Presentation should include introduction with (mathematical) principles, methodology (with segments of programmes), results (examples with figures and tables), and discussions (with possible applications). This general structure can be modified according to the own proposed topic or a topic selected from the following list:

1. Specification of fundamental programming tools and data structures in MATLAB
2. Two-dimensional and three-dimensional graphics in the MATLAB environment
3. Basic blocks and ideas of data modelling in the SIMULINK environment
4. Principle of the mean square method for data approximation
5. Z-transform, its definition, basic properties and applications
6. Discrete Fourier transform, interpretation and selected properties
7. Spectral analysis, short time Fourier transform and window functions use
8. Two-dimensional discrete Fourier transform in image analysis
9. Difference equations and digital filtering, FIR and IIR filters
10. Explanation of convolution and its use in spectral analysis and filtering
11. The use of discrete Fourier transform for frequency domain filtering
12. Principles of wavelet transform, signal decomposition and reconstruction, signal de-noising
13. Wavelet decomposition and de-noising in image processing
14. Explanation of relation between wavelet dilation and spectrum compression
15. Autoregressive signal modelling and prediction
17. Artificial neural networks in adaptive signal processing
18. Specific problems of environmental signal processing and data modelling
19. Selected problems and methods of biomedical signal processing
20. Problems and methods of biomedical image analysis and Radon transform use
21. Application of autoregressive modelling to prediction of energy consumption
Programme of the colloquium on Monday 14 December 2020

The topic can be selected from the list above or it can be devoted to the topic suggested by the course participant. Presentations should be 10 minutes long with the following discussion of all participants 5 minutes long.

8:30  Cvetkoska Ana (P): Difference equations and digital filtering, FIR and IIR filters
8:45  Hidalgo Ríos Benito (??): 2D and 3D graphics in the MATLAB environment
9:00  Kraus Lorenz Alois (P): Spectral analysis and digital filters
9:15  Pollaris Ewout (P): Discrete Fourier transform, interpretation and selected properties
9:30  Schmiedler Thomas (?): Principle of the mean square method for data approximation
9:45  Martin Hruška (P): Processing of plasmon absorption spectra (DSP, D405, P445008)
10:00 Geiger Niklas Maximilian (??): xxx