Study programmes: Doctoral studies – Mathematics – Probability and statistics

Course name: Spectral theory of stochastic processes

Lecturers: Pavle Mladenović

Status: Optional

ECTS: 9

Attendance prerequisites: Theory of stochastic processes, Stationary stochastic processes

Course aims: Acquiring general and specific knowledge concerning spectral analysis of stochastic processes

Course outcome: Upon completing the course, a student is capable of applying the acquired knowledge and conducting individual scientific research in this field.

Course content: Stationary stochastic processes. Covariance and autocorrelation functions. Discrete parameter models. White noise. AR, MA and ARMA processes. Linear processes. Harmonic processes. Continuous parameter models. Fourier series of periodic functions. Spectral analysis of periodic functions. Spectral analysis of stationary processes. Spectral measure. Spectral density. Relationship between spectral density function and the autocovariance and autocorrelation function. Estimation of the mean. Estimation of autocovariance function. Estimation of parameters in standard models. Estimation in the frequency domain. Periodgram. Asymptotic properties of periodgram. Estimation of spectral density. Periodgram estiamtion. Speectral windows and consistent estimators. Estimation of spectral function. Application pf spectral analysis of stationary processes.

Literature:

M.B. Priestley, *Spectral Analysis and Time Series*, Academic Press, Inc. London, 1981.

Number of hours : 10	**Lectures**: 4	**Research:** 6

Teaching and learning methods: Frontal / Individual

Assessment (maximal 100 points)

Course assignments	points	**Final exam**	points
homework	20	Written exam	
Exercises / Tutorials		Oral exam	60
Colloquia			
Essay / Project	20		