

DESCRIPTION OF THE COURSE

- **Course code:** ARR3104
- **Course title:** SERVO-MOTOR COMPONENTS OF AUTOMATICS
- **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		1		
<i>Number of hours/semester*</i>	15		15		
<i>Form of the course completion</i>	<i>Written test</i>		<i>Completion of lab. exercises</i>		
ECTS credits					
Total Student's Workload					

- **Level of the course:** advanced
- **Prerequisites:** Completed basic courses of Electrical Machines and Electric Drives
- **Name, first name and degree of the lecturer/supervisor:**
Krzysztof Makowski Ph.D. D.Sc. Eng.
- **Names, first names and degrees of the team's members:**
Ignacy Dudzikowski, Ph.D. D.Sc. Eng., Jan Zawilak Ph. D. D.Sc. Eng.,
Ludwik Antal Ph.D. D.Sc. Eng.
- **Year:** 1 **Semester:** 2
- **Type of the course:** optional
- **Aims of the course** (effects of the course):
To learn about construction, methods of determination of parameters and performance characteristics of the micro-motors, methods of control and operating electromechanical converters applying in industry automatic systems.
- **Form of the teaching:** traditional
- **Course description:** Micro-machines for automatics – basic requirements. Type of micro-machines: DC/AC commutator motors, single-phase induction and synchronous motors. Stepper motors: methods of control, mechanical characteristics, applications. Position transducers: selsyn control transformers, synchro-control transformers. Speed converters: DC/AC rate generators, speed and position measuring systems. DC servomotors: field and armature control systems. AC servomotors: two-phase induction motors, voltage and torque equations. Typical automatic control systems with electro-machines.

- **Lecture:**

<i>Particular lectures contents</i>	<i>Number of hours</i>
<i>1. General description of the micro-machines for automatics – basic requirements. Methods of analysis.</i>	2
<i>2. Types of micro-machines: DC/AC commutator motors, single-phase induction and synchronous motors.</i>	2
<i>3. Stepper motors: principle of operation, methods of control,</i>	

<i>mechanical characteristics, applications</i>	2
4. <i>Position transducers: synchro-control transformers, selsyns and selsyn systems, transformer synchro-system</i>	2
5. <i>Speed and position converters: DC rate generators, two-phase induction rate generators, synchronous rate generators, speed and position measuring systems.</i>	2
6. <i>DC servomotors: principle of construction and operation, field and armature control systems.</i>	2
7. <i>AC servomotors: principle of construction and operation, two-phase induction servomotors, voltage and torque equations.</i>	2
8. <i>Practical control systems with electro-machines used in automatics.</i>	1

- Classes – the contents:

- Seminars – the contents:

- **Laboratory** – the contents:

Includes testing of the S-MCA operated in typical control systems:

1. Testing of synchronous micro-motor. 2. Testing of selsyn system. 3. Testing of two-phase servomotor. 4. Testing of commutator servomotor. 5. Testing of induction rate generator. 6. Testing of DC rate generator.

- Project – the contents:

- **Basic literature:**

1. Praca zbiorowa, *Elektryczne maszynowe elementy automatyki*, WNT, Warszawa 1983.

2. Sochocki R. : *Mikromaszyny elektryczne*, O. Wyd. PW, Warszawa 1996.

3. Wróbel T.: *Silniki skokowe*, WNT, Warszawa 1993.

- **Additional literature:**

1. Chruszczew W.W., *Elektromaszynowe elementy automatyki. Teoria i obliczanie*. PWN, Warszawa 1973.

2. Smith J., *AC micro-machinery*, Cleredon Press, New York 1994.

- **Conditions of the course acceptance/creditation:** Passing of a written text and completion of lab. exercises.

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* - depending on a system of studies