

# ELEC-E7210

## Communication Theory

Course Plan, fall 2020

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# General

- Course in M.Sc. Program in Communications Engineering
- Acceptable for post-graduate studies
- Prerequisites: Working understanding of
  - Linear algebra
  - Digital communication in AWGN channels
  - Matlab & some mathematica
- Teachers
  - Dr. Roope Vehkalahti, responsible teacher, lecturer
  - Prof. Olav Tirkkonen, responsible teacher.
  - Dr Jialing Liao, tutorials
  - Mr Mohsen Amidzade, tutorials, homework.
- Exam:
  - Thu Dec 10, 2020, 16:30 – 19:30
  - Mon Feb 1, 2021, 16:30 – 19:30
  - Mon March 29, 2021, 16:30 – 19:30

# F2F Teaching

- Lectures: **Tue 12-14 (Kept remotely)**
  - Not on Oct 20
  
- Tutorials: **Wed 12-14 (Kept remotely)**
  - Not on Oct 21
  - Eight analytic tutorial sessions
  - Two MATLAB-tutorial sessions, each session doubled
  
- Reception of R. Vehkalahti on Wednesday from 11-12. Please contact by an e-mail and we can organize a ZOOM meeting.
  
- All the teaching will be kept remotely. Links for the corresponding ZOOM meetings are in Lectures and Tutorials sections.

# Schedule II

Week starting	Lecture Tue 12-14	Tutorials Wed 12-14	
7.9.	Lecture 1	Tutorial 1	
14.9.	Lecture 2	Tutorial 2	
21.9.	Lecture 3	Tutorial 3	
28.9.	Lecture 4	Matlab tut 1	
5.10.	Lecture 5	Tutorial 4	
12.10.	Lecture 6	Matlab tut 1	
19.10.	---	---	
26.10.	Lecture 7	Tutorial 5	
2.11.	Lecture 8	Matlab tut 2	
9.11.	Lecture 9	Tutorial 6	
16.11.	Lecture 10	Matlab tut 2	
23.11.	Lecture 11	Tutorial 7	
30.11.	Lecture 12	Tutorial 8	

# Teaching Material

- ❑ Slides & tutorial solutions distributed in MyCourses.
- ❑ Textbook A. Goldsmith: "Wireless Communication"
  - ❑ e-copy at <https://aalto.finna.fi/Record/vaari.1619470>.
    1. Click "Show all details".
    2. Then "Show full text or availability in other libraries".
    3. Then click the first "Go" link, immediately after "Full text available via Knovel Electronics & Semiconductors Academic".
  - ❑ Aalto account needed
- ❑ Other recommended books: Tse-Viswanath, "Fundamentals of Wireless Communications", Haykin-Moher, "Modern Wireless Communications, Proakis, "Digital Communications".

# Learning Objectives

- After the course the student
  - Understands the functionalities of the physical layer in a modern communication system in multipath fading channels
  - Understands principles of multiantenna and multiuser communication
  - Understand principles of link adaptation
  - Can operate a link simulator

# Course Evaluation

- ❑ Students get points from
  1. Active participation in tutorial exercises (15 %)
    - ❑ Analytical & matlab exercises are solved together during tutorial sessions
  2. Homework assignments (25 %)
  3. Exam (60 %)
- ❑ Points from items 1 & 2 honored in exams during academic year 2020--2021.
- ❑ One point added to exam result for students that fill in feedback form
  - ❑ If there is more than 10 students giving feedback. With less students, the list of students giving feedback is not available to course teachers.
- ❑ Points are counted together, and passing the course and course grade depends on total number of points
- ❑ Mapping points to Grade depends on the difficulty of the exam.
  - Typically some 33% of points needed to pass the course

