

# Human Ecology and Sustainable Development

## PhD Course in Sustainable Development

### U9240 Spring 2019

#### **Instructor**

Jeffrey Shrader

**Email:** [jgs2103@columbia.edu](mailto:jgs2103@columbia.edu)

**Office hours:** IAB 1406, Thursdays from 12:00—2:00 p.m. or by appointment.

#### **Teaching Assistant**

Anouch Missirian ([am4215@columbia.edu](mailto:am4215@columbia.edu)). Anouch is responsible for recitations and providing assistance with anything related to the class. Her office hours will be announced at the beginning of the semester.

#### **Class Meeting Times**

Lectures: Tuesday 11:00 a.m.—12:50 a.m., IAB 418

Recitation session: Thursday 6:10 p.m.—8:00 p.m., IAB 404

#### **Prerequisites**

The prerequisite is Environmental Science for Sustainable Development (SDEV U6240).

#### **Course Objectives and Overview**

This course has two primary objectives: first, to provide a structured way to think about—and conduct research in—the field of sustainable development. Second, to introduce formal models of dynamic, coupled human and environmental systems.

The course describes the interactions between physical ecology and economic development and stresses the two-way interactions between them. Ecological constraints (climate, disease ecology, physical resources such as soils and energy sources, topography and transport conditions) significantly shape the patterns of economic development, demography, wealth, and poverty. At the same time, anthropogenic activities (farming, resource depletion, demographic stresses, and energy use), as well as the political and economic institutions used to govern them, change the physical environment. This course aims to give an in-depth treatment of this two-way interaction. This course differs substantially from a traditional course on economic development by placing the greatest stress on the interactions between the physical environment and human society. This emphasis results in a trade-off: many important issues are not covered in detail including (but by no means limited to) household consumption and saving, industrial organization, bargaining, and trade. By the end of the course, students should have a base of knowledge and intellectual structure to conduct novel and independent research in the field of sustainable development.

#### **Grading and Assignments**

##### **Problem Sets (25%)**

Each week, on Tuesday, you will need to submit your solution to that week's problem set. The problem sets will have a mix of questions that will cover the analytical models covered in class, questions that require some data analysis and visualization, and questions that will require some independent research. You are allowed to work in teams, but each individual must submit their

own solution. Please note who you work with at the top of your solutions. Grading is on a scale of 0-100.

### **Reading Responses (10%)**

Each week, on Tuesday, you will need to submit a short (up to one page) reading response essay on the required readings for the week (usually two papers). The goal is not to write a summary of the readings but to engage in critical thinking. For example, you can place the paper in the context of the course, point out particularly helpful or insightful parts of the analysis, highlight limitations and directions for future research.

### **Midterm exam (25%)**

The midterm will cover material from the class, recitations, and readings.

### **Final exam (40%)**

The final will cover material from the class, recitations, and readings.

## **Course Materials**

There is no textbook. Required readings will be available on the course website. For an overview of many of the themes and methods in the course, students are welcome to read *The Age of Sustainable Development* by Jeffrey Sachs.

## **Course Outline**

### **Part I: Sustainable development through the lens of dynamic, coupled systems**

1. Sustainable development: the dynamics of coupled economic and natural systems
2. Introduction to dynamic, coupled models
3. Headline example: Climate change and integrated assessment models

### **Part II: Introduction to growth theory**

1. Economic welfare
2. Malthus to Solow
3. Ramsey and discount rates
4. Romer, Acemoglu, and endogenous growth

### **Part III: Growth and the Environment**

1. Renewable and non-renewable resources
2. Demographics and urbanization
3. Limits to growth
4. Examples of conducting research in human ecology: climate change, fisheries, disease transmission
5. Lingering questions: inequality, market power, and institutions