



EC/ES/PO 303 - SUSTAINABLE ENERGY: CONCEPTS, POLICY, STRATEGIES AND SOLUTIONS

IES Abroad Freiburg

DESCRIPTION: Sustainable Energy – renewable energy and energy efficiency solutions – are necessary to address energy needs and climate change today and in the future. This course introduces the challenges of energy demand and climate change, and presents strategies for addressing them via sustainable energy policy, technology, business models and best practice. Students will learn from cases in Freiburg, Germany and Europe and deepen their learning of course concepts by creating their own sustainable energy business plan.

Studying the topic while being in one of the most sustainable cities in the EU – Freiburg, Germany - students are certain to be gain invaluable experience and be inspired for their future personal and professional paths.

CREDITS: 3

Contact Hours: 45

LANGUAGE OF INSTRUCTION: English

PREREQUISITES: Basic knowledge of and keen interest in climate change, energy efficiency and renewable energy.

ADDITIONAL COST: None

METHOD OF PRESENTATION:

- Lectures
- Student simulations, scenarios, research and observation-based problem-solving
- Video Clips
- Student presentations, exchange and discussion
- Study of current events related to session topics
- Student Team Teaching
- Workshop activities within class
- Field study to learn from sustainable energy solutions in the Freiburg region

REQUIRED WORK AND FORM OF ASSESSMENT:

- Course participation - 20%
- Sustainable Energy and Climate Change Statement - 10%
- One Midterm exam - 20%
- TERM WORK: Renewable Energy (RE)-Energy Efficiency (EE) Project or Business Plan
 - Proposal - 10%
 - Presentation and Project / Business Plan Pitch - 15% (presented to class colleagues for the purpose of input to the final document)
 - Final RE/EE Business Plan / Project Proposal - 25%

Course participation – 20%

Students are expected to participate in debates with questions related to the readings and Students are required to complete all reading assignments and will be expected to demonstrate this through regularly assigned homework, pop quizzes, and/or insightful and relevant contributions to in-class discussion. All these components will count toward the class participation grade. Participation also applies to course-related trips, outings and/or special events in and around Freiburg. A rubric for participation is available in the appendix and on Moodle.

Sustainable Energy (SE) Statement and Business/Project Plan Idea Storm - 10%

During the first week of the course, you will prepare a sustainable energy statement with five observations and questions on energy use and renewable energy that you have noticed since your arrival in Freiburg as well as a first idea pool for your course business or project plan.

To be handed in on Moodle on the date indicated in your course schedule.

- 3 **observations and reflection questions upon energy use and production** based on what you've experienced in Freiburg that relate to this course.
- 2 **initial ideas** for your Sustainable Energy / Climate Business Plan / Project assignment. and why you think that they are needed and would work. They must have a clear energy or climate focus.

Midterm Exam - 20%

Sessions 1-11: These mid-module **test** consists of one essay question and other short (fill in blank / multiple choice) questions. The tests cover the material of the first eleven sessions (*lectures and readings*) to ensure that the basic policy concepts to date have been understood.

Renewable Energy-Energy Efficiency Business Plan / Project Proposal – 50%

During the course of the module, you will prepare a sustainable energy / climate change-related project proposal or business plan (depending on the nature of what you wish to implement). Guidelines will be provided. You will present your plan in class during sessions 16 and 17.

LEARNING OUTCOMES:

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

- Formulate and apply fundamental structures and driving forces of global developments (e.g. demographic and climate change) as well as their link with systems of power supply
- Research and analyze basic technological, economic and organizational aspects of using renewable energy sources
- Analyze systemic interrelations between technological, economic and political developments in this field
- Analyze and discuss the potential of renewable energies to cope with the consequences of oil depletion, climate change and declining resources
- Assess feedback mechanisms by policy measures in innovative technologies, in the dynamic of the market and in the ecosphere
- Understand and analyze that global and national strategies need innovative regional concepts which are socially acceptable
- Analyze and compare the key characteristics of environmental and climate politics of the EU and Germany as well as the role of international climate negotiations

Attendance Policy (see also the detailed version on Moodle ESS Academics page)

