# Duke AHEAD Grants 2022-2023

**Title**: Climate Fluency Curriculum for Duke Health Professions Students and Faculty

**Principal Investigator(s)**: AnnMarie Walton (SON) and Brian McAdoo (NSOE)

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**Collaborators**: Trisha Dalapati, SOM- Graduate Assistant in the application,
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**Focused Question**: Health professions students and faculty must be educated about climate change. We propose developing and piloting a course called "Climate Fluency for Health Professionals" to answer the question, "What is the feasibility and efficacy of an introductory climate fluency course for health professions students and faculty?"

**Background**: Climate change significantly affects human health. Rising average global temperature results in more severe weather events, such as stronger tropical cyclones, more widespread tornadoes, increased flooding, extreme temperature swings, wildfires and drought. These events increase health risks, including heat and cardio-respiratory illnesses, allergies, vector borne diseases, carbon monoxide poisoning, trauma, drowning, and psychological stress. Extreme weather events also stress food, housing and infrastructure including energy, forcing marginalized populations to make difficult decisions as supplies decline and prices rise. These insecurities exacerbate racial and socioeconomic disparities within our local, regional, and global communities. Ironically, health systems account for 8-9% of US greenhouse gas emissions and so are themselves contributors to climate change (1). Health systems and health care professionals are responsible for responding to the evolving and inevitable climate crisis. Health professional students and faculty need to be educated about climate change via a solution-focused approach. Recognizing that it is difficult to add climate change content to an already full curriculum (2), a few schools have tried to embed climate change content across courses (3). A few peer institutions, including the University of Minnesota, University of Michigan School of Nursing, and University of Colorado School of Medicine, have courses on climate change (4-6). However, learning objectives chiefly focus on understanding the science driving climate change and the associated health outcomes. Moreover, some of these curricular efforts are accessible only to US government agencies (7) or already licensed healthcare professionals (4, 6). The importance of teaching health professional students in an interprofessional setting is widely recognized, yet interprofessional climate change education is lacking. In a scoping review by Duke Medical students (in progress, unpublished), broad keywords related to climate change and interdisciplinary education were used to identify over 600 abstracts from databases. Of 600 articles, only six articles were original research studies focused on interdisciplinary education on climate change in a health professional setting (8-13). Moreover, three of the articles were developed and implemented in health professional programs outside of the United States (10, 11, 13). Although many educational efforts on climate change in health professional training settings within the United States are not/have not been published, the general lack of peer-reviewed articles suggests gaps in addressing the topic of climate change in a rigorous, validated didactic manner. Considering these gaps, we propose an interprofessional course on climate change fluency for health

professional students and faculty to advance Duke University's Climate Change Commitment (14). Our pilot course is unique compared to others at peer institutions as it will 1) engage both faculty and students – the future of healthcare- who will be ultimately responsible for creating and implementing future solutions responsive to climate change, 2) harness the interdisciplinary landscape across Duke University and Duke Health, and 3) teach not only science of climate change but also focus on sustainable practices and solution-oriented discussions at a premier academic hospital system, and 4) offer service-learning opportunities for participating students and faculty in the local community to emphasize the tangible impact of climate change. Of critical importance, this course is not being developed only by one health professional school for its students and faculty. Our course is co-developed and co-led by experts and students from the Nicholas School of the Environment (NSOE), School of Medicine, School of Nursing, Physician Assistant Program, and Doctor of Physical Therapy Program. The project is a pilot intended to be modified after feedback and assessments. We anticipate this course could become required by the School of Medicine, School of Nursing, PT, and PA programs (students and faculty). We also see opportunities to open the course to other learners at Duke, and even to health system employees in the future. The Agency for Healthcare Research and Quality is currently soliciting proposals on the intersection of climate change and healthcare, which could be a source of funding to scale the course (15).

