EVPP 378 **FALL 2025**

Ecological Sustainability

INSTRUCTOR:	**Dr. Changwoo Ahn**
	Professor of Environmental Science and Policy
OFFICE:	3034 David King Hall (office hours: by appointment or after Wed. class)
PHONE:	(703) 993-3978
E-MAIL:	cahn@gmu.edu
WEBSITE:	http://www.changwooahn.com
TA (part time)	Victor Cregger-Acosta, vcregger@gmu.edu
CLASS TIME:	Lecture: 3 pm -4:15 pm, Mondays/Wednesdays
	Lab/Field: Tuesdays 1:30 PM-4:10 PM
LOCATION	Lecture: Horizon Hall 1007
	Lab & Fields (DK 3031, Ahn Lab or Wetland Mesocosm Compound (AWM
CREDIT HOURS:	4
PREREQUISITE:	BIOL 308 or permission of instructor.
REQUIRED TEXT:	Reading materials/handouts will be provided

RS COURSE (also as Mason Apex to be) STATEMENT

This Mason Core Capstone course is designed as a Mason Impact + Research and Scholarship (RS) Intensive course, allowing students to actively participate in research and scholarship training. Thus, in this class, you will critically read and study original and relevant literature in both scope and subject matter. Through this kind of authentic inquiry in the *interdisciplinary* approach, you will learn firsthand what it means to produce a scholarship in Ecological Sustainability Sciences.

In this RS course, students will:

1) Build their understanding of an original RS project via a critical literature study on complex environmental topics/issues.
2) Communicate knowledge from a scholarly project through various media presentations (e.g., PowerPoint, creative writing, photologs, and/or a short video etc.)
3) Engage in the scholarly inquiry by:
    - Articulating and refining a scientific hypothesis and/or a specific question for the study's goal to be provided
    - Gathering evidence appropriate to the question by applying necessary lab/field methodologies
    - Synthesizing knowledge obtained from all class activities to discuss the outcomes of projects
    - Applying appropriate scholarly conventions when reporting the results of the project- Peer and/or near-peer presentations will be part of communicating the outcomes of the research project.

COURSE GOALS & LEARNING OUTCOMES

The course is to develop critical reading and thinking skills related to contemporary topics in Ecological

Sustainability. The course will train students to build, assess, and monitor the trajectory of environmental changes while applying as well as gaining the knowledge and skills of how to conduct a research project. This semester, the class will focus on the ecological services of urban wetlands. The class project may include, but not be limited to, assessing and monitoring urban hydrology (water level), water quality, soil colors, and/or wildlife observation as part of the Ahn Wetland Ecosystem Lab project. Students will gain a decent level of literacy in ecological sustainability, and hands-on experience in conducting a field-based experiment to collect, analyze, and effectively communicate environmental data.

SPECIFIC COURSE OBJECTIVES

Students will complete the class with **1)** thorough literature/book research and discussion on the key issues/concepts, history, culture, and languages of a chosen topic, **2)** exposure to scientific methods to collect/analyze/report the information of a field-based research project for the chosen topic, and **3)** communicating the science of ecological sustainability, focusing mostly on ecosystem services and biodiversity, and how they support humanity and society, 4) exposure to real-world careers paths in environmental sustainability

COURSE STRUCTURE AND FORMAT: The class will be a mixture of lectures, studying literature and presenting its summary, active group (and class) discussion, class research project relevant to the theme of the class, along with a field trip(s) that are relevant to the content of the class.

CLASS DISCUSSION

The discussion will be greatly facilitated based on the reading materials for each topic. The instructor will provide students with reading materials for at least a week before discussing the subject matter. Every student must participate individually or as a group in discussion actively. A Canvas discussion board will be used to facilitate discussion.

