University of Pittsburgh
Mascaro Center for Sustainable Innovation

SUMMER RESEARCH IN SUSTAINABILITY

The Mascaro Center is seeking talented undergraduate and master's level students interested in gaining hands-on research experience related to the broad topic of sustainability.

APPLICATION PROCESS Students should review project abstracts and rank their top two project interests within their application form. While we aim to match student interests, funding will follow the strongest applications as determined by the summer research review committee.

DUE DATE **Applications are due on February 18, 2026.**

PROGRAM DURATION is 10 weeks full time (37.5 hours/week) from May 18 – July 24, 2026. Students will be paid $14.50/hour.

NEW THEMEATIC COHORTS developed with support from our partner centers and initiatives across the University connect students with faculty, staff, and peers in unique summer networks that foster collaboration.

RESEARCH THEMES

OPEN CALL FOR SUSTAINABILITY RESEARCH includes research from engineering, science, humanities, and social sciences with projects that address pressing environmental, social, and economic challenges.

PITTSBURGH WATER COLLABORATORY includes research related to water issues across all disciplines, with a focus on projects that relate directly or indirectly to issues of interest in Southwest PA or the Ohio River Basin.

RESPONSIBLE DATA SCIENCE includes research that addresses the use of data and AI transparently, ethically, and equitably to address environmental and social challenges. This work can be directly or indirectly associated with HAIL (Hub for AI and Data Science Leadership).

SUSTAINABLE HEALTHCARE includes research whose projects reduce health care's environmental impact and or improve health-system resilience.

PROJECT SUMMARIES

Theme Cohort	Advisor(s)	Department(s)	Project Title	Project Description
Open Call in Sustainability Research	Seth Asare Okyere	Urban Studies	Heat (in)justice in Pittsburgh: The role of nature-based solutions for urban heat adaptation in low-income communities	Extreme heat is a growing threat to low-income communities in the Pittsburgh area given recent reports of rising temperatures and inequitable access to cooling. This project seeks to evaluate how community- and nature-based solutions (e.g, tree planting, community gardens, etc.) can support heat adaptation for those with vulnerabilities to extreme heat.
Open Call in Sustainability Research	Seth Asare Okyere	Urban Studies	Spatial injustice: Impact of historical exclusion and disempowerment on heat-induced health outcomes during extreme heat	The legacy of historical spatial exclusionary practices (e.g., redlining) and disinvestment manifests strongly in several neighborhoods across Pittsburgh. Extreme heat compounds existing vulnerabilities. This project seeks to 1) spatially map how the convergence of extreme heat and spatial injustice induces stress and anxiety for low-income neighborhoods during extreme heat season and 2) most importantly, discuss coping mechanisms.
Open Call in Sustainability Research	Mostafa Bedewy	Mechanical Engineering and Materials Science	Graphene Raincoat: Designing Ultra-Hydrophobic, Self-Cleaning Surfaces with Laser Light	What if buildings, fabrics, and everyday materials could clean themselves every time it rains? In this project, the student will use lasers to create graphene-based micro-/nano-textures that repel water and dirt. Self-cleaning surfaces reduce water consumption, eliminate harsh detergents, extend material life, and can be applied to fabrics or infrastructure for low-maintenance, low-waste, energy-free cleaning.
Open Call in Sustainability Research	Mostafa Bedewy	Mechanical Engineering and Materials Science	Lotus Steel: Growing Carbon Nanostructures for Water-Repelling, Corrosion-Resistant Metal Surfaces	Combining nanotechnology with stainless steel, this project explores how nanocarbons can completely transform surface behavior, making steel so hydrophobic that water droplets roll off like dew on a lotus leaf. The student will tune carbon nanotube (CNT) growth conditions, visualize micro- and nano-textures, and measure wetting properties to create superhydrophobic metal surfaces. Superhydrophobic CNT-coated steel can reduce corrosion, minimize cleaning needs, extend component lifetimes, and decrease chemical usage in industrial maintenance, supporting longer-lasting, lower-impact materials for infrastructure and manufacturing.

