

REM+ Master Course Descriptor

Title:

TET4575 – Power Electronic Systems and Components, Specialisation Course

Credit value:

7.5 ECTS

Mandatory/Optional:

Mandatory

Semester:

1

Lecturer/s:

Professor Roy Nilsen (Course Coordinator), and several other lecturers from the Dept. of Electric Power Engineering.

University:

Norwegian University of Science and Technology (NTNU)

Department:

Department of Electric Power Engineering

Rationale:

Specialisation courses are designed to supplement the background and knowledge required by the students to initiate and conduct supervised research in their subsequent thesis work.

Objectives:

The objective of this specialisation course is to impart in-depth knowledge on the following advanced topics in power electronic systems and components.

- Solid-state components (pn diode, IGBT, MOSFETs, thyristors and WBG devices) and information on gate drivers, packaging, reliability and snubber circuits.
- Design aspects of converters (magnetics, filters, cooling system, testing procedures, sensors)
- Modulation schemes
- Advanced control topics in PE
- Grid integration of converters
- Laboratory: Building or testing of PE converters or use of the PESC Control Platform for control purposes (can include emulation)

Note: The specific topics listed above are subject to change. Changes will be indicated at the start of the semester.

Skills: *(according to the list of skills provided)*

Subject skills	More Master Skills						
	L2.1	L2.2	L2.3	L2.4	L2.5	L2.6	L2.7
L3.1. Obtain specialised exposure to select-few topics on advanced topics in power electronic systems and components.	X	X	X				
L3.2. To acquire skills in group work and in working independently, acquire critical thinking through analysis and synthesis, systematically organize information, and create effective assignment/project reports.						X	X

Teaching and learning methods:

The course methodology includes various techniques such as individualised and group learning methods, combining both throughout the whole learning process. Lectures, tutorials, lab, and project are typically used:

1. *Lecture format with oral and audiovisual presentations. Also includes guest lectures.*
2. *Assignments/lab work/project work.*
3. *Individual/group monitoring of the learning process is done through mentoring/guidance by the lecturers.*

Allocation of student time:

A typical estimate is as given below.

	Attendance (classroom)	Non attendance (lecture preparation, self study...)
Lectures	56 hours	84 hours in total of self-preparation; this also includes group project work.
Assignments/Project	28 hours	

Assessment:

The Assessment rules might vary from year to year. The students will be notified at the beginning of the semester of such changes. For further details, the student is referred to the course webpage at NTNU.

*Sample procedure for assessment of the course:
Lab-based course project, and/or assignments.*

Assessment Matrix:

Note that this is a sample example of just one of the several assessment options that could be put in use. The exact assessment scheme will be made available at the semester start.

Subject skills	Assessment method				
	Exam	Presentation	Homework	Report	Lab Participation
L3.1.				50%	50%
L3.2.				50%	50%

Programme:

Depending on the coordination among different teachers involved in the course, the course schedule will vary from year to year; the schedule will be released at the start of the semester.

Resources:

Classroom, Blackboard, laptop, projector, audio, computer room.

All the material necessary to follow the course is facilitated by the course instructors during the course, through 'eLS' (e-Learning System) platform (known as 'Blackboard').

Bibliography:

The required lecture material, notes, and supplementary material will be provided through the e-learning platform.

Further comments:

Deviations: Since the teaching and learning processes are adaptive, there may arise minor deviations in the course schedule and content. For all authoritative information, the student is required to visit the NTNU coursepage and the Blackboard coursepage at the start of the semester.