

# ENVIRONMENTAL SCIENCE GRADUATE PROGRAM

## 2018-2019 Curriculum Guide for Masters of Science degree program with a specialization in CLIMATE CHANGE SCIENCE AND POLICY

As a part of the Ohio State Environmental Sciences Graduate Program (ESGP), this specialization focuses on issues relating to climate change. Research on climate change at both the scientific and policy-making level inherently requires an interdisciplinary approach that bridges the gap between social and natural sciences. Research themes addressed by the climate change specialization include:

- The global water cycle, causes and consequences of sea level rise, and the sustainability of water resources
- The global energy economy, including conventional and alternative energy sources, technology and policy
- Rapid climate change, including changes in the mean and variation in temperature and precipitation, and their effects on managed and natural ecosystems, such as biodiversity and agroecosystems

Students admitted to the MS degree program are assigned a faculty advisor who will provide guidance throughout the program. Students are encouraged to get to know their advisor and meet with him/her at least twice each semester. This document serves as a resource to be used by the student and the advisor in planning a program with a specialization in CCSP, but is not inclusive of all important degree, college(s), and university requirements. All students are expected to be familiar with the *ESGP Handbook* <https://esgp.osu.edu/sites/esgp.osu.edu/files/esgp-handbook-text-final-revision-ss-gb-updated-final-2014.12.2.pdf> and with the *Graduate School Handbook* (available at <http://www.gradsch.ohio-state.edu/>).

### PROGRAM OF STUDY

The MS-Climate Change Science and Policy curriculum consists of a minimum of 30 credits.

#### ESGP Required Courses (14 credits)

ESGP 7899	ESGP Seminar	1, 1, 1 (3 credits total)
Special Topic	Climate change special topic or an independent study with a climate change affiliated supervisor	2 credits
Biological Science	Select from courses in Appendix	3 credits
Physical Science	Select from courses in Appendix	3 credits
Social Sciences & Policy	Select from courses in Appendix	3 credits

#### Electives (3 credits)

With advisor's guidance and approval, select from the following list of ESGP courses

AEDECON 4320/ INTSTDS 4320	Energy, Environment, and the Economy	3 credits
ATMOSSC 5901	Climate System Modeling: Basics and Applications	3 credits
ATMOSSC 5950	Atmospheric Thermodynamics	3 credits
EARTHSC 5663	Global Biogeochemical Cycles	3 credits
EARTHSC 5650	Paleoclimatology	4 credits
EARTHSC 5663/ PUBHLTH 5203	Geo-environment and Human Health	3 credits
EARTHSC 5663	Global Change and Sustainability in the Earth System	4 credits
EARTHSC 5650	Glaciology	4 credits
EEOB 5470	Community and Ecosystem Ecology	3 credits
ENR 5600	Sustainable Agriculture and Food Systems	3 credits
GEOG 8902	Applied Climatology	3 credits
GEOG 5802	Globalization and Environment	3 credits
PUBAFRS 7500	Energy Policy and the Environment	3 credits

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PUBAFRS 7504	Science and Technology Policy	3 credits
PUBHEHS 5320	Climate Change and Human Health	3 credits

**Research Credits (13 credits)**

Research hours in advisor's home department 13 credits minimum

**Grade Policy:**

In addition to the general Graduate School requirements of a cumulative grade point average of 3.0 or higher, students must meet specific college policies regarding grades in courses.

**Support Staff**

**Environmental Sciences Graduate Program**

(614) 292-9762/Smith Laboratory/174 W. 18<sup>th</sup> Ave/Columbus, Ohio/43210/esgp.osu.edu

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## Appendix

### Core and Elective Courses in Biological Sciences in Agricultural Ecology

The objective of this core course area is to ensure that students are familiar with the diversity and functioning of organisms and the interactions among species and between organisms and the environment. Because the environmental sciences focus on the relationships between living organisms and their environment, the basic principles of ecology and a solid understanding of ecosystems structure and function is the focus of the ESGP core. This understanding can be gained through coursework that focuses on a particular taxon or a particular kind of ecosystem, but must be broadly applicable to any environment.

