serious, intense engagement takes place. If the school is to get real about climate education, then locate it in prime pedagogical territory. One suggestion was to create an interrelated cluster of climate studios addressing problems and locations worldwide. Indeed one of the remarkable aspects of a GSD education (at least pre-COVID and presumably once again) is so-called "sponsored studios," where students are able to travel to and engage with stakeholders at domestic and international sites. Some thought that there should be a distributional requirement satisfied by a number of climate change courses in order to generate variety and choice. Still others wanted to see climate education represented in every course, required or elective. To that end, the call went out for faculty members to scrutinize their syllabi and see where the touch points could be. Unsurprisingly, no one opposed the idea of more electives.

Further discussions centered on the content of GSD's education in climate change. Teaching about mitigation and adaptation strategies received significant recognition. With regard to mitigation, buildings through energy consumption and embodied energy are highly significant producers of greenhouse gas emissions. Courses in the Architecture department and research at the Center for Green Buildings and Cities already address how buildings can reduce their carbon footprint and in so doing become more sustainable. Urban planning courses address the spatial aspects of development, encouraging patterns that minimize reliance on cars.

The study of adaptation and resilience falls squarely within the GSD's wheelhouse. After all, the school's signal focus on shaping the built and natural environment dovetails perfectly with fashioning adaptive responses to climate change. If "grey" and "green" armor, elevate, accommodate, and retreat are foundational adaptation strategies, then the GSD should offer courses that provide the contextual and technical knowledge required to operate effectively with such strategies. Environmental and climate justice should provide a foundational contextual frame given that climate change for historical and structural reasons disproportionately affects socially vulnerable persons, whether they live in flood-prone deltas or urban centers with heat island effects. Indeed the moral and ethical underpinnings of climate education need to be articulated front and center. Some suggested that climate education itself was too small a container and that it should locate itself in broader conceptual portfolios of resilience, sustainability, environmental degradation, and restorative ecologies. Still others emphasized how GSD studios uniquely at Harvard test radical imaginings of the future and that such speculations should characterize the school's approach to climate education.



Faculty and students debated the role of science in climate education at the GSD. For some that meant bringing scientists into the school and creating lab space for their activities. For others, worried in part about the absence of infrastructure (lab space) and personnel (a cohort of scientists, doctoral and post-doctoral students), it meant creating relationships with scientists at Harvard outside the GSD. The level of scientific literacy for faculty and students alike elicited debate. While some thought that fluency with the basic science of climate change was essential, others argued that translating that science into on-the-ground outcomes was sufficient. A few faculty members argued that it is scientists that need to know more about design and planning. The idea of GSD students taking science courses offered by other schools received a nod.

Next steps

Next steps arise from ideas floated or inspired by faculty, students, and staff. To emphasize once more, they do not reflect a consensus. The unifying theme is that the GSD has terrific opportunities to build on current efforts within the school and has the possibility of engaging more robustly with the rest of Harvard and the world. Next steps are ordered based on a rough guess about resources and not on importance.

1. The dean should appoint a **schoolwide faculty or faculty/student committee** to consider the various curricular approaches to climate education and come forward with a proposal to be voted upon by the departments and full voting faculty. Discussions thus far have been fruitful, but they now need to be tethered to specific proposals that can be debated. Perhaps a standing committee on climate education could perform this role and ensure an unsiloed interdepartmental approach to climate education.
2. **The GSD should ensure that current curricular and extracurricular efforts are better publicized** for students and faculty within and outside the school. The GSD has unique knowledge and methods to tackle climate change impacts. Access to that knowledge and those methods requires publicizing their availability. That means making information about syllabi, library resources, faculty research, professional practice, center/office activities, and public programs more visible to all. The school should create a climate change subject matter landing page on its website. It is also important to provide information on curricular and research activities conducted at the 11 other Harvard schools. Students already cross-register in courses offered elsewhere. The GSD does not have to cover all ground and can leverage the University as a whole, especially if it effectively informs its students about opportunities elsewhere.
3. **Special training sessions for faculty members** would make it easier for GSD faculty to acquire the knowledge necessary to address climate elements in their courses.
4. The GSD should arrange funding for **summer internships** that would permit students to test course-generated ideas in the field. This may be understood in part as an extension of the GSD's wide array of so-called "sponsored studios," where various entities with site-specific problems and opportunities provide funding for students to develop creative design and planning solutions. It may be interesting to think about internships as taking the next step with regard to ideation and implementation.
5. The GSD needs **more faculty** in the climate space. A cluster hire that produces candidates with diverse disciplinary and field approaches makes sense.
6. The GSD should seek **funding for dedicated Ph.D. and Doctor of Design slots, in planning, history, and technology** that intersect with topics in the climate area.



7. The GSD should consider sponsoring or co-sponsoring with a partner a biannual **international design competition**, open to professionals and students alike, that would take specific sites worldwide threatened by climate change and seek out implementable adaptation responses.
8. The GSD should consider the creation of a university-wide **Climate Futures Hub** for analyzing and representing the spatial and place-based implications of climate change. The GSD has unique expertise within the University for imagining and representing in two- and three-dimensions future built and natural environments under climate change conditions. This hub would be the go-to place at Harvard for depicting and imagining spatially arrayed physical outcomes arising from climate policies. The Hub could partner with Harvard's long-standing Center for Geographic Analysis, which provides superb training for those interested in employing GIS in their research and teaching.
9. The GSD should propose the creation of a university-wide **Consortium** composed of individuals from business, civic organizations, construction, government, technology, science, public health, and other allied professions to meet regularly and cross-fertilize with the latest thinking on climate responses. Indeed, Harvard's immense convening power makes the possibility of a pivotal annual meeting, coupled with multiple smaller group offshoots, more than a pipe dream. Were the Consortium to take root, it could ultimately spawn university-enterprise-government-civic collaborations in research and practice that would serve as a launching pad for translational pipelines running from basic research to application and vice versa. With growing demands to measure investments and operations against Environment, Social, and Governance (ESG) metrics, the Consortium could become a truth-seeking forum for evaluating efforts in the climate sense. There is this sense that academia is behind industry or that industry is behind academia. Depending on the subject matter, both can be true. As one of potential co-creators and sponsors of the Consortium, the GSD can leverage the Center for Green Buildings and Cities, the Joint Center for Housing Studies with its unparalleled relationships with housing providers, and the Master in Real Estate and Master in Design Engineering programs with their connections to enterprise activities.

Harvard Graduate School of Education

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This report on opportunities to advance climate change education at the Harvard Graduate School of Education is based on individual conversations with fifteen colleagues, faculty and staff, at the school and with a focus group with students who are members of the student council at the school and of the student advisory committees of the various master's programs at the school. The final report benefited from the discussions in the University Committee on Climate Change Education and from feedback from the co-chairs of the Committee to a draft. After a brief introduction (in section 1), the report is structured presenting first short term and long-term recommendations for Harvard at large (in section 2), followed by short term and long-term recommendations for the Harvard Graduate School of Education (in section 3).

Introduction

Harvard has an opportunity to intentionally address climate change in ways of consequence not just within our institution, but beyond. While we can clearly make improvements in the extent to which our research and education programs better address this grave challenge, we also have the opportunity to make contributions of far greater consequences, extending our reach far beyond the communities we educate directly and those who read the research journals where our researchers publish their work. To do the latter, we must think boldly about deep impact at scale with a level of ambition which can attract the support our peer institutions have garnered with initiatives in this



domain, such as the recent gift of 1.1 billion dollars to Stanford's newly established Doerr School of Sustainability, the first school established at that university in 70 years tasked with the bold mandate to accelerate solutions to the global climate crisis.

Harvard's approach should be bold and deep in contrast to a symbolic gesture in recognition of the importance of this subject that leads only to shallow educational initiatives that help our students recognize or understand the topic, rather than gain the skills to address it. Scale to denote a commitment to educating all of our students, and others within our reach, in contrast to creating programs that engage a limited number of our students. We should strive to educate all of our students on ways they can contribute to adaptation, mitigation and reversal of climate change, and we should aim for our efforts to inspire what other institutions of higher education, and educational institutions at other levels, do as well, at a minimum in ways that compare to the inspiration that Stanford's commitment will provide to the higher education community. When the history of the efforts of institutions of higher education to address climate change is written, the impact of those efforts and Harvard's standing would gain if that history showed that Harvard led, rather than follow.

That kind of impact, deep and at scale, would be essential to achieve consequential dents on adaptation, mitigation or reversal of climate change because anything we can do on this topic at Harvard is unlikely to matter much if it does not impact the rest of the world. The actual number of people we educate directly (even accounting for a few future presidents, prime ministers, justices and highly influential individuals) or who read the journals Harvard's scientific contributions to this subject are published is too small, relative to the world population to make much direct difference in the actions, individual and collective, that could transform the systems responsible for the unsustainable path the world is in.

Given our role within higher education we may be able to have an influence that has ripple effects across the entire sector, perhaps more so than other institutions. If the President of the University, and the Corporation, communicated that we have made an existential decision to focus on climate change, this would be noticed within Harvard and beyond. If the actions we undertook as part of this commitment were transformational and effective, they could inspire efforts in other institutions. That kind of impact, on higher education writ large, or even in other educational and societal institutions, would represent a more suitable way to address the scale of the challenge represented by climate change than more feeble efforts, including those we have undertaken to date.

If we are to address this priority as an existential decision, our efforts to address climate change should not be another add on, another project or initiative, another silo in our programmatic and organizational structures. Instead, they should be integrated within our current work and structures and align with and contribute to our larger mission of research, teaching and extension, improving how students think, adding to their higher education capital, and advancing knowledge on how to address climate change and how to educate everyone so we can adapt to, mitigate and revert climate change.

Our efforts should contribute to the advancement of knowledge on the multifaceted areas implicated in adaptation, mitigation and reversal of climate change, through research, and to the development of the capacities of our students and others we reach through our educational efforts for discernment, understanding of evidence and critical decision making.

Embracing this existential priority offers considerable opportunities for meaningful collaboration across the boundaries of the disciplines and of our institutional structures as well as opportunities to develop novel ways to



articulate research with the solution of significant social challenges beyond the conventional diffusion of research-based knowledge.

We should recognize and resist the risk in addressing this complex theme of incorporating it in shallow ways leading to students who end up engaging in superficial advocacy rather than in the essential, but harder, intellectual and creative work of inventing solutions to the complicated challenges, and assessing the difficult tradeoffs, identified in the various reports of the International Panel on Climate Change and other science-based reports. In this, as in other complex themes relevant to the education of our students and to our pursuits in service of advancing knowledge, we should ensure our efforts preserve a climate truly open to free inquiry and deliberation, maintain an openness to the facts and to different interpretations of the facts in our educational and research efforts. We should be wary of political orthodoxies of any kind creeping into our efforts to educate students about climate change.

Given our structures and norms, in order for this priority to permeate our institutional culture and ways of doing, we should support deliberation and engagement among faculty, and educate the faculty on what is known about climate change and its interactions with many spheres affecting human life and sustainability, so that each one of us can reach their own conclusions about whether and how to align our work with this existential priority and commit the effort that will be required to increase our knowledge and to find ways to align our work with this priority. This process of deliberation, learning and collaboration undoubtedly will take more effort and time than proclaiming new institutional priorities or initiatives from the top. It is however essential to avoid a new orthodoxy, to protect academic freedom and faculty governance and to engage the full range of many talents within this university in the process of addressing this serious crisis. Such an inclusive approach may also be more impactful in penetrating our everyday actions and save us from creating yet another siloed initiative.

Suggestions for Harvard

The most promising university-wide opportunities are catalytic actions that (1) support efforts in the schools and departments, (2) foster collaboration across the units of Harvard's decentralized structure, (3) empower faculty leadership in meaningfully committing to contributing to addressing climate change in their research and teaching, (4) advance the university's social embeddedness in deeply connecting work on climate change with the functioning of other social institutions and communities, and (5) engage with other institutions of higher education in reciprocal exchanges of knowledge so that, collectively, we accelerate higher education's footprint in tackling climate change.

Harvard's existential commitment to climate change should be structured following the principle of subsidiarity. What faculty, departments and schools can accomplish on their own effort and initiative should not be taken by a higher authority. A most obvious expression of the importance of this principle is that our work in this area should respect the principle of academic freedom. No faculty should be told what to teach or how, or otherwise pressured to address climate change in their research or teaching and we should strive to protect freedom of expression and diversity of ideas on how our students and faculty interpret the facts about climate change and how to address this challenge. An extension of that principle of subsidiarity is that no department or school should be told by higher authority whether or how to integrate climate change in their programmatic priorities.

As such, Harvard-wide actions should be to support meaningful work to be done within our existing structures and integrating this work within the institutional priorities of those units, rather than create new structures or displace current priorities, and to foster collaborations across units when the benefits of those are likely to exceed work carried out within existing units. For instance, a pillar of our work in this area should be advancing research on the



multidirectional relationships between climate change and the kind of work carried out in each respective school. That research should be carried out by existing faculty and by faculty recruited and cultivated to do this work. Since faculty are appointed to our existing schools and departments, a catalytic university-wide action would be to help obtain faculty lines so that the schools can add that capacity, without jeopardy to current institutional and curricular commitments. But those appointments should be made by those faculties, not by higher authority. Similarly, the emphasis of educating students in various schools on climate change should be integrated with current curricular and programmatic priorities, rather than creating new university-wide requirements that work across purposes or which may be difficult to integrate with current programmatic priorities.

Short term opportunities

Support efforts in schools and departments

In order to build on our existing strengths, a first step might be to document ongoing initiatives to educate students across Harvard schools and departments about how to address climate change, and to share this information widely across the university. The document collating these various reports might be a first step in this direction. A way to support discoverability would be to create a HUB making visible courses, activities and resources related to climate change at Harvard. In addition, the HILT could spotlight instructional initiatives focused on climate change in their forthcoming programming to highlight pedagogical innovation.

Because we make decisions often about our own institutional impact on climate, and because there are many thoughtful efforts already to mitigate such impact, making those efforts visible, in how we build and manage our physical infrastructure and manage our endowments, would support ongoing efforts and make them part of the curriculum. In making visible how we ‘walk the talk’ this will become an open, and not a hidden, curriculum that will contribute to the education of our students and affirm the priority that we assign to this issue.

Foster collaboration across Harvard’s units

A structure is needed that facilitates collaboration across schools in the development of curriculum and interdisciplinary research on climate change. This could be supported with the discoverability tool mentioned above, a Hub of sorts, such as those that exist already in the medical sciences or to map ongoing global efforts at Harvard. Specific communities could then support efforts in research, curriculum development or the development of faculty capacity. Examples of those are described later in this document.

There are already courses and other resources that support education on climate change. Making those visible and creating mechanisms to support collaboration across units in accessing those resources, repurposing them or creating new ones would create synergies among them. One such mechanism could be an advisory service, including reference librarians with deep knowledge of existing courses and digital assets as well as some faculty with deep expertise on climate. This team could curate a selection of courses and instructional materials, and could offer consultations to faculty interested in infusing climate change topics into their courses. Perhaps a ‘tiered’ mechanism could be structured to offer advice to faculty interested in integrating climate change in their existing courses. Beginning with librarians providing digital resources that faculty interested in incorporating elements about climate change into their courses can study to increase their own knowledge, followed by consultations specifically about their courses with librarians, and then with consultations with faculty with expertise on various elements of climate change.



A map of all professional development courses already available at Harvard focused on climate change, and incentives and support to integrate climate change into existing professional development programs would address some of the most obvious barriers or knowledge and time. The primary aim of these resources would be to help faculty increase their own knowledge, and to use these resources in their courses for the benefit of their students.

Develop an orientation program –could be a digital asynchronous program-- for students that introduces them to all existing resources to learn about climate change at Harvard, this would require first mapping those resources and identifying and removing any programmatic barriers that impede cross-registration.

Overtime, support the development of new programs, focused on climate change, such as those offered by the professional development courses at the [Columbia Climate School](#).

Empower faculty leadership

A first step in mobilizing faculty leadership in efforts to advance knowledge and teaching on climate change would involve assessing their knowledge and disposition to do this, and the extent to which they already do engage in such efforts. This assessment would also help map what is already going on and making this information visible would contribute to the discoverability efforts mentioned earlier.

Based on the identified interests, knowledge and existing work of the faculty as it relates to climate change, it would then be possible to create opportunities to increase knowledge among the faculty on climate change and how it intersects with their own primary focus.

Fostering faculty deliberation across the entire university so that this university priority builds on already existing efforts and cultivating widespread ownership of this initiative not as a new project, another silo, but as a lens through which to examine our research, teaching and extension would also contribute to mobilizing faculty leadership for these efforts.

Advance the university's social embeddedness

Integrate climate change as one of the areas of foci of the programming of the Harvard innovation lab, such as the venture incubation programs, President's innovation challenge and the various programs which support entrepreneurship, such as the social enterprise initiative at HBS or the Social Innovation Initiative.

Collective leadership

Mapping and participating in existing networks of universities already focused on climate change, approaching them in a spirit of humility and with a desire to learn from them, and then sharing this knowledge through the various mechanisms described in this document, would position us well to contribute to collective leadership with other institutions.

Long term opportunities

Support efforts in schools and departments



The single most transformational action to create capacity in the schools to address climate change would be to make faculty lines available to schools and departments to enable hiring faculty dedicated to the study of the implications of climate change in the areas addressed in each school, and the ways in which the fields of study within that particular school, and the professionals prepared there, can contribute to adapt to, mitigate and revert climate change. These individuals will form the core of a group, across the university, which will lead Harvard's efforts to advance knowledge and teaching in this area. This approach to infusing our climate change efforts broadly across our existing curriculum, building an 'invisible college' of climate focused faculty with appointments in all schools, might have greater impact, over time, than Stanford's approach of creating a separate school focused on climate, which entails the risk of becoming a silo within the larger institutional structure.

Foster collaboration across Harvard's units

One of the challenges in a university of Harvard's size is for each member of the university community to find others with shared interests across this vast institution. Two efforts can support discovery and collaboration: a university-wide initiative that articulates those doing research and teaching in this area across various disciplines and fields, and an annual conference that brings together a much larger group of faculty working on various climate change related efforts for mutual recognition and learning.

A long-term interfaculty initiative, such as the Children's Initiative or the Mind, Brain and Behavior Initiative, would bring together faculty doing research on climate change education and stimulate collaboration. This university wide initiative could support research efforts, student fellows, and facilitate collaborations across professional boundaries.

An annual Harvard conference on climate change innovation could serve as the flagship event to bring the entire community to take stock and reflect on what we are doing, and to steer continuous innovation. This event could also reach beyond Harvard, as an avenue to share with other educational institutions what we are learning and our advances, as part of our efforts on collective leadership, described below.

Empower faculty leadership

Since the curriculum is in the hands of the faculty, and since our efforts in this area stand to greatly benefit from the inclusive engagement of the broad range of talents available in our community, the available options to influence it aligned with the principle of academic freedom are persuasion, support and engagement. A number of the options discussed in this document are aimed at stimulating the curiosity, interest and knowledge of faculty on the subject of climate change and, more specifically, their interest in how they could align their own efforts with this topic. Once educated and persuaded, support in facilitating the integration of climate change into their teaching may be the most productive approach. A well curated library of digital assets and faculty development could support integration of climate change into the existing curriculum.

Advance the university's social embeddedness

The social embeddedness of the university, through our various outreach and extension activities, could be enhanced by our efforts to address climate change, among others supporting climate change education in schools and in other universities and institutions of higher education.



For instance, a university wide immersive media e-learning initiative could develop open access digital assets for use in high schools and colleges that could support other educational institutions in similar efforts. One example of this would be the [ecolearn curriculum](#) for pre-college students, or curriculum for college level learning, involving virtual reality, along the lines of [Stanford's virtual reality experience on ocean acidification](#).

There are already various units at Harvard working on elements that could be brought together, for example the Harvard visualization lab or the Harvard librarians working on immersive media. This initiative could involve Harvard students in developing these materials. There are many research opportunities in this initiative on the role of different kinds of media, dosages, intensity or focus (emotional vs. intellectual) of these education experiences. These questions have relevance to the learning and teaching of climate change but extend beyond that particular domain.

In addition to developing public goods to support climate change education as those described above, we could support members of our alumni network who are involved in the design of social innovations that address climate change. For example, we could fund summer fellowships for students working on projects focused on climate change. We could also identify Harvard alumni working on climate change efforts and provide them visibility and support them in scaling those efforts.

We could secure funding to advance climate change programming to the existing coalition of programs focused on supporting social innovation, including HGSE, the Lemann Program on Creativity and Entrepreneurship, the Social Innovation Initiative, the Social Enterprise Initiative and the Innovation lab. And we could also secure funding for ongoing and growing support for climate related ventures in the programs supported by the Harvard Innovation Lab, supporting student entrepreneurs whose ventures focus on climate change.

Collective leadership

Resourceful and inventive as we are, it would be unreasonable, even for Harvard, to expect that a single university, among the 28,000 institutions of higher education in the world, could single handedly tackle the challenges of climate change, or even just the challenges as they pertain to university level education. Our priority should be to do what we do best, advancing knowledge and teaching, while deepening our social impact, and to do it exceptionally well. But we don't need to do this work alone, we can learn from and share what we learn with other institutions or higher education, and with other institutions involved in addressing climate change.

Climate change is clearly an adaptive challenge requiring collective leadership and we should see our work as situated in that arena and in those collaborations that produce such collective leadership. At the most granular level those collaborations will take place in the very work of our faculty and in our schools and departments. There is, however, one form of collective leadership we might be well positioned to contribute to at the university level, and that is engaging with other institutions of higher education who, just as we are, are interested in making more meaningful contributions to addressing climate change. Just as it is apparent that some are ahead of us, others might learn from us, and we might all learn much together.

