Guía docente
240293 - 240EN46 - Modelización Energética y Política Climática

Unidad responsable:	Escuela Técnica Superior de Ingeniería Industrial de Barcelona
Unidad que imparte:	713 - EQ - Departamento de Ingeniería Química.

Titulación: MÁSTER UNIVERSITARIO EN INGENIERÍA DE LA ENERGÍA (Plan 2022). (Asignatura optativa).

Curso: 2024 **Créditos ECTS:** 5.0 **Idiomas:** Inglés

PROFESORADO

Profesorado responsable: CESAR ALBERTO VALDERRAMA ANGEL

Otros: CESAR ALBERTO VALDERRAMA ANGEL

METODOLOGÍAS DOCENTES

OBJETIVOS DE APRENDIZAJE DE LA ASIGNATURA

The 4 main Intended Learning Outcomes are:
1. Explain the role of energy and climate policy and its instruments in making energy systems sustainable.
2. Understand how energy system modelling can support the development of energy and climate policies.
3. Build computer model of national energy system and employ the scenario analysis to conduct impact assessment of achieving various energy and climate policy objectives.
4. Formulate and solve operational and investment planning problems in power systems using mathematical programming.
5. Build computer model of national energy system and employ scenario analysis to conduct impact assessment of achieving various energy and climate policy objectives.

HORAS TOTALES DE DEDICACIÓN DEL ESTUDIANTADO

Tipo	Horas	Porcentaje
Horas grupo grande	45,0	100.00

Dedicación total: 45 h

CONTENIDOS

Module 1. Energy and climate policy

Descripción:
Evolution of global and European energy-climate policy, Limits to Growth and
Brundtland reports, the history of the UNFCCC and its most important protocols shaping the global and EU climate policy, scenarios depicting the evolution of primary energy demand and global greenhouse gas (GHG) emissions between 1990 and 2100, assessment of the development of energy systems in selected countries using sustainable development indicators.

Dedicación: 16h
Grupo grande/Teoría: 9h
Actividades dirigidas: 4h
Aprendizaje autónomo: 3h

Module 2: Solving power system planning problems using mathematical programming) (2 ECTS credits)

Descripción:
Introducing to mathematical programming, selected types of optimization problems, formulation of the primal and dual problem in linear programming problem, systems approach to modeling power systems in the GAMS language, GAMS fundamentals (model structure, syntax, data management, variables, equations), programming environments, typical planning problems in the power system, solving selected real-world optimization problems in power systems using GAMS.

Dedicación: 27h
Grupo grande/Teoría: 15h
Actividades dirigidas: 7h
Aprendizaje autónomo: 5h

Module 3: System modelling for energy planning and climate policy development (2 ECTS credits)

Descripción:
Modeling the development of energy systems, IEA-ETSAP TIMES model generator (objective function, decision variables, main equations and user constraints), defining Reference Energy System in TIMES, parametrization of processes and commodities, building energy scenarios with various energy and climate policy objectives, cost-benefit analysis of the scenarios and sensitivity analysis of the results.

Dedicación: 22h
Grupo grande/Teoría: 12h
Actividades dirigidas: 6h
Aprendizaje autónomo: 4h

SISTEMA DE CALIFICACIÓN

BIBLIOGRAFÍA

Básica:
- Rosenthal, Richard E.. A GAMS Tutorial [en línea]. [s.l.]: [s.n.], [s.d.] [Consulta: 19/09/2024]. Disponible a: https://www.gams.com/latest/docs/UG_Tutorial.html.
- A. Soroudi. Power System Optimization Modeling in GAMS [en línea]. Cham: Springer International Publishing, 2017 [Consulta: 05/07/2024]. Disponible a: https://link-springer-com.recursos.biblioteca.upc.edu/book/10.1007/978-3-319-62350-4. ISBN 3319623508.
- R. Loulou et al.. Documentation for the TIMES Model : Part I [en línea]. [Paris]: IEA - ETSAP, 2016 [Consulta: 05/07/2024]. Disponible a: chrome-extension://efaidnbmnnnibpcajpcglclefindmkaj/https://iea-etsap.org/docs/Documentation_for_the_TIMES_Model-Part-I_July-2016.pdf.
- Munasinghe, Mohan ; P. Meier. Energy policy analysis and modeling. Cambridge: Cambridge University Press, 2012. ISBN 9780511983573.
- Rosenthal, Richard E.. NouGAMS – A User's Guide [en línea]. Washington, DC: GAMS Development Corporation, 2007 [Consulta: 05/07/2024]. Disponible a: chrome-extension://efaidnbmnnnibpcajpcglclefindmkaj/https://www.un.org/en/development/desa/policy/mdg_workshops/training_material/gams_users_guide.pdf.
- Energy indicators for sustainable development : guidelines and methodologies [en línea]. Viena: International Atomic Energy Agency, 2005 [Consulta: 05/07/2024]. Disponible a: chrome-extension://efaidnbmnnnibpcajpcglclefindmkaj/https://www-pub.iaea.org/MTCD/Publications/PDF/Pub1222_web.pdf. ISBN 9201162049.