

COURSE TITLE:	POWER ELECTRONICS FOR POWER QUALITY IMPROVEMENT
Institute / Division:	Institute of Circuit Theory and Metrology / Faculty of Electrical and Computer Engineering
Course code:	E1-PQual
Number of contact hours:	45
Duration:	1 semester
ECTS credits:	5
Programme 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. 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 • PFC rectifier
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>
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>Energy controlled shunt active power filter</i>, COMPEL: The International Journal for Computation and Mathematics in Electrical and Electronic Engineering, Volume 26, Issue 4, 2007, pp. 1142-60.</p> <p>A. Szromba, <i>A shunt active power filter: development of properties</i>, COMPEL: The International Journal for Computation and Mathematics in Electrical and Electronic Engineering, Volume 23, Issue 4, 2004, pp. 1146-62.</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>
Prerequisites:	Basic Circuit Theory
Assessment method:	Project and computer simulations
Lecturer:	Andrzej Szromba, PhD, Eng.
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