

DESCRIPTION OF THE COURSES

- **Course code:** ARR3105
- **Course title:** ELECTRIC MICROMACHINES FOR INDUSTRY 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> | 2 | | 1 | | |
| <i>Number of hours/semester*</i> | 30 | | 15 | | |
| <i>Form of the course completion</i> | Pass | | Pass | | |
| ECTS credits | | | | | |
| Total Student's Workload | | | | | |

- **Level of the course:** advanced
- **Prerequisites:** Passed subjects: Electric machines part I and II
- **Name, first name and degree of the lecturer/supervisor:** Ignacy Dudzikowski
Ph.D., D.Sc., prof.
- **Names, first names and degrees of the team's members:** Marek Ciurys M.Sc.,
Dariusz Gierak M.Sc.
- **Year:** 1 **Semester:** 2
- **Type of the course:** optional
- **Aims of the course (effects of the course):**

The aim of the course is to learn: construction, principle of operation, electromagnetic phenomena and electromechanical characteristics of electric micro-machines used in industry automatics.

- **Form of the teaching:** traditional
- **Course description:**

Direct current micro-motors, universal motors, brushless direct current motors, permasyn motors, reluctance motors, single-phase asynchronous motor, asynchronous motors synchronized by reluctance torque, linear and tube induction motors, resolvers, electrostatic motors, tachogenerators.

- **Lecture:**

| <i>Particular lectures contents</i> | <i>Number of hours</i> |
|---|------------------------|
| 1. Direct current micro-motors: commutator, wobble-plate, drag-cup: construction, electromagnetic phenomena, operating proprieties, control | 2 |
| 2. Brushless direct current motors: | |

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|--|---|
| a) constructions: cylindrical, wobble-plate, coreless, | 2 |
| b) control systems, transients of electrical and mechanical quantities | 2 |
| c) operating proprieties and applications - computer hardware, automatics and robotics, audio – video, robots and vehicles drives | 2 |
| 3. Universal motors: construction, electromagnetic torque, phasor diagram, operating characteristics, rotational speed control | 2 |
| 4. Small power permanent magnet synchronous motors (permasyn motors): magnetic circuits structures, electromagnetic torque, starting, applications | 2 |
| 5. Reluctance motors: magnetic circuits structures, reluctance torque, electromechanical parameters, applications | 3 |
| a) synchronous reluctance motors | 1 |
| b) reluctance motors witch switched windings | 1 |
| 6. Asynchronous motors synchronized by reluctance torque | 1 |
| 7. Single-phase asynchronous motor | 2 |
| 8. Linear and tube induction motors | 2 |
| 9. Phase shifters and induction regulators | 2 |
| 10. Resolvers | 2 |
| 11. Electrostatic motors (capacitive) | 1 |
| 12. Tachogenerators | 2 |
| 13. Permanent magnet machines co-operation with controlled rectifiers and with pulse converters | 2 |
| 14. Credit | |

• **Laboratory – the contents:**

1. Permanent magnet direct current micro-motor testing. 2. Brushless direct current motor testing. 3. Single-phase asynchronous motor testing. 4. Pulse converter feed motor testing. 5. Selsyns testing. 6. Universal motor testing.

• **Basic literature:**

1. Glinka T. : Maszyny elektryczne o magnesach trwałych, Wydawnictwo Politechniki Śląskiej, Gliwice 2002
2. Sochocki R.: Mikromaszyny elektryczne, Wydawnictwo Politechniki Warszawskiej, 1996
3. Dudzikowski I.: Silniki komutatorowe o magnesach trwałych, Wydawnictwo Politechniki Wrocławskiej, 1992

• **Additional literature:**

1. Gieras J. F., Wing M.: Permanent magnet motor technology, Marcel Dekker, Inc. New York, Basel 2002
2. Smith, AC micro-machinery, Cleredon Press, New York, 1994

• **Conditions of the course acceptance/creditation:** knowledge of the problems discussed on the course

* - depending on a system of studies

