



Faculty of Health, Science and Technology
Electrical Engineering

Syllabus

Electrical Machines and Transformers

Course Code:	ELGB32
Course Title:	Electrical Machines and Transformers <i>Elmaskiner och transformatorer</i>
Credits:	10
Degree Level:	Undergraduate level
Progressive Specialisation:	First cycle, has less than 60 credits in first-cycle course/s as entry requirements (G1F)

Major Field of Study:

Course Approval

The syllabus was approved by the Faculty of Health, Science and Technology 2016-09-05, and is valid from the Spring semester 2017 at Karlstad University.

Prerequisites

Circuit Analysis (ELGA01) 7.5 ECTS cr and Introduction to Power Engineering (ELGB20) 7.5 ECTS cr, or equivalent

Learning Outcomes

Upon completion of the course, students should be able to:

- give an account of the properties of ferromaterials and basics of analysing magnetic circuits,
- give an account of single phase and three phase transformers,
- perform calculations of single- and three-phase transformers,
- give an account of the construction and operation properties in measuring transformers
- perform calculations of measuring transformers,
- give an account of function in safeprotective-, isolation-, and adjustable transformers
- give an account of the construction and operation properties of direct current, asynchronous and synchronous machines,
- perform calculations of direct current, asynchronous and synchronous machines.

Content

Instruction is in the form of lectures, exercises and mandatory laboratory sessions.

Magnetic circuits: important properties in non-linear magnetic materials, calculations of magnetic circuits, magnetizing losses and magnetizing current.

Transformers: step down and step up transformers, law of induction, transformer theorem, open circuit, voltage drop, equivalent scheme, loss, efficiency, structure, materials, coiling, cooling, three-phase connection, rated current data in switching, transformer testing, short circuit impedance, winding connector, parallel connection of three-phase transformers.

Direct current machines: construction, theory, separate-, shunt-, and series magnetization, armature reaction, commutation, loss, efficiency, start, brake, speed rotation control.

Asynchronous machines: construction, theory, short circuit- and slip-ring machine, loss, efficiency, start, brake, speed rotation control, single phase operation, generator operation.
Synchronous machines: construction, theory, generator and machine operation, over- and under-magnetising, start, phase synkronization, loss, efficiency.

Reading List

See separate document.

Examination

Assessment is based on a written exam and mandatory laboratory sessions and lab reports.

Grades

One of the grades Distinction (VG), Pass (G), or Fail (U) is awarded in the examination of the course. Engineering students are awarded a grade on the scale Distinction (5), Some Distinction (4), Pass (3), or Fail (U).

Quality Assurance

Follow-up relating to learning conditions and goal-fulfilment takes place both during and upon completion of the course in order to ensure continuous improvement. Course evaluation is partly based on student views and experiences obtained in accordance with current regulations and partly on other data and documentation. Students will be informed of the result of the evaluation and of any measures to be taken.

Course Certificate

A course certificate will be provided upon request.

Additional information

The local regulations for studies at the Bachelor and Master levels at Karlstad University stipulate the obligations and rights of students and staff.