STUDENT PAPER PRESENTATIONS:

Each student is required to read papers assigned and participate in the discussion of those papers . Presenting groups will present the summary of the paper chosen in class for **15-20 minutes** (ppt presentation of 9-10 ppt slides recommended) and lead a discussion session with the entire class. Each member of the group must contribute **equally** to the ppt preparation and its delivery: please spell out in the last ppt slide who is responsible for which slide of the presentation. The ppt file should be sent to the instructor at least 2 hrs before the class presentation for any feedback.

CLASS PROJECT FINAL PRESENTATION:

Each student (or group) is required to do a final PowerPoint presentation of each project (15-20 minute presentation and 5 minutes Q&A). Students are allowed to collaborate on class project presentations. Final project report is required to be submitted individually by **December 12 (to be emailed by noon****). **No late assignment will be accepted****.

- *The length of the final class project report: min. 2,000 words up to 2,500 words (excluding tables and figures) with references (min. 15 references) following a peer-reviewed journal article style/format we review during the semester*

COURSE POLICY AND EXPECTATIONS: Class **attendance is strongly recommended** as participation plays a critical role in this class. Be punctual. Lateness is disruptive and disrespectful to

your peers and to me. There will be a strong emphasis on active and effective **participation** in class discussions, not only during the class presentations and discussion periods following these presentations but also throughout all the other class periods. I expect each of you to be present and prepared for each class. Use of electronic gadgets, including cell phones, are discouraged during the discussion. In addition, note-taking by hands is strongly recommended to minimize the use of laptop during the class unless necessary. This will involve having read the assigned material before each class. I strongly recommend not using your cell phones during class. *Academic dishonesty* will not be tolerated (honor code responsibilities). *Minor changes in course organization and content* may be required throughout the semester, thus students will be made aware and asked for input if such actions are needed. **Late assignments will not be accepted**.

CLASS E-MAIL AND COMMUNICATION WITH ME:

I will frequently e-mail to remind you of deadlines or to clarify points from a lecture. In addition, all class activities are facilitated by email**, so please use GMU e-mail (**@gmu.edu)** to facilitate any communication, questions, and discussion. Please check your e-mail and online announcement **daily**. When you email your assignments be sure to label your file with your first name, date, and course number (e.g., **Firstname0205-425**). If you email a question of general interest, I will likely send my response to the entire class list. Be sure to take full advantage of your classmates, the library, and the web as learning resources. Finding answers and solutions among yourselves by tapping into the multitude of resources available to you is generally a more gratifying and educationally valuable approach than seeking answers from a single authority.

LABS & FIELD TRIPS: Students are required to participate in scheduled fieldwork, field trips and do lab assignments as necessary. Field (& lab) work and/or field trips are scheduled for **Tuesdays 1:30 PM – 4:10 PM** and/or on-campus lab sessions (in Ahn Wetland Mesocosm Compound or DK 3071/3079a-Ahn Lab). The instructor will discuss the field trips before they occur. Additional work in any of the labs or fields should be arranged with Dr. Ahn as necessary for your class project. Limited laboratory space for your class project work, if needed, can be made available in Ahn Wetland Ecosystem Lab. For field trips/fieldwork, you may want to wear shoes that can get wet or soiled. Transportation will not be provided for local field trips, car-pooling is strongly recommended. The cost of food and your share of the transportation costs (i.e., gas) are at your own expense. For the field/lab activities, the schedule may be subject to minor changes in response to logistics and weather.

Also needed for field trips may include a field notebook (e.g., paper or electronic –phone, pads), a camera (or your smartphone that can take pictures and videos), a pencil, a calculator and/or just your smartphone with photo-taking capacity. Old clothes and boots/shoes for fieldwork, rain gear upon weather conditions

LAB REPORT & DATA FILE with Results

Some field/lab sessions will require a written report with photos (if available) (**850~ <1000 words** recommended with photos) that will be due by the next field/lab session. Field data EXCEL sheet submission is also required with graphs and tables to be included in the final class project presentation. For each lab/field, specific instructions will be provided.

