

## DESCRIPTION OF THE COURSES

- Course code: ELR3306
- Course title: TESTING AND IMPROVING OF ELECTRICAL ENERGY QUALITY
- 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>	<i>1</i>		<i>1</i>		
<i>Number of hours/semester*</i>	<i>15</i>		<i>15</i>		
<i>Form of the course completion</i>					
<i>ECTS credits</i>	<i>1</i>		<i>1</i>		
<b><i>Total Student's Workload</i></b>	<i>60</i>				

- Level of the course (basic/advanced): advanced
- Prerequisites: electrical metrology, theoretical electrotechnology
- Name, first name and degree of the lecturer/supervisor: Jerzy LESZCZYŃSKI, Ph.D.
- Names, first names and degrees of the team's members: Grzegorz KOSOBUDZKI, Ph.D.
- Year:..... Semester:.....
- Type of the course (obligatory/optional): optional
- Aims of the course (effects of the course):
- Form of the teaching (traditional/e-learning): traditional
- Course description:  
Parameters characterising the quality of electric energy, requirements, norm regulations. Influence of technical disturbances on the quality and parameters of electric energy. Exploitation characteristics of non-linear receivers introducing deformations in electroenergetic course. Effects of course distortion. Methods of controlling and ways of limiting inappropriate quality parameters. Methods and devices limiting the content of higher harmonics. The laboratory makes: measurements of selected electroenergetic values while the disturbances occur, analysis of the courses of voltages, currents and power transmitted by higher harmonics, recording and analysis of the courses when the assumed parameters are not preserved. Modelling and studying the effectiveness of higher harmonic filters, studying the influence of higher harmonics on the improvement of the correctness of functioning of some electroenergetic devices and gauges. Examining harmonic emissions by energy receivers.
- Lecture:

<i>Particular lectures contents</i>	<i>Number of hours</i>
1. Parameters characterising the quality of the supply voltage. Presentation of the influence of deviations on the electroenergetic network.	2
2. Definition of parameters characterising the quality of electric energy – measurement conditions, legal norms and regulations.	2
3. Influence of distortions on devices and electroenergetic network.	2
4. The notions of power in systems with distorted courses – calculation example.	2
5. Methods of limiting distortions - examples.	1
6. Voltage deviations and flickers.	2
7. Methods of measuring parameters characterising energy value.	2
8. Problems of electric energy quality in the area of Wrocław – examples, energy losses resulting from distortions.	2

- Classes – the contents:

- Seminars – the contents:
- Laboratory – the contents:
  1. Studies on voltage quality – designating voltage deviations, asymmetry, dips, breaks, signal voltages, harmonic and interharmonic – system MEMOBOX 686
  2. Analysis of current and voltage courses – designating harmonic and interharmonic values – system MEMOBOX 604.
  3. Studies of the influence of non-linear receivers on the distortion of courses.
  4. Register and analysis of electroenergetic courses (indirect method)
  5. Studies of the resistance of electric energy receivers on dips and short breaks of supply voltages.
  6. Examining higher harmonic emission by energy receivers.
  7. Power analysis in distorted circuits. – Topas system 1000.
- Project – the contents:
- Basic literature:
  1. Materiały konferencyjne, publikacje
  2. Opracowania własne
  3. R.C. Dugan, M.F. Mc Gramaghan, H. W. Beaty: Electrical Power System Quality, Wyd. MC Graww-Hill 1996
  4. Normy i przepisy prawne
- Additional literature:
- Conditions of the course acceptance/creditation:

\* - depending on a system of studies