ENV 330 Environmental sustainability in Earth Sciences

Course Description

The course includes basic concepts in Environmental sustainability in Earth Sciences, such as principles of sustainable development and global challenges, climate change, water and soil degradation and mitigation techniques, natural hazards and so on.

Practical activities, where knowledge acquired during the lectures is applied, are included in the course, as well as field trips involving data collection: observations and measurement for testing hypotheses and drawing conclusions (scientific method).

No previous knowledge on Earth Sciences is required, however environmental background is desired.

Course Goals and Methodology

The course aims to introduce the student to the field of Earth Sciences. Basic principles of Earth sciences, emphasizing *climate change, water and soil science and natural hazards*, are approached relying on different tools to learn about them.

Lectures will emphasize general principles and models. Case studies from the literature will be used to exemplify natural phenomena. The course also focuses on the application of earth sciences principles in solving environmental problems. Field and laboratory activities will offer students hands-on opportunities to examine natural processes, and to collect, analyze and interpret data. Students will also conduct independent research projects.

Learning Objectives

Earth systems is intended for Geological Science majors & minors and for students who required a science base course. The course will examine the structure and function of Earth systems, including climate, water, soils and natural hazards, and the influence of society on those systems. By the end of the semester, students who complete all necessary assignments will be able to:

1. understand major concepts and terminology in the field of Earth system sciences;
2. be able to apply quantitative tools (simple mathematical models and statistics) to Earth sciences problems;
3. produce a scientific paper from experimental design and data gathering to writing up;
4. be prepared to pursue advanced study in Earth sciences, if they choose.

Required Materials/Texts

Material for this course will be made available on Blackboard. Useful texts are:

- Baird, C. (1995). *Environmental Chemistry*. Ed. Freeman. New York. - Cech, T.V. (2003). *Principles of water resources*. Ed. John Wiley & Sons. - Chow, V.T., Maidement, D.R., Mays, L.W. (1988). *Applied Hydrology*. Ed. McGraw Hill. Singapore.
- Brady, N. C., Weil, R. R., & Weil, R. R. (2008). The nature and properties of soils (Vol. 13, pp. 662-710). Upper Saddle River, NJ: Prentice Hall.
- Fetter. C.W. (2001). *Applied Hydrogeology*. Ed. Pearson Education. New Jersey.
- Ribeiro, L., Chambel, A. y Condesso, M.T. (2007). *Groundwater and Ecosystems.* Abstract Book of the XXXV IAH Congress. Ed. Arlindo Silva Artes Gráficas. Lisboa.
- Rockström, J. (2009). A safe operating space for humanity. *Nature* 461, 472-475
- Ward, A.D. (2004). *Environmental Hydrology*. Lewis Publishers.
- Wilby, R.L. (1997). *Contemporary Hydrology*. Ed. John Wiley & Sons.

Course Requirements and Grading

Your final grade will be calculated as follows:

Engagement	25%
Assignments	15 %
Midterm Exam	20%
Field trip activities	15 %
Final Exam	25%

All assignments, quizzes, and examinations will be announced in advance.

Exams and Grading System

Exams are designed to assess students' mastery of the topics covered in class, as well as their ability to analyze and offer insightful reflections on the material presented in the readings. The date of the final exam will be announced approximately one month after the start of the semester. Exam dates cannot be changed under any circumstances.

Exams and every other assignment will be graded according to the Spanish numerical range. Below is the grade conversion table which includes the Spanish, U.S. and the standard European grading systems:

SPAIN	10	9.9 - 9.5	9.4 - 9	8.9 - 8.5	8.4 - 8	7.9 - 7.5	7.4 - 7	6.9 - 6.5	6.4 - 6	5.9 - 5.5	5.4 - 5	4,9 - 0
USA	A+	A	A-	B+	B	B	B-	C+	C	C	C-	F
ECTS	A	B	B	C	C	C	C	D	D	E	E	F

General Course Policies

Each student is required to be familiar with the course syllabus. Students are expected to be actively engaged in class, arrive on time, and stay until class ends. Leaving the classroom on repeated occasions is disturbing to both your professor and your classmates and may adversely affect your engagement grade. Please make use of the 10-minute breaks in between classes to fill up your water bottle, use the restroom, etc.

Students are expected to listen and respect other points of view. Phone calls, social media, email, or Internet browsing at any time during class are not acceptable except for specific class-related activities expressly approved by your instructor. You are responsible for any course material covered in class, announcements, and/or handouts if you are not present for any reason. Students will be held responsible to be up to date by attending class regularly and checking both email and the Blackboard site of the course frequently (monitor your email and Blackboard announcements at least once every 24 hours).

Communicating with the instructor: Please allow at least 48 hours for your instructor to respond to your emails. The weekend is not included in this timeframe. If you have an urgent request or question for your professor, be sure to send it during the week.

Student engagement policy

Student's engagement will account for 20% of the final grade for every course, thus highlighting its significance for high-impact learning. Students will receive two engagement grades: a mid-term grade (10%) and an end-of-semester grade (10%).

An engagement rubric is provided to ensure transparent and consistent grading.