#### Agricultural Systems Management

ASM 5786	Environmental Issues in East Asia	3 credits	SP
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#### Environment and Natural Resources

ENR 5225	Ecosystems Modeling	3 credits	
ENR 5250.01 and 5250.02	Wetland Ecology Restoration and Wetland Field Laboratory	4 credits	AU
ENR 5263	Biology of Soil Ecosystems	3 credits	SP
ENR 5270	Soil Fertility	3 credits	AU
ENR 5560	Rehabilitation/Restoration of Ecosystems	2 credits	AU
ENR 6610	Soil and Environmental Biochemistry	2 credits	SP
ENR 7333	Successional Dynamics of Forests	3 credits	SP

#### Entomology

ENTMLGY 6410	Insect Ecology and Evolutionary Processes	3 credits	AU
ENTMLGY 6701	Biodiversity Analysis for Ecosystem Sustainability and Resilience	2 credits	AU
ENTMLGY 6704	System Analysis, from Molecules to Ecosystems	2 credits	

#### Environmental Engineering

ENVENG 7217	Applied Mathematical Ecology	4 credits	
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#### Evolution, Ecology and Organismal Biology

EEOB 4410	Conservation Biology	3 credits	SP
EEOB 5420	Aquatic Ecosystems – Ecology of Inland Waters	4 credits	
EEOB 5470	Community and Ecosystem Ecology	3 credits	SP
EEOB 6210	Ecotoxicology	3 credits	

#### Horticulture and Crop Science

HCS 5602	The Ecology of Agriculture	3 credits	AU
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#### Microbiology

MICRO 5150	Microbial Ecology	3 credits	AU
MICRO 5155	Environmental Microbiology	3 credits	

#### Public Health

PUBHEHS 6320	Global Health and Environmental Microbiology	3 credits	AU
PUBHEHS 7360	Water Contamination: Sources and Health Impact	3 credits	

### Core and Elective Courses in Physical Sciences in Climate Change

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The objective of this core area is to provide an understanding of physical structure and processes in which ecosystems must function. Physical structure includes soil, water, air, geological media, climate, nutrients, and contaminants. Physical science processes include movement of “abiotic” matter and energy through ecosystems. Core courses must (1) study fundamental physical, hydrological, chemical, or biogeochemical processes and (2) study and emphasize the effects of physical structure and processes on ecosystem biotic components and function and the interactions between the biotic and abiotic components of the ecosystem.

### **Environment and Natural Resources**

ENR 8710*	Soils and Climate Change	2 credits	SP
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### **Chemistry**

CHEM 6550	Atmospheric Chemistry	3 credits	
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### **Geography**

GEOG 5900	Climatology	3 credits	SP
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\*As this class is only 2 credit hours, include a petition to count one credit from the climate change elective for your Physical Science core

### **Core and Elective Courses in Social Sciences and Policy Important in Climate Change**

The objective of the social science core is to provide an understanding of concepts related to the study of human society and/or individuals and their relationships to the structure and function of the ecosystem(s) of which they are a part. Methodology includes a range of approaches, both qualitative and quantitative. Core social science courses must engage social science in a combined theoretical and/or applied study of a physical, cultural, regulatory, or economic relationship between humans and the natural and physical environment.

### **Environment and Natural Resources**

ENR 7380	Climate and Society	3 credits	AU
ENR 7400*	Communicating Environmental Risk	2 credits	SP

### **Agricultural, Environmental and Developmental Economics**

AED 5330	Benefit-Cost Analysis	3 credits	AU
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### **Law**

Law 8311	Climate Change Law	3 credits	AU
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\*As this class is only 2 credit hours, include a petition to count one credit from the climate change elective for your Social Science core

### **Climate Change Faculty**

Heather Allen  
 Joel Barker  
 Gil Bohrer  
 Dan Herms  
 Casey Hoy  
 Rattan Lal  
 Jiyoung Lee  
 Berry Lyons  
 Andy May  
 Mark Moritz  
 Virginia Rich  
 Mazeika Sullivan  
 Kelly Wrighton

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