LEARNING ABROAD CENTER
UNIVERSITY OF MINNESOTA

In Partnership With

CET ACADEMIC PROGRAMS

# Nature-Based Solutions for Climate Resilience in Spain

## Course Details

### Course Designator & Number: BCLA 3029
### Number of Credits: 3
### Language of Instruction: English
### Contact Hours: 45
### Instructor: xxx

## Course Description

In a world that was once mesmerized by the capabilities of new technology, there is an increasing trend of returning to the basics and using nature to reduce climate impacts and create resilience to the climate crisis. The increase in the number of people implementing Nature-based Solutions (NbS) has yielded incredible results in the environmental, economic, and social realms. This course focuses on NbS in Spain that are implemented to promote climate resilience across a variety of landscapes in the country. Students learn of the benefits of NbS with a primary focus on environmental benefits and disaster risk reduction, and a supplementary focus on the economic and social impacts of the solutions. Climate resilience is demonstrated through specific case studies of NbS in a variety of regions spanning from the buzzing urban center of Barcelona to the vineyards in Spanish mountains. Students are exposed to innovative NbS through guest lectures by stakeholders implementing NbS, field visits to NbS sites, and experiential learning to connect theory to practice. Upon completion of the course, students gain a comprehensive understanding of how NbS can be implemented in an array of contexts, how NbS promotes climate resilience through disaster risk reduction, and the social and economic implications of NbS.

## Course Objectives

Through their participation in this course, students will:

- Learn about Spain's most pressing climate challenges.
- Explore climate resilience and disaster risk reduction through NbS.
- Gain a substantial understanding of what NbS are being implemented in Spain.
- Engage with local case studies of NbS through field visits and guest lectures.
- Identify the environmental, social, and economic implications of NbS.
- Master the ability to analyze problems from multiple stakeholder perspectives.
- Strengthen their skills in translating academic research into material targeted to the general public.

### Experiential Learning & Field Visits

Field study and experiential learning components may include:

- A walking tour of green infrastructure in Barcelona
- A field visit to Montjuïc park
- An urban garden workshop in Barcelona—Urbacultiving
- Guest lecture by farmers about NbS practices
- An excursion to see mobile pastoralism—Aleppo Pine Forests in Baix Llobregat Mountains
- Guest lecture by firefighters from Forestry Reinforcement Group (GRAF) about wildfires
- An excursion to a dune reconstruction site—playas de Gavà y Castelldefels

## Course Prerequisites

None

## Required Reading / Materials

Textbook:

Brears, Robert C. 2020. *Nature-Based Solutions to 21st Century Challenges*. Routledge.

Additional Sources:


Castaldo, Anna Giulia, and Israa Mahmoud. "Nature-Based Solutions Framework for Wildfire Risk Reduction: Evaluating Governance Recommendations in Girona Province, Spain." *Advances in Science, Technology & Innovation*, 2024, 139–49. https://doi.org/10.1007/978-3-031-49495-6_11.

Coello, Jaime, and Guillem Llena, eds. 2024. Review of *Multifunctional Management of Peri-Urban Aleppo Pine Forests in "Baix Llobregat" Mountains (Barcelona)*. *ResAlliance*, February. https://eufarmbook.eu/en/contributions/66df1a54cf9e48d3e2e5b6e2.

Costa, Giuseppe Pio, Massimiliano Marino, Iván Cáceres, and Rosaria Ester Musumeci. 2023. "Effectiveness of Dune Reconstruction and Beach Nourishment to Mitigate Coastal Erosion of the Ebro Delta (Spain)." *Journal of Marine Science and Engineering* 11 (10): 1908. https://doi.org/10.3390/jmse11101908.

Cots-Folch, R., J. A. Martínez-Casasnovas, and M. C. Ramos. 2006. "Land Terracing for New Vineyard Plantations in the North-Eastern Spanish Mediterranean Region: Landscape Effects of the EU Council Regulation Policy for Vineyards' Restructuring." *Agriculture, Ecosystems & Environment* 115 (1): 88–96. https://doi.org/10.1016/j.agee.2005.11.030.

García Matallana, Rubén, Manuel Esteban Lucas-Borja, Maria Elena Gómez-Sánchez, S.M. Mijan Uddin, and Demetrio Antonio Zema. 2022. "Post-Fire Restoration Effectiveness Using Two Soil Preparation Techniques and Different Shrubs Species in Pine Forests of South-Eastern Spain." *Ecological Engineering* 178 (May): 106579. https://doi.org/10.1016/j.ecoleng.2022.106579.

IUCN, International Union for Conservation of Nature. 2016. "Mediterranean Marine Protected Areas as Nature-Based Solutions to Climate Change." YouTube. February 5, 2016. https://www.youtube.com/watch?v=sB_cSdSlZ-A.

Langemeyer, Johannes, and Francesc Baró. "Nature-Based Solutions as Nodes of Green-Blue Infrastructure Networks: A Cross-Scale, Co-Creation Approach." *Nature-Based Solutions* 1 (December 2021): 100006. https://doi.org/10.1016/j.nbsj.2021.100006.

