

# Course Final Survey

Your input is valuable in helping us improve the learning experience for future students. Please take a few moments to provide honest feedback about your experience in the course. Your responses are anonymous and will be only used for course improvement and research purposes. Thank you for your participation!

**1) Course Curriculum:**

1 point

What did you like best about the Environmental Data Science course?

I liked to learn about pandas.

**2) Course Curriculum:**

1 point

What did you like least about the Environmental Data Science course?

There weren't any pre-requirements for this course and it is an advanced course. There should be more basic programming classes in order to take this course.

**3) Course Curriculum:**

1 point

Considering a 15-week course duration, students dedicate approximately:

1. Introduction to environmental data science (2 lessons)
2. Python basics (3 lessons)
3. Python programming (4 lessons)
4. Pandas (5 lessons)
5. AI coding assistance (1 lesson)
6. Data science workflow (1 lesson)
7. NumPy (3 lessons)
8. Matplotlib (3 lessons)
9. Xarray and CartoPy (3 lessons)
10. Google Earth Engine with GeeMap API (planned but not covered)
11. Machine learning (planned but not covered)
12. Project presentation (2 lessons)

Considering the time allocations and the content importance, how would you recommend adding, removing, merging, or extending some topics based on your experience.

This is a good organization for the course. I would not change it.

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**4) Course Curriculum:**

1 point

Given the course schedule and the importance of adapting to emerging trends in environmental data science such as machine learning and Google Earth engine, which option do you find most suitable for enhancing the curriculum?

- Restructure the course to focus on environmental data science emphasizing datasets, dashboards, and case studies related to water quality, surface hydrology, groundwater hydrology, climate change, environmental equity, etc., while encouraging self-learning of Python with AI-supported coding
- Maintain the current Python-centric approach but streamline topics to allocate more time for machine learning and Google Earth engine integration.
- Maintain the current course structure and offer a second course dedicated to machine learning, Google Earth engine, and case studies.
- Keep the course as it is and encourage self-learning of machine learning and Google Earth engine outside of class.
- Other: .....

**5) Course Curriculum:**

1 point

What are other thing(s) you would prefer/like to change about the way the course has been taught? What would you like the instructor to do differently? Additional comments/concerns/suggestions/compliments, etc.

The instructor should stick to basics

.....

**6) AI Coding Assistance:**

1 point

When I solve an environmental data science problem, I heavily rely on AI?

- Strongly agree
- Agree
- Neutral
- Disagree
- Strongly disagree

**7) AI Coding Assistance:**

1 point

After I study a topic in this course and feel that I understand it, I have difficulty solving problems on the same topic.

- Strongly agree
- Agree
- Neutral
- Disagree
- Strongly disagree

**8) AI Coding Assistance:**

6 points

When I get stuck on an environmental data science problem, rank how you seek help in order:

	1	2	3	4	5	6
Seek help from classmates	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>
Consult online resources	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>
Review lecture notes	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>
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**9) AI Coding Assistance:**

1 point

How has the integration of AI coding assistance, such as Jupyter AI or ChatGPT, impacted your learning experience in the course, both positively and negatively?

It was good to me! I like having a back up help when I can not resolver problems.

**10) AI coding Assistance:**

1 point

We use this statement to discard the surveys of people who are not reading the questions.  
Please select "Agree" for this question to preserve your answers.

 Strongly agree Agree Neutral Disagree Strongly disagree**11) Pedagogical Approach:**

1 point

In what ways do you feel project-based learning has contributed to your skill development in environmental data analysis?

- Improved problem-solving skills
- Enhanced data interpretation abilities
- Strengthened programming skills
- Developed critical thinking skills

 Other:  
.....

**12) Pedagogical Approach:**

1 point

Did the project-based learning approach encourage you to actively engage with the course material outside of class?

- Yes, significantly
- Yes, to some extent
- No, not significantly

**13) Pedagogical Approach:**

1 point

How effective did you find the self-directed learning opportunities, such as selecting your dataset for homework and choosing your project topic, provided in this course?

- a) Effective
- b) Challenging but effective
- c) Challenging but somehow effective
- d) Time consuming and not worth the challenge

**14) Pedagogical Approach:**

1 point

How would you recommend adjusting the pedagogical approach to optimize student learning outcomes? Select all that you found or will be useful:

- Integrate project-based learning into the curriculum, providing students with hands-on experience applying course concepts to real-world environmental data analysis scenarios.
- Incorporate peer-to-peer learning activities, such as group projects, to encourage knowledge sharing and teamwork among students.
- Implement a flipped classroom model, where students engage with course materials independently before class, allowing for more interactive and application-focused sessions.
- Record a YouTube video for each lesson to cater to diverse learning preferences and enhance comprehension.
- Provide additional problem-solving tutorials where students can work on homework assignments with the instructor
- Provide additional problem-solving tutorials where students tackle complex environmental data science challenges with the instructor
- Other:  
.....

**15) Pedagogical Approach:**

1 point

Overall, how would you rate your learning experience in this Environmental Data Science course?

- Excellent
- Good
- Fair
- Poor
- Very poor

**16) Learning Outcomes:**

1 point

Has this course enhanced your interest in pursuing further studies or research in water and environmental data analysis?

- Yes, significantly
- Yes, to some extent
- No, not at all

**17) Learng Outcome:**

1 point

I enjoy solving water and environmental data analysis problems

- Strongly Agree
- Agree
- Neutral
- Disagree
- Strongly Disagree

**18) Learning Outcome:**

1 point

How confident are you in your ability to apply Python-based tools for water and environmental data analysis after completing this course?

- Extremely confident
- Very confident
- Moderately confident
- Slightly confident
- Not confident at all

**19) Course Usefulness:**

3 points

The technical skills, reasoning and computational thinking skills, and knowledge presented in this course can be helpful to my

	Strongly Agree	Agree	Undecided	Disagree	Strongly Disagree
study	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
career	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
everyday life	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

**20) Course Usefulness:**

4 points

Please rate the usefulness of this course compared to other types of courses you've taken, considering the following categories.

	Equally useful	More useful	Less useful
Required courses in my major	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>
Required courses outside my major	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>
Elective courses in my major	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>
Elective courses outside my major	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>

**21) Course Usefulness:**

1 point

I am interested in learning more about environmental data science

- Strongly agree
- Agree
- Neutral
- Disagree
- Strongly disagree

**22) Course Usefulness:**

1 point

Select all that apply

- I would like to take more courses in Environmental Data Science to work on case studies related to water quality, surface water, groundwater, environmental and Earth science problems, or any other topic of my interest.
- I would like to take more courses in Environmental Data Science to learn more tools such as machine learning, Google Earth Engine, ArcGIS-Python, or other tools of my interest.
- I feel confident in my ability to continue learning Environmental Data Science independently and do not feel the need to take more courses.
- I am not interested in pursuing further education in Environmental Data Science because I do not believe it aligns with my career goals or interests.
- Other: .....

**23) General:**

1 point

Rate your overall experience

**24) General:**

1 point

Is there any additional feedback or comments you would like to share?

N/A

**25) General:**

1 point

What is your program ?

- Undergraduate - Engineering
- Undergraduate - Water School
- Graduate - Engineering
- Graduate - Water School
- I do not want to answer

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**1) Course Curriculum:**

1 point

What did you like best about the Environmental Data Science course?

Learning how to answer my own questions in python. We may not know all of python but we know where to look.

**2) Course Curriculum:**

1 point

What did you like least about the Environmental Data Science course?

Some elements of python are not intuitive

**3) Course Curriculum:**

1 point

Considering a 15-week course duration, students dedicate approximately:

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12. Project presentation (2 lessons)

Considering the time allocations and the content importance, how would you recommend adding, removing, merging, or extending some topics based on your experience.

I think it moved pretty well

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**5) Course Curriculum:**

1 point

What are other thing(s) you would prefer/like to change about the way the course has been taught? What would you like the instructor to do differently? Additional comments/concerns/suggestions/compliments, etc.

Keeping troubleshooting until after class and only going over elementary topics one time

.....

**6) AI Coding Assistance:**

1 point

When I solve an environmental data science problem, I heavily rely on AI?

- Strongly agree
- Agree
- Neutral
- Disagree
- Strongly disagree

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After I study a topic in this course and feel that I understand it, I have difficulty solving problems on the same topic.

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**9) AI Coding Assistance:**

1 point

How has the integration of AI coding assistance, such as Jupyter AI or ChatGPT, impacted your learning experience in the course, both positively and negatively?

I believe it helps me solve problems and makes the class seem more helpful, instead of learning to pass a test we are actually learning to solve problems.

**10) AI coding Assistance:**

1 point

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In what ways do you feel project-based learning has contributed to your skill development in environmental data analysis?

 Improved problem-solving skills Enhanced data interpretation abilities Strengthened programming skills Developed critical thinking skills Other:  
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Did the project-based learning approach encourage you to actively engage with the course material outside of class?

- Yes, significantly
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1 point

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1 point

Select all that apply

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- Other: .....

**23) General:**

1 point

Rate your overall experience

**24) General:**

1 point

Is there any additional feedback or comments you would like to share?

n/a

**25) General:**

1 point

What is your program ?

- Undergraduate - Engineering
- Undergraduate - Water School
- Graduate - Engineering
- Graduate - Water School
- I do not want to answer

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**1) Course Curriculum:**

1 point

What did you like best about the Environmental Data Science course?

I really liked learning a new skill in Python. I am glad that I was able to learn how to code and use such a valuable skill.

**2) Course Curriculum:**

1 point

What did you like least about the Environmental Data Science course?

