SENSE – Smart Electrical Networks and Systems
Hans Edin, March 14, 2019

Smart Grids – The electricity system for the future
In SENSE we will teach you have to make it

Further information: Hans Edin (Coordinator)
edin@kth.se +46 8 7907639
Program background

- A European Master program within EIT – European Institute of Innovation and Technology and in the Knowledge and Innovation Community (KIC) termed “InnoEnergy”

- The program is organised by a consortium of 7 European Universities and is coordinated by KTH

- Industrial support that will support the program and provide thesis work and future careers opportunities

- Mobility demand & opportunity: You have to study at two different universities in two different countries (First year at KTH and a second year at another univ.)

- You will achieve a double (dual) degree from the two universities, i.e. a degree from each university

- You will achieve a diploma/certificate from EIT/KIC InnoEnergy

Aim of program

- To provide the most suitable education that prepares the students for an international career in the electric power engineering area with a specific focus on the “Smart Grids” concept - that is the power system of the future.

- To provide an education with an enhanced focus on entrepreneurship, innovation and business creation, in particular within the field of electric power engineering and ”Smart Grids”
A traditional electric power grid

Uni-directional Power flow

Bi-directional Power flow

Towards a smart grid

www.innoenergy.com

What will be new in the future?
Important concepts in the future electric power system

Communication aspects...
HVDC supergrid – from point-to-point towards an HVDC www

The two years in SENSE
First study year at KTH

KTH Autumn Semester courses Per 1-2
*)EI2600 Innovation and Entrepreneurship in Electric Power Engineering, 6 ECTS
*)EI2455 Smart Electrical Networks and Systems 3,75 ECTS/7,5 ECTS
EG2100 Power System Analysis, 6 ECTS
EJ2201 Electrical Machines and Drives, 6 ECTS
EJ2301 Power Electronics, 6 ECTS
One elective course. In total. Min 30 ECTS

KTH Spring Semester courses Per 3-4
*)EI2610 Industrial Innovation Project, 12 ECTS
*)EI2455 Smart Electrical Networks and Systems 3,75 ECTS/7,5 ECTS
Elective courses, in total. min 30 ECTS

*) Courses specifically designed for SENSE
The EI2455 "SENSE" course involves many KIC Added Value Activities
First study year at KTH - Special SENSE activities

Autumn

August XX Program KIC-OFF/Welcome meeting
Aug XX Individual "intervju" meetings with Hans
August XX Courses start
Core courses in electric power engineering
Course: EI2455 Smart Electrical Networks and Systems
- SENSE module 1 – Intro Smart Grids.
- SENSE module 2 in Grenoble and Barcelona (week 42. Prel. (Sunday – Friday, Saturday, Sunday))
- SENSE module 3 on Power Quality in Krakow (Prel. Early Dec)

Course: "Innovations in Electric Power Engineering (EI2600)"
- Guest Lectures
Course: "Smart Electrical Networks and Systems"
- Guest Lectures
- Study Visits
Industrial training activities. Industrial Innovation Project Brainstorming.
Short course on Battery Storage given by Uppsala

Spring/Summer

Industrial innovation project, towards an industry in some way (12 hp)

SENSE module 4 on HVDC supergrids at KTH
- Study visits to ABB in Västerås and Ludvika

SENSE module 5 on ICT as enabler for smart grids

MEET event (Late May/early June)
- All 2nd year students come here and presents their MSc thesis topics
- 1st year students (YOU) present their industrial innovation projects

ESADE B&E summer school in Barcelona (July)
Innovation and Entrepreneurship activities in SENSE

- **V1** EI2600 Innovations and Entrepreneurship in Electric Power Engineering
- **Y1** EI2610 Industrial Innovation Project
- **Y2 Master Thesis** (too a high extent in a company or related to a company)

*) In general focus on thematic field, INP Grenoble has an innovation course

---

Second study year opportunities and specialisations

- **Grenoble INP, France**
  Energy management in Buildings and Power Grids

- **KU Leuven, Belgium**
  Power Distribution and Storage

- **TU/e Eindhoven, The Netherlands**
  Sustainable Electrical Energy Systems

- **UPC, Barcelona, Spain**
  Power Electronics as Enabling Technology for Renewable Integration

30 ECTS in Y2 is the MSc thesis and can be done anywhere in the world (but is examined from the Y2 university). Industry or business connection is mandatory.