

## 2020-2021 Curriculum Guide for Doctor of Philosophy degree program with a specialization in WATER ISSUES

As a part of the Ohio State Environmental Sciences Graduate Program (ESGP), this specialization focuses on issues relating to water. Research on Earth's water is interdisciplinary and requires the ability to bridge social and natural sciences and engineering. The water issues specialization research areas include:

- Water quantity, hydrologic forecasting and remote sensing
- Water quality and the role of water in biogeochemical cycles
- The relationship between the human activities, aquatic ecosystems services and conditions, and public health
- Water contaminant fate and ecotoxicity
- Collaborative watershed planning and transboundary water governance

Students admitted to the PhD 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 WI, 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/default/files/2020-08/esgp\\_handbook\\_2020-2021.pdf](https://esgp.osu.edu/sites/default/files/2020-08/esgp_handbook_2020-2021.pdf)) and with *The Graduate School Handbook* (available at <http://www.gradsch.ohio-state.edu/>).

### **PROGRAM OF STUDY**

The PhD-Water Issues curriculum consists of a minimum of 80 credits.

#### **ESGP Required Courses (22 credits)**

ENVSCI 7899	ESGP Seminar	1, 1, 1 (3 credits total)
ENR 8890.02	Ecological Restoration Seminar	1 credit
Biological Science	Select from courses in Appendix	6 credits
Physical Science	Select from courses in Appendix	6 credits
Social Sciences & Policy	Select from courses in Appendix	6 credits

#### **Electives (6 credits)**

With advisor's guidance and ENR 5280	approval, select from the following list of ESGP courses	
	Stream Ecology	4 credits
ENR 5345	Methods in Aquatic Ecology	4 credits
ENR 5355	Aquaculture	3 credits
ENR 7700	Watershed Ecology and Restoration	3 credits
CIVILEN 5230	Transport Phenomena in Water Resources Engineering	3 credits
CIVILEN 5420	Remote Sensing of Environment	3 credits
CIVILEN 6230	Numerical Models in Water Resources Engineering	3 credits
ENVENG 5120	Advanced Environmental Biotechnology	3 credits

ENVENG 6210	Environmental Engineering Unit Operations	3 credits
EARTHSC 5206	Advanced Oceanography	3 credits
EARTHSC 5655	Land Surface Hydrology	3 credits
EARTHSC 5751	Quantitative Ground-Water Flow Modeling	4 credits
EARTHSC 5752	Contaminants in Aqueous Systems	4 credits
FABENG 5730	Design of Agricultural Water Management Systems	3 credits
FABENG 5750	Stream Geomorphology and Watershed Hydrology	3 credits

### **Research Credits (52 credits)**

Pre-and Post-Candidacy research hours in advisor's home department	52 credits minimum
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### **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

**\*\*\*\*\*Questions regarding the student's program of study should be directed to their advisor\*\*\*\*\***

## Appendix

### Core and Elective Courses in Biological Sciences

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.

#### Evolution, Ecology and Organismal Biology

EEOB 5420	Aquatic Ecosystems- Ecology of Inland Waters	1.5-4 credits	
EEOB 6210	Ecotoxicology	2-4 credits	

#### Environmental and Natural Resources

ENR 5250.01 and ENR 5250.02	Wetland Ecology and Restoration and Field Laboratory	3 credits	AU
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#### Public Health

PUBHEHS 7360	Water Contamination: Sources and Health Impact	3 credits	
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### Core and Elective Courses in Physical Sciences

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 5273	Environmental Fate and Impact of Contaminants in Soil and Water	3 credits	SP
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#### Civil and Environmental Engineering

CIVILEN 5130	Applied Hydrology	3 credits	
ENVENG 6100	Environmental Engineering Analytical Methods	3 credits	SP
ENVENG 5430	Principles of Risk Assessment	3 credits	SP

#### Earth Sciences

EARTHSC 5621	Introduction to Geochemistry	3 credits	AU
EARTHSC 5651	Hydrogeology	3 credits	AU
EARTHSC 5718	Aquatic Geochemistry	3 credits	

#### Food, Agricultural and Biological Engineering

FABENG 5550	Design of Sustainable Waste Management Systems	3 credits	SP
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## Core and Elective Courses in Social Sciences and Policy

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 5451	Water Law	3 credits	SP
ENR 8350	Ecosystem Management Policy	3 credits	AU

### Law

Law 8890.02	Environmental Law	2-4 credits	AU
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### **Water Issues Faculty**

Heather Allen

Joel Barker

Nick Basta

Gil Bohrer

Larry Brown Ozeas

Costa Michael

Durand Casey Hoy

Rattan Lal

Roman Lanno

Jiyoung Lee

Allison MacKay

Andy May

Mark Moritz

Paula Mouser

Susan Olesik

Shaurya Prakash

Virginia Rich

Mazeika Sullivan

Linda Weavers

Dale White

Kelly Wrighton

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