Title: Digital Signal Processing

Lecturer: dr. Urban Burnik, senior lecturer

Aim of the course:

To acquire the fundamental knowledge of digital signal processing systems.

Required (pre)knowledge:

Mathematics, Signals and information

Contents:

Fundamentals of digital signals (properties of digital signals, complex representation, digital signal processing structures, signal classification). Sampling theory (sampling theorem, sampling in time and frequency domain). Quantisation of signals (analog-to-digital conversion, quantization error). Discrete-time systems (discrete linear time-independent systems, causality, differential equations, impulse response, structures of time-discrete systems). Frequency analysis of discrete time signals. Discrete Fourier Transform (algorithms, fast Fourier transform, rapid filtering, window functions).Z transform (Z transformation and inverse Z transformation, rational Z transform, pole-zero position). Analysis and synthesis of discrete-time systems in frequency domain (transfer functions, rational transfer function in Z domain, stability, frequency response). Digital filter design (finite impulse response, infinite impulse response).Multidimensional signal processing aspects (fundamental image processing methods).

Selected references:

McClellan, Schafer and Yoder, DSP FIRST: A Multimedia Approach. Prentice Hall, Upper Saddle River, New Jersey, 1998

Bose, T., Digital signal and image processing, John Wiley and Sons, 2004.