

DESCRIPTION OF THE COURSES

- Course code: ELR3210
- Course title: **MODELLING AND SIMULATION OF CONVERTER-FED DRIVES**
- Language of the lecturer: polish

<i>Course form</i>	<i>Lecture</i>	<i>Classes</i>	<i>Laboratory</i>	<i>Project</i>	<i>Seminar</i>
<i>Number of hours/week*</i>	1		2		
<i>Number of hours/semester*</i>	15		30		
<i>Form of the course completion</i>	<i>credit</i>		<i>credit</i>		
ECTS credits					
Total Student's Workload					

- Level of the course (basic/advanced): advanced
- Prerequisites:
- Name, first name and degree of the lecturer/supervisor: Czesław T. Kowalski, dr hab. inż.
- Names, first names and degrees of the team's members: dr inż. Krzysztof Dyrzcz, dr inż. Marcin Pawlak, dr inż. Krzysztof Szabat
- Year:.....2..... Semester:.....2.....
- Type of the course (obligatory/optional): optional
- Aims of the course (effects of the course): modeling and simulation converter fed drives
- Form of the teaching (traditional/e-learning): traditional
- Course description: Typical computer simulation tasks for converter systems, numerical integration methods, algorithmic and simulation programming languages. Mathematical models of elements of converter systems, electrical machines, load machines, control systems. Review of universal software packages for simulation of converter-fed systems. Simulation package TCAD – description of the software, simulation models of elements, libraries. Application examples of TCAD in modelling of DC and AC converter-fed drives.
- Lecture:

<i>Particular lectures contents</i>	<i>Number of hours</i>
1. Typical computer simulation tasks for converter systems.	2
2. Methods of analysis and simulation of converter systems.	2
3. Mathematical models of elements of converter systems, electrical machines, load machines, control systems.	2
4. Review of universal software packages for simulation of converter-fed systems.	2
5. Simulation package TCAD – description of the software, simulation models of elements, libraries – part 1.	2
6. Simulation package TCAD – description of the software, simulation	1

models of elements, libraries – part 2.	
7. Application examples of TCAD in modelling of DC converter-fed drives.	2
8. Application examples of TCAD in modelling of AC converter-fed drives.	2

- Classes – the contents:
- Seminars – the contents:
- Laboratory – the contents:

1. Application of TCAD for modelling of electrical and power electronic circuits.
2. Application of TCAD for modelling of non-controlled rectifiers (4d,6D)
3. Application of TCAD for modelling of controlled rectifiers (4T, 6T).
4. Modelling of PWM generation systems and transistor bridge H type.
5. Modelling of DC motor.
6. Application of TCAD for modelling of DC converter-fed drives (cascade structure) –part 1.
7. Application of TCAD for modelling of DC converter-fed drives (cascade structure) –part 2.
8. Modelling of AC motor.
9. Modelling of PWM frequency converter.
10. Application of TCAD for modelling of AC converter-fed drives - part1.
11. Application of TCAD for modelling of AC converter-fed drives - part1.
12. Modelling of the direct field oriented control of the induction motor.

- Project – the contents:
- Basic literature:

Orłowska-Kowalska T., Bezczujnikowe układy napędowe z silnikami indukcyjnymi, Oficyna Wydawnicza Politechniki Wrocławskiej 2005

Szczęśny R., Komputerowa symulacja układów energoelektronicznych, Wydawnictwo Polit. Gdańskiej, 1999

Osowski S., Modelowanie układów dynamicznych z zastosowaniem języka SIMULINK, Oficyna Wydawnicza Polit. Warsz., 1997

Tunia H., Winiarski B., Podstawy energoelektroniki, WNT, Warszawa 1994

- Additional literature:

1. TCAD instruction guide
2. Barlik R., Nowak M., Technika tyrystorowa, WNT 1994
3. Tunia H., Kaźmierkowski M., Automatyka napędu przekształtnikowego, PWN, Warszawa, 1987

- Conditions of the course acceptance/creditation: credit

* - depending on a system of studies