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SMAGRINET

POWERING SMART GRID
EXPERTISE IN EUROPE

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Manual for

ECONOMIC OPERATION AND SOCIETAL CHALLENGES MODULE

PROGRAMME
H2020

CONTRACT NUMBER
837626

DURATION
30 Months

START
April 2019

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1. Introduction

Based on the material prepared for the blended programme the trainers manual for the short-term programmes have been developed under the SMAGRINET project.

The methodological manual package includes support for the trainers for the up-take of the capacity building programme (module).

These manuals are available as online resources for the enrolled universities and representatives and are easily accessible for the Trainers and universities that have joined the SAMGRINET HUB.

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2. Objective of the module

2.1.1. Learning outcomes

- Analyze, understand and describe the process of the EU energy policy development
- Predict the influence of energy policy
- Understand and assess the impact of the energy sector and its related sectors on social development and energy security.
- Assess the expectations of the energy sector stakeholders.
- Understand the international dimension and output of energy policy in the country's legal regulation.
- Assess the economic, technological and social impact of the introduction of energy types on society and the energy system.
- Assess the efficiency of the overall energy chain, the best technologies used and the balance of costs and expected revenues / savings of the parties.
- Understand the scope of fuel and energy markets from a regional aspect – assess and analyse fuel and energy security of supply and price formulation,
- Understand energy impact on the environment;
- understand the structure, peculiarities and the operational principles of the energy and fuel market;
- understand the need and manage consumption according to energy and fuel prices;
- understand electricity market problems;
- understand the formulation of electricity prices and tariffs

2.1.2. Aims as a lecturer

1. Motivate students to develop their abilities to analyse and understand the scope of EU fuel and energy markets, its legislation, strategic plans and its impact on the developments happening in the field of environmental resource efficiency.
2. To give students knowledge about the formation of energy and fuel prices;
3. To broaden the understanding of EU regulations regarding regional and international fuel/energy trade.
4. To inspire students to partake in the discussions on the EU energy transition for them to be comfortable on these subjects in the future.
5. To stimulate interest among students and to encourage participation talks regarding the EU progress in the energy policy
6. To deepen the students' analytical capability to systematize the assumptions of the background policy for the development of energy policy, to predict the outcome
7. To extend the student's knowledge of measures to increase energy security, and success indicators and engineering responsibility and the reasons within the EU policies;
8. Encourage students to understand the importance of EU and national energy policy in the economic community, the movement of freedom of the Member States in shaping national energy policy, the feasibility of implementing regional cooperation and solidarity.
9. Understand the EU policies towards energy and the environment – make the connections between them

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3. Teaching material

3.1.1. Lecture register

1. EU energy policy (28 slides)
2. Power sector regulation (38 slides)
3. Electricity prices
4. Power sector regulation and policy
5. Electricity market pricing
6. Long-term energy demand forecasting
7. Congestion mangement
8. Transmission tariff
9. Power planning
10. Electricity financial market and its risk management
11. Cost and benefit analysis
12. Environmental issues
13. Societal Changes

3.1.2. Types of materials and methods used in the lecture

11 lecture files will be provided to you after the completion of train-the-trainer program and contractual agreements between the SMAGRINET consortium and the faculty of your University.

- Oral examination forms 40% of the grade.

2 projects
- Powerplant cost benefit analysis –excel file provided
- Power stock planning – excel file provided

Seminars (1 each student)

- Each student has to give a seminar (15 mins).
- Seminar will be on the research articless. Examples are provided on the following subjects:

    - Consumer behaviour
    - Distributed energy
    - Energy models for demand forecasting
    - Future of energy system
    - EU internal Electricity Market
    - Efficient technologies or user behaviour
    - Energy-saving behaviour
    - Manipulation in the market
    - Reshaping design
    - Bottom up models
    - Information in EE
    - Strategic witholding
    - Consumer Behaviour

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□ SMAGRINET can provide assistance but the final material is provided by the course representative.

In addition to lectures, the recommended text books including web based materials are available in the indexes of lectures.
You may also use the vídeos from the SMAGRINET Youtube channel or other vídeo recordings if they are available and help with the illustration of the material.

