Title:	**Fundamentals of Signal and Image Processing**
Lecture hours:	30
Study period: (summer/winter)	Winter or summer
Number of credits:	4 ECTS
Assessment methods:	1. Test 50%, 2. Homework 25%, 3. Activity during Lab Exercises - 25%
Language of instruction:	English/French
Prerequisites:	English B1/B2 Basic competences in analysis of algorithms and linear algebra. Programming experience, preferably in MATLAB/SIMULINK, and/or C/C++/Delphi.
Course content:	This course will be divided for two parts concerning the area of Digital Signal Processing and Image Processing and will provide students with theoretical and practical aspects of the field. The signal for processing is mathematically modeled as a function or a sequence of numbers that represent the state or behavior of a physical system. The examples of the signals range from speech, audio, image and video in multimedia systems, electrocardiograms in medical systems (ECG/EKG), to electronic radar waveforms in military. Signal processing is concerned with the representation, transformation, and manipulation of signals and the information they contain. In this semester, we only study the fundamentals of discrete-time signals and systems. The course content includes the concept and the classification of discrete-time signal, representations of signals in time and frequency. The second part of the course is devoted to fundamentals of Image processing problems. The beginning of the course gives an overview of digital image processing systems and digital image fundamentals. During this unit, important elements of human visual perception are reviewed and the concepts of sampling and quantization, are described. Moreover, the unit considers image transform analysis, with a primary focus on Fourier-based techniques. The two-dimensional Fourier transform analysis (Discrete Fourier Transform) and its properties are described.
Learning outcomes:	It is expected that after the course student will gain experience in applying signal and image processing algorithms to real problems and implement and evaluate algorithms using a digital computer. Moreover, the student will develop algorithms for signal and image processing in spatial domain and transform domains and will be prepared to read the current image processing literature.
Name of lecturer:	Michał Pakuła PhD
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Literature:	1. Richard G. Lyons, Understanding Digital Signal Processing, Prentice Hall, 1996. 2. S. W. Smith, The Scientist and Engineer's and Guide to Digital Signal Processing, California Technical Publishing, 1997. http://www.dspguide.com/pdfbook.htm 3. Digital Signal Processing: A Computer-based Approach, 3E, Mitra, S., McGraw Hill, 2005 *Computer Vision and Image Processing*, by Scott Umbaugh, Prentice-Hall, Inc., Upper Saddle River, New Jersey, 1998. 4. Signal Processing Toolbox: User's Guide. For use with Matlab, http://www.mathworks.com/help/toolbox/signal/ Image Processing Toolbox: User's Guide. For use with Matlab, http://www.mathworks.com/help/toolbox/images/