The Talloires network established at Tufts University by President Bacow is an example of how university networks can collaborate to advance shared purposes –civic engagement in that case. We might look for existing networks that are already focused on climate change, or to help steer existing university networks in service of that goal and engage actively with those existing communities both to learn from others, to share with others what we are learning from



our efforts and to sustain our commitment to excellence benchmarking our efforts against what others do. We might even find ways to collaborate across institutions, though that would be a taller order.

Suggestion for HGSE

As befits a decentralized university drawing much of its strength from the autonomy and entrepreneurship of its faculty and from the independence and autonomy of its schools and departments, the opportunities for catalytic actions at the school level differ from university-wide opportunities. In a nutshell, most of Harvard's work to address climate change will be carried out by faculty in the units to which they are ascribed: departments and schools. That is where the research, teaching and social impact will take place and that is where the university-wide priority on climate change needs to be carefully articulated with existing demands, priorities and commitments, and with those that the respective fields demand of such units. That is also where this new priority on climate change needs to be translated into operational strategies with careful attention to existing levels of capacity and ongoing priorities.

The most promising opportunities to advance efforts aligned with climate change at the Harvard Graduate School of Education are (1) advancing knowledge, (2) educating our degree students on the ways in which they can contribute to adaptation, mitigation and reversal in their respective professional roles, through the existing degree programs in the school, (3) deepening our social impact, (4) empowering faculty leadership, and (5) engaging in collective leadership with other schools of education.

Given current priorities, commitments and capacity, most opportunities for HGSE appear to be long term, requiring additional resources and faculty capacity. These are described below.

Short term opportunities

Advance knowledge of the multifaceted relationships between climate change and education.

It is not evident that there are many opportunities for our current faculty to take on new areas of research on top of their current commitments. The efforts to support the recently launched redesigned master's program, and the many efforts necessary to sustain the school's work during the pandemic, have come for many faculty at some cost to their research and writing. For that reason, it does not seem realistic that much more can be expected in the short term by way of new research on climate change and education with current levels of capacity. Perhaps a first step would be to assess faculty interest in doing research that relates to climate change in some way, and to fund modest efforts to seed this work so that, over time, more faculty begin to orient their research to this area or to explore intersections between their established areas of research and climate change.

Educate our degree students

HGSE is currently mapping the curriculum, and climate change education could be one of the domains included in such exercise.

In order to provide all or most of our students with relevant skills and knowledge to address climate change from their respective professional roles, it would be helpful to map the climate related competencies which such roles would require. This could be approached in an analogous way to what a committee at HGSE (DACED) did in producing a framework of diversity, equity and inclusion related competencies. A working group, involving all



programs in the school, could develop a framework of such competencies, which could then guide subsequent efforts at infusing into existing courses elements that relate to climate change, aligned with the development of such competencies. This may be a two step process, first this working group needs to develop their own knowledge base on climate change, to then be able to develop such competency framework.

We could make available to our students information on existing courses across the university addressing climate change, this could be facilitated through a university-wide HUB organizing such courses, activities and other resources related to climate change. It may be necessary to identify whether there are impediments to cross-registration, for example resulting from the existing programmatic requirements of our academic programs, and if there are, to explore whether there might be ways to remove those impediments, for example, allowing room within the current programmatic requirements for students to cross-register across schools and departments in climate change courses. This examination could begin assessing the current extent of cross-registration of our students, in general and in climate change courses in particular.

HGSE has made considerable investments in the renovation of our physical plant in recent years. It has done so with great attention to sustainability, and we have an active Green Team. Given that many of our students are preparing for roles in which they will have responsibility for efforts to build and improve physical educational infrastructure, we could make visible for our students the kind of environmental impact considerations that went into our physical plant renovation, in this way turning into an element of the curriculum the very buildings and classrooms that our students inhabit while pursuing their studies.

Deepen Social Impact

Dissemination of research on climate change and its relationship to education to system level leaders, policy makers, using our convening capacity. Create programs of outreach focused on climate change and education, for example through education fora, our various channels to disseminate knowledge (e.g., usable knowledge) or through executive education programs or programs of outreach to HGSE graduates.

One of the opportunities through which we could impact the field would be orienting our students to pursue careers that engage them with climate change. Our career services office could map occupational roles that are actively working on climate change related topics and that our graduates would be qualified for and include this as part of their programming to help students to make career decisions.

Empower faculty leadership

Dean Long can signal an emerging priority focus on climate change, for instance devoting time to discuss it at faculty meetings, addressing this topic on her various communications with students, faculty and other key constituencies at the school and in general inviting faculty engagement and initiative in taking responsibility to make this a more meaningful focus of our work than it is at present.

Create structures which support communication and collaboration among the various faculty and staff at the school already interested on this topic. This committee could cut across the various areas of work at the school, various programs, professional education, initiatives, and might be tasked with identifying opportunities to infuse climate change in the curriculum of the school, along the lines of the work done by the DACED committee.



Collective leadership with schools of education

It is not evident that there are any short-term opportunities here. Perhaps we could invest in a landscape analysis of what a selected number of schools of education are currently doing in this domain.

Long term opportunities

Advance knowledge of the multifaceted relationships between climate change and education.

A research program led by faculty focusing on advancing understanding of the implications of climate change for education and on the role education can play adapting to, mitigating and reverting climate change will be the most transformational initiative the school could undertake. This will require new faculty lines and funding for research, for instance advancing the science of climate change education focusing on the cognitive science of climate change, studying what is involved in learning about climate change and examining longitudinally learning of this topic over time. This research agenda should address needs of the field, for instance advancing knowledge which can help support system change in education in ways that address climate change, or in ways which help design effective professional development for teachers or school leaders focused on climate change or examining the interdependencies between mental health and climate impact.

This could help build a new field of study, and we might, over time, partner with other schools of education and foundations (e.g., Spencer Foundation or National Science Foundation) to prepare the next generation of researchers on the science of climate change education.

Educating our degree students

There is clearly an opportunity to better prepare our students to understand in what ways the professional roles for which they are preparing are implicated with climate change. But we need to balance and integrate new priorities on climate change education with current priorities and demands on our curriculum. For example, articulate explicitly how climate change education relates to our current priorities on advancing education equity, and diversity, and inclusion and to the professional roles for which the new master's programs prepare students.

Within our current academic programs at the master's level, we might consider creating a concentration on climate change education, available to masters' students, assuming enough faculty interest and capacity. But if we are to successfully educate all of our students to understand how their respective professional roles and areas of specialization can address climate change, then our priority should be to infuse climate change into many of the courses at the school, or at least to the courses that reach the majority of the students.

Develop a robust set of course offerings aligned to the professional roles that the school prepares students for, such as teachers, school principals, university administrators. For teachers, for example, those courses would develop their capacity to educate students who are scientifically literate.

Integrate curriculum focused on climate change and its implications for education within specific courses that are part of the programmatic requirements of the various education programs and research initiatives at the school (e.g., programs focused on civic engagement). Integrating climate change in the foundation's courses would be an efficient way to make this domain part of the 'core' knowledge available to all students at the school.



Given the complex and interdisciplinary nature of climate change as a subject of study, we will likely need to partner with other schools at Harvard (e.g. chemistry, physics, arts and humanities, public health, design), and with other institutions outside Harvard, to develop high quality curriculum that reflects current science on climate change and to explore the intersections between climate change and the lives of students and their communities and the functioning of schools.

As part of our varied efforts with pedagogical and curricular innovation, we could develop an active-based experience foundational course on climate change that experiments with active performance simulations, and integrates this topic with topics on diversity, equity and inclusion.

Deepen Social Impact

HGSE has a robust delivery structure to communicate and partner with a range of education institutions in the field, such as schools, school districts, providers of services to schools and others. This structure could be used to translate emerging research-based knowledge on climate change and education to the field, and also to support bidirectional communication so the school's efforts in this area reflect the challenges which teachers and school administrators actually perceive they have as they relate to climate change.

A moonshot goal could be to develop curriculum, with accompanying digital assets, to help elementary and secondary teachers integrate climate change into their teaching, this would require curriculum frameworks, instructional assets and resources and assessment. The development of such a course would require collaboration with colleagues across the university with subject matter expertise in the various domains involved in climate change.

Develop professional development programs focused on climate change and education for teachers to teach about climate change, and for other education professionals in the domains which are relevant.

Empower faculty leadership

A most obvious way to empower faculty leadership would be expanding faculty capacity on this subject through new faculty appointments as well as through alternative appointments that can bring experts to the school for defined periods of time, similar to the President in residence or to the Yidan Global Fellows program.

In addition to enhancing faculty capacity with appointments primarily dedicated to this subject, we could support a greater number of existing faculty in updating their curriculum to infuse climate change, for example using competitive grants for curriculum revision, or to develop case studies focused on the subject.

Since one of the university-wide areas to support faculty is to develop a well curated library of digital assets which could be integrated into existing courses, HGSE could partake in creating those assets, for the benefit of our faculty and of faculty across the university.

Collective leadership with schools of education

Since HGSE is not the only school of education interested in educating for climate change there are opportunities for mutual learning with other institutions. Much as proposed above for university-wide engagement with networks of other universities, HGSE could engage with other schools of education to work together towards greater alignment in the preparation of education professionals and addressing climate change. To my knowledge such collaborative



networks do not yet exist, it could be one that we could help create and lead, perhaps in partnership with the Carnegie Foundation for the Advancement of Teaching or other institution aligned with the goal of improving the preparation of education professionals.

FAS - Division of Continuing Education

Author: Lindi von Mutius

Introduction

The Division of Continuing Education (DCE) is excited to participate in this survey of climate education and ongoing planning across the University. In 2021, 2,814 students took courses that addressed aspects of the complex climate change issue in the January, Spring, Summer School, and Fall terms. While these courses are housed primarily in the Sustainability and Global Development Practice (GDP) Graduate Programs, several are also offered as electives in other degree programs. The volume of students who engage with climate education through extension courses presents a three-fold challenge: 1) meeting the needs of individuals who are occasional students; 2) offering a strong curriculum to degree candidates in Sustainability and GDP so they can be consummate leaders in their fields; and, 3) doing so with Instructors who are primarily adjunct faculty, and where enrollment numbers are an important factor in curriculum development. Our student populations have distinct needs and it is critical for our curriculum to nimbly adapt to changing science and policy, convey the complexity and relevancy of climate change in a variety of fields, retain a faculty of experts, while inspiring critical thinking and offering practical training.

This memo outlines the current state of, and potential opportunities for enhancing, climate education within the Division of Continuing Education, and furthering DCE's mission of making meaningful contributions to Harvard University and the world by enriching the lives of all kinds of adult learners.

The current state of play

From Summer '21 through Summer '22, DCE offered eighty-one courses that address the many facets of climate change. In addition to these courses, ALM degree candidates in Sustainability and GDP have the opportunity to complete either a Thesis, a Capstone, or a Consulting Capstone, on a subject relevant to climate change. Informally, the Sustainability and GDP Programs offer a monthly "Departmental Coffee Chat" via Zoom, where we invite alumni of the programs, enrolled students, and guests to hear from a speaker or Instructor, on a topic relevant to climate change. The sheer number of individuals that our climate change-focused courses reach is impressive. We are now challenged to increase innovation and address the following gaps in our programs' climate curriculum:

- A Certificate Program specifically focused on climate change and adaptation
- Climate change education tailored specifically to certain professions, and in collaboration with, professional organizations or corporations
- Professional development modules that are shorter and more flexible than regular courses
- Hiring instructors with a more diverse set of backgrounds, identities, and geographic locations
- Increasing access to our courses for students from a wider range of economic backgrounds
- Adding courses focused on climate change and:
 - Equity, social and economic justice
 - Migration
 - Human health



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- Climate adaptation and community resilience
- Biodiversity
- Carbon mitigation and sequestration technologies
- Law, policy, and activism
- The global south and indigenous communities
- Traditional ecological knowledge and decolonization

In addition, there are opportunities beyond our programs to innovate and collaborate:

- Creating an incubator for student research and projects
- Internship and skill-building opportunities for younger students seeking work experience
- Hosting thought leadership events that encourage professional development and learning for a more diverse range of alumni and professionals
- Connecting our events to those occurring in the wider Harvard community, and giving our students a sense of belonging to a larger Harvard community of learners

Closing these gaps will require creativity and collaboration across Harvard. It will also require framing the issue of climate education as empowering change. Time and again, we hear feedback from our students that they are more inspired when courses and speakers present practical solutions and tools that they can directly implement in their professional and personal lives.

Shorter-term actionable opportunities

Based on research into similar programs at seventeen peer universities and conversations with students, Instructors, and DCE colleagues in my first 90 days, I see four short-term opportunities to expand climate education in the next eighteen months (June '22 - December '23):

Opportunity: Certificate Program in Climate Change & Adaptation	
<i>How would this opportunity further climate education, DCE, and the field?</i>	
We already have a robust set of courses, but a Certificate track would create a more targeted curriculum around mitigation and adaptation to climate change. This opportunity enables DCE to better engage both the occasional students and working professionals seeking a specialized Certificate for career development. There is currently little competition among peer institutions for an adaptation-focused Certificate, allowing Harvard and its expertise to play a leadership role.	
<i>Challenges:</i> <ul style="list-style-type: none"> ● Process to obtain approval ● Recruiting additional faculty ● Sustaining enrollments over time 	<i>Stakeholders & Partners:</i> <ul style="list-style-type: none"> ● Ideally, this Certificate would be a collaboration with other schools and programs also developing an adaptation-focused curriculum.



Implementation Strategy: Begin curriculum design in June 2022, with a goal to finalize the proposal in September 2022, and offer the new certificate by the Fall semester of 2023.

Opportunity: Professional Development For Climate Adaptation and Resilience Practitioners

How would this opportunity further climate education, DCE, and the field?

Recent legislation like the Parks, Equity, and Jobs Act and the Bipartisan Infrastructure Investment and Jobs Act has allocated funding for small towns and municipalities to train planners, local legislators, and private sector contractors on climate adaptation and community resilience. However, expertise in this field is held by a few research centers and universities or by consultants working in well-resourced cities and towns and is not shared broadly. There is a lack of networking and sharing of best practices among professionals. Regional information sharing and planning networks are only beginning to develop, and there is much potential for Harvard and DCE to play a leading and transformative role in developing a valuable toolkit and network to help communities prepare for climate change.

Challenges:

- Navigating more challenging funding sources and pricing the program appropriately for potential professional cohorts.
- Logistics and execution
- Designing the curriculum
- Recruiting additional faculty

Stakeholders & Partners:

- Graduate School of Design, the Kennedy School, and the DCE Professional Development Programs
- The American Planning Association
- Urban Sustainability Directors Network
- Institute for Sustainable Communities
- Various non-profit organizations who would provide expertise such as The Nature Conservancy and the Trust for Public Land

Implementation Strategy: Convene partners by September 2022 with a view to having a curriculum designed by December 2022. Begin recruiting teaching staff through April 2023, and launch the program in the Fall semester of 2023.

Opportunity: Continued Climate Education for (and by) Alumni



How would this opportunity further climate education, DCE, and the field?

Many of our programs’ alumni work as sustainability and climate policy leaders in large corporations, governments, and international development organizations. We currently miss the opportunity to feed their specialized, practical, experience back into our curriculum and events. We also receive requests from alumni to speak to their corporate sustainability teams or C-suite executives and do not have a mechanism to leverage these one-off opportunities to benefit the entire program and curriculum. A conference or thought-leadership forum would help us broaden our engagement and leverage our collective expertise.

Challenges:

- Event planning and logistics
- Funding to attract and compensate speakers
- Collaboration across the university.

Stakeholders & Partners:

- Starbucks, Micron, The World Bank, The United Nations Supply Chain Group, The National Audubon Society, and Cognizant have solicited speakers in the last four months
- DCE Alumni Engagement and Marketing teams

Implementation Strategy: Ideal target for launch is Earth Day 2023 as part of a Harvard-wide series of events, coordinated with the Center for the Environment and its alumni, as well as Harvard Sustainability to feature innovations across the university.

Opportunity: Climate Change & Development Speakers Series

How would this opportunity further climate education, DCE, and the field?

Many schools across Harvard have dedicated speaker series on specific topics, and it would be helpful for DCE to enter that space around climate change and global development to establish its leadership through the interrelated Sustainability and GDP degree programs. The impacts of climate change will increasingly shape how large and small organizations conduct development. Such a series would make DCE more competitive and allow our programs to attract partners and experts to ensure that our curriculum is innovative. However, most importantly, this series would provide a medium to share knowledge more broadly - both across Harvard and communities around the world.



<i>Challenges:</i>	<i>Stakeholders & Partners:</i>
<ul style="list-style-type: none"> ● Event planning and logistics ● Funding to attract and compensate speakers ● Collaboration across the university 	<ul style="list-style-type: none"> ● Potentially, conference collaborators such as TEDx, the Aspen Institute, the World Economic Forum Working Groups ● Harvard Sustainability and the Center for the Environment (lectures could be curated and shared across several outlets)
<p><i>Implementation Strategy: It would be strategically helpful to coordinate this with the launch of the new Certificate in Climate Change & Adaptation in the Fall of 2023.</i></p>	

Longer-term/less constrained (resources/institutional) opportunities

Harvard’s prominence, reputation, and resources enable it to create, curate, and disseminate knowledge and sustainability solutions that benefit people worldwide. By 2030, most people on the planet will be experiencing the disruptive effects of climate change either through natural disasters, forced migration, increased disease, food insecurity, or increased pollution. Every student at Harvard, in every school, should be exposed to some degree of climate education that enables them to help their communities and organizations cope with these disruptions. The foundations we build now to ensure greater collaboration across departments will help Harvard University not only be an educational leader but a facilitator of solutions and a convener of people who can implement those solutions.

Finding better pathways to collaborate among the knowledge centers within Harvard is the key to realizing that potential. Over the last 3 years, several large research universities have created well-funded institutes dedicated to sustainability and climate change. While these efforts are certainly laudable and exciting, a recent study by Deloitte cited that the knowledge-sharing culture of an organization is significantly more important than restructuring the organization or creating vast databases of knowledge:

Knowledge sharing must become a desire, rather than an obligation. This happens by providing a transparent and innovative environment, enabling employees to feel safe and develop a knowledge-sharing mindset in which they recognize the value of their own expertise, and its benefit to the company, and are able to learn continuously through the process of knowledge sharing.

In this spirit, and recognizing that my observations are limited by experiencing the culture for only ninety-eight days, I have observed a few ways that the knowledge sharing culture could shift to facilitate better collaboration:

1. Creating a listing of and facilitating a quarterly meeting of climate-related program, lab, and innovation hub Directors would enable us to more easily build the relationships that lead to collaboration across schools
2. Expanding the work of the Harvard Innovation Labs to focus specifically on climate change, perhaps by creating a fourth lab ecosystem where students from all parts of the university could compete and collaborate



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3. Offering cross-school opportunities like the Climate Solutions Lab to Extension School students would enable traditional students to benefit from the practical expertise of working professional students
4. Leveraging DCE alumni to create connections for students from other Harvard Schools
5. Within DCE, ensuring that all Instructors are aware of opportunities and events across the University
6. Curating recordings of speakers from all parts of the University and making them accessible and searchable via HOLLIS

More fundamentally, those who work on climate education at Harvard should have an easier time finding each other, identifying and being incentivized to collaborate across schools, and opening opportunities to a wider range of students.

The Division of Continuing Education can play a pivotal role in ensuring that knowledge created at Harvard can indeed enrich the lives, and increase the effectiveness, of several thousand professionals around the world working to solve the climate crisis.

FAS - Arts & Humanities and Harvard Divinity School

Authors: Sarah Dimick, Janet Gyatso, Ian Miller, Karen Thornber

Current State of Play

Despite tremendous enthusiasm for climate education in the Arts & Humanities at Harvard, current course offerings and initiatives remain both scarce and uncoordinated. Moreover, there is no central space to turn for faculty and students interested in learning about and researching the many aspects of climate change/disruption not covered by STEM fields or the quantitative social sciences. Nor is there any curricular or research structure for interaction and discussion on the crucial issues in climate change problems and solutions between, on the one hand, the STEM fields and/or the quantitative social sciences, and, on the other hand, the arts, humanities, and qualitative social sciences.

Current courses directly focused on climate change taught by tenured or tenure-track faculty members in the Arts & Humanities include:

- GenEd 1167: Climate Crossroads (James Engell and Jim Anderson)
- GenEd 1015: Ethics of Climate Change (Lucas Stanczyk)
- English 67C: Writing in the Wake of Climate Change (Sarah Dimick)

Tenured or tenure-track Arts & Humanities faculty members who teach related courses on the environment include: Bruno Carvalho, Joyce Chaplin, Suzannah Clark, Sarah Dimick, James Engell, Arunabh Ghosh, Janet Gyatso, Sharon Harper, Robin Kelsey, Tiya Miles, Ian Miller, Lucien Castaing-Taylor, Michael Pollan, Alexander Rehdig, Victor Seow, Lucas Stanczyk, Ajantha Subramanian, and Karen Thornber. It is worth noting the relative strength of environmental history faculty in the Departments of History and History of Science (qualitative social sciences), but even there Harvard's profile is not on par with that of our institutional peers. Several of the faculty listed here have their main tenure lines located within the social sciences, but they maintain affiliate or joint



appointments in such Arts & Humanities programs as East Asian Languages and Civilizations, History & East Asian Languages (graduate), and South Asian Studies.

Beyond the classroom, [The Environment Forum](#), co-organized by Robin Kelsey and Sarah Dimick through the Mahindra Center for the Humanities, serves as the primary conduit for guest speakers in the environmental arts and humanities. This initiative needs increased funding to support more than the current schedule of three talks per academic year. A regular schedule (for example, the third Thursday of the month) would enable the Forum's audience to cohere into a community of environmental arts and humanities thinkers on campus.