Open Call in Sustainability Research	Kevin Bell	Bioengineering	Integrating PLA Recycling and Injection Molding into SSOE Curriculum	The student will research the best ways to integrate PLA recycling and desktop injection molding into the SSOE curriculum while strengthening the systems for PLA collection, processing, and reuse. The student will implement an upgraded desktop injection molding machine, develop instructional materials, and create reliable processes that support sustainable manufacturing practices across SSOE. The selected summer intern will work within the SSOE IDEA Lab to address this problem and will also contribute to other ongoing projects within the lab to gain holistic exposure to the innovation, design, and entrepreneurship process.
Open Call in Sustainability Research	Amy Brooks	Civil and Environmental Engineering	Circular Economy at the University of Pittsburgh - Exploring Opportunities of Reuse.	Assess existing Surplus Property operations at the University of Pittsburgh, including defining, verifying, and articulating contributions to campus circular economy. Considering national circular economy models and best practices, leverage 45 years of operations and data to determine landfill diversion rate, embodied carbon avoidance, financial value proposition, campus community contributions, and other key performance indicators.
Open Call in Sustainability Research	In Hee Lee	Electrical and Computer Engineering	Development of a Self-Powered Sensing Embedded System for Sustainability	This project involves creating a smart sensing embedded system that operates entirely on harvested ambient energy recharging a battery. Students will design low-power hardware and firmware capable of continuous environmental monitoring while adapting to variable energy conditions. The project advances sustainability by reducing electronic waste, extending system lifespan, and enabling long-term, self-sufficient sensing in real-world applications.
Open Call in Sustainability Research	Paul Leu	Industrial Engineering	Antireflection glass for bifacial solar panels.	Bifacial solar panels are rapidly replacing traditional monofacial panels because they can generate electricity from light striking both the front and the back surfaces. Depending on the reflectivity of the surrounding environment, this dual-sided absorption can boost overall energy production by more than 30%. This project will investigate how antireflection coatings can further enhance the performance of bifacial panels. Using optical simulations, the student will quantify how different coating designs influence the amount of light entering the cells and assess the potential efficiency gains compared to uncoated panels.
Open Call in Sustainability Research	Paul Leu	Industrial Engineering	Solar Cell Recovery vs. Solar Cell Recycling	Traditional solar cell recycling typically involves mechanically crushing or chemically dissolving modules to extract materials such as glass, aluminum, copper, and silver. While this approach recovers bulk materials, it destroys the silicon cells, which represent some of the highest-value components in the module. Solar cell recovery offers a different pathway. Instead of breaking

				down the module, recovery methods aim to delaminate and extract intact silicon cells so they can be reused or remanufactured. This project will compare these two approaches - recycling and recovery - from both technical and economic perspectives.
Open Call in Sustainability Research	Qihan Liu	Mechanical Engineering and Materials Science	Additive manufacturing of continuous fiber reinforced composite using aerodynamic fiber deposition	Fiber-reinforced composites (FRC) are lightweight, high-performance materials that are crucial for energy saving in transportation. Conventional FRC manufacturing is labor-intensive and has limited control over fiber arrangement. Aerodynamic fiber deposition is a new technique that enables the high-throughput manufacturing of continuous FRC with uniform fiber placement. This project will study the processing-structure relation of this manufacturing technique.
Open Call in Sustainability Research	Daniel Mosse	Computer Science	Optimizing HVAC for homes	Based on a cost-conscious infrastructure to collect data in homes (i.e., $10 temperature and humidity sensors, made by Govee, plus outside temperature +humidity, sun location + light), we will carry out data analysis to improve building energy optimization and temperature/humidity comfort. For example, decide when to turn on or off the AC vs opening and closing windows (this project will be in the summer). Another example is whether we need multiple window AC units (one per room), or one AC unit plus a fan for air circulation. The goal is to save money and keep people comfortable (just temperature + humidity, not noise or other metrics).
Open Call in Sustainability Research	Daniel Mosse	Computer Science	Devising alternative cooling for parked cars in the summer	Who loves to come back to your parked car in the summer and feel that warm sauna weather? Who would prefer to come back to a chilled car? The goal of this project is to find alternative ways to cool parked cars (running on solar energy). The car will not necessarily be cool but should at least not hot. Curious + independent mechanical engineers or super curious + independent students. We will carry out literature search and come up with a design. If needed, we will measure temperatures inside cars at various conditions, to create good datasets and models.
Open Call in Sustainability Research	Tina Ndoh	Environmental and Occupational Health	Thriving Communities Through Regional Change: Integrating Circularity and Safety Principles in Environmental Design	This project will explore the points of intersection and distinction between Circularity Assessment Protocols (CAP) and Neighborhood Crime Prevention Through Environmental Design (nCPTED) tools. The student will conduct a pilot assessment of both protocols at a local park in the Pittsburgh area.

Open Call in Sustainability Research	Carla Ng	Civil and Environmental Engineering	Sustainability Success Stories	When new regulations are proposed or environmental pressures mount, there is a tendency for some to claim that meeting these demands will hamper progress or the economy. In fact, the opposite is usually true. This project will collect data on how engineering innovations have met the moment of environmental regulations and sustainability to produce materials to share these success stories through multiple types of scientific communication (social media posts, short publications, and websites).
Open Call in Sustainability Research	Carla Ng	Civil and Environmental Engineering	Proteins as sustainable sorbent materials for forever chemicals	Emerging fluorinated chemicals are poorly treated by traditional sorbent materials like GAC. Our research group is evaluating the use of proteins to trap these hard-to-capture short-chain compounds for eventual recycling or destruction. This project will evaluate different types of proteins in batch experiments to identify the best performing candidates for further investigation. Skills that will be learned include protein attachment to solid supports, producing equilibrium sorption isotherms, and analyzing PFAS (under the supervision of a senior PhD student).
Open Call in Sustainability Research	Lucy Page	Economics	Local Political Constraints to the Clean Energy Transition	This project studies how local decision-making power over land use holds back the clean-energy transition in the US. Many counties in the US have effectively banned wind or solar farms on their land, despite residents supporting the clean-energy transition overall. We will use data on the transcripts of local government meetings and the locations of utility-scale renewable projects to study how local NIMBYism holds back growth in renewables.
Open Call in Sustainability Research	Lucy Page	Economics	Persuasion on Climate Change	This project is a series of online experiments testing which messengers can most effectively persuade other Americans to support climate policy. In particular, we will test whether people are more able to persuade those who are similar to them, as well as whether certain types of arguments are especially persuasive for certain demographic groups.
Open Call in Sustainability Research	Cassie Quigley	Teaching, Learning, and Leading	The Making of a Green Workforce: Understanding Sustainability Career Intentions in Youth Through Longitudinal Interview Data.	This historical study analyzes nine years of interview and open-ended response data collected from diverse youth across Western PA, including rural, urban-fringe, suburban, and urban communities. The analysis will identify emerging trends and shifts in young people's perspectives on sustainability careers. By contextualizing these trends with simultaneous educational policies and curriculum changes, the project aims to understand how formal education may influence the development of these green career interests.