GRADING: (subject to minor changes) **% of Grade**

Lecture	**GRADING (**subject to minor changes)
Mid-term exam (I)-open book format (access to CANVAS)	**10**
Literature review and presentation (I/G)	**20**
Final Project Presentation (PPT file) and Project Report (G/I)*	**20 (10/10)**
Participation (discussion +homework) (I)	**20**
Lab/Field	
Field data collection & EXCEL file (data and results summary) (G)	**20**
Field Trip reports (I)	**10**
TOTAL POINTS	**100**

*I = Individual; **G = Group

- Failure to meet deadlines for reading summaries, assignments, and project reports will result in losing 2 points per day within the grace period of 3 days in the final grade. You won't get any point after the grace period.
- For all Group work (G), student names must be spelled out with their responsibilities and contributions to the task (e.g., paper presentations, field/lab work, and data collection etc.) to make sure of equal contribution. For the paper review presentation, all group members are required to spell out the section of the paper each is in charge of and participate in the integration of all sections of the paper for presentation. The quality of the presentation will be assessed by categories such as Excellence (95-100), Good (90-94), Average (81-89), and Below Average (70-80).
- *Extra credit opportunities* are available for assisting with the Living Lab Project work unrelated with your class research project as well as with wetland compound maintenance work (0.25 pt per hour up to 20 hrs to the final score for the letter grade)
- Your course will be determined using the following straight scale: A+ (97-100), A (94-96), A-(90-93), B+(85-89), B (80-84), C (70-79), D (60- 69), F(<60)

GMU COMMON COURSE POLICIES

Please see the details: https://stearnscenter.gmu.edu/home/gmu-common-course-policies/

A.I. POLICY FOR THE COURSE The use of generative AI tools (e.g., ChatGPT, Claude, Gemini etc..) is not permitted for any coursework in this class unless explicitly authorized. Unauthorized use will be treated as a violation of academic standards. The policy is for critical thinking, problem-solving, or deep engagement with course material.

ACCOMMODATIONS FOR STUDENTS WITH DISABILITIES

Disability Services is committed to providing equitable access to learning opportunities for all students by upholding the laws that ensure equal treatment of people with disabilities. If you are seeking accommodations for this class, please first visit http://ds.gmu.edu/ for detailed information about the Disability Services registration process. Then please discuss your approved accommodations with me. Disability Services is located in Student Union Building I (SUB I), Suite 2500. Email:ods@gmu.edu | Phone: (703) 993-2474.

ACADEMIC INTEGRITY Mason is an Honor Code university; please see the Office for Academic Integrity for a full description of the code and the honor committee process. The

principle of academic integrity is taken very seriously and violations are treated gravely. What does academic integrity mean in this course? Essentially this: when you are responsible for a task, you will perform that task. When you rely on someone else's work in an aspect of the performance of that task, you will give full credit in the proper, accepted form. Another aspect of academic integrity is the free play of ideas. Vigorous discussion and debate are encouraged in this course, with the firm expectation that all aspects of the class will be conducted with civility and respect for differing ideas, perspectives, and traditions. When in doubt (of any kind) please ask for guidance and clarification.

COUNSELING AND PSYCHOLOGICAL SERVICES

Student Health Services and Counseling and Psychological Services Offices (703-993-2380) provides a range of resources to assist and support you. Students can call (703-993-2831) or walk-in during open hours to schedule an appointment to talk with a healthcare provider. If you or someone you know experiences a mental health crisis or emergency, seek help immediately. Call 911 for local emergency services, the National Suicide Prevention Lifeline (1-800-273-8255), or text the Crisis Text Line (741-741) anytime. Visit http://caps.gmu.edu .

