COURSE TITLE:	**Power Electronics for Power Quality Improvement**
Institute/Division:	Department of Electrical Engineering Faculty of Electrical and Computer Engineering
Course code:	E-PQ
Erasmus subject code:	0713 Electricity and energy
Number of contact hours	45
Course duration:	1 semester (Fall/Winter)
ECTS credits:	6
Course description:	This course comprises lectures and computer simulations. It covers basic aspects of electric power quality improvement with the use of power electronic converters. Modern non-active powers compensation techniques are discussed. All subjects are clarified and made familiar using exercises and computer simulations. Subjects of the course are listed below: • Electric power definitions • Evolution of electric power theory • Components of load current and power • Detection of non-active load current and power components • Principles of active compensation • Introduction to power electronic converters used for power quality improvement • Single- and three-phase shunt active power filter • UPQC device
Course type:	Lectures (20h), Computer simulations (20h), Project (5h)
Literature (books):	H. Akagi, E. Watanabe, M. Aredes, Instantaneous *Power Theory and Applications to Power Conditioning*, Wiley & Sons, 2007, ISBN 978-0-470-10761-4. M. H. Rashid, *SPICE for Power Electronics and Electric Power*, CRC Press, 2012, ISBN 978-1-4398-6046-5. M. P. Kazmierkowski, R. Krishnan, F. Blaabjerg, *Control in Power Electronics*, Academic Press , 2002, ISBN 0-12-402772-5. E. F. Fuchs, M. A. Masoum, *Power Quality in Power Systems and Electrical Machines*, Academic Press, 2008, ISBN 978-0-12-369536-9.

Literature (journal papers):	L. Asimionaei, F. Blaabjerg, S. Hansen, *Detection is key. Harmonic detection methods for active power filter applications*, IEEE Industrial Application Magazine, July/Aug 2007, pp 22-33. A. Szromba, *Shunt Power Electronic Buffer as Active Filter and Energy Flow Controller*, Archives of Electrical Engineering, vol. 62(1), 2013, pp. 55-75. A. Szromba, *The Unified Power Quality Conditioner control method based on the equivalent conductance signals of the compensated load*, Energies, Vol. 13, Iss. 23, Spec. Iss., 2020 A. Szromba, *Is it possible to obtain benefits by reducing the contribution of the digital signal processing techniques to the control of the active power filter?,* Energies, Vol. 14, Iss. 19, Spec Iss.
Prerequisites:	Basic Circuit Theory
Assessment method:	Project and computer simulations
Contact Person:	Prof. Andrzej Szromba., aszromba@pk.edu.pl