

Earth Institute Practicum
SUMA K4734.001
Science-Based Solutions for Sustainability

Time: T 4:15-6:00PM

Location: TBD

Instructor Information

Art Lerner-Lam

lerner@ldeo.columbia.edu

845.365.8365

Instructional Assistants

Nathan Rudder

nrudder@ei.columbia.edu

212.854.5193

Yasmin Khan

ykhan@ei.columbia.edu

212.854.1214

Course Description

The Earth Institute Practicum is designed to be a broad survey of the applications of frontier research to the practice of sustainable development and environmental policy. **The course is open to both graduate and undergraduate students. Undergraduate students with the Special Concentration in Sustainable Development are required to take a practicum and this course fulfills that requirement.**

The Practicum is a dynamic forum featuring a different lecture each week by the directors or lead researchers representing various units from across the Earth Institute. Each week the guest lecturer will present the applications of their research and discuss the policy implications. Students taking this course will attend lectures and presentations given by the following speakers:

- **Steven Cohen**, Executive Director, The Earth Institute, Columbia University
- **Art Lerner-Lam**, Deputy Director, Lamont-Doherty Earth Observatory
- **Jeff Shaman**, Assistant Professor, Department of Health Sciences
- **Upmanu Lall**, Director, Columbia Water Center
- **Scott Barrett**, Lenfest-Earth Institute Professor of Natural Resource Economics, Department of International and Public Affairs
- **Wolfram Schlenker**, Associate Professor of International and Public Affairs
- **Cynthia Rosenzweig**, Adjunct Senior Scientist for NASA/Goddard Institute for Space Studies (GISS), Head of the Climate Impacts Group, Center for Climate Systems Research

- **Sabine Marx**, Managing Director, Center for Research on Environmental Decisions
- **Shelley Welton**, Deputy Director, Center for Climate Change Law
- **Richard Seager**, Palisades Geophysical Institute/Lamont Research Professor
- **Maureen Raymo**, Director, Core Repository; Lamont Research Professor

The Practicum will run weekly on Tuesday afternoons from 4:15 - 6:00 PM. Students are expected to complete required readings before each session in order to be able to participate in class discussions with each speaker. Articles and resources to accompany the guest lecturer and topic will be posted on Courseworks.

Earth Institute Overview

The Earth Institute at Columbia is the world's leading academic center for the integrated study of Earth, its environment, and society. The Institute's overarching goal is to help achieve sustainable development primarily by exploring and expanding the knowledge surrounding environmental issues. Through education, scientific research and practical application, the Earth Institute tackles real-world challenges. With 850 scientists, postdoctoral fellows and students working in and across more than 20 Columbia University research centers, the Earth Institute is helping to advance understanding of nine interconnected global issues: climate and society, water, energy, poverty, ecosystems, public health, food and nutrition, hazards and urbanization.

The Earth Institute builds upon excellence in the core disciplines - earth sciences, biological sciences, engineering sciences, social sciences, and health sciences - and stresses cross-disciplinary approaches to complex problems. Through its research, training, and global partnerships, it mobilizes science and technology to advance sustainable development, while placing special emphasis on the needs of the world's poor.

Method of Evaluation

There are three methods of evaluation for this course. Students may elect to take the course for 1 credit pass/fail, 1 credit with a letter grade, or for 3 credits.

1 Credit Pass/Fail: Successful completion of the course will be based on participation in class discussions and attendance.

1 Credit: Students will be required to write one 2000 word essay that examines integrated approaches to sustainability management and sustainable development drawn from lectures throughout the semester.

3 Credits: Students will be required to write three 1200 word essays and one 3000 word research paper examining integrated approaches to sustainability management and sustainable development. Students may also choose one or several approaches for this assignment.

Students interested in taking this course should contact Nathan Rudder at nrudder@ei.columbia.edu.

Session I. Sustainability Management

Speaker: Steve Cohen

Steve Cohen, Executive Director of the The Earth Institute and Program Director for the MPA in Environmental Science and Policy program and the M.S. in Sustainability Management program, will discuss the need for working sustainability professionals who are equipped to deal with issues relating to resource use, environmental planning, management, policy, and development. Dr. Cohen will discuss education programs operated through The Earth Institute and Earth Institute faculty.