SEXUAL HARASSMENT, SEXUAL MISCONDUCT, AND INTERPERSONAL VIOLENCE

George Mason University is committed to providing a learning, living and working environment that is free from discrimination and a campus that is free of sexual misconduct and other acts of interpersonal violence to promote community well-being and student success. *Faculty members are required to report all disclosures of sexual assault, interpersonal violence, and stalking to Mason's Title IX Coordinator per university policy 1412. If you wish to speak with someone confidentially, please contact the Student Support and Advocacy Center (703-380-1434), Counseling and Psychological Services (703-993-2380), Student Health Services, or Mason's Title IX Coordinator (703-993-8730; cde@gmu.edu).*

Date	**Topic** (subject to minor changes)
AUG 25	Name plates, Syllabus, OSCAR- URSP (by Oct 8)
AUG 27	AHN website, Ecological Sustainability
SEP 1	Univ. Closed (Labor Day)
SEP 3	Groups and class project work expectations
SEP 8	Wetland Ecology Intro
SEP 10	Wetland Ecology Intro 2, **Paper 1 (G1, G10)**
SEP 15	Water Quality 1-variables & ORW campus wetland
SEP 17	Water Quality 2 -monitoring, **Paper 2 (G2, G9)**
SEP 22	Wetland Soil 1 -Hydric Soils
SEP 24	Wetland Soil 2, **Paper 3 (G3, G8)**
SEP 29	Wetland Soils 3 -Sampling and data collection
OCT 1	Guest lecture for Soil Color (Dr. Schmidt)
OCT 6	Wetland Plants 1
OCT 8	Wetland Plants 2 **Paper 4 (G4, G7)**
OCT 13	**Fall break (No class)**
OCT 15	**Mid-term** exam (open book)
OCT 20	Ecosystem Restoration (EE)
OCT 22	Ecosystem Restoration, **Paper 5(G5, G6)**
OCT 27	Beaver as Ecological Engineer
OCT 29	Beaver Eco-research, **Paper 6 (G6, G1)**
NOV 3	Nature-Based Solutions (NBS) 1,
NOV 5	NBS 2 (The Rain Project), **Paper 7(G7, G2)**
NOV 10	Ecosystem Ecology and Ecological Engineering
NOV 12	Guest lecture (Mr. Sean Gagnon) – Law and Policy
NOV 17	**Paper 8(G8, G3)** and **Paper 9(G9, G4)**
NOV 19	Data presentation and discussion
NOV 24	No Class (Nov 18 substituted)
NOV 26	Thanksgiving holiday
DEC 1	FINAL Presentation and Q/A (Gs 1,3,and 5)
DEC 3	FINAL Presentation and Q/A (Gs 2 and 4)
DEC 8	End of Semester Review of class and Q/A

LAB/FIELDS (subject to minor changes)

Date	Topics and activities
AUG 26	No class
SEP 2	Lab/Field Orientation -AHN Living Wetland Lab
SEP 9	Ahn Wetland Compound (AWC)/project field site orientation
SEP 16	No class
SEP 23	Field Trip- Huntley Meadow Park (3701 Lockheed Boulevard, Alexandria)
SEP 30	AWC – Fieldwork and Data Collection
OCT 7	TBA
OCT 14	AWC – Fieldwork and Data Collection
OCT 21	Group/Individual work
OCT 28	TBA
NOV 4	No class (Election Day)
NOV 11	Group work (data Analysis and discussion)
NOV 18	Class (Nov 24 substitute) **–Paper 10(G10, G5)**
NOV 25	No class (Thanksgiving week)
DEC 2	Group/Individual work

POTENTIAL CLASS RESEARCH PROJECT TOPICS: subject to minor changes
Ecological literacy of an urban accidental wetland on campus: hydrology, water quality, soil colors, and ecosystem health

1. Soil color sensor data collection between wetlands and uplands (main project)
2. Diurnal water quality and water level data collection for a month
3. Accidental wetland vegetation survey
4. Mapping the accidental wetland ecosystem with major components (GIS and drawing)
5. Wildlife cam data analysis, including beaver activity monitoring

Paper review groups: 10 groups

Field project work/data collection groups: 5 groups

Peer-Reviewed Journal Articles for the Class Paper Presentation:

