Summer of Learning Symposium

Welcome to the eighth annual Summer of Learning Symposium! This is the culminating event for 79 Princeton undergraduates whose summer experiences focused on scientific, technical, policy, and human dimensions of global environmental challenges in climate and energy, sustainable development, resource conservation, biological diversity, and ecological health around the world.

This summer, participating students travelled to destinations in the United States and 11 foreign nations on assignments with faculty-led research projects, academic institutions, NGOs, and government and community service enterprises. As interns, the students engaged in research, outreach, policy analysis, communications, and other practical work experiences. The internship program and the assignments enrich students’ perspectives and prepare them as leaders.

The Summer of Learning Symposium is an opportunity to celebrate the contributions of individual students, exchange perspectives, develop a shared mission, and consider practical, achievable solutions to the world’s most pressing environmental challenges.

We extend our congratulations to the students and our heartfelt appreciation to those faculty, colleagues, friends, and community partners who have made this year’s internship program and Summer of Learning Symposium possible.
Schedule of Morning Presentations

**Climate Science (pp. 5-6)**  
*Location: Prospect Room (First Floor)*

- 08:45 - 09:00 am  Registration and Breakfast
- 09:00 - 11:30 am  Presentations
- 11:30 - 01:00 pm  Group Lunch

**Biodiversity and Conservation (pp. 7-8)**  
*Location: Library (Second Floor)*

- 08:30 - 08:45 am  Registration and Breakfast
- 08:45 - 11:30 am  Presentations
- 11:30 - 01:00 pm  Group Lunch

**Energy Technology (p. 9)**  
*Location: Den (Ground Floor)*

- 09:45 - 10:00 am  Registration and Breakfast
- 10:00 - 11:45 am  Presentations
- 11:45 - 01:00 pm  Group Lunch
Schedule of Afternoon Presentations

Ecosystem Health and Sustainable Environments (pp. 10-12)
Location: Prospect Room (First Floor)

12:00 - 01:00 pm  Registration and Lunch
01:00 - 04:00 pm  Presentations

Energy and the Environment/Sustainable Solutions (pp. 13-14)
Location: Library (Second Floor)

12:00 - 01:00 pm  Registration and Lunch
01:00 - 03:15 pm  Presentations
**Climate Science (9:00 am - 11:30 am)**

**Moderator:** François Morel, Professor of Geosciences; Director, Princeton Environmental Institute

**EARTH HISTORY**

1. **Calibrating Climate Records with 15 Million-Year Old Volcanic Rocks**
   Joshua Murray (*Class of 2018, Geosciences*)
   Adviser: Blair Schoene, Assistant Professor, Geosciences

2. **Late Cretaceous Milankovitch Climate Cyclicity**, Bolivia
   Adrian Tasistro-Hart (*Class of 2017, Geosciences*)
   Adviser: Adam Maloof, Associate Professor, Geosciences

**CLIMATE AND THE TERRESTRIAL BIOSPHERE**

3. **Droughts of the Future: Climate Change Impacts on Western US Forests**
   Sophia Su (*Class of 2017, Ecology and Evolutionary Biology*)
   Adviser: Stephen Pacala, Professor, Ecology and Evolutionary Biology

4. **Tropical Forest Seasonality and Climate Change**
   Lena Dubitsky (*Class of 2018, Mechanical and Aerospace Engineering*)
   Adviser: David Medvigy, Assistant Professor, Geosciences

5. **Effects of Amazon Deforestation on Patterns of Cloud Formation**
   Kellie Swadba (*Class of 2017, Geosciences*)
   Adviser: David Medvigy, Assistant Professor, Geosciences

6. **Mapping Vegetation in African Drylands**, Kenya
   Vinicius Amaral (*Class of 2017, Civil and Environmental Engineering*)
   Adviser: Kelly Caylor, Associate Professor, Civil and Environmental Engineering

7. **Shedding Light on Plant Respiration**, Sweden
   Joseph Redmond (*Class of 2018, Chemical and Biological Engineering*)
   Olivia Trase (*Class of 2017, Ecology and Evolutionary Biology*)
   Advisers: Michael Bender, Emeritus Professor, Geosciences; Paul Gauthier, Postdoctoral Research Associate, Geosciences
CLIMATE AND THE OCEANS

8. Winter in the Southern Ocean: Icebergs, Insomnia, and Isotopes, South Africa
   Ethan Campbell (Class of 2016, Geosciences)
   Adviser: Daniel Sigman, Professor, Geosciences