I wish that we had gotten through more material, and I wish it was a little more interactive. I also wish that things were a little more organized, like with a study guide in Microsoft Word as opposed to being on Jupyter/Discord/GitHub because I am not as familiar with those platforms and they were hard to access and study and make my own.

**3) Course Curriculum:**

1 point

Considering a 15-week course duration, students dedicate approximately:

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10. Google Earth Engine with GeeMap API (planned but not covered)
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12. Project presentation (2 lessons)

Considering the time allocations and the content importance, how would you recommend adding, removing, merging, or extending some topics based on your experience.

I do not think Xarray was very helpful, so I would have removed that. I have found with my project I am using scipy a lot of statistical analysis, so I wish we could have covered that in this course. The introduction could have been accomplished in 1 lesson likely. I wish this course was over two semesters so we could have covered everything and a few things like Pandas, NumPy and Matplotlib in more depth.

**4) Course Curriculum:**

1 point

Given the course schedule and the importance of adapting to emerging trends in environmental data science such as machine learning and Google Earth engine, which option do you find most suitable for enhancing the curriculum?

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- Maintain the current course structure and offer a second course dedicated to machine learning, Google Earth engine, and case studies.
- Keep the course as it is and encourage self-learning of machine learning and Google Earth engine outside of class.

 Other:

I think the easiest thing to self learn would be the specific case studies. I would not encourage self learning of Python.

**5) Course Curriculum:**

1 point

What are other thing(s) you would prefer/like to change about the way the course has been taught? What would you like the instructor to do differently? Additional comments/concerns/suggestions/compliments, etc.

I would love for the course to be more interactive. Maybe if the course was smaller, this would be easier, but I understand that a lot of students want to take this course. As wonderful as Python is, I wish we also had a course specific to R, since I feel that is being used more widely especially for ecological studies. Maybe if we could have a lecture day and then a workshop day where we spend half the class walking through how to do a code and the second half working with a partner to try to apply it to a case study.

**6) AI Coding Assistance:**

1 point

When I solve an environmental data science problem, I heavily rely on AI?

Strongly agree

Agree

Neutral

Disagree

Strongly disagree

**7) AI Coding Assistance:**

1 point

After I study a topic in this course and feel that I understand it, I have difficulty solving problems on the same topic.

Strongly agree

Agree

Neutral

Disagree

Strongly disagree

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**9) AI Coding Assistance:**

1 point

How has the integration of AI coding assistance, such as Jupyter AI or ChatGPT, impacted your learning experience in the course, both positively and negatively?

I used ChatGPT a lot in this course. I am disappointed that Jupyter AI did not work as well for me. I feel like while I am using ChatGPT I am not learning as much as I could, so I wish I had a stronger foundation without it instead of heavily relying on it.

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1 point

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 Strongly agree Agree Neutral Disagree Strongly disagree**11) Pedagogical Approach:**

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1 point

Overall, how would you rate your learning experience in this Environmental Data Science course?

- Excellent
- Good
- Fair
- Poor
- Very poor

**16) Learning Outcomes:**

1 point

Has this course enhanced your interest in pursuing further studies or research in water and environmental data analysis?

 Yes, significantly Yes, to some extent No, not at all**17) Learing Outcome:**

1 point

I enjoy solving water and environmental data analysis problems

 Strongly Agree Agree Neutral Disagree Strongly Disagree

**18) Learning Outcome:**

1 point

How confident are you in your ability to apply Python-based tools for water and environmental data analysis after completing this course?

 Extremely confident Very confident Moderately confident Slightly confident Not confident at all**19) Course Usefulness:**

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I am interested in learning more about environmental data science

- Strongly agree
- Agree
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Select all that apply

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- Other: .....

**23) General:**

1 point

Rate your overall experience

1 2 3 4 5 6 7 8 9 10

Poor



Excellent

**24) General:**

1 point

Is there any additional feedback or comments you would like to share?

I am very grateful that I had the opportunity to take this course. I hope that more courses like this will be offered again before I graduate in Spring 2025 - I would definitely take advantage of them. I wish there was something like this directly in the Water School so I did not have to search outside of my major to find it, and I am extremely grateful that Dr. Elshall reached out to the Water School faculty to tell them about this course.

.....

**25) General:**

1 point

What is your program ?

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- Undergraduate - Water School
- Graduate - Engineering
- Graduate - Water School
- I do not want to answer

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Google Forms

# Course Final Survey

Your input is valuable in helping us improve the learning experience for future students. Please take a few moments to provide honest feedback about your experience in the course. Your responses are anonymous and will be only used for course improvement and research purposes. Thank you for your participation!

**1) Course Curriculum:**

1 point

What did you like best about the Environmental Data Science course?

Learning how to code using python and discovering different uses

**2) Course Curriculum:**

1 point

What did you like least about the Environmental Data Science course?

the trial and error in trying to code

**3) Course Curriculum:**

1 point

Considering a 15-week course duration, students dedicate approximately:

1. Introduction to environmental data science (2 lessons)
2. Python basics (3 lessons)
3. Python programming (4 lessons)
4. Pandas (5 lessons)
5. AI coding assistance (1 lesson)
6. Data science workflow (1 lesson)
7. NumPy (3 lessons)
8. Matplotlib (3 lessons)
9. Xarray and CartoPy (3 lessons)
10. Google Earth Engine with GeeMap API (planned but not covered)
11. Machine learning (planned but not covered)
12. Project presentation (2 lessons)

Considering the time allocations and the content importance, how would you recommend adding, removing, merging, or extending some topics based on your experience.

I think the course moved at a good pace but I do wish there was more time allotted to learn about google earth

**4) Course Curriculum:**

1 point

Given the course schedule and the importance of adapting to emerging trends in environmental data science such as machine learning and Google Earth engine, which option do you find most suitable for enhancing the curriculum?

- Restructure the course to focus on environmental data science emphasizing datasets, dashboards, and case studies related to water quality, surface hydrology, groundwater hydrology, climate change, environmental equity, etc., while encouraging self-learning of Python with AI-supported coding
- Maintain the current Python-centric approach but streamline topics to allocate more time for machine learning and Google Earth engine integration.
- Maintain the current course structure and offer a second course dedicated to machine learning, Google Earth engine, and case studies.
- Keep the course as it is and encourage self-learning of machine learning and Google Earth engine outside of class.
- Other: .....

**5) Course Curriculum:**

1 point

What are other thing(s) you would prefer/like to change about the way the course has been taught? What would you like the instructor to do differently? Additional comments/concerns/suggestions/compliments, etc.

I think more should be taught on the steps to troubleshoot the code with respect to the more common errors

.....

**6) AI Coding Assistance:**

1 point

When I solve an environmental data science problem, I heavily rely on AI?

- Strongly agree
- Agree
- Neutral
- Disagree
- Strongly disagree

**7) AI Coding Assistance:**

1 point

After I study a topic in this course and feel that I understand it, I have difficulty solving problems on the same topic.

- Strongly agree
- Agree
- Neutral
- Disagree
- Strongly disagree

**8) AI Coding Assistance:**

6 points

When I get stuck on an environmental data science problem, rank how you seek help in order:

	1	2	3	4	5	6
Seek help from classmates	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Consult online resources	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>
Review lecture notes	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Experiment on my own	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Reach out instructor for guidance	<input type="radio"/>	<input checked="" type="radio"/>				
Reach out AI for guidance	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>

**9) AI Coding Assistance:**

1 point

How has the integration of AI coding assistance, such as Jupyter AI or ChatGPT, impacted your learning experience in the course, both positively and negatively?

The use of LLM has been helpful but also lackluster as sometimes the LLM model is not structured to assist with certain things that I would need to be fixed.

**10) AI coding Assistance:**

1 point

We use this statement to discard the surveys of people who are not reading the questions.  
Please select "Agree" for this question to preserve your answers.

 Strongly agree Agree Neutral Disagree Strongly disagree**11) Pedagogical Approach:**

1 point

In what ways do you feel project-based learning has contributed to your skill development in environmental data analysis?

 Improved problem-solving skills Enhanced data interpretation abilities Strengthened programming skills Developed critical thinking skills Other:  
.....

**12) Pedagogical Approach:**

1 point

Did the project-based learning approach encourage you to actively engage with the course material outside of class?

- Yes, significantly
- Yes, to some extent
- No, not significantly

**13) Pedagogical Approach:**

1 point

How effective did you find the self-directed learning opportunities, such as selecting your dataset for homework and choosing your project topic, provided in this course?

- a) Effective
- b) Challenging but effective
- c) Challenging but somehow effective
- d) Time consuming and not worth the challenge

**14) Pedagogical Approach:**

1 point

How would you recommend adjusting the pedagogical approach to optimize student learning outcomes? Select all that you found or will be useful:

- Integrate project-based learning into the curriculum, providing students with hands-on experience applying course concepts to real-world environmental data analysis scenarios.
- Incorporate peer-to-peer learning activities, such as group projects, to encourage knowledge sharing and teamwork among students.
- Implement a flipped classroom model, where students engage with course materials independently before class, allowing for more interactive and application-focused sessions.
- Record a YouTube video for each lesson to cater to diverse learning preferences and enhance comprehension.
- Provide additional problem-solving tutorials where students can work on homework assignments with the instructor
- Provide additional problem-solving tutorials where students tackle complex environmental data science challenges with the instructor
- Other: .....

**15) Pedagogical Approach:**

1 point

Overall, how would you rate your learning experience in this Environmental Data Science course?

