### Communication Engineering - IVB001ANVM

Lecture/Practice/Lab: 2/0/1

Credit points: 4

Requirement: Midterm grade

Semester: Spring, 4/7

Prerequisites: Electromagnetic fields

Lecturer: Zsolt Kisander

Department: Department of Automation

This course covers fundamentals of analog and digital communications. We study the related basics of signals and systems (sampling and quantization, modulation, signal detection) and the physical properties of communication systems.

#### Lecture topics

Lecture topics follow the recommended textbook’s chapters.

1. Historical background and related fields. Required topics in mathematics, physics, electronics and information theory.
2. Fourier representation of signals and systems. Mathematical description of signals in time and frequency domain. Fourier series and transformation.
3. Fourier representation of signals and systems. Mathematical description of systems. Convolution and its properties. Filters, amplifiers, attenuators.
4. Physical and electrical properties of signals and systems. Losses, noises, in different transfer media.
5. Wireless transmission. Basics of radiocommunication. Common wireless standards.
6. Amplitude modulation and demodulation.
7. Angle modulations, frequency and phase modulation.
8. PCM and delta modulation.
9. Baseband data transmission. Intersymbol interference. Nyquist channel.
10. Digital modulations (binary), ASK, FSK, PSK.
11. Digital modulations, (quadrature) QAM, QPSK.

#### Lab topics

Recommended readings are the most recent versions of the respective official standards.

1. Industrial, RS232.
2. Industrial, RS422 and RS485.
3. Industrial, Modbus.
4. CAN.
5. Embedded, UART, SPI, I2C.

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#### Midterm requirements and fulfillment

Students must be present on more than 70% of contact classes and/or consultations. Having more than 30% absence results in signature denial.

Midterm assessments:

* One written test after the 10th week (lecture topics). The exact schedule will be voted on by the students.

Students have to complete each assessment with a passing grade to get the signature and the midterm grade. The midterm grade is the arithmetic mean of the assessment results.

| Mark | 5 | 4 | 3 | 2 | 1 |
| --- | --- | --- | --- | --- | --- |
| Grade | Passing | Failed |
| Limits (%) | 85 | 70 | 55 | 40 | < 40 |

#### Exam requirements

Not applicable.

#### Failing the requirements

The Code of Studies and Examinations of the University of Pécs is applicable in general.

* Students have one midterm test retake opportunity before the exam period.
	+ Schedule: 15th week’s lecture
	+ Format: same as the test
* Students without signature have one opportunity to earn a passing midterm grade and signature in the exam period.
	+ Schedule: 1st week of the exam period, lecture time
	+ Format: written test

#### Recommended literature

S. Haykin, M. Moher: Introduction to Analog and Digital Communications (2nd ed), Wiley, ISBN: 0471432229

Official and up-to-date standards of the discussed communication protocols.