

Course guide

240638 - 240638 - Generation of Wind Electricity

Last modified: 13/03/2025

Unit in charge: Barcelona School of Industrial Engineering
Teaching unit: 709 - DEE - Department of Electrical Engineering.

Degree: BACHELOR'S DEGREE IN INDUSTRIAL TECHNOLOGY ENGINEERING (Syllabus 2010). (Optional subject).

Academic year: 2025 **ECTS Credits:** 4.5 **Languages:** English

LECTURER

Coordinating lecturer: Gomis Bellmunt, Oriol

Others: Gomis Bellmunt, Oriol
Prieto Araujo, Eduardo
Egea Alvarez, Agustí

DEGREE COMPETENCES TO WHICH THE SUBJECT CONTRIBUTES

Specific:

9. Knowledge and use of electric machines and circuit theory principles.

Generical:

8. PROJECT MANAGEMENT: Being able to present, execute and direct Industrial Engineering projects, by means of applying scientific and technologic knowledge , attitudes and procedures, once conditions have been identified or valued.

Transversal:

1. EFFICIENT ORAL AND WRITTEN COMMUNICATION. Communicating verbally and in writing about learning outcomes, thought-building and decision-making. Taking part in debates about issues related to the own field of specialization.
2. ENTREPRENEURSHIP AND INNOVATION: Knowing about and understanding how businesses are run and the sciences that govern their activity. Having the ability to understand labor laws and how planning, industrial and marketing strategies, quality and profits relate to each other.
3. SUSTAINABILITY AND SOCIAL COMMITMENT. Being aware of and understanding the complexity of social and economic phenomena that characterize the welfare society. Having the ability to relate welfare to globalization and sustainability. Being able to make a balanced use of techniques, technology, the economy and sustainability.
4. TEAMWORK. Being able to work as a team player, either as a member or as a leader. Contributing to projects pragmatically and responsibly, by reaching commitments in accordance to the resources that are available.
5. EFFECTIVE USE OF INFORMATION RESOURCES. Managing the acquisition, structure, analysis and display of information from the own field of specialization. Taking a critical stance with regard to the results obtained.
6. SELF-DIRECTED LEARNING. Detecting gaps in one's knowledge and overcoming them through critical self-appraisal. Choosing the best path for broadening one's knowledge.
7. THIRD LANGUAGE. Learning a third language, preferably English, to a degree of oral and written fluency that fits in with the future needs of the graduates of each course.

TEACHING METHODOLOGY

LEARNING OBJECTIVES OF THE SUBJECT

L'assignatura introdueix els principis fonamentals d'enginyeria aplicada a la generació elèctrica eòlica. En particular els objectius de l'assignatura són:

- Entendre el context de la energia eòlica en el sistema energètic
- Analitzar les diferents tecnologies disponibles i els seus components, incloent eòlica terrestre i marina, i tant grans generadors com petits microgeneradors.
- Entendre el principi de funcionament dels aerogeneradors.
- Dissenyar aerogeneradors de diferents tecnologies.
- Analitzar i simular el funcionament d'aerogeneradors.
- Dissenyar parcs eòlics compostos de diversos aerogeneradors.
- Analitzar la viabilitat tecno-econòmica de projectes eòlics.
- Analitzar els aspectes fonamentals de la integració de la energia eòlica a la xarxa elèctrica.

STUDY LOAD

Type	Hours	Percentage
Hours large group	45,0	40.00
Self study	67,5	60.00

Total learning time: 112.5 h

CONTENTS

Principis bàsics i anàlisi del recurs

Description:

El recurs eòlic.
Configuració aerogeneradors.
Components.
Corbes de potencia.

Full-or-part-time: 45h

Theory classes: 7h 30m
Guided activities: 7h 30m
Self study : 30h

Anàlisi d'aerogeneradors en règim permanent i transitori

Description:

Anàlisi d'aerogeneradors en règim permanent i transitori.
Operació a velocitat fixa i variable.
Tipus d'aerogeneradors.
Control d'aerogeneradors.
Problemes.
Modelització dels diferents components.
Simulació.

Full-or-part-time: 45h

Theory classes: 7h 30m
Guided activities: 7h 30m
Self study : 30h

Parcs eòlics i integració a xarxa

Description:

Parcs eòlics terrestres
Parcs eòlics marins
Disseny elèctric
Transmissió de potencia
Integració a xarxa

Full-or-part-time: 45h

Theory classes: 7h 30m
Guided activities: 7h 30m
Self study : 30h

GRADING SYSTEM

BIBLIOGRAPHY

Complementary:

- Heier, S. Grid integration of wind energy: onshore and offshore conversion systems [on line]. 3rd ed. Chichester, West Sussex: Wiley, 2014 [Consultation: 04/11/2025]. Available on: <https://onlinelibrary-wiley-com.recursos.biblioteca.upc.edu/doi/book/10.1002/9781118703274>. ISBN 9781118703304.
- Hau, E. Wind turbines : fundamentals, technologies, application and economics [on line]. 3rd ed. Berlin: Springer Berlin Heidelberg, 2013 [Consultation: 19/06/2025]. Available on: <https://link-springer-com.recursos.biblioteca.upc.edu/book/10.1007/978-3-642-27151-9>. ISBN 3642271510.
- Ackermann, Thomas. Wind power in power systems [on line]. 2nd ed. Chichester: Wiley, 2012 [Consultation: 19/06/2025]. Available on: <https://onlinelibrary-wiley-com.recursos.biblioteca.upc.edu/doi/book/10.1002/9781119941842>. ISBN 9780470974162.
- Lubosny, Zbigniew. Wind turbine operation in electric power systems : advanced modeling [on line]. Berlin: Springer, 2003 [Consultation: 19/06/2025]. Available on: <https://ebookcentral-proquest-com.recursos.biblioteca.upc.edu/lib/upcatalunya-ebooks/detail.action?pq-origsite=primo&docID=6300737>. ISBN 354040340X.

RESOURCES

Hyperlink:

- EWEA. <http://www.ewea.org/>- Eoliccat. <http://www.eoliccat.net/>- AEE. <http://www.aeeolica.org/>- 4Coffshore. <http://www.4coffshore.com/windfarms/>