- Excellent
- Good
- Fair
- Poor
- Very poor

**16) Learning Outcomes:**

1 point

Has this course enhanced your interest in pursuing further studies or research in water and environmental data analysis?

- Yes, significantly
- Yes, to some extent
- No, not at all

**17) Learing Outcome:**

1 point

I enjoy solving water and environmental data analysis problems

- Strongly Agree
- Agree
- Neutral
- Disagree
- Strongly Disagree

**18) Learning Outcome:**

1 point

How confident are you in your ability to apply Python-based tools for water and environmental data analysis after completing this course?

- Extremely confident
- Very confident
- Moderately confident
- Slightly confident
- Not confident at all

**19) Course Usefulness:**

3 points

The technical skills, reasoning and computational thinking skills, and knowledge presented in this course can be helpful to my

	Strongly Agree	Agree	Undecided	Disagree	Strongly Disagree
study	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
career	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
everyday life	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>

**20) Course Usefulness:**

4 points

Please rate the usefulness of this course compared to other types of courses you've taken, considering the following categories.

	Equally useful	More useful	Less useful
Required courses in my major	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>
Required courses outside my major	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>
Elective courses in my major	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>
Elective courses outside my major	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>

**21) Course Usefulness:**

1 point

I am interested in learning more about environmental data science

- Strongly agree
- Agree
- Neutral
- Disagree
- Strongly disagree

**22) Course Usefulness:**

1 point

Select all that apply

- I would like to take more courses in Environmental Data Science to work on case studies related to water quality, surface water, groundwater, environmental and Earth science problems, or any other topic of my interest.
- I would like to take more courses in Environmental Data Science to learn more tools such as machine learning, Google Earth Engine, ArcGIS-Python, or other tools of my interest.
- I feel confident in my ability to continue learning Environmental Data Science independently and do not feel the need to take more courses.
- I am not interested in pursuing further education in Environmental Data Science because I do not believe it aligns with my career goals or interests.
- Other: .....

**23) General:**

1 point

Rate your overall experience

**24) General:**

1 point

Is there any additional feedback or comments you would like to share?

N/A

**25) General:**

1 point

What is your program ?

- Undergraduate - Engineering
- Undergraduate - Water School
- Graduate - Engineering
- Graduate - Water School
- I do not want to answer

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# Course Final Survey

Your input is valuable in helping us improve the learning experience for future students. Please take a few moments to provide honest feedback about your experience in the course. Your responses are anonymous and will be only used for course improvement and research purposes. Thank you for your participation!

**1) Course Curriculum:**

1 point

What did you like best about the Environmental Data Science course?

I really enjoyed the instruction of this course, as well as the course material. I appreciated the lecture style, as well as the use of lecture/example problems.

**2) Course Curriculum:**

1 point

What did you like least about the Environmental Data Science course?

I wish there was more time to work on our final projects/more time in class. I appreciated that the last HW was removed to permit more time to dedicate to the project.

**3) Course Curriculum:**

1 point

Considering a 15-week course duration, students dedicate approximately:

1. Introduction to environmental data science (2 lessons)
2. Python basics (3 lessons)
3. Python programming (4 lessons)
4. Pandas (5 lessons)
5. AI coding assistance (1 lesson)
6. Data science workflow (1 lesson)
7. NumPy (3 lessons)
8. Matplotlib (3 lessons)
9. Xarray and CartoPy (3 lessons)
10. Google Earth Engine with GeeMap API (planned but not covered)
11. Machine learning (planned but not covered)
12. Project presentation (2 lessons)

Considering the time allocations and the content importance, how would you recommend adding, removing, merging, or extending some topics based on your experience.

I would suggest less on Pandas, and more time allotted towards the special topics (Machine learning and GeeMap API).

---

**4) Course Curriculum:**

1 point

Given the course schedule and the importance of adapting to emerging trends in environmental data science such as machine learning and Google Earth engine, which option do you find most suitable for enhancing the curriculum?

- Restructure the course to focus on environmental data science emphasizing datasets, dashboards, and case studies related to water quality, surface hydrology, groundwater hydrology, climate change, environmental equity, etc., while encouraging self-learning of Python with AI-supported coding
- Maintain the current Python-centric approach but streamline topics to allocate more time for machine learning and Google Earth engine integration.
- Maintain the current course structure and offer a second course dedicated to machine learning, Google Earth engine, and case studies.
- Keep the course as it is and encourage self-learning of machine learning and Google Earth engine outside of class.
- Other: .....

**5) Course Curriculum:**

1 point

What are other thing(s) you would prefer/like to change about the way the course has been taught? What would you like the instructor to do differently? Additional comments/concerns/suggestions/compliments, etc.

.....

**6) AI Coding Assistance:**

1 point

When I solve an environmental data science problem, I heavily rely on AI?

 Strongly agree Agree Neutral Disagree Strongly disagree**7) AI Coding Assistance:**

1 point

After I study a topic in this course and feel that I understand it, I have difficulty solving problems on the same topic.

 Strongly agree Agree Neutral Disagree Strongly disagree">

<https://docs.google.com/forms/d/1TkJxLH25E2PhikF1zASWQBZywBRQbJIB8734NgLALyk/edit#responses>

**8) AI Coding Assistance:**

6 points

When I get stuck on an environmental data science problem, rank how you seek help in order:

	1	2	3	4	5	6
Seek help from classmates	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>
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Review lecture notes	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Experiment on my own	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Reach out instructor for guidance	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Reach out AI for guidance	<input type="radio"/>	<input checked="" type="radio"/>				

**9) AI Coding Assistance:**

1 point

How has the integration of AI coding assistance, such as Jupyter AI or ChatGPT, impacted your learning experience in the course, both positively and negatively?

It has helped a lot, I actually think more time allotted to AI coding assistance would have been an efficient use of time and would allow for less time to be focused on Pandas/NumPy/Xarray

**10) AI coding Assistance:**

1 point

We use this statement to discard the surveys of people who are not reading the questions.  
Please select "Agree" for this question to preserve your answers.

 Strongly agree Agree Neutral Disagree Strongly disagree**11) Pedagogical Approach:**

1 point

In what ways do you feel project-based learning has contributed to your skill development in environmental data analysis?

- Improved problem-solving skills
- Enhanced data interpretation abilities
- Strengthened programming skills
- Developed critical thinking skills

 Other:  
.....

**12) Pedagogical Approach:**

1 point

Did the project-based learning approach encourage you to actively engage with the course material outside of class?

- Yes, significantly
- Yes, to some extent
- No, not significantly

**13) Pedagogical Approach:**

1 point

How effective did you find the self-directed learning opportunities, such as selecting your dataset for homework and choosing your project topic, provided in this course?

- a) Effective
- b) Challenging but effective
- c) Challenging but somehow effective
- d) Time consuming and not worth the challenge

**14) Pedagogical Approach:**

1 point

How would you recommend adjusting the pedagogical approach to optimize student learning outcomes? Select all that you found or will be useful:

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- Provide additional problem-solving tutorials where students can work on homework assignments with the instructor
- Provide additional problem-solving tutorials where students tackle complex environmental data science challenges with the instructor
- Other: .....

**15) Pedagogical Approach:**

1 point

Overall, how would you rate your learning experience in this Environmental Data Science course?

- Excellent
- Good
- Fair
- Poor
- Very poor

**16) Learning Outcomes:**

1 point

Has this course enhanced your interest in pursuing further studies or research in water and environmental data analysis?

- Yes, significantly
- Yes, to some extent
- No, not at all

**17) Learing Outcome:**

1 point

I enjoy solving water and environmental data analysis problems

- Strongly Agree
- Agree
- Neutral
- Disagree
- Strongly Disagree

**18) Learning Outcome:**

1 point

How confident are you in your ability to apply Python-based tools for water and environmental data analysis after completing this course?

- Extremely confident
- Very confident
- Moderately confident
- Slightly confident
- Not confident at all

**19) Course Usefulness:**

3 points

The technical skills, reasoning and computational thinking skills, and knowledge presented in this course can be helpful to my

	Strongly Agree	Agree	Undecided	Disagree	Strongly Disagree
study	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
career	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
everyday life	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

**20) Course Usefulness:**

4 points

Please rate the usefulness of this course compared to other types of courses you've taken, considering the following categories.

	Equally useful	More useful	Less useful
Required courses in my major	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>
Required courses outside my major	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>
Elective courses in my major	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>
Elective courses outside my major	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>

**21) Course Usefulness:**

1 point

I am interested in learning more about environmental data science

- Strongly agree
- Agree
- Neutral
- Disagree
- Strongly disagree

**22) Course Usefulness:**

1 point

Select all that apply

- I would like to take more courses in Environmental Data Science to work on case studies related to water quality, surface water, groundwater, environmental and Earth science problems, or any other topic of my interest.
- I would like to take more courses in Environmental Data Science to learn more tools such as machine learning, Google Earth Engine, ArcGIS-Python, or other tools of my interest.
- I feel confident in my ability to continue learning Environmental Data Science independently and do not feel the need to take more courses.
- I am not interested in pursuing further education in Environmental Data Science because I do not believe it aligns with my career goals or interests.
- Other: .....

**23) General:**

1 point

Rate your overall experience

1 2 3 4 5 6 7 8 9 10

Poor



Excellent

**24) General:**

1 point

Is there any additional feedback or comments you would like to share?

This course was extremely informative and will be very useful for my future career goals. I wish there was more time to cover all of the course content.

.....

**25) General:**

1 point

What is your program ?

