**CE/EEE: Study Abroad Water and Infrastructure Resilience: Public Health and Extreme Events**

**Course Instructor:** Prof. Andrew J. Whelton,  [awhelton@purdue.edu](mailto:awhelton@purdue.edu)

***[email is the best/fastest contact method]***

                                    Office: Hampton Hall Room 3145, telephone (765) 494-2160

**Course Credit:** 3 credits

**Course Content:** Brightspace ("Learning Management System")

**Meeting Days/Times:** Study Abroad United Kingdom

**Course Location:** Brightspace and United Kingdom (see syllabus)

* *The course will be held on Brightspace and the United Kingdom depending on Purdue University and health department policies, and Instructor access. It is expected the course will be primarily held in-person.*
* *The instructor will do his best to give advance notice about syllabus modifications, when possible.*
* *Students who have unexpected events and are unable to complete deliverables on time should contact the Instructor ASAP. Deliverables are also noted at the start of class so students can plan for their submission.*

**Office hours:** Contact the instructor directly to setup Zoom OR in-person meetings, depending on university policies and personal logistics. The instructor plans to have a flexible schedule to meet with students. The Instructor is rarely in his physical office, but instead moving between laboratories, worksites, and home locations.

**Course Description**

This course is focused on introducing and inspiring students about the engineering, science, and policy challenges associated with water infrastructure and extreme events. Topics will span water quality, public health, infrastructure, the environment, public safety, and communications.

**Learning Objectives**

At the completion of this course, it is expected that students will be able to:

* Identify key population needs following natural and man-made disasters;
* Explain the roles and responsibilities of common organizations responding to incidents;
* Describe water quality challenges and solutions to natural and man-made disasters;
* Communicate technical concepts effectively with audiences with widely-varying backgrounds;

**Course Content**

This course is designed for students to learn the roles, responsibilities, and complexity of responding to disasters and emergencies from leaders in this space. Events to be covered include those caused by natural disasters and those that are man-made. A variety of representatives from federal, academic, and private corporations will share experiences on this topic. The course objectives will be fulfilled in three capacities: Through (a) a combination of interactions with invited experts on the topics speaker interactions/information sharing, (b) learning activities in the host country and online education and learning opportunities, (c) final report and presentation that represents the student’s breadth and depth knowledge. Materials will be available on Brightspace.

**Learning Resources, Technology & Texts**

* There is no required textbook or notes package to be purchased for this course.
* The Brightspace page is the location of all materials. See the Help tab for resources.
* Students should NOT pay for access to any scientific article for this course. Journals and documents can be found by logging in with your student PUID here: <https://www.lib.purdue.edu/>.

**Assignments**

Student learning will be assessed through a combination of participation throughout the course. Details on these assignments, including a schedule of due dates, and guidelines on discussion participation and evaluation will be posted on the course website.

* There is no final exam.
* PARTICIPATE in the course activities IN the United Kingdom: Students are expected to attend and participate in every course activity in the United Kingdom. Speakers and tours have been setup so that students can learn directly from experts in the discipline. Tours will enable students to learn concepts and see, firsthand, the technologies of importance to this course.
* UPLOAD a 1-page reflection to Brightspace for each activity in the United Kingdom.Each submission should be a single spaced, 12pt font or smaller, 1”x1” margins. In this reflection, the student should discuss the speaker’s topic/tour topic content and provide a reflection upon what they learned *and* additional thoughts that they had because of the presentation.
* COMPLETE the online Brightspace quizzes for specific reading materials as denoted on the schedule.
* UPLOAD a 1-page reflection to Brightspace for each Scientific Paper assigned.Each submission should be a single spaced, 12pt font or smaller, 1”x1” margins. In this reflection, the student should discuss the speaker’s topic/tour topic content and provide a reflection upon what they learned *and* additional thoughts that they had because of the presentation.
* UPLOAD a FINAL REPORT to Brightspace about an extreme event topic of the student’s choosing. Details are below.

