

### 2.3.4 Signals and Systems

<b>Signals and Systems</b>
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<b>Module Summary</b>
Module code: EEIB340
Module coordinator: Prof. Dr. Manfred Strohrmann
Credits (ECTS): 6 Points
Semester: 3. Semester
Pre-requisites with regard to content: Competencies acquired in lectures Mathematics 1 + 2, Physics and Analog Electronics
Pre-requisites according to the examination regulations: Regarding to the examination regulations no pre-requisites are required
Competencies: Participants will be able to describe and analyze linear, time-invariant systems in the time, Laplace, and frequency domains by <ul style="list-style-type: none"> <li>• describing signals in the time domain with mathematical functions</li> <li>• applying the Laplace transform to continuous-time signals</li> <li>• reading system properties from impulse responses and transfer functions</li> <li>• determine spectra of energy and power signals</li> <li>• construct and interpret Bode diagrams of linear, time-invariant systems</li> <li>• to develop an interdisciplinary understanding of systems that can be used to capture, control and simulate dynamic systems.</li> </ul>
Assessment: Exam, 120 minutes
Usability: This module lays the systems theory foundations for Control Theory as well as Modeling and Simulation. Furthermore, the module is essential for the Lecture Theory of Digital Systems.

<b>Course: Signals and Systems</b>
Module code: EEIB341
Lecturer: Prof. Dr. Manfred Strohrmann
Scope of weekly semester hours (SWS): 4
Semester of delivery: Winter semester
Type/mode: Lecture, Compulsory subject
Language of instruction: English
<ul style="list-style-type: none"> <li>• Content:</li> <li>• Signals in the time domain, signal algebra, impulse function, correlation function</li> </ul>

- Systems in the time domain, differential equation, system properties, impulse response, convolution
- Signals in the Laplace domain, Laplace transformation
- Systems in the Laplace domain, transfer function, switching on and switching off processes
- Spectrum of signals, Fourier series, Fourier transform
- Frequency response of systems
- Basics of filter design

- Recommended reading:
- Oppenheim, Alan: Signals, Systems and Inference, Pearson, 2017
  - Chaparro, Luis: Signals and Systems using MATLAB, Academic Press, 2018

<b>Course: Signals and Systems Lab</b>
Module code: EEIB342
Lecturer: Prof. Dr. Manfred Strohrmann
Scope of weekly semester hours (SWS): 2
Semester of delivery: Winter semester
Type/mode: Labor, Compulsory subject
Language of instruction: English
Content: <ul style="list-style-type: none"> <li>•</li> </ul>
Recommended reading: <ul style="list-style-type: none"> <li>• Presentations and Media on Ilias learning platform</li> <li>• Oppenheim, Alan: Signals, Systems and Inference, Pearson, 2017</li> <li>• Chaparro, Luis: Signals and Systems using MATLAB, Academic Press, 2018</li> </ul>