

## SYLLABUS: TELECOMMUNICATION

**Date / Revision** August 22, 2017 / 22.08.17 /MaS  
**Faculty** Engineering  
**Study Programm** Mechatronics

### SUBJECT: Telecommunication

#### 1 Basic Information

<b>1.01</b>	<b>Subject Name</b>	<b>Telecommunication</b>
<b>1.02</b>	<b>Semester</b>	5
<b>1.03</b>	<b>Level</b>	1
<b>1.04</b>	<b>SKS</b>	2
<b>1.05</b>	<b>Mandatory / Curriculum</b>	Mandatory / D-10
<b>1.06</b>	<b>Subject Code</b>	TCOM
<b>1.07</b>	<b>Subject Code</b>	MTE-D-TCOM-5110
<b>1.08</b>	<b>Year</b>	2017 (7)
<b>1.09</b>	<b>Quality Control</b>	Final Test, see evaluation
<b>1.10</b>	<b>Limitations</b>	Min 12 and Max 32 students in one class
<b>1.11</b>	<b>Combined with</b>	ELE
<b>1.12</b>	<b>Perquisite</b>	Applied Mathematics, Signal and System 1
<b>1.13</b>	<b>Responsible</b>	Dean of Engineering Faculty
<b>1.14</b>	<b>Revision</b>	22-08-2017/MaS

#### 2 Description of Subject

This course is designed to provide basic information and an overview of the telecommunications principle. The course covers the telecommunication principles, standardization and regulation, the evolution of data communications, the data protocols, analog- and digital-modulation and demodulation.

#### 3 Objectives

- Introduces the concept of analog and digital telecommunication
- introduce the communication protocol

## 4 Competency

After having the course, students are expected have to:

- Describe the nature and kinds of telecommunication.
- Define telecommunication and contrast it to other communication systems.
- Recount and explain the development of telecommunication in general.
- Compare and contrast the communication industries.
- Perform a contemporary analysis of a specific telecommunications outlet (newspaper, radio station, television station, magazine etc.).
- Describe current issues in telecommunication.
- Understand the OSI Layer.
- Understand the communication Protocols.
- Describe the analog- and digital-modulation principle

## 5 Learning Approach / Methodology

- Lectures/ Class contact (time-tabled) supplemented with interactive questions and answers;
- Discussion, sample problem, group work;
- Student Study Effort: homework/assignment; preparation for test/quizzes/ examination.

## 6 Evaluation

5.1	<b>Absence maximum</b>	25%
5.2	<b>Participation in Discussion</b>	05 Points
5.3	<b>Homework / Classwork</b>	05 Points
5.4	<b>Presentation /Simulation</b>	10 Poin
5.5	<b>Daily Quiz</b>	20 Points
5.6	<b>Final Examination</b>	60 Points
	<b>Total</b>	100 Points

## 7 Text Book and Reference

1	<b>Main Text Book:</b> “ <i>The Telecommunications Handbook, Engineering Guidelines for Fixed, Mobile and Satellite Systems</i> ” , <b>Authors / Edited by:</b> Jyrki T. J. Penttinen, <b>Publisher:</b> John Wiley, 2015, <b>ISBN:</b> 9781119944881
2	<b>Supplementary Text books:</b> <ul style="list-style-type: none"> <li>•</li> </ul>

8 Content / Topics of Lecture

Week	Content/ Topics of Lecturing	Text Book	Remark
1	<b>History of Telecommunications</b> <ul style="list-style-type: none"> <li>• The Beginning</li> <li>• Analog Telephony Era</li> <li>• Wireless Era</li> </ul>	Ch1 Part 1.1, 1.2	
2	<b>The Telecommunications Scene:</b> <ul style="list-style-type: none"> <li>• Current Information Sources</li> <li>• Telecommunications Market</li> <li>• Effect of Video Services</li> <li>• Network Scalability</li> <li>• How to Handle Increased Smartphone Signaling</li> <li>• Effects of Online Video</li> </ul>	Ch1 Part 1.3,	
3-4	<b>Standardization and Regulation:</b> <ul style="list-style-type: none"> <li>• Introduction</li> <li>• Standardization Bodies, Industry Forums, Other Entities</li> </ul> <b>Frequency Regulation</b> <ul style="list-style-type: none"> <li>• National Regulators</li> <li>• Guideline for Finding and Interpreting Standards</li> </ul>	Ch2: Part 2.1, 2.2, 2.3 ... part 2.7	Quiz
5	<b>Telecommunications Principles</b> <ul style="list-style-type: none"> <li>• Introduction</li> <li>• Terminology and Planning Principles: Decibel, Erlang, Noise and Interferences,</li> <li>• Other Typical Telecommunications Units</li> </ul>	Ch3 3.1, 3.2 3.3	
6	<b>Evolution:</b> <ul style="list-style-type: none"> <li>• Mobile Networks,</li> <li>• Mobile Data</li> <li>• Demand for Multimedia</li> <li>• Spectrum Allocations</li> </ul>	Ch3 3.3, 3.4, 3.5	Quiz
7	<b>Physical Aspects:</b> <ul style="list-style-type: none"> <li>• Radio Interface and Radio Links</li> <li>• Electrical Wires: Copper Lines, Fiber Optics</li> </ul>	Chapter 3 Part 3.5	
8	<b>MIDTERM SEMESTER BREAK</b>		
9	<b>Protocols:</b> <ul style="list-style-type: none"> <li>• Introduction</li> <li>• OSI : Physical Layer (1), Data Link Layer (2), Network Layer (3), Transport Layer (4), Session Layer (5), Presentation Layer (6), Application Layer (7)</li> <li>• Practice</li> </ul>	Ch4 4.1, 4.2,	Quiz
10	<b>Fixed Networks : SS7, SIGTRAN</b> <ul style="list-style-type: none"> <li>• Mobile Networks</li> <li>• Data Networks: TCP/IP, UDP</li> </ul>	Ch4 4.3, 4.4, 4.5	

11	<b>Error Recovery: Message</b> , Error Correction Methods <ul style="list-style-type: none"> <li>LAP Protocol Family</li> <li>Cross-Layer Protocol Principles</li> </ul>	Ch4 4.6, 4.7, 4.8	
12	<b>Modulation and Demodulation</b> <ul style="list-style-type: none"> <li>Analog Modulation Methods: Amplitude Modulation, Frequency Modulation, Phase Modulation</li> </ul>	Ch 10 10.1, 10.2,10.3	Quiz
13	<b>Digital Modulation and Demodulation:</b> <ul style="list-style-type: none"> <li>Amplitude Shift Keying (ASK)</li> <li>Phase Shift Keying (PSK)</li> <li>Combinations of ASK and PSK</li> <li>Frequency Shift Keying (FSK)</li> </ul>	Ch 10 10.4, 10.4.1 – 10.4.4	
14	<b>Modulation from a Mathematical Perspective:</b> <ul style="list-style-type: none"> <li>Pulse Shaping and Power Spectral Density of Modulated Signals</li> <li>Typical Transmitter- and Receiver-Side Signal Processing</li> <li>Digital Modulation Schemes Used in Practical Systems</li> <li>Multiplexing, Multiple Access and Duplexing</li> <li>Orthogonal Frequency Division Multiplex</li> </ul>	Ch 10 10.4, 10.4.5 – 10.4.10	
15	<b>REVIEW and FINAL EXAM Preparation</b>		
16	<b>FinalExamination</b>		