Moreover, the newly launched [Intergenerational Humanities Project](#), designed by Robin Kelsey and Suzannah Clark, and led by Bruno Carvalho, Joyce Chaplin, Sarah Dimick, and Tiya Miles, will offer co-taught environmental humanities courses for Harvard sophomores until 2024. The project is also hosting six postdoctoral scholars in the environmental humanities during the 2022-2023 academic year. The momentum generated by this project should be harnessed to design enduring curricular initiatives that engage more of the Arts & Humanities and qualitative Social Sciences faculty, as suggested below.

The [Harvard Environmental History Working Group](#), convened by Joyce Chaplin, closed its doors after running from 2015-2020.

Students and faculty in the Arts & Humanities and qualitative Social Sciences at Harvard report the following key interests:

- The ethics of climate change management
- Climate justice (including intersections of climate change with gender, race, class, citizenship status, health, disability, and other phenomena)
- Displacement and migration related to climate change
- Energy history and energy humanities
- Impacts of climate change on frontline communities across the globe
- Curricular engagement with Boston-area climate initiatives and adaptations
- Addressing climate change via the arts (climate and film, climate and visual art etc.)
- Science and Technology Studies (in addition to adjacent fields such as History of Science and History of Technology)
- Climate fiction, poetry, literature, theater, and film

Shorter term/Actionable Opportunities

1. Environmental Studies Concentration

The most important opportunity to expand climate education in the Arts & Humanities community at Harvard is in the undergraduate curriculum. This committee proposes creating a truly interdisciplinary **Environmental Studies Concentration** for Harvard College students. This concentration would have several tracks that would map loosely onto the divisions (i.e., arts and humanities, engineering and science, qualitative and quantitative social sciences). Students would focus on a single track, while being required to take a limited number of courses in the other tracks. The program would model the kind of cross-divisional education that has long defined the best of the Harvard College liberal arts model. It would also match the scope of the global climate challenge. It would create a vital institutional structure for faculty across the disciplines to work together directly in the task of climate education. And



finally, it would capitalize on our university's distinctive advantage: excellence across the full ambit of disciplines and areas.

Our committee does not recommend the creation of a separate Environmental Humanities (or similar) concentration. Doing so would undoubtedly be the easiest route forward. Yet this type of unnecessary siloing, a problem which can be pervasive at Harvard, is precisely what we strive to transcend. As has long been clear, the scale and complexity of climate and environmental challenges demands a truly multidisciplinary approach that takes into account human responses to the problem as central to any solution. Our students deserve a concentration which prepares them for life in a multifaceted world, where expertise in diverse fields is necessary for success. Arts and humanities methods of learning provide crucial training for all students aiming to address any dimension of climate change work. They offer tools for ethical adjudication in complex contexts, and they support the creation of just standards of accountability and equity. They educate the imagination. They provide critical knowledge of, and appreciation for, global and local cultural difference. And they offer resources for the emergence of new values and commitments to sustain human flourishing in the coming challenging decades.

Climate change is not absent from the Harvard College curriculum, but our students' ability to grapple with this complex issue is limited by our current siloed curricular offerings. The closest approximation of the proposed interdisciplinary **Environmental Studies Concentration** is found in our current Environmental Science & Public Policy concentration. ESPP expertly covers many aspects of climate education. But it does not give our students training in the humanistic knowledge and methodologies necessary to understanding and solving environmental/climate challenges. Nor does ESPP enable students to engage deeply with the cultural knowledge produced in the qualitative social sciences that is a necessary component to addressing climate change worldwide. ESPP itself recognizes the importance of a fully multi-disciplinary approach on its website, which presents the scope of the challenge as follows: "The ability to form rational judgments concerning many of the complex challenges confronting society today involving the environment requires both an understanding of the underlying scientific and technical issues and an appreciation for the relevant economic, political, legal, historical, and ethical dimensions." Harvard's new climate education initiative gives the University the opportunity to enhance the fulfillment of this requirement by institutionalizing a more richly multi-disciplinary, cross-divisional undergraduate concentration, without displacing the excellent educational opportunities already available.

As it stands, Harvard College students eager to meet the climate challenge within a formal concentration may have to address questions of history, values, cultural difference, ethics, and aesthetics as these relate to climate under the guidance of faculty who are not trained experts in those fields. Or they may not have a programmatic home at all. The climate challenge does not map neatly to any one discipline or set of disciplines. Our students certainly see the problem in this way, even as they wish to develop core disciplinary specializations. Given this complexity, we propose a shared concentration with tracks rather than the further proliferation of smaller, siloed concentrations within the Harvard College curriculum. If there ever was an area of inquiry that requires full interdisciplinarity, it is climate change and environmental degradation.

Such training is critical to our students' efforts to answer the climate challenge. Seen at scale, the key impediments to climate solutions are cultural, economic, and political. The arts and humanities demand rigorous engagement with the historical, ethical, and philosophical dimensions of climate change/disruption. They prompt our students to consider complex issues from diverse standpoints, asking them to shift approaches in ways that strengthen understanding in scientific, social scientific, and technological disciplines. Similarly, as agendas shift from climate change prevention to mitigation and adaptation, questions of justice, resilience, and compensation come to the fore. Answers to these



problems will be stronger—and more effective—if they are fully informed by humanistic and qualitative social scientific training. Finally, the arts offer our students unique opportunities to make meaning out of processes that can be deeply alienating and disaffecting.

Establishing such a concentration will require a thoughtful and inclusive process within FAS and SEAS, and across the professional schools. We recommend the creation of a committee to explore how we might build on the successes of ESPP while expanding the concentration to provide a fully interdisciplinary approach to climate change education.

Support from the College, the Educational Policy Committee, the Office of Undergraduate Education, and the Vice Provost for Climate and Sustainability will also be vital in creating such a concentration.

Comparands

Creating a truly interdisciplinary Environmental Studies concentration will place Harvard at the forefront of climate education in the United States. To date, Harvard's peers and other institutions that engage seriously with environmental studies continue to silo the environmental humanities. Most of these institutions offer stand-alone Environmental Humanities concentrations or majors -- the very approach we advise against -- EH certificates, or EH minors. The Princeton Environmental Studies program gives a certificate that is interdisciplinary with a possible focus on humanities, but it is not a major. In addition, it does not require students focusing on the sciences to take even a single course in environmental humanities or students focusing on the humanities to take even a single course in environmental science. Yale College's Environmental Studies major includes under its single umbrella a range of [sub]concentrations in areas in the sciences, social sciences and the humanities, with a variety of distribution requirements. But humanities students are not required to take environmental science courses and students focusing on the environmental sciences are not required to take environmental humanities courses.

There are two exceptions. The first is Johns Hopkins University's major in Environmental Science and Studies ([Majors | Environmental Science & Studies | Johns Hopkins University \(jhu.edu\)](https://www.jhu.edu/undergraduate/majors/environmental-science-studies)). As part of this major, students choose between a BS in environmental science and a BA in environmental studies (focus on social sciences and humanities). Both tracks share a series of core courses which “provide a strong, interdisciplinary background in the environmental and social aspects of our changing world.” Johns Hopkins is actively seeking to grow the environmental humanities component of this major, including by extending the offer of a Krieger-Eisenhower Professorship to Harvard's Karen Thornber.

The second exception is Middlebury College, which in 1965 established the first Environmental Sciences program in the United States. Today, Middlebury's undergraduate major in Environmental Studies (<https://www.middlebury.edu/academics/es>) requires all students to receive basic training in environmental sciences, social sciences, and humanities, after which they can focus on a range of subdisciplines that encompass multiple approaches to knowledge: Biology, Environmental Chemistry, Environmental Geology, Conservation Psychology, Environmental Economics, Environmental Policy, Geography, Human Ecology, Architecture and the Environment, Creative Arts, Environmental History, Environmental Nonfiction, Literature, Religion Philosophy and the Environment.

In adopting our recommendation to create a truly interdisciplinary **Environmental Studies Concentration** (going above and beyond Johns Hopkins's and Middlebury's expectations regarding training outside a student's core focus),



Harvard College would be leading the country in demonstrating our conviction that the arts and humanities are indispensable components of the education of any student aiming to work on climate change.

2. Graduate Certificate in GSAS and Select Professional Schools

The Arts & Humanities subcommittee also recommends a **Graduate Certificate in GSAS and select professional schools** devoted to humanistic aspects of environmental studies. A certificate will credential graduate students in the environmental arts and humanities, rendering them competitive in a job market of candidates with equivalent credentials. Additionally, a certificate program will build lines of communication among key faculty in the environmental arts and humanities at Harvard.

Components of this graduate program might include:

- A required introductory seminar, taught in rotation by core faculty in environmental arts, humanities, and related social sciences. This seminar will introduce graduate students to key scholarship and conversations. Each session of this seminar will include a guest visit from either a Harvard faculty member working in environmental studies or a leading environmental academic at another university. Students will conclude the semester able to identify areas of active research at Harvard and able to navigate environmental conversations unfolding beyond our university.
- Two or three environmental electives beyond the graduate student's home department. Ideally, these courses will build towards a student's dissertation, increasing their fluency in the interdisciplinary aspects of their research.
- Generous funding for students completing summer internships in environmental career paths (including environmental communication, environmental justice nonprofit jobs, environmental think tanks, etc.).
- Competitive funding for students pursuing environmental research either domestically or abroad.
- Highly encouraged attendance at the Environmental Studies Forum (see below).
- An annual graduate student conference to share work, including a keynote speech by a prominent environmental scholar selected by graduate student conference organizers.

3. Environmental Studies Forum

Thirdly, the Arts & Humanities subcommittee recommends the creation of an **Environmental Studies Forum**. We believe the faculty steering committee of the undergraduate Environmental Studies concentration and the faculty steering committee of the Graduate Certificate should organize and run a monthly forum to address leading issues in climate change and environmental studies. These meetings will constitute a vital supplement to the undergraduate concentration and graduate certificate program. The issues discussed will draw primarily from the curricula of these programs. All concentrators and graduate students pursuing the certificate will be expected to attend regularly, along with affiliated faculty. The interdisciplinary nature of the Forum will be crucial to its purpose. The topics of the Forum will bring the various tracks of the concentration into conversation, and often lively debate.

Some questions for debate at the Environmental Studies Forum: How accountable must environmental technology and business be to global equity? How do we measure quality of life in the Anthropocene? How can we assess the impact of individual action and consciousness shifts upon macro trends in climate science? How do we weigh public policy decisions against inconvenient scientific imperatives, not to mention cultural difference around the globe? How can artists educate the human imagination of scientists and economists? The aim for the Forum would be to foster intellectual community at Harvard around climate change as well as new collaborative thinking across the sciences,



social sciences and the humanities. Speakers/debaters will alternate between Harvard students, Harvard faculty and staff, and invited scholars and practitioners. Funding to support generous honoraria will allow us to invite high-caliber scholars and practitioners to speak.

4. Undergraduate Houses as Living Learning Laboratories; Arts for the Future

The Arts & Humanities subcommittee recommends a re-envisioning of the University’s twelve **Undergraduate Houses as Living Learning Laboratories**. This effort is not specific to Arts & Humanities. Rather, it is necessarily cross-disciplinary. The Houses offer an ideal platform for students to put ideas into practice, providing settings exempt from the stresses of graded evaluation and open to inter-generational and peer-to-peer learning. Houses are diverse communities where students can (indeed, must) learn to negotiate differences in opinion respectfully. As informal settings that are nonetheless connected to the curricular elements of the University through faculty and tutors, they are places where fear of failure is less of a concern. Resident Tutors and Non-Resident Tutors might be oriented to programming geared to applied learning and community building, supported through a renewed faculty engagement via Senior Common Rooms and oftentimes modest funding. Living Learning Labs would offer partnership with departments and programs as well as University and FAS offices such as the Office for Sustainability and the Office of Physical Resources and Planning (OPRP).

Not all Houses would need to pursue this model, but two are already eager to move forward. Mather House, with support from the Harvard Climate Change Solutions Fund, will implement a program called “Measuring Mather” built around SEAS and Sciences faculty projects meant to measure energy expenditure and use in the House. Students will co-create data sets with FAS faculty who would then collaborate with tutors, graduate students, and undergraduates to use the data for policy recommendations within the House. Where Mather is focused on measurement, Cabot House is focused on meaning. The House would work with faculty from the Graduate School of Design, the Arnold Arboretum, Harvard Forest, and other programs to redesign the defining space of the House: the open spaces of the Radcliffe Quad. Gardening, water management, land acknowledgement, and other elements would become the subject of a year-long interdisciplinary course called “Quad Lab,” taught by the Faculty Dean with collaboration from colleagues in HUCE and elsewhere.

Our students are eager for applied learning opportunities. They relish the experience of meaningful agency—the capacity to change the world around them. The Houses offer an ideal stage for those efforts. Much of the University’s response to climate change will come through changes to physical plant and built environment, not least House Renewal. We propose integrating curricular opportunities into those costly and necessary changes to Harvard’s landscape and buildings. These two Living Learning Lab opportunities are only examples. Many avenues, some modest and others quite grand, appear once we embrace the concept.

Arts for the Future

House-based programming could be supported by an **Arts for the Future** Standing Committee, including faculty, staff, and students. This effort might find partnership in the Office for the Arts and include a dedicated fund for invited speakers, practical supplies, and trips. Topics and practices would range broadly and be responsive to student demand. Examples include (all of the below have been suggested by students):

- Stewardship and carbon-neutral planning and planting (use of open spaces, native species, rewilding, waste water reuse etc.)



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- Incorporation of solar, wind and other forms of infrastructure into the campus environment (Coop work with OPRP and other campus partners)
- Multi-species planning (bat houses, apiaries for pollinators, etc.)
- Community-level disaster preparation and response
- Family/Friends/Community: how to mourn; how to find/create community; supporting climate refugees; deciding whether to have children
- Developing “Political” skills: rhetorical skills; how to support a campaign; how to lobby; how to assess environmental records; organizing
- Developing “Practical” skills: ethical consumption; urban/balcony gardening; mending/sewing clothes; repairing bicycles; seed saving; water and air purification; reducing plastics
- How to live with climate anxiety; understanding the impacts of climate anxiety on mental health

Longer term/less constrained (resources/institutional) opportunities - 2030

- By 2030, Harvard needs to have a fully-fledged Environmental Studies concentration for undergraduates, which provides students in the College with the broad expertise needed to address the climate challenges of today and those of the future.
- Seven new FTE’s across Harvard with expertise in environmental arts and humanities
- Four new endowed Chairs in environmental arts and humanities
- Masters’ certificates in Environmental Studies across Harvard. The Masters programs in FAS and the Professional Schools will have established course requirements and criteria for students to receive certificates in Environmental Studies as appropriate for their disciplines.
- A signature annual event that supports and showcases environmental art (other universities hold annual environmental film festivals, for instance). A week-long gathering of climate writers from around the globe could generate high-profile readings open to the public. Each year, the writers could partner with a local climate justice project, collaborating with key stakeholders to articulate solutions and generate media attention.

Implementation and Barriers

- Implementing the above will require financial and human resources (faculty, administrators, and staff). It also will require flexibility and openness to new approaches, and a significant increase in collaboration across disciplines and schools.
- Such collaboration needs to be incentivized.

FAS - Science/John A. Paulson School of Engineering and Applied Sciences

Authors: Missy Holbrook, Rebecca Nesson, Dan Schrag, Steve Wofsy, Elsie Sunderland

Climate change has been a core focus of research and education for many science and engineering faculty at Harvard since the 1970s. The concept is construed broadly to include physical climate, the functioning and interactions of the major components of the Earth system that affect the composition and dynamics of the atmosphere and oceans, the functioning of the terrestrial biosphere (including agroecosystems), and the scientific basis for mitigation and adaptation. Several faculty members have extended these studies to include climates of other planets (e.g. Mars).



Other faculty have significant real-world experience bridging climate change science with policy/social science and several faculty with expertise relevant to climate change jointly appointed with the Kennedy school.

The faculty in science/engineering have informed curriculum development in climate and environmental science more broadly with this holistic view of climate science as a grand intellectual challenge motivated by a compelling need for engineering solutions to address critical global issues. Undergraduate concentrations and graduate programs in these areas include Environmental Science and Engineering (ESE), Earth and Planetary Sciences, and Environmental Science and Public Policy (ESPP, undergraduate only). The Harvard University Center for the Environment (HUCE) supports a wide array of cross-University educational activities related to climate change, providing a unique resource for educating students in the multiple links between the different aspects of climate science.

To build out interdisciplinary and experiential learning in climate and environmental science commensurate with the urgency of understanding and addressing climate change will require substantial additional resources, a strong infusion of committed younger faculty, and a willingness on the part of the University to make curriculum development and expansion in climate science a priority, including resources for active learning and strategic faculty hiring.

What should climate education at Harvard look like in 2030? The three principal concentrations focusing on climate need to be upgraded and strengthened to satisfy strong student demand for disciplinary and advanced education to address climate issues in the real world. In addition, Harvard students in all fields of study should understand in a meaningful way the causes, consequences and challenges posed by climate change, sufficient to be able to assess what actions and policies will have a measurable and durable impact, and which will not. Students should be motivated to understand the political, economic, scientific, and social dimensions of the climate change problem and how interdisciplinary solutions are needed to address the problem. Finally, students should be able to critically assess the uneven societal impacts of climate change and all proposed measures to combat it.

Current state of play

- Many faculty have long-standing research efforts related to the challenges of climate change.
- For students who are not specializing in climate or environmental science, there are multiple courses at the Gen Ed level that are centered on climate change (e.g., GenEd 1094 Confronting Climate Change (available for credit across the University and a version offered on-line through the extension school), ESE 101 Global Warming Science, OEB 157 Global Change Biology, ESPP 90). In addition, many entry level science courses include substantial discussion of climate change (e.g., ESE 6 Introduction to Environmental Science and Engineering, PS 11 Foundations and Frontiers of Modern Chemistry). These courses help to inform science and engineering students about climate science and its connection to critical elements of the Earth system.
- The three environmental undergraduate concentrations (ESPP, EPS and ESE) plus a secondary field (E&E) provide opportunities for students to delve deeply into climate science in their course work. Strengthening these concentrations and informing the linkage between natural and biological science, climate issues, and societal needs are priorities for climate-focused learning for these students.
- The Climate Solutions Fund has been fostering innovation in hands-on learning in this area. For example, Prof. Mahadevan (Applied Math; Mather House Dean) has recently received funding from the Climate Solutions Fund to build out a quantitative project at Mather (“Measuring Mather”) on resource/energy use and sustainability and integrate this into a project-based course.
- The HUCE graduate consortium on climate and environment provides graduate students from across the university the opportunity to become well versed in the interconnected challenges of climate change and



energy through interdisciplinary coursework and regular group discussion sections led by Harvard faculty. Science students complement their graduate research with learning in social science or economics, and social science students gain better knowledge of the physical and biological components of the climate system.

- New faculty hires are in the works: (i) a senior appointment in biodiversity and ecology in OEB, for which the top candidate's work focuses on how climate change (and other environmental stressors) are affecting plant diversity. (ii) Cluster hires in SEAS are focused on two areas: 1) energy technology and the energy transition; and 2) climate science. Curriculum needs feature strongly in shaping this creative initiative. (iii) FAS Science has analogous cluster hiring in discussion. These areas are of high priority and would strengthen SEAS and FAS climate education.

Shorter term/actionable opportunities

For Faculty:

1. Create a strong cohort of young faculty committed to research and education in this area through new hires, exploiting in particular the cluster hire paradigm.
2. Exploit the opportunity to develop new courses in coordination with the Learning Incubator (LIInc) Fellows program at SEAS that provides support for faculty and pedagogical fellows to help with course redesign. Consider expanding this approach to FAS Science. HUCE already does this, and the Climate Initiative should strengthen and expand the effort.
3. Engage students in critical and quantitative studies of sustainability, including by making use of Harvard's OFS and the living lab initiative to develop helpful practicum.
4. Encourage co-teaching of cross-disciplinary courses across schools/departments/clusters that enhance dialogue re: climate change solutions.
5. Expand capacity and gain visibility in the climate space through visiting faculty.
6. Support faculty and staff development in the area of climate change (i.e., to help science faculty learn about policy/economics, etc.) – potentially in the form of workshops or semester-long fellowships.
7. Award postdoc fellowships in climate education and communication, which could bring talented young scientists to work with faculty to develop/expand courses and non-credit learning experiences

For Graduate students:

- Ensure the continuity and growth of the HUCE graduate consortium in climate and environment.
- Develop workshops and field trips (potentially in collaboration with other schools) focused on climate change – to provide opportunities for learning about climate change outside of semester-long classes.

For Undergraduates:

- Emphasize competency in climate change: either through a Gen Ed course or non-classroom opportunity that most students will experience while at Harvard.
- Strengthen and support EPS/ESPP/ESE/EE (for ESPP – make sure teaching in ESPP is valued by home departments, hire more faculty with policy/social science experience; larger budget to enable more field trips/experiential learning);
- Expand summer support/internships for students by developing new opportunities to work with alumni and connecting students with policy/business leaders.



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- Develop climate change content for pre-matriculation programs (either digital (like Zero-L) or residential).
- Utilize J-term for undergraduate education in climate (use the HUCE-led J-term workshop (pre-covid) as a model).
- In SEAS, better integrate design education and design approaches to solving large, complex, problems. One offshoot of this could be a Gen Ed pr 100-level course that includes design/design engineering approaches to climate challenges.