   Kate Begland (Class of 2017, Geosciences)
   Adviser: Jorge Sarmiento, Professor, Geosciences

10. Parameter Space Study of Tidal Mixing over Rough Topography
    Paul Yi (Class of 2017, Geosciences)
    Adviser: Sonya Legg, Senior Research Oceanographer, Atmospheric and Oceanic Sciences

11. Understanding Oxygen in the Southern Ocean from Models and Observations
    Lauren Santi (Class of 2017, Geosciences)
    Adviser: Jorge Sarmiento, Professor, Geosciences

12. Triggering of Phytoplankton Bloom Onset in the Southern Ocean
    Alex Dominguez (Class of 2016, Chemical and Biological Engineering)
    Adviser: Jorge Sarmiento, Professor, Geosciences

GROUP LUNCH
Biodiversity and Conservation (8:45 am - 11:30 am)

Moderator: Daniel Rubenstein, Professor of Ecology and Evolutionary Biology

OCEANS

1. **Assessing Coral Reef Bleaching**, Bermuda
   Vivian Yao (*Class of 2017, Geosciences*)
   Adviser: Daniel Sigman, Professor, Geosciences

2. **4-Dimensional Study of Earth’s Most Ancient Reefs in the Canadian Rockies**, Canada
   William Van Cleve (*Class of 2017, Geosciences*)
   Adviser: Adam Maloof, Associate Professor, Geosciences

3. **Exploring the Mesophotic Zone: Lionfish, Fisheries’ Targeted Species, and the Goldface Toby**, Bermuda
   Jenny Zhou (*Class of 2016, Woodrow Wilson School*)
   Adviser: Tim Noyes, Bermuda Institute of Ocean Sciences

4. **Blurry Waters: Groundwater and Bermuda’s Coral Reefs**, Bermuda
   Zoe Sims (*Class of 2017, Ecology and Evolutionary Biology*)
   Adviser: Stephen Pacala, Professor, Ecology and Evolutionary Biology

5. **Detecting Thresholds in Linkages Between Climate and Marine Fishes in the California Current Ecosystem**
   Joanna Sobolewska (*Class of 2016, Woodrow Wilson School*)
   Adviser: Jorge Sarmiento, Professor, Geosciences

6. **The Unknown Unknowns: Discovering Phytoplankton Diversity in Their Genes**
   Sunyoung Wang (*Class of 2016, Civil and Environmental Engineering*)
   Adviser: Bess Ward, Professor, Geosciences

7. **Fish Ecology from Otoliths: Past and Present**
   Atleigh Forden (*Class of 2016, Geosciences*)
   Adviser: Bess Ward, Professor, Geosciences

ECOLOGY AND BIODIVERSITY

   Ryan O’Connell (*Class of 2017, Ecology and Evolutionary Biology*)
   Adviser: Robert Pringle, Assistant Professor, Ecology and Evolutionary Biology
9. The Unexplored Biodiversity of Costa Rica’s Singing Insects, Costa Rica
William Atkinson (Class of 2018, Geosciences)
Adviser: David Wilcove, Professor, Woodrow Wilson School

10. Parataxonomy in Costa Rica, Costa Rica
Donald Martocello (Class of 2018, Major Undecided)
Adviser: Daniel Janzen, University of Pennsylvania

11. Grazing Regimes and Impacts on Animal Health, Kenya
Morgen Harvey (Class of 2016, English)
Adviser: Daniel Rubenstein, Professor, Ecology and Evolutionary Biology

CONSERVATION

12. Central Valley Habitat Exchange
Jane Urheim (Class of 2017, Woodrow Wilson School)
Adviser: Daniel Kaiser, Environmental Defense Fund

13. Developing a Decision Support Tool for Policies to Reduce Deforestation
Anjali Taneja (Class of 2016, Geosciences)
Advisers: Michael Oppenheimer, Professor, Geosciences and Woodrow Wilson School; Ruben Lubowski, Environmental Defense Fund

14. Teaching Assistant for Conservation Clubs, Kenya
Mackenzie Dooner (Class of 2017, Ecology and Evolutionary Biology)
Advisers: Daniel Rubenstein, Professor, Ecology and Evolutionary Biology; Nancy Rubenstein, Mpala Research Centre

GROUP LUNCH
Energy Technology (10:00 am - 11:45 am)

Moderator: Craig Arnold, Professor of Mechanical and Aerospace Engineering; Director, Program in Materials Science and Engineering; Interim Director, Princeton Institute for the Science and Technology of Materials