Open Call in Sustainability Research	Joaquin Rodriguez	Chemical and Petroleum Engineering	Hydroponics experimental research	The Pitt Hydroponic Experimental Research Station (PHERS) offers the possibility to advance research in growing soilless corps by exploring the impact of selected variables (light cycle, water quality and cycle, temperature, humidity, CO2, etc.). The system is open for improvements in collecting and analyzing data. Literature search and practitioners networking is further encouraged to explore collaborations and promote further work.
Open Call in Sustainability Research	Joaquin Rodriguez	Chemical and Petroleum Engineering	Sustainability research project	This project aims to advance sustainability learnings and commitments based on research on a selected topic of interest for students. Students are encouraged to bring a proposal for analysis and development. The project will cover fundamental knowledge on sustainability, guiding principles, and basic approaches for sustainable development. It will explore scientific literature on the selected topic and provide an analysis to highlight the most promising opportunities for further development. Students will be trained in project management and advancing research on sustainability.
Open Call in Sustainability Research	Tatsuya Sakurahara	Mechanical Engineering and Materials Science	Probabilistic Risk Analysis for Sustainable Integrated Energy Systems	Future energy systems will rely on coupled nuclear, renewable, and storage technologies, producing multiple forms of energy products, such as power, hydrogen, and heat. Such energy systems will create new interdependencies that conventional risk methods don't adequately capture. This project aims to build probabilistic risk modeling tools to identify potential failure modes and quantify cascading risks in these integrated systems. Students will help develop analytical approaches that support the design and operations of resilient, low-carbon integrated energy systems.
Open Call in Sustainability Research	Tatsuya Sakurahara	Mechanical Engineering and Materials Science	Risk-Informed Decision-Making for Advanced Nuclear Reactors under Deep Uncertainties	Advanced nuclear power reactors can provide carbon-free baseload power, but their deployment faces substantial technical and regulatory uncertainties that are difficult to quantify using probability distributions. This project tackles the challenge of making defensible decisions when data are scarce by developing quantitative frameworks that combine probabilistic modeling with value-of-information analysis. Students will contribute to methods that can accelerate the licensing and siting of next-generation reactors while maintaining rigorous safety standards.

Open Call in Sustainability Research	Cynthia Salter	Behavioral & Community Health Sciences (Public Health)	Sustainability research at the global intersection of bioengineering and public health	Learning to work collaboratively and ethically with partners in low-resource environments is critical for global careers in both bioengineering and public health. This project offers learning in global health sustainability through cross-disciplinary work in both fields. As part of a Pitt learning initiative that brings together bioengineering and public health students to complete hands-on projects with global partners, the student will complete a landscape scan of existing national programs, to identify needs, opportunities and gaps. The project will contribute to understanding of successful university-level global health/bioengineering collaborations that offer training opportunities for students/fellows, as well as pathways for sustaining such initiatives.
Open Call in Sustainability Research	Cynthia Salter	Behavioral & Community Health Sciences (Public Health)	Teaching Sustainability through Pitt's Global Health Case Competition	In this project, the student will develop a mini sustainability curriculum for use during Pitt's Global Health Case Competition. Now in its fifth year, the competition is a university-wide opportunity for students to develop and present a strategy to solve a real-life global health problem. The winning team receives funding to compete in an international competition. This project will contribute to campus-wide sustainability learning across the multi-disciplinary team-based Global Health competition.
Open Call in Sustainability Research	Fernando Tormos-Aponte	Sociology	Advancing Environmental Justice Through Movement-Engaged Participatory Research	Students will conduct research in consultation and collaboration with environmental justice groups. This will include identifying and summarizing relevant academic literature, drafting policy briefs and white papers, and working on scholarly manuscripts. Topics of interest include 1) policies to achieve a just transition away from fossil fuels and plastic production 2) carbon offsets and credits, 3) solidarity and inclusion within the environmental movement ecosystem, and 4) disasters, mutual aid, and social vulnerability, among other topics.
Open Call in Sustainability Research	Goetz Veser	Chemical Engineering	Fueling a Renewable Future: From Waste to Sustainable Energy Storage	Graphite - a critical material for modern batteries - is currently sourced almost entirely from China, where it is being mined and processed using highly toxic chemicals or produced from fossil fuel byproducts under vast energy consumption. We have developed a new technology to produce battery-quality graphite from a wide range of feedstocks, including biomass and plastic waste which promises to drastically reduce the environmental footprint of graphite production. This project will further explore this technology, which utilizes a unique processing environment with molten metals as a catalyst!