Langemeyer, Johannes, Francesc Baró, Peter Roebeling, and Erik Gómez-Baggethun. “Contrasting Values of Cultural Ecosystem Services in Urban Areas: The Case of Park Montjuïc in Barcelona.” *Ecosystem Services* 12 (April 2015): 178–86. https://doi.org/10.1016/j.ecoser.2014.11.016.

Langemeyer, Johannes, Marta Camps-Calvet, Laura Calvet-Mir, Stephan Barthel, and Erik Gómez-Baggethun. “Stewardship of Urban Ecosystem Services: Understanding the Value(s) of Urban Gardens in Barcelona.” *Landscape and Urban Planning* 170 (February 2018): 79–89. https://doi.org/10.1016/j.landurbplan.2017.09.013.

Lasanta, Teodoro, Jose Arnaez, P. Ruiz-Flaño, N. Lana-Renault, and José Arnáez. 2013. “Agricultural Terraces in the Spanish Mountains: An Abandoned Landscape and a Potential Resource.” *Boletín de La Asociación de Geógrafos Españoles* 63 (January):487–91.

López-Felices, Belén, Jose A. Aznar-Sánchez, Juan F. Velasco-Muñoz, and Ernesto Mesa-Vázquez. 2022. “Installation of Hedgerows around Greenhouses to Encourage Biological Pest Control: Farmers’ Perspectives from Southeast Spain.” *Journal of Environmental Management* 323 (December):116210. https://doi.org/10.1016/j.jenvman.2022.116210.

Pollicino, Dario, ed. 2024. Review of *The Vital Role of Mobile Pastoralism in the Resilience of Mediterranean Ecosystems*. *ResAlliance*, June. https://eufarmbook.eu/en/contributions/665499a2a613cc9ed34b4480.

Prieto, Fernando, and Máximo Florín. 2022. “Understanding Wildfires and Designing a Sustainable Future by Solutions Based on Forest-Society Relationships,” January, 107–20. https://doi.org/10.1007/978-981-19-0071-6_5.

Rodrigo-Comino, Jesús, Antonio Giménez-Morera, Panos Panagos, Hamid Reza Pourghasemi, Manuel Pulido, and Artemi Cerdà. 2020. “The Potential of Straw Mulch as a Nature-based Solution for Soil Erosion in Olive Plantation Treated with Glyphosate: A Biophysical and Socioeconomic Assessment.” *Land Degradation & Development* 31 (15): 1877–89. https://doi.org/10.1002/ldr.3305.

Rodriguez Fernandes-Blanco, Carmen. “Building Climate Resilience in Southeastern Spain Through the 4 Returns Framework ,” March 12, 2024. https://eufarmbook.eu/en/contributions/66c8acca04d857e0e65d00fd.

Sánchez-García, Carlos, Óscar Corvacho-Ganahín, Albert Santasusagna Riu, and Marcos Francos. “Nature-Based Solutions (NBSS) to Improve Flood Preparedness in Barcelona Metropolitan Area (Northeastern Spain).” *Hydrology* 11, no. 12 (December 9, 2024): 213. https://doi.org/10.3390/hydrology11120213.

White, Angela M., and Jonathan W. Long. 2018. “Understanding Ecological Contexts for Active Reforestation Following Wildfires.” *New Forests* 50 (1): 41–56. https://doi.org/10.1007/s11056-018-9675-z.

WWF International. “Urban Nature-Based Solutions: What Are They and Why Are They so Important?” YouTube, November 17, 2017. https://www.youtube.com/watch?v=SRXx0QyxBFo.

Yilmaz, E. “Mobile Pastoralism in Mediterranean Landscapes: The State of (Mobile) Pastoralism in Five Polit Sites.” *Road Less Travelled*. MAVA Foundation, 2019. https://yolda.org.tr/content/MP-in-Med-Landspaces.pdf.

# Grading

## Grading Rubric

| Letter Grade | Score or Percentage | Description |
|---|---|---|
| A | 93–100 | Achievement that is outstanding relative to the level necessary to meet course requirements. |
| A- | 90–92 | Achievement that is significantly above the level necessary to meet course requirements. |
| B+ | 87–89 | |
| B | 83–86 | |
| B- | 80–82 | Achievement that meets the course requirements in every respect. |
| C+ | 77–79 | |
| C | 73–76 | |
| C- | 70–72 | Achievement that is worthy of credit even though it fails to fully meet the course requirements. |
| D+ | 67–69 | |

| Letter Grade | Score or Percentage | Description |
|---|---|---|
| D | 60–66 | |
| F | 0–59 | Represents failure (or no credit) and signifies that the work was either (1) completed but at a level of achievement that is not worthy of credit or (2) was not completed and there was no agreement between the instructor and the student that the student would be awarded an I. |

## Summary of How Grades Are Weighted

| Assignments | Percentage of Grade |
|---|---|
| Participation in class | 10% |
| Field study journal | 5% |
| City council pitch | 15% |
| Group podcast | 15% |
| Roundtable simulation | 15% |
| Public awareness campaign | 15% |
| Final project | 25% |
| **Overall grade** | **100%** |

## Assessment Details

Active participation is essential in this course. Classes include lectures, field visits, interactive seminars, group projects, and individual assignments. Students are expected to attend each class and field study course component as outlined in the CET Attendance Policy. Students are expected to read all assigned materials before the relevant class session and come prepared to participate thoughtfully in class discussions. Reading assignments are generally 20-30 pages per class session. Students are expected to contribute equally to group projects and come prepared to group meetings. All assignments must be submitted via Canvas unless otherwise noted.

