

TSEK02 Radio Electronics

Course syllabus 2018

1. GENERAL

Course Code: TSEK02, Radio Electronics (Radioelektronik), 6 HP (6 ECTS).

Recommended background: basic knowledge of semiconductor devices and analog circuits.

Supplementary courses:

TSEK03 Radio Frequency Integrated Circuits

TSEK38 Radio Frequency Transceiver Design

Advanced courses in RF CMOS design

Goal: The course gives students a basic knowledge in radio electronics on a system level. After completion of the course, students will be able to read and understand specifications of a modern wireless system and design the corresponding radio on a block diagram level.

Content: The course starts with fundamentals of data transmission and discusses certain fundamental and practical limitations. Transmitter and receiver architectures as well as properties of the wireless channel will be introduced and signal impairments will be studied from the time it is transmitted to the time it is detected. The course is organized in a very homogeneous and logical order for the student to learn how a radio system is step by step designed.

Course book: B. Razavi, RF Microelectronics (2nd Ed) (International paperback version), Pearson, ISBN 0132839415/9780132839419, 2012.

2. LECTURES OVERVIEW

Lecture	Content	Book chapters
1	Course introduction Basic definitions	not in the book
2	Modulation Techniques	3.1 - 3.3.1
3	Modulation Techniques	3.3.2 - 3.3.6
4	Multiple Access Techniques TX Architectures	3.6 4.3
5	Nonlinearity Issues	2.1.2-3, 2.2.1-2, 2.2.4-5
6	Channel and antenna Noise	not in the book 2.3
7	Noise Receiver Architectures	2.3.5 4.1, 4.2.1, 4.2.3
8	RX Nonlinearity Issues Demodulation	2.2, 2.4 not in the book

3. STAFF

Teacher (Lectures, examiner):

Ted Johansson, Adjunct Professor

Integrated Circuits and Systems, Dept. of Electrical Engineering (ISY)

Office: 3D:553, B-building

Tel: 070-627 02 37

E-mail: ted.johansson@liu.se

Assistant (Tutorials, labs):

Oscar Morales, Ph.D. student

Integrated Circuits and Systems, Dept. of Electrical Engineering (ISY)

Office: 3D:541, B-building

Tel: 070-402 36 71

E-mail: oscar.morales@liu.se

4. LABORATORY EXERCISES

There are two laboratory exercises in this course:

- Lab 1. Radio Transceiver Simulations (Simulink/matlab), in computer lab, max 20 students/group signup required (course page).
- Lab 2. Radio Receiver Measurements, in EKS-lab (3D:542), max 3+3 students/group, signup required (course page)

5. EXAMINATION

TEN1 Written examination 4 HP

LAB1 Laboratory assignments 2 HP

Written examination:

Some descriptive questions covering lectures and corresponding parts of the course book. Some analysis/design problems in the same style as the tutorials. No course material (book or notes) is allowed during the exam.

Examination dates (for the 2018 course):

2019-01-18, 14-18

2019-04-24, 08-12

2019-08-27, 14-18

You have to register to take the exam.