

Comparative Sustainable Bioeconomy and Energy Resources

ENVI-3000 (3 credits)

Portugal: Sustainability and Environmental Justice

This syllabus is representative of a typical semester. Because courses develop and change over time to take advantage of unique learning opportunities, actual course content varies from semester to semester.

Course Description

This seminar takes Portugal and southern Spain as case studies for a critical reflection on the impact of bioeconomy and energy resources on economic growth and sustainability within a Water-Energy-Food-Ecosystems (WEFE) Nexus framework of analysis. The course builds on understanding sustainability, growth, circular economy and Nexus concepts while allowing students to explore applications of these frameworks in practice. Portugal's sustainability approach maps directions for alternative options in renewable energy sources, circular economy, sustainable tourism and access to a sustainable urban environment. Portugal generates almost 60% of the country's needs in electricity consumption from renewable energy, its approach to sustainable tourism has been hailed as a model for economic development, and Lisbon was awarded the title of European Green Capital for 2020. Spain is the second most-visited country in the world, the world's largest producer of olive oil, and is expected to achieve 100% renewable energy in electricity generation by 2030. Through field excursions, students compare different sustainability and resource use issues including conservation projects, sustainable agriculture and tourism, resource management and environmental good practice, use of renewable energy sources and impact on sustainable economic growth.

Learning Outcomes

Upon completion of the course, students will be able to:

- List key sustainability, bioeconomy and nexus models, their goals, achievements and the challenges of their implementation in Portugal and beyond;
- Compare different approaches to mass tourism and sustainable agriculture;
- Explain defining features of sustainability paradigms that have shaped the development of the green economy in Portugal;
- Develop a theoretical and empirical viewpoint of the economic, environmental, and socio-cultural sustainability impact of bioenergy, biotechnology, and use of renewable resources, including water, on the economies of Portugal and southern Spain;
- Synthesize key components of the sustainability and nexus paradigms and their impact on economic development.

Language of Instruction

This seminar is conducted in English, but students will be exposed to vocabulary related to seminar content through in-country expert lectures and field visits in a wide range of venues.

Instructional Methods

This course is delivered in five modules as described below. The methodological approach will be integrative, participatory, and experiential, and will aim to help the student develop a theoretical, empirical, and comparative understanding of sustainability approaches in Portugal and southern Spain and impacts of bio-based economy on industry, agriculture, and tourism. The modules include field visits and meetings with academics, policy makers, and environmentalists.

SIT's teaching and learning philosophy is grounded in the experiential learning theory developed by Kolb (1984; 2015) and informed by various scholars, such as Dewey, Piaget, Lewin, among others. Experiential learning theory recognizes that learning is an active process that is not confined to the formal curriculum; "knowledge is created through the transformation of experience" (Kolb, 2015, p. 49). Learning involves both content and process. Learning is holistic and happens through various life experiences upon which students draw to generate new ways of knowing and being. Learning involves a community and is a lifelong endeavor. Learning is transformational. The suggested four step-cycle of a *concrete experience, reflective observation, abstract conceptualization, and active experimentation* embedded in the experiential learning model is not linear and might not always happen in that specific order, as any learning is highly context dependent. These stages of taking part in a shared experience; reflecting on that experience by describing and interpreting it; challenging their own assumptions and beliefs to generate new knowledge; and ultimately applying new knowledge, awareness, skills, and attitudes in a variety of situations and contexts are important for students to engage in to become empowered lifelong learners.

Assignments and Evaluation

Assignment Descriptions and Grading Criteria

1) Group Comparative Paper (40%)

Students submit a comparative paper on an aspect of sustainability and the nexus, addressing at least two regional case studies (Modules 1, 2 and 3). The paper should demonstrate solid conceptual framework and data collected in the course of lectures, field visits or educational excursions. The paper should be 8-10 pages long.

2) Group Oral Presentation (20%)

Students are required to present orally and creatively at the end of the thematic seminar highlighting the most relevant and important issues discussed in class and on the different excursions. Students should present the issues critically discussed either in their comparative paper or final essay. The presentation should contemplate their insights regarding field visits and excursions, where students have mapped, visually, their in-class learning.

Students are also encouraged to provide their own insights and recommendations for how the issue could better be resolved.

3) Final Essay (30%)

The comprehensive essay exam will consist of a 5-page essay which should demonstrate the student's capacity to synthesize and engage critically with main sustainability and bioeconomy arguments addressed in Module 4 and 5 lectures, readings, or field visits throughout the course. Students will be provided with two essay questions to choose from.

