



AUHR РУЦ
Universidad de Cádiz
Университет Кадиса

Vicerrectorado de Proyección
Social, Cultural e Internacionales
Aula Universitaria Hispano-Rusa
c/Benito Pérez Galdós, s/n oficina 126
11002 - Cádiz (España)
Tel. +34 956015648 Fax. +34 956015895

auhr@uca.es
www.auhr.es
facebook.com/auhruca
vk.com/auhr_uca
twitter.com/auhruca

Renewable energies

Technical application and environmental solutions

Module 1. Introduction to renewable energies (5 hours)

- 1. Energy and Society.**
 - 1.1. Introduction.
 - 1.2. Environmental impact: local and global impacts.
 - 1.3. Geopolitical effects and sustainability.
- 2. Fundamentals of renewable energies.**
 - 2.1. Physics and Technology.
- 3. Energy sources.**
 - 3.1. Non renewable.
 - 3.2. Renewable: hydraulic, solar, wind, marine, geothermal and biomass.
- 4. National and regional initiatives.**
 - 4.1. Solar thermal energy.
 - 4.2. Solar photovoltaic energy.
 - 4.3. Wind power.
- 5. European and national Politics.**
 - 5.1. R&I initiatives in the field of energy.
 - 5.2. R&I in the University of Cadiz.

Module 2. Photovoltaic energy and technology (15 hours)

1. Fundamentals of photovoltaic energy.
2. Semiconductors for photovoltaic applications. Energy band configurations.
3. Photovoltaic systems. Main devices.
4. PV Stand-alone applications. Characteristics and typical uses.
5. PV grid connected applications.

Practical session in the experimental Campus of the University

- Visit to UCA spin-off company for renewable energy. IGFOTON, in shared experimental Campus (University-Technological company IGFOTON)



UCA | Universidad
de Cádiz

**Facultad de Ciencias
del Mar y Ambientales**

CASEM Polígono Río San Pedro
11510, Puerto Real, Cádiz
Tel: +34 956 016 041
Fax: +34 956 016 115
Correo-e: decanato.ccmarm@uca.es



AUHR РУЦ
Universidad de Cádiz
Университет Кадиса

Vicerrectorado de Proyección
Social, Cultural e Internacionales
Aula Universitaria Hispano-Rusa
c/Benito Pérez Galdós, s/n oficina 126
11002 - Cádiz (España)
Tel. +34 956015648 Fax. +34 956015895

auhr@uca.es
www.auhr.es
facebook.com/auhruca
vk.com/auhr_uca
twitter.com/auhruca

- Solar radiation measurement. Meteorological data station for solar and wind parameters record.
- PV module test for different technologies. Technical characteristics, basic measurements. I-V curve tracer.
- Basics practice with PV solar training equipment.
- Experimental PV grid connected installations. Characteristics, c-Si (Mono and poly), a-Si.

Field session. Visit to a PV installation

- PV stand-alone applications of hybrid installation PV-wind energy for freshwater treatment. ETAP-ERN project.
- Building Integrate Photovoltaic, grid connected. BIPV. 100 kW of nominal power in the Faculty of Economics (University of Cadiz).

Module 3. Wind power (20 hours)

1. Fundamentals of wind power.
2. Wind resource basics concepts. Physical energy limits.
3. Instrumentation and wind measurement devices.
4. Windmill types. Vertical and horizontal axis.
5. Windmill main components. Wind turbine, electric power generator and auxiliary equipment.
6. Small windmills applications. Rural application with solar PV energy.

Wind power and the environment

1. Renewable energy sources (RES) and biodiversity: Conflicts and solutions.
2. Environmental impact of RES: a general overview.
3. The Environmental Impact Assessment for wind power: legislative framework and procedures
4. The impacts of RES on wildlife: an overview
5. Methodological guidelines to assess and mitigate the impact of RES on wildlife
6. Study Case 1: the development of wind power in the Strait of Gibraltar.
7. Study Case 2: the surveillance program of wind farms in Tarifa (Cadiz).

Field session: visit to the “El Pino” windfarm in los Barrios (Cádiz) / visit to the wind farm area of Tarifa (Cádiz).



UCA | Universidad
de Cádiz

**Facultad de Ciencias
del Mar y Ambientales**

CASEM Polígono Río San Pedro
11510, Puerto Real, Cádiz
Tel: +34 956 016 041
Fax: +34 956 016 115
Correo-e: decanato.ccmr@uca.es



AUHR РУЦ
Universidad de Cádiz
Университет Кадиса

Vicerrectorado de Proyección
Social, Cultural e Internacionales
Aula Universitaria Hispano-Rusa
c/Benito Pérez Galdós, s/n oficina 126
11002 - Cádiz (España)
Tel. +34 956015648 Fax. +34 956015895

auhr@uca.es
www.auhr.es
facebook.com/auhruca
vk.com/auhr_uca
twitter.com/auhruca

Teaching staff

- **Dr. Juan María González Leal.** *Coordinator of Module 1.* Department of Condensed Matter Physics
- **Dr. Rafael Jiménez Castañeda.** *Coordinator of Module 2.* Department of Electrical Engineering
- **Dr. Gonzalo Muñoz Arroyo.** *Coordinator of Module 3.* Department of Biology
- **Dr. Ignacio Hernández Carrero.** Department of Biology
- **Luis Barrios.** Consultant and Conservation Biologist.
- **Román Muñoz.** Migres Foundation.

Venue

Library of Campus de Río San Pedro. Puerto Real. Espacio de Aprendizaje.



UCA | Universidad
de Cádiz

**Facultad de Ciencias
del Mar y Ambientales**

CASEM Polígono Río San Pedro
11510, Puerto Real, Cádiz
Tel: +34 956 016 041
Fax: +34 956 016 115
Correo-e: decanato.ccmr@uca.es