COLUMBIA UNIVERSITY
School of Professional Studies

Master of Science in Sustainability Management

SUMA PS 4145: Climate Change and Sustainable Water
Wednesday
4:10 – 6:00 PM (C01 Knox Hall)
3 credits

Instructor: Shannon Marquez, PhD, s.marquez@columbia.edu tel: 347-558-5496

Office Hours: by appointment

Response Policy: I generally respond to emails within 24 hours except when traveling

Course Overview

This course covers all topics and material about water sustainability, the global water crisis and the impacts from climate change. It is a comprehensive introductory water resource class that all sustainable-minded professionals should have. The topics and materials studied in the class strikes a balance for management, business, science, and technical specialists.

The sustainability of water has become an increasingly critical issue, and over the coming decade, as awareness and resources go into addressing public health, economics, growing development, climate and weather changes, and aging infrastructure. Water resources are affected by changes not only in climate but also in population, economic growth, technological and scientific changes, and other socioeconomic factors. In addition, they serve a dual purpose; water resources are critical to both human society and natural ecosystems. The objective of this course is to provide a fundamental understanding of key global water challenges and hydrological processes in the natural and built environment. We will then use this understanding to explore aspects of sustainable strategies for integrated and climate-resilient water resources management. We will explore the roles of humans as an integral part of the water cycle: how we use our water resources and how our actions help shape the water cycle. In addition, students will be encouraged to think about how climate change will impact water resources.

Ultimately, students will gain insights on the world's water resources and how to manage them in a sustainable way. Case studies will be highlighted throughout the course as well as the practical challenges faced by water practitioners (researchers, water and sustainability policy makers and managers, technologists).

The course consists of 10 lectures; group, individual and discussion board assignments; and a final project/paper submission and presentation. The final project will involve submission of a brief proposal (2 pages max), a final paper presenting the student's research on a specific question of their choice (15 pages max), and a final presentation (10 minutes). Depending on class size, final project can be either individual or group of 2. This elective course is open to all who are interested in water resources, including students from other programs. The course is offered in-person, but remote attendance can be accommodated when needed (e.g., sickness requiring isolation).

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Learning Objectives

Upon successful completion of this course, students should be able to

- L1: explain the global water crisis and the water cycle
- L2: explain why human is an intrinsic part of the water cycle, and articulate the relationships between us and the other components
- L3: explain our water future in the face of climate change and water infrastructure challenges, and how we might define and achieve sustainability in water use and management.
- L4: identify ways to manage water resources sustainably, and foster a more sophisticated understanding of the challenges and opportunities inherent in pursuing sustainability
- L5: describe the dimensions of the global water crisis and its interconnections with environmental sustainability, social equity, health, and economic development

Assignments and Assessments

Assignments may include:

- Individual assignments or group work (3), may include presentation of readings case studies
- Discussion board assignments
- Class participation
- Final project, which involves a preliminary proposal (max 2 pages, ungraded), a term paper presenting the student's research on a specific question of their choice (max 15 pages), and a final presentation (10 minutes + 3 minutes Q & A). Depending on class size, final project can be either individual or group of 2.

During the first 6-7 weeks of this course, class time will be partly devoted to an interactive lecture and group work and individual assignments, which may include reviewing case studies and readings, reports and group oral presentations (some of which may be assigned as needed). These in-class assignments will be developed around topics introduced during class lectures and case studies from the field and will be tailored to further scholarly examination of those lecture topics. Collaborative groups may include students from disparate backgrounds (engineering and public health, as well as divisions within those fields), each of whom will bring a different scholarly perspective to these assignments. In this way, the in-class group assignments provide the students a more in-depth, first-hand understanding of the range of issues associated with water, sanitation and human health. Students will be evaluated on their synthesis and understanding of fundamental concepts and clarity in presentation of those concepts.

The final project is meant as an avenue for students to apply what is learned in class, to explore and address a climate-related water resource challenge in a specific region of interest. Each student will identify the region of interest (could be anywhere in the world), the water resources challenges of that region, and one specific problem to be addressed. The student will then proposal several solutions and discuss the pros and cons of each one.

The problems to be addressed could be of a scientific nature—a knowledge gap that could be solved by a new research project, in which case the proposed solution could be a research proposal. Alternatively, the problem could be of an applied nature, in which case the proposed solutions could be an engineering one (a hard solution), policy analysis, or a management one (a soft solution).