Session II. Overview of Earth Systems Research, Lamont-Doherty Earth Observatory

Speaker: Art Lerner-Lam

The Earth Institute's overarching goal is to help achieve sustainable development primarily by exploring and expanding the knowledge surrounding environmental issues. Through education, scientific research and practical application, the Earth Institute tackles real-world challenges. The Earth Institute is comprised of 30 research centers and programs. With 850 scientists, postdoctoral fellows and students, the Earth Institute is helping to advance understanding of nine interconnected global issues: climate and society, water, energy, poverty, ecosystems, public health, food and nutrition, hazards and urbanization. The Earth Institute at Columbia is the world's leading academic center for the integrated study of Earth, its environment, and society.

The Earth Institute builds upon excellence in the core disciplines - earth sciences, biological sciences, engineering sciences, social sciences, and health sciences - and stresses cross-disciplinary approaches to complex problems. Through its research, training, and global partnerships, it mobilizes science and technology to advance sustainable development, while placing special emphasis on the needs of the world's poor. The Earth Institute is motivated by the belief that science and technological tools already exist, and could be expanded, to greatly improve conditions for the world's poor while preserving the natural systems that support life on Earth

Readings:

- 2012 Donor Report

- Earth Institute Website <http://earth.columbia.edu>.

Session III. Evaluating Project Success: Infectious Diseases

Speaker: Jeff Shaman

Jeff Shaman's background is in climate, atmospheric science, hydrology, and biology with particular interest in the environmental determinants of infectious disease transmission. Previous investigations include how hydrologic variability affects mosquito ecology and mosquito borne disease transmission, and how atmospheric conditions impact the survival, transmission, and seasonality of pathogens.

Prof. Shaman will focus on evaluating project success through the research projects he has conducted centered around infectious disease and disease transmission.

Session IV. The Columbia Water Center

Speaker: Upmanu Lall

The Columbia Water Center, in collaboration with other Earth Institute units and external partners, is leading intellectual inquiry into the assessment, understanding and resolution of the potentially global crisis of freshwater scarcity. Founded in 2008, the Water Center was established for the purpose of studying the diminishing levels of fresh water and creating innovative sustainable and global solutions. The Columbia Water Center engages in diverse projects worldwide--from helping in-need communities design and build appropriate water infrastructure development, to applied regional climate modeling and prediction, to research and policy recommendations on the intersection between water science and public policy.

Readings:

The Economist: Special Report on Water. London: May 22, 2010. Vol. 395, Iss. 8683 - Below, please find the different sections from this special report:

o For want of a drink:

<http://www.economist.com/node/16136302>

o Enough is not enough:

<http://www.economist.com/node/16136260>

o Business begins to stir

<http://www.economist.com/node/16136270>

o Every drop counts

<http://www.economist.com/node/16136324>

o Making farmers matter

<http://www.economist.com/node/16136354>

o China's peasants look to the skies

<http://www.economist.com/node/16136344>

o The ups and downs of dams

<http://www.economist.com/node/16136280>

o Trade and conserve

<http://www.economist.com/node/16136292>

o To the last drop

<http://www.economist.com/node/16136364>

o A glass half empty

<http://www.economist.com/node/16136334>

o Sources and acknowledgments

<http://www.economist.com/node/16136316>

Session V. International Climate Treaties

Speaker: Scott Barrett

Scott Barrett is the first Lenfest-Earth Institute Professor of Natural Resource Economics. Prior to joining Columbia in the fall of 2009, Professor Barrett served on the faculty of Johns Hopkins University's Paul H. Nitze School of Advanced International Studies.

His research focuses on institutional remedies to transnational challenges, including global climate change and the control of infectious diseases.

He has been an advisor to many organizations, including the European Commission, the International Task Force on Global Public Goods, the OECD, the World Bank, and the United Nations. He was a lead author of the second assessment report by the Intergovernmental Panel on Climate Change and was previously a member of the Academic Panel of Environmental Economists to the UK's Department of Environment.

