Title of course	**Signals and Systems**
Responsible instructor	*Prof. Dr. Martin Golz*
Learning objectives	*The students will get the opportunity to* - Analyse typical problems of signal processing, - *Comprehend integral transforms of continuous functions,* - Comprehend the discrete Fourier transforms of sequences, - *Comprehend and apply the discrete Fourier transform,* - Comprehend and apply digital filters, - Comprehend and apply spectral estimation of stochastic signals, - *Comprehend and apply time-frequency analysis,* - Know some of the mathematical background issues.
Course contents	*8. Introduction* *9. Fourier integral* *9.1. Integral transforms, Fourier kernel* *9.2. Dirichlet conditions, properties* *9.3. Elementary signals* *9.4. Signal energy, signal power, decibel, band width* *10. Fourier series* *11. Convolution* *12. Sampling theorem* *13. Discrete Fourier transform* *13.1. Properties* *13.2. Discrete Walsh transform, z-transform* *14. Linear, time-invariant systems* *14.1. Properties* *14.2. Impulse response, transfer function, Bode plot* *14.3. Pole-Zero plot, stability* *14.4. State space description* *15. Stochastic signals* *15.1. Properties* *15.2. Probability density function* *15.3. Wiener-Khinchin theorem, power spectral density* *15.4. Cepstrum* *15.5. Spectral estimation* *15.6. Applications* *16. Time-frequency analysis* *16.1. Short-time Fourier transform* *16.2. Gabor series* *16.3. Wavelet transform* *16.4. Applications*
Teaching methods	*- Frontal lectures with* o Digital presentation slides, o Demonstration programs *- Exercises held in the computer pool*

	o Programming with MATLAB and signal processing toolbox o Clarification of open issues
Prerequisites	*No formal requirements* *Basic knowledge in linear algebra, analysis, statistics*
Suggested reading	*The following books are recommended:* *- Oppenheim (1997) Signals and systems. Prentice Hall* *- Haykin, van Veen (2003) Signals and systems. Wiley* *- Percival, Walden (2000) Wavelet methods for time series analysis. Cambridge University Press*
Applicability	*This module is an obligatory subject.* *An appropriation to similar majors is possible under stipulation of their examination regulations.*
Workload	*Total 150 hours. Attendance: 60 hours, Self-Study: 45 hours, Exam Preparation 45 hours*
ECTS credit points and weighting factor	*5 CP (Emphasis of the Grade for the final Grade 5/120)*
Basis of student evaluation	*Oral examination (30 minutes)*
Time	*1st Semester*
Frequency	*Once during the academic year*
Duration	One semester
Course type	*Obligatory subject*
Remarks	Teaching language is English.