Beyond Harvard:

- More extension school and/or HarvardX courses to broaden reach; collaborate with other Universities in developing/sharing teaching materials.
- Work with GSE and/or Museums/Arnold Arboretum/Harvard Forest to develop/expand climate education materials for K-12.

Longer term/less constrained (resources/institutional) opportunities

- More faculty; faculty cluster hires in climate, biodiversity, energy technology.
- New Ph.D. options that integrate science and policy/social science.
- Explore developing new cross-school Master's/Professional/certificate programs: policy/business/design/science; seas/design, ed/climate change science, law/policy/biodiversity science (biodiversity conservation and climate change – potentially a draw for individuals in countries where biodiversity is at high risk).

FAS - Social Science

Authors: Jason Beckfield, Janet Browne, and Dustin Tingley

This memo summarizes ideas about how social scientists currently contribute to climate education at Harvard, and how those contributions might develop alongside Harvard's new climate change initiative. In preparing this memo, we spoke to faculty, students, staff and alumni via 1:1 meetings and listening sessions. The social sciences cover a broad range of perspectives and needs, and we undoubtedly omitted insights. Economics was covered by a separate group as part of the committee's efforts.

The Current Situation

Faculty, students and staff in Social Science are excited to work on climate change. In our listening sessions, surveys, and conversations with students, faculty and staff, we sensed a deeply felt urgency to use the tools of social science to address the seemingly intractable problems of climate change. While there seems to be an age/cohort gradient, and subfield differences, in the degree to which social scientists prioritize climate change, overall enthusiasm was palpable. Moreover, the social sciences are ideally situated to add important cultural, historical, and social dimensions to many aspects of the current crisis. We find that these cultural and social aspects rank highly in our surveys and discussions.

Searching, for example, the 2019-2020 FAS Course Catalog in the social sciences for "climate change" yields two kinds of courses (see appendix). Eight with "climate" or "climate change" in the title and eighteen with climate change in the course description. We, and students we discussed current offerings with, see this as paltry at best. And this



course desert parallels feelings around co-curricular and extra-curricular opportunities that are attractive to students interested in the social sciences.

There was also a deep recognition of the intersections between climate change and other topics of deep interest in the social sciences. For example, some BIPOC members of the social science community see the problems of racism and racist violence in the United States as more dire, since they are life-or-death today rather than life-or-death tomorrow. We highlight this aspect at the outset, given that diversity, inclusion and belonging, like climate change, are among Harvard's highest priorities. One way to align these priorities would be to integrate insights across climate science and environmental justice as part of the social science curriculum. Notably, History already has doctoral students working on environmental racism and Black geographies and Sociology has two students working on energy transition and climate resilience. History of Science has several doctoral students working on historical and sociological aspects of human interaction with the environment, including legislation and in non-western contexts. Graduate students in Critical Media Practice (a GSAS secondary field) often engage in film work related to these topics.

Undergraduate students in Social Sciences expressed interest in taking both foundational courses within their concentration, but also take courses on broadly integrative themes. These include integrative themes like Economically Just Transitions, Extinction, Loss of Biodiversity, Exploitation of Indigenous Peoples, the Anthropocene, Repositioning of BIPOC People in Climate Politics, Global Food Systems, and the Politics of Water. Graduate students in History specifically want courses on the Anthropocene, Climate Politics, and Climate Arts (e.g., film). A number of students expressed great interest in topics and perspectives that are not US or western centric, and that have a more international orientation generally.

Actionable Short-Term Opportunities

We see several different types of short-term opportunities.

One type relates to awareness of what curricular opportunities do exist. Students and advisers would benefit from up-to-date listings of courses on climate change. Perhaps this could be built into digital tools such as syllabus.harvard.edu, or even manually curated each semester by a centralized organization (e.g., [HUCE in part does this](#) but keeping it up to date and usefully search faceted will always be a challenge) and distributed through coordinated efforts in the house system. Wording in course descriptions does not always indicate how topics might be presented to students and so faculty could explicitly include key phrases such as “climate change” in order for it to be more readily picked up.

Another relates to the types of curricular offerings available. Within Departments, offering a core course that is followed up by elective opportunities would be a clear place to start. Coordination within the Gen Ed program on climate and social science courses would also be an opportunity to take advantage of existing Gen Ed courses but also perhaps a core social science focused course that spans a variety of disciplines (e.g., politics, sociology, history, economics, law).

Centers can support cross-disciplinary and cross-school efforts, such as the Center for Population and Development Studies' new *Population Dynamics of Climate Change Initiative*, which brings together Sociology, Demography, and Public Health. As a new effort this year, faculty are planning to develop research projects linking climate change to its demographic causes and effects.



The Mindich Center currently supports partnerships between Harvard faculty and community organizations. Course development and internship programs are two straightforward mechanisms for the integration of classroom and community. Mindich also supports students and faculty working on water pollution in the Charles River by bringing in community groups and policymakers. This model (faculty member + students + NGO) offers excellent opportunities for multidisciplinary engaged learning.

Undergraduates expressed substantial interest in Engaged Scholarship projects, like the Boston Climate Plan Class project that is being done in Ansolabehere and Tingley's Gov 1722 course (and which drew in Harvard alum) or the [Fellows at the Forefront program](#) that has a climate module led by Tingley. The Fellows at the Forefront program from the Center for Public Service and Engaged Scholarship has piloted a model where a group of students is led over the summer by a faculty member working on climate. Some students are in internship programs in the climate space, and others work as a research assistant. Importantly, the program creates opportunities for students to share their experiences working in different domains.

Combining (a) student interest in learning research skills with (b) the urgency of climate change and (c) the reality that social science faculty are often engaged in research on "live" problems, a credited and paid Climate Internship program could be developed to align with departments' undergraduate course offerings of the "91R" type.

Turning to graduate students, we see increasing interest in climate change across fields, suggesting that field [fellowships to support dissertation research on climate change](#) would be welcome, and would repay the investment. However, students express hesitation in working in this area given that it has not been a mainstream part of many social science disciplines. Pathways to help such students be supported within their field (not just here at Harvard) are underway, such as the Weatherhead Center for International Affairs has supported a [Climate Pipeline Project](#) that seeks to foster PhD students and untenured faculty working on climate in political science. However, efforts like these are time intensive for faculty providing these [discipline wide public goods](#).

We also note an important role for a series of co-curricular events that could address various dilemmas we face. For example, we might invite perspectives on "What causes climate-related social behavior to change?" or "How should we think about contingency, eventfulness, and timing in mitigating and adapting to climate change?" and convene intensive symposia on such questions where we deeply involve student ideas and participation as appropriate.

While exciting, these opportunities are short-term and modest in ambition.

Potential Long-Term Opportunities

Community partnerships

Harvard faculty and students come from almost everywhere, including places that are already experiencing fatal extreme weather events linked to climate change or are struggling with policy and environment induced transitions. Harvard faculty and students also study nearly everywhere. And Harvard alumni, with deep expertise and connections, live all over the world. Those social and intellectual ties present opportunities to form deeper partnerships with communities and organizations far from 02138, but such partnerships need to be real relationships that develop and deepen over time with sustained and serious investment.



Fellowships and other visiting positions for people from a variety of backgrounds and locales, including leaders of indigenous communities and fenceline communities, Frontline adaptation leaders, and local/state/national/international policymakers, could help in further building relationships. Such systematic opportunities should be explicitly coordinated with schools and organizations outside the FAS. To date, this coordination has been appropriately decentralized. But as Harvard works towards greater coordination, this coordination can be done in ways that collectively benefit all of Harvard's students while still allowing for Schools to develop unique opportunities for their students.

Often, communities and organizations outside Harvard come to feel that they are in an extractive relationship with Harvard, where Harvard faculty and students gather data and expertise from them, without returning anything tangible, and without being open to genuine two-way collaboration. The social science community is well equipped to avoid these perennial challenges. And our alumni can be a crucial partner with the local community they inhabit or that they work with as part of their own climate leadership.

The integrative themes we discussed above would help students be intellectually prepare for these experiences. Likewise, robust community engagement would be facilitated by students taking interdisciplinary courses offered by instructors of different backgrounds. For instance, an urban sociologist and an urban anthropologist could show how different concepts and methods related to place and locality reveal the multilevel, multidimensional realities of climate change through deep understanding of human settlements. Continuing with the urban theme, a scholar of local politics could work with a scholar of urban planning to surface different dimensions of the urban/climate nexus.

Deepening Connections with Professional Schools

Social science students in the social sciences are well aware of the fact that Harvard is also home to some of the top professional schools in the world, including the Kennedy School, Business School, and Law School. How can Harvard take advantage of the convening and recruiting power of these institutions in a way that benefits a range of students?

We hope that existing and new institutions, such as the Institute of Politics, can take on climate change as a core area of interest. This could manifest in a variety of ways, including internship programs that place multiple Harvard students in the same organization so an undergraduate government student is working alongside a MPP student (for example).

Similarly, while joint appointments across schools always face challenges, our ability to recruit talented social scientists to the faculty might be improved by such opportunities. As many other schools are hiring in this area, we will face competition.

Finally, there will be emerging opportunities offered by the professional school curriculum developments that should be evaluated for their appropriateness for undergraduate liberal arts students. For example, the Law School will be offering a course on "lawyering", or how law can be practiced across a range of climate and environmental areas. We strongly suspect there would be substantial undergraduate interest in such a course. But we have to make sure such an expansion, or even "cloning", is incentive compatible for our colleagues at the Law school and financially feasible for the FAS. Further, we emphasize that these connections need not stop at traditionally social science oriented professional schools. Rich opportunities could emerge from intersections with SEAS given that engineering projects often take place in deeply social contexts, and also create social infrastructure. And, historically speaking, avoiding this



intersection has led to disastrous outcomes especially for the most marginalized in society. Indeed, one student in our survey suggested “A cohesive set of team-taught courses that address sustainability and climate challenges. I could imagine a sequence that engages faculty from multiple schools around core issues..., ranging from the potential of technological solutions, health effects, and earth systems, to cultural influences on behavioral change.”

Education beyond Harvard

In the past decade Harvard has invested considerably in bringing high quality educational opportunities to the world. However, the role of climate and the social sciences is virtually absent to date in these efforts. There are a handful of executive education modules, a handful of niche online courses, and limited offerings via the Extension School. This is unfortunate given that the climate change challenge will be just as much social and behavioral in nature as it will be a technological or scientific challenges. And these modes of offering content can help transcend barriers such as different time zones or inability to travel to Cambridge. Such opportunities dovetail with ideas featured in the recent [Future of Teaching and Learning report](#). They also resonate with suggestions from the Harvard community survey (“Take some of the education out to the public sector and make it available for companies (multi-nationals or large corporations) to put their staff through a short-course or summer course to increase scope and reach.”).

Implementation and Barriers

The number one barrier we heard about in our conversations is that Harvard lacks a critical mass of faculty to create a coherent social science curriculum on climate change, and to offer advising to undergraduate and graduate students. This is reflected in the minimal course offerings in this space. Across the whole division in AY 2019-2020, the last pre-COVID set of course offerings, we had only 8 courses centrally about climate change, and no clear progression or thematic structure. Government had 1, and Sociology had 0, for instance. And where they exist, there is no clear progression or thematic structure even with Departments. Further, the few faculty working in this area are overwhelmed with requests from students across the College, GSAS, and the professional schools to meet and discuss their interests.

Several faculty said they would be interested in doing more in this space, but that they felt like they as scholars know too little about the general subject area to be effective. This is an important consideration because, for example, Harvard should avoid the “101 problem” (Dean Claybaugh interview, spring 2022) where students take multiple courses that all have similar “101 level” introductions to climate issues.

One way to address this faculty gap is cluster hiring, where departments compete for lines. UBC, Washington, Georgetown, and Berkeley all recently hired clusters of climate scholars. Stanford’s new school on climate and sustainability ran a cluster search on environmental justice and sustainability that was targeted at social scientists. Recently there was progress at the Kennedy School in hiring a set of economists, but not other social scientists.

Where we do have the right faculty, teaching across Departments, Divisions, and Faculties still confronts the credit problem: who gets credit for teaching a course, who gets credit for taking a course, and is a co-taught course worth as much to the department/division/faculty as a sole-taught course? And, in the case of courses with cross-registration, how do we accomplish quality control, such that social scientists don’t feel they are “faking it” when teaching about climate science (and, presumably, vice-versa)? And how can cross-registrations count towards the provisioning of teaching fellows, which currently does not happen in FAS.



University-wide Economics

Authors: Robert N. Stavins, Robert Stowe

Key Points

Based on data drawn from surveys completed by eight faculty members in the Faculty of Arts and Sciences (FAS), Harvard Business School (HBS), Harvard Kennedy School (HKS), and Harvard T.H. Chan School of Public Health (HSPH); as well as six students (4 Ph.D.: 2 Economics and 2 Public Policy); two HKS master's students (one MPP and one Mid-Career MPA):

3. Significant educational offerings currently exist in climate-change economics at HKS (doctoral, masters-level, and executive education), FAS Department of Economics (primarily undergraduate), and HBS (MBA).
4. Some of these courses are exclusively or largely focused on economics of climate change (HKS and FAS Economics), but most are courses with other primary focuses and contain limited sessions or material on climate change economics.
5. HBS is undertaking a number of exploratory initiatives that may lead to new degree-program courses and executive education courses.
6. Future opportunities to strengthen climate-change-economics education consist of new courses with climate-change as their primary focus, based primarily or in part in the discipline of economics.
7. A particular need is for a PhD-level course or two-course sequence on the economics of climate change and climate-change policy. (Note that a visitor will teach such a course in the Department of Economics in the 2022-23 academic year.)
8. Additional financial/human resources – as well as administrative measures to facilitate further cross-school collaboration – are required to implement the full set of promising opportunities for expanding educational offerings.

Current state of play (including initiatives in progress)

Significant educational offerings exist in climate-change economics at HKS (doctoral, masters-level, and executive education), FAS Department of Economics (primarily undergraduate), and HBS (MBA). A small number focus solely or largely on this topic; the others have one module or a small number of class sessions on climate -change economics.

Following are courses identified by faculty and students. In this list, courses that are solely or largely on the economics of climate change are in **bold**:

Harvard Kennedy School

For-credit courses:

- [API-101](#) and [API-102](#) (required core courses): “Resources, Incentives, and Choices I & II” (“Markets and Market Failures” and “Analysis of Public Policy”). These courses have included some discussions and analysis of the social cost of carbon and other topics related to climate-change economics. Content varies across sections.^[2]
- [API-135](#) (cross-listed as **ECON 1661**): **“Economics of Climate Change and Environmental Policy.”** **This course is exclusively dedicated to climate-change policy from an economic perspective.**



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- [API-165](#): “Energy and Environmental Economics and Policy.” The majority of this course is climate-oriented, with grounding primarily in economics.
- [API-905y](#) (cross-listed as ECON 3116): “Environmental Economics and Policy Seminar.” In most semesters, the majority of sessions (eight in spring 2022) address climate change. *This seminar of guest speakers is currently the only Ph.D.-level course in climate-change economics at Harvard. All four of the doctoral-student respondents – and one of the master’s students – found the seminar of considerable value.*

Executive Education: Much of the content of the following two programs is based in economics:

“[Climate Change and Energy: Policymaking for the Long Term](#)” (in-person); offered five times, with 216 total participants;

“[Climate Change Policy: Economics and Politics](#)” (remote); offered three times, with 223 total participants.

Seminars and Other Not-for-credit Opportunities:

- [Graduate Student Workshop in Environmental Economics](#): Organized by economics doctoral students in various Ph.D. programs, who make presentations, often on climate-related topics. *All four of the doctoral-student respondents value this seminar highly.*
- The weekly [Energy Policy Seminar](#) occasionally hosts economists who make presentations related to climate change.
- The Regulatory Policy Seminar occasionally hosts economists addressing climate-change policy.
- Harvard Climate Internship Program: This Harvard-wide program will help students identify climate-related summer-internship opportunities, provide financial support, and provide weekly programming and mentoring from faculty for participating students. (Three of the student respondents noted the need for more internship opportunities, and interaction at Harvard with visiting practitioners.)

Faculty hires: HKS recently conducted a cluster search for new faculty working on climate change. One of the two sub-searches focused on policy, and included economists conducting research and teaching on climate change, environment, and natural resources. HKS has hired a new assistant professor, Charles Taylor, who will join the faculty in July 2023, and tenure offers have been made to Solomon Hsiang and Catherine Wolfram.

Department of Economics

For-credit courses:

- [ECON 50](#): “Using Big Data to Solve Economic and Social Problems.” Climate change is among a number of topics addressed.
- [Econ 980CC](#) (junior seminar): “Readings on Market Imperfections and Implications for Government Intervention.” One week on climate change.
- [Econ 1661](#) (cross-listed as HKS API-135): “Economics of Climate Change and Environmental Policy.” This course is exclusively dedicated to climate-change policy from an economic perspective.
 - [Econ 2450B](#) (graduate course): “Public Economics and Fiscal Policy II.” One week on climate change.
 - [Econ 3116](#) (cross-listed as HKS API-905y): “Environmental Economics and Policy Seminar.” (See notes under “HKS” above.)



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- [FRSEMR 42H](#): “U.S. Energy Policy and Climate Change.” While a freshman seminar and not within the Department as such, the seminar is taught by Jim Stock and draws heavily upon insights from economics.

Seminars: The public and labor economics seminars for Ph.D. students occasionally have topics related to climate and climate change.

Harvard Business School:

For-credit courses:

One respondent listed six core courses and thirteen electives that include at least one session based in climate-change economics. The full list is in Appendix 1. Among electives that appear to deal extensively with climate change and that have economics content are the following.^[3]

- [1135](#): Global Climate Change
- [1142](#): Global Energy in Transition
- [1324](#): Risks, Opportunities, and Investments in the Era of Climate Change

Executive Education:

Two HBS executive education programs, “Agribusiness Seminar” and “Strategic Management for Environmental Leaders,” address economic dimensions of climate change and climate change policy.

Course Development in Process:

- Forest Reinhart and Michael Toffel are exploring additional opportunities for MBA students to learn about the energy transition, via an elective course and/or student seminar.
- George Serafeim, Toffel, and others are exploring the possibility of developing business and climate change course material that could be deployed in the MBA core.
- Reinhart and Toffel are developing an HBS Online course on business and climate change that is expected to launch in January 2023. This will serve double duty, in somewhat modified form, as an executive education program.
- Serafeim and Toffel are developing course materials on decarbonization that might be deployed as an MBA elective, a recurring executive education program, and an HBS Online course.

Harvard T.H. Chan School of Public Health

For-credit courses:

- HPM 260: “Health Economics with Applications to Global Health Policy” has some climate-change economics content.
- RDS 284: “Decision Theory” includes sessions on long-run discounting, with climate change as a primary example.

Harvard Law School



For-credit course: [HLS 2589](#) (cross-listed at HKS as [API-305](#) and FAS Department of Economics as Econ 2050): “Behavioral Economics, Law and Public Policy.” Has significant climate-change and energy content.[4]

Shorter term/actionable opportunities

Survey respondents noted several short-term opportunities for strengthening education in climate-change economics:

- Three faculty respondents suggested, with somewhat varying emphases, adding a regularly-taught advanced course in climate-change economics, following API-135, and cross-listed between the FAS Department of Economics and HKS. *Two of the four doctoral-student respondents stated that such a doctoral-level course was the highest priority in the near term, and a third felt it was important.* Marty Weitzman taught such a course, primarily for doctoral students, and, as noted above, such a course will be offered by a visitor in AY 2022-23. One respondent suggested that this course might include some environmental cases or topics other than climate, which might broaden its appeal.[5]
- Adding an HKS course that would provide a broad overview of climate-change-risk management. It would draw from economics, political science, international relations, and science and engineering. Another faculty respondent, based elsewhere at Harvard, provided a related recommendation for a course on environmental regulatory impact analysis and the methods needed to assess environmental risk, and quantify benefits and costs of alternative policies, of which climate would be part.[6]
- Designing a course at HSPH with a specific focus on climate change, economics, and health.
- Designing a cross-listed course (home School to be determined) centered on integrated assessment models, providing understanding of and integrating information about the climate system (from the natural sciences), impacts, damages, and abatement technologies. The respondent taught some of this material as part of an ESPP tutorial (ESPP 90v, Economic evaluation of environmental regulation, 2012-2014).
- Providing more opportunities for formal and informal learning across Harvard schools – and perhaps across universities in the Boston area. Three doctoral and one master’s-level respondents emphasized this approach, in various ways. Another Ph.D. student, though not explicitly making such a suggestion, noted the need for “[m]ore formal treatment of environmental justice and climate justice” – which would probably require cross-disciplinary and perhaps cross-school collaboration.

One faculty respondent suggested adding a joint HKS/Econ/HBS seminar series on climate, parallel to the current [Inequality and Social Policy Seminar](#). Unlike Econ 3116/API-905y (Seminar in Environmental Economics and Policy), it would be limited to climate change and would be broader than economics.

The chair of this report notes that opportunities for collaboration exist, in particular, between HKS, the Department of Government, HSPH, HLS, and HBS – as illustrated at various points in this report.

One – though surely not the only – approach to addressing this need is expanding the scope of the Harvard Environmental Economics Program (HEEP). HEEP is currently “a venue to bring together faculty and graduate students from across Harvard University engaged in research, teaching, and outreach in environmental, energy, and natural resource economics and related public policy.” After some careful reflection and planning, HEEP might address some of the needs identified through the survey.