3.1.3. Lectures

Energy policy

Covered topics and content:

- Definition of the energy policy and the areas it covers.
- Main issues facing the EU energy sector : Dependency import and climate change.
- EU goals and acts for energy security, renewable energy development.
- The students have to understand the European energy situation and what energy policy is the UE pursuing.

Outcomes of the lecture or what students must know by the end of the lecture:

- The students have to understand the European energy situation and what energy policy is the EU pursuing.

Power sector regulation –Energy Policy

Covered topics and content:

- List of the European institutions dealing with the energy sector and their history.
- Steps toward and unified European energy market
- Why regulation is needed on the energy market?

Outcomes of the lecture or what students must know by the end of the lecture:

- The students must understand the organization of the energy market and it regulation.

Environmental issues –Societal transmission challenges

Covered topics and content:

- The link between energy sector and climate change.
- Measures (societal and technological) that can reduce the CO2 emissions from the energy sectors.

Outcomes of the lecture or what students must know by the end of the lecture:

- The students will understand the environmental impact of energy sector and what are the actions to solve this problem.

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Power sector regulation –Electricity prices

Covered topics and content

- Organisation of the energy market structure.
- Basics of microeconomics: supply and demand, social welfare.·
- Network price regulation methods.

Outcomes of the lecture or what students must know by the end of the lecture:

- The role of each actor (TSO, DSO, producer, retailer).
- The way prices are fixed on a market.

Electricity market –Pricing model

Covered topics and content

- The composition of the end user electricity prices.
- Calculation of revenue requirement for regulated activities.

Outcomes of the lecture or what students must know by the end of the lecture:

- Which actors are regulated.
- How to use business concepts such as OPEX, CAPEX, etc for energy sector actors.

Long-term energy demand forecasting

Covered topics and content

- The concept of energy balance.
- Information and statistics required for energy demand forecasting.
- Description of some forecasting methods.

Outcomes of the lecture or what students must know by the end of the lecture:

- The composition of the energy balance (primary energy, final energy, etc).
- The relationship between energy consumption and economic development.
- Which factors influence the energy balance (elasticities, population, GDP).

Power generation, transmission and distribution planning

Covered topics and content

- Descriptions of the steps and goals of power planning.

Outcomes of the lecture or what students must know by the end of the lecture:

- The main data required to make a proper power planning.
- The different types of existing models and methods for planning.

Congestion management and transmission tariff

Covered topics and content

- The organization of the power exchange market in the EU.
- The composition of transmission tariffs.

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Outcomes of the lecture or what students must know by the end of the lecture:

- How European countries electrical networks are connected to each other.

Electricity financial market and its risk management

Covered topics and content

- The organization of the electricity financial market.
- The different types of trades made on electricity market.

Outcomes of the lecture or what students must know by the end of the lecture:

- What a future is there in finance or what is there to be expected regarding financing in the power grid sector?
- The goal of futures (Forward capacity allocation) in electricity risk management.
-

Cost and benefit analysis –Risk assessment

Covered topics and content

- The main concepts required to carry out and cost-benefit analysis.
- The different costs to consider while evaluating an project.
- The analysis to conduct to assess the risk of a project.
- Organization of the electricity financial market.
- The different types of trades made on electricity market.

Outcomes of the lecture or what students must know by the end of the lecture:

- The discount rate.
- Net present value, benefit cost ratio and the internal rate of return.
- The levelized cost of electricity.
- The students must be able to evaluate whether or not a project is interesting.

3.1.4. Exercises

The exercises sessions are supposed to be face-to-face classes of 2 hours each. The students have to prepare the exercises before every session.

Purpose of Exercise 1

Exercises allowing the students to acquire a better understanding of market concepts such as:

- Supply and demand curves
- Market equilibrium
- Calculation of social welfare, producer surplus, consumer surplus
- Price elasticity

Purpose of the Exercise 2

Exercises allowing the students to manipulate business concepts such as:

- OPEX
- CAPEX
- Regulated Asset Base
- Return on investment
- Revenue requirement

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Purpose of Exercise 3

Exercises to train students on cost and benefits analysis :

- Comparison of a solar and a wind power plants by calculation of the net present values of each project.
- Comparison of a coal and gas power plants by calculation of the levelized cost of electricity of each project.