- Undergraduate - Engineering
- Undergraduate - Water School
- Graduate - Engineering
- Graduate - Water School
- I do not want to answer

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# Course Final Survey

Your input is valuable in helping us improve the learning experience for future students. Please take a few moments to provide honest feedback about your experience in the course. Your responses are anonymous and will be only used for course improvement and research purposes. Thank you for your participation!

**1) Course Curriculum:**

1 point

What did you like best about the Environmental Data Science course?

I liked seeing the future of data management of engineering and the various tools utilized.

**2) Course Curriculum:**

1 point

What did you like least about the Environmental Data Science course?

I disliked how slow some of the lessons were.

**3) Course Curriculum:**

1 point

Considering a 15-week course duration, students dedicate approximately:

1. Introduction to environmental data science (2 lessons)
2. Python basics (3 lessons)
3. Python programming (4 lessons)
4. Pandas (5 lessons)
5. AI coding assistance (1 lesson)
6. Data science workflow (1 lesson)
7. NumPy (3 lessons)
8. Matplotlib (3 lessons)
9. Xarray and CartoPy (3 lessons)
10. Google Earth Engine with GeeMap API (planned but not covered)
11. Machine learning (planned but not covered)
12. Project presentation (2 lessons)

Considering the time allocations and the content importance, how would you recommend adding, removing, merging, or extending some topics based on your experience.

I would shorten the panda lesson and python programming lesson by one lesson each to shit another subject in there.

---

**4) Course Curriculum:**

1 point

Given the course schedule and the importance of adapting to emerging trends in environmental data science such as machine learning and Google Earth engine, which option do you find most suitable for enhancing the curriculum?

- Restructure the course to focus on environmental data science emphasizing datasets, dashboards, and case studies related to water quality, surface hydrology, groundwater hydrology, climate change, environmental equity, etc., while encouraging self-learning of Python with AI-supported coding
- Maintain the current Python-centric approach but streamline topics to allocate more time for machine learning and Google Earth engine integration.
- Maintain the current course structure and offer a second course dedicated to machine learning, Google Earth engine, and case studies.
- Keep the course as it is and encourage self-learning of machine learning and Google Earth engine outside of class.
- Other: .....

**5) Course Curriculum:**

1 point

What are other thing(s) you would prefer/like to change about the way the course has been taught? What would you like the instructor to do differently? Additional comments/concerns/suggestions/compliments, etc.

I think how the instructor teaches the class is perfectly fine and shouldn't be changed.

.....

**6) AI Coding Assistance:**

1 point

When I solve an environmental data science problem, I heavily rely on AI?

 Strongly agree Agree Neutral Disagree Strongly disagree**7) AI Coding Assistance:**

1 point

After I study a topic in this course and feel that I understand it, I have difficulty solving problems on the same topic.

 Strongly agree Agree Neutral Disagree Strongly disagree

**8) AI Coding Assistance:**

6 points

When I get stuck on an environmental data science problem, rank how you seek help in order:

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Reach out AI for guidance	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>

**9) AI Coding Assistance:**

1 point

How has the integration of AI coding assistance, such as Jupyter AI or ChatGPT, impacted your learning experience in the course, both positively and negatively?

AI coding assistance has helped me build the skeleton of my project and assisted me during homework problems.

**10) AI coding Assistance:**

1 point

We use this statement to discard the surveys of people who are not reading the questions.  
Please select "Agree" for this question to preserve your answers.

 Strongly agree Agree Neutral Disagree Strongly disagree**11) Pedagogical Approach:**

1 point

In what ways do you feel project-based learning has contributed to your skill development in environmental data analysis?

 Improved problem-solving skills Enhanced data interpretation abilities Strengthened programming skills Developed critical thinking skills Other:  
.....

**12) Pedagogical Approach:**

1 point

Did the project-based learning approach encourage you to actively engage with the course material outside of class?

- Yes, significantly
- Yes, to some extent
- No, not significantly

**13) Pedagogical Approach:**

1 point

How effective did you find the self-directed learning opportunities, such as selecting your dataset for homework and choosing your project topic, provided in this course?

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- b) Challenging but effective
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- Provide additional problem-solving tutorials where students tackle complex environmental data science challenges with the instructor
- Other: .....

**15) Pedagogical Approach:**

1 point

Overall, how would you rate your learning experience in this Environmental Data Science course?

- Excellent
- Good
- Fair
- Poor
- Very poor

**16) Learning Outcomes:**

1 point

Has this course enhanced your interest in pursuing further studies or research in water and environmental data analysis?

- Yes, significantly
- Yes, to some extent
- No, not at all

**17) Learng Outcome:**

1 point

I enjoy solving water and environmental data analysis problems

- Strongly Agree
- Agree
- Neutral
- Disagree
- Strongly Disagree

**18) Learning Outcome:**

1 point

How confident are you in your ability to apply Python-based tools for water and environmental data analysis after completing this course?

- Extremely confident
- Very confident
- Moderately confident
- Slightly confident
- Not confident at all

**19) Course Usefulness:**

3 points

The technical skills, reasoning and computational thinking skills, and knowledge presented in this course can be helpful to my

	Strongly Agree	Agree	Undecided	Disagree	Strongly Disagree
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career	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
everyday life	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

**20) Course Usefulness:**

4 points

Please rate the usefulness of this course compared to other types of courses you've taken, considering the following categories.

	Equally useful	More useful	Less useful
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Required courses outside my major	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>
Elective courses in my major	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>
Elective courses outside my major	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>

**21) Course Usefulness:**

1 point

I am interested in learning more about environmental data science

- Strongly agree
- Agree
- Neutral
- Disagree
- Strongly disagree

**22) Course Usefulness:**

1 point

Select all that apply

- I would like to take more courses in Environmental Data Science to work on case studies related to water quality, surface water, groundwater, environmental and Earth science problems, or any other topic of my interest.
- I would like to take more courses in Environmental Data Science to learn more tools such as machine learning, Google Earth Engine, ArcGIS-Python, or other tools of my interest.
- I feel confident in my ability to continue learning Environmental Data Science independently and do not feel the need to take more courses.
- I am not interested in pursuing further education in Environmental Data Science because I do not believe it aligns with my career goals or interests.
- Other: .....

**23) General:**

1 point

Rate your overall experience

**24) General:**

1 point

Is there any additional feedback or comments you would like to share?

For the project, formatting guidelines should be posted along with the rubric on what will be graded.

**25) General:**

1 point

What is your program ?

- Undergraduate - Engineering
- Undergraduate - Water School
- Graduate - Engineering
- Graduate - Water School
- I do not want to answer

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**1) Course Curriculum:**

1 point

What did you like best about the Environmental Data Science course?

That Python makes long tasks much quicker.

**2) Course Curriculum:**

1 point

What did you like least about the Environmental Data Science course?

Running into error after error when working with codes.

**3) Course Curriculum:**

1 point

Considering a 15-week course duration, students dedicate approximately:

1. Introduction to environmental data science (2 lessons)
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11. Machine learning (planned but not covered)
12. Project presentation (2 lessons)

Considering the time allocations and the content importance, how would you recommend adding, removing, merging, or extending some topics based on your experience.

It moved well.

---

**4) Course Curriculum:**

1 point

Given the course schedule and the importance of adapting to emerging trends in environmental data science such as machine learning and Google Earth engine, which option do you find most suitable for enhancing the curriculum?

- Restructure the course to focus on environmental data science emphasizing datasets, dashboards, and case studies related to water quality, surface hydrology, groundwater hydrology, climate change, environmental equity, etc., while encouraging self-learning of Python with AI-supported coding
- Maintain the current Python-centric approach but streamline topics to allocate more time for machine learning and Google Earth engine integration.
- Maintain the current course structure and offer a second course dedicated to machine learning, Google Earth engine, and case studies.
- Keep the course as it is and encourage self-learning of machine learning and Google Earth engine outside of class.
- Other: .....

**5) Course Curriculum:**

1 point

What are other thing(s) you would prefer/like to change about the way the course has been taught? What would you like the instructor to do differently? Additional comments/concerns/suggestions/compliments, etc.

I would prefer if the lecture was more hands-on.

.....

**6) AI Coding Assistance:**

1 point

When I solve an environmental data science problem, I heavily rely on AI?

- Strongly agree
- Agree
- Neutral
- Disagree
- Strongly disagree

**7) AI Coding Assistance:**

1 point

After I study a topic in this course and feel that I understand it, I have difficulty solving problems on the same topic.

- Strongly agree
- Agree
- Neutral
- Disagree
- Strongly disagree

**8) AI Coding Assistance:**

6 points

When I get stuck on an environmental data science problem, rank how you seek help in order:

	1	2	3	4	5	6
Seek help from classmates	<input type="radio"/>	<input checked="" type="radio"/>				
Consult online resources	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Review lecture notes	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Experiment on my own	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Reach out instructor for guidance	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>
Reach out AI for guidance	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>

**9) AI Coding Assistance:**

1 point

How has the integration of AI coding assistance, such as Jupyter AI or ChatGPT, impacted your learning experience in the course, both positively and negatively?

It has allowed me to understand topics without seeking assistance first.

**10) AI coding Assistance:**

1 point

We use this statement to discard the surveys of people who are not reading the questions.  
Please select "Agree" for this question to preserve your answers.

 Strongly agree Agree Neutral Disagree Strongly disagree**11) Pedagogical Approach:**

1 point

In what ways do you feel project-based learning has contributed to your skill development in environmental data analysis?

 Improved problem-solving skills Enhanced data interpretation abilities Strengthened programming skills Developed critical thinking skills Other:  
.....

**12) Pedagogical Approach:**

1 point

Did the project-based learning approach encourage you to actively engage with the course material outside of class?