Open Call in Sustainability Research	Goetz Veser	Chemical Engineering	Reducing the environmental footprint of polymerization	Emulsion polymerization is widely used in industry. While more efficient than traditional solvent-based polymerization processes, emulsion polymerization typically results in large energy consumption, wastewater generation, and contamination with residual surfactants. In close collaboration with an industrial partner, we are exploring the use of aerosols polymerization as a next-generation polymerization technology with drastically reduced energy footprint which would completely mitigate the use of process water.
Open Call in Sustainability Research	Wei Xiong	Mechanical Engineering and Materials Science	Redesigning Sustainable Cutting Tools: From Toxic Cobalt to High-Entropy Alloys	The cemented carbide industry urgently needs cobalt-free alternatives due to toxicity and environmental concerns. This project explores high-entropy alloys as novel binders for tungsten carbide cutting tools, combining experimental sintering with computational thermodynamic modeling to predict phase transformations. You'll learn to design advanced materials by understanding composition-processing-structure-property relationships while contributing to environmentally sustainable manufacturing. This hands-on experience bridges materials science, additive/powder metallurgy, and computational design, skills critical for next-generation green manufacturing technologies.
Open Call in Sustainability Research	Wei Xiong	Mechanical Engineering and Materials Science	Eliminating Cracking in Rocket Engine Nozzles Through Smart Interface Design	Additive manufacturing of rocket engine nozzles faces a critical challenge: copper-nickel superalloy interfaces develop catastrophic solidification cracks due to mismatched thermal properties, leading to expensive failures, wasted energy, and non-recyclable toxic waste. This project uses computational thermodynamics and advanced metal 3D printing to design crack-resistant interfaces that prevent defects before they form. You'll gain hands-on experience with cutting-edge aerospace manufacturing while developing solutions that simultaneously improve production efficiency and environmental sustainability for next-generation space propulsion systems.
Open Call in Sustainability Research	Trevor Young-Hyman	Organizations and Entrepreneurship, School of Business	Ensuring Regional Small Business Sustainability	Nearly 5 million small business owners will retire in the next 10 years and nearly half lack a succession plan. When small businesses close, relationships to employees, communities, and other local businesses suffer and the sustainability of local economic ecosystems declines. This project will leverage a Summer 2026 Small Business Conference at the University of Pittsburgh to survey and track regional small business owners and their exploration of sustainable succession options. At the conference, small business owners will learn about various place-based succession options can preserve the legacies of their

				companies. We will track their evolving effort to develop a sustainable succession plan and explore the factors that support that effort.
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Pittsburgh Water Collaboratory	Pratirupa Bardhan	Geology & Environmental Science	Tracing Sources and Biogeochemical Processing of Particulate Organic Matter in an Urban Pittsburgh Stream Using Carbon and Nitrogen Stable Isotopes	This research will contribute to understanding how urbanization affects stream biogeochemistry in Pittsburgh watersheds. Stable isotopes provide a robust method for tracing anthropogenic impacts and ecological processes. Findings may inform stormwater management, restoration planning, and urban water-quality policy.
Pittsburgh Water Collaboratory	Markus Chmielus and Ian Nettleship (co-advisors)	Mechanical Engineering and Materials Science	Functionalizing low-cost and sustainable clay filter for use in local run-off and industrial water filtration	This project is a continuation of a clay filter project that will be targeted towards filtration of water that is not only tainted by pathogens common in underdeveloped communities, but also industrial contaminations common in Western PA water run-off and small-scale industrial wastewater. In order to achieve this project, we will investigate how the porous clay surfaces can be effectively coated and functionalized to significantly reduce relevant contaminants.
Pittsburgh Water Collaboratory	Emily Elliott and Grace Mattson (co-advisors)	Geology and Environmental Science	Evaluating longitudinal dynamics among macroinvertebrate community composition and PFAS bioaccumulation	Per- and polyfluoroalkyl substances (PFAS) are persistent contaminants of emerging concern in urban aquatic ecosystems, particularly in areas impacted by leaking sewage infrastructure, such as Pittsburgh, PA. Little is known about how PFAS interact with other co-occurring pollutants such as nitrate or how these combined stressors affect aquatic biota. As a part of the Urban Stream Team, you will sample water, sediment, and macroinvertebrates along the headwaters, transitional zone, and depositional zone of an urban tributary to assess the potential for PFAS bioaccumulation caused by anthropogenic activities.
Pittsburgh Water Collaboratory	Emily Elliott and Grace Mattson (co-advisors)	Geology and Environmental Science	Determining how variable land use across watersheds affected PFAS uptake in macroinvertebrate populations	Leaking sewage infrastructure is a major source of PFAS in urban streams around Pittsburgh, PA, yet the ways these contaminants interact with other pollutants like nitrate are still poorly understood. Sampling macroinvertebrates, water, and sediments across five streams with varying land-use characteristics will allow the student to determine how sewage-derived pollution and broader anthropogenic pressures shape PFAS bioaccumulation in aquatic biota.