3.1.5. Individual student works

Economical analysis of a generation power plant project or grid project

A different variant of the task is given to each student.

They are to conduct the analysis of an energy project with different assumptions for each variant.

The objective of this task is to evaluate the capacity of the students to use the concepts and tools studied during the lectures and exercises sessions.

Article analysis

The article is provided by the supervisor and is given to the students.

The students are required toread it and make a summary of the article.

This task had the following objectives:

- To make the students more familiar with the structure of a scientific article.
- To evaluate the general understanding of the module and see their ability to bind it with the article content.

3.1.6. Timeframe or preparation

Six Months Prior

- Familiarise the module or course goals and re-determine course content.
- Begin reviewing your arsenal of possible supportive material such as:
  - The latest EU policy summaries of new directives.
  - Relevant material regarding your national trends and comparative material with the EU.

THREE MONTHS PRIOR

- Begin to develop course schedule and syllabus.
- If you have had prior experience re-evaluate your teaching methods and tools at your disposal (excel, CAD and others)
- Determine the dates when you will evaluate student learning: you're your assignments and exams accordingly.
- Organise updated text(s) and other materials, including films, videos.

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□ If planning to use instructional technology or multimedia equipment, reserve a classroom that has all the necessary components.
□ If possible for seminars – contact guest speakers.
□ If possible - arrange field trips and other activities

One Month Prior

□ Refine the course syllabus for the concrete semester (might have moved).
□ Seek training or consult with SMAGRINET on the possible developments the on how to use updated instructions or other related topics.

DURING AND AFTER

□ Take a few, brief notes after every class session; these notes will remind you of what went well and what you would like to change after the course has concluded for next year.
□ Review student evaluations.
□ Refine the course design, responding to student evaluations and reflecting on your own evaluation of the course.

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4. Teaching model

4.1.1. Teaching with the lectures method

The SMAGRINET lectures are an immensely effective tool for your classroom as they have been previously piloted in the classroom, allowing you as an instructor to provide an overarching theme with pre-organizes material in an illuminating and interesting way.
You as the instructor must take care, however, to shape the lecture for the specific audience of students who will hear it and to encourage those students to take an active and immediate part in learning the module.

CREATE A COMFORTABLE, NON-THREATENING ENVIRONMENT.

Introduce yourself and explain your interests in the topic on the first day. Encourage questions from the outset. For example, require each student to submit a question about the course during the first day or week. Students can submit these questions via an online discussion forum, such as that which is available on Moodle.

REVIEW AND PRACTICE THE LECTURE BEFORE CLASS BEGINS.

After writing the lecture, leave at least 30 minutes before your class to organize your thoughts and gather any material you need. Practicing the lecture will help you identify points where you will want to slow the pace, pause, or offer a summary or a question.
.
Make sure your tech works
If you do not have an assigned classroom or have had prior bad experience with projectors at your assigned classroom, especially regarding connecting them – make sure that you have somebody at hand or you are there early enough to get the nuisance of connection problems out of your way.

If you have chosen to do your lectures online – makes sure that you send the invitation of the digital online class with a 15 minute spare time prior to the agreed start time of the lecture. This allows for students to get into the lobby of the online platform that you are using and they are able to work out their audio-visual problems that might occur. This gives you vital time to make sure that your own microphone is working and your presentations are ready to be presented.

INTERACT WITH YOUR STUDENTS.

Arrive to class early, especially on the first day, and greet students who are already in the room. Students will feel more comfortable asking you questions and will feel more engaged in the topic of the course if they have an opportunity to interact with you in this way. If time does not permit for students to approach you for questions before or after the lecture, encourage them to see you during office hours.
The more an instructor interacts with the students during a lecture, the more active the learning will be. The judicious use of questions throughout a class session can move the lecture forward, engage the students, increase the use of higher-order thinking processes, and make the lecture more interesting.