Criteria	Exemplary (9-10)	Proficient (7-8)	Passing (5-6)	Poor (0-4)
Attendance	Arrives on time and stays for the entire duration of class. No absences, or if absent once, demonstrates knowledge of course material missed.	Misses no more than one class or is occasionally late. Demonstrates knowledge of course material missed.	Misses two classes or frequently arrives late/leaves early; exhibits little knowledge/interest regarding course material missed.	Misses 3 or more classes and does not demonstrate knowledge of course material missed.
Preparation	Consistently well-prepared; demonstrates deep understanding of readings and completes assignments.	Usually prepared; completes readings with some understanding and usually completes assignments.	Occasionally prepared. Demonstrates limited understanding of materials and occasionally completes assignments.	Rarely prepared; minimal effort to engage with course materials.
Participation	Actively participates in discussions with thoughtful comments/questions; demonstrates knowledge of the material and critical thinking skills.	Participates often demonstrating knowledge of material and critical thinking skills.	Participates once in a while or contributions lack depth or relevance.	Does not participate or is disruptive during discussions.
Attentiveness & Respect	Fully engaged and attentive during all sessions; respectful to professor and fellow students. Use of laptop/tablet for notetaking only; no cellphone use.	Generally attentive, with very infrequent lapses in focus and use of electronic devices for non-class related purposes. Respectful to professor and fellow	Occasionally inattentive or disengaged. Use of electronic devices for non-class related purposes thus showing disrespect towards professor and fellow students.	Rarely attentive, focused or responsive. Repeated use of electronic devices for non-class related purposes thus showing disrespect towards professor and fellow students.

		students.		
Collaboration & Feedback	Effectively collaborates with peers in group or in-class activities following professor's instructions. Incorporates feedback to improve learning & performance.	Collaborates frequently with peers or in in-class activities. Incorporates feedback and makes moderate efforts to improve learning & performance.	Occasionally works well with peers but does not contribute substantially to in-class or group assignments. Responds to feedback inconsistently with minimal improvement.	Does not collaborate with peers, does not complete in-class or group assignments. Ignores feedback.

Absences and lack of engagement

Absences during the add/drop period do not count against students' engagement grade, but may impact their performance in the course.

As a consistent lack of academic engagement may raise concerns about a student's overall academic performance, the following steps will be taken in order to support students' success:

Initial outreach – after missing 3 classes

E-mail from professor reiterating engagement policy and consequences for additional absences.

Second outreach – after missing 4 classes

E-mail from professor and notification of academic staff at the International Office.

Academic probation – after missing 6 classes

Student is called in for a meeting with academic staff at the International office. Automatic notification of home institution and further academic consequences.

Any additional absences will result in a failing grade.

Academic Honesty

Academic integrity is a guiding principle for all academic activity at Pablo de Olavide University. Cheating on exams and plagiarism (which includes copying from the Internet) are clear violations of academic honesty. A student is guilty of plagiarism when he or she presents another person's intellectual property as his or her own. The penalty for plagiarism and cheating is a failing grade for the assignment/exam and a failing grade for the course. The International Center may also report this to your home university. Avoid plagiarism by citing sources properly, using footnotes and a bibliography, and not cutting and pasting information from various websites when writing assignments.

The use of Artificial Intelligence (AI) tools

ChatGPT, Copilot, etc. and automatic translation tools are prohibited unless expressly permitted by the instructor to enhance the students' learning experience. Plagiarism includes, but is not limited to, the unacknowledged use of these tools to create content submitted as one's own. If the use of any of these tools is suspected, the instructor may request notes and other materials used in preparing assignments. Students must retain these materials until final grades are posted. Failure to produce these materials when requested may negatively impact the student's grades.

Learning Accommodations

If you require special accommodations or have any other medical condition you deem may affect your class performance, you must stop by the International Center to speak to Marta Carrillo (mcaroro@acu.upo.es) to either turn in your documentation or to confirm that our office has received it. Please abide by the deadline set for each semester. Marta will explain the options available to you.

Behavior Policy

Students are expected to show integrity and act professionally and respectfully at all times. A student's attitude in class may influence his/her/their participation grade. The professor has a right to ask a

student to leave the classroom if the student is unruly or appears intoxicated. If a student is asked to leave the classroom, that day will count as an absence regardless of how long the student has been in class.

Course Contents: Environmental sustainability in Earth Sciences

Prof. 1 (Module 1): Alejandro Jiménez-Bonilla, Ph. D.

Prof. 2 (Module 2): Miguel Rodríguez-Rodríguez, Ph. D.

Prof 3. (Module 3): Manuel Díaz-Azpiroz, Ph. D.

Module 1: Foundations of Environmental Sustainability

- Overview of Sustainability and Earth Sciences
- Earth's Systems and Processes (Lithosphere, Atmosphere, Hydrosphere, Biosphere)
- Global Challenges and Principles of Sustainable Development
- Climate Change Science. Anthropogenic global warming
- Sustainable Energy Systems and Carbon Mitigation Strategies
- Environmental Justice and Climate Inequity

Module 2: Earth resources sustainability: water and soil use and degradation. Water policy.

- The environmental impact of the exploitation and use of the resources of the Earth.
- Soil as a resource. Soil degradation and management.
- Water use: Reserves - Resources – Demands
- Water pollution and degradation
- Water Resources Management: Sustainable use, conservation, and policy
- Case study: water conflicts in Doñana National Park

Module 3: Environmental Hazard Assessment

- Natural and Human-Induced Hazards: Hazard, Vulnerability, and Risk
- Environmental hazards: types, definition, causes, and consequences
- Data acquisition and processing
- Assessment, Prediction, and Mitigation
- Case Studies