Learning outcomes

Future energy systems need to be characterised by a reliable and secure supply to an increasing number of customers while taking into account the rational energy end-use, environmental impact mitigation and sustained performance enhancement.

These considerations are driving major changes in all energy systems with particular reference to the electrical infrastructure. The most evident evolution is the significant increase of connections of renewable energy resources (RERs) to electrical grids. Indeed, the promotion of RERs and, in general, distributed generation, has resulted in the need to develop new tools able to manage the increasing complexity of electrical grids and, also, of the relevant coupled energy systems.

The challenges associated in the near-term deployment of suitable energy storage systems, dedicated large-scale telecommunication infrastructures, as well as new concepts for the optimal operation of the electrical grids, are the core aspects of this Master program.

Within this context, the main learning outcomes for students participating in the EPFL MSc program in Smart Grids Science and Technology will be:

- integrated methodological approaches to address multi-disciplinary problems of energy conversion systems with particular reference to the electrical one;
- innovative approaches for the solution of complex optimal problems ranging from planning to real-time operation of electrical systems;
- applied concepts deployed within the experimental infrastructure available in the campus.
Thematic areas and program draft

The program is organized in order to provide four main areas of competence:

1. Mathematical methods for the optimal control of complex systems (electrical and telecom networks);
2. Energy networks with particular reference to electrical grids;
3. Energy conversion systems principles and modeling;
4. Advanced control systems theory applied to components and complex systems.

Program Structure

The Master program in Smart Grids Science and Technology consists of 120 ECTS (European Credit Transfer System).

One year and a half of courses, lab, project and internship (90 ECTS).

Students follow the mandatory coursework, which consists of core courses (15 ECTS), a semester project (11 ECTS), a teaching lab (4 ECTS) and courses in humanities and social sciences (6 ECTS). The remaining credits are to be obtained with concentration courses (24 ECTS). The cycle can be completed with a minor (30 ECTS), or a long internship in industry (30 ECTS). The Master program is to be completed with a master thesis (30 ECTS).

Internship in industry

Internship in a company is an integral part of the Master cursus in Smart Grids Science and Technology. This is an excellent opportunity for the student to get a crucial insight into the day-to-day work-flow in industry and also offer to the company his broad expertise and skills in the domain.

A four-month Masters project (30 ECTS)

Under the supervision of our faculty, the student performs a research project. The project can be carried out in one of our research laboratories, in a company, or in another university (Switzerland or elsewhere).

Language

The working language of the Master is English.
Detailed study plan and rules

http://sel.epfl.ch/smartgrids

Candidates profile

The EPFL reputation has been earned by producing multi-disciplinary engineers who solve complex problems by applying innovative approaches. Following this path, the EPFL MSc in Smart Grids Science and Technology is open to candidates characterized by multi-disciplinary attitudes and who are motivated to grow within a unique learning environment in which new methodologies and technologies meet the challenging area of Smart Grids.
Welcome message

On behalf of the EPFL Section and Institute of Electrical Engineering, together with the teaching staff who has joined the Electrical Engineering Master in Smart Grids Science and Technology (MSc-SGST), I would like to introduce you to this high-level teaching program.

The electricity sector is experiencing deep changes and evolutions. The new challenges of Smart Grids require high-profile engineers capable of understanding, and solving, multi-disciplinary problems that integrate energy conversion systems together with power and telecommunication networks.

We invite you to send your application and join us in this inspiring teaching program.

Best regards

Mario Paolone