



T-866-POEL

POWER ELECTRONICS

6 ECTS

Year of study: First year MSc.
Semester: Fall. *In fall semester 2020, the course is taught as a 12-week course with RT PWR 1003 Power Electronics in the Department of Applied Engineering.*
Level of course: 5. Second cycle, intermediate.
Type of course: Elective. *Recommended elective for MSc Electrical Power Engineering.*
Prerequisites: No prerequisites.
Schedule: Taught either as an intensive 3-week course with 4 teaching hours each day, or as a 12-week course with 6 teaching hours a week. *In fall semester 2020, the course is taught 6 hours a week for 12 weeks.*
Supervisor: Ragnar Kristjánsson.
Lecturer: Guðmundur Kristjánsson.

Learning outcome:

Knowledge

- Students should learn basic ideas of how to generate AC voltage from DC and DC voltage from AC voltage
- Students should learn basic ideas of how to control electric power
- Students should learn the fundamental operation and performance of power electronics.

Skills

- They should be able to calculate the main values of power electronic circuits
- They should be able to use main methods of power electronic converters
- They should gain adequate experience and skills of using computer simulation to design and test simple converters.
- Their experience of group working/discussion for solving the problems and presenting their solutions, should be developed.

Competence

- They should be able to describe, analyze, design and calculate simple power electronic converters behaviour.
- They should be able to investigate, simulate and evaluate simple power electronic converters performance.

Content: Introduction to power electronics and electronic switches. Power computations for AC waveforms. DC-DC converters; the buck converter, the boost converter and non-ideal switches and converter performance. DC Power Supplies; the flyback converter, the forward converter, and full-bridge and half-bridge DC-DC converters. DC-AC inverters; full and half-bridge converters, pulse-width-modulated output, and three-phase inverters. AC-DC rectifiers; half-wave, controlled half-wave, full-wave, single-phase, full-wave, controlled and three-phase. AC voltage controllers; single-phase and three-phase. Resonant converters. Drive circuits, snubber circuits, and heat sinks.

Reading material: Daniel M. Hart, *Power Electronics*, McGraw-Hill 2011.

Teaching and learning activities; Assessment methods: Will be introduced in the learning management system Canvas at the beginning of the semester.

Language of instruction: English.

All course descriptions may be subject to change. Updated information on the course schedule, reading material, teaching and learning activities, and assessment methods will be introduced in the learning management system Canvas at the beginning of the semester.