*Final Report Instructions*

* NO cover page shall be used. Please see the template attached.
* Formatting required: 10-12 pt Arial or Times New Roman font type; single spacing is required, not 1.5 or double spacing; 1 inch margins on all sides required
* The report shall only be a maximum of 4-pages in total length, not less than 3 pages. The list of references however is not considered inside the report’s maximum 4-page limit. For example, a compliant report can be 4 pages in length and then include an additional 1 or more pages of references.
* The topic must, at the minimum, include the following sections:
  1. **Background and Significance**: Describe why a particular scientific/policy question is important for a single type of disaster or emergency. Explain the scope of knowledge to date (i.e., a brief literature review). Intrigue the reader, but do not overwhelm them. Cite key authorities. Do not use vague terms. What is written should be well-understood by the student. The student will need to read a lot of reports and papers to narrow down the question they deem is important, and may not cite all of the documents they read.
  2. **Key Challenges of a Stakeholder:** Identify a specific stakeholder (household, local, county, state, or federal government, nongovernmental organization, business). Each different stakeholder will have different priorities. Identify their priorities. Then identify the challenges they can/have/may face.
  3. **Provide Examples of the Disaster or Emergency Caused Challenges and How the Stakeholders have or Need Help**: Explain the literature pertaining disaster and explain
  4. **Reflection:** Provide a brief (50-100 word) description of information gained through this activity.
* Other report tips:
* Google Scholar and Purdue library electronic resources can be helpful in finding information about specific topics. Government and NGO websites may also be helpful. Media articles/reports are not primary sources, but can be cited.
* 3 sentences are needed for 1 paragraph
* If the sentence is 3 or more lines long it likely needs to be cut into multiple sentences.
* Define any acronym you use the first time it’s used, then don’t define it again.

*Final Presentation Instructions*

* The purpose of the presentation is to not only demonstrate the student’s journey in newly gained knowledge but also ENABLE other students to learn about the topic.
* Total duration of presentation should 5 to 6 minutes in length, and shall not exceed 6 minutes.
* This can be accomplished by recording by zoom while the slides are shown on the screen. The recording file can then be uploaded to the Brightspace page.

**Grading**

Several activities will be used to determine the student’s final grade:

25% Speaker/tour reflections

25% Scientific paper reflections and assigned reading Brightspace online quizzes

25% Final report

25% Final presentation and assessment of 5 other student presentations

**Rubric for Reflections**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| *Criteria* | *Excellent* | *Acceptable* | *Marginal* | *Unacceptable* |
| *Points* | *5* | *4* | *3* | *<2* |
| Thoughtfully Engage Material | Clearly evident knowledge of background material | Good knowledge of background material | Partial knowledge of background material | Knowledge of background material is lacking |
| Demonstrate Critical Thinking | Evidence issue is comprehensively understood. | Evidence issue is reasonably understood. | Evidence issue is partially understood. | Little to no evidence issue is understood. |

**Academic Guidance in the Event a Student is Quarantined/ Isolated**

If you become quarantined or isolated at any point in time during the semester, in addition to support from the Protect Purdue Health Center, you will also have access to an Academic Case Manager who can provide you academic support during this time. Your Academic Case Manager can be reached at [acmq@purdue.edu](mailto:acmq@purdue.edu) and will provide you with general guidelines/resources around communicating with your instructors, be available for academic support, and offer suggestions for how to be successful when learning remotely. Importantly, if you find yourself too sick to progress in the course, notify your academic case manager and notify me via email or Brightspace. We will make arrangements based on your particular situation. The Office of the Dean of Students (odos@purdue.edu) is also available to support you should this situation occur.

**REFLECTION: [INSERT REFLECTION TOPIC]**

*[INSERT STUDENT NAME], [INSERT STUDENT SCHOOL OR DEPARTMENT]*

Fall 2023

 [insert discussion………………..]

[When students read other documents in their pursuit of better understand the paper they are reading, they can list references reviewed]

**FINAL REPORT: [INSERT PROJECT TITLE]**

*[INSERT STUDENT NAME], [INSERT STUDENT SCHOOL OR DEPARTMENT]*

Fall 2023

**1. Background and Significance**

            [insert discussion………………..]

