PARTNER WITH A COOPERATION AGREEMENT

1. Ikerlan
2. Jema
3. Vicomtech
4. Ariadna Instruments S.L.
5. Irizar e-Mobility
6. CEIT
7. CAF Power
8. Orona
9. Nexeya France
10. CENER
11. ZIV Aplicaciones Tecnología, S.L.
12. Enedis
13. Tekniker
14. Tecnalia
15. Instituto Tecnológico de Canarias (ITC)
16. Indar Electric S.L.
17. Ingeteam
18. Ormazabal
19. Fundación Hidrógeno Aragón
20. Epic Power Converters S.L.
22. EDF Recherche et Développement
23. Total Solar
24. Goiener
25. I.Ener
26. Enargia
27. Vinci-energies
28. Pragma Industrie
29. Usurbilgo Lanbide Heziketa and Tknika
30. eXDCi Solutions S.L.

The degrees that give access to the master’s degree are:

- Degree in Renewable Energy Source Engineering
- Degree in Electrical Engineering
- Degree in Industrial Electronic Engineering & Automatics
- Degree in Industrial Technology Engineering
- Other equivalent university degrees (at the discretion of the academic committee).

The aim of this master’s degree is to train specialists to model, simulate, control, operate and manage smart grids and distributed generation.

This master’s degree will allow students to:
- Acquire high-level skills, allowing them to be recruited quickly.
- Acquire practical experience thanks to the intensive collaboration with companies.
- Master English, which has become an essential language with which to grow professionally.
- Have the possibility of carrying out a PhD.
- Contribute to a sustainable economic and social development.

Graduates will be able to work as designers, project managers, researchers or maintenance managers in the sector of renewable energies and power systems, of course, but also in others sectors such as electro-mobility, machine tools, etc.

The schedule is adjusted each year taking into account all the important restrictions.

### ABOUT THE COURSE

**Teaching place:** Faculty of Engineering - Gipuzkoa
Ecole Supérieure des Technologies Industrielles Avancées (ESTIA) (Biarritz, France).

**Teaching type:** On-site.

**Teaching language:** English. Spanish, Euskera and French are also possible in 36 ECTS.

**Approximate fees:** 4,650 - 4,750 €.

**Calendar:**
- First quarter: September to December
- Second quarter: January to April

External Internships and Master Thesis Project: 6 months between May and December

The schedule is adjusted each year taking into account all the important restrictions.

### TRAINING SYLLABUS

**Compulsory subjects:**
- Introduction to Smart grids
- Grids Operation and Control
- Communications in Smart grids
- Power Converters
- Modelling and Control of Storage Systems and Associated Converters
- Disturbances and Protections in Smart grids
- Control of the Machine-Side Converter-Generator Set
- Dynamic Modelling of Distributed Generation Sources
- Component Connection to the Grid by DC/AC Converters
- Demand Side Management (DSM)
- Management and Control of Smart grids and Microgrids
- Component Connection to the Grid by DC/AC Converters
- Implementation of Smart grids Control Algorithms
- Modelling and Control of Renewable Generation Farms and Participating with Ancillary Services
- Seminars and Visits
- Application to Concrete Projects

**Optional subjects:**
- Research Methodology
- Industrial Informatics
- Introduction to the Electric Power System
- Modelling and Control of Wind Turbines
- Fuzzy logic. Application to microgrids

**Internship and Master Thesis:**
- Internship
- Master Thesis

### STUDY LOAD

- **Compulsory subject courses:** 51 ECTS credits
- **Optional subject courses:** 9 ECTS credits
- **Internship and Master Thesis:** 30 ECTS credits
- **Total:** 90 ECTS credits

**Teaching place:** Faculty of Engineering - Gipuzkoa
Ecole Supérieure des Technologies Industrielles Avancées (ESTIA) (Biarritz, France).

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INTRODUCTION & OBJECTIVES

This master’s degree has been designed in conjunction with a large number of international companies and several research centres in order to ensure a high placement rate. The master’s degree has several special features:

- 40 ECTS in collaboration with companies.
- The main language of instruction is English.
- Classes taught in 2 centres: Faculty of Engineering of Gipuzkoa (Donostia-San Sebastian and Eibar) and ESTIA Institute of Technology (Biarritz, 30 min from Donostia-San Sebastian).
- Possibility of a double-degree programme with ESTIA.

The aim of this master’s degree is to train specialists to model, simulate, control, operate and manage smart grids and distributed generation. This master’s degree will allow students to:

- Acquire high-level skills, allowing them to be recruited quickly.
- Acquire practical experience thanks to the intensive collaboration with companies.
- Master English, which has become an essential language with which to grow professionally.
- Have the possibility of carrying out a PhD.
- Contribute to a sustainable economic and social development.

ENTRY PROFILE

The degrees that give access to the master’s degree are:

- Degree in Renewable Energy Source Engineering
- Degree in Electrical Engineering
- Degree in Industrial Electronic Engineering & Automatics
- Degree in Industrial Technology Engineering
- Other equivalent university degrees (at the discretion of the academic committee).

ENTRY PROFILE CAREER OPPORTUNITIES

Graduates will be able to work as designers, project managers, researchers or maintenance managers in the sector of renewable energies and power systems, of course, but also in others sectors such as electro-mobility, machine tools, etc.

ABOUT THE COURSE

Teaching place: Faculty of Engineering - Gipuzkoa
Ecole Supérieure des Technologies Industrielles Avancées (ESTIA) (Biarritz, France).
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External Internships and Master Thesis Project: 6 months between May and December
The schedule is adjusted each year taking into account all the important restrictions.

TRAINING SYLLABUS

Compulsory subjects:
- Introduction to Smart grids 3 ECTS
- Grids Operation and Control 3 ECTS
- Communications in Smart grids 3 ECTS
- Power Converters 3 ECTS
- Modelling and Control of Storage Systems and Associated Converters 3 ECTS
- Disturbances and Protections in Smart grids 3 ECTS
- Control of the Machine-Side Converter-Generator Set 4,5 ECTS
- Dynamic Modelling of Distributed Generation Sources 3 ECTS
- Management and Control of Smart grids and Microgrids 4,5 ECTS
- Component Connection to the Grid by DC/AC Converters 3 ECTS
- Demand Side Management (DSM) 3 ECTS
- Implementation of Smart grids Control Algorithms 3 ECTS
- Modelling and Control of Renewable Generation Farms and Participating with Ancillary Services 3 ECTS
- Seminars and Visits 3 ECTS
- Application to Concrete Projects 6 ECTS

Optional subjects:
- Research Methodology 3 ECTS
- Industrial Informatics 3 ECTS
- Introduction to the Electric Power System 3 ECTS
- Modelling and Control of Wind Turbines 3 ECTS
- Fuzzy logic. Application to microgrids 3 ECTS

Internship and Master Thesis:
- Internship 18 ECTS
- Master Thesis 12 ECTS

STUDY LOAD

<table>
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<tr>
<th>Compulsory subject courses</th>
<th>Optional subject courses</th>
<th>Internship and Master Thesis</th>
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<td>9 ECTS credits</td>
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TOTAL: 90 ECTS credits
## Academic information:
Haritza Camblong Ruiz  
**Phone:** +34-943018681  
**Email:** gie.smartgrids@ehu.eus

## PARTNER WITH A COOPERATION AGREEMENT

| 1. Ikerlan          | 16. Indar Electric S.L.          |
| 2. Jema            | 17. Ingeteam                    |
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