ENERGY TECHNOLOGY

1. Sustainability of Biomass Use for Energy in the Southeastern U.S.
   Jaclyn Rambarran (Class of 2016, Mechanical and Aerospace Engineering)
   Adviser: Eric Larson, Senior Research Engineer, Andlinger Center for Energy and the Environment

2. Electrical Engineering for Mobile Electric Device Commercial Project
   Weimen Li (Class of 2017, Electrical Engineering)
   Anid Laoui (Class of 2016, Operations Research and Financial Engineering)
   Amy Tian (Class of 2016, Operations Research and Financial Engineering)
   Adviser: Eric Materniak, Lightening Energy

3. Analysis of a Microplasma in Carbon Dioxide Gas
   Kevin Pardinas (Class of 2016, Mechanical and Aerospace Engineering)
   Adviser: Raitses Yevgeny, Principal Research Physicist, Princeton Plasma Physics Laboratory

4. Clean Small Fusion Reactors
   Emily Ho (Class of 2018, Major Undecided)
   Jacob Pearcy (Class of 2018, Physics)
   Jackey Liu (Class of 2018, Operations Research and Financial Engineering)
   Adviser: Samuel Cohen, Director, Program in Plasma Science and Technology

5. Modified Hematite (Fe203) Surfaces for Solar Water Splitting
   Thomas Beauchemin (Class of 2017, Chemical and Biological Engineering)
   Adviser: Bruce Koel, Professor, Chemical and Biological Engineering

GROUP LUNCH
Ecosystem Health and Sustainable Environments
(1:00 pm - 4:00 pm)

Moderator: Kelly Caylor, Associate Professor of Civil and Environmental Engineering; Director, Program in Environmental Studies

LAND AND AGRICULTURE
1. Modeling Agricultural Expansion in Zambia to Predict and Minimize Tradeoffs, Zambia
   Marcus Spiegel (Class of 2017, Civil and Environmental Engineering)
   Adviser: Kelly Caylor, Associate Professor, Civil and Environmental Engineering

2. Forecasting Smallholders’ Yields Via In-Field, Cloud-Distributed Sensing, Zambia
   Soumya Sudhakar (Class of 2018, Mechanical and Aerospace Engineering)
   Adviser: Lyndon Estes, Associate Research Scholar, Woodrow Wilson School

3. Combining the Human Eye Machine Learning to Better Map African Crop Fields
   Hun Choi (Class of 2017, Computer Science)
   Adviser: Lyndon Estes, Associate Research Scholar, Woodrow Wilson School

4. UAVs for Ecological Observation
   Eric Principato (Class of 2016, Mechanical and Aerospace Engineering)
   Adviser: Lyndon Estes, Associate Research Scholar, Woodrow Wilson School

5. Illumination and Radiometric Correction of UAV-Collected RGB and NGB Images
   Savannah Du (Class of 2018, Operations Research and Financial Engineering)
   Adviser: Lyndon Estes, Associate Research Scholar, Woodrow Wilson School

   Aparna Raghu (Class of 2018, Major Undecided)
   Adviser: Satish Myneni, Professor, Geosciences
7. A Biological Role for Vanadium in Cyanobacteria
Sarah Tian (Class of 2018, Major Undecided)
Adviser: François Morel, Professor, Geosciences

8. Nitrogen-Fixing Soil Bacteria and Their Response to Trace Elements
Garrett Baird (Class of 2017, Chemical and Biological Engineering)
Adviser: François Morel, Professor, Geosciences

9. Land-Ocean Nutrient Flux to Bermuda’s Coastal Zone, Bermuda
Konadu Amoakuh (Class of 2017, Woodrow Wilson School)
Adviser: Eric Hochberg, Bermuda Institute of Ocean Sciences

10. Ocean Acidification and Deoxygenation: Climate Variability Versus Climate Change
Maricela Coronado (Class of 2017, Geosciences)
Adviser: Jorge Sarmiento, Professor, Geosciences

SUSTAINABLE ENVIRONMENTS

11. The Princeton Atlas Project
Catherine Blume (Class of 2018, Physics)
Jeffrey Gleason (Class of 2018, Computer Science)
Adviser: Catherine Riihimaki, Associate Director, Science Education, Council on Science and Technology

12. Advancing Natural Infrastructure for Coastal Community Adaption to Climate Change
Aaron Schwartz (Class of 2018, Operations Research and Financial Engineering)
Adviser: Shannon Cuniff, Environmental Defense Fund