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Grading

The final grade will be calculated as described below:

FINAL GRADING SCALE

Grade	Percentage
A+	98–100 %
A	93–97.9 %
A-	90–92.9 %
B+	87–89.9 %
B	83–86.9 %
B-	80–82.9 %
C+	77–79.9 %
C	73–76.9 %
C-	70–72.9 %
D	60–69.9 %
F	59% and below

Assignment/Assessment	% Weight	Individual or Group/Team Grade
Assignments #1	10%	Group
Assignment #2	10%	Group
Assignment #3	10%	Individual
Discussion Board #1, #2, #3	10%	Individual
Class participation	10%	Individual
Term paper	25%	Individual
Final presentation	25%	

Course Schedule/Course Calendar

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Note: this is the first time this new syllabus is implemented, so you can expect some flexibility in the content, and we will adapt along with the semester.

For the lecture topics listed below, all learning objectives & readings will be posted in Courseworks-Canvas

Date	Topics and Activities
9/04	**Introductions and Class Overview** **Lecture 1: Global Water crisis & The Water Cycle**
9/11	**Lecture 2: Water Resources, Water Quality, and Health Aspects** **Activity: Assignment #1 (Group work; to be discussed during class)**
9/18	**Lecture 3: Built Water Infrastructure** **Activity: Group work recap/presentations (from 9/11); Discussion board assignment #1 posted**
9/25	**Lecture 4: Watersheds, Runoff and Streamflow** **Activity: Discussion board assignment #1 due by 4pm**
10/2	**Lecture 5: Floods** **Activity: Assignment #2 (Group Work; to be discussed during class)**
10/9	**Lecture 6: Droughts & Scarcity** **Activity: Group work recap/presentations (from 10/2); Discussion board assignment #2**
10/16	**Lecture 7: Coordination & Emergency Response** **Activity: Assignment #3 (to be discussed during class)**
10/23	**Lecture 8: Water, Energy, Food Nexus** **Activity: Assignment #3 due by 4pm; Discussion board assignment #3**
10/30	**Lecture 9: Water Footprint & Ecological Implications** **Activity: Paper proposal due this week**
11/6	**Lecture 10: IWRM - Climate Resiliency & Promising Potential Solutions** **Activity: Work on paper and presentation**
11/13	**Final Presentations (10 students; 10 min + 3 min Q&A/student presentation)**
11/20	**Final Presentations (10 students; 10 min + 3 min Q&A/student presentation)**
11/27	**Academic Holiday – NO CLASS**
12/4	**Final Presentations (10 students; 10 min + 3 min Q&A/student presentation)** **Final Paper Due**

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Course Policies

Participation and Attendance

As the course content involves the human dimension, discussions are crucial, both in-person and online. You are expected to be prepared for class discussion by reading last week's materials, and if possible, skimming through the current week's slide deck. During class you should ask questions, express and defend your point of view, and challenge the point of view of others, in a respectful and constructive manner.

I strongly encourage you to post your questions on the discussion boards instead of emailing me, so that your classmates can participate in answering and benefit from the answers. Posting and answering questions on the discussion board count towards your class participation.

If you need to miss a class for any reason, please discuss the absence with me in advance. If you miss an experience in class, you miss an important learning moment and the class misses your contribution.

Citation & Submission

All written assignments must use standard citation format (e.g., MLA, APA, Chicago), cite sources, and be submitted to the course website (not via email).

You are encouraged to discuss the assignments among each other. If you received help from a classmate, acknowledge it in your submission. Using someone else's work without acknowledging and without their consent is deemed as plagiarism.

Special Policy on ChatGPT

You are *allowed* to use ChatGPT in your work, **but** you **must** provide a **reflection** on **how you used it**, and **your experience** throughout the process.

School and University Policies and Resources

Copyright Policy

Please note—Due to copyright restrictions, online access to this material is limited to instructors and students currently registered for this course. Please be advised that by clicking the link to the electronic materials in this course, you have read and accept the following:

The copyright law of the United States (Title 17, United States Code) governs the making of photocopies or other reproductions of copyrighted materials. Under certain conditions specified in the law, libraries and archives are authorized to furnish a photocopy or other reproduction. One of these specified conditions is that the photocopy or reproduction is not to be "used for any purpose other than private study, scholarship, or research." If a user makes a request for, or later uses, a photocopy or reproduction for purposes in excess of "fair use," that user may be liable for copyright infringement.