Pittsburgh Water Collaboratory	Emily Elliott and Jason Aguirre (co-advisors)	Geology and Environmental Science	Urban Stream Ecology and Stable Isotope Biogeochemistry	The City of Pittsburgh is a prime location for exploring the impact of the built environment on stream ecosystems. In this project, student researchers will primarily train in field and lab techniques to collect and analyze water, plants, and organismal samples from local waterways to explore how human infrastructure influences the distribution of nutrients across food webs via stable isotope analyses. As part of the Urban Stream Team, you will have opportunities to network with local stakeholders, explore Pittsburgh, practice freshwater science techniques such as aquatic macroinvertebrate identification, and contribute to the understanding of your own backyard.
Pittsburgh Water Collaboratory	Emily Elliott and Jason Aguirre (co-advisors)	Geology and Environmental Science	Urban Waterways: Detangling the Aquatic/Human/Ecological Landscape of Pittsburgh with Geospatial Analyses	Pittsburgh's waterways contain hidden biogeochemical wonders and questions that are not easily explained at first glance. For this research project, a student researcher would implement GIS analyses and R coding to visualize and explore the dynamics of Pittsburgh's hydrology, how it is shaped by the urban landscape, and how that compares to nearby waterways. Fieldwork with the Urban Stream Team will be involved to explore study sites, with optional opportunities for lab work and networking. GIS and R skills are required.
Pittsburgh Water Collaboratory	Jacob King	Civil and Environmental Engineering	Regenerable Electrodes for Capture and Destruction of Emerging Ultra-short-chain PFAS in Nutrient-rich Wastewater	Nitrogen recovery for fertilizer production from nutrient-rich wastewater, such as source separated urine, can advance the circular nutrient economy, but the presence of toxic per- and polyfluoroalkyl substances (PFAS) pose a problem. Emerging ultra-short-chain PFAS (e.g., trifluoroacetic acid) are particularly problematic because they are mobile and hydrophilic, meaning that treatment methods using traditional sorbents (e.g., granular activated carbon) fail. As an alternative treatment method, the student will develop and test electrodes with specialized molecular functional groups to selectively sequester, then destroy, these PFAS, while also assessing whether electrodes can be sustainably regenerated.
Pittsburgh Water Collaboratory	Jacob King	Civil and Environmental Engineering	Separation and Recovery of Critical Minerals and Sulfur from Acid Mine Drainage in Western Pennsylvania	Acid mine drainage poses a contamination risk to humans and aquatic wildlife but also contains valuable chemicals, including sulfate and rare earth elements, that can be utilized in a circular economy. Electrodialysis has been shown to effectively separate charged chemical species, including sulfate, from seawater while generating concentrated salt solutions. The student will explore application of electrodialysis to acid mine drainage, investigating how to recover sulfate as sulfuric acid, while selectively concentrating rare earth elements by removing major metal interferences (e.g., iron).

Pittsburgh Water Collaboratory	Xu Liang	Civil and Environmental Engineering	Modeling Drought Effects on Plant Photosynthesis	This project examines how drought affects plant photosynthetic responses by using the VIC+ hydrological model coupled with eco-evolutionary optimality principles. Field data from FLUXNET2015 will be used to support and validate the investigation.
Pittsburgh Water Collaboratory	Xu Liang	Civil and Environmental Engineering	How Floods Influence Baseflow Dynamics	This project examines the impacts of floods on baseflow behavior and on how baseflow is parameterized in hydrological models. Watersheds in the Ohio River Basin will be used for the investigation.
Pittsburgh Water Collaboratory	Paul Ohodnicki	Mechanical Engineering and Materials Science	Fiber optic sensing in marine and water application environments	The student will collaborate with an interdisciplinary team exploring fiber optic sensors for sensing in marine and water application environments. Examples of relevant analytes of interest include CO_2 and pH monitoring related to water acidification and enhanced alkalinity as well as water infrastructure sustainability, although additional analytes are also of interest such as temperature, nitrates, and salinity. The project includes fabrication and/or testing of fiber optic sensors under relevant application environment conditions in the lab or field conditions depending on student interests.
Pittsburgh Water Collaboratory	Paul Ohodnicki	Mechanical Engineering and Materials Science	Amorphous and nanocrystalline soft magnetic alloys for electric power grid transformer applications	The project will collaborate with an interdisciplinary research group on development and characterization of soft magnetic alloys for transformer applications. Amorphous alloys will be characterized in terms of their magnetic and structural properties. Transformers on the electric power grid are a critical asset that is currently suffering from challenges including supply chain and increased electricity demand, and novel alloys and materials can improve efficiency and help to promote a more sustainable electricity infrastructure.
Pittsburgh Water Collaboratory	Patrick Shirey	Geology and Environmental Science	Determine Thermal Benefit of Cold Springs for Brook Trout Habitat Rehabilitation, Namekagon River, Wisconsin	To protect native brook trout and ensure population resiliency in the Namekagon River within the Saint Croix National Scenic Riverway we must better understand 1) the role of temperature in structuring fish communities in the river's cold-water zone, 2) habitat suitability to inform restoration, and 3) impacts of existing barriers to cold-water intrusion. The student will work with existing temperature records, help deploy new temperature loggers, and take measurements of water quality and temperature near springs seeps that are important for sustaining the cold-water fisheries of the Namekagon River into the future under changing climate. Using environmental history records and data, the long-term goal of the data collected from this project is to determine the potential