**2. Key Challenges of a Stakeholder:**

[insert discussion………………..]

**3. Examples of the Disaster or Emergency Caused Challenges and How the Stakeholders have or Need Help**

[insert discussion………………..]

**4. Reflection**

1. [insert discussion………………..]

**List of References** [not included in the page limit]

[Use alphabetical order…. A, B, C, D, ….. Z]

*It is recommended that students identify a “goal” and “objectives” for this project. What is it that they intend to learn? This can help focus the project. Students must get preapproval for their topic as a condition of this assignment. Students are encouraged to speak with the instructor about the project activity and seek feedback.*

**Tentative Agenda**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Day** | **Topic** | **Activities to Prepare for the Course Period** | **Deliverable Due** |  |
| Before trip to U.K. | PreWork and Awareness before U.K. | Read: Chapter 1 (14 pgs), **Thinking in Systems:** *The Basics,* Donna Meadows  Read: Chapter 2 (38 pgs), **Thinking in Systems:** *A Brief Visit to the Systems Zoo*, Donna Meadows  Read: Chapter 3 (11 pgs), **Thinking in Systems:** *Why Systems Work So Well*, Donna Meadows  Read: Chapter 5 (17 pgs), **Thinking in Systems:** *System Traps … and Opportunities*, Donna Meadows  Read [Systems Thinking and the Future of Cities - Resilience](https://www.resilience.org/stories/2014-05-30/systems-thinking-and-the-future-of-cities/) | Complete Quiz 1  Complete Quiz 2  Complete Quiz 3 |  |
| Extreme Events | Watch (3:26): [Floods 101 | National Geographic (youtube.com)](https://www.youtube.com/watch?v=4PXj7bOD7IY&t=50s)  Watch (44:12): [The Water Crisis | National Geographic (youtube.com)](https://www.youtube.com/watch?v=3VyfN30XzDM)  Read: [Water security in focus as England faces threat of another summer drought (ft.com)](https://www.ft.com/content/5c46d8c3-c0bc-4ae6-8b0d-b8721ff28ac6)  Review: [As it happened: Heatwave latest: Major incident declared as London hits 40C and fires burn - BBC News](https://www.bbc.com/news/live/uk-62184978)  Watch (3:13): ['HUNDREDS of people' falling ill with EXTREME diarrhea as parasite contaminates water in Devon (youtube.com)](https://www.youtube.com/watch?v=kGpVffiICYQ)  Watch (1:37): [Cases of disease more than double after parasite found in drinking water (youtube.com)](https://www.youtube.com/watch?v=2BXu4yfEakg)  Watch (2:23): [Microplastics found in UK tap water (youtube.com)](https://www.youtube.com/watch?v=LeTgHbMK5R0)  Read: [England flooding: Hundreds of homes evacuated after heavy rain (bbc.com)](https://www.bbc.com/news/uk-67888959)  Read: [Floods and Your Safety | Floods | CDC](https://www.cdc.gov/floods/about/index.html)  Read: [Imperial College scientists study London's 2022 'firewaves' - BBC News](https://www.bbc.co.uk/news/articles/c8rxgmmg4g7o.amp) | Complete Quiz 4 |  |
| Fire | Read: [Heatwaves and firewaves: the drivers of urban wildfires in London in the summer of 2022 | Research Square](https://www.researchsquare.com/article/rs-4774726/v1)  Read: [This insidious urban wildfire health risk happens after the fires stop (inverse.com)](https://www.inverse.com/science/urban-wildfire-health-risk-boulder-colorado)  Read: [Review—Meta-Review of Fire Safety of Lithium-Ion Batteries: Industry Challenges and Research Contributions - IOPscience](https://iopscience.iop.org/article/10.1149/1945-7111/aba8b9)  Read: [FSRI Study Focuses on EV Fires - Firefighting - Electric Vehicles (fireengineering.com)](https://www.fireengineering.com/firefighting/fsri-study-focuses-on-ev-fires/)  Read: [A Probabilistic Methodology for Assessing Post-Earthquake Fire Ignition Vulnerability in Residential Buildings | Fire Technology (springer.com)](https://link.springer.com/article/10.1007/s10694-018-0811-2?fromPaywallRec=false)  Read: [Post-earthquake fire risk and loss assessment in urban areas | Innovative Infrastructure Solutions (springer.com)](https://link.springer.com/article/10.1007/s41062-023-01333-0) | Complete Quiz 5 |  |