- Yes, significantly
- Yes, to some extent
- No, not significantly

**13) Pedagogical Approach:**

1 point

How effective did you find the self-directed learning opportunities, such as selecting your dataset for homework and choosing your project topic, provided in this course?

- a) Effective
- b) Challenging but effective
- c) Challenging but somehow effective
- d) Time consuming and not worth the challenge

**14) Pedagogical Approach:**

1 point

How would you recommend adjusting the pedagogical approach to optimize student learning outcomes? Select all that you found or will be useful:

- Integrate project-based learning into the curriculum, providing students with hands-on experience applying course concepts to real-world environmental data analysis scenarios.
- Incorporate peer-to-peer learning activities, such as group projects, to encourage knowledge sharing and teamwork among students.
- Implement a flipped classroom model, where students engage with course materials independently before class, allowing for more interactive and application-focused sessions.
- Record a YouTube video for each lesson to cater to diverse learning preferences and enhance comprehension.
- Provide additional problem-solving tutorials where students can work on homework assignments with the instructor
- Provide additional problem-solving tutorials where students tackle complex environmental data science challenges with the instructor
- Other: .....

**15) Pedagogical Approach:**

1 point

Overall, how would you rate your learning experience in this Environmental Data Science course?

- Excellent
- Good
- Fair
- Poor
- Very poor

**16) Learning Outcomes:**

1 point

Has this course enhanced your interest in pursuing further studies or research in water and environmental data analysis?

- Yes, significantly
- Yes, to some extent
- No, not at all

**17) Learng Outcome:**

1 point

I enjoy solving water and environmental data analysis problems

- Strongly Agree
- Agree
- Neutral
- Disagree
- Strongly Disagree

**18) Learning Outcome:**

1 point

How confident are you in your ability to apply Python-based tools for water and environmental data analysis after completing this course?

 Extremely confident Very confident Moderately confident Slightly confident Not confident at all**19) Course Usefulness:**

3 points

The technical skills, reasoning and computational thinking skills, and knowledge presented in this course can be helpful to my

	Strongly Agree	Agree	Undecided	Disagree	Strongly Disagree
study	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
career	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
everyday life	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

**20) Course Usefulness:**

4 points

Please rate the usefulness of this course compared to other types of courses you've taken, considering the following categories.

	Equally useful	More useful	Less useful
Required courses in my major	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>
Required courses outside my major	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>
Elective courses in my major	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>
Elective courses outside my major	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>

**21) Course Usefulness:**

1 point

I am interested in learning more about environmental data science

- Strongly agree
- Agree
- Neutral
- Disagree
- Strongly disagree

**22) Course Usefulness:**

1 point

Select all that apply

- I would like to take more courses in Environmental Data Science to work on case studies related to water quality, surface water, groundwater, environmental and Earth science problems, or any other topic of my interest.
- I would like to take more courses in Environmental Data Science to learn more tools such as machine learning, Google Earth Engine, ArcGIS-Python, or other tools of my interest.
- I feel confident in my ability to continue learning Environmental Data Science independently and do not feel the need to take more courses.
- I am not interested in pursuing further education in Environmental Data Science because I do not believe it aligns with my career goals or interests.
- Other: .....

**23) General:**

1 point

Rate your overall experience

**24) General:**

1 point

Is there any additional feedback or comments you would like to share?

The course was interesting.

**25) General:**

1 point

What is your program ?

- Undergraduate - Engineering
- Undergraduate - Water School
- Graduate - Engineering
- Graduate - Water School
- I do not want to answer

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# Course Final Survey

Your input is valuable in helping us improve the learning experience for future students. Please take a few moments to provide honest feedback about your experience in the course. Your responses are anonymous and will be only used for course improvement and research purposes. Thank you for your participation!

**1) Course Curriculum:**

1 point

What did you like best about the Environmental Data Science course?

What I like the most about this course is how I learned that python can do more things and have way more variety of packages than R.

**2) Course Curriculum:**

1 point

What did you like least about the Environmental Data Science course?

The only thing I liked the least is how hard python can be with very complex code.

**3) Course Curriculum:**

1 point

Considering a 15-week course duration, students dedicate approximately:

1. Introduction to environmental data science (2 lessons)
2. Python basics (3 lessons)
3. Python programming (4 lessons)
4. Pandas (5 lessons)
5. AI coding assistance (1 lesson)
6. Data science workflow (1 lesson)
7. NumPy (3 lessons)
8. Matplotlib (3 lessons)
9. Xarray and CartoPy (3 lessons)
10. Google Earth Engine with GeeMap API (planned but not covered)
11. Machine learning (planned but not covered)
12. Project presentation (2 lessons)

Considering the time allocations and the content importance, how would you recommend adding, removing, merging, or extending some topics based on your experience.

I would say extend class hours in general for subjects like Matplotlib, Xarray, Numpy, and Pandas so we could cover more topics in the future.

**4) Course Curriculum:**

1 point

Given the course schedule and the importance of adapting to emerging trends in environmental data science such as machine learning and Google Earth engine, which option do you find most suitable for enhancing the curriculum?

- Restructure the course to focus on environmental data science emphasizing datasets, dashboards, and case studies related to water quality, surface hydrology, groundwater hydrology, climate change, environmental equity, etc., while encouraging self-learning of Python with AI-supported coding
- Maintain the current Python-centric approach but streamline topics to allocate more time for machine learning and Google Earth engine integration.
- Maintain the current course structure and offer a second course dedicated to machine learning, Google Earth engine, and case studies.
- Keep the course as it is and encourage self-learning of machine learning and Google Earth engine outside of class.
- Other: .....

**5) Course Curriculum:**

1 point

What are other thing(s) you would prefer/like to change about the way the course has been taught? What would you like the instructor to do differently? Additional comments/concerns/suggestions/compliments, etc.

Only for the class hours to be 2 hour long, or one hour long if it is a MWF class.

.....

**6) AI Coding Assistance:**

1 point

When I solve an environmental data science problem, I heavily rely on AI?

 Strongly agree Agree Neutral Disagree Strongly disagree**7) AI Coding Assistance:**

1 point

After I study a topic in this course and feel that I understand it, I have difficulty solving problems on the same topic.

 Strongly agree Agree Neutral Disagree Strongly disagree">

<https://docs.google.com/forms/d/1TkJxLH25E2PhikF1zASWQBZywBRQbJIB8734NgLALyk/edit#responses>

**8) AI Coding Assistance:**

6 points

When I get stuck on an environmental data science problem, rank how you seek help in order:

	1	2	3	4	5	6
Seek help from classmates	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Consult online resources	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>
Review lecture notes	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>
Experiment on my own	<input type="radio"/>	<input checked="" type="radio"/>				
Reach out instructor for guidance	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Reach out AI for guidance	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

**9) AI Coding Assistance:**

1 point

How has the integration of AI coding assistance, such as Jupyter AI or ChatGPT, impacted your learning experience in the course, both positively and negatively?

Negatively, it does not really help me much when I am learning extremely hard codes, and the AI give me complicated results, but the rest is positive for basic simple code.

**10) AI coding Assistance:**

1 point

We use this statement to discard the surveys of people who are not reading the questions.  
Please select "Agree" for this question to preserve your answers.

 Strongly agree Agree Neutral Disagree Strongly disagree**11) Pedagogical Approach:**

1 point

In what ways do you feel project-based learning has contributed to your skill development in environmental data analysis?

 Improved problem-solving skills Enhanced data interpretation abilities Strengthened programming skills Developed critical thinking skills Other:  
.....

**12) Pedagogical Approach:**

1 point

Did the project-based learning approach encourage you to actively engage with the course material outside of class?

- Yes, significantly
- Yes, to some extent
- No, not significantly

**13) Pedagogical Approach:**

1 point

How effective did you find the self-directed learning opportunities, such as selecting your dataset for homework and choosing your project topic, provided in this course?

- a) Effective
- b) Challenging but effective
- c) Challenging but somehow effective
- d) Time consuming and not worth the challenge

**14) Pedagogical Approach:**

1 point

How would you recommend adjusting the pedagogical approach to optimize student learning outcomes? Select all that you found or will be useful:

- Integrate project-based learning into the curriculum, providing students with hands-on experience applying course concepts to real-world environmental data analysis scenarios.
- Incorporate peer-to-peer learning activities, such as group projects, to encourage knowledge sharing and teamwork among students.
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- Record a YouTube video for each lesson to cater to diverse learning preferences and enhance comprehension.
- Provide additional problem-solving tutorials where students can work on homework assignments with the instructor
- Provide additional problem-solving tutorials where students tackle complex environmental data science challenges with the instructor
- Other: .....

**15) Pedagogical Approach:**

1 point

Overall, how would you rate your learning experience in this Environmental Data Science course?

- Excellent
- Good
- Fair
- Poor
- Very poor

**16) Learning Outcomes:**

1 point

Has this course enhanced your interest in pursuing further studies or research in water and environmental data analysis?

- Yes, significantly
- Yes, to some extent
- No, not at all

**17) Learng Outcome:**

1 point

I enjoy solving water and environmental data analysis problems

- Strongly Agree
- Agree
- Neutral
- Disagree
- Strongly Disagree

**18) Learning Outcome:**

1 point

How confident are you in your ability to apply Python-based tools for water and environmental data analysis after completing this course?