- Adding a course in electricity economics, regulation, and policy – an important topic, in part with reference to a world with higher penetration of renewables. Bill Hogan taught an advanced course on electricity policy for many years, but recently retired from teaching.
- One faculty respondent suggested adding a course – probably at HKS – in sustainable development, based in economics and political science, and including components focusing on climate-change mitigation and adaptation. A master’s respondent similarly felt a need for more cases dealing with developing countries.
- Develop an online tool that centralizes the various offerings related to climate change and economics at Harvard (i.e. courses, workshops, student organizations and publications, faculty who conduct research on the subject, recent relevant publications from Harvard affiliates) to allow Harvard community members with interest in this area to easily learn about existing opportunities.^[7]

Shorter-Term Opportunities for Online Offerings

Three faculty respondents noted shorter-term opportunities in online education, part of the broader educational evolution at Harvard. Efforts are ongoing at HKS to expand online offerings of various types on climate change, including climate-change economics. See, as well, HBS-course-development points above.

Longer term/less constrained (resources/institutional) opportunities

Responses from faculty included the following:

- More cluster searchers, along the lines of HKS’s recent search (see above), which this respondent suggested would be very helpful for generating a group of scholars who can facilitate educational opportunities focused on climate-change economics.
- HBS needs more faculty capacity to teach various aspects of business and climate change, which would include climate change economics. This might arise if more existing faculty turn their attention to this topic, but new hires in this space are also needed.
- Establish a Harvard Center for Climate Change Economics or a department of environmental economics at Harvard, which would:
 - Consolidate the various disciplines and operations across Harvard that conduct work related to climate change economics;
 - Expand and house research projects;
 - Host conferences, talks, and offer opportunities for students to connect with professionals;
 - Collaborate with similar centers at partner institutions;
 - Promote greater awareness on climate change economics within and beyond the Harvard community.
- Perhaps somewhat related to the previous suggestion, one doctoral student suggested that (links added):

“[A] potential way to improve climate-change-economics education at Harvard is to develop a strong research cluster in this space. I think the [[Energy Institute at Haas](#) {UC Berkeley School of Business}] or [[Energy Policy Institute at the University of Chicago](#)] could be a very interesting model for this, where there is a large set of strong faculty in the given field with institutional knowledge and funding to hire a team of graduate students and pre-doctoral research assistants and produce leading research in the field. [The Harvard Environmental Economics Program] is a great networking tool, but something with more a more concrete, institutionalized research program and agenda and a strong PhD training mission like [at Haas] would be fantastic and could go a long way to establishing Harvard



as a leader in this space. This obviously would take substantial funding, so I put this here as a longer-term improvement.”

We note that it is hoped (and expected) that the new HKS junior hire in environmental and resource economics plus the two outstanding senior offers to a climate-change economist and an energy economist will facilitate the establishment of a strong climate-change economics research cluster at HKS and Harvard more broadly.

Implementation and Barriers

Each of the opportunities discussed above would require additional faculty resources – often new hires – with specific academic focus on climate change and economics. Additional financial resources would be needed for faculty, staff, and – at times – space. Online opportunities may require additional support from designers and producers of digital materials and from experts in online pedagogy. Respondents did not attempt to quantify such additional resources at this stage.

Both faculty and student respondents also noted, with varying emphasis, the need for continued development of cooperation and communication among schools, units, and departments, if the above opportunities are to be realized. In this regard, one HBS faculty respondent observed: “Organizationally, we need to figure out how to prioritize hiring more faculty in this area, given our department-focused approach may not sufficiently prioritize this topic ... Our hiring process (which at HBS is done exclusively via our departments) may not sufficiently prioritize this topic to enable more ladder faculty to be hired in this area.”

Harvard Kennedy School

Authors: Suzanne Cooper, Daniel P. Schrag

The Harvard Kennedy School’s mission is to improve public policy and leadership so people can live in societies that are more safe, free, just, and sustainably prosperous. Engaging in research and teaching about climate, energy, and resources is essential to our mission, and we work hard to provide a broad array of learning opportunities for our students. Still, as we think to the future, we hope to do more to educate the next generation of public leaders who will face a changing climate and the many global and local challenges that will result.

HKS has been a strong contributor to University activities on climate change policy, and we expect that to continue. In particular, we have a number of climate-related courses taught by our own faculty, several that are taught by jointly appointed faculty, and our faculty contribute to courses in the ESPP concentration in the College. In this memo we focus on the first two categories and assume that the co-chairs and FAS teams can cover the ESPP-specific curricular offerings.

Current State of Play at HKS

The existing learning opportunities for students in the area of climate and environment at HKS are many. Courses entirely or substantially about climate and environment include:

- a. API-135: Economics of Climate Change and Environmental Policy (cross listed as Econ 1661)
- b. API-165: Energy and Environmental Economics and Policy
- c. API-905Y: Seminar in Environmental Economics and Policy (cross listed as Econ 3116)
- d. DEV-209: Management, Finance, and Regulation of Public Infrastructure in Developing Countries



- e. IGA-402: Confronting Climate Change: A Foundation in Science, Technology and Policy (University-wide course)
- f. IGA-408: Climate Disruption: Emerging Topics in Policy, Politics, and Technology of Climate Change
- g. IGA-412: The Geopolitics of Energy
- h. IGA-413M: The Energy-Climate Challenge
- i. IGA-455: Environmental Politics: Persuasion, Advocacy and Negotiation
- j. IGA-513: Science, Power, and Politics
- k. IGA-565M: Analytical Methods for Complex Adaptive Systems
- l. IGA-671M: Policy and Social Innovations for the Changing Arctic

With this array of courses, students who are eager to delve into policy issues from an economics standpoint and/or engage in the political process and/or bridge from science to policy have a rich array of offerings. Although some of these courses fulfill requirements for Harvard College students (in Economics and ESPP), at this time there is no requirement that HKS masters students take any of these courses.

In parallel with these for-credit courses for degree-program students, the HKS teaching mission extends to those professionals who do not leave their roles for full-time Harvard enrollment but rather engage intensively but briefly in our Executive Education programs. Through this venue we offer a one-week, intensive course on Climate Change and Energy: Policymaking for the Long Term. Through recent renewed collaboration between HKS and SEAS, including a joint event with both deans and a number of faculty in April 2022, we expect further opportunities to engage in bringing science/engineering and policy together for professional audiences.

In addition to formal learning opportunities, there is a student-organized group known as the Climate, Energy, and Environment PIC which facilitates informal learning opportunities as it “supports student engagement in topics related to climate change, energy, sustainability, and the environment. CEEPIC hosts student meetings to foster community around these topics and also works with various campus initiatives and centers to host guest speakers. CEEPIC also supports employer recruiting events, dinners with practitioners, skill workshops, working groups, and social events.” In addition, our PhD students meet once per week in their own working lunch series, ECON 3016: Graduate Student Workshop in Environmental Economics.

This memo does not address the many important research programs led by our faculty. Those research programs often lead to student projects as all our two-year students do a capstone “Policy Analysis Exercise” or the equivalent, some students arrange “Reading and Research” independent study learning opportunities with our faculty, and our small but highly selective PhD programs include students who study energy and environment (including alumni such as [Nat Keohane](#), [JR DeShazo](#), and [Richard Newell](#)). Our [Sustainability Science Program](#) has provided a number of post-doc opportunities as well.

If HKS has a weakness, it is the even longer list of important research initiatives we could include, which are only loosely connected to one another if at all. As with most faculty, the work is of high quality and high importance, but mostly run by independent faculty with limited coordination or collaboration. As it relates to curriculum, each faculty member teaches in their own area of expertise, but there is limited co-teaching across disciplines to bring approaches and perspectives together for students. Rather, the students select from the broad range of courses and assemble a climate-focused curriculum for themselves.

Shorter Term / Actionable Opportunities



There are four key areas in which we could expand climate education at HKS:

1. Field-based experiences

HKS has several faculty who teach field-based courses with student projects tailored to learning goals. Several faculty suggested that they could include climate-related projects among those offered to students in their existing classes. Significant expansion of such courses and the number of climate-related projects and students who could engage in such a project would take more resources, but in the near term climate could be added to the list of topics these courses engage with. As one specific example, Linda Bilmes teaches an HKS course that is field/project-based on the topic of budgeting, and she works with the city of Boston on climate-related topics such as flood insurance.

2. Leadership development

HKS has a rich set of curricular offerings in leadership development, but we could consider – if the faculty were willing – an offering that focuses on the leadership skills that will be required for our students as they need to prepare others for climate change implications such as migration, changed behaviors in everyday commuting, inequities in ability to adapt, and political implications. We have one such course (see IGA-455 above) but that course is not focused broadly on leadership development.

3. Implementation/Deployment of Existing Solutions

Although HKS does not have specific expertise in this topic beyond the courses we offer currently, students (particularly those we heard from in CEEPIC) have requested a focus on clear actionable steps they can take in their careers to implement climate mitigation strategies that are already in existence but not in widespread use. They are intrigued, of course, by the world-class research of our faculty. But they want to know what they can do in June when they graduate and go work for a city or national government or advocacy non-profit. These students are not as concerned with the world of 2050 as they are with the world of 2022 and how to handle the world as it is. To offer such a course would likely require collaboration among faculty to bridge their areas of expertise to develop a course of sufficient breadth in terms of actions students can learn to take. At HKS our curriculum is divided across six areas. There is not one obvious area to host such a course, but we must not get tied down by the area structure and instead should create the course we need and worry about what to call it later on.

Educate faculty who are not experts in climate, so they can address the topic in their courses that are primarily on other topics. Several HKS faculty noted that they want to learn from the substantive experts at HKS and the broader University. For example, in a course about advocacy, what sorts of technologies should we be advocating for? Some number of faculty are willing to “infuse” the topic of climate and environment into their courses if they felt they could do so competently. A near-term opportunity is for Harvard’s climate experts to teach Harvard’s faculty who are experts on other topics. One faculty member suggested lunches/dinners with a mix of faculty with climate expertise and those who don’t have the direct expertise but are interested. One way or another, the University could facilitate this learning opportunity for faculty or even support the creation of case studies or other curricular materials. HKS could do some of this work, but arguably everyone would be better off if we didn’t do it on our own. In fact, self-paced online learning modules might serve multiple purposes, from providing a common grounding in the subject to all students, so every climate-related course doesn’t have to re-teach the basics, to educating faculty, to educating the broader world.

4. New, More Advanced Courses



Nearly all of the current courses listed above are taught at the same level. So, students could benefit from a more advanced follow-on course for our masters students. In addition, there is a pressing need for a PhD-level course in environmental and/or climate change economics, which could be offered by HKS, the Department of Economics, or both. This is discussed in more detail in the separate report from the University-wide group focused on climate economics education.

In addition, there is great appetite for coordinating the meeting times of climate courses across the University so they conflict as little as possible (recognizing some conflict is inevitable given the differing class times around the University). Within HKS we learned the hard way about courses scheduled by other parts of Harvard and the conflicts with HKS-scheduled courses. We are now attentive to this problem for the courses we know about, but one result of this committee's work will be a catalogue of courses University-wide, and an ability for the Vice Provost's office to flag conflicts while there is still time to change class times at the school level.

Longer-Term Opportunities

Climate-based field learning experiences – See above, but significant expansion would take a lot of resources. Field-based courses are very faculty-intensive, to create the learning experience and cultivate the relationships with the client organizations. HKS has several very good models and we would be happy to share what we know about field-based learning in general if helpful. The greatest constraint to expansion of field experiences for students is faculty time to cultivate relationships with external entities and craft meaningful learning experiences. Unlike internships, field-based courses have learning goals and curriculum designed with the field experiences as a critical component of achieving those learning goals. That said, perhaps with University resources to cultivate the clients, faculty could include climate-relevant clients in existing field-based courses with broader learning goals. HKS alumni, as well as alumni from other parts of the University might be clients for field learning, enhancing the connection between current and former students.

Climate as a topic threaded throughout the curriculum – Since climate change and the environment will be no less important in the future, we could imagine creating enough knowledge among our faculty that a significant number of our courses would have at least some coverage of climate as it relates to the topic of the course. There is interest in making sure that all students who graduate from HKS have some understanding of climate and environment, and our current curriculum does not ensure that. One pathway would be to create a required course for everyone, but it's hard to imagine what the specific content would be or how the broad range of faculty could agree on the essential content. It might be more fruitful to build capacity among our faculty to engage on the topic within their own courses.

At the same time, a basic grounding in concepts via asynchronous learning might enable any student to engage on the topic in any class. If there were a basic grounding in concepts available across the University, that could open classes around the University to those who have completed the basic grounding, enhancing the ability of students from the College and elsewhere to tap into HKS offerings.

Increase the perspectives brought to the pressing issue of climate change. Students from CEEPIC whom we met with noted that there is tremendous impact from hearing the voices of those from island nations who will face an existential crisis with rising sea level. People in areas hard-hit by heat waves or fires or other climate-related impacts have stories to tell that create urgency but also bring the challenges from the abstract to the real. Our current courses are strong on theoretical solutions but short on the voices of those who live day-to-day with the greatest immediate impacts of climate



change. These voices could be brought to our faculty over time, but at a minimum should be brought to classes via guests, and perhaps via internship opportunities as well.

Cross-disciplinary teaching would enable HKS to leverage the knowledge and expertise from multiple disciplines, from economics to political science to physical sciences and engineering to communication, advocacy, and leadership. Our courses currently go deep in one discipline or approach, but with time and resources and incentives, we could create courses that break down the disciplinary silos and push faculty to engage across those disciplines. And beyond HKS, an investment in cross-disciplinary teaching (which is very time-intensive for faculty) would provide opportunities for faculty to learn from each other, while expanding our faculty capacity to address climate change in their courses.

Implementation/Barriers

The HKS faculty culture is to be individually entrepreneurial. We seem to have at least as many projects and programs as we have senior faculty, and these projects and programs are terrific. But there is little incentive to engage on collaborative teaching. Faculty collaborate when that is part of their research agenda, but only rarely because the collaboration is of benefit to the students' learning. We provide a premium in our workload system for co-teaching, but it appears insufficient to create cross-disciplinary courses on climate. Individual faculty try to bridge that gap, but institutionally we have long been – on climate especially but also on other topics – unable to make much headway. The potential is here, and even more so if we are able to recruit several new faculty (one junior offer accepted for arrival summer 2023, and two senior offers outstanding), but the culture has not enabled the spirit of collaboration across widely divergent disciplines and views as of yet.

Harvard Law School

Authors: Catherine Claypoole, Richard Lazarus

This memorandum constitutes the report of the law school in response to our committee's charge to consider how Harvard University can best prepare its students for leadership in a world with a changing climate. The report is based on our survey of and discussions with faculty and students here at the law school, as well as our learning from representatives across the university during the committee's own discussions. As recommended, our report is divided into three parts. Part I describes current curricular offering and activities within the law school relating to climate change. Part II considers shorter-term opportunities to expand our offerings. And, Part III speculates about longer term, potentially less constrained opportunities.

Current State of Play

The law school currently offers a rich set of courses and activities available to students to learn about law related to climate change. They serve, moreover, as an effective basis from which students have been able to launch themselves in future careers focused on the challenges presented by climate change. Of course, as discussed in Parts II and III below, there are opportunities for significant improvement — especially in terms of increasing the number of full-time faculty teaching climate-related courses and increasing further still the number of such courses —but the “current state of play” is strong.

The centerpiece of our current offerings are upper-level (second and third year) courses that include significant coverage of climate issues. They include the four survey courses on Environmental Law, Natural Resources Law,



International Environmental Law, and State Energy Law. In addition to those four classes, the law school's expansive clinical classes include four clinics that already include significant opportunities for the students to work on cases and other matters related to climate change. These clinics include the Environmental Law and Policy Clinic, Food Law and Policy Clinic, Animal Law & Policy Clinic, and Climate Solutions Living Lab (sponsored by the University). The law school offers each of these classes every year. Full-time faculty teach most of these classes, but several are taught by visiting faculty and lecturers.

These regular course and clinical offerings are also joined by a wide variety of advanced courses and writing seminars that similarly include significant coverage of climate change issues. These courses are not all offered every year, though many are offered on a regular basis (*e.g.*, every other year). Several of these more advanced classes focus directly on climate change, including two courses on Climate Change Law and Climate Change and the Politics of International Law. The law school's International Human Rights Clinic has long had projects that focus on global climate justice advocacy. Other courses and seminars regularly have significant coverage of climate change because climate change law arises in so many different areas of law. These classes include Advanced Environmental Law in Theory and Application, Advanced International Trade Law, Advanced Regulatory State, Behavioral Economics, Law and Public Policy, China and the International Legal Order, City Use of Technology, Contemporary Challenges in International Human Rights, Environmental Justice, Environmental Law After the Trump Administration and in the Biden Administration, Environmental Law in the Supreme Court, Food Law and Policy, International Trade Law, and Wildlife Law. For instance, the course on City Use of Technology regularly studies the efforts of Charleston, South Carolina, to address the threat of flooding from climate change.

Looking at student enrollment just in the fourteen classes most focused on environmental law, about twenty percent of our JD students take at least one class and a significant percentage of those twenty percent likely take two or more of those classes. Between six and eleven percent of our LLM graduate students enroll in those same classes.

Law students also regularly sign up to undertake research projects supervised by individual faculty for writing credit. Most often, the students themselves come to a professor with a proposed topic for research and writing. The papers can be for one, two, or three credits. Many law students pursue this option and research topics for supervised research related to climate change have become increasingly popular in recent years.

There are also significant opportunities to develop both substantive expertise in climate change law and to engage in related law and policymaking fora on climate issues outside of the classroom. The Harvard Environmental and Energy Law Program (EELP) is a center within the law school that seeks to bring innovative and pragmatic legal analysis to improve environmental and climate outcomes and support clean energy. HLS full-time tenured faculty oversee EELP's operations and an executive director runs the program on a daily basis. The program employs several full-time legal counsel and legal fellows responsible for various projects. About two dozen law students serve as research assistants each year for EELP. They conduct in-depth legal research and prepare the legal analysis found in the program reports and other work products. EELP's work currently focuses on five general areas of environmental and energy law and policy, each one of which has a close nexus to climate change:

Federal Climate and Public Health Rules, including Regulatory and Policy Trackers that chronicle the Biden administration's steps to advance clean energy deployment

- Electricity Law Initiative
- State and Regional Climate Strategies



- Environmental Justice and Equity
- Corporate Climate Disclosures and Financial Requirements

Two important student-run organizations, both the Harvard Environmental Law Review and the Harvard Environmental Law Society, also provide students with opportunities to learn more about legal issues related to climate change. HELR publishes articles by outside authors and HLS students on a wide variety of environmental-related legal issues. About forty-five students work on HELR and that journal has published an increasingly larger number of climate change related scholarship during the past decade. Six student officers lead the Environmental Law Society, which seeks to build a supportive community within the law school of students interested in learning more about environmental law and professional pathways. To that same end, ELS sponsors student meetings and host speakers on pressing climate change legal issues.

Finally, the law school's full-time environmental law faculty are deeply engaged in both legal scholarship and public service related to the climate issue. Faculty publish legal scholarship, give talks at academic institutions and professional organizations, and respond to requests for pro bono advice to both government agencies and nonprofit organizations on climate related topics. Some faculty also are actively engaged in pro bono litigation on climate issues. The environmental law faculty routinely hire individual and teams of students as research assistants in support of their legal scholarship and public service work.

Shorter-Term/Actionable Opportunities

As strong as the existing courses and extracurricular activities are at the law school, there is clearly a need for significant improvement given the enormous challenges that climate change presents and the concomitant responsibility of Harvard Law School to prepare its graduates to address those challenges. Some relate to additional course and clinical offerings. Others relate to increased opportunities for legal scholarship that is more crosscutting in nature. The most obvious practical limitation, at least in the short term, is availability of resources. Limited resources necessarily place a ceiling on classes, because existing faculty can teach only so many classes, and on extracurricular activities that require significant additional funding.

The law school curriculum would benefit from the addition of several climate change related classes that faculty were able to offer on a regular basis. First, there is no class offered each year on Climate Change Law. That is a significant gap. While, as described above, many law faculty include significant coverage of climate issues in many of the existing introductory survey classes, such as Environmental Law, Natural Resources Law, and International Environmental, and in a host of more advanced law classes, no member of the law faculty currently teaches every year a class focused exclusively on climate change law. The law school can fill that gap in its curriculum in the short run, given the overriding importance of addressing the climate issue.

Another important class missing from the existing curriculum is a course on Comparative Climate Change Law. By its global nature, no one nation alone can effectively address climate change. Given, moreover, the absence of any international body with the legal authority to impose climate change mandates on individual nations, it is the laws of those individual nations across the globe that will instead determine whether the nations of the world will address climate change on a time scale required to avoid its worst, potentially catastrophic consequences. This includes laws that mitigate the degree of climate change by reducing greenhouse gas emissions and laws that undertake measures to reduce the adverse consequences of now-unavoidable climate change. No law school, and certainly not Harvard Law School, given its own global reach as punctuated by its international student body, can focus only on the climate



change laws of the United States. For this reason, a Comparative Climate Change Law course should likewise be a course offered on a regular basis.

The law school should also add a new course on Climate Lawyering. In fact, in response to the survey of law students conducted as a part of this Committee's work, the law school will be offering this class for the first time next spring. The course will respond to the students' persuasive suggestion that students need to learn about the many different ways that lawyers can play an important role in addressing climate change apart from the most obvious professional pathway of working as an environmental lawyer. The new Climate Lawyering class is described more fully in Appendix C, below.

Climate change will require the United States, as well as other nations, to transform the way we produce and distribute energy. It will also require expedited efforts to reduce the enormous harm that might otherwise result from significant climate change that is no longer avoidable. Those transformative undertakings will require creative lawyering in a wide variety of areas of law far beyond environmental law, including, for instance, agricultural law, banking law, corporate law, energy and public utility regulation, insurance law, national security law, patent law, securities regulation, and transportation law. It will also depend on lawyers working in a variety of professional settings, including government, public interest organizations, and in the private sector too, especially in-house and outside counsel to private companies seeking to sell products and services that will promote a transition to a carbon-free energy future. To that end, the Climate Lawyering class will explore all these different areas of law and professional settings for lawyers seeking through their practices to play a constructive role in addressing climate change.