Session VI. Sustainability Economics

Speaker: Wolfram Schlenker

Wolfram Schlenker teaches classes in environmental and natural resource economics. His research interests include the economics of climate change with a focus on the effects of changing weather conditions on agricultural output.

He holds a PhD in Agricultural and Resource Economics from the University of California, Berkeley (2003) and a Master of Engineering and Management Sciences from the University of Karlsruhe, Germany (2000), as well as a Master of Environmental Management from Duke University (1998).

Session VII. NYC's Urban Resiliency Plan

Speaker: Cynthia Rosenzweig

The Center for Climate Systems Research is a unit of the [Earth Institute](#), Columbia University, and was established in 1994 for the purpose of enhancing the program of interdisciplinary Earth and Climate systems research both at Columbia and the [NASA/Goddard Institute for Space Studies](#). NASA/GISS is a division of the Goddard Space Flight Center in Greenbelt, MD; GISS is located in NYC just off Columbia's main campus.

Cynthia will be discussing the work and research of the Center for Climate Systems Research followed by how this research can be applied to urban planning and city management focusing especially on Bloomberg's Resiliency Plan for New York City.

Session VIII. Risk, Perception, and Decision-Making

Speaker: Sabine Marx

Sabine Marx is the Managing Director at the Center for Research on Environmental Decisions (CRED) at Columbia University. She joined CRED in 2005 after two years of post-doctoral work at the International Research Institute for Climate and Society (IRI) at Columbia's Earth Institute. She has received her Ph.D. in medical history from Carnegie Mellon University, and holds a Masters degree in Sociology and Pedagogy, with a minor in Psychology and Art Therapy from the University of Cologne, Germany.

The work of Sabine Marx falls in the area of decision making under uncertainty. Her research focuses on the use of climate information in agriculture, public health, and disaster preparedness and management. She is especially interested in the integration of climate science and social science, communication of climate information, and outreach to decision makers.

At CRED, she is responsible for the coordination of 20 plus research projects and for building synergy among the various projects.

Session IX. Distributed Energy Supply Management

Speaker: Vijay Modi

After receiving his PhD from Cornell University in 1984, Professor Modi pursued Post-doctorate research at MIT 1984-1986. Modi has taught at Columbia since the mid-1980s. His expertise is in the fields of Energy sources and conversion, heat/mass transfer and fluid mechanics. His current areas of research interest are related to: energy infrastructure, CO2 sequestration, fuel cells, distributed sensing/control of flow and heat transfer. He has authored or co-authored numerous journal papers, and served as the principal or co-principal of a number of research grants from government and industry.

Session X. International and National Climate Law

Speaker: Shelley Welton

Welton works as deputy director and Earth Institute Climate Law Fellow at the Center for Climate Change Law, under the direction of Michael Gerrard. Her research focuses on the intersections of climate and energy law, including regulatory strategies for promoting energy efficiency, ways to enhance federal and state transmission policy, and legal issues related to state and regional efforts to regulate greenhouse gases.

Session XI. Environmental Treaties: Montreal and Kyoto

Speaker: Richard Seager

Seager's interests are in climate variability and change on timescales of seasons to millennia

and in particular the causes of multiyear droughts around the world and how climate change will impact global hydroclimate. He analyzes observations, proxy climate records and model simulations and also uses idealized modeling to understand the basic climate dynamic processes in the atmosphere and ocean that generate global climate variability and change.

He is currently the Palisades Geophysical Institute/Lamont Research Professor at the Lamont Doherty Earth Observatory of Columbia University in Palisades, New York.

Session XII. Sea-Level Rise and Paleoclimate Presentation

Speaker: Maureen Raymo

Raymo studies the causes of climate change over Earth's history, in particular the role played by the global carbon cycle and Earth's orbital variations around the Sun. Most of her work is based on data collected from deep-sea sediment and microfossils recovered using the research vessel JOIDES Resolution. She uses the stable isotopes of oxygen and carbon to study past ocean circulation and ice volume history and is well known for her proposal that the cooling of global climate over the last 40 million years was caused primarily by enhanced chemical weathering and consumption of atmospheric CO₂ in the mountainous regions of the world, especially in the Himalayas.