- Extremely confident
- Very confident
- Moderately confident
- Slightly confident
- Not confident at all

**19) Course Usefulness:**

3 points

The technical skills, reasoning and computational thinking skills, and knowledge presented in this course can be helpful to my

	Strongly Agree	Agree	Undecided	Disagree	Strongly Disagree
study	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
career	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>
everyday life	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>

**20) Course Usefulness:**

4 points

Please rate the usefulness of this course compared to other types of courses you've taken, considering the following categories.

	Equally useful	More useful	Less useful
Required courses in my major	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>
Required courses outside my major	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>
Elective courses in my major	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>
Elective courses outside my major	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>

**21) Course Usefulness:**

1 point

I am interested in learning more about environmental data science

- Strongly agree
- Agree
- Neutral
- Disagree
- Strongly disagree

**22) Course Usefulness:**

1 point

Select all that apply

- I would like to take more courses in Environmental Data Science to work on case studies related to water quality, surface water, groundwater, environmental and Earth science problems, or any other topic of my interest.
- I would like to take more courses in Environmental Data Science to learn more tools such as machine learning, Google Earth Engine, ArcGIS-Python, or other tools of my interest.
- I feel confident in my ability to continue learning Environmental Data Science independently and do not feel the need to take more courses.
- I am not interested in pursuing further education in Environmental Data Science because I do not believe it aligns with my career goals or interests.
- Other:  
Python could be good for some of my everyday life, but not the career I want to pursue. I would be more interested in python, if I have a very strong skills of coding.

**23) General:**

1 point

Rate your overall experience

1 2 3 4 5 6 7 8 9 10

Poor



Excellent

**24) General:**

1 point

Is there any additional feedback or comments you would like to share?

So far, this class is pretty interesting. I personally think, this course should be two hours so not only the professor can teaches us more things, but also possible that if the lesson is done before class time ends, students can work on the exercises while can spend more time and can ask the professor for help, in which, in my opinion, could help students understand python more.

**25) General:**

1 point

What is your program ?

- Undergraduate - Engineering
- Undergraduate - Water School
- Graduate - Engineering
- Graduate - Water School
- I do not want to answer

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# Course Final Survey

Your input is valuable in helping us improve the learning experience for future students. Please take a few moments to provide honest feedback about your experience in the course. Your responses are anonymous and will be only used for course improvement and research purposes. Thank you for your participation!

**1) Course Curriculum:**

1 point

What did you like best about the Environmental Data Science course?

This class was overall very enjoyable, and i enjoyed most the content on xarray because of the power and utility of accessing nc files and their relevance to my field of study.

**2) Course Curriculum:**

1 point

What did you like least about the Environmental Data Science course?

The least enjoyable aspect of the course was the first few lessons on python basics, which went quite slow and could have been studied more efficiently at home.

**3) Course Curriculum:**

1 point

Considering a 15-week course duration, students dedicate approximately:

1. Introduction to environmental data science (2 lessons)
2. Python basics (3 lessons)
3. Python programming (4 lessons)
4. Pandas (5 lessons)
5. AI coding assistance (1 lesson)
6. Data science workflow (1 lesson)
7. NumPy (3 lessons)
8. Matplotlib (3 lessons)
9. Xarray and CartoPy (3 lessons)
10. Google Earth Engine with GeeMap API (planned but not covered)
11. Machine learning (planned but not covered)
12. Project presentation (2 lessons)

Considering the time allocations and the content importance, how would you recommend adding, removing, merging, or extending some topics based on your experience.

I feel that a lesson just on AI coding assistance is not entirely necessary, especially because much of the utility of having an integrated AI API key in the jupyter notebook can be replicate by simplying accessing ChatGPT, Copilot, or any other LLM online. Additionally, it may be worth reducing the lessons on Matplotlib and instead teaching it alongside other lessons.

---

**4) Course Curriculum:**

1 point

Given the course schedule and the importance of adapting to emerging trends in environmental data science such as machine learning and Google Earth engine, which option do you find most suitable for enhancing the curriculum?

- Restructure the course to focus on environmental data science emphasizing datasets, dashboards, and case studies related to water quality, surface hydrology, groundwater hydrology, climate change, environmental equity, etc., while encouraging self-learning of Python with AI-supported coding
- Maintain the current Python-centric approach but streamline topics to allocate more time for machine learning and Google Earth engine integration.
- Maintain the current course structure and offer a second course dedicated to machine learning, Google Earth engine, and case studies.
- Keep the course as it is and encourage self-learning of machine learning and Google Earth engine outside of class.

 Other:

I think many of the basics of python and introductory packages like pandas are learned best via self-learning. The lessons for example can be modified such that we can do it on our own for homework, and class time would be reserved for advanced topics/case studies. This way, there is more reinforcement of knowledge and practice while saving time.

**5) Course Curriculum:**

1 point

What are other thing(s) you would prefer/like to change about the way the course has been taught? What would you like the instructor to do differently? Additional comments/concerns/suggestions/compliments, etc.

The instructors enthusiasm is very welcomed, and helps convey the importance of data science skills and programming. I would prefer a more self-learning focused class for the basics of learning packages and the basics of python in general, and more advanced topics/case studies to be covered in class.

**6) AI Coding Assistance:**

1 point

When I solve an environmental data science problem, I heavily rely on AI?

Strongly agree

Agree

Neutral

Disagree

Strongly disagree

**7) AI Coding Assistance:**

1 point

After I study a topic in this course and feel that I understand it, I have difficulty solving problems on the same topic.

Strongly agree

Agree

Neutral

Disagree

Strongly disagree

**8) AI Coding Assistance:**

6 points

When I get stuck on an environmental data science problem, rank how you seek help in order:

	1	2	3	4	5	6
Seek help from classmates	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Consult online resources	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>
Review lecture notes	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Experiment on my own	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>
Reach out instructor for guidance	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Reach out AI for guidance	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>

**9) AI Coding Assistance:**

1 point

How has the integration of AI coding assistance, such as Jupyter AI or ChatGPT, impacted your learning experience in the course, both positively and negatively?

It has positively impacted learning by helping me diagnose errors when other resources, such as stack exchange and github forums, are unclear.

**10) AI coding Assistance:**

1 point

We use this statement to discard the surveys of people who are not reading the questions.  
Please select "Agree" for this question to preserve your answers.

 Strongly agree Agree Neutral Disagree Strongly disagree**11) Pedagogical Approach:**

1 point

In what ways do you feel project-based learning has contributed to your skill development in environmental data analysis?

- Improved problem-solving skills
- Enhanced data interpretation abilities
- Strengthened programming skills
- Developed critical thinking skills

 Other:  
.....

**12) Pedagogical Approach:**

1 point

Did the project-based learning approach encourage you to actively engage with the course material outside of class?

- Yes, significantly
- Yes, to some extent
- No, not significantly

**13) Pedagogical Approach:**

1 point

How effective did you find the self-directed learning opportunities, such as selecting your dataset for homework and choosing your project topic, provided in this course?

- a) Effective
- b) Challenging but effective
- c) Challenging but somehow effective
- d) Time consuming and not worth the challenge

**14) Pedagogical Approach:**

1 point

How would you recommend adjusting the pedagogical approach to optimize student learning outcomes? Select all that you found or will be useful:

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- Provide additional problem-solving tutorials where students tackle complex environmental data science challenges with the instructor
- Other:  
.....

**15) Pedagogical Approach:**

1 point

Overall, how would you rate your learning experience in this Environmental Data Science course?

- Excellent
- Good
- Fair
- Poor
- Very poor

**16) Learning Outcomes:**

1 point

Has this course enhanced your interest in pursuing further studies or research in water and environmental data analysis?

- Yes, significantly
- Yes, to some extent
- No, not at all

**17) Learng Outcome:**

1 point

I enjoy solving water and environmental data analysis problems

- Strongly Agree
- Agree
- Neutral
- Disagree
- Strongly Disagree

**18) Learning Outcome:**

1 point

How confident are you in your ability to apply Python-based tools for water and environmental data analysis after completing this course?

 Extremely confident Very confident Moderately confident Slightly confident Not confident at all**19) Course Usefulness:**

3 points

The technical skills, reasoning and computational thinking skills, and knowledge presented in this course can be helpful to my

	Strongly Agree	Agree	Undecided	Disagree	Strongly Disagree
study	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
career	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
everyday life	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>

**20) Course Usefulness:**

4 points

Please rate the usefulness of this course compared to other types of courses you've taken, considering the following categories.

	Equally useful	More useful	Less useful
Required courses in my major	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>
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Elective courses outside my major	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>

**21) Course Usefulness:**

1 point

I am interested in learning more about environmental data science

- Strongly agree
- Agree
- Neutral
- Disagree
- Strongly disagree

**22) Course Usefulness:**

1 point

Select all that apply

- I would like to take more courses in Environmental Data Science to work on case studies related to water quality, surface water, groundwater, environmental and Earth science problems, or any other topic of my interest.
- I would like to take more courses in Environmental Data Science to learn more tools such as machine learning, Google Earth Engine, ArcGIS-Python, or other tools of my interest.
- I feel confident in my ability to continue learning Environmental Data Science independently and do not feel the need to take more courses.
- I am not interested in pursuing further education in Environmental Data Science because I do not believe it aligns with my career goals or interests.
- Other: .....

**23) General:**

1 point

Rate your overall experience

1 2 3 4 5 6 7 8 9 10

Poor



Excellent

**24) General:**

1 point

Is there any additional feedback or comments you would like to share?

I enjoyed the course overall and I hope for it to become more advertised/encouraged in the future. These kinds of tools are how a lot of high level research is conducted and is very beneficial to learn prior to graduate study.

**25) General:**

1 point

What is your program ?