**Specific Aims**: Our specific aims through this pilot course are to: 1. Teach faculty and students the basic scientific concepts of climate change, sustainability, and health impacts to increase fluency around these topics, 2. Emphasize the importance of interprofessional and interdisciplinary education, 3. Provide first-hand experiences on how climate change affects the local surrounding community through service-learning events, 4. Familiarize participants with the DUHS infrastructure to illustrate the contribution and impact of healthcare systems on the environment, 5. Assess changes in the knowledge-base, fluency, and self-efficacy related to climate change and sustainability through pre- and post-course assessments.

**Methods**: - The proposed project will utilize an interprofessional community across Duke to develop and deliver the content for this "Climate Fluency for Health Professionals" course. Instructors will model the values of collaboration and professionalism, common to all our disciplines, through the interprofessional team-teaching structure of each module. Participating faculty from more than one department from DUHS and one from the environment school (NSOE) will be present at each of the office hours and community engagement opportunities. Proposed participants: Two students each from the SOM, the SON, the PA and PT programs, and one faculty from each of the aforementioned programs. A convenience sample of interested participants will be sought and the course will be capped at 12 participants. Proposed delivery methods: ● online modules with video recorded lectures, readings, case studies, and resources ● in-person engagement sessions where participants can interact with university and community members who have expertise in environmental sustainability, population health, environmental justice and other areas related to climate change ● office hours hosted in person and remote by members of the core team on this grant to discuss climate change issues of interest to the learners- one NSOE faculty member and one health professions faculty member together at each office hours- vary locations of the in-person office hours ● pre- and post-assessment of knowledge, self-efficacy and intention to change related to climate change content and practices Proposed assessment/evaluation methods: ● Pre-post assessment of knowledge, self-efficacy, and intention to change regarding climate change concepts and sustainability practices ● Discussion forums (n=4

anticipated in September, November, February, April) ● Attendance at in person events to engage with course faculty, interprofessional colleagues, and the community (n=2 anticipated in September and March) ● Critical Reflection Essay at end of the semester Proposed module topics, schedule, and methods: ● Module 1 (August-September 2023): Understand the concept of planetary health and how human health fits within this framework. Pre-assessment, asynchronous content, discussion forum, in-person interprofessional event involving a community sustainability service project, office hours. ● Modules 2 & 3 (October-November): Understand the causes of climate change and the impacts it has on the environment and planetary health including increasing extreme weather events, heat stress, air and water quality, vector distribution, food systems and mental health. Asynchronous content, discussion forums, office hours. ● Module 4 (January 2024): Recognize how climate change disproportionately impacts marginalized communities, exacerbating extant social injustices and health disparities. Understand the need for resiliency planning. Asynchronous content, office hours. ● Module 5 (February): Understand from a systems perspective: the adverse environmental impacts of the healthcare industry, the role of medical professionals in advocating for sustainable practices and greenhouse gas reduction policies in both inpatient and outpatient settings. Asynchronous content, discussion forum, office hours. ● Module 6 (March): Understand how to educate and support patients affected by climate change. Asynchronous content, interprofessional service-learning activity, discussion forum, office hours. ● Module 7 (April): Review and summary including opportunities for impact in research, education, and clinical practice. Asynchronous content, critical reflection paper, office hours, post-assessment. An IRB application to share pre-post assessment data would be sought in April, content development would occur May-August 2023, and the pilot course would run September 2023-April 2024. The time anticipated for each participant to pilot the course and give feedback is 16 hours per participant. Participants would each receive $100 in remuneration at the end of the course. Outcomes and Measures: A team-developed series of questions about knowledge, self-efficacy, and intention to change behavior centered on climate change concepts will be administered before and after the delivery of the content (September and April). The knowledge questions addressing climate competence will be developed with a category-based tool (16). Team-developed questions will assess feasibility and the participant experience. Data Management and Evaluation: While some demographic information will be collected, responses to the pre-and post-assessment about knowledge, self-efficacy, and intention to change will be sent from REDCap, stored in REDCap, and results shared in aggregate only. We will ask for permission to share narrative comments about the course made on the assessment in future publications/presentations. Student assessments such as discussion forums and critical reflection essays will not be utilized as data