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4.1.2. Suggestions

PREPARING

- Create a comfortable, non-threatening environment.
- Organize the lecture like a good speech.
- Prepare notes that will serve as a “road map” rather than a script to be read verbatim.
- If you are team-teaching, talk with co-instructors or TAs often to ensure coherence among lectures, discussions sessions, and office hours.
- Review and practice the lecture before class begins.
- If you plan to use tech for your lectures – make sure they work

DURING THE LECTURE

- Interact with your students.
- Provide students a clear sense of the day’s topics and their relation to the course as a whole.
- Show passion for the subject.
- Focus on communicating with your audience: speak clearly; move around the room, and use gestures to engage student attention.
- When asking questions, do not be afraid of silence.
- Demonstrate respect for, and interest in, student ideas and questions.

10 COMMON MISTAKES TO AVOID

- Trying to cover too much material in one class session.
- Not including opportunities for questions or active learning.
- Waiting until the last two minutes of class to ask and answer questions.
- Answering your own questions or asking more than one question at once.
- Assuming students are learning the material if they are not asking questions.
- Assuming that students will identify and understand the important points of each lecture.
- Reading your notes or the content of your slides when using slide-ware such as PowerPoint.
- Not looking at the students when you are lecturing; looking only at your notes or the chalkboard.

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5. Grading and feedback

You should diligently follow the grading criteria, procedures, and policies developed by SMAGRINET. In addition, you should keep in mind that you will be on the “front line” for student questions and concerns about grading. Therefore, it is essential that you communicate early and often with the course instructor about all aspects of the grading process, so that you can answer questions and concerns that are likely to be posed by students.

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6. General approach to teaching

It has been taken into account that the need to add some readings and classroom discussions help students understand their vital role in the learning process.

nN order to avoid problems with attendances, uncompleted reading assignments, and student focus on grades rather than learning it is important to make sure that students recognize the value of what they are learning.

One of the safest ways of connecting and providing insight to students is to reference each topic back to The Green Deal. The Green Deal provides the course for the EUs economy and at the end of the day it will directly affect the industry, society and the environment physically around the students.

6.1.1. The Green Deal

The European Green Deal provides an action plan to:

- boost the efficient use of resources by moving to a clean, circular economy
- restore biodiversity and cut pollution

The plan outlines investments needed and financing tools available. It explains how to ensure a just and inclusive transition.

The EU aims to be climate neutral in 2050. It has been proposed at the European Climate Law level to turn this political commitment into a legal obligation.

Reaching this target will require action by all sectors **which your students will be fulfilling** and play a part in the following years to come:

- **investing in environmentally-friendly technologies**
- **supporting industry to innovate**
- **rolling out cleaner, cheaper and healthier forms of private and public transport**
- **decarbonising the energy sector**
- **ensuring buildings are more energy efficient**
- **working with international partners to improve global environmental standards**

- The EU will also provide financial support and technical assistance to help those that are most affected by the move towards the green economy. This is called the Just Transition Mechanism. It will help mobilise at least €100 billion over the period 2021-2027 in the most affected regions.

All in all, the Green Deal asks your students to be bold and take action as they are educated and if they are educated, they should know that if they understand the flow of the future in the energy and environmental sector they will have a bright future.

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7. Motivation of the students

Some students worry about grades; others need to satisfy a course prerequisite. Still others want to learn and explore ideas. In fact, many students are probably motivated to learn and to succeed by a combination of intrinsic and extrinsic elements. The key for us as teachers is to understand what we can do to build students' motivation to learn in our classroom, and to nurture the intrinsic motivation that will guide future learning.

Teachers often assume that, because they are"teaching," students must be learning. Students assume that, because they have read their textand memorized facts, they have learned something.

We know that students respond positively to three elements in most classes:

· A well-organized course;

· A teacher who is enthusiastic about the material and about teaching;

· A teacher who shows he or she cares about the students and their learning.

Communicate high but attainable expectations and goals. Most students want to be challenged and feel that they are directing their energies toward a worthwhile experience.

This means that they will work to achieve challenging goals if they view the goals as within their reach. True, some students are motivated by the fear of the daunting "killer test," but you will lose more students than you gain, and those you gain will not retain their motivation outside of the classroom.