- Undergraduate - Engineering
- Undergraduate - Water School
- Graduate - Engineering
- Graduate - Water School
- I do not want to answer

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**1) Course Curriculum:**

1 point

What did you like best about the Environmental Data Science course?

Nothing.

---

**2) Course Curriculum:**

1 point

What did you like least about the Environmental Data Science course?

Everything.

---

**3) Course Curriculum:**

1 point

Considering a 15-week course duration, students dedicate approximately:

1. Introduction to environmental data science (2 lessons)
2. Python basics (3 lessons)
3. Python programming (4 lessons)
4. Pandas (5 lessons)
5. AI coding assistance (1 lesson)
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11. Machine learning (planned but not covered)
12. Project presentation (2 lessons)

Considering the time allocations and the content importance, how would you recommend adding, removing, merging, or extending some topics based on your experience.

None.

---

**4) Course Curriculum:**

1 point

Given the course schedule and the importance of adapting to emerging trends in environmental data science such as machine learning and Google Earth engine, which option do you find most suitable for enhancing the curriculum?

- Restructure the course to focus on environmental data science emphasizing datasets, dashboards, and case studies related to water quality, surface hydrology, groundwater hydrology, climate change, environmental equity, etc., while encouraging self-learning of Python with AI-supported coding
- Maintain the current Python-centric approach but streamline topics to allocate more time for machine learning and Google Earth engine integration.
- Maintain the current course structure and offer a second course dedicated to machine learning, Google Earth engine, and case studies.
- Keep the course as it is and encourage self-learning of machine learning and Google Earth engine outside of class.
- Other: Simpler lessons

**5) Course Curriculum:**

1 point

What are other thing(s) you would prefer/like to change about the way the course has been taught? What would you like the instructor to do differently? Additional comments/concerns/suggestions/compliments, etc.

Simpler lessons.

**6) AI Coding Assistance:**

1 point

When I solve an environmental data science problem, I heavily rely on AI?

 Strongly agree Agree Neutral Disagree Strongly disagree**7) AI Coding Assistance:**

1 point

After I study a topic in this course and feel that I understand it, I have difficulty solving problems on the same topic.

 Strongly agree Agree Neutral Disagree Strongly disagree

**8) AI Coding Assistance:**

6 points

When I get stuck on an environmental data science problem, rank how you seek help in order:

	1	2	3	4	5	6
Seek help from classmates	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>
Consult online resources	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>
Review lecture notes	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Experiment on my own	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Reach out instructor for guidance	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>
Reach out AI for guidance	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

**9) AI Coding Assistance:**

1 point

How has the integration of AI coding assistance, such as Jupyter AI or ChatGPT, impacted your learning experience in the course, both positively and negatively?

Helped.

**10) AI coding Assistance:**

1 point

We use this statement to discard the surveys of people who are not reading the questions.  
Please select "Agree" for this question to preserve your answers.

 Strongly agree Agree Neutral Disagree Strongly disagree**11) Pedagogical Approach:**

1 point

In what ways do you feel project-based learning has contributed to your skill development in environmental data analysis?

 Improved problem-solving skills Enhanced data interpretation abilities Strengthened programming skills Developed critical thinking skills Other: .....

**12) Pedagogical Approach:**

1 point

Did the project-based learning approach encourage you to actively engage with the course material outside of class?

- Yes, significantly
- Yes, to some extent
- No, not significantly

**13) Pedagogical Approach:**

1 point

How effective did you find the self-directed learning opportunities, such as selecting your dataset for homework and choosing your project topic, provided in this course?

- a) Effective
- b) Challenging but effective
- c) Challenging but somehow effective
- d) Time consuming and not worth the challenge

**14) Pedagogical Approach:**

1 point

How would you recommend adjusting the pedagogical approach to optimize student learning outcomes? Select all that you found or will be useful:

- Integrate project-based learning into the curriculum, providing students with hands-on experience applying course concepts to real-world environmental data analysis scenarios.
- Incorporate peer-to-peer learning activities, such as group projects, to encourage knowledge sharing and teamwork among students.
- Implement a flipped classroom model, where students engage with course materials independently before class, allowing for more interactive and application-focused sessions.
- Record a YouTube video for each lesson to cater to diverse learning preferences and enhance comprehension.
- Provide additional problem-solving tutorials where students can work on homework assignments with the instructor
- Provide additional problem-solving tutorials where students tackle complex environmental data science challenges with the instructor
- Other: .....

**15) Pedagogical Approach:**

1 point

Overall, how would you rate your learning experience in this Environmental Data Science course?

- Excellent
- Good
- Fair
- Poor
- Very poor

**16) Learning Outcomes:**

1 point

Has this course enhanced your interest in pursuing further studies or research in water and environmental data analysis?

- Yes, significantly
- Yes, to some extent
- No, not at all

**17) Learng Outcome:**

1 point

I enjoy solving water and environmental data analysis problems

- Strongly Agree
- Agree
- Neutral
- Disagree
- Strongly Disagree

**18) Learning Outcome:**

1 point

How confident are you in your ability to apply Python-based tools for water and environmental data analysis after completing this course?

- Extremely confident
- Very confident
- Moderately confident
- Slightly confident
- Not confident at all

**19) Course Usefulness:**

3 points

The technical skills, reasoning and computational thinking skills, and knowledge presented in this course can be helpful to my

	Strongly Agree	Agree	Undecided	Disagree	Strongly Disagree
study	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>
career	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>
everyday life	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>

**20) Course Usefulness:**

4 points

Please rate the usefulness of this course compared to other types of courses you've taken, considering the following categories.

	Equally useful	More useful	Less useful
Required courses in my major	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>
Required courses outside my major	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>
Elective courses in my major	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>
Elective courses outside my major	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>

**21) Course Usefulness:**

1 point

I am interested in learning more about environmental data science

- Strongly agree
- Agree
- Neutral
- Disagree
- Strongly disagree

**22) Course Usefulness:**

1 point

Select all that apply

- I would like to take more courses in Environmental Data Science to work on case studies related to water quality, surface water, groundwater, environmental and Earth science problems, or any other topic of my interest.
- I would like to take more courses in Environmental Data Science to learn more tools such as machine learning, Google Earth Engine, ArcGIS-Python, or other tools of my interest.
- I feel confident in my ability to continue learning Environmental Data Science independently and do not feel the need to take more courses.
- I am not interested in pursuing further education in Environmental Data Science because I do not believe it aligns with my career goals or interests.
- Other: .....

**23) General:**

1 point

Rate your overall experience

**24) General:**

1 point

Is there any additional feedback or comments you would like to share?

None.

**25) General:**

1 point

What is your program ?

- Undergraduate - Engineering
- Undergraduate - Water School
- Graduate - Engineering
- Graduate - Water School
- I do not want to answer

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# Course Final Survey

Your input is valuable in helping us improve the learning experience for future students. Please take a few moments to provide honest feedback about your experience in the course. Your responses are anonymous and will be only used for course improvement and research purposes. Thank you for your participation!

**1) Course Curriculum:**

1 point

What did you like best about the Environmental Data Science course?

I enjoyed learning about so many different packages in Python

**2) Course Curriculum:**

1 point

What did you like least about the Environmental Data Science course?

I feel like it was hard to cram all into one semester, it would be nice to break it up into two.

**3) Course Curriculum:**

1 point

Considering a 15-week course duration, students dedicate approximately:

1. Introduction to environmental data science (2 lessons)
2. Python basics (3 lessons)
3. Python programming (4 lessons)
4. Pandas (5 lessons)
5. AI coding assistance (1 lesson)
6. Data science workflow (1 lesson)
7. NumPy (3 lessons)
8. Matplotlib (3 lessons)
9. Xarray and CartoPy (3 lessons)
10. Google Earth Engine with GeeMap API (planned but not covered)
11. Machine learning (planned but not covered)
12. Project presentation (2 lessons)

Considering the time allocations and the content importance, how would you recommend adding, removing, merging, or extending some topics based on your experience.

I wish we were able to dive into Machine Learning

---

**4) Course Curriculum:**

1 point

Given the course schedule and the importance of adapting to emerging trends in environmental data science such as machine learning and Google Earth engine, which option do you find most suitable for enhancing the curriculum?

- Restructure the course to focus on environmental data science emphasizing datasets, dashboards, and case studies related to water quality, surface hydrology, groundwater hydrology, climate change, environmental equity, etc., while encouraging self-learning of Python with AI-supported coding
- Maintain the current Python-centric approach but streamline topics to allocate more time for machine learning and Google Earth engine integration.
- Maintain the current course structure and offer a second course dedicated to machine learning, Google Earth engine, and case studies.
- Keep the course as it is and encourage self-learning of machine learning and Google Earth engine outside of class.
- Other: .....

**5) Course Curriculum:**

1 point

What are other thing(s) you would prefer/like to change about the way the course has been taught? What would you like the instructor to do differently? Additional comments/concerns/suggestions/compliments, etc.

.....

**6) AI Coding Assistance:**

1 point

When I solve an environmental data science problem, I heavily rely on AI?

- Strongly agree
- Agree
- Neutral
- Disagree
- Strongly disagree

**7) AI Coding Assistance:**

1 point

After I study a topic in this course and feel that I understand it, I have difficulty solving problems on the same topic.

- Strongly agree
- Agree
- Neutral
- Disagree
- Strongly disagree

**8) AI Coding Assistance:**

6 points

When I get stuck on an environmental data science problem, rank how you seek help in order:

	1	2	3	4	5	6
Seek help from classmates	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
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Review lecture notes	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>
Experiment on my own	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>
Reach out instructor for guidance	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Reach out AI for guidance	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>

**9) AI Coding Assistance:**

1 point

How has the integration of AI coding assistance, such as Jupyter AI or ChatGPT, impacted your learning experience in the course, both positively and negatively?