Session XIII. Final Presentations

Speaker: Practicum 3 Credit Students

[IISD Compendium: A Global Directory to Indicator Initiatives](#) -

[Sustainability Indicators 101](#) -

Session IX. African Green Revolution 2.0

Speaker: Pedro Sanchez

Topic: Tropical Agriculture

The Tropical Agriculture Program of the Earth Institute at Columbia University is dedicated to addressing the interactions between agricultural production, environmental quality and human well-being.

Through research, policy advising, education and training, the program seeks to address the links between environment, agriculture, health, poverty, and economic growth. The program uses science, technology, management, and policy tools to improve environmental quality, nutrition and farmers' incomes through sustainable agricultural practices in developing countries. It focuses on the tropics, where expansion and intensification of agriculture is needed to improve food security, but risks harming the long-term integrity of the environment.

The Tropical Agriculture Program leads the Earth Institute's initiative The Millennium Villages Project; provides support to the MDG Centers in Nairobi, Kenya and Bamako, Mali; administered the U.N. Millennium Project Task Force on Hunger; and conducts publicity and relevant research.

Readings:

The African Millennium Villages website

Session X. Academic Holiday

No Class

Session XII. Jeffrey Sachs Lecture (NOT YET SCHEDULED)

Session XIII. Natural Disasters and Sustainable Development

Speaker: John Mutter

Topic: Natural Disasters

Readings:

Mutter, John. "Disasters widen the rich-poor gap." In *Nature*, v. 466 (Aug. 2010): 1042.

[Don't Blame Nature](#) - By John C. Mutter. From the Earth Institute News Archive. August 31, 2006.

[A Changing Debate: Bringing Disaster and Development Together](#) - From UNDP's Global

Report. Reducing Disaster Risk. A Challenge for Development. (2004). The full report is available at <http://www.undp.org/cpr/disred/rdr.htm>.

[Disaster Risk Reduction or Climate Change Adaptation: Are We Reinventing the Wheel?](#) -

Jessica Mercer: Disaster Risk Reduction or Climate Change Adaptation: Are We Reinventing the Wheel? Journal of International Development, 22: pp.247-264 (2010).

[Accounting for Katrina's Dead](#) - Report on Prof. Mutter's research in accounting for victims of Hurricane Katrina.

Session XIV. Center for Global Health and Economic Development

Speaker: Joanna Rubinstein

Topic: CGHED

The Center for Global Health and Economic Development (CGHED) is based at the [Earth Institute at Columbia University](#). CGHED provides research, education, policy and operational programs that focus on the intersections of global health and economic development. CGHED focuses on the role of the health sector in relation to other sectors, such as infrastructure, agriculture and education. Through this interdisciplinary approach, CGHED develops programs that focus on scaling up access to health care in developing countries.

New models for innovative and economically sustainable health interventions aim at strengthening health systems in developing countries to address the major global health challenges of our time, such as malaria, tuberculosis, neglected tropical diseases (NTDs), HIV/AIDS and non-communicable diseases. Local, national and global financing mechanisms for the achievement of the health-related Millennium Development Goals are at the core of several of the Center's projects.

CGHED programs focus on demonstrating the benefits of increased investments in health on sustainable economic growth. CGHED's research and operational experience in global health is designed to lead to the development of policies promoting sustainable development. The Center provides scientific, technical and policy advice to the governments of several developing countries. CGHED is also focused on studying health in the context of an integrated rural development project--the Millennium Villages project--and other scaling-up initiatives.

Readings:

CHW Report from CGHED -

[Taking Concepts to Scale: Achieving the Millennium Development Goals in Nigeria](#) -

Huffington Post article from Annika Sweetland and Ishiyaku M. Mohammed.

[New UN Partnership seeks to promote reproductive health in Africa](#) -

Ghana News Agency, December 14, 2010

[Recent releases in global health](#) - Medical News Today, November 15, 2010

[Village becomes lab for curing Africa's problems](#) -