



## COURSE DATASHEET

<b>Semester:</b>	2014/15/2
<b>Course:</b>	Power Electronics and microprocessor based driving systems
<b>Code:</b>	VEMKGEM144T
<b>Responsible department:</b>	Institute of Mechanical Engineering
<b>Department code:</b>	MKGEI
<b>Responsible instructor:</b>	Dr. Dénes Fodor

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### Course objectives:

Overview of the delivery semi-conductors, application areas, and application methods.  
Introduction: distributing of the electric energy, partitioning the converters.

### Course content:

Delivery semi-conductors:

Diode, TRIAC, thyristor, GTO, delivery transistor, Power MOSFETs, integrated thyristor – diode, IGBT.

Partitioning the converters.

Detectors:

Dividing them by phase number, cycle number, path number. Working of the base connection for various charging.

Half-driven 1 phase connections.

Generalization of the power-factor, introduce the type-capacity.

Working of the 3 phase detector connection, controller characteristic curves.

Alternating-current choppers.

1 phase alternating-current choppers controllers characteristic curves for various charging. Solid relays.

3 phase alternating-current choppers with out-leaded, and un-out-leaded starpoint. Charging the nullconductor.

Continuous current chopper connection:

Thyristorial continuous-current choppers. Working methods of coagulative circles, sizing, controlling.

Continuous current transformers with transistor. GTO-built continuous current transformers. IGBT transformers.

Inverters:

1 and 3 phase inverters with thyristor. Inverters with transistors. GTO-inverters. IGBT- inverters.

Using the converters:

Static converters: power-packs, non-braking systems. Induction heaters. Welding equipments.

Electrical propulsions: Continuous current propulsion, asynchronous propulsion-frequency changer, synchronous propulsion, speed-control of special engines.

View-points of sizing:

Defences. Snubber current circuits.

Defending semi-conductors from overvoltage and overcurrent.



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### Course content:

Cooling of semi-conductors. Heating-calculating, sizing of the flange cooling.  
Controller electrical circuits. Controllers of thyristors, transistor's driving electrical circuits.  
Power-semiconductor devices, their operation, boundary values and usage. Rectifiers, basis circuits.  
Transformation of electrical energy by rectifiers. Network reflexes, correction of power factor. Over-current, over-voltage and over-heat protection of semiconductors.  
Precondition: Mathematical analysis for engineers I., Electricity

### Requirements, evaluation and grading:

Condition of entering the exam: achieve minimum 30% score on the in-term test, attendance minimum 50% of the lectures. The mark will be assigned on a compulsory written exam based on the result. After the compulsory written test there is a possibility of an oral test.

Score(Mark)

90- 100 (5)

76-89 (4)

61-75 (3)

51-60 (2)

0-50 (1)

### Required and recommended readings:

Monan N., Underland T.M., W. P. Robbins: Power Electronics. Converters, Applications and Design. Wiley 1995.  
Muhammad H. Rashid: Power Electronics, Circuits, Devices and Applications Prentice-Hall 1993.  
Schmidt István, Vincze Gyuláné, Veszprémi Károly: Villamos szervo és robothajtások. Műegyetemi Kiadó 2000.  
Halász S.: Automatizált villamos hajtások I. II., Tankönyvkiadó, 1989. 1998