| Water Infrastructure | Review to definition of EH: [Definitions of Environmental Health | National Environmental Health Association: NEHA](https://www.neha.org/about-neha/definitions-environmental-health)  Watch (2:01): [Water Infrastructure 101 (youtube.com)](https://www.youtube.com/watch?v=Rv_BW0att7o)  Watch (3:21): [Water, Wastewater and Stormwater (youtube.com)](https://www.youtube.com/watch?v=m7eWg1-OAGA)  Watch (10:59): [How Water Towers Work (youtube.com)](https://www.youtube.com/watch?v=yZwfcMSDBHs)  Watch (12:27): [How Sewers Work (feat. Fake Poop) (youtube.com)](https://www.youtube.com/watch?v=UpHOkHxpTvQ)  Watch (5:40) [What's That Infrastructure? (Ep. 3 - Hydraulic Structures) (youtube.com)](https://www.youtube.com/watch?v=th9XwRihDGg&list=PLTZM4MrZKfW_XJht-K7a9_egIsFqze0nQ&index=13)  Watch (11:03) [John Snow's contribution to modern epidemiology (youtube.com)](https://www.youtube.com/watch?v=MbQ4-gKmP6E)  Watch (17:40): [Down the drain: What went wrong with Britain's water system? (youtube.com)](https://www.youtube.com/watch?v=hr_W3CO2y3E)  Read: [The UK’s water industry is broken – here’s how to fix it (theconversation.com)](https://theconversation.com/the-uks-water-industry-is-broken-heres-how-to-fix-it-190700)  Review: [Drinking Water Inspectorate (dwi.gov.uk)](https://www.dwi.gov.uk/)  Scan: [Thames Water - The UK’s largest water and wastewater company](https://www.thameswater.co.uk/)  Watch (1:25): [Where London gets its water from (youtube.com)](https://www.youtube.com/watch?v=XmqmjS1_hb4) | Complete Quiz 6 |  |
|  | Water Quality and Floods | Read: [Microbial risks associated with exposure to pathogens in contaminated urban flood water - ScienceDirect](https://www.sciencedirect.com/science/article/pii/S0043135410000989)  Read: [Remobilization of pollutants during extreme flood events poses severe risks to human and environmental health - ScienceDirect](https://www.sciencedirect.com/science/article/pii/S0304389421016563) Read: [Full article: Environmental health effects attributed to toxic and infectious agents following hurricanes, cyclones, flash floods and major hydrometeorological events (tandfonline.com)](https://www.tandfonline.com/doi/full/10.1080/10937404.2019.1654422#abstract)  Read: [Microbial Contamination of Drinking Water Supplied by Private Wells after Hurricane Harvey | Environmental Science & Technology (acs.org)](https://pubs.acs.org/doi/full/10.1021/acs.est.0c07869)  Read: [Health Impacts of Floods | Prehospital and Disaster Medicine | Cambridge Core](https://www.cambridge.org/core/journals/prehospital-and-disaster-medicine/article/health-impacts-of-floods/11829B2183F14BF6E8563C37D73E8651)  Read: [Linking Water Infrastructure, Public Health, and Sea Level Rise: Integrated Assessment of Flood Resilience in Coastal Cities - Thomas R. Allen, Thomas Crawford, Burrell Montz, Jessica Whitehead, Susan Lovelace, Armon D. Hanks, Ariel R. Christensen, Gregory D. Kearney, 2019 (sagepub.com)](https://journals.sagepub.com/doi/full/10.1177/1087724X18798380)  Read: [Climate change impacts on infrastructure: Flood risk perceptions and evaluations of water systems in coastal urban areas - ScienceDirect](https://www.sciencedirect.com/science/article/pii/S2212420922001029)  Read: [Association of flooding exposure with cause-specific mortality in North Carolina, United States | Nature Water](https://www.nature.com/articles/s44221-023-00167-5)  Read: [Health Risks of Flood Disasters | Clinical Infectious Diseases | Oxford Academic (oup.com)](https://academic.oup.com/cid/article/67/9/1450/4945455)  Read: <https://www.researchsquare.com/article/rs-4774726/v1> | Complete Quiz 7 |  |
