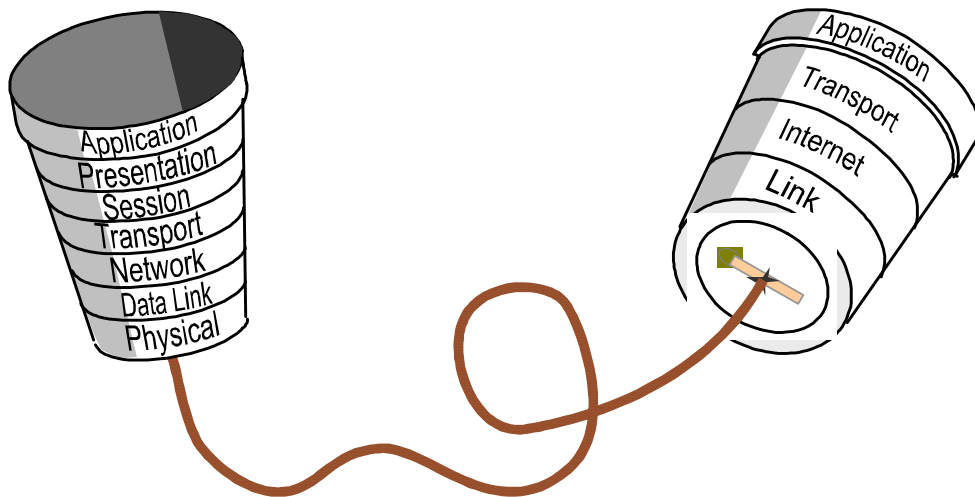


# Wireless Communication Systems

Lecture at FH-Rosenheim

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This handout summarizes the main contents of the lecture, however it cannot replace the active attendance at the course.

**Additional notes are strongly recommended!**

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**Relevance:** March 08; correctness of the contents is not guaranteed!

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## List of Contents

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	<u>hrs</u>
1. <u>Introduction</u>	2 h
2. <u>Selected Aspects of Mobile Communication</u>	10 h
3. <u>Bluetooth</u>	6 h
4. <u>Second Generation of Mobile Communication – GSM</u>	12 h
5. <u>Third generation of mobile communication – UMTS</u>	6 h
6. <u>Wireless LANs, OFDM, and MIMO</u>	10 h



## General References for Accompanying this Lecture

### ■ Available in the Library of FH Rosenheim

- [Fun] *Funkschau*. Weka Zeitschriften, Germany
- [Lob] H. Lobensommer: *Handbuch der modernen Funktechnik*. Franzis, Poing, Germany
- [Sie-a] G. Siegmund: *Technik der Netze*. Hüthig, Germany
- [Sta] W. Stallings: *Data and Computer Communications*. Prentice Hall, USA
- [Tan] A.S. Tanenbaum
  - ⇒ *Computernetzwerke*. Prentice Hall, Germany
  - ⇒ *Computer Networks*. Prentice Hall, USA
- [Wir] *Wireless communication – the interactive multi-media CD ROM*. Kluwer, Dordrecht, NL

### ■ Available in the Internet

- [Wiki] [www.wikipedia.org](http://www.wikipedia.org)

### **Books for obtaining prerequisite knowledge in Signals, Systems, and Communications:**

- [Opp] A.V. Oppenheim, A.S. Wilsky, H. Nawab: *Signals & Systems*. Prentice Hall, Englewood Cliffs, USA
- [OppS] A.V. Oppenheim, R.W. Schafer, J.R. Buck:
  - *Zeitdiskrete Signalverarbeitung*. Pearson Studium, Munich, Germany
  - *Discrete-time Signal Processing*. Prentice-Hall, USA
- [Pro] J.G. Proakis: *Digital Communications*. McGraw Hill, USA
- [Skl] B. Sklar: *Digital Communications*. Prentice Hall, USA
- [Ste] S.D. Stearns: *Digitale Verarbeitung analoger Signale*. Oldenbourg, Germany
- [Zie-a] R.E. Ziemer, W.H. Tranter, D.R. Fannin: *Signals & Systems: Continuous and Discrete*. Prentice Hall, USA
- [Zie-b] R.E. Ziemer, R. Peterson: *Introduction to Digital Communication*. Prentice Hall, USA
- [Zie-c] R.E. Ziemer, W.H. Tranter: *Principles of Communications*. John Wiley & Sons, USA

### **Books for obtaining prerequisite knowledge in Data Communication:**

- [Hal] F. Halsall: *Data communications, computer networks and open systems*. Addison Wesley, Boston, MA; USA



## Prerequisites for this Lecture

■ In the fields of **Data Communication**:

- The ISO/OSI reference model
  - ⇒ Basic concepts of *Protocols, Interfaces* and *Services*
- Protocols:
  - ⇒ The TCP/IP protocols
  - ⇒ Error Coding, especially CRC (Cyclic Redundancy Check)
  - ⇒ FEC and ARQ Protocols (like *Stop-and-Wait* or *Sliding Window*)
  - ⇒ The HDLC (*High Level Data Link Control*) protocol
  - ⇒ Bitstuffing

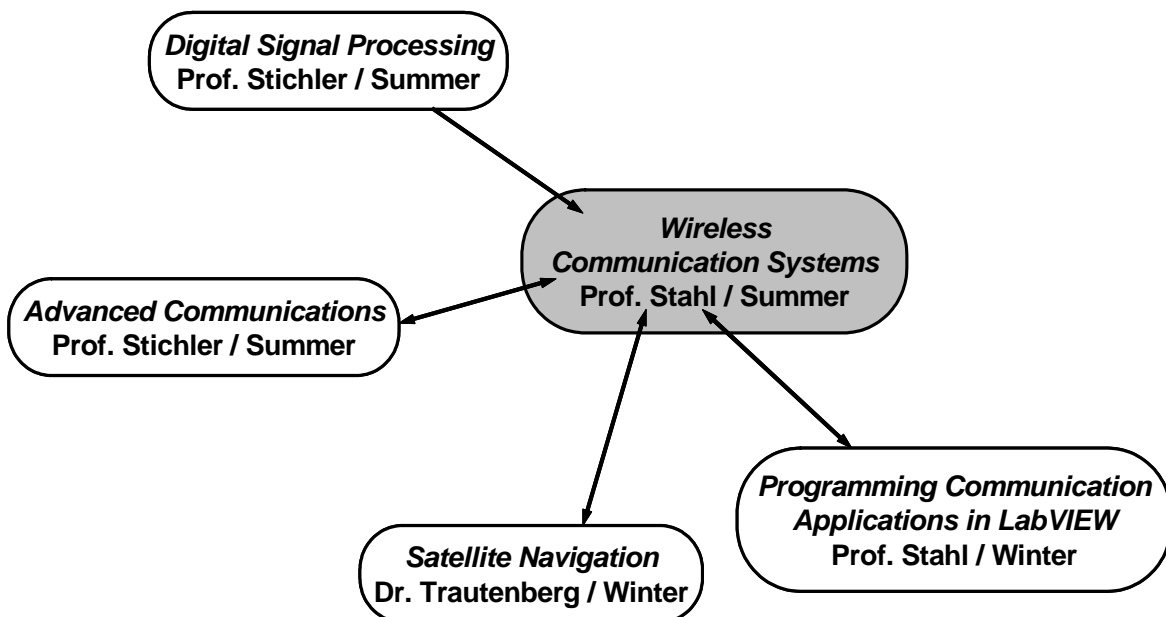
■ In the fields of **System Theory**:

- Representation of signals and systems in the *time and frequency domain*
- Sampling and reconstruction of signals
- *Analogue ↔ Digital* Conversion of signals

■ In the fields of **Communications**:

- Digital modulation techniques like *QAM, PSK*, etc.
- *Low Pass ↔ Band Pass* Transformation

### Related Lectures at FH-Rosenheim





## Organisation of the Lecture

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### ■ You will get from me:

- A printed lecture hand-out (get your copy from the printer's)
- Exercises & Solution Proposals, to be downloaded from [www.fh-rosenheim.de/live/fachbereiche/kpe/eit/personalia/professoren/stahl/downloads.html](http://www.fh-rosenheim.de/live/fachbereiche/kpe/eit/personalia/professoren/stahl/downloads.html)
- Sample examination (download from the address above)
- Fresh lab exercises
  - ⇒ 6 hands-on exercises in small teams of 2-3 people
  - ⇒ A printed [hand-out](#) for the lab (get your copy from the printer's office)
- Latest topics for [short presentations](#), that you will hold in front of the audience!

### ■ My Expectations of You:

- Your active contribution to this seminar:
  - ⇒ Please ask me, if something is unclear!
  - ⇒ Please correct me, if you think I am telling something wrong!
- Prepare your Lab exercises, before you go into the Lab!
  - ⇒ Preparation for one exercise (there are 6) should not take more than 3-6 hrs.

## Evaluation of *Wireless Communication Systems MV06*

This class consists of two parts: The lecture **MV06.1** and the Lab **MV06.2**. Both parts can only be taken together. For each of the two parts you will get a mark in the range 5.0...1.0:

- Determination of the mark for *Wireless Communication Systems MV06.1* = 70% of the MV06 mark:

Written Examination of 90 minutes, all non-electronic documents and pocket calculator are allowed. The questions in the examination will be about the lecture and also the lab exercises.
- Determination of the mark for *Wireless Comm. Systems Lab MV06.2* = 30% of the MV06 mark:
  - 37,5%: Assessment of short presentations during the lecture
  - 62,5%: Assessment of the preparation and performing of the Lab exercises

