

# THE WAGNER FREE INSTITUTE OF SCIENCE

Winter 2019  
BIOLOGICAL SCIENCES/PALEONTOLOGY SERIES  
**Environmental Geology: Humans and the Earth**  
Professor Jason Downs

This course will be held at the **City Institute Branch of the Free Library of Philadelphia**, located at 1905 Locust Street, Philadelphia.

**Dates:** 8 Saturdays from January 26 – March 16, 2019

**Time:** Lectures meet from 10:30 AM TO NOON

**This course requires pre-registration. To sign-up, click on the link on the Wagner's course schedule webpage or call 215-763-6529 x23.**

## Course Description

Environmental geology is the study of the interaction between humans and their geological environment (lithosphere [crust], hydrosphere [water], cryosphere [ice], biosphere [life] and atmosphere [gasses]). It is an applied science that addresses geological impacts on human health, economy, and culture. It also addresses human impacts on other organisms, natural resources, and climate. This course will focus on those topics in geology that are most relevant to the human experience. Environmental geology is a cautionary discipline, but the tone of the class conversations will be hopeful.

## Course Schedule

### **1. Saturday, January 26, 2019 – Introduction to the science**

This lecture will introduce the geological processes that are responsible for the human environment. It will also discuss uniquely human concerns of responsibility and ethics as they pertain to the environment.

### **2. Saturday, February 2, 2019 – Soils**

Human existence depends on topsoil. This lecture will explore soil development and fertility, the engineering properties of soils, and the process of desertification.

### **3. Saturday, February 9, 2019 – Rivers and coasts**

Water is essential to life and, as a result, human settlements concentrate in places that are most susceptible to flooding: river floodplains and coastlines. This lecture will cover a broad range of topics including flooding, cyclones, and coastal erosion in addition to the engineering approaches to protecting human settlements from these natural processes.

### **4. Saturday, February 16, 2019 – Mass wasting**

Mass wasting refers to landslides and related surface processes. This lecture will examine slope stability and how it is affected by topography, climate, runoff, human land use, and vegetation.

### **5. Saturday, February 23, 2019 – Tectonics and Earthquakes**

This lecture will cover the basics of plate tectonics and faulting, the stages of the earthquake cycle, and the human technology of earthquake prediction.

## **6. Saturday, March 2, 2019 – Volcanic activity**

From the human perspective, volcanic activity is a natural hazard. It also is a necessary driver in the geological carbon cycle. Without it, life on Earth would be impossible. This lecture will focus on the types of volcanic processes that impact humans and the human efforts to study, predict, and protect from volcanoes.

## **7. Saturday, March 9, 2019 - Pollution**

As human populations grow, there may be no greater environmental problem facing humans than the loss of clean air and/or clear water. This lecture will examine new sources of pollution, new health concerns, and new solutions.

## **8. Saturday, March 16, 2019 - Energy**

All energy sources used by humans come from Earth. This lecture will address available energy sources and human trends in usage. It will also address energy policy and the cultural impact of energy access and defense.

Saturday, March 23, 2019 – make-up class (if needed)

### **Recommended Readings**

Environmental Geology, An Earth Systems Approach. Dorothy Merritts, Kirsten Menking, and Andrew DeWet, 2<sup>nd</sup> Edition, Macmillan, ISBN: 97881429237437

Environmental Geology. Jim Reicherd, 3<sup>rd</sup> Edition, McGraw Hill, ISBN: 1260149447

### **About the Professor**

**Dr. Jason Downs** is Assistant Professor of Biology at Delaware Valley University. He is also a Research Associate at the Academy of Natural Sciences in the Vertebrate Paleontology Group, where he has done active research since 2006. He was one of the team members who discovered the *Tiktaalik roseae*, a specimen that shed new light on the vertebrate transition to land. Dr. Downs has been teaching for the Wagner since 2012.