In addition, because climate change law is effective only if it reflects climate science, law students interested in climate change need to gain a more sophisticated understanding of the complexities of the science of climate change. This includes both its causes and its consequences. Law school classes that currently address climate change law typically include some bare-bones instruction on climate science. Climate science instruction available to law students warrants a significant upgrade.

The law school can accomplish this either by increasing the depth of focus of climate science in existing law school classes or by increasing the opportunities for law students to take a class exclusively dedicated to the science of climate change. Such classes already exist outside the law school that law students are able to take on a cross-registration basis. But cross-listing these courses (which is often more attractive to students) while theoretically possible presents more challenges because law school accreditation requirements bar the law school from cross-listing the classes in which students will be graded at least in part by graduate students rather than faculty. Another challenge is the contrasting time blocks for law school classes and university-wide classes, which place the latter, as a practical matter, out of reach for law students.

There are short-term opportunities at the law school for better and more effective coordination between different law school programs that each address the climate change issue from their competing, yet potentially complementary perspectives. As described above, there are a host of different law school programs and clinics that regularly address climate change issues, including programs related to environmental law, animal law, food law, and international human rights law. There is room for deeper collaborations and synergies among these programs

Finally, the law school can do a better job of bringing onto its campus — as speakers in courses and extracurricular activities — faculty from other parts of the university who are expert on climate issues, whether scientists, economists,



political scientists, or public health experts. In that manner, students would not only learn highly relevant material, but also become better aware of important climate work that faculty is doing elsewhere in the university.

Longer Term/Less Constrained Opportunities

The major factor at the law school that limits its climate change offerings is the number of full-time environmental law faculty. There are currently two full-time environmental law faculty in addition to an opening for a member of the clinical faculty responsible for running the law school's environmental law clinic. Running the clinic is itself a full-time job for its faculty director. There are, moreover, limits on the number of classes that the full-time environmental law faculty can teach because their teaching responsibilities are not limited to environmental law. Both teach popular large first-year classes that take up a significant chunk of their teaching loads and one frequently is further responsible for teaching a second large upper-level class that consumes much of the rest of their teaching load. Outstanding visitors and lecturers have contributed classes too, and may be an option for expanding the number of climate-related offerings available to students. The law school could also consider adding a full-time faculty member who is an expert in climate change.

The law school could also significantly improve its coverage of climate change in the many crosscutting areas of law relevant to address climate change. As described above in the discussion of the new course on Climate Lawyering, lawyers who practice in seemingly far-flung areas of law address legal issues central to the achieving the kind of legal transformation necessary to produce and distribute energy in a manner that addresses climate change. Many of our current law school courses already reflect this connection, which is why the climate issue routinely comes up in courses on administrative law, constitutional law, corporate law, banking law, energy regulation, financial regulation, state and local governmental law, and tort law. A very positive longer-term step would be for the law school to undertake a more systematic examination of all of its course offerings and identify further opportunities to integrate discussion of climate change into its classes. The law school recently did the same in considering how its curriculum could better address issues of systemic racism.

With additional funding, the existing Environmental and Energy Law Program could significantly expand its resources and thereby its reach. As described above, the overarching purpose of that program is to engage with outside law and policymaking fora to promote legal analysis that supports climate solutions and a clean energy future. The model has already proven highly successful, enlisting the work of students, faculty, and staff to address in a constructive, nonpartisan fashion the challenges of climate law making. That model is susceptible to effective expansion and would have the further advantage of launching students to leadership positions.

Just as it is important to teach law students more about climate science, as described above in Part II, so too would it be a very positive development to have students in other parts of the university interested in climate change have the opportunity to learn about climate change law. There are currently, however, significant structural and pedagogical hurdles that make it very difficult for non-law students to take law school classes. The law school has its own distinct teaching block schedule, non-law students frequently lack the knowledge of law and legal analysis necessary to take an upper-level law school class, and many of our classes are oversubscribed with lengthy law student waiting lists, leaving no space for non-law students. Nor, within current resource limits, are law school faculty available to teach climate law classes in other parts of the university.

Removal or at least significant lowering of these significant structural and pedagogical hurdles and resource limitations would be a very positive development over the longer term. And, it should be doable. For instance, the university



might develop a single graduate school (or college) class with faculty from different disciplines across the university teaching different weeks, which takes fuller advantage of the extraordinary expertise on issues related to climate that exists at Harvard, including faculty experts from the Economics and Government Departments, Kennedy School, Business School and Law School to teach particular class sessions. A class of such ambition would certainly better position Harvard to achieve this Committee's stated goal of preparing Harvard students for leadership in a world with a changing climate.

Harvard Medical School

Authors: Gaurab Basu, MD, MPH and Caren Solomon, MD, MPH

Fossil fuel driven climate change is a health equity and public health crisis, and it is critical that curricula at HMS and HMS-affiliated hospitals include attention to its broad health harms and to effective means of mitigation and adaptation. Being an effective physician now and in the future requires knowledge of the range of health consequences associated with fossil fuel generated climate change and air pollution, and their disproportionate impacts on our most vulnerable patients, including communities of color and poor communities, as well as children. These consequences include heat related illnesses, cardiovascular diseases, respiratory diseases, pregnancy complications, mental health conditions, infectious diseases, allergies, malnutrition, water scarcity, and injuries/trauma, as well as extreme weather and natural disaster-related breakdowns in health care delivery. Understanding these and related harms allow physicians to identify and counsel patients at increased risk and to institute practice-based interventions to reduce risks. Moreover, education regarding the large carbon footprint of US healthcare (which accounts for about 8.5% of total US greenhouse gas emissions) is needed to facilitate appropriate mitigation efforts. As highly trusted voices, physicians are uniquely positioned to educate the broader community regarding the human toll of climate change and to encourage planetary health and climate action based on shared values of promoting health equity and well-being. Thus, we believe that Harvard Medical School and its affiliated hospital are critical to Harvard University's mission of being leaders in climate education.

To gather information from a broad group of stakeholders in HMS climate education, we surveyed and/or had conversations with members of Students for Environmental Awareness in Medicine (SEAM), the most prominent climate/environmental health student group; faculty and/or trainees from several HMS affiliated hospitals (including Massachusetts General Hospital, Brigham and Women's Hospital, Beth Israel Deaconess Medical Center, Boston Children's Hospital, and Cambridge Health Alliance, each of which has training programs in medical and surgical disciplines); Deans for Students and Education at HMS; and members of the HMS Faculty Council subcommittee on climate change.

Current State of Play

Harvard Medical School

The HMS curriculum both for the Pathways and Health Sciences & Technology programs has included sporadic lectures addressing content related to climate change, air pollution, and health (with students hearing between 1 to 3 lectures during the 4 years of medical school) but no longitudinal curriculum. In recent years, there has been an increased interest in creating a longitudinal cohesive 4-year climate health curriculum. About 1 year ago, the Students for Environmental Awareness in Medicine (SEAM), the most prominent climate/environmental health student group,



successfully presented this vision to curricular committees, which began to engage course directors in developing relevant content within their courses. Concurrently, Dean Ed Hundert reached out to faculty with an interest in developing an HMS Climate and Health Faculty working group. That working group now includes 14 faculty committed to working with students to create a longitudinal curriculum. (It is chaired by Gaurab Basu and includes Caren Solomon).

SEAM and faculty are working together to meet with each course director in the first-year medical school curriculum. For academic year 2022-2023, the goal is to include in each first-year course some content related to climate change, through addition of a focused didactic lecture, embedding of content into an existing lecture, and/or discussion or case-based learning.

Residency/Fellowship training

Prior to the past couple of years, there was little attention to health effects of climate change in curricula; training programs at the institutions we surveyed included only sporadic lectures related to effects of climate change, planetary health and/or fossil fuel generated air pollution. As is the case at HMS, this is now changing. This academic year, residents at BWH and MGH collaboratively organized a 3-lecture series, involving faculty speakers, for medicine residents at both institutions covering 1) an overview of climate and health 2) health care system sustainability, and 3) physician advocacy re climate justice. In addition, medicine residents, with support from some faculty, have developed an integrated climate and health curriculum, with attention to health equity, that is currently being rolled out. This incorporates a slide or 2 on effects of climate change and /or air pollution into numerous lectures across the curriculum (e.g. asthma, cardiovascular disease, renal insufficiency, allergy, women's health). (See their detailed [curricular guidance](#).)

The residents leading this effort are now partnering with trainees at Columbia and UCSF to lead the development of a freely accessed climate and health curriculum covering a broad range of disciplines. (Note additional work led by BCH faculty on [climate education in residency training](#)).

To educate both trainees and faculty, over the past year and a half, BWH faculty involved in the above efforts have also given a series of Grand Rounds lectures across medicine divisions (general medicine, women's health, pulmonary, gastroenterology, cardiovascular, renal, neurology) focused on health effects of climate change, and approaches to reducing health care's carbon footprint, specific to given specialties. MGB has established a Center for the Environment which has monthly lectures related to climate change, likewise attended by trainees and faculty.

BIDMC, in partnership with HSPH (FXB Center for Health and Human Rights, and the Center for Climate, Health and the Global Environment [C-CHANGE]), is now offering a Climate and Human Health Fellowship to train emergency physicians to become national leaders in climate and health research and advocacy, with [training individualized](#) according to interest and goals.

Cambridge Health Alliance's climate offerings are mostly homed in the Center for Health Equity Education & Advocacy (CHEEA). Within CHEEA, a newly launched 6 month fellowship -- the [Climate Health Organizing Fellows](#) program--developed in collaboration with Harvard Kennedy School Professor Marshall Ganz, focuses on developing leadership, organizing, and narrative skills among health professionals who seek to impact climate change. This fellowship is an example of HMS and HKS faculty collaboration to develop innovative educational



programming to teach about climate change. CHA also has a “Climate Health Working Group” that seeks to educate health professionals working at CHA about the impacts of climate change and health.

A 2020 symposium organized jointly by the *New England Journal of Medicine*, HMS, C-CHANGE at HSPH, and Harvard Global Health Institute, and supported by multiple Harvard affiliated hospitals, brought together physicians, trainees, and administrators from across Harvard hospitals and other MA medical centers for presentations and discussions on a broad range of [effects of climate change on clinical practice and health equity](#). A key goal was to facilitate cross institutional conversation and collaboration.

Dead Ends/Lessons learned

A key (unsurprising) lesson is the need for support for faculty involved in climate education. Most faculty at affiliated hospitals must cover their own salaries, typically through clinical work, research, and/or administrative responsibilities. Climate-related efforts at HMS and affiliated hospitals have until recently been conducted without any financial support for faculty. While small stipends have more recently been provided by HMS for the faculty committee chair for HMS curricular development and by BWH and MGH for a faculty member at each institution involved in climate education, the majority of faculty work related to climate and health continues to be on a volunteer basis. Resources are likewise needed for the climate and health fellowship to effectively expand beyond emergency medicine and to broaden educational opportunities.

Short term actionable opportunities

At HMS, after developing a first-year curriculum, the goal will be to expand offerings to all 4 years. Educational content will include lectures, case-based study and discussion, as well as career development opportunities; the latter will incorporate formalized mentoring and internships involving research or work related to climate change mitigation and adaptation in communities disproportionately affected by climate change. Opportunities to work on climate health policy, health equity, and community partnership are important for career development. We hope to be able to formalize mentorship opportunities between students and faculty in areas of interest.

Short term goals at HMS affiliated hospitals include full integration of climate change into medicine residency curriculum, and expansion to other disciplines (e.g. OB GYN, surgery, psychiatry), including at other Harvard affiliated hospitals beyond those currently leading efforts in these areas. We recommend development of a master’s or Certificate program in climate and health that involves cross disciplinary learning across Harvard Schools (to provide broader education relevant to physicians and other health professionals who will make this a career focus). Students and residents are enthusiastic about these opportunities and are the driving force behind curriculum development.

Barriers include time constraints related to the large amount of material that must be mastered in medical school and residency training; limited faculty expertise (with the need to educate faculty to effectively include this material in their teaching); historical lack of collaboration across different Harvard affiliated hospitals and disciplines; challenges in identifying a suitable home for a cross -school program and in students’ cross registering at other schools ; and, again, need for financial support/protected time for faculty working on curriculum development. Departments and divisions of HMS affiliated hospitals have not traditionally taken a leadership role in sustainability and climate education, but leadership from these vantage points would substantially enhance climate education in medical training. Community engagement and partnership should be an integral component of HMS’s climate education efforts.



Implementation would best be accomplished by outreach to leadership of HMS courses, residencies and fellowships not already incorporating this material to underscore the importance of including climate related content (of note those approached so far have been supportive of its inclusion); providing FTE support for faculty member(s) representing different institutions and disciplines to work collaboratively, sharing resources developed at Harvard hospitals or through the broader initiative in which MGB currently involved. A positive step is that the group we convened through this committee is already discussing ways to facilitate ongoing cross institutional collaboration; we also plan to identify persons at other smaller affiliates to join this effort.

Resources should include financial support/protected time for faculty and elective time for trainees to work on new curricular materials.

Stakeholders include trainees, preclinical HMS students, HMS students rotating through different disciplines, course directors at HMS, faculty, directors of residencies and fellowships, and sustainability committees already in existence at many affiliates (whose work is also relevant to trainee education.)

Goals for trainee education are closely connected to Harvard's overall goal of having students well prepared to understand the effects of climate change and be leaders in efforts to mitigate and adapt to these consequences.

A cross-school master's or certificate program could be completed during a year off from medical school, between residency and fellowship or during fellowship; models for the latter include current HMS or HSPH master's programs pursued by trainees e.g. in clinical epidemiology and research methods. Some examples of potential benefits of a cross-school program with respect to physician effectiveness in addressing climate change include: (1) Coursework at Harvard Kennedy School, the Harvard TH Chan School of Public Health, or Harvard Law School could facilitate more effective involvement of physicians in developing and/or advocating for policies to protect health (2) Interaction with faculty and students from the Paulson School for engineering and applied science could enhance physician efforts to improve health system sustainability (3) Information learned at the School of Education could refine approaches to education regarding climate change. Moreover, involvement of HMS faculty would ensure that students and educators from other disciplines broadly understand the health harms of burning fossil fuels, including their disproportionate effects on marginalized populations, and recognize that a rapid and just transition to renewable energy is necessary to protect health.

Digital resources will be important in broad educational efforts. Educational resources being developed by trainees will be shared digitally across institutions and disciplines. In addition, a Harvard wide MOOC on climate change (for which HMS is an integral partner) could reach and educate a broad audience outside Harvard.

Longer term opportunities

By 2030, effects of climate change on health should be integrated into all relevant HMS courses and into all Harvard affiliate residency training programs. Education about the disproportionate impacts of climate change on communities of color, poor communities and the global south must be at the foundation of the educational mission, and community partnerships are an important component. There should be more fellowship program opportunities for trainees who plan to focus their careers on research, education, policy and/or other aspects of health related to climate change. (See recommendations above re Harvard-wide master's or certificate program.)



Many students and trainees already recognize that knowledge in these areas is fundamental to their education and are among the drivers of curriculum development in this area.

As above, support is needed for faculty and trainees to develop and deliver appropriate curricular content. In addition, development of a cross Harvard program will require structural changes. Ideally it would allow for a program to be sited centrally, rather than at one school; if sitting at one school is necessary, a system is needed to share course revenue, provide course credit, and support faculty across other schools. Changes are also needed in existing promotion pathways at HMS to recognize leadership in climate change education as relevant and valued for promotion. Change will require top-down messaging and associated action by Harvard leadership that recognizes that climate change poses the greatest public health challenge of our time; that post graduate training in its broad effects on health, and on mitigation and adaptation, is needed for trainees to be effective physicians and leaders; and that providing high quality training requires allocation of resources to those working in these areas.

Stakeholders include Harvard and HMS administration, Department Chairs, Division Chiefs, and administrative leaders at the affiliated hospitals, and of course students, trainees, and faculty.

Role of digital resources described above.

Implementation and barriers

As covered above, accomplishing the goals above requires a commitment to support faculty who are engaged in development of curricula and teaching about health effects of climate change and fossil fuel- driven air pollution at HMS and across hospitals; to recognize the value of these activities in academic promotion; and to address structural barriers to cross-disciplinary programs. It is important that funds raised for educational efforts be shared across other schools, including HMS.

Ongoing support from the Vice Provost's office is needed for the development of broadly accessible cross school master's or certificate programming, and the creation of robust digital educational offerings, as well as to provide funding opportunities and academic promotion pathways for faculty actively involved in climate education. As HMS representatives to this initiative, we would welcome continued engagement with the Vice Provost's office to promote collaboration between HMS and other Harvard schools and to further efforts at HMS and HMS affiliated hospitals to integrate climate change education and action throughout medical education.

Harvard College Writing Program

Authors: Karen Heath, Thomas R. Jehn

Making Persuasive Arguments About the Climate Crisis:

A Role for the Harvard College Writing Program in Undergraduate Climate Education

Over the past several years, the Harvard College Writing Program has been developing significant opportunities for first-year students to engage with climate crisis issues in the writing courses we offer. Our climate crisis unit in the Expos Studio 10 curriculum has the greatest reach (approximately 170 students each fall semester), and we have two or three Expos 20 courses with climate crisis themes or units each semester that, combined, enroll about 120 students each year. We offer in this memo an account of current offerings that we would like to expand in light of lessons learned, and also a sketch of a more ambitious plan to help undergraduates develop the skills that will make all the



difference to how effective they will be as future leaders and citizens: the skills of communicating evidence-based ideas about the climate crisis persuasively and responsibly to audiences who may not agree with them.

The Current State of Play

Background information on Writing Program course types

Before discussing these opportunities and limitations, we should provide brief context for the types of courses our program has control over and can therefore shape.

Our program administers

- first-year academic writing courses that fulfill the College’s expository writing requirement: the **standard Expos 20** course that most first-years take in either fall or spring semester, and the **elective Expos Studio 10/Expos Studio 20** courses for students who can benefit from intensive introductory instruction.
 - Each Expos 20 course has a theme, anchored in the preceptor’s disciplinary background, allowing students to write papers throughout the semester that explore different topics related to the theme. By contrast, all sections of Studio 10 and Studio 20 share the same curriculum, including readings and assignments.
 - Combined, our writing courses reach about 1,580 first-year students each year.
- an elective public speaking practicum course, Expos 40.
 - Expos 40 students practice delivering four speeches of various types and of increasing length, including “Speech to Teach,” “Speech to Initiate an Action,” and “Speech to Change an Attitude.”
 - The nine sections of the course enroll approximately 135 sophomores through seniors each semester.

A Climate Education Unit in Studio 10

Since Fall 2020, our Studio 10 course has been exposing about 170 students each year to the important debate around fossil fuel divestment by Harvard. As we begin to teach our students the broad strokes of argument, we ask our students to write a brief proposal to Dean Rakesh Khurana for what action Harvard College might take in response to Harvard’s evolving policies on the climate crisis. The students examine President Bacow’s 2020 and 2021 statements on divestment, and the argument and recommendations of the November 2019 FAS faculty-authored white paper, “Harvard’s Response to the Climate Crisis.” Students also draw from a variety of brief and accessible arguments about different aspects of the climate crisis and activism, including videos from the “Harvard Speaks on Climate Change” series. It is an important lesson for students that their thinking and communicating about climate crisis actions by students, faculty, and administrators could reach a real audience. A great many of our Studio students report to us that prior to the unit they had not thought about climate crisis issues.

Expos 20 Course Themes on the Climate Crisis

We have been thrilled to see several preceptors in the past few years design and teach rich Expos 20 courses that either have the climate crisis as their theme or include units about the crisis (see the Appendix for additional information about these courses):

- “Ecological Crisis: Witnessing and Planning in the Age of Climate Change”



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- “What Do We Talk About When We Talk About Climate Change?”
- “Humans, Nature, and the Environment”
- “Wastelands”
- “Animals and Politics”

Although “Ecological Crisis” is no longer offered (the preceptor who designed and taught it exited the program for a professorship at Berkeley), the offering was an outstanding example of what an ambitious and transformative writing course on the climate crisis can look like and do. “Ecological Crisis” was designed as a [Mindich Engaged Scholarship Expos](#) course, which had students working alongside local community entities like the Cambridge Community Development Department, 350 Cambridge, and Green Cambridge to develop fact-based educational materials for audiences beyond the college classroom and campus addressing the sources of climate change and potential solutions.

Constraints

There are two obstacles to our efforts at integrating climate education into Expos courses.

- While we would like to see more Expos 20 courses foreground or include a unit on the theme of climate crisis, there will realistically be a limited number of such courses that can be offered by our program in any given year.
- First-year students enrolling in Expos are interested in a wide variety of issues, with which we need to align our [Expos 20 course offerings](#).
- Our program’s instructors are largely postdocs drawn from across fields in the humanities, social sciences, and occasionally life sciences, and our top job candidates in our annual hiring cycle typically have areas of expertise and teaching interests not in climate education. In addition, it is difficult if not impossible to attract climate scientists to teach writing-intensive courses. Such a career move would likely be unwise for those interested in eventually obtaining tenure-track positions in their field (there is no institutional mechanism for scientists in our non-ladder faculty positions to conduct their research in a Harvard lab, nor does the intensive nature of work in our teaching-focused program allow much time for lab research—preceptors must mark many papers every few weeks and meet with all students in 1:1 conferences regularly throughout the semester).