Graded assignments include:

- **Active participation**: Students are expected to actively contribute to all class sessions and group activities.

- **Field study journal**: A journal kept by students, containing their reflections during and after field study visits. Each entry should be at least 500 words. The journal aids students in developing other class assignments. Students will submit the journal one week after the final field visit.
- **City council pitch**: Students individually develop a short elevator pitch to city council for a small-scale green infrastructure project, justifying their design using NbS principles for urban resilience. Students have the choice of giving a 5-minute elevator pitch or submitting a 1,000-1,200 word pitch.
- **Group podcast**: Groups of 3-4 students create a 15-20 minute podcast discussing an agricultural or rural NbS. Each group must include the climate challenge, how the chosen NbS addresses it, and offer a variety of stakeholder perspectives (e.g. farmers, investors, residents, climate activists) concerning the solution. Each student in the group should speak for approximately 5 minutes.
- **Roundtable simulation**: A roundtable for wildfire prevention is simulated, where students will role-play as relevant stakeholders to discuss a plan to coordinate a fire prevention plan in peri-urban and regional landscapes.
- **Public awareness campaign**: Students individually create either an infographic poster with at least 4 infographic elements and supporting text, a 7-minute presentation, or a 7-minute video as an awareness campaign for one of the marine or coastal NbS targeting to educate local communities about the selected solution.
- **Final project**: Climate resilience magazine feature. Students write a magazine-style article (1,700-2,000 words) that discusses one of the NbS or topics learned in class. The topic's connection to climate resilience should be clear in addition to economic and/or social perspectives related to the selected topic. The article should aim to be academically and empirically strong while targeting an educated but non-expert audience through research, compelling storytelling, and, optionally, the addition of images or infographics. All articles will be compiled together into a digital magazine for students to save as a keepsake of the course.

# Course Content

## Unit 1

### Introduction to Spanish Climate Resilience & Nature-based Solutions

- Introduction to the course and overview of climate challenges
- What are Nature-based Solutions (NbS), ecosystem services, and Disaster Risk Reduction (DRR)?
- Governing resilience: NbS and/or DRR in Spanish climate policies and action plans

## Unit 2

### Urban Resilience

- The origins of Spain's urban climate challenges and its impacts on urban residents
- Green infrastructure in Barcelona
- The power of a green thumb: urban gardens for resilience in food security, biodiversity, and carbon neutrality
- 4 Returns framework in Southeastern Spain (Granada, Almeria, Murcia) for social, economic, and climate resilience

## Unit 3

### Agriculture & Rural Resilience

- NbS for soil conservation and flood mitigation in olive plantations
- The revival of traditional terracing in agricultural mountainscapes
- Back to bugs: restoring ecosystems through biological pest control

# Unit 4

## Forests & Regional Landscapes

- The win-win use of mobile pastoralism from Iberian dehesas to peri-urban mountains
- Designing fire-smart landscapes: wildfire risk planning and prevention
- Soil, seeds, and species: post-fire forest restoration

# Unit 5

## Coastal & Marine Resilience

- The role of Marine NbS on ecosystems and climate change
- Reviving seagrass meadows and kelp forests to restore ecosystems
- The power of dune reconstruction along Spanish coasts

# Policies

## Attendance Policy

Students are expected to be on time and attend all classes while abroad. Many instructors assess both attendance and participation when assigning a final course grade. Attendance alone does not guarantee a positive participation grade; the student should be prepared for class and engage in class discussion. See the on-site syllabus for specific class requirements.

## University of Minnesota Policies & Procedures

Academic integrity is essential to a positive teaching and learning environment. All students enrolled in University courses are expected to complete coursework responsibilities with fairness and honesty. Failure to do so by seeking unfair advantage over others or misrepresenting someone else's work as your own can result in disciplinary action. The University Student Conduct Code defines scholastic dishonesty as follows:

### Scholastic Dishonesty

Scholastic dishonesty means plagiarizing; cheating on assignments or examinations; engaging in unauthorized collaboration on academic work; taking, acquiring, or using test materials without faculty permission; submitting false or incomplete records of academic achievement; acting alone or in cooperation with another to falsify records or to obtain dishonestly grades, honors, awards, or professional endorsement; altering forging, or misusing a University academic record; or fabricating or falsifying data, research procedures, or data analysis.

Within this course, a student responsible for scholastic dishonesty can be assigned a penalty up to and including an "F" or "N" for the course. If you have any questions regarding the expectations for a specific assignment or exam, ask.

### Student Conduct

The University of Minnesota has specific policies concerning student conduct. This information can be found on the Learning Abroad Center website.