| 3/14 | - | Fly to U.K. | - |  |
| 3/15 | - | Official arrive London England  Free day  Day to rest /check into hotel, free evening for rest | - |  |
| 3/16 | Welcome and Orientation | Breakfast at hotel  London City Tour  Stop for lunch on own  Welcome Dinner 5:00 pm, free evening | - |  |
| 3/17 | Introduction to Public health, water infrastructure, and extreme events | Breakfast at hotel  Kickoff class session 9am-12pm  (Content: Review Public health uses of water, principles, water system infrastructure 101 (source to tap), Challenges: contaminants (lead, PFAS, etc.), Extreme events (drought, floods, fires, etc.)  Break for lunch  Afternoon educational learning/industry tour - Ideally, emergency services and operations center visit of London and discussion with emergency managers and leaders. (Content: Importance of water for safety, hygiene; layers of planning; experiences associated with extreme events; Lessons from the London Fires of July 2022)  Free evening  Dinner on own | - |  |
| 3/18 | Regulatory and national approaches to water, infrastructure, and public safety | Breakfast at hotel  Class session 9am-12pm  (Content: Invited guest UK Drinking Water Inspectorate Chief Marcus Rink; Content: Recent lessons learned from extreme events and water safety in the UK and policy, Parliament, and laws – importance of safe drinking water to the nation)  Break for lunch on own  Afternoon cultural activity or tourist site, free evening | - |  |
| 3/19 | Water infrastructure and challenges from utilities; Importance of water for fire incident response | Breakfast at hotel  Morning educational learning/Industry tour – (Ideally, Thames Water, London facility visit; Content: Learn about drought, water supply, and aging infrastructure)  Break for lunch on own  Afternoon educational learning/Lecture at Imperial College London/South Kensington Station (Content: Fire science and engineering - Prof. Guillermo Rein; Deeper dive into resilience and fire)  Dinner on own Free evening | - |  |
| 3/20 | Utility disaster response and recovery challenges | Breakfast at hotel  Morning class session 9am-12pm (Topics: TBD)  Break for lunch on own  Afternoon Industry tour – Ideally, Essex, Suffolk, or Anglian Water to learn about disaster response and possibly drought challenges  Dinner on own, free evening | - |  |
| 3/21 | The importance of communication and the role of the media in disaster response and recovery | Morning class 9am-12pm (Content: Journalism, Communications, Water, and Disasters; industry and profession orientation)  Guided educational learning tour of BBCNEWS Headquarters and studio.  Morning educational learning /cultural activity – Visit John Snow Broad Street Pump-Broad Street pump (Broadwick Street, Westminster W1F 7AG) (Content: Monument regarding Cholera outbreak).  Afternoon educational learning/ cultural activity -Guided tour of Parliament.  Evening fun tourist activity  Farewell Dinner 5:00 pm, Free evening after dinner | - |  |
| 3/22 |  | Breakfast at hotel, Free day | - |  |
| 3/23 | - | Everyone convenes to fly out early AM, Check out of hotel- travel to USA | - |  |
| After trip to the U.K | - | - | Request approval of final topic report  Reflection Day 3/17  Reflection Day 3/18  Reflection Day 3/19  Reflection Day 3/20  Reflection Day 3/21  Final report |  |