4) Participation (10%)

This includes active involvement in lectures, readings, discussions and excursions using the following criteria:

- Attendance - promptness to class and positive presence in class.
- Active Listening - paying attention in class and during field excursions, asking appropriate questions, showing interest and enthusiasm (this includes body language), entertaining contradictory perspectives, taking notes.
- Involvement in Class Discussions - either in small or large groups, sharing knowledge. This means challenging yourself to speak up if you usually don't, and also means allowing others to speak if you are a person who tends to dominate class discussions.
- Group Accountability – positive participation in the group during field excursions and classes; not keeping others waiting.
- Displaying Respect – culturally appropriate interaction with hosts, SIT program staff, SIT lecturers and communities.

Assessment

Group Comparative Paper – 40%

Group Oral Presentation – 20%

Final Essay – 30%

Participation – 10%

Attendance and Participation

Due to the nature of SIT Study Abroad programs, and the importance of student and instructor contributions in each and every class session, attendance at all classes and for all program excursions is required. Criteria for evaluation of student performance include attendance and participation in program activities. Students must fully participate in all program components and courses. Students may not voluntarily opt out of required program activities. Valid reasons for absence must be notified in advance when possible and be discussed with the academic director or other designated staff person. Absences impact academic performance, may impact grades, and could result in dismissal from the program.

Late Assignments

SIT Study Abroad programs integrate traditional classroom lectures and discussion with field-based experiences, site visits and debriefs. The curriculum is designed to build on itself and progress to the culmination (projects, ISP, case studies, internship, etc.). It is critical

that students complete assignments in a timely manner to continue to benefit from the sequences in assignments, reflections and experiences throughout the program.

Example: Students may request a justified extension for one paper/assignment during the semester. Requests must be made in writing and at least 12 hours before the posted due date and time. If reason for request is accepted, an extension of up to one week may be granted at that time. Any further requests for extensions will not be granted. Students who fail to submit the assignment within the extension period will receive an 'F' for the assignment.

Grading Scale

94-100%	A
90-93%	A-
87-89%	B+
84-86%	B
80-83%	B-
77-79%	C+
74-76%	C
70-73%	C-
67-69%	D+
64-66%	D
below 64	F

Program Expectations

- Show up prepared. Be on time, have your readings completed and points in mind for discussion or clarification. Complying with these elements raises the level of class discussion for everyone.
- Have assignments completed on schedule, printed, and done accordingly to the specified requirements. This will help ensure that your assignments are returned in a timely manner.
- Ask questions in class. Engage the lecturer. These are often very busy professionals who are doing us an honor by coming to speak.
- Comply with academic integrity policies (no plagiarism or cheating, nothing unethical).
- Respect differences of opinion (classmates', lecturers, local constituents engaged with on the visits). You are not expected to agree with everything you hear, but you are expected to listen across difference and consider other perspectives with respect.
- Storing Your Work: Keep several copies of your work as back up and keep one copy accessible to you through an online forum, such as an attachment in your email, the course learning management system, or cloud-based storage. This way your work will always be available to despite technical issues. Lost files, deleted drives, or computer crashes are not excuses for late, missing work.
- Personal Technology Use: Cell phones and other personal electronics can be used for taking notes and other class activities. Off-task usage is not acceptable. You may be marked as absent for habitually using them for something other than classroom activities.
- Course Communication: Course documents and assignments will be posted. Although the course calendar provides a broad overview and the general sequence of work and assignments for the course, what we accomplish in class will vary, and revisions to the

calendar will be posted at the course site. You will need to check the course site regularly. You are responsible for letting me know about any network-related problems that prevent you from accessing or submitting assignments.

- Content Considerations: Some texts and activities you will encounter in this course delve into sensitive topics that may be emotionally and intellectually challenging. Our classroom is a space where we can engage with challenging ideas, question assumptions, and navigate difficult topics with respect and maturity. As possible, flag content and activities that are especially graphic or intense may be shared. If you are struggling to keep up with the work or participate in the course because of the nature of the content and activities, you should speak with the academic director and/or seek help from counseling services.
- Classroom recording policy: To ensure the free and open discussion of ideas, students may not record classroom lectures, discussion and/or activities without the advance written permission of the instructor, and any such recording properly approved in advance can be used solely for the student's own private use.

SIT Policies and Resources

Please refer to the [SIT Study Abroad Handbook](#) and the [Policies](#) section of the SIT website for all academic and student affairs policies. Students are accountable for complying with all published policies. Of particular relevance to this course are the policies regarding: academic integrity, Family Educational Rights and Privacy Act (FERPA), research and ethics in field study and internships, late assignments, academic status, academic appeals, diversity and disability, sexual harassment and misconduct, and the student code of conduct.

