ES/GE 311 THE MEDITERRANEAN ENVIRONMENT
IES Abroad Barcelona

DESCRIPTION:
The course will explore what is understood by the term Mediterranean Environment. The main characteristics of the Mediterranean will be studied from an environmental (terrestrial and marine), historical, social, economic and cultural point of view. Emphasis will be given to the unifying role of the Mediterranean Sea, climate, and ecosystems, as well as shared realities and the regional approach to tackle environmental problems. The course looks closely into the effects of human activities on a variety of ecosystems, including marine and coastal areas, the efforts to reverse its impacts and to reach sustainable development.

CREDITS: 3 credits

CONTACT HOURS: 45 hours

LANGUAGE OF INSTRUCTION: English

INSTRUCTOR:

PREREQUISITES: None

ADDITIONAL COST: None

METHOD OF PRESENTATION:

- Lectures: provide the platform to introduce each topic, set core concepts and analyze the different elements involved in each session while promoting discussions to share different points of view and encourage student participation.
- Readings: selected texts consist of either an overview of the relevant subject and background information, or a case study that illustrates the main ideas to be discussed during class. Readings are sometimes quite technical and will come mostly from Academic publications (peer-reviewed articles). Each session will begin with a 30-minute seminar discussing the readings for that class. This will be a structured and graded exercise.
- Homework Assignments: will be based on the reading for a particular session and aim to help the student identify the key points of the readings and facilitate discussion during class. They are due at the beginning of each class.
- Class activities: are designed to apply the learned information and help the student assimilate it in a more personal way. These consist of group activities, analyses, student's presentations and documentary viewings among others. These activities also promote student participation.
- Term paper and oral presentation: Students have the opportunity to analyze and explore in more detail some of the topics discussed in class. This is a skill-building exercise and the oral presentation and discussion allows the student to share the learning experience with the rest of the class
- Off-site classes: provide a hands-on experience of some of the topics through visits to certain localities that exemplify some of the topics discussed in class.
- Course-related trip: This activity is essential to fully assimilate and put into context some of the topics covered by the course. There is one trip to Ebro Delta, on Friday. Attendance to the course-related trips is mandatory (see IES attendance policy). Following the trip, there will be a Quiz and an assignment (essay-type). that will contribute towards the Course-related Trips component.

REQUIRED WORK AND FORM OF ASSESSMENT: The final grade will be determined as follows:

- Reading Seminars -15%
- Course-related trips and classes off-site -15%
- Midterm exam -25%
- Final exam -25%
- Term paper and oral presentation -20%

Reading Seminars
Confronting primary scientific literature is a significant intellectual challenge. The seminars will provide guidance and practice on how to assimilate such material. This activity also will expose students to highly effective study techniques (Mind Maps and Cornell Notes) which will be of value throughout their academic and later career. A grading rubric will be available to students to accompany this evaluated work.

Course-related trips and classes off-site
Attendance to course-related trips and off-site classes is mandatory, this activity is essential to gain a deep insight into some of the topics covered by the course and have an applied vie on Mediterranean ecosystems. The course includes a **self-guided excursion to the Botanical Garden of Barcelona** (7,5%). and will be evaluated from a double perspective: (a). individual assignment with questions about some Mediterranean plants and your personal impressions about it, to explore similarities and differences between Med biomes. This is uploaded as an assignment in Moodle. and (b). a group assignment to select two species seen in the garden, describe some of its characteristics and distribution. The group assignment is only presented to the class (no upload required).. The **course-related trip to an emblematic area representative for Mediterranean ecosystems that can be found in Catalonia** (e.g. the Ebro Delta), combining marine, freshwater and terrestrial habitats with examples of stakeholders' interaction with nature. The assignment (7,5%). consists of an essay (around 800 words). that links the activities of the field-trip to the material covered in class, with your personal insights.

Midterm exam and Final exam
A set of written, short-answered questions to evaluate whether students are familiar with the basic topics discussed in class.
Term paper and oral presentation (20%): an opportunity to get more personally involved with a particular topic on your choice reviewed during the course, promoting critical thinking.