**IRB Status**:

☐ Plan to submit

**Challenges**: ● Time: Development of these modules will take time. We have purposefully scheduled the majority of the content to be developed in the summer months when faculty academic responsibilities are a little lighter. ● Logistics: Offering in-person and virtual office hours on a monthly basis attended by at least two of the course faculty will be logistically challenging. The motivated graduate assistant on our team will assist with this. ● Technology: Educational technology requires a specific skillset. We have secured an Academic Technology Support Administrator in the School of Nursing to be assigned to this course in the fall if it is funded. ● Community: Courses that include community engagement components must be responsive to the community and enduring. Students will engage where there are

already authentic and collaborative relationships with Duke (e.g. REMEDY @ Duke) that will endure beyond the scope of the pilot project.

**Works Cited**: References: 1. FACT SHEET: Health Sector Leaders Join Biden Administration's Pledge to Reduce Greenhouse Gas Emissions 50% by 2030. https://www.whitehouse.gov/briefing-room/statements-releases/2022/06/30/fact-sheet-health-sector-leaders-join-biden-administrations-pledge-to-reduce-greenhouse-gas-emissions-50-by-2030/ (2022). 2. D'Ambrosio, A. Teaching Climate Change in Med School Gains Momentum. MedPage Today https://www.medpagetoday.com/special-reports/exclusives/100852 (2022). 3. Buckley, M. R. F. Connecting Climate Change and Health. Harvard Medical School https://hms.harvard.edu/news/connecting-climate-change-health (2023). 4. Climate Change and Health Curriculum. University of Minnesota https://globalhealthcenter.umn.edu/climate-change-and-health-curriculum. 5. Bridging Climate Change and Health. Univeristy of Michigan School of Nursing https://nursing.umich.edu/research/bridging-climate-change-health. 6. Introducing the Diploma in Climate Medicine. University of Colorado Anschutz Medical Campus https://medschool.cuanschutz.edu/climateandhealth/diploma-in-climate-medicine#ft-curriculum-1. 7. Haines, A. & Ebi, K. The Imperative for Climate Action to Protect Health. N. Engl. J. Med. 380, 263–273 (2019). 8. Wilkes, M. S., Conrad, P. A. & Winer, J. N. One Health-One Education: Medical and Veterinary Inter-Professional Training. J. Vet. Med. Educ. 46, 14–20 (2019). 9. Hatfield, J. et al. An interprofessional, solutions-oriented approach to raising awareness about the impacts of climate change on human health for health profession students. Int. J. Gynaecol. Obstet. Off. Organ Int. Fed. Gynaecol. Obstet. 160, 453–454 (2023). 10. Mahoney, M. R., Baltzell, K., Nderitu, E., Dhanani, R. & Macfarlane, S. Interprofessional curriculum on environmental and social determinants of health in rural Kenya: Aga Khan University East Africa-University of California San Francisco Integrated Primary Health Care Program. Ann. Glob. Health 80, 197 (2014). 11. Charlesworth, K. E., Madden, D. L. & Capon, A. G. Environmentally sustainable health care: using an educational intervention to engage the public health medical workforce in Australia. New South Wales Public Health Bull. 24, 76–80 (2013). 12. Katzman, J. G. et al. Climate Change and Human Health ECHO: Global Telementoring for Health Professionals. J. Med. Educ. Curric. Dev. 8, 23821205211061020 (2021). 13. Shendell, D. G. & Ana, G. R. E. E. Promoting environmental public health in rapidly urbanizing areas of less-developed countries in Africa: a collaborative interdisciplinary training in Ibadan, Nigeria. J. Environ. Health 74, 26–35 (2011). 14. Duke Climate Comitment. Duke University. https://climate.duke.edu/ 15. NOT-HS-23-006: AHRQ announces interest in research on climate change and Healthcare. National Institutes of Health https://grants.nih.gov/grants/guide/notice-files/NOT-HS-23-006.html (2023). 16. Fuertes, M. Á. et al. Climate Change Education: A proposal of a Category-Based Tool for Curriculum Analysis to Achieve the Climate Competence. Educ. Knowl. Soc. EKS 21, 13 (2020).

