

## DESCRIPTION OF THE COURSES

- Course code: ELR1214
- Course title: Sensors- properties and application
- 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				
<i>Number of hours/semester*</i>	30				
<i>Form of the course completion</i>	<i>w r i t t e n t e s t</i>				
<b>ECTS credits</b>					
<b>Total Student's Workload</b>					

- Level of the course (basic/advanced): advanced
- Prerequisites: General Physics.
- Name, first name and degree of the lecturer/supervisor: Michał Lisowski, prof., DSc, PhD
- Names, first names and degrees of the team's members:
  1. Leszek Woźny, PhD
  2. Jan Ziaja, PhD.
- Year:.....I..... Semester:.....2.....
- Type of the course (obligatory/optional): optional
- Aims of the course (effects of the course):

Acquaintance of physical and chemical operation basis of ceramic, semiconducting and polymeric sensors. Knowledge about technological parameters influence on sensors parameters. Acquaintance of application range of various sensors.

- Form of the teaching (traditional/e-learning): traditional
- Course description:

Basic sensor properties, metrological, static and dynamic parameters. Sensors in measurement and diagnostic systems, in monitoring and automatics as well. Temperature sensors. Non electric thermometers. Electric sensors: resistive, temperature-sensitive. Wave-guide and pyrometer sensors. Sensors of mechanical parameters. Sensors of stresses, concentrated forces, pressure, displacement, torque moment, linear and rotational velocity. Sensors of flow intensity and fluid amount. Gas sensors. Humidity sensors. Sensors of hydrogen ions concentration (pH). Sensors of nuclear radiation. Sensors of sound intensity and combustion gas concentration in air. Sensors of magnetic field.

- Lecture:

<i>Particular lectures contents</i>	<i>Number of hours</i>
1. The role of sensors and their classification. Basic sensor properties.	2
2. Metrological, static and dynamic parameters Sensors in measurement and diagnostic systems, in monitoring and automatics as well.	2
3. Physical and chemical phenomena used in sensor operation.	1
4. Technologies of solid, thick and thin sensor manufacturing.	2

5. Ceramic and polymer materials used in sensors.	2
6. Non electric thermometers. Temperature sensors: resistance, platinum, nielum, copper and semiconducting.	2
7. Temperature sensors: thermistor, diode and capacity sensors.	2
8. Thermoelectric temperature sensors.	2
9. Wave-guide and pyrometer sensors.	2
10. Sensors of mechanical parameters. Sensors of stresses, concentrated forces, pressure, etc.	2
11. Displacement, torque moment, linear and rotational velocity sensors.	2
12. Sensors of flow intensity and fluid amount. Gas sensors.	2
13. Humidity sensors. Sensors of hydrogen ions concentration (pH).	2
14. Sensors of sound intensity and combustion gas concentration in air.	2
15. Sensors of magnetic field.	1
16. Written test.	2

- Classes – the contents:
- Seminars – the contents:
- Laboratory – the contents:
- Project – the contents:
- Basic literature:
  1. Romer E.: Miernictwo przemysłowe. PWN, Warszawa 1970.
  2. Jabłoński A. i inni: Automatyka przemysłowa. Cz. I. Urządzenia pomiarowe, sterownicze i sygnalizacyjne. Skrypt Pol. Wrocławskiej 1982.
  3. Limann O., Pelka H.: Automatyka (czujniki). WKŁ, Warszawa 1991
- Additional literature:
  1. Gardner J. W.: Microsensors. Principles and applications. John Wiley and Sons. Chichester, 1995.
  2. Wagner E. i inni: Sensors. A comprehensive survey. Vol. 6. Optical sensors. VCH Weinheim 1992.
  3. Ohba R. i inni: Intelligent sensor technology. John Wiley and sos, Chichester 1992.
  4. Fraden J.: AIP hadbook of modern sensors. Physics, designs and applications. AIP, New York 1993.
  5. Rylski A.: Sensory i przetworniki wielkości nieelektrycznych. Skrypt Pol. Rzeszowskiej, 1994
- Conditions of the course acceptance/creditation: Written test passed.

\* - depending on a system of studies