It helped me dive into the errors and understand why I was getting them and how to fix them.

**10) AI coding Assistance:**

1 point

We use this statement to discard the surveys of people who are not reading the questions.  
Please select "Agree" for this question to preserve your answers.

 Strongly agree Agree Neutral Disagree Strongly disagree**11) Pedagogical Approach:**

1 point

In what ways do you feel project-based learning has contributed to your skill development in environmental data analysis?

 Improved problem-solving skills Enhanced data interpretation abilities Strengthened programming skills Developed critical thinking skills Other:  
.....

**12) Pedagogical Approach:**

1 point

Did the project-based learning approach encourage you to actively engage with the course material outside of class?

- Yes, significantly
- Yes, to some extent
- No, not significantly

**13) Pedagogical Approach:**

1 point

How effective did you find the self-directed learning opportunities, such as selecting your dataset for homework and choosing your project topic, provided in this course?

- a) Effective
- b) Challenging but effective
- c) Challenging but somehow effective
- d) Time consuming and not worth the challenge

**14) Pedagogical Approach:**

1 point

How would you recommend adjusting the pedagogical approach to optimize student learning outcomes? Select all that you found or will be useful:

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- Incorporate peer-to-peer learning activities, such as group projects, to encourage knowledge sharing and teamwork among students.
- Implement a flipped classroom model, where students engage with course materials independently before class, allowing for more interactive and application-focused sessions.
- Record a YouTube video for each lesson to cater to diverse learning preferences and enhance comprehension.
- Provide additional problem-solving tutorials where students can work on homework assignments with the instructor
- Provide additional problem-solving tutorials where students tackle complex environmental data science challenges with the instructor
- Other:  
.....

**15) Pedagogical Approach:**

1 point

Overall, how would you rate your learning experience in this Environmental Data Science course?

- Excellent
- Good
- Fair
- Poor
- Very poor

**16) Learning Outcomes:**

1 point

Has this course enhanced your interest in pursuing further studies or research in water and environmental data analysis?

- Yes, significantly
- Yes, to some extent
- No, not at all

**17) Learng Outcome:**

1 point

I enjoy solving water and environmental data analysis problems

- Strongly Agree
- Agree
- Neutral
- Disagree
- Strongly Disagree

**18) Learning Outcome:**

1 point

How confident are you in your ability to apply Python-based tools for water and environmental data analysis after completing this course?

 Extremely confident Very confident Moderately confident Slightly confident Not confident at all**19) Course Usefulness:**

3 points

The technical skills, reasoning and computational thinking skills, and knowledge presented in this course can be helpful to my

	Strongly Agree	Agree	Undecided	Disagree	Strongly Disagree
study	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
career	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
everyday life	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>

**20) Course Usefulness:**

4 points

Please rate the usefulness of this course compared to other types of courses you've taken, considering the following categories.

	Equally useful	More useful	Less useful
Required courses in my major	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>
Required courses outside my major	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>
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Elective courses outside my major	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>

**21) Course Usefulness:**

1 point

I am interested in learning more about environmental data science

- Strongly agree
- Agree
- Neutral
- Disagree
- Strongly disagree

**22) Course Usefulness:**

1 point

Select all that apply

- I would like to take more courses in Environmental Data Science to work on case studies related to water quality, surface water, groundwater, environmental and Earth science problems, or any other topic of my interest.
- I would like to take more courses in Environmental Data Science to learn more tools such as machine learning, Google Earth Engine, ArcGIS-Python, or other tools of my interest.
- I feel confident in my ability to continue learning Environmental Data Science independently and do not feel the need to take more courses.
- I am not interested in pursuing further education in Environmental Data Science because I do not believe it aligns with my career goals or interests.
- Other: .....

**23) General:**

1 point

Rate your overall experience

1 2 3 4 5 6 7 8 9 10

Poor



Excellent

**24) General:**

1 point

Is there any additional feedback or comments you would like to share?

**25) General:**

1 point

What is your program ?

- Undergraduate - Engineering
- Undergraduate - Water School
- Graduate - Engineering
- Graduate - Water School
- I do not want to answer

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# Course Final Survey

Your input is valuable in helping us improve the learning experience for future students. Please take a few moments to provide honest feedback about your experience in the course. Your responses are anonymous and will be only used for course improvement and research purposes. Thank you for your participation!

**1) Course Curriculum:**

1 point

What did you like best about the Environmental Data Science course?

Interaction with the content! Being able to follow along on Notebooks

**2) Course Curriculum:**

1 point

What did you like least about the Environmental Data Science course?

The fact that we had a final project and final exam

**3) Course Curriculum:**

1 point

Considering a 15-week course duration, students dedicate approximately:

1. Introduction to environmental data science (2 lessons)
2. Python basics (3 lessons)
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8. Matplotlib (3 lessons)
9. Xarray and CartoPy (3 lessons)
10. Google Earth Engine with GeeMap API (planned but not covered)
11. Machine learning (planned but not covered)
12. Project presentation (2 lessons)

Considering the time allocations and the content importance, how would you recommend adding, removing, merging, or extending some topics based on your experience.

More time to work on Individual Project with professor guidance. Maybe about 2 classes allocated for that.  
AI coding assistance maybe removed or merged with another class.

---

**4) Course Curriculum:**

1 point

Given the course schedule and the importance of adapting to emerging trends in environmental data science such as machine learning and Google Earth engine, which option do you find most suitable for enhancing the curriculum?

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- Keep the course as it is and encourage self-learning of machine learning and Google Earth engine outside of class.
- Other: .....

**5) Course Curriculum:**

1 point

What are other thing(s) you would prefer/like to change about the way the course has been taught? What would you like the instructor to do differently? Additional comments/concerns/suggestions/compliments, etc.

Structured lessons. Lecture at beginning, exercise in the middle, questions at the end.

**6) AI Coding Assistance:**

1 point

When I solve an environmental data science problem, I heavily rely on AI?

- Strongly agree
- Agree
- Neutral
- Disagree
- Strongly disagree

**7) AI Coding Assistance:**

1 point

After I study a topic in this course and feel that I understand it, I have difficulty solving problems on the same topic.

- Strongly agree
- Agree
- Neutral
- Disagree
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6 points

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Reach out AI for guidance	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>

**9) AI Coding Assistance:**

1 point

How has the integration of AI coding assistance, such as Jupyter AI or ChatGPT, impacted your learning experience in the course, both positively and negatively?

Jupiter AI was unhelpful because it did not work. chatgpt was slightly helpful but it would be bad if i became too reliant on it

**10) AI coding Assistance:**

1 point

We use this statement to discard the surveys of people who are not reading the questions.  
Please select "Agree" for this question to preserve your answers.

 Strongly agree Agree Neutral Disagree Strongly disagree**11) Pedagogical Approach:**

1 point

In what ways do you feel project-based learning has contributed to your skill development in environmental data analysis?

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**12) Pedagogical Approach:**

1 point

Did the project-based learning approach encourage you to actively engage with the course material outside of class?

- Yes, significantly
- Yes, to some extent
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**13) Pedagogical Approach:**

1 point

How effective did you find the self-directed learning opportunities, such as selecting your dataset for homework and choosing your project topic, provided in this course?

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- Provide additional problem-solving tutorials where students tackle complex environmental data science challenges with the instructor
- Other:  
.....

**15) Pedagogical Approach:**

1 point

Overall, how would you rate your learning experience in this Environmental Data Science course?

- Excellent
- Good
- Fair
- Poor
- Very poor

**16) Learning Outcomes:**

1 point

Has this course enhanced your interest in pursuing further studies or research in water and environmental data analysis?

- Yes, significantly
- Yes, to some extent
- No, not at all

**17) Learng Outcome:**

1 point

I enjoy solving water and environmental data analysis problems

- Strongly Agree
- Agree
- Neutral
- Disagree
- Strongly Disagree

**18) Learning Outcome:**

1 point

How confident are you in your ability to apply Python-based tools for water and environmental data analysis after completing this course?

- Extremely confident
- Very confident
- Moderately confident
- Slightly confident
- Not confident at all

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3 points

The technical skills, reasoning and computational thinking skills, and knowledge presented in this course can be helpful to my

	Strongly Agree	Agree	Undecided	Disagree	Strongly Disagree
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career	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
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**20) Course Usefulness:**

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Elective courses outside my major	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>

**21) Course Usefulness:**

1 point

I am interested in learning more about environmental data science

- Strongly agree
- Agree
- Neutral
- Disagree
- Strongly disagree

**22) Course Usefulness:**

1 point

Select all that apply

- I would like to take more courses in Environmental Data Science to work on case studies related to water quality, surface water, groundwater, environmental and Earth science problems, or any other topic of my interest.
- I would like to take more courses in Environmental Data Science to learn more tools such as machine learning, Google Earth Engine, ArcGIS-Python, or other tools of my interest.
- I feel confident in my ability to continue learning Environmental Data Science independently and do not feel the need to take more courses.
- I am not interested in pursuing further education in Environmental Data Science because I do not believe it aligns with my career goals or interests.
- Other: .....

**23) General:**

1 point

Rate your overall experience

**24) General:**

1 point

Is there any additional feedback or comments you would like to share?

**25) General:**

1 point

What is your program ?

- Undergraduate - Engineering
- Undergraduate - Water School
- Graduate - Engineering
- Graduate - Water School
- I do not want to answer

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