Term paper
Is scheduled on the second half of the course and is a group activity. The written part (around 2.000 words). is uploaded to Moodle as an assignment and team members present their work to the class (5-7 minutes). There is a specific rubric available to evaluate written term paper and oral presentation.

LEARNING OUTCOMES:
By the end of the course students will be able to:

- Identify the key elements and phenomena that define the Mediterranean environment from a holistic approach
- Differentiate the Mediterranean region from other temperate regions in the world
- Analyze the role of humans in shaping Mediterranean ecosystems, from a multi-stakeholder perspective and also considering the services that these ecosystems provide
- Identify the main environmental problems and challenges faced by Mediterranean countries
- Understand the need for sustainable development in the Mediterranean, and also its governance challenges
- Appreciate the significance of "Mediterraneism": a climate, a sea, a landscape, a culture, a history and much more

ATTENDANCE POLICY:
As a member of our class community, you are expected to be present and on time every day. Attending class has an impact on your learning and academic success. For this reason, attendance is required for all IES Barcelona classes, including course-related excursions. If a student misses more than three classes in any course without justification, 3 percentage points will be deducted from the final grade for every additional absence. Seven unjustified absences in any course will result in a failing grade. Absences will only be justified, and assessed work, including exams, tests and presentations rescheduled, in cases of documented medical or family emergencies.

CONTENT:

Session	Content	Required Reading

Session 1	Introduction to the course	
Session 2	Definitions of the Mediterranean environment. The Mediterranean climate.	• Lionello, P. *et al.* (2012). Introduction: Mediterranean Climate—Background Information. In P. Lionello (Ed.). The Climate of the Mediterranean Region: From the Past to the Future (pp. xxxv-xc).. Elsevier Inc. • Suc, J.P. (1984). Origin and Evolution of the Mediterranean vegetation and climate in Europe. *Nature*, **307** (2), 429-432.
Session 3	The role of history in landscape dynamics	• Kizos, T. *et al.* (2006). Agricultural landscape dynamics in the Mediterranean: Lesvos (Greece). case study using evidence from the last three centuries. *Environmental Science & Policy*, **9**: 330-342. • Blondel, J. and J. Aronson (2005).. *Biology and Wildlife of the Mediterranean Region*. New York: Oxford University Press. Pp 25-29.
Session 4	Historical Ecology and Mediterranean Ecosystems	• Vigne, J. (2013). The origins of mammals on the Mediterranean islands as an indicator of early voyaging A.J. Ammerman & T. Davis (eds), Island Archaeology and the Origins of Seafaring in the Eastern Mediterranean, *Eurasian Prehistory* **10** (1-2): 45-56. • Chefaoui, R.M. (2017). Palaeoclimatic conditions in the Mediterranean explain genetic diversity of *Posidonia oceanica* seagrass meadows. *Scientific Reports*, **7**: 2732-2740.
Session 5	Biodiversity	• Cox RL, Underwood EC (2011). The Importance of Conserving Biodiversity Outside of Protected Areas in Mediterranean Ecosystems. PLoS ONE **6**(1): e14508. • Cowling, *et.al.* (1996).. Plant-diversity in Mediterranean-Climate Regions. *TREE*, **11** (9), 362-366. • Coll, M. *et al.* (2010).. The biodiversity of the Mediterranean Sea: estimates, patterns and threats. *PLos One*, **5**, e11842.
Session 6	Wetlands	• Perennou, C. *et al.* (2012). Existing areas and past changes of wetland extent in the Mediterranean region: an overview. *Ecologia mediterranea*, **38**, 53-66.

