

Module name	Communications Engineering
Module number	Eul-ET-C-NT, Eul-BMT-C-NT, Eul-IST-E-NT, Eul-MT-E-NT
Lecturer in charge	Prof. Dr.-Ing. Dr. h.c. Gerhard Fettweis gerhard.fettweis@tu-dresden.de
Objectives	After completing the module, students will know the basic principles and practical application of communication. They will be able to understand and mathematically describe the basic signal processing procedures in communication transmission systems. They are familiar with baseband and bandpass transmission and know the most important analog and digital modulation methods. They understand the influence of noise on transmission quality for simple analog and digital transmission scenarios. They will be able to simulate modules of a telecommunications transmission system.
Contents	The module covers the basic modules of transmission technology. The focus is on <ul style="list-style-type: none"> - signal theory, in particular sinusoidal signals, Dirac function, convolution and Fourier transformation, - linear time-invariant systems, in particular transfer function and impulse response, - band-pass signals, in particular real and complex up- and down-mixing of signals and equivalent low-pass signals; - analog modulation, in particular modulation, demodulation, characteristics of AM, PM and FM, - analog-to-digital conversion, in particular sampling theorem, signal reconstruction, quantization, undersampling and oversampling; - digital modulation methods, in particular modulation methods, matched filter receivers and bit error probability as well as - more current topics such as the basic idea of multi-antenna transmission and multi-carrier transmission.
Modes of teaching and learning	2 hours per week lectures, 1 hour per week exercises, 1 hour per week practical lab courses and self-study.
Prerequisites	The skills to be acquired in the module Introduction to Analysis and Algebra, Complex Function Theory and in the Diploma degree programmes Electrical Engineering, Information Systems Engineering and Mechatronics the skills acquired in the first semester of the module Systems Theory and in the Diploma degree programme Biomedical Engineering the skills acquired in the module Introduction to Systems Theory are required.

Usability	<p>The module is a compulsory module in the basic studies of the degree programme Electrical Engineering and a compulsory module in the main studies of the degree programme Biomedical Engineering. Further, it is a compulsory elective module from the compulsory elective area of orientation of the main course of study in the Diploma degree programme Information Systems Engineering in accordance with § 6 section 3 of the study regulations and § 33 section 3 of the exam regulations. It is also a compulsory elective module from the compulsory elective area of Methods and Applications of the main course of study in the Diploma degree programme Mechatronics in accordance with § 6 section 3 of the study regulations and § 33 section 3 of the exam regulations.</p> <p>It creates the prerequisites for the modules that list that module in the "Prerequisites" field.</p>
Requirements for the award of credit points	<p>The credit points are awarded when the module assessment is passed. The module assessment consists of a written exam of 120 minutes. A bonus to the written exam is the completion of 20 hours of exercises.</p>
Credit points and grades	<p>5 credit points can be obtained by the module. The module grade is the grade of the examination.</p>
Frequency	<p>The module is offered every summer semester.</p>
Workload	<p>The total effort is 150 hours.</p>
Duration	<p>The module takes one semester.</p>