## Budget:

| | | Estimated Cost: |
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| PI Support | AnnMarie Walton, PhD, RN, MPH, OCN, CHES, FAAN: Principal Investigator (.15 Calendar months. $2,276): Dr. Walton is an Associate Professor | $2276 |

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| | in the Duke University School of Nursing (DUSON). She is the Liaison to the Nurses Climate Challenge and the Global Consortium on Climate and Health Education for DUSON. She has incorporated climate change content into the Population Health Course at DUSON and lectures and writes about the topic of climate change and environmental health education. Her role on the project will be to co-lead the team, facilitate bi-weekly meetings, co-lead the development of a curriculum in climate change and sustainability for health professions students and faculty, and to leverage her networks and resources in shaping the course. She will work closely and collaboratively with Ms. Dalapati as Graduate Assistant and the essential other significant contributors listed below. Brian McAdoo, PhD: Co-PI (0 calendar months; InKind): Dr McAdoo is a disaster researcher and head of the PlanetLab in the Earth and Climate Science Division at Duke University's Nicholas School of the Environment (NSOE). | |

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| | The PlanetLab researches how humans are damaging the Earth's physical systems that support life on the planet and how the resulting disasters disproportionately impact marginalized communities. McAdoo will co- coordinate expert contributors from NSOE as well as lead the development of experiential opportunities for community engagement in Durham and beyond. | |
| Consultant costs | Trisha Dalapati, Graduate Assistant 5,916 (.47 calendar months. $2,016): Trisha is a MD-PHD candidate in the Duke Medical Scientist Training Program. Trisha serves on the Chancellor Washington's Climate Change, Health, and Equity Committee. In addition to her thesis work, she is researching curriculum on climate change and sustainability at health professional programs with other medical students and under the guidance of Dr. Andrew Muzyk. Ms. Dalapati will to assist with booking of rooms, coordination of office hours, honoraria for | $5916 |

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| | speakers, remuneration of participants, set up of REDCap, analysis of REDCap data, set up of virtual office hours, coordination of interprofessional service activities, coordination of team member meetings (biweekly throughout the pilot). HonorariaCommunity Member/Lecturers ($1,200): Honoraria for participating community members/lecturers ($200 x 6= $1,200): Honoraria for guest lecturers and faculty experts outside of the Duke community who will facilitate hands-on visits to community sites so that students can participate in a live learning opportunity about climate change or sustainability and/or come to sharing opportunities on campus. Tangible gifts for participating faculty ($100 x 15 = $1,500): Tangible gifts (e.g. reusable notebooks, reusable water bottles) for faculty who will design and/or record enduring guest lectures to be embedded in the course. May include some of the other significant contributors named above. Educational | |

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| | technology support ($1,200): Educational technology support to design and set up the Canvas course, ensuringcourseis ensuring course is accessible (may include closed captioning). | |
| Equipment | *This is other (not equipment): Transcription ($108): 15 faculty will present recorded lectures for approximately 30 minutes sessions. Transcription estimated at 25 cents per minute through Ubiquis/Verbal Link. (.25 x 430 minutes = $108) Remuneration for students/faculty ($1,200): Honoraria for each student/faculty member that participates in this pilot course as a learner (12X 100= $1,200). | $1308 |
| Computer | | $0 |
| Supplies | Refreshments ($500): Light refreshments for the two in person activities in which the entire cohort of learners will be brought together with community members and faculty in the course. | $500 |
| Travel | | $0 |
| Other Expenses | | |
| | | |
| Total Costs for proposed project: | | $10000 |