Session 7	Water and Agriculture	• European Commission (2020). Farm to Fork strategy – publication, For a fair, healthy and environmentally-friendly food system (23p).. • Ibáñez, C. *et al*. (2010). "Influence on birds of rice field management practices during the growing season: a review and an experiment." Waterbirds **33**.sp1: 167-180.
Session 8	Plant Adaptations to the Mediterranean Climate: Forests and Shrublands	• Gimeno, *et al.* (2009).. Plasticity and stress tolerance override local adaptation in the responses of Mediterranean Holm Oak seedlings to drought and cold. *Tree physiology* **29**, 87-98. • Peñuelas, *et al.* (2018). Assessment of the impacts of climate change on Mediterranean terrestrial ecosystems based on data from field experiments and long-term monitored field gradients in Catalonia, *Environmental and Experimental Botany*, (**152**):49-59.
Session 9	The role of Fires in shaping communities	• Bond, J.W. and J.E. Keeley (2005).. Fire as a global "herbivore": The ecology and evolution of flammable ecosystems. *TREE,* **20** (7), 387-394. • Batllori, E. *et al.* (2017). Cumulative effects of fire and drought in Mediterranean ecosystems. *Ecosphere* **8**(8): e01906.
(Friday).	Course-related trip: EBRO DELTA	
Session 10	Botanical Garden field-trip presentations	• *Barcelona Botanical Gardens Website:* www.jardibotanic.bcn.es
Session 11	Forests Goods and Services	• Croitoru, L. (2007). Valuing the non-timber forest products in the Mediterranean region. Ecological Economics, **63**:768-775. • IUCN (1999). Forest Harvest: Mediterranean woodlands and the importance of non-timber forest products to forest conservation. *Special Supplement Arbor Vitae.*
Session 12	**Mid-term Exam** Topics covered in sessions 2-9, 11	
Session 13	Pollution	• Cozar, A. *et al.* (2015). Plastic Accumulation in the Mediterranean Sea. PlosOne **10**: e0121762. • Köck-Schulmeyer, M. *et al.* (2011). Wastewater reuse in Mediterranean semi-arid areas: The impact of discharges of tertiary treated sewage on the load of polar micro pollutants in the Llobregat river (NE Spain).. *Chemosphere*, **82**: 670-678.

Session 14	Climate change I	• Cramer, W. *et al.* (2018). Climate change and interconnected risks to sustainable development in the Mediterranean. *Nature Climate Change* **8**, 972–980. • Lejeusne, C. (2010). Climate change effects on a miniature ocean: the highly diverse, highly impacted Mediterranean Sea. *Trends in Ecology and Evolution*, **25**(4):250-260.
Session 15	Climate change II	• Scheffran J. *et al.* (2014). Conflicts and Security Risks of Climate Change in the Mediterranean Region. In: Goffredo S. Dubinsky Z. (eds). The Mediterranean Sea. Springer, Dordrecht. • Kapsomenakis, J. *et al.* (2022). Climate change threats to cultural and natural heritage UNESCO sites in the Mediterranean. *Environment, Development and Sustainability*: 1-26.
Session 16	Fisheries I Documentary viewing and discussion: "The end of the line". Documentary filmmaker Rupert Murray examines the devastating effect that overfishing has had on the world's fish populations.	
Session 17	Fisheries II	• Forcada, A. *et al.* (2010). Structure and spatio-temporal dynamics of artisanal fisheries around a Mediterranean marine protected area. *Journal of Marine Science*, **67**: 191–203. • Colloca, F. *et al.* (2017). Recent trends and impacts of fisheries exploitation on Mediterranean stocks and ecosystems. *Frontiers in Marine Science* **4**: 244.
Session 18	Protected Areas	• Harmelin-Vivien, et.al. (2008).. Gradients of abundance and biomass across reserve boundaries in six Mediterranean marine protected areas: Evidence of fish spillover? *Biological Conservation*, **141,** 1829-1839. • Zografou K., *et al.* (2014). Signals of Climate Change in Butterfly Communities in a Mediterranean Protected Area. PLoS ONE 9(1): e87245.
Session 19	Mass Tourism	• Manera, C. et al. (2016). The evolution and impact of tourism in the Mediterranean: the case of island regions, 1990-2002.Cuadernos de Turismo de la Universidad de Múrcia, **37**: 269-303. • Lagarias, A. *et al.* (2022). Coastalization patterns in the Mediterranean: a spatiotemporal analysis of coastal urban sprawl in tourism destination areas. *GeoJournal*: 1-24.