Please refer to the SIT Study Abroad Handbook and SIT website for information on important resources and services provided through our central administration in Vermont, such as [Library resources and research support](#), [Disability Services](#), [Counseling Services](#), [Title IX information](#), and [Equity, Diversity, and Inclusion](#) resources.

Course Schedule

Please be aware that topics and excursions may vary to take advantage of any emerging events, to accommodate changes in our lecturers' availability, and to respect any changes that would affect student safety. Students will be notified if this occurs

Module 1: Comparative Approaches to Sustainability

This module surveys the main sustainability models and examines the state of Portugal and Spain considering the UN sustainable development goals. The module also addresses conceptualizations of green, circular and bioeconomy, and discusses the potential gains and costs of implementation alternatives. The WEF Nexus is introduced as a steppingstone towards systems thinking for sustainability. Through an examination of specific examples, students develop a comparative perspective of sustainability frameworks, building knowledge of the relevant indicators.

Sessions and class discussions in this module explore:

- Emerging sustainability models: planetary boundaries and doughnut economics;
- Concepts in bioeconomy: green, circular and bioeconomy;

- The WEF Nexus as a framework for sustainability and regeneration;
- Sustainability indicators in Portugal and Spain: a comparative approach.

Excursions examples:

North Excursion, Portugal

Sustainable textile industry – how Portuguese industries are using plastic trash from the Portuguese coast to produce fashion items, e.g., shoes.

Required Readings:

Sachs, J. (2015). *The Age of Sustainable Development*, Columbia University Press (selected chapters).

D'Amato, D., Korhonen, J. (2021) Integrating the green economy, circular economy and bioeconomy in a strategic sustainability framework, *Ecological Economics*, <https://doi.org/10.1016/j.ecolecon.2021.107143>

Malagó, A., Comero, S., Bouraoui, F., Kazezyilmaz-Alhan, C. M., Gawlik, B. M., Easton, P., & Laspidou, C. (2021). An analytical framework to assess SDG targets within the context of WEF nexus in the Mediterranean region. *Resources, Conservation and Recycling*, 164, 105205.

Recommended Readings:

Europe Sustainable Development Report 2022, <https://eu-dashboards.sdgindex.org/>

Raworth, K. (2017). *Doughnut economics: seven ways to think like a 21st-century economist*. Chelsea Green Publishing.

Wiedmann, T., Lenzen, M., Keyßer, L. T., & Steinberger, J. K. (2020). Scientists' warning on affluence. *Nature communications*, 11(1), 3107.

Module 2: The WEF Nexus in Portugal

This module highlights aspects of the WEF nexus in the Portuguese bioeconomy, namely the role of the water sector and the potential for sustainable agriculture. Land-based food production provides opportunities for improved nutrition and food security but agriculture must be regenerative rather than exploitative, especially considering the challenges brought on by climate change, which predicts higher temperatures and lower precipitation for most of the Iberian Peninsula. Furthermore, the biodiversity crisis provides a stark call for policy action.

Sessions and class discussions in this module explore:

- Understanding water and sewage services
- Sustainable agriculture practices in the context of the EU “Farm to Fork” strategy and the Nature Restoration Law;

Excursions examples:

South Excursion, Portugal

Biological Olive Oil - see how local producers are changing the paradigm of traditional to sustainable production.

Syntropic Farming – assess the potential of harnessing ecological succession to improve food production
Site Visit to a Recycling Plant
AmarSul – learn about treatment and recovery of urban solid waste

Required Readings:

European Commission (n.a.) The European Green Deal
https://commission.europa.eu/strategy-and-policy/priorities-2019-2024/european-green-deal_en

Ronzon, T. and M'Barek, R. (2018). Socioeconomic Indicators to Monitor the EU's Bioeconomy in Transition. *Sustainability*, 10: 1745. Accessed: doi:10.3390/su10061745

Bio-based industries consortium. (n.a.) Mapping the potential of Portugal for the bio-based industry. Retrieved: https://biconsortium.eu/sites/biconsortium.eu/files/downloads/Country_Report_Portugal.pdf

Module 3: Sustainability and Renewable Energies

This module examines alternative technologies for electricity production and builds competence for a critical analysis of energy systems within the Nexus. The module addresses renewable energy technologies, the types and scales of energy utilization technologies, and the relationship between energy production, consumption, and resource management. Students learn how Spain uses renewable energy production to drive future economic growth and create jobs.

Sessions and class discussions in this module explore:

- Spain's renewable energy systems
- Spain's Green combustion and biofuels in a local context;
- Renewable energy investments and markets: in Portugal and Spain

Excursion examples:

Extremadura, Spain

Solar power plant and biomass plant visits – learn how Spain uses renewable energy to drive economic growth and create jobs in this high unemployment area

Required Readings:

Montoya, F., Aguilera, M., and Manzano-Agugliaro, F. (2014). Renewable energy production in Spain: a review. *Renewable and Sustainable Energy Reviews*, 33, pp. 509–531.

