LUND
UNIVERSITY

EITG05 – Digital Communications

(Previously: ETT051)

Course Information

Michael Lentmaier
Monday, September 2, 2019

About me:

- since 2013: Lund University, Associate Professor
  Director of Master's programme in Wireless Communication
- 2008 – 2012: TU Dresden, Germany
  Vodafone Chair Mobile Communication Systems
  Senior Lecturer and Researcher
- 2005 – 2007: German Aerospace Center (DLR), Oberpfaffenhofen
  Researcher, positioning and satellite navigation
- 2003 – 2004: University of Notre Dame, South Bend, IN, USA
  Postdoctoral Resarch Associate
- 1998 – 2003: Lund University
  PhD student, telecommunication theory
- 1997: Lund University
  Erasmus student, Master's project
- 1991 – 1997: University of Ulm, Germany
  Student in Electrical Engineering

Lectures

- **Teacher:**

  Michael Lentmaier, michael.lentmaier@eit.lth.se, E:2375

  Mondays 10.15 – 12.00 in DC:Stora hörsalen (Design Center)
  exception: E:1406 on Sep 9

  Thursdays 10.15 – 12.00 in E:B

- **Course webpage:**

  `http://www.eit.lth.se/course/EITG05`

  - Slides from the lectures will be posted each week
  - Please check messages on this page regularly

- **Course administrator:**

  Erik Göthe, erik.gothe@eit.lth.se, E:3152b

Exercises

There are two groups of exercise classes:

- **Group A:** (priority for C students)

  Wednesdays 10.15 – 12.00 in E:2116
  Fridays 10.15 – 12.00 in E:2116

- **Group B:** (priority for MWIR students)

  Wednesdays 13.15 – 15.00 in E:2517
  Fridays 8.15 – 10.00 in E:2116

- If there is enough space in the rooms you can choose the group you prefer (otherwise see priorities above)
- **Instructor:**
  Muhammad Umar Farooq,
  muhammad.umar_farooq@eit.lth.se, E:2367
- **All exercises are held in English**

Examination

Final Exam

- Written exam
- Thursday, October 31, 2019, 14.00 – 19.00 in Vic 1A–C
- Five problems with 10 points each
- Covers all parts of the course
- 20 exam points or more are required to pass
- It may be easier to get 5 points in 4 problems than 10 in 2

Online quiz: (new this year)

- An online quiz will be made available during week 5
- Participation is voluntary
- Passing 80% of the quiz gives you 5 bonus points in exam (you can try the quiz three times)

Remark: bonus points cannot be used to convert a fail to a pass

Laboratory

- Two laboratory lessons are included in the course (mandatory):
  - Lab 1 in study week 3
  - Lab 2 in study week 7
- Each lab lesson takes 2 hours
- Reservations of the lab times are made online (not open yet)
- More information, including the instructions, will be posted (check the messages on the course webpage)

Course Literature

The course is based on the compendium:

"Introduction to Digital Communications"
by Göran Lindell, August 2006

Available at KFS bookstore in the LTH study center

- **You are allowed to use the compendium in the written exam!**
- The parts of the compendium which are related to the different lectures are defined in the course outline, which is available on the webpage (*Lecture* section)
- Problems to be solved in the exercises will be posted weekly
  Includes some new problems (not from compendium)

Course Outline

Course outline: (preliminary version, may slightly change during the course)

Cal. Week	Lecture	Topic	Compendium	Slides
36	Mon, Sep 2	Course information Introduction, Overview, Basic concepts	pages 1-32	
	Thu, Sep 5	Signal constellations, PAM, PSK, FSK, PPM, QAM, PWM, OFDM	p. 31-55	
37	Mon, Sep 9 Room E:1406	Bandwidth of the transmitted signal, Fourier transform, R(f) M-ary and binary, Bandwidth	p. 61-72, 77-88	
	Thu, Sep 12	Bandwidth of the transmitted signal, R(f) for PAM, QAM, OFDM and FSK signals	p. 88-102	
38	Mon, Sep 16	Receivers in digital communication systems, Basic concepts, Minimum Euclidean distance receiver Matched filter receiver, Performance binary signaling No Thursday lecture because of first laboratory	p. 227-255	
39	Mon, Sep 23	Receivers continued: System design criteria, Performance for M-ary signaling	p. 254-286	

See course webpage

Some advices

- Attend the lectures and exercises (voluntary but useful)
- Spend some time before/after the lectures to review the material
- Work with the compendium and the lecture slides
  (both are allowed within the exam)
- Lectures/exercises/labs are more efficient if you are prepared

Time plan:

1. Lectures: 24 hours (12 lectures within 7 weeks)
2. Exercises: 28 hours (2 sessions each week)
3. Laboratories: 4 hours (two labs, 2 hours each)
4. Time for self-studies: 144 hours (7.5 credits = 200 hours)

Hence you could learn 6 days á 24 hours before exam = 144 hours
(I do not recommend this strategy, you need some sleep as well!)

Course Representative / Kursombud

We are looking for

- Two students from the C program
- One student from the MWIR program
- Other program representatives welcome if there is interest

If you are interested, please get in touch with me after the lecture