Session 20	Sustainable Tourism	• Farsari, Y. *et al.* (2007). Sustainable tourism policy for Mediterranean destinations: issues and interrelationships. *Int. J. Tourism Policy* ***1*** *(1):* 58–78. • Gkoumas,A. (2019). Evaluating a standard for sustainable tourism through the lenses of local industry, *Heliyon*, **5**(11).e02707.
Session 21	Term-paper presentations I	
Session 22	Term-paper presentations II	
Session 23	Ecological Footprint	• Baabou, W. *et al.* (2017). The Ecological Footprint of Mediterranean cities: Awareness creation and policy implications. *Environmental Science & Policy*. **69**:94-104. • WWF (2016). Living Planet Report 2016. Risk and resilience in a new era. WWF International, Gland, Switzerland
Session 24	Renewable Energies	• Erkut B. (2022). Renewable Energy and Carbon Emissions: New Empirical Evidence from the Union for the Mediterranean. *Sustainability* 14(11):6921. • Capellán-Pérez, I. *et al.* (2018). Renewable Energy Cooperatives as an instrument towards the energy transition in Spain, *Energy Policy* (123): 215-229

Final Exam
Topics covered in sessions 13-20 and 23-24

COURSE-RELATED TRIP:

- One trip to Ebro Delta, on **Friday**. Attendance to the course-related trip is mandatory.

REQUIRED READINGS:

- *Baabou, W. et al. (2017). The Ecological Footprint of Mediterranean cities: Awareness creation and policy implications. Environmental Science & Policy. 69:94-104.*
- *Barcelona Botanical Gardens Website: www.jardibotanic.bcn.es*
- Batllori, E. *et al.* (2017). Cumulative effects of fire and drought in Mediterranean ecosystems. *Ecosphere* 8(8):e01906
- *Blondel, J. and J. Aronson (2005). Biology and Wildlife of the Mediterranean Region. New York: Oxford University Press. Pp 25-29.*
- *Bond, J.W, and J.E. Keeley (2005). Fire as a global "herbivore": The ecology and evolution of flammable ecosystems. TREE, 20 (7), 387-394.*
- Capellán-Pérez, I. *et al.* (2018). Renewable Energy Cooperatives as an instrument towards the energy transition in Spain, *Energy Policy* (123): 215-229
- *Chefaoui, R.M. (2017). Palaeoclimatic conditions in the Mediterranean explain genetic diversity of Posidonia oceanica seagrass meadows. Scientific Reports, 7: 2732-2740.*
- *Coll, M, et al. (2010).. The biodiversity of the Mediterranean Sea: estimates, patterns and threats. PLos One, 5, e11842.*