Therefore, we will never approach a preponderance of climate education courses in our program, but perhaps we would be able to add 1-3 more such courses in a year if we adjusted our recruitment efforts or introduced a different model (we describe such a model in the “New Opportunities” section below).

2. While our Studio 10 climate change assignment is well designed and effectively exposes a large number of students each year to climate education, there are two concerns our teaching staff share about climate education more generally in the College as we see manifested in our students’ thinking:
 - There are numerous students, not just in Studio, who are growing numb to the many calls for transformative politics and to some of the climate crisis discourses that make the prospect of dramatically reconceptualizing our lives to save humanity and the planet seem overwhelming. Many—certainly not all—incoming first-year students, whether in Studio or in standard Expos 20, have already heard a steady drumbeat about the climate crisis in their high schools, and there is a challenge in inviting students to see an academic project in a college course as not just another virtue-signaling performance they submit for a grade.



- We also recognize that many students in this course consistently struggle with thinking about what concrete and meaningful steps they and their fellow citizens and leaders can and must take to address the climate crisis. Students need help articulating a theory of political change, and such instruction cannot happen in just one unit and even in one writing course. The question of what forms of changemaking are most efficacious is a live one; students need to grapple with that question with the help of thoughtful voices from around and beyond the Harvard community and need to grapple with it in a sustained and concrete way. Otherwise, students will misunderstand their statement of opinion, expression of conviction, or vague recitals of calls to action as sufficient.

New Opportunities

We envision several areas where the Writing Program could energetically expand opportunities for meaningful climate education for undergraduate communicators across all four class years.

- **Harness the power of writing about the climate crisis to influence audiences outside of the classroom.** We imagine creating a co-curricular climate education communication lab where students could learn how to deliver responsible and effective multimedia communication of evidence-based arguments about the climate crisis. Such instruction would foreground the urgency of understanding resistance to, indifference to, or hesitancy about various activist discourses and proposed green policies. Many of our students need to get out of their echo chambers and cannot be effective future leaders if they are not making efforts to understand the experiences and concerns of those who do not agree with proposed green policies.

Students are keenly interested in being able to remediate the researched writing they do in courses to communicate persuasively to audiences beyond their own classroom. They want to know that their ideas matter and can have an impact on institutions, policies, and behaviors. They have, however, not always sufficiently studied an issue to craft a well-reasoned and well-informed argument that can speak to a broader audience, or a very specific group of stakeholders. Furthermore, students face a daunting communications challenge when they are ready to remediate their research: communicating important ideas in a world oversaturated with media and clogged with disinformation requires savvy and responsible developers of content. To be sure, climate-themed standard Expos 20 courses and the Studio 10 climate crisis unit offer students guidance in some fundamental rhetorical moves for writing to an audience beyond the instructor, whether Harvard deans or an imagined lay public, and these are important forms of instruction; a wide variety of courses in the College also ask students to submit final multimedia projects and thereby impress upon students the importance of communicating ideas in impactful ways. But students are often receiving insufficient instruction in what are quite complex modes of communication, and that carry with them ethical consequences when out in the world. Since most final projects typically stay inside the course as an assignment, students do not receive instruction in multimedia communication as a real-world practice. The stakes for convincing the lay public, politicians, and corporate leaders to take bold and effective action on the climate crisis are high, and our students should be better equipped for the mission.

The College, then, could dramatically expand on this significant area of learning for students by creating co-curricular communication labs for systematic instruction in multimedia communication of evidence-based arguments on various key issues of the climate crisis. We imagine not only motivated Expos 20 and Studio



students but also undergraduates in many other climate-themed courses in the College availing themselves of workshops on remediating researched writing. Some possible topics and skills:

- **What medium is best for which arguments and types of evidence and for which audience?** We see instructors and students alike too quickly thinking that a YouTube video or a podcast will make an argument about the climate crisis inherently compelling and accessible, when some arguments may best be delivered visually, others through a long audio form, others through infographics, and so on.
- **How does a writer best tell the story?** How and when does a writer compress and vivify the claims and evidence of an academic paper for a different medium?
- **How does the writer make their multimedia arguments responsibly and ultimately more convincingly?** Too often in the urge to get clicks, well-intentioned advocates make sloppy claims, massage evidence, fail to engage in healthy counterargument. What research should the writer do to inform themselves of opposing viewpoints and really understand the concerns of those they are trying to convince?
- **Which production skills need to be learned?** While Harvard is not a video and audio editing school, students are empowered when they learn some fundamental production skills to leverage the increasingly powerful apps available to consumers.
- **How does a writer effectively harness the power of social media**—and navigate its minefields—to reach target audiences and influence voters, legislators, policymakers, and opinion leaders?

We imagine the Bok Center’s Learning Lab as an important site for this kind of instruction, and one that could perhaps harness online and in-person instruction (master classes, workshop series, etc.) by various experts in multimedia content creation specifically for climate education, from professors who have adroitly communicated their research to a range of audiences outside of the academy to successful, responsible, and highly-regarded YouTube influencers, podcasters, and long-form print and broadcast journalists. There might be fruitful collaborations with the Harvard University Center for the Environment, the Nieman Foundation, and the Shorenstein Center, to name just a few.

The climate education communications lab could leverage the public speaking practicum course Expos 40 and its gifted instructors in teaching undergraduates how to wield a skill as vital to future leaders and participants in civic life as persuasive speaking. Expos 40 students might devote one of their required speeches to a climate crisis issue, and could then, along with the Expos 40 instructional team, become closely involved with coaching students from other College courses who can learn about crafting and delivering effective oral presentations at the lab.

One issue to consider: altering the Expos 40 curriculum, which is standardized across all Expos 40 sections, would require discussions with Expos 40 preceptors to explore the opportunities and challenges involved in re-imagining the current level of choice that students have with their speech topics.

In addition to partnering with relevant Gen Ed, Expos, and concentration courses, the climate education communication labs could also be sites of sustained instruction for student organizations whose members wish to learn vital multimedia communication skills.

- **Harness the intellectual curiosity of first-year students and capture them early in their undergraduate careers through innovative Expos courses co-taught by Expos preceptors and**



faculty affiliated with the Center for the Environment. We want to inspire as many first-years as possible to pursue concentrations, extracurriculars, and ultimately careers and civic life that focus on this existential crisis for our civilization; Expos courses could play a crucial role in pointing many students in that direction. Given the challenge of regularly recruiting candidates for preceptorships who both can teach undergraduate writing effectively and have expertise in climate education, we would propose a different approach: developing innovative co-taught Expos climate crisis courses, in the spirit of what the Princeton Writing Program has successfully done in its upper-division writing course “[Measuring Climate Change: Methods in Data Analysis & Scientific Writing](#).” We could imagine an advanced Expos preceptor and a professor affiliated with the Center for the Environment co-designing an Expos course that would offer students the thrilling opportunity to learn from an expert on climate change while receiving rigorous and deeply experienced instruction in academic writing and feedback on papers from an Expos preceptor. The course could include an experiential learning component, whether of the sort delivered in Mindich Engaged Scholarship courses involving visits to New England field sites and conversations with community partners, or even more intensive multi-day field trips. Co-taught Expos climate-crisis courses would lend themselves particularly well to project-based learning.

Using Digital Resources. Climate education delivered through Expos 20 and Studio 10 courses would be greatly enhanced through at least two digital resources:

- **Virtual reality.** Pre-pandemic, we were in fruitful discussions with Rus Gant of the Visualization Research Laboratory to program sessions in the VR Lab for Studio 10 students in order to bring climate change research and issues vividly to life for them as they worked on their writing assignment. As Harvard spaces had to shut down for the pandemic, the Writing Program paused this collaboration. We would like to explore it again, not only for Studio 10 but for Expos 20 climate-themed courses where relevant.
- **The Center for Geographic Analysis.** We imagine leveraging the remarkable tools relevant to climate education that CGA has already developed, can connect us to (if open-source apps have been developed elsewhere), and can possibly even design for us as we build out and innovate new assignments for our climate-themed writing courses.

Harvard Forest

Author: Clarisse Hart, Harvard Forest Director of Education and Outreach

The Harvard Forest is Harvard University’s 4000-acre laboratory and classroom, with year-round staff dedicated to long-term science and experiential learning. Located in central Massachusetts (70 miles west of Boston), the scientists, students, and collaborators at the Harvard Forest explore topics ranging from conservation and environmental change, to land-use history and the ways in which physical, biological and human systems interact to change our earth. [The Harvard Forest](#) was founded in 1907 and since 1932 has been part of the Faculty of Arts and Sciences.

Status of Existing Programs at Harvard Forest relevant to Climate Change Education

- **Freshman Seminar** taught by Dave Orwig: Research at the Harvard Forest—Global Change Ecology: Forests, Ecosystem Function, and the Future



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- Now in its 5th decade, the College’s longest-running freshman seminar
- Hosts 11 Harvard College freshmen at the Forest for 4 intensive weekends (Friday evening through Sunday afternoon) in Fall.
- Students explore Harvard’s signature climate research experiments in a wide range of ecosystem types, and try their hand at several key research methods (i.e. tree coring). Presentations by ecologists, conservation professionals, historians, and Indigenous community leaders help students understand how history and society shape our research questions, and how data can inform climate science and policy.
- The Forest’s REU-based **Summer Research Program in Ecology** hosts 20-30 undergraduates annually from Harvard and institutions around the US. Students spend 11 weeks living at the Forest and working full-time on mentored, team-based projects across STEM disciplines (and sometimes including the social sciences, arts, and humanities) that integrate field and lab work, data analysis, and science communication. >50% of each summer cohort are students from groups traditionally underrepresented in the sciences. Longitudinal outcomes assessment reveals that 75% of program alumni go on to graduate school and careers in environmental fields.
- In the past 18 years, the Harvard Forest Schoolyard Ecology Program has trained hundreds of K-12 teachers to set up **climate-related ecological studies in local schoolyards** throughout New England. To date, more than 40,000 students have collected and submitted field data for their school studies on invasive species, forest carbon dynamics, and warming seasons, with some school datasets stretching back 15+ years. HF scientists and educators host 4 annual workshops for teachers to build skills in field data collection, long-term data analysis, and links to local climate and conservation policy. All school data can be [freely accessed and graphed in an interactive database](#).
- The [Witness Tree social media project](#), supported in part by the Harvard Climate Change Solutions Fund, provides an innovative, online platform for real-time learning about trees’ growth, ecosystem benefits, and climate dynamics. A growing network of **“tweeting” trees**, wired with sensors and coded to tweet their experiences to social media, began at Harvard Forest in 2019 and now has 10,000+ followers. 2022 has seen expansion of the project to include trees on the Cambridge Common, at Drumlin Farm Mass Audubon sanctuary, and the Arnold Arboretum (coming in summer 2022). Education researchers from Project Zero in the Harvard Graduate School of Education (PI Flossie Chua) are working with middle and high school teachers to study the impacts of this technology on climate change teaching in the classroom.
- The Harvard Alumni Association annually hosts a **day trip for 50 alumni** at Harvard Forest every fall, which includes a science lecture in the Fisher Museum and small group walks to see climate research experiments and discuss conservation activities. Registration always fills quickly.
- The Emmett Environmental Law Clinic at Harvard Law School regularly matches HLS students with Harvard Forest projects focused on **state climate and forest carbon policy**, and – new in 2022 – working with local Indigenous groups to decolonize the state’s legal structures for land conservation. HF hopes to engage ESPP undergraduates in this work in the fall.
- Throughout the year, HF hosts **guided field and museum tours for courses**, with content that’s flexible and accessible across STEM fields, as well as the social sciences, arts, and humanities. At present, about 1,000 Harvard students participate in these kinds of tours annually. Another 1,000+ students from other universities, and groups of climate and conservation professionals, come for tours and conferences at the Forest each year (we have fee waivers available for underserved groups). The tour schedule tends to be at capacity at peak foliage season in autumn, particularly on weekends, but the academic-year tour calendar is



under-utilized, especially on weekdays. HF also offers **virtual, real-time, interactive tours** of the signature climate experiments in the forest for those who are not able to come out in person.

- An annual **wintersession internship program** brings College and GSAS students to the Forest for an immersive, 3-week, mentored research experience, with the option to continue the project remotely in the spring. Winternships mentored by HF scientists and educators include both field and computational work, as well as museum exhibit creation and stakeholder partnership development. To date, HF has hosted up to 4 January interns at a time, but there are always several dozen applications for these spots.
- Each year, 4-6 students from the Harvard College Conservation Society take on **semester-long projects** with Harvard Forest, spending several hours a week on real-world research and outreach projects in partnerships with local conservation groups.
- Students from the Harvard Divinity School and Harvard Graduate School of Education have recently completed **capstone research and service projects** at the Forest. There are likely many more students at the professional schools who may be interested in this option. So far, these graduate students tend to find the Forest when the [Climate Leaders Program](#) comes here for their annual fall retreat.

Harvard Office for Sustainability

Author: David Havelick

Introduction

With its several professional schools, breadth of disciplines, and depth of expertise and resources, Harvard is well-positioned to be a leader on climate and sustainability education. In addition to its academic strengths, Harvard is also set up for its students, faculty, and staff to come together to use the campus as a testbed to incubate exciting ideas and pilot promising new solutions to real-world challenges threatening the health of people and the planet — at Harvard and across the world. Our community is already generating new discoveries that can be used to inform the University’s implementation of its sustainability vision and priorities in ways that can be replicated and applied on the local, regional, and global level.

Current State of Play

Coursework and Experiential Learning. The Office for Sustainability works with students in a variety of ways to support their climate and sustainability education while at Harvard. OFS staff members are often invited into classes to present about our work or to serve as a client that poses a challenge for students to solve (e.g., ES-96). Together with faculty, OFS helped co-create the [Climate Solutions Living Lab course](#), which provides the opportunity for students from across Harvard to work in teams to design real-world practical tools for advancing climate change goals, such as reducing greenhouse gas (GHG) emissions and adapting to the impacts of climate change. This type of work, which is applied and experiential, is something the National Academies of Sciences, Engineering, and Medicine have called on institutions of higher education to offer more of ([2020 Report](#)). Other examples at Harvard of this experiential curricular teaching include [ES-96](#) (SEAS), [Re-Wilding Harvard](#) (GSD), and [Using Big Data to Solve Economic and Social Problems](#) (FAS). Students are often telling us that these are their favorite classes, and alumni have come back to tell us that these are the types of courses that set them up for success in their future careers.

Co-Curricular and Extra-Curricular Learning. Twenty years ago, we launched one of the first-ever peer-to-peer sustainability education programs, called the [Resource Efficiency Program](#), which trains student employees to become



sustainability change agents. We also manage the Council of Student Sustainability Leaders, which allows students from across Harvard's 12 Schools to work together on projects and inform the priorities and work of our office. One of the students from the Council helped launch the [Climate Leaders Program for Professional Students at Harvard](#), in collaboration with the Harvard University Center for the Environment (HUCE). We have two funds that support sustainability projects, including the [Student Sustainability Grant Program](#) and the [Campus Sustainability Innovation Fund](#). With funding from the Harvard Initiative for Learning and Teaching, we hosted a workshop for staff who work with students on these types of sustainability projects, called [We Are All Educators](#), which helped staff become more effective educators when working with students. We also supported the new Harvard Alumni for Climate and Environment (HACE) Shared Interest Group (SIG) with their [Climate Boot Camp](#) that they launched in 2021 for alumni, together with Climate Reality Project.

Shorter Term Actionable Opportunities

Coordinate with Living Lab Subcommittee. The Presidential Committee on Sustainability (PCS) charged a Living Lab Subcommittee (Faculty Co-Chairs: Professors Karen Thornber and Ari Bernstein) with developing a vision and plan for advancing Harvard's efforts to translate the latest research and thought-leadership into institutional action to demonstrate globally applicable solutions to climate change and sustainable development, making sure to differentiate institutional applied research (i.e., sustainability living lab) from core research and teaching. There may be opportunities for collaboration between members of this Subcommittee and the Climate Education Committee.

Scaling funding for projects developed in the classroom. Often, projects and innovations developed in the classroom get dropped after the class is over. The i-Lab has been a beacon for students who want to take their projects to the next level, but that is mostly for innovations that could lead to a business venture. For approaches and ideas that will not likely lead to a business venture, though, there is little funding for innovations that are promising and could be scaled. Perhaps a call for proposals could be launched at the end of each semester for climate-related student projects that could be taken to the next level as, for instance, a pilot project. This would provide crucial opportunities for students to learn how these ideas fare in a real-world setting.

Implementation and Barriers

Reputation of Applied Research. We have heard from faculty and students that applied research has a reputation for being treated differently than other types of research – often being under-resourced, not as respected, and not as important for tenure considerations.

Tension between learning outcomes and scalable solutions. We have been involved in several projects with students, and the outcomes from coursework tend to be less feasible when learning outcomes are prioritized over developing a realistic solution to a challenge. However, there are many examples where learning outcomes are tied specifically to the development of a feasible/tested solution rather than something that is theoretical. Funding for testing and piloting would be necessary for this type of education to be beneficial.

Silos. We have heard from faculty and students that cross-registration and cross-disciplinary work can be very difficult at Harvard, which sends the message that it is not a priority, and in fact might be something Harvard is intentionally disincentivizing.



Harvard Alumni for Climate and the Environment SIG

Harvard Alumni for Climate and the Environment SIG Management Committee

Executive Summary

Climate education at Harvard does not end at commencement – climate education extends into the Harvard alumni experience. The Harvard alumni ecosystem fostered by the Harvard Alumni Association, Schools, and other Harvard community organizations drives climate education beyond Harvard undergraduate and graduate degrees.

By 2025, Harvard will have established a new system of climate initiatives, embodying the principles of interdisciplinary work and external partners. Harvard will have core climate competencies and literacy standards interweaving technical and social disciplines. Climate justice will be a fundamental element of climate education. Harvard will offer 1) enhanced climate education and career support services, 2) increased resourcing for Harvard-wide climate education initiatives, and 3) introduced new Harvard faculty climate education programs and courses. Harvard alumni will be fundamental to co-creating this climate education ecosystem.

By 2030, Harvard climate education will be interdisciplinary and intergenerational. Harvard will be positioned as a leader in global climate education. Climate education will address systems-level change, knowledge-action linkages, and intergenerational well-being. There will be clear professional services and pathways for students to enter a climate job regardless of the field of study because each student will have a core climate education as a part of their Harvard citizenship learnings.

I. Alumni Community Current State of Play

Climate education in the Harvard alumni community has been experimental, creative, emergent, and responsive to community needs due to underinvestment in climate education. Nonetheless, climate education has grown more robust in the alumni community over the past decade, especially with the surge in climate interest and resourcing in the past few years. For example, alumni could become a student again and enroll in HarvardX courses like Health Effects on Climate Change or attend a climate session during their Reunion programming. Professionals could take the new HKS Executive Education program on climate and energy or submit a venture for the Harvard iLab and Harvard Alumni for Climate and the Environment's Climate Entrepreneurship Circle. Alumni could use the Office for Sustainable digital Alumni Guide or attend a virtual event through a Harvard Club. These engagements complement professional and personal efforts based in non-Harvard affiliated communities or organizations that deepen alumni climate education.

Climate organizing efforts have served as a fundamental core of Harvard climate education in the alumni community. Over the past decade, the Fossil Fuel Divest Harvard campaign raised awareness about climate change (and Harvard's contribution to the climate crisis) among the alumni community and served as an ongoing educational opportunity for alumni to learn about climate change and climate action. These efforts used in-person and digital organizing tactics like seminars, webinars, petitions, background documents, forums, sit-ins, and protests to embed climate education across disciplines, schools, and graduation years. Similarly, the Harvard Forward campaign harnessed alumni interest in climate action during the Board of Overseers elections and offered workshops, digital resources, and electoral action options for alumni to re-engage with Harvard on climate education. These campaign methods used experiential and applied learning methods to provide Harvard alumni with practical climate skill development and education while activating their Harvard identity.

The Harvard Alumni Association's shared interest groups serve as another method of climate education in the alumni community. Harvard Alumni for Climate and the Environment SIG (HACE), Harvard Alumni Disaster Preparedness and Response Team, Harvard Alumni for Agriculture, and Harvard Alumni for Fashion, Luxury, and Retail, Harvard Alumni in IMPACT, among other SIGs, create educational programs and events for the Harvard



community. These SIGs collaborate with Harvard Centers, Harvard Clubs, School-Based Alumni Networks, and student groups to host in-person and virtual seminars, workshops, and conferences. For example, the Harvard Alumni Association worked with multiple groups to host the Climate Conversation Series in 2020.

Harvard must prepare alumni to unlearn, relearn, and learn new skills for leadership in a world with a changing climate. The current climate crisis requires a broad immediate leadership response across all sectors; we cannot wait for the next generation to be trained. Harvard as an educational institution can participate in this response by empowering its alumni community. There is a strong demand and need for climate-related programming and community within the alumni community at Harvard. This represents an opportunity for the university to strengthen its ties to alumni. There are also opportunities for alumni to work in tandem with the undergraduate and graduate programs to mentor, provide connections, and support events. HACE attempts to build a better connected and resourced Harvard alumni community to meet fellow alumni, learn about climate and the environment, and act to combat the climate and environmental crises.

Founded in 2020, HACE is one of the only University-wide, dedicated climate and environment alumni initiative, and has grown quickly to just under 2,000 members representing all Harvard schools. HACE connects Harvard alumni and members of the larger community through a number of growing community groups including the Mentorship Program, Affinity Groups, Local Groups, and International Groups, as well as events with undergraduate (e.g. EAC) and graduate groups. HACE supports several long-term arcs of virtual programming including the Deep Dive Series, the Career Transitions Series, and the Environmental Justice Series. Now in its second year with the Harvard iLab, the Climate Entrepreneurship Circle program provides a cohort of 28 entrepreneurs resources and support to accelerate their development. (Please see [this announcement](#) for our current cohort.)

