

Environmental Solutions Initiative

Summer 2016 UROP and Student Project Ideas

11 April 2016

ESI's summer 2016 UROP and student employment positions will advance research in environment and sustainability at MIT. Possible projects include developing a dorm-based modular agriculture system, mapping ongoing environmental work at MIT, and creating a library of mini-videos. ESI also welcomes UROP proposals on any of the priority environment and sustainability research topics identified below.

The summer group will meet regularly with ESI leadership to discuss the planning of the ESI as it expands and accelerates its activities. Interested students are encouraged to bring their own ideas of enhancing the awareness and engagement of students and other communities in issues of the environment on our campus, in the region, and globally.

Possible summer projects include:

- Prototyping a dorm-based personal agriculture system
- Creating short videos featuring environment and sustainability students, faculty and staff
- Developing an effective tool to map/visualize the diversity of environment/sustainability research, education, and other activities at MIT
- Assisting with research and educational assignment development for infusing GIRs with environment and sustainability content
- Conducting a benchmarking study on interdisciplinary/integrative classes in environment/sustainability
- Identifying environment/sustainability alumni and developing proposals for leveraging an alumni network to support undergraduate education, internships, and career development

ESI's three environment and sustainability research priority areas, and sample topics in each priority area, are indicated below.

Climate Science and Earth Systems

- Advancing fundamental physics of climate science for robust predictive modeling
- High resolution modeling of continental, regional, and local consequences of climate change, including implications for water, food, and population disruption
- Reducing model uncertainty related to aerosols, particulates, water vapor and clouds

- Ocean warming, acidification, and sea-level rise and associated effects on ecological and marine systems
- Extreme weather modeling and prediction at various temporal and spatial scales
- Coupled science and policy investigations especially as related to mitigating carbon emissions
- Carbon capture and storage and including biomass (bio-CCS)
- Climate-driven emergence and dispersion of virulent biological agents
- Sociopolitical and socioeconomic dynamics and policy formulation related specifically to changes in global and regional climate and involving international, national, and subnational actors

Cities and Infrastructure

- Urban metabolism and the resource intensity of contemporary cities
- The Future City and its environmental opportunities and challenges
- Electrification of transportation and urban air pollution
- Environmentally calibrated urban planning
- Urban production and consumption for the environment
- Resource, effluent, and demographic flows between urban and rural environments
- Environmentally advanced aviation technologies and systems

Sustainable Society and Economy

- Environmentally positive resource extraction and processing
- Environmentally positive supply chain and logistics
- Design for reuse, disassembly, material recovery, and other extensions of material and product lifetimes
- Transitions toward a circular economy
- Anthropological perspectives on human society and the environment
- The new frontier of the Arctic – oceans and land territories
- Environmental health, toxicity – better understanding of diffusion and exposure
- Energy, minerals, environment nexus - economics, politics, and equity
- Regional and sub-national impacts of resource extraction on communities and cultures
- Carbon pricing and/or tax
- Emissions Trading System (ETS) Carbon cap and trade
- Creative policy instruments for improving management of resource extraction and refining
- Cultural, behavioral, and ethical dimensions of pathways toward a sustainable economy



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