Module 'Stochastic Processes'				
Code	**Workload**	**Credits**	**Turnus**	**Duration**
MGE-GES-07-01-20182	180 h	6.0 LP	Winter semester	1 semester

Module coordinator

Prof. Dr. techn. W.-D. Schuh

Module lecturers

Prof. Dr. techn. W.-D. Schuh; MSc T. Schubert; Dr. M. Reguzzoni

Providing teaching unit(s)

Institute of Geodesy and Geoinformation

Course program usability

Program of study	Mode	Semester
Geodetic Engineering (MSc)	elective module (profile GES)	3rd regular semester
Geodesy and Geoinformation (MSc)	elective module	3rd regular semester

Learning objectives

Acquisition of expert knowledge on data analysis of deterministic and stochastic signals processing; Ability to apply the most relevant techniques to analyze and transform deterministic and stochastic signals

Key competences

Ability to collect, describe, evaluate, and to interpret scientific information and to draw scientifically founded conclusions; Ability of recognition and application of complex topical relationships; Competences in transfer of knowledge to other techniques

Learning content

Deterministic signal processing for periodic and non periodic, continuous time series (amplitude and phase spectrum, Parseval theorem, Fourier transform, convolution) Transition from continuous to discrete time series (Dirac Delta distribution, sampling theorem, window-function, discrete Fourier transform, discrete cyclic and linear convolution); discrete digital filters (design in time domain and frequency domain).

Stochastic signal Processing:Interpolation Theory - Collocation - Least Squares Collocation - Wiener Filter - Empirical Covariance Estimation - Covariance Models - Example of 1D Time Series Filtering - Example of 2D Inverse Gravimetric Problem - Example of Gravimetric Geoid Determination - MATLAB Software Development

Prerequisites for admission to the module

none

Courses

Teaching method	Topic	Group size	Time of contact	Workload
1L+1Ep+1S	Stochastic Processes	6	40 h	120 h
1L+1Ep	Collocation and Applications	3	35 h	60 h

Academic performance

Type of academic performance	un/marked
Oral and/or written coursework	unmarked

Examination

Type of examination (Duration in minutes)	un/marked	Weight
Oral examination – Stochastic Processes (25 min)	marked	60 %
Assignment	marked	40 %

Further information

References:

Buttkus, Burkhard (2000): Spectral Analysis and Filter Theory in Applied Geophysics. Berlin; New York: Springer

Brockwell, Peter J., and Richard A. Davis (2006): Time Series: Theory and Methods. 2. ed., Reprint of the 1991 ed. Springer Series in Statistics. New York, NY: Springer

	Hamming, W. (1998): Digital Filters. 3. ed., Dover Publications.
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