Academic Integrity

Columbia University expects its students to act with honesty and propriety at all times and to respect the rights of others. It is fundamental University policy that academic dishonesty in any guise or personal conduct of any sort that disrupts the life of the University or denigrates or endangers members of the University community is unacceptable and will be dealt with severely. It is essential to the academic integrity and vitality of this community that individuals do their own work and properly acknowledge the circumstances, ideas, sources, and assistance upon which that work is based. Academic honesty in class assignments and exams is expected of all students at all times.

SPS holds each member of its community responsible for understanding and abiding by the SPS Academic Integrity and Community Standards posted at https://sps.columbia.edu/students/student-support/academic-integrity-community-standards. You are required to read these standards within the first few days of class. Ignorance of the School's policy concerning academic dishonesty shall not be a defense in any disciplinary proceedings.

Diversity Statement

It is our intent that students from all diverse backgrounds and perspectives be well-served by this course, that students' learning needs be addressed both in and out of class, and that the diversity that the students bring to this class be viewed as a resource, strength and benefit. It is our intent to present materials and activities that are respectful of diversity: gender identity, sexuality, disability, age, socioeconomic status, ethnicity, race, nationality, religion, and culture.

Accessibility

Columbia is committed to providing equal access to qualified students with documented disabilities. A student's disability status and reasonable accommodations are individually determined based upon disability documentation and related information gathered through the intake process. For more information regarding this service, please visit the University's Health Services website: https://health.columbia.edu/content/disability-services.

Class Recordings

All or portions of the class may be recorded at the discretion of the Instructor to support your learning. At any point, the Instructor has the right to discontinue the recording if it is deemed to be obstructive to the learning process.

If the recording is posted, it is confidential and it is prohibited to share the recording outside of the class.

SPS Academic Resources

The Division of Student Affairs provides students with academic counseling and support services such as online tutoring and career coaching: https://sps.columbia.edu/students/student-support/student-support-resources.

Columbia University Information Technology

Columbia University Information Technology (CUIT) provides Columbia University students, faculty and staff with central computing and communications services. Students, faculty and staff may access University-provided and discounted software downloads.

Columbia University Library

Columbia's extensive library system ranks in the top five academic libraries in the nation, with many of its services and resources available online.

The Writing Center

The Writing Center provides writing support to undergraduate and graduate students through one-on-one consultations and workshops. They provide support at every stage of your writing, from brainstorming to final drafts. If you would like writing support, please visit the following site to learn about services offered and steps for scheduling an appointment. This resource is open to Columbia graduate students at no additional charge. Visit http://www.college.columbia.edu/core/uwp/writing-center.

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Career Design Lab

The Career Design Lab supports current students and alumni with individualized career coaching including career assessment, resume & cover letter writing, agile internship job search strategy, personal branding, interview skills, career transitions, salary negotiations, and much more. Wherever you are in your career journey, the Career Design Lab team is here to support you. Link to https://careerdesignlab.sps.columbia.edu/

Netiquette *[Only applies to courses using online platforms]*

Online sessions in this course will be offered through Zoom, accessible through Canvas. A reliable Internet connection and functioning webcam and microphone are required. It is your responsibility to resolve any known technical issues prior to class. Your webcam should remain turned on for the duration of each class, and you should expect to be present the entire time. Avoid distractions and maintain professional etiquette.

Please note: Instructors may use Canvas or Zoom analytics in evaluating your online participation.

More guidance can be found at: https://jolt.merlot.org/vol6no1/mintu-wimsatt_0310.htm

Netiquette is a way of defining professionalism for collaborations and communication that take place in online environments. Here are some Student Guidelines for this class:

- Avoid using offensive language or language that is not appropriate for a professional setting.
- Do not criticize or mock someone's abilities or skills.
- Communicate in a way that is clear, accurate and easy for others to understand.
- Balance collegiality with academic honesty.
- Keep an open-mind and be willing to express your opinion.
- Reflect on your statements and how they might impact others.
- Do not hesitate to ask for feedback.