1. WJ Mitsch, et al. 1998. Creating and Restoring Wetlands. Bioscience 48 (12): 1019-1027, **Paper 1**
2. Ahn, C. and W. J. Mitsch. 2002. Scaling considerations of mesocosm wetlands in simulating a large marsh. Ecological Engineering 18:327-342. **Paper 2**
3. Ledford, K., Schmidt, S, Ahn, C. 2022. Assessing carbon storage potential of forested wetland soils in two physiographic provinces of Northern Virginia, USA. *Sustainability 14: 2048,* **Paper 3**
4. Bansal, S., Lishawa, S.C., Newman, S. *et al. Typha* (Cattail) Invasion in North American Wetlands: Biology, Regional Problems, Impacts, Ecosystem Services, and Management. *Wetlands* 39, 645–684 (2019). **Paper 4**
5. Napora, K, Noe GB, Ahn C and Noe-Fellows, M. 2023. Urban stream restorations increase soil carbon and nutrient retention along a chronosequence. *Ecological Engineering* 107063. **Paper 5**
6. Jordan CE and Fairfax E. 2021. Beaver: The North American freshwater climate action plan. WIREs Water 2022: 9:e1592, **Paper 6**
7. McAndrew, B, Ahn, C., Spooner J. 2016. Nitrogen and sediment capture of a floating treatment wetland on an urban stormwater retention pond – the case of the Rain Project, *Sustainability* 8, 972; doi:10.3390/su8100972. **Paper 7**
8. Dee, S, Korol, A , Ahn, C.., Lee, J , Means A. 2018. Patterns of vegetation and soil properties in a beaver-created wetland located in the coastal plain of Virginia, Landscape and Ecological Engineering 14(2): 209-219. **Paper 8**
9. Ahn, C., P. M. Gillevet, M. Sikaroodi, and K. Wolf. An assessment of soil bacterial community structure and physicochemistry in hummocks and hollows of palustrine forested wetland. Wetland Ecology and Management 17:397-407, **Paper 9**
10. Stiglitz, R., Mikhailova, E., Post, C., Schlautman, M., & Sharp, J. (2016b). Teaching soil color determination using an inexpensive color sensor. *Natural Sciences Education*, *45,* **Paper 10**

Recommended reading for ecological sustainability communication:

11. The Serviceberry -Abundance and Reciprocity in the natural world by Robin Wall Kimmerer 2024

References that may be used for class discussion/field/lab work and/or for your interests:

1. Brendan Fisher, Olivia Buchler, and Marian R-C. 2025. Dam Beavers, for a more sustainable world , *Front Ecol Environ: doi 10.1002/fee.2850*
2. Schmidt S. and Ahn, C. 2022. A protocol for digitizing colors: the case of measuring color variables for forested wetland soils, USA. *Environmental Monitoring and Assessment 194: 726*.
3. Schmidt S. and Ahn, C. 2021. Predicting forested wetland soil carbon using quantitative color sensor measurements in the region of northern Virginia, USA", *Journal of Environmental Management* 300, 15 December 2021, 113823.
4. James I. McClintock.1992. Gary Snyder's Poetry & Ecological Science. *The American Biology Teacher, Vol. 54, No. 2 (Feb., 1992), pp. 80-83* (for system ecology overview)
5. Zettlemoyer MA etal. 2022. What are we reading? Hot topics and authorship in ecology literature across decades. *Bull Ecol Soc Am 00(00):e02025*
6. Sonti NF, Groffman PM, Norwak DJ, Henning JG, Avolio ML, Rosi EJ. 2021. Urban net primary production: concepts, field methods, and Baltimore, Maryland, USA case study. *Ecological Applications 2022,32:e2562.*
7. Maculary SJ et al., 2025. Addressing grand ecological challenges in aquatic ecosystems: how can mesocosms be used to advance solutions? *Oikos2025:e11020*