- Colloca, F. (2017). Recent trends and impacts of fisheries exploitation on Mediterranean stocks and ecosystems. *Frontiers in Marine Science* 4: 244.
- *Cowling, et.al. (1996). Plant-diversity in Mediterranean-Climate Regions. TREE, 11 (9), 362-366.*
- *Cox RL, Underwood EC (2011). The Importance of Conserving Biodiversity Outside of Protected Areas in Mediterranean Ecosystems. PLoS ONE 6(1): e14508*
- *Cozar, A. et al. (2015). Plastic Accumulation in the Mediterranean Sea. PlosOne 10: e0121762.*
- Cramer, W, *et al*. (2018). Climate change and interconnected risks to sustainable development in the Mediterranean. *Nature Climate Change* 8, 972–980
- *Croitoru, L. (2007). Valuing the non-timber forest products in the Mediterranean region. Ecological Economics, 63, 768-775.*
- European Commission (2020). Farm to Fork strategy – publication, For a fair, healthy and environmentally-friendly food system (23p).
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- *Farsari, Y. et al. (2007). Sustainable tourism policy for Mediterranean destinations: issues and interrelationships. Int. J. Tourism Policy 1 (1): 58–78.*
- *Forcada, A. et al. (2010). Structure and spatio-temporal dynamics of artisanal fisheries around a Mediterranean marine protected area. Journal of Marine Science, 67: 191–203.*
- *Gimeno, et.al. (2009).. Plasticity and stress tolerance override local adaptation in the responses of Mediterranean Holm Oak seedlings to drought and cold. Tree physiology 29, 87-98.*
- Gkoumas,A. (2019). Evaluating a standard for sustainable tourism through the lenses of local industry, *Heliyon*, Volume 5, Issue 11, 2019, e02707,
- *Harmelin-Vivien, et.al. (2008).. Gradients of abundance and biomass across reserve boundaries in six Mediterranean marine protected areas: Evidence of fish spillover? Biological Conservation, 141, 1829-1839.*
- Ibáñez, C. *et al*. (2010). "Influence on birds of rice field management practices during the growing season: a review and an experiment." Waterbirds 33.sp1: 167-180
- *IUCN (1999). Forest Harvest: Mediterranean woodlands and the importance of non-timber forest products to forest conservation. Special Supplement Arbor Vitae.*
- *Kapsomenakis, J, et al. (2022). Climate change threats to cultural and natural heritage UNESCO sites in the Mediterranean. Environment, Development and Sustainability (2022): 1-26.*
- *Kizos, T. et al. (2006). Agricultural landscape dynamics in the Mediterranean: Lesvos (Greece) case study using evidence from the last three centuries. Environmental Science & Policy, 9: 330-342.*
- *Köck-Schulmeyer, M. et al. (2011). Wastewater reuse in Mediterranean semi-arid areas: The impact of discharges of tertiary treated sewage on the load of polar micro pollutants in the Llobregat river (NE Spain). Chemosphere, 82: 670-678.*
- Lagarias, A. *et al.* (2022). Coastalization patterns in the Mediterranean: a spatiotemporal analysis of coastal urban sprawl in tourism destination areas. *GeoJournal*: 1-24.
- *Lejeusne, C. (2010). Climate change effects on a miniature ocean: the highly diverse, highly impacted Mediterranean Sea. Trends in Ecology and Evolution, 25(4):250-260.*
- Lionello, P. *et al.* (2012).. Introduction: Mediterranean Climate—Background Information. In P. Lionello (Ed.), The Climate of the Mediterranean Region: From the Past to the Future (pp. xxxv-xc).. Elsevier Inc.
- Manera, C. et al. (2016). The evolution and impact of tourism in the Mediterranean: the case of island regions, 1990-2002.Cuadernos de Turismo de la Universidad de Múrcia, 37: 269-303.
- *Perennou, C. et al. (2012). Existing areas and past changes of wetland extent in the Mediterranean region: an overview. Ecologia mediterranea, 38, 53-66.*
- Peñuelas, *et al.* (2018). Assessment of the impacts of climate change on Mediterranean terrestrial ecosystems based on data from field experiments and long-term monitored field gradients in Catalonia, *Environmental and Experimental Botany*, Volume 152: 49-59,
- *Scheffran J. et al. (2014). C*onflicts and Security Risks of Climate Change in the Mediterranean Region*. In: Goffredo S, Dubinsky Z. (eds). The Mediterranean Sea. Springer, Dordrecht.*
- *Suc, J.P. (1984). Origin and Evolution of the Mediterranean vegetation and climate in Europe. Nature, 307 (2), 429-432.*

- *Vigne, J. (2013). The origins of mammals on the Mediterranean islands as an indicator of early voyaging A.J. Ammerman & T. Davis (eds), Island Archaeology and the Origins of Seafaring in the Eastern Mediterranean, Eurasian Prehistory 10 (1-2): 45-56*
- *WWF (2016). Living Planet Report 2016. Risk and resilience in a new era. WWF International, Gland, Switzerland*
- Zografou K, *et al.* (2014). Signals of Climate Change in Butterfly Communities in a Mediterranean Protected Area. PLoS ONE 9(1): e87245.

RECOMMENDED READINGS

- *Iglesias, A. et al. (2007). Challenges to Manage the Risk of Water Scarcity and Climate Change in the Mediterranean. Water Resources Management, 21: 775-788.*
- King, R. (1997).. Introduction. An essay on Mediterraneanism. In: King, R, L. Proudfoot and B. Smith *the Mediterranean Environment and Society*: 2-11. London: Arnold.
- Kizos, T. *et al.* (2011). 'For my children': Different functions of the agricultural landscape and attitudes of farmers on different areas of Greece towards small scale landscape change. *Danish Journal of Geography*, 111 (2), 117–130
- *Myers, N, R. A. Mittermeier, C. G. Mittermeier, G. A. B. da Fonseca and J. Kent. (2000). Biodiversity hotspots for conservation priorities Nature 403: 853-858.*