IES Abroad courses are designed to utilize the unique contribution of the instructor; the lecture/discussion format is regarded as the **primary mode of instruction**. Therefore, attendance is mandatory. Any unexcused absence will incur a penalty on your final course grade. Deductions from grades due to absences are based on contact hours (= 45 minutes). Any unexcused absence will result in a penalty on your final course grade (1 unexcused contact hour absence - 1%, 2nd unexcused contact hour absence -2%, 3rd unexcused contact hour absence – 3% and so on). Any student who misses more than 25% of a course (= more than 11 contact hours), whether the absences are excused or are unexcused, will receive an “F” as the final grade in the course.

ESS courses may have entire course blocks that take place on one day in addition to longer field trips that count for several contact hours. In this case, the actual missed contact hours are added together, and the absences are sanctioned according to the rule above. If you are late for a planned field trip, you will generally not be able to join the trip, since the group needs to leave on time and cannot wait for one person. Punctuality is therefore essential here. If you miss a class, it is **your responsibility** to make up on everything that was covered in class. Tests/presentations missed during unexcused absences **cannot be made up**.

Arriving late for class: Punctuality is important for the planned course schedule. If you are late for class, the late time will be recorded and added up at the end of the course. You will receive a grade reduction based on the accumulated amount of missing contact hours (as outlined above; i.e., if you were late by 15 minutes on 3 days, your grade would be reduced by 1% for 1 missing contact hour).



LATE OR FAILURE SUBMISSION OF ASSIGNMENTS: Late submission of assignments or failure of submission of assignment results in the grade F of that particular assignment. This does not apply to late or non-submission due to illness with an excused absence.

Excused absence: Please call the IES Center before the start of your first class if you are ill and would like to be excused from your course, as outlined in the "Cell Phone and Attendance Policy" handed out during orientation. Student Affairs staff will decide whether your absence can be excused directly or whether a doctor's note is necessary. Absences due to religious observances and family emergencies may be excused at the discretion of the Center Director, with written approval. A petition for an excused absence due to a religious holiday needs to be submitted 2 weeks in advance. If permission is granted, the student needs to inform the Academic Dean, the Student Affairs Team and their instructors. Absences due to private travel or travel delays cannot be excused, even with advanced notice.

ACADEMIC INTEGRITY CODE:

Students are expected to abide by the IES Abroad Code of Academic Integrity. The detailed IES Abroad academic integrity code can be accessed on Moodle.

All work submitted by a student for academic credit should constitute the student's own original work. Regardless of the quality of work, plagiarism will result in a failing grade for the course and/or an academic review and possible expulsion from the program. Plagiarism may be broadly defined as "copying of materials from sources, without acknowledging having done so, claiming other's ideas as one's own without proper reference to them, buying materials such as essays/exams, and using AI-generated content without disclosure."

As AI tools continue to evolve, learning how to use them responsibly is an important emerging skill. Some of our courses allow students to explore the use of generative artificial intelligence (GAI) tools such as ChatGPT for some assignments and assessments. The instructor of each course will communicate whether GAI may be used in a course and provide specific guidelines and procedures for its appropriate use.

Updated information on your course and readings, including additional readings from journalistic articles, can be found on the Moodle platform at <https://moodle.iesabroad.org/login/index.php>

CONTENT:

Week	Content	Assignments
Week 1	Session 1: A presentation of course content followed by a student-focussed workshop to discover and understand student interests in sustainable energy and climate change. Energy Outlooks: Declining resources in a growing world The power needs of developed and developing nations are massive and will be met by a combination of traditional and renewable fuel sources. We will discuss economic and demographic growth in the context of world energy needs and compare differing views on world energy outlooks and global energy priorities.	Required Reading: World Energy Outlook 2013 Executive Summary (On Moodle) FOR SESSIONS 2 AND 3: Renewable Energy Facts: Chapter 1. Sections 1.1-1.7
	Session 2: Understanding Climate Change Regardless of varying opinions on causes and impacts, climate change is a proven phenomenon. In this session we will seek to understand what is meant by climate change. We will have a look at the scientist reports, discuss why climate-neutrality must be a priority and as a group we will discuss climate protection and what can and is being done to be climate neutral.	Required Reading: - Climate Change Indicators in the United States – EPA 2012 - Pages 1-15 (and beyond as recommended reading) Recommended Reading: - IPPC Assessment Reports (summaries) at www.ipcc.ch
	Session 3: Sustainable Energy: the winning combination to combat climate change The terms “Renewable Energy” and “Sustainable Energy” are often used interchangeably, yet there they are not one and the same. Sustainable energy is much broader in both its definition and its impact on mitigating climate change. It includes renewable sources, as well as energy efficiency technologies and methodologies. We will examine sustainable energy’s role in combatting climate change.	Required Reading: IPCC: A Report of Working Group III of the IPCC. RENEWABLE ENERGY SOURCES AND CLIMATE CHANGE MITIGATION: SUMMARY FOR POLICYMAKERS (On Moodle)

	Session 4: German Energy and Climate Policy: Part 1 - Renewable Energy and Energy Efficiency Policy As a major energy user and emissions emitter Germany has been one of the leading countries on the globe to put forth climate policy, supported by many strategies including sustainable energy. We will look at the evolution of the Germany renewables market as well as some of the energy related policies that support Germany's position as a world leader in the RE sector. Community and Small Scale Projects The particularities and importance of small scale, decentralized projects will be discussed. Large Scale RE Power Projects We will look at the latest discussions surrounding implementation of large scale renewable power projects such as technology, grid connection, transmission, storage, financing and risk.	Required Reading: • Unger, D. <i>Germany's aggressive push for a clean-energy future</i>. Christian Monitor Science. March 9, 2014. (link on Moodle) • FOR SESSIONS 6 AND 7: Renewable Energy Facts: Chapter 11: all sections. Recommended Reading: • http://www.dena.de/en/ • German Politics, Vol.19, No.2, June 2010, pp.148–163 CHRISTOPH H. STEFES. Bypassing Germany's Reformstau: The Remarkable Rise of Renewable Energy Required Research/Class defined reading: • Class identified research question Required Reading: • Renewable Energy Facts: Sections 2.1-2.4; 3.1-3.3;8.1 and Chapter 4: all sections Required Research/Class defined reading: • Class identified research question Required Reading: • Renewable Energy Facts: Sections 2.6 and 3.5 and Chapter 6: all sections.
Week 2	Session 5: German Energy and Climate Policy: Part 2 – It's not just about renewables: other successful climate strategies and policies in Germany What other sectors are contributors to increased climate change beyond energy? We will look at some of the other climate change policies in Germany, which are not directly linked to sustainable energy policy and practices...or are they?	Required Reading: • German Federal Ministry of the Environment, Nature Conservation and Nuclear Safety. March 2009. Combating Climate Change the German adaptation Strategy – with a particular focus on chapter 3
	Session 6: Renewable Energy Implementation: Key success factors As an introduction to sessions 12 through 15, we will examine the key elements to RE development, implementation and large scale deployment.	Required Research/Class defined reading: • Class identified research question Required Reading: • Renewable Energy Facts: Chapter 10: all sections.