7.1.1. Motivation during your module

Create a learning community in your classroom

Interaction, particularly with peers, is an important motivator for many students. There are several easy steps you can take to create an environment where students see themselves as part of a community of learners rather than as isolated individuals.

Things maybe looked upon from different point of views

Reward success publicly. This does not need to be an elaborate effort. Thank students for their comments, compliment good points by saying "good point," and refer back to individual students for their contributions when you can.

Share exemplary work with students

Copy, distribute (without names and with permission) and discuss outstanding research papers or assignments. This helps students see your standards and it recognizes students who do outstanding work.

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Use collaborative/cooperative learning groups

Students respond to interaction with their peers. Putting students in groups can therefore promote their learning.

Know your students and their interests

If you know who your students are and what they are involved in, you can adjust your class to connect with their interests. This can help them see the relevance of the material and motivate them to engage in class.

Some students can't be motivated

When you feel this way (and you will), it is important to remember that, for students, our course is one small component of their lives.

They are taking other courses, making friends, participating in activities, working to pay their way through school, and even taking care of families. In short, they are leading complex lives that affect how much energy and attention they can give to our classroom.

There is a limit to just how much we can actually motivate students. But it is also important not to stop trying because you may find that they actually will appreciate the efforts you have made.

7.1.2. Simple tips

There are simple solutions for quickly motivating and supporting students during the modules:

1. State clearly and explicitly what students need to do to receive an "A" in your course.
2. Get to class early and talk with your students about what they are doing in school, what they hope to learn, and what they are really enjoying.
3. Find simple ways (a comment to the class, a remark to a student after class, an e-mail) to recognize student contributions and excellent work.
4. Give students examples of ways in which class concepts relate to "real world" matters.

7.1.3. Lecturer suggestions during class sessions

Arrive early, start on time, and end on time.

Showing your respect for everyone's time will encourage your students to do the same. Arriving at the classroom early will allow you not only to set up for class but also to talk with students informally. This informal interaction will help you establish a rapport with your students, which will in turn help them feel confident to participate in class and to ask for help when they need it.

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INTERACT WITH STUDENTS; INCLUDE OPPORTUNITIES FOR ACTIVE LEARNING.

Demonstrate from the first class that you are interested in what students are thinking. Include plenty of opportunities for students to ask and answer questions. While a lecture course will provide fewer opportunities for interaction than a discussion course, you will find that students will be able to learn and retain more material if you pause every 15-20 minutes to ask questions or to ask students to apply a theory, solve a problem, or discuss a debated point.

SHOW PASSION FOR THE SUBJECT AND FOR YOUR STUDENTS' LEARNING.

One of the most effective ways to inspire your students to learn is to show that you are truly interested in, and excited about, the course content and their learning.

BE FLEXIBLE.

Be prepared to have good days and bad days in the classroom. If you are not getting good results teaching in a particular way, try something new. For example, if the students in your discussion or recitation section are extremely quiet, break them up into smaller groups to solve a problem or answer a set of questions.

IF STUDENTS APPEAR BORED, INCLUDE MORE OPPORTUNITIES FOR ACTIVE LEARNING.

Pause in the middle of class to have students ask and answer questions, provide examples, or solve problems. Do not assume that students look bored because they know the material and then decide to speed up your pace; it may be instead that they are having trouble understanding what you are presenting to them. It may also be that they are sleep-deprived, as college students often are.

IF YOU DO NOT KNOW THE ANSWER TO A QUESTION, SAY SO.

Tell the students that you will find an answer, and then get back to them. Present the answerto the entire group during the next class; do not let the matter drop. You do not need to be allknowing to maintain your credibility. One way to lose it, in fact, is to bluff by giving an answer of which you are unsure and that students may later find out to be untrue. Model intellectual curiosity and honesty. Your enthusiasm to learn something new will inspire your students to follow your example.

WHEN ASKING QUESTIONS, DO NOT BE AFRAID OF SILENCE.

Often, silence means that students are thinking. Do not give in to the temptation to end the silence by answering your own questions, which will only convince students that if they wait long enough, they will not have to think because you will supply the answers for them. Wait 5-10 seconds for an answer. If, at that point, you are getting blank stares and quizzical expressions, rephrase your question.

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