13. The Sustainable Development of Urban Rivers in São Paulo, Brazil
Angeline Jacques (Class of 2016, Architecture)
Adviser: Mario Gandelsonas, Professor, Architecture

14. Potable Water System, Peru
Isabella Douglas (Class of 2017, Civil and Environmental Engineering)
William Guiracocche (Class of 2017, Mechanical and Aerospace Engineering)
Corrie Kavanaugh (Class of 2017, Civil and Environmental Engineering)
Amanda Li (Class of 2017, Ecology and Evolutionary Biology)
Kasturi Shah (Class of 2016, Physics)
Joshua Umansky-Castro (Class of 2017, Mechanical and Aerospace Engineering)
15. **Rainwater Catchment System**, Kenya
Danielle Coates (*Class of 2018, Chemical and Biological Engineering*)
Roan Gideon (*Class of 2018, Major Undecided*)
Brendan Hung (*Class of 2017, Operations Research and Financial Engineering*)
Lucy Lin (*Class of 2018, Computer Science*)
Cecilia Stoner (*Class of 2017, Mechanical and Aerospace Engineering*)
Adviser: Peter Jaffe, Professor, Civil and Environmental Engineering
Energy and the Environment/Sustainable Solutions
(1:00 pm - 3:15 pm)

Moderator: Denise Mauzerall, Professor of Civil and Environmental Engineering and Public and International Affairs, Woodrow Wilson School

ENERGY AND THE ENVIRONMENT

1. Methane Leakage from the Natural Gas System
   Ejeong Baik (Class of 2016, Civil and Environmental Engineering)
   Adviser: Eric Larson, Senior Research Engineer, Andlinger Center for Energy and the Environment

2. Measurement of Methane Leakage from Abandoned Oil and Gas Wells
   Eugene Cho (Class of 2017, Chemical and Biological Engineering)
   Shanna Christian (Class of 2016, Geosciences)
   Christianese Kaiser (Class of 2017, Geosciences)
   Adviser: Denise Mauzerall, Professor, Woodrow Wilson School

3. Design and Implementation of an Automated Imaging and Auto-Focusing System for a Remote CLaDS Methane Sensor
   Stacey Huang (Class of 2016, Electrical Engineering)
   Adviser: Gerard Wysocki, Assistant Professor, Electrical Engineering

4. Copper Nanowires for Hydrogen Evolution and Hydrogen Oxidation
   Melina Acevedo (Class of 2016, Chemistry)
   Adviser: Bruce Koel, Professor, Chemical and Biological Engineering

5. Design, Synthesis, and Characterization of Cathode Materials for Use in Magnesium Ion Batteries
   Bizuwork Melesse (Class of 2016, Chemistry)
   Adviser: Craig Arnold, Professor, Mechanical and Aerospace Engineering

SUSTAINABLE SOLUTIONS

6. Hazardous Element Mobilization in Shale Wastewater
   William Arendt (Class of 2016, Civil and Environmental Engineering)
   Jeffrey Chen (Class of 2017, Chemistry)
   Adviser: Jeffrey Fitts, Research Scholar, Civil and Environmental Engineering

7. Development of Nanoparticulate Coated Mineral Adsorbents for Water Purification
   Justin Mehl (Class of 2017, Chemical and Biological Engineering)
8. The Environmental Impact of Prescriptive vs. Performance-Based Structural Fire Design
Julie Chong (Class of 2017, Civil and Environmental Engineering)
Adviser: Maria Garlock, Associate Professor, Civil and Environmental Engineering

9. Ensuring the Sustainability of Perovskites, A Potentially Transformative Solar Material
Lydon Kersting (Class of 2018, Chemical and Biological Engineering)
Adviser: Sarah Jane White, Visiting Associate Research Scholar, Geosciences

10. Crystallization of Thin Films Under Spatial Confinement
Sally Jiao (Class of 2018, Chemical and Biological Engineering)
Adviser: Lynn Loo, Professor, Chemical and Biological Engineering

11. Fluorous Organocatalysis in Green Medicinal Chemistry
Uriel Tayvah (Class of 2017, Chemistry)
Advisers: Wei Zhang, University of Massachusetts Boston

12. China’s Climate and Energy: HFC Alternatives and Smart Grids, China
Amy Xie (Class of 2017, Chemical and Biological Engineering)
Adviser: Alvin Lin, National Resources Defense Council
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