

Electrical and Electronics  
Engineering  
2024-2025  
Master Semester 2

Course  
Smart grids technologies  
**Course Introduction**

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# Course objectives



The course focuses on the latest **technologies** and **methodologies** for the **monitoring**, **operation** and **control** of the **current and future power systems**.

The course has four main blocks:

1. **Modern monitoring of power systems:** synchrophasors estimation, time dissemination/alignment and phasor measurement units.
2. **Power grid calculus:** topology assessment and compound admittance matrix. Numerical solution of the load flow problem using nodal injection and branch flow models. Power systems state estimation and bad data processing/assessment.

# Course objectives



The course focuses on the latest **technologies** and **methodologies** for the **monitoring, operation and control** of the **current and future power systems**.

The course has four main blocks:

3. ***Forecasting techniques*** of loads and stochastic renewables.
4. ***Optimal power flow problems***: deterministic and stochastic OPF problems. OPF applications.

# Learning outcomes

By the end of the course, the student must be able to:

- *Design monitoring and control platforms for smart grids*
- *Test a smart grid*
- *Implement a smart grid*
- *Analyse performances of a smart grid*

# Students' activities

- *Attend lectures and labs*
- *Do lab homework*
- *Quizzes*

# Teaching approach and exam



Each week is normally structured with **lectures** and **labs** using different software tools.

Uploading lab reports (homework) is mandatory but **does not count for the final grading**. It is, **however, a suggested homework for the quizzes**.

**Quizzes are mandatory** since they are counted for the final grading (see below).

## Grading:

- graded quizzes (in person during classes): 50 %
- written exam: 50 %

# Your TA team



- César García Veloso
- Simone Rametti
- Vladimir Sovljanski
- Willem Lambrechts
- Pål Forr Austnes
- Matthieu Jacobs

# Moodle



All the lectures, lab sessions and mandatory quizzes are reported in the course moodle.

It is highly recommended to use the moodle Q&A forum to ask questions to your teacher and Tas.