	Session 7: International Policies and Strategies: past and future Since nearly every country in the world became a Party to the United Nations Framework Convention on Climate Change, a gamut of international agreements and negotiations has followed. We will look at the impact of these policies and strategies on climate change and in particular in the uptake of sustainable energies, as well as their limitations.	- World Meteorological Organisation Overview of UNFCC and Kyoto - http://www.wmo.int/pages/themes/climate/international_unfccc.php UNFCC Details on the COP - http://unfccc.int/bodies/body/6383.php Recommended Reading: - Rough Guide: The UNFCCC and the Kyoto Protocol
	Session 8: European Environmental, Energy and Climate Policy The EU is a leader in sustainable energy policy. We will look at the EU policy and how Member States have implemented it with different policy and market mechanisms.	Required Reading: - European Renewable Energy Council, EU TRACKING ROADMAP 2013: Keeping Track of Renewable Energy. June 2013. Recommended Reading: - Renewables Make the Difference. EU, 2011
Week 3	Session 9: Biomass and Biofuels: the good and the bad Biofuels are part of many national strategies to reduce the use of non-renewable fossil fuels. There are however many discussions surrounding their sustainability. We will discuss the good and the bad sides of this “renewable” resource.	Required Research/Class defined reading: - Class identified research question Required Reading: - Renewable Energy Facts: Chapter 5: all sections.
	Session 10: Energy Efficiency: the forgotten high climate impact technologies and processes Why is efficiency such an important part of sustainable energy strategies? In this session we will discuss the role of efficiency in overall energy policy and strategies, in reducing carbon and impacting the bottom line for the private sector, governments and individuals.	Required Research/Class defined reading: - Class identified research question Required Reading: - Renewable Energy Facts: Sections 1.8 – 1.9; 1.11
	Session 11: Business Plan “Speed Pitching” In preparation for your presentations and your final business and project plan submission please Bring your “work in progress BUSINESS PLANS to class: “SPEED PITCHING” “ready”	Required Research In class review of: The Global Environmental Facility_ Least Developed Countries Fund Financing Adaptation Action-2012

	Session 12: Student Presentations Part 1: Sustainable Energy Project Proposals /Business Plan and Student Presentations Part 2: Sustainable Energy Project Proposals /Business Plan	
	Session 13: Sustainable Energy Applications in Developing Country Contexts Developing countries and emerging economies are important target areas for renewable energies. They tend to make up the majority of “vulnerability areas” for climate change, will continue to represent a large amount of new global growth and provide opportunities for the development of green economies by addressing development and environmental challenges at the same time. Summary, Wrap-up and Student’s Personal/Professional Statements	

REQUIRED READINGS:

- Dieter Seifried; and Walter Witzel. Renewable Energy - The Facts. London and Washington, D.C.: Earthscan, 2010.
- Environmental Protection Agency. Climate Change Indicators in the United States. 2012.
- German Federal Ministry of the Environment, Nature Conservation and Nuclear Safety. March 2009. International Energy Agency: World Energy Outlook 2012 Executive Summary
- Intergovernmental Panel on Climate Change : Assessment Reports. [www. ipcc.ch](http://www.ipcc.ch)
- Intergovernmental Panel on Climate Change. A Report of Working Group III of the IPCC. RENEWABLE ENERGY SOURCES AND CLIMATE CHANGE MITIGATION: SUMMARY FOR POLICYMAKERS
- World Meteorological Organisation Overview of UNFCCC and Kyoto - http://www.wmo.int/pages/themes/climate/international_unfccc.php Renewables Make the Difference. EU , 2011
- Rough Guide: The UNFCCC and the Kyoto Protocol. UNFCCC. 2011

Appendix:

Rubric for course participation:

A	Excellent participation The student's contributions reflect an active reading of the assigned bibliography. Skillfully synthesizes the main ideas of the readings and raises questions about the applications and implications of the material. Demonstrates, through questions and comments, that they have been capable of relating the main ideas in the readings to the other information discussed in the course and with their own life experience. The student makes informed judgments about the readings and other ideas discussed in class, providing evidence and reasons. They respectfully state their reactions about other classmates' opinions and can contribute to the inquiry spiral with other questions. The student gets fully involved in the completion of the class activities.
B	Very good participation The student's contributions show that the assigned materials are usually read. Most of the time, the main ideas are identified, even though sometimes it seems that applications and implications of the information read were not properly reflected upon. The student can construct over others' contributions, but sometimes seems to interrupt the shared construction to go over tangents. They are respectful of others' ideas. Regularly involved in the activities but occasionally loses concentration or energy.
C	Regular participation The participant evidences a regular reading of the bibliography but in a superficial way. They try to construct over others' ideas, but commonly provide comments that indicate a lack of preparation about the material. Frequently, contributions are shallow or unarticulated with the discussion in hand.
F	Insufficient participation Consistently, the participant reads in a shallow way or does not read at all. Does not participate in an informed way and shows lack of interest in constructing over others' ideas.