



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:	<p>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.</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• 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):	<p>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.</p> <p>M. H. Rashid, <i>SPICE for Power Electronics and Electric Power</i>, CRC Press, 2012, ISBN 978-1-4398-6046-5.</p> <p>M. P. Kazmierkowski, R. Krishnan, F. Blaabjerg, <i>Control in Power Electronics</i>, Academic Press, 2002, ISBN 0-12-402772-5.</p> <p>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>



Literature (journal papers):	<p>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> <p>A. Szromba, <i>Shunt Power Electronic Buffer as Active Filter and Energy Flow Controller</i>, Archives of Electrical Engineering, vol. 62(1), 2013, pp. 55-75.</p> <p>A. Szromba, <i>The Unified Power Quality Conditioner control method based on the equivalent conductance signals of the compensated load</i>, Energies, Vol. 13, Iss. 23, Spec. Iss., 2020</p> <p>A. Szromba, <i>Is it possible to obtain benefits by reducing the contribution of the digital signal processing techniques to the control of the active power filter?</i>, Energies, Vol. 14, Iss. 19, Spec Iss.</p>
Prerequisites:	Basic Circuit Theory
Assessment method:	Project and computer simulations
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