HACE's Pilot Climate Boot Camp - Alumni Climate Education Case Study: In 2021 HACE and Climate Reality co-developed and produced The Climate Boot Camp, a pilot for an educational program offered to alumni. Over 500 members of the Harvard community participated in the pilot. This participation demonstrates that alumni are deeply concerned about the climate crisis and want to learn how to drive sustainable action in the organizations where they have influence. Starting in 2022, HACE will offer the open-access program to the Harvard alumni community independently. Please see a summary of the program [at this link](#) and in Appendix II. The experience with the pilot underscored the alumni demand and revealed the opportunity to further develop action-oriented educational programs developed for alumni.

II. Shorter-term, actional opportunities for 2025

Harvard should increase resourcing and launch new Harvard-wide climate education initiatives. These alumni-led and supported efforts will be complemented by strengthened investments in undergraduate, graduate, and alumni. Alumni climate education initiatives, like the HACE and Climate Reality Climate Boot Camp, provide scalable models of alumni learning. However, human capacity and financial resources commonly constrain alumni volunteer organizations.

1. Provide investment for one-time development as well as ongoing support for HACE's continued evolution and professionalization of the **Harvard Alumni Climate Action Training**, the action training piloted led by the Climate Boot Camp volunteer planning team, to maximize its quality and impact:
 - a. Year 1 and 2, one-time investment of \$400,000 to revamp program curriculum, lectures, interactive sessions and ongoing volunteer community support structure offered through HACE's website;
 - b. One-time investment of an amount (TBD) after year 2 for developing the program as a HarvardX offering available to the wider public;
 - c. Starting Year 1, ongoing investment of \$100,000 annually for:
 - i. Program content updating at regular intervals to stay current and address identified needs;
 - ii. Managing ongoing program marketing, production and volunteer training to facilitate interactive sessions and community support;



- d. Starting Year 1, ongoing infrastructure investment \$15,000 annually:
 - i. Infrastructure including: learning management software, video hosting, community platforms, other as needed;
 - ii. In-kind access to Harvard's Zoom account, relevant memberships (e.g. AASHE), fund-raising accounts (e.g. Instrumentl), and active university email accounts.
2. Invest \$100,000 annually for HACE operational support for ongoing programming to include but not be limited to:
 - a. Programs: career development (e.g. Career Transitions Series and The Mentorship Program); environmental justice programming (e.g. The Environmental Justice Health Series), community programming (e.g. networking and affinity groups)
 - b. Supporting infrastructure including but not limited to site development and database development.
3. Provide operational support to HACE through paid University student interns (e.g. Communications, events, or social media term time and summer interns)
4. In partnership with HACE, provide formalized institutional support for alumni through HACE including through:
 - a. Increased integration with HUCE, OFS, and BEI through formalized staff contacts to support alumni programming development
 - b. Formal representation of HACE on the HAA Board through an appointed position.
 - c. The creation of a HAA Director position supporting SIG climate-related activities for HACE and other SIGs

Harvard should establish core climate competencies and climate literacy standards. What does climate education at Harvard represent? Climate change, like other socio-ecological systems, expands beyond atmospheric science disciplines and requires interrogation by physical and social domains. Climate justice should serve as a fundamental element of climate education. Climate education should be anchored in community needs and create practical skill development needed for climate action. Climate research and knowledge generation is not enough. Climate education at Harvard must accelerate knowledge-action pathways. By 2025, Harvard must define climate education benchmarks for all graduating students. In turn, this can inform basic competencies to develop for Harvard alumni so alumni can be guided in their climate education journey.

Harvard should enhance climate educational support and career support services. In a 2018 survey of 100 students from eight Harvard schools, Sanjay Seth found that about half of students interested in climate-related work came to Harvard with professional experience in the field. Around three-quarters of students surveyed were either underwhelmed or didn't meet their goals and expectations at Harvard. Almost all (94%) of students surveyed said they had a mostly or completely self-directed experience studying climate change at Harvard. More than half were somewhat or very dissatisfied with their ability to work with students across the various Harvard schools. Harvard Schools provide educational support (e.g. PAFs, tutors, and faculty advisors) and career support services, so Harvard can focus on increasing support for those resource providers so students receive better climate advising. Similarly, Harvard-wide digital resources could support alumni and community members, too. For example, the HACE climate and environment alumni database could support the decentralized career services alumni networking digital resources.

Harvard should hire new climate faculty and establish climate residency programs for practitioners from frontline and underrepresented communities. Who defines and represents climate education instructors inside and outside of the classroom? New faculty hires will build out academic connections, lead breakthrough educational pathways, and inspire Harvard students and alumni. Digital opportunities provide a greater connection to the frontline and marginalized communities facing the burden of climate injustices. Harvard can redefine traditional academic professional standards by uplifting Indigenous and local community knowledge in these hires and in the new research and courses. These new faculty can also pioneer new teaching methods that generate open-access resources, like on HarvardX. Harvard students can still receive personal instruction and learning, but the HarvardX components of new climate courses could enhance alumni climate education.



Harvard has a unique opportunity to invest in the alumni community to create the next generation of climate education. Harvard alumni still turn to Harvard to understand the breakthrough climate solutions, read the leading research, watch the big thinkers, listen to the lessons learned and insights from practitioners leading the way to create more climate resilient livelihoods. By 2030, we hope they still turn to Harvard, but one with significantly expanded climate institutions, initiatives, and innovations.

Harvard Museums of Science and Culture

Author: Brenda Tindal, Executive Director

The Harvard Museums of Science & Culture’s mission is to foster curiosity and a spirit of discovery in visitors of all ages, enhancing public understanding of and appreciation for the natural world, science, and human cultures. This mission in mind, climate science and environmental literacy has long been leveraged within HMSC exhibits and programs—particularly those that center on educating our audiences about the cyclical and natural causes of climate change and its human-driven impacts. As we look toward the future, climate education, will continue to be a critical feature of HMSC’s education and public programming landscape, virtual and in-gallery experiences, and strategic initiatives and partnerships, including but not limited to:

Temporary, Long-term, & Permanent Exhibitions

In Search of Thoreau’s Flowers: An Exploration of Change and Loss is an immersive multidisciplinary experience that marries art and science through a modern artistic interpretation of Henry David Thoreau’s preserved plants. Thoreau was prolific in his practice of collecting botanical samples and plants are important indicators of how our world is responding to climate change. Long preserved in the Harvard University Herbaria, 648 specimens serve as the foundation of this new exhibition. The digitization of the specimens, and others in the Herbaria collection, are now allowing broader access to scholars and citizen scientists, in turn welcoming new domains of scholarship.

The exhibition invites visitors to experience emotionally resonant connections to the profound loss of natural diversity caused by human-induced climate change. The exhibition urges us to ask, “What do Thoreau’s findings tell us about what plants are winning, and what plants are losing, in the face of climate change today?”

[The exhibition](#) is open from May 2022 to November 2023.

The Climate Change exhibition draws on the latest scientific information about our warming climate, the global and local consequences, and how to both reduce the fossil fuel emissions that cause it and prepare for its effects. This multimedia exhibit includes engaging video and storm simulations, a “check your knowledge” interactive station, and a dramatic inside look at a high-tech Argo float from Woods Hole Oceanographic Institution, one of more than 4,000 deployed worldwide to monitor global oceans and climate. Developed in collaboration with the Harvard University Center for the Environment and informed by new Harvard research, the exhibit offers visitors the unfettered facts—the knowns and unknowns—about one of the greatest challenges the world faces.

Rewilding Harvard is an outdoor planter in front of the Harvard Museum of Natural Science and a digital installation that aligns with global conservation efforts aimed at restoring early-stage biodiversity and protecting and exploring the benefit of the natural environment, including the support of pollinators. The installation was created in partnership with Harvard Professor Joyce Chaplin (History), who designed a series of ongoing courses in which students learned about rewilding and work collaboratively to develop content in support of the *Rewilding Harvard* project.

Strategic Initiatives & Partnerships



HMSC is an active participant in **The Green Ribbon Commission Cultural Institutions Working Group**: The City of Boston aims to be carbon neutral by 2050, as well as resilient to the greatest climate threats. To support these efforts the Green Ribbon Commission and over 40 of Boston's world class arts, history, sports, and entertainment organizations have partnered together to launch the Action Pact Boston campaign. Arts and culture have the power to open people's minds and help people see things in new ways. Our goal is to harness that power and encourage a sustained focus on visioning and achieving a climate-safe future.

In May 2022, HMSC's Executive Director will present alongside other members of the GRC Cultural Institutions Working group at the Alliance of American Museums (AAM) conference held in Boston. The panel/session is entitled: **"All Boats Rise: Mobilizing Cultural Communities to Tackle Climate Change"**

This session will tell the story of the Boston Green Ribbon Commission's (GRC) efforts to mobilize area museums and cultural organizations around the topic of climate change. It will address the process by which the GRC built a sector-based network, mobilized participants around two specific activity areas--Programming & Communications and Energy & Resilience--and helped members align their interests with those of the City of Boston. The session will showcase the challenges of bringing a broadly diverse range of institutions together to push for a common cause, the complexities of communicating with the public about a tough topic, and the difficulties of balancing energy efficiency and resilience with delicate collections and historic buildings. It will also highlight the critical importance of museums and cultural institutions of *all kinds* as trusted and creative conduits not only for the dissemination of information about climate change but also for the emotional processing of cataclysmic shifts in the world around us.

The session will be presented at a moment of culmination for the GRC's Cultural Institutions Working Group as they mobilize a collective programming effort, titled *Action Pact 2022: Ready, Resilient, Re-invented*, from April to June 2022 and conclude their first collaborative climate action planning cohort which will result in climate action plans for ten member institutions.

Peer Institutions

In preparation for the work of this committee, Vice Provost Stock requested support from the Office of the Provost in researching the current state of climate and sustainability academic programs at ivy plus peer institutions. The information that follows is an abbreviated list of the most robust programs, as of January 2022. All program details were found on said institution's public-facing website. These summaries are not all-encompassing of the full slate of climate and sustainability efforts, yet of the degree-granting academic programs.

California Institute of Technology

CalTech offers undergraduate and graduate programs in the department of [Environmental Science and Engineering](#). The [Division of Geological and Planetary Sciences](#) offers undergraduate degrees in Geobiology, Geochemistry, Geology, Geophysics, and Planetary Science. Students enrolled in the PhD program may be awarded a master's degree when they have satisfied the basic Caltech requirement of 135 units. The [Center for Climate Sciences](#) offers Climate Workshops, Climate Summer School, Climate Seminars, and Themed Climate Colloquia.

Columbia University, *The Columbia Climate School: Climate, Earth, and Society*

Columbia University has created the nation's first [climate school](#). In conjunction with the Earth Institute, Columbia College and the School of General Studies offer a [major and a special concentration in sustainable development](#).



HARVARD

Vice Provost for Climate & Sustainability

Students may also pursue an accelerated program that allows them to earn a BA and an MS in Sustainability Management in just five years. The [Department of Earth and Environmental Sciences](#) offers majors in environmental science and in earth science, as well as a concentration in: [Department of Ecology, Evolution and Environmental Biology](#) offers majors and concentrations in [environmental biology](#) and in [evolutionary biology of the human species](#). A [major in earth and environmental engineering](#), or can choose to blend their scientific pursuits with a liberal arts experience through a dual-degree [combined program](#). Through Barnard College's [Department of Environmental Science](#), students can choose to major in [environmental science](#), [environmental biology](#) or [environmental policy](#). Students are trained to cope with balancing human requirements and environmental conservation and may choose to pursue one of several [five-year, dual-degree programs](#).

Graduate degrees are offered in: Master of Arts in [Climate and Society](#); MS in [Sustainability Management](#), MS in [Sustainability Science](#), an [MPA Environmental Science and Policy](#), an [MPA in Development Practice](#) (a 21-month MPA-DP), an [MPH Environmental Health Sciences](#), a [Master of Arts in Ecology Evolution and Conservation Biology](#) and an [MS Earth and Environmental Engineering](#) with concentrations in: Water Resources and Climate Risks, Sustainable Energy, Sustainable Mining and Materials.

The Climate School also offers [Non-Degree Programs](#) for: Professional Learning, Pre-College Programs, Educator Training.

Dartmouth College

The [Arthur L. Irving Institute](#) for Energy & Society at Dartmouth College offers undergraduate programs in [Environmental Studies](#), as well as a Graduate program in [Ecology, Evolution, Ecosystems, and Society](#), and a foreign study program in southern Africa that helps students understand the global aspects of environmental problems. Each fall term, 16 Dartmouth undergraduates gain hands-on experience with issues of population, land and water use, ecotourism, and resource management in a developing country.

The Irving Institute also offers a number of [experiential learning opportunities](#), including: hands-on learning, energy immersion trips, a Russia Energy/Government FSP, a mini-grant program, and internship and job search support.

Duke University, *Nicholas School of the Environment*

[Duke's Nicholas School of the Environment](#) offers Undergraduate Programs – majors in BS or AB, and a minor – in [Earth & Climate Sciences](#), [Environmental Sciences & Policy](#), and [Marine Science & Conservation](#). And Graduate Programs offering: [Master of Environmental Management](#), [Duke Environmental Leadership Master of Environmental Management](#), and [International Master of Environmental Policy](#).

The Nicholas School also offers [Certificate Programs](#) for Undergraduates, Master's, Doctoral, and Executive Education students.

Massachusetts Institute of Technology



[MIT](#) Undergraduate Degrees are offered by the academic departments which allow students to pursue tracks or concentrations within their majors that engage closely with environmental issues. Students can also pursue minors - whether offered by individual departments, combinations of departments, or Institute-wide, numerous minors at MIT allow students to pair their majors with a substantive course of studies in sustainability

- [Civil and Environmental Engineering](#) (Course 1, Bachelor of Science in Engineering) with tracks in [Environmental Engineering Science](#) or [Systems Engineering](#)
- [Mechanical Engineering](#) (Course 2-A, Bachelor of Science in Engineering) with [concentrations](#) in [Environmental Mechanics](#) or [Sustainable and Global Development](#)
- [Chemical Engineering](#) (Course 10-ENG, Bachelor of Science in Engineering) with an [Environmental Concentration](#)
- [Planning](#) (Course 11, Bachelor of Science) with a concentration in [Environmental Policy](#)
- [Earth, Atmospheric, and Planetary Sciences](#) (Course 12, Bachelor of Science) with concentrations in [Environmental Systems](#) or [Atmosphere, Oceans, and Climate](#)
- [Aeronautics and Astronautics](#) (Course 16-ENG, Bachelor of Science in Engineering) with [concentrations](#) in the Environment, Computational Sustainability, or Energy
- [Biological Engineering](#) (Course 20, Bachelor of Science) with a concentration in [Environmental and Toxicological Studies](#)

Through [the department of Earth, Atmospheric and Planetary Sciences](#), MIT offers master's level graduate degrees in: Atmospheres, Oceans, & Climate, Geology, Geochemistry, & Geobiology, Geophysics, Planetary Science, MIT/WHOI Joint Program, and a Fifth-Year Masters. They also offer options for Online Education: MITEI is currently developing graduate-level massive open online courses (MOOCs) based on residential MIT energy classes. These courses are free to audit, and certificates of completion for academic and/or professional recognition are available to purchase. Additionally, students can earn a Sustainability Certificate through the [MIT Sloan Sustainability Initiative](#).

Stanford University, *Stanford Doerr School of Sustainability (launching in September 2022)*

[Stanford's new climate and sustainability school](#) will bring together and expand on the [School of Earth, Energy, and Environmental Sciences](#) (Stanford Earth), the [Stanford Woods Institute for the Environment](#), the [Precourt Institute for Energy](#), the [Department of Civil and Environmental Engineering](#) (joint with the School of Engineering) and the facilities at [Hopkins Marine Station](#).

The school will offer undergraduate degrees from the Earth School in: [Earth Systems](#), with minors in: Earth Systems, Sustainability and Earth Systems, Environmental Justice; [Geological Sciences](#); [Geophysics](#) (major and minor); [Energy Resources Engineering](#) (major and minor); and a [Master of Science](#) (also offered as a coterminal BS/MS program). Additional undergraduate programs are offered in: [Civil & Environmental Engineering](#), [Atmosphere and Energy](#) – (students take classes in both Atmosphere and Energy as well as classes that integrate the two fields) and [Environmental Systems Engineering](#).

[Stanford Earth](#) will offer graduate degree programs in: [Energy Resources Engineering](#) (an MS in Petroleum Engineering and MS in Energy Resources Engineering); [Geological Sciences](#) (an MS in Geological Sciences), and [Geophysics](#) (MS in Geophysics - also offered as a coterminal BS/MS program) The [Earth Systems Program](#) offers



undergraduates the opportunity to apply for a [coterminal Master of Science \(M.S.\) degree in Earth Systems](#) and a [coterminal Master of Arts \(M.A.\) degree in Earth Systems, Environmental Communication](#). Additionally, the [Emmett Interdisciplinary Program in Environment and Resources](#) offers a Joint and Dual MS in Environment and Resources.

- Joint MS for
 - M.B.A. students at Stanford's Graduate School of Business or
 - J.D. students at Stanford Law School.
- Dual MS degree for Master's students in the
 - Ford Dorsey Master's in International Policy program
 - M.D. students at Stanford's School of Medicine
 - Or students pursuing a Ph.D. in another Stanford school or department.

Finally, the [Change Leadership for Sustainability Program](#) offers current Stanford University undergraduates the opportunity to apply for a [one-year coterminal Master of Arts \(M.A.\) or Master of Science \(M.S.\) in Sustainability Science and Practice \(SUST\)](#).

Yale University, *Yale School of the Environment*

[The Yale School of the Environment](#) offers Undergraduate Programs in: [Environmental Studies BA](#) and [BS](#) and Master's Programs in: [Master of Environmental Management](#), [Water Resource Science and Management](#), [Master of Forestry](#), and a [Master of Forest Science or Master of Environmental Science](#).

Yale also offers a [Joint Degree Programs](#) – which are ideal for students interested in applying environmental management frameworks to particular research or professional contexts beyond the scope of YSE's traditional offerings. Additionally, they offer two 10-12 month [online certificate programs](#) in Financing and Deploying Clean Energy and Tropical Forest Landscapes: Conservation, Restoration & Sustainable Use.

The University of Massachusetts at Amherst, *School of Earth and Sustainability*

Established in Spring 2016, the [School of Earth and Sustainability](#) (SES) is a transdisciplinary partnership between the Departments of [Environmental Conservation](#), [Geosciences](#), [Landscape Architecture & Regional Planning](#) and [Stockbridge School of Agriculture](#) as well as the [Environmental Microbiology](#) group from the Department of Microbiology. SES joins diverse academic programs, research, and outreach that share a common focus on sustainability in the natural and built environments. SES offers Undergraduate Programs in [Earth Systems](#), [Environmental Science](#), [Geology](#), [Landscape Architecture](#), [Microbiology](#), [Natural Resources Conservation](#) (Environmental Conservation, Forest Ecology & Conservation and Wildlife Ecology & Conservation), [Sustainable Community Development](#), and [Turfgrass Science & Management](#).

SES offers a range of multidisciplinary Professional MS, Research MS/PhD, and 1-year MS programs that meet or exceed the requirements of science and sustainability-related fields in the following disciplines: [Applied Geohydrology](#), [Environmental Conservation](#), [Geographic Information Science and Technology](#), [Geography](#), [Geosciences](#), [Intercampus Marine Science](#) (which leverages opportunities within the [Five College network](#)), [Landscape Architecture](#), a [Regional Planning master's program](#) and [Planning PhD program](#), [Microbiology](#), [Plant & Soil Sciences](#), [Sustainability Science](#), and [Sustainable Building Systems](#).



Dual-degree programs offer an increased level of depth and interdisciplinary study for students interested in the confluences between academic and professional fields. These programs provide accreditation in multiple fields in accelerated two or three-year programs:

- [Master of Landscape Architecture & Master of Regional Planning](#) (MLA/MRP)
- [Master of Regional Planning & Master of Science in Sustainability Science](#) (MRP/MS3)
- [Master of Landscape Architecture & Master of Architecture](#) (MLA/MArch) in partnership with the [Department Architecture](#)
- [Master of Regional Planning & Master of Architecture](#) (MRP/MArch) in partnership with the [Department Architecture](#)
- [Master of Public Policy and Administration & Master of Regional Planning](#) (MPPA/MRP) in partnership with the [School of Public Policy](#)
- [Master of Regional Planning & Law](#) (MRP/JD) in conjunction with the [School of Law at Western New England University](#) in Springfield

Additionally, the university partnered with the city of Newton, MA to help develop their Green Leadership Collaborative via the [Wells Avenue Tech District Living Lab](#).

The University of Massachusetts at Boston, *School for the Environment*

The School for the Environment offers a unique opportunity for aspiring environmental leaders to ensure a prosperous and just future for our planet. In Boston, the most dynamic and rich urban coastal region there is, the school works within one of the most active environmental communities in the U.S. The school offers undergraduate programs in [Community Development, BA](#), [Environmental Science, BA](#), [Environmental Science, BS](#), [Environmental Studies and Sustainability, BA](#) and an accelerated [BS-MS Environmental Sciences](#).

Graduate programs are awarded as Masters of Science in the fields of: [Environmental Sciences Professional, PSM](#), [Environmental Sciences, MS](#), [Marine Science and Technology, MS](#), and [Urban Planning and Community Development, MS](#).

In a partnership with East Boston, MA, [the Sustainable Solutions Lab](#) at UMass Boston has released new research exploring the question of what is necessary for true community and climate resilience in East Boston.