

THE EARTH INSTITUTE  
COLUMBIA UNIVERSITY



# Undergraduate Major in Sustainable Development



COLUMBIA | GS  
School of General Studies

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# Undergraduate Major in Sustainable Development

## What Is Sustainable Development?

Sustainable development is one of the most pressing challenges facing humanity. How can the world's growing population meet its requirements for food, energy, water and other basic needs without undermining the planet's ecological systems? Major challenges such as poverty alleviation, climate change and food security are so intertwined that none can be viewed apart from the others.

“Sustainable” refers to managing the world's economy in a manner consistent with the continued healthy functioning of Earth's ecosystems, oceans, atmosphere and climate. “Development” refers to continued social, political and economic progress aimed at the improvement of global human well-being, especially for the poorest of the poor.

Achieving sustainable development requires holistic and integrated approaches that consider the complex interplay between the planet's natural and social systems and work at multiple levels of society, from the local to the international.

## The Sustainable Development Program

One of the first degree programs of its kind in the United States, Columbia University's new undergraduate major in sustainable development is founded on the belief that students must be trained in a variety of disciplines in order to be effective leaders in the field of sustainable development. The program is designed to ensure that graduates understand the basics of the natural and social sciences and are equipped to address complex problems across a wide range of challenges facing humanity.

The interdisciplinary major addresses sustainable development through the lens of interacting natural and social systems. Students learn, for example, how to navigate complex public health and urbanization issues, and to use analytical skills to develop solutions to water management problems. They take the first step toward addressing the challenges facing today's world.

The program provides a unique experience. Students take classes specifically designed for sustainable development majors—classes that were developed by experienced faculty and practitioners in the field through a series of collaborative discussions. The benefit of this is that the cross-disciplinary program provides students with a well-rounded education that addresses the very real and complex issues of development as they relate to the interactions of the natural and social systems. Students will address the fundamental question of how to move toward a trajectory of sustainability that will allow future generations to pursue further progress in human well-being without causing irreparable harm to the planet.

## The Columbia Context

Columbia University has long worked at the forefront of sustainable development issues through its research centers and graduate programs. More recently, the University began incorporating this work into its undergraduate degree programs.

In 2007, the Earth Institute helped to launch the special concentration in sustainable development for undergraduate students. The concentration was designed as a cluster of specialized courses to serve as a complement to the expert training inherent in existing disciplinary majors at Columbia. The energy and interest that the special concentration generated from faculty and students foretold the need for a full major in sustainable development.

# Program of Study

The major in sustainable development extends from the philosophical, ideological and structural traditions of the Columbia Core. Students who wish to complete the major in sustainable development will work with their program adviser to decide on course selection and sequencing. Study abroad and internships are strongly encouraged, particularly as a basis for thesis research and to provide students with practical experience early on in their professional development.

The program benefits from the support of Earth Institute researchers—many of whom have helped design classes in the degree—and their pioneering work in the field. Drawing on cutting-edge research and practical work at the Earth Institute, graduates of the program will be uniquely prepared to approach issues of sustainable development from all angles in the public, private and non-profit sectors.

## Courses

A minimum of 15 courses and a practicum are required, for a total of approximately 47 points, to complete the major. Students will take courses within the following framework:

- I. Sustainable Development Foundation**
- II. Basic Disciplinary Foundation**
- III. Analysis and Solutions to Complex Problems**
- IV. Skills/Actions**
- V. Electives**
- VI. Capstone Workshop**

Students wishing to complete the major in sustainable development should work with the program adviser to decide on course selection and sequencing. A minimum of 15 courses and a practicum are required for the major as follows:

- I. Sustainable Development Foundation (three courses):**
  - SDEV W1900 Introduction to Sustainable Development Seminar
  - SDEV W2300 Challenges of Sustainable Development
  - EESC W2330 Science for Sustainable Development
  
- II. Basic Disciplinary Foundation (five courses):**
  - One of the following science sequences:
    - EEEB W2001 and W2002 Environmental Biology I and II
    - CHEM C1403 and C1404 General Chemistry
    - PHYS V1201 and V1202 General Physics
    - EESC V2100 and V2300 Earth Science
    - EAAE E1100 and E2002 Engineering Science
  
  - Two social science courses to be chosen from an approved list in conjunction with the program adviser:
    - ECON W1105 Principles of Economics
    - SDEV W3400 Demography of Human Populations
    - POLS V1501 Introduction to Comparative Politics or V1601 International Politics
    - SOCI W1000 The Social World
    - ANTH V1002 The Interpretation of Culture

One of the following Quantitative Foundations courses:\*

**Statistics**

STAT W1211 Introduction to Statistics (with calculus)  
STAT W2024 Applied Linear Regression Analysis  
STAT W2025 Applied Statistical Methods  
STAT W2026 Statistical Applications and Case Studies  
STAT W3026 Applied Data Mining  
STAT W3105 Introduction to Probability Models  
STAT W3107 Introduction to Statistical Inference  
STAT W4105 Introduction to Probability  
STAT W4107 Statistical Inference  
STAT W4315 Linear Regression Models  
STAT W4606 Elementary Stochastic Processes

**Linear Algebra**

MATH V2010 Linear Algebra

**III. Analysis and Solutions to Complex Problems (two courses):**

EAIA W4200 Alternative Energy Resources  
SDEV W3330 Ecological and Social Systems for Sustainable Development  
PUBH W3100 Fundamentals of Global Health  
SDEV W3200 Global Food Systems  
SDEV W3360 Disasters and Development  
SDEV W3410 Urbanization and Sustainability  
ECIA W4100 Management and Development of Water Resources  
The Summer Ecosystems Experience for Undergraduates (SEE-U) Summer Program

**IV. Skills/Actions (two courses):**

SDEV W3355 Climate Change and Law  
SDEV W3390 GIS for Sustainable Development  
SCNC W3010 Science, Technology and Society  
SDEV W3450 Spatial Analysis and Modeling for Sustainable Development  
EESC W4050 Global Assessment Remote Sensing  
SDEV W3320 Economic and Financial Methods for Sustainable Development  
SUMA K4100 Sustainability Management

**V. Electives (a practicum and two courses):**

One of the following practicums:

SUMA K4734 Earth Institute Practicum  
INAF U4420 Oil, Rights and Development

Two of the following:

- Additional courses from Analysis and Solutions to Complex Problems
- Additional courses from Skills/Actions
- Senior Thesis Seminar (EESC W3901 and EESC BC3800)
- Upper division courses from the list as approved by program adviser

**VI. Capstone Workshop (one course):**

SDEV W3280 Workshop in Sustainable Development

**Total Points ~ 47**

\*Students should have completed secondary school level calculus before enrolling in these courses

## Beyond the Classroom

In addition to coursework, students are encouraged to take advantage of the many resources available at Columbia. By attending lectures and career panels, becoming active in student organizations, and pursuing internship opportunities, students will gain broad perspectives on sustainable development and gather ideas on shaping their future goals. The Earth Institute's Office of Academic and Research Programs offers research assistant positions and special events for undergraduates throughout the year.

## Online Resources

Visit [earth.columbia.edu/susdevundergrad](http://earth.columbia.edu/susdevundergrad) for the following forms and information:

- Course Planning Form
- Course Approval Form
- Internship Substitution Form
- Major Declaration Form
- Opportunities for Students Outside the Classroom
- Information on How to Study Abroad
- Research Assistant Program
- Sample Course Schedules

**For more information on the major or the special concentration in sustainable development, please contact:**

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