Scarlat, N., Dallemand, J., Monforti-Ferrario, F. and N., Viorel. (2015). The role of biomass and bioenergy in a future bioeconomy: Policies and facts. *Environmental Development*, pp. 3-34.

Emmanuel Koukios, E. and Monteleone, M., et al. (2018). Targeting sustainable bioeconomy: A new development strategy for Southern European countries. The Manifesto of the European Mezzogiorno. *Journal of Cleaner Production*, 172, pp. 3931-3941.

Module 4: Sustainability and Forest Fire Management

This module addresses Portugal's experience in managing forest fires and long-term fire damages. Students meet with wildfire prevention professionals to learn about Portugal's Fire Plan (Plano Nacional de Defesa da Floresta Contra Incêndios). Students also analyze impacts of climate change on forest fire occurrence and severity, assess fire risks for the next decades, and hear from experts how Portugal is pursuing a balanced and sustainable strategy to preempt fire threats, improve firefighters' performance, and develop forest intervention areas.

Sessions and class discussions in this module explore:

- Impacts of climate change on wildfire management;
- Portugal's Fire Plan (Plano Nacional de Defesa da Floresta Contra Incêndios)
- Rural Civil Protection and Rural;
- Sustainability and Portugal's balanced approach to fire prevention and management
- EU leadership in environmental governance.

Excursions examples:

North Excursion, Portugal

Air Force Base – located in *Pinhal de Leiria*, one of the most fire prone areas in Portugal, students will learn how a Portuguese AirForce base (certified for environmental excellence by EMAS EU Eco-Management and Audit Scheme) is working as a small smart city - having better resources use and less emissions.

Required readings:

Beighley, Mark & Hyde, A. C. (2018). Portugal Wildfire Management in a New Era: Assessing Fire Risks, Resources and Reforms. Accessed: https://www.isa.ulisboa.pt/files/cef/pub/articles/2018-04/2018_Portugal_Wildfire_Management_in_a_New_Era_Engish.pdf

Collins, Ross D. et al. (2013). Forest fire management to avoid unintended consequences: A case study of Portugal using system dynamics. *Journal of Environmental Management*, 130 (pp. 1-9). Accessed: <http://www.cienciaviva.pt/img/upload/Forestfiremanagement.pdf>

Recommended Reading:

Mustalahti, I. (2018). The responsive bioeconomy: The need for inclusion of citizens and environmental capability in the forest based bioeconomy. *Journal of Cleaner Production*, 172, pp. 3781-3790.

Module 5: Sustainable Tourism

This module examines integrated sustainable management of tourism, using the Algarve and Azores as case studies. Students learn about the management and sustainability principles in

the tourism industry and conduct field-based assignments to assess the Algarve and Azores' approach to sustainable tourism and its impact on economy and local communities.

Sessions and class discussions in this module explore:

- The concept of Sustainable Tourism and economic growth
- The economic value of touristic natural resources
- Biodiversity and its impact on development;
- Case studies in the Algarve and Azores (in loco)

Excursion examples:

Azores Excursion, Portugal

The Azores, São Miguel – students will learn how one of the world's most sustainable destinations works in the best practices for managing a sustainable tourist economy while avoiding over-tourism.

South Excursion, Portugal

Ria Formosa - Learn about the ecosystems of the Ria Formosa and discuss the importance of this Protected Area and the pressures that is suffering due too, e.g., mass tourism.

Required Readings:

Saarinen J. (2006). Traditions of Sustainability in Tourism Studies. *Annals of Tourism Research*, 33(4), 1121-1140.

Tisdell, C. (2006). Valuation of Tourism's Natural Resources, In Dwyer, L. and P. Forsyth (ed.), *International Handbook on the Economics of Tourism*, Edward Elgar, Cheltenham, UK.

Recommended Readings:

Oliveira, F., P. Pintassilgo, P. Pinto, I. Mendes and J. A. Silva (2017). Segmenting Visitors Based on Willingness to Pay for Recreational Benefits: The Case of Leiria National Forest. *Tourism Economics*, Vol. 23, No 3, pp. 680-691.

Pintassilgo, P., P. Patrícia Pinto, A. Costa, A. Matias, and M. H. Guimarães (2021). Environmental attitudes and behaviour of birdwatchers: a missing link. *Tourism Recreation Research*, DOI: 10.1080/02508281.2021.1920755

Weaver, D. (2012). Organic, Incremental and Induced Paths to Sustainable Mass Tourism Convergence. *Tourism Management*, 33: 1030–1037.