				to improve brook trout habitat via the removal of human-constructed levees that likely prevent immediate cold-water intrusion to the upper Namekagon River and possibly impede brook trout access to spawning gravels.
Pittsburgh Water Collaboratory	Patrick Shirey	Geology and Environmental Science	Community-Engaged Research in the Churchill Valley Greenway	There exists a need to build community efforts for science-based greenspace and blue-space conservation. This project will involve the student in research on Acid Mine Drainage damaged lands and waters as part of a Before-After-Control-Impact (BACI) ecosystem restoration and monitoring effort in the Churchill Valley Greenway, a greenspace with headwater streams adjacent to Environmental Justice communities. In partnership with the Chalfant Run Thompson Run Watershed Association, the student will have the opportunity to help collect physical, chemical, and biological data and work with existing data to help inform long-term efforts to improve water quality.
Pittsburgh Water Collaboratory	Guofeng Wang	Mechanical Engineering and Materials Science	Design spinel ferrite magnetic adsorbents for water purification	In this project, advanced computational methods will be used to predict the capability of a series of spinel ferrites for removing metal ions (such as Pb, As) from industrial wastewater. The outcome of the project is to identify the optimal composition and morphology of spinel ferrite particles to chemically adsorb and remove metal ions from the water.
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Responsible Data Science	John Brigham	Civil and Environmental Engineering	Environmentally Responsive Building Envelopes - Computational Evaluation and Optimization	The student will use computational modeling to evaluate the capability of using environmental indicators, such as external temperature, solar insulation, and humidity, to 'trigger' automatic changes in the building facade to naturally improve internal conditions. Buildings account for a huge portion of infrastructure energy costs. As such, improving energy efficiency through environmental adaptivity has the potential to tremendously impact sustainability of the built environment.
Responsible Data Science	John Brigham	Civil and Environmental Engineering	Data-Driven Building Energy Analysis to Evaluate Novel Responsive Building Systems	This project will use computational modeling to explore the impact of novel responsive building systems, such as adaptive facades, on building energy performance. Moreover, the project will consider the effect of variations in amount and quality of spatial data (i.e., satellite, imaging, and/or other data sources) used to describe the size/shape and composition of various building components on the accuracy of the energy analysis.

Responsible Data Science	Setareh Kazemi Kheiri	Industrial Engineering	Ethical modeling of workers' fatigue using wearable sensors in a dynamic order picking task	Wearable sensors have become valuable tools for continuously monitoring workers' physical fatigue. However, traditional machine learning models require collecting all sensor data in a central server, which can expose sensitive personal information to third parties. Traditional models also fail to account for worker diversity, such as differences in gender, age, and BMI, which can bias predictions. In this project, we aim to develop novel, fair, and privacy-preserving predictive models that use wearable sensor signals, individual characteristics, and task information to accurately predict workers' future fatigue. The goal is to enable early detection of fatigue-related risks and help prevent workplace injuries.
Responsible Data Science	Setareh Kazemi Kheiri	Industrial Engineering	Prediction of power outages under extreme weather events	Extreme weather conditions, such as thunderstorms, are among the leading causes of power outages in the United States. Despite recent advances in forecasting technologies, accurately predicting future outages remains a challenge. This project aims to develop a spatiotemporal predictive model that uses geographical, environmental, and weather-related data from different counties to forecast power outages. The long-term goal is to build a predictive tool for residents and essential services, allowing them to anticipate outages and prepare accordingly. This is particularly impactful for hospitals, emergency responders, and other critical support units that rely on uninterrupted power.
Responsible Data Science	Justin Kitzes	Biological Sciences	Using machine learning to identify wildlife species in field audio recordings	Our lab uses small, inexpensive acoustic recorders to record soundscapes at field sites across the United States. We are interested in hosting a summer fellow who will work with us on this research. The main tasks will be developing and testing machine learning models to identify species of birds, bats, frogs, and/or insects within long field recordings, but tasks may also include deploying recorders in the field, managing incoming data, and testing new hardware designs.
Responsible Data Science	Ruth Mostern	History	Environmental Discourse Keywords Website	The Environmental Discourse Group, organized within the Mascaro Center, is a hub for scholars from across disciplines in the humanities, social sciences, public health and beyond who study how language, narratives, and forms of communication shape our engagement with environmental challenges. Throughout this year, we have been convening a series of workshops to explore our five focus areas: worldviews and ideologies, narrative, creative expressions, power and politics, and persuasion. At each workshop, we are identifying KEYWORDS: terms and phrases that anchor our sustainability language, which may either add clarity or cause confusion. This

				summer, we seek a student (or a team of students) to support our project to build a website with brief definitions, a bibliography, short videos, slides, and curriculum materials introducing the keywords to a wide audience inside and outside the university.
Responsible Data Science	Amin Rahimian and Justin Kitzes (co-advisors)	Industrial Engineering and Biological Sciences	Learning Bird Soundscapes: Gaussian Process Models for Urban Biodiversity Monitoring	This project will use passive acoustic monitoring data from regional bird soundscapes to model how biodiversity varies over space and time. The student will learn to pre-process audio recordings, extract species- or community-level activity indices, and fit Gaussian process regression models that capture daily and seasonal patterns in acoustic activity across sites. Building on recent work using Gaussian process metamodels to emulate large-scale epidemic simulations, we will adapt similar ideas to soundscape data to generate indicators of ecosystem health and provide transferable tools for monitoring urban biodiversity and informing sustainability planning.
Responsible Data Science	Amin Rahimian	Industrial Engineering	Sustaining Online Knowledge Commons in the Age of Generative AI	Large language models (LLMs) such as ChatGPT are rapidly changing how people search for information, ask questions, and learn online. At the same time, platforms like Stack Overflow and Wikipedia function as digital commons, where public knowledge is created, maintained, and curated by volunteer contributors. This project will examine how the rise of LLMs is affecting the sustainability of these online knowledge communities. The student will assemble and analyze platform data from before and after the public release of ChatGPT to track shifts in question volume, topic mix, and participation patterns across novice and expert users. Using basic tools from data science and network analysis, they will explore whether LLMs appear to substitute for or complement human contributions, and what this implies for the resilience of shared knowledge resources. The project will provide the student with hands-on experience in computational social science while contributing to broader conversations about sustaining trustworthy, open knowledge infrastructures in an AI-mediated digital future.
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Sustainable Healthcare	Nikhil Bajaj and William Clark (co-advisors)	Mechanical Engineering and Materials Science	ReACTIV Sleeve Development: Acoustic Coupling Design for Reusable IV Sensors	This project explores acoustic-based IV insertion guidance using reusable sensor sleeves to reduce medical waste and improve clinical outcomes. The undergraduate researcher will prototype sleeve designs with integrated piezoelectric transducers, measure acoustic coupling efficiency across catheter gauges, and conduct preliminary validation tests using tissue phantoms.

Sustainable Healthcare	Ipsita Banerjee	Chemical Engineering/ Bioengineering	Engineering Sustainable Alternatives to Animal Testing: Life Cycle Analysis of Next-Generation Organ-on-Chip Technology	Our group is developing sustainable microphysiological (organ on chip) systems that replace animal testing in diabetes drug discovery. In this project the student will conduct a comprehensive Life Cycle Analysis (LCA) to quantify how our innovative glass-based, reusable organ-on-chip platform reduces carbon emissions, plastic waste, and resource consumption compared to traditional research methods. This project bridges bioengineering innovation with environmental sustainability, offering hands-on experience in both green technology assessment and healthcare sustainability metrics.
Sustainable Healthcare	Markus Chmielus and Ian Nettleship (co-advisors)	Mechanical Engineering and Materials Science	Improving Sustainability and Functionality of Biomedical Metal Foams Via Use of Sustainable Bio-Derived Space Holders	Incorporating natural space holders derived from agro-waste like spent coffee grounds or fruit peel fibers as well as sugar and salt crystals into metal foam manufacturing significantly enhances both environmental and economical sustainability of complex metal foams. The inherent irregularity of organic particles creates a porous architecture that effectively mimics cancellous bone, optimizing the material for biological osseointegration for implants on one hand and efficient fluid permeability in waste filtration systems on the other hand. In this project, we will investigate how substituting synthetic petrochemical agents with cost-effective, renewable byproducts will affect manufacturability as well as mechanical and functional properties of complex binder jet printed high-performance implants and filters.
Sustainable Healthcare	Susan Cohen	Pitt Business	Scaling Circular Economy Business Models	The focus of this project is to work with a startup that already has traction in the market and a proven business model for reducing plastic waste in the healthcare context to develop recommendations for how they can replicate and scale their business model. This has been notoriously difficult for many businesses to replicate a successful circular economy solution that is effective in one plant, for one customer, or geographic market in other contexts. Students will work with a team of engineering and business mentors to integrate technical, economic, and organizational concepts central to scaling new ventures and to apply them to a business model that creates value through recycling, repurpose, and reducing single use plastics. Most likely, we will be collaborating with Polycarbin for this project. https://polycarbin.com/
Sustainable Healthcare	Lola Conti and Michael Boninger	Office of Sustainability in the Health Sciences	Assessing the Integration of Planetary Health Principles Across Health Science Curricula	Conduct a curriculum review of a health science school using the Planetary Health Report Card. Evaluate and develop sustainable healthcare curriculum and research the best implementation methods for sustainable healthcare topics in health science curriculum.

Sustainable Healthcare	Sydney Crum	UPMC Center for Sustainability	Greenhouse Gas Emission Tracking and Transportation at UPMC	This project will build off the previous year's MCSI summer research student's work to continue to develop a greenhouse gas inventory for UPMC hospitals. The student will work with UPMC Center for Sustainability to research carbon coefficients and help create an inventory to track scope 3 transportation emissions. This project will heavily revolve around excel modeling, building graphics, and data management.
Sustainable Healthcare	David Gau	Pathology	Re-using single-use lab plastics in biomedical research	Biomedical research labs use an enormous amount of plastics every day to conduct rigorous science. This project seeks to test the re-usability of "single-use" plastics and develop a workflow to do so. In addition to wet-bench work to assess validity of re-using plastics in a lab setting, the project will also measure the environmental impact of re-using plastics.
Sustainable Healthcare	Steven Little and Alireza Mohammadzadeh (co-advisors)	Bioengineering	AgriNUE: Plant-derived Lipid Carrier for Fertilizer Delivery	Conventional nitrogen fertilizers are essential for sustaining global food security, yet they come with a cost: nutrient runoff pollutes waterways and degrades soil health. The MCSI summer intern will assist in developing novel plant-derived lipid fertilizer carriers that reduce nitrogen leaching losses and improve plant productivity.
Sustainable Healthcare	Natasa Miskov-Zivanov	Electrical and Computer Engineering	Leveraging Large Language Models to Accelerate Sustainability Analysis in Hospital Operating Rooms	This project explores the use of large language models (LLMs) to address information gaps and support sustainable decision-making in the healthcare setting. Specifically, we investigate the following questions: (i) can LLMs accurately and consistently infer missing sustainability attributes (such as material type, reusability, or disposal method) using limited procurement data? (ii) can these models assist in surfacing more sustainable alternatives based on real-world product descriptions, usage context, and clinical constraints? (iii) can the resulting information be used to populate tools or dashboards that help hospital stakeholders make environmentally informed decisions at scale?
Sustainable Healthcare	Natasa Miskov-Zivanov	Electrical and Computer Engineering	Addressing information overload for digital sustainability	The goal of this project is to tackle the rapidly growing challenge of information overload and leverage AI to balance equity, environment, and economics. By synthesizing available information, LLMs can make complex environmental, social, and economic trade-offs more comprehensible and actionable. The project will focus on following tasks, using LLMs: (i) automatically collect and synthesize sustainability-relevant definitions, rules, and standards; (ii) extract and synthesize product sustainability claims and statements from online sources; (iii) evaluate and address the sustainability of AI-driven solutions for information

				overload. The case study will be determined at the beginning of the project and will focus on a group of consumer products.
Sustainable Healthcare	Michelle Varnell	Sports Medicine & Nutrition (SHRS)	Green Clinic Initiative	This project would assist in developing a Green Clinic assessment and designation program. Healthcare clinics are unique to labs and offices and would warrant specific assessments relative to medical services they provide. Further, this would allow healthcare facilities to identify where they could implement more sustainable practices.
Sustainable Healthcare	Claire Werner	Oral and Craniofacial Sciences (Dental Medicine)	Reimagining Dental Waste with Upcycling Solutions	Dentistry is a significant contributor to waste, largely due to the prevalence of single-use plastics. The project will identify and investigate upcycling of type 5 plastics used at the University of Pittsburgh Dental Clinic in collaboration with 'Reimagined Recycling,' a local Pittsburgh group dedicated to repurposing plastic materials. Students will explore approaches to transform dental clinic plastics into reusable supplies for future patients, promoting sustainable healthcare within the Pittsburgh community.
Sustainable Healthcare	Kate Zettl	UPMC Center for Sustainability	Smart Energy Dashboard	This project will involve enhancing the energy dashboard being built by UPMC Center for Sustainability in Power BI. This dashboard will be expanded to integrate different sources of energy related data, including utility bill data, building level data, real-time energy sensor data, greenhouse emissions, and weather trends. The goals of the project will include: 1. Configure dashboards for quick access to critical data 2. View performance of buildings across 5 regions, 40+ hospitals, and hundreds of health centers and office buildings 3. Understand efficiency and sustainability metrics 4. Share progress with key stakeholders
Sustainable Healthcare	Kate Zettl	UPMC Center for Sustainability	Energy Storage Project in Health Center or Office Building	This project will research the integration of energy storage (e.g. batteries) into smaller health center or office buildings at UPMC to improve energy efficiency and reduce demand on the electric grid. It will involve exploring different battery alternatives, reaching out to vendors, evaluating technical requirements, and completing cost-benefit analysis. Key parameters for the battery project will be identified, and potential buildings will be evaluated based on a comparative analysis.