

Course Title: Power Quality Improving Systems	
Institute/Division:	Department of Electrical Engineering Faculty of Electrical and Computer Engineering
Course code:	E-PQIS
Erasmus subject code:	0713 Electricity and energy
Number of contact hours:	35
Course duration:	1 semester (Fall/Winter)
ECTS credits:	4
Course description:	<p>This course comprises lectures and computer simulations. It covers basic aspects of electric power quality improvement with the use of passive LC compensators and power electronic devices (PFC, SAPF, UPQC). Classical compensators and modern compensation techniques based on power electronic converters are discussed. All subjects are clarified and made familiar using lectures, exercises and computer simulations.</p> <p>Subjects of the course are listed below:</p> <ul style="list-style-type: none"> • Electric power definitions • Evolution of electric power theory • Components of load current and power • Principles of passive and active compensation • Introduction to power electronic converters used for power quality improvement • Principles of SAPF and UPQC devices action
Course type:	Lectures (15h), Computer simulations (15h), Project (5h)
Literature:	<p><u>Books:</u> H. Akagi, E. Watanabe, M. Aredes, <i>Instantaneous Power Theory and Applications to Power Conditioning</i>, Wiley & Sons, 2007, ISBN 978-0-470-10761-4. M. H. Rashid, <i>SPICE for Power Electronics and Electric Power</i>, CRC Press, 2012, ISBN 978-1-4398-6046-5. M. P. Kazmierkowski, R. Krishnan, F. Blaabjerg, <i>Control in Power Electronics</i>, Academic Press, 2002, ISBN 012402772-5. E. F. Fuchs, M. A. Masoum, <i>Power Quality in Power Systems and Electrical Machines</i>, Academic Press, 2008, ISBN 978-0-12-369536-9.</p> <p><u>Journal papers:</u> L. Asimionaei, F. Blaabjerg, S. Hansen, <i>Detection is key. Harmonic detection methods for active power filter applications</i>, IEEE Industrial Application Magazine, July/Aug 2007, pp 22-33.</p>

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.

Assessment method: Project and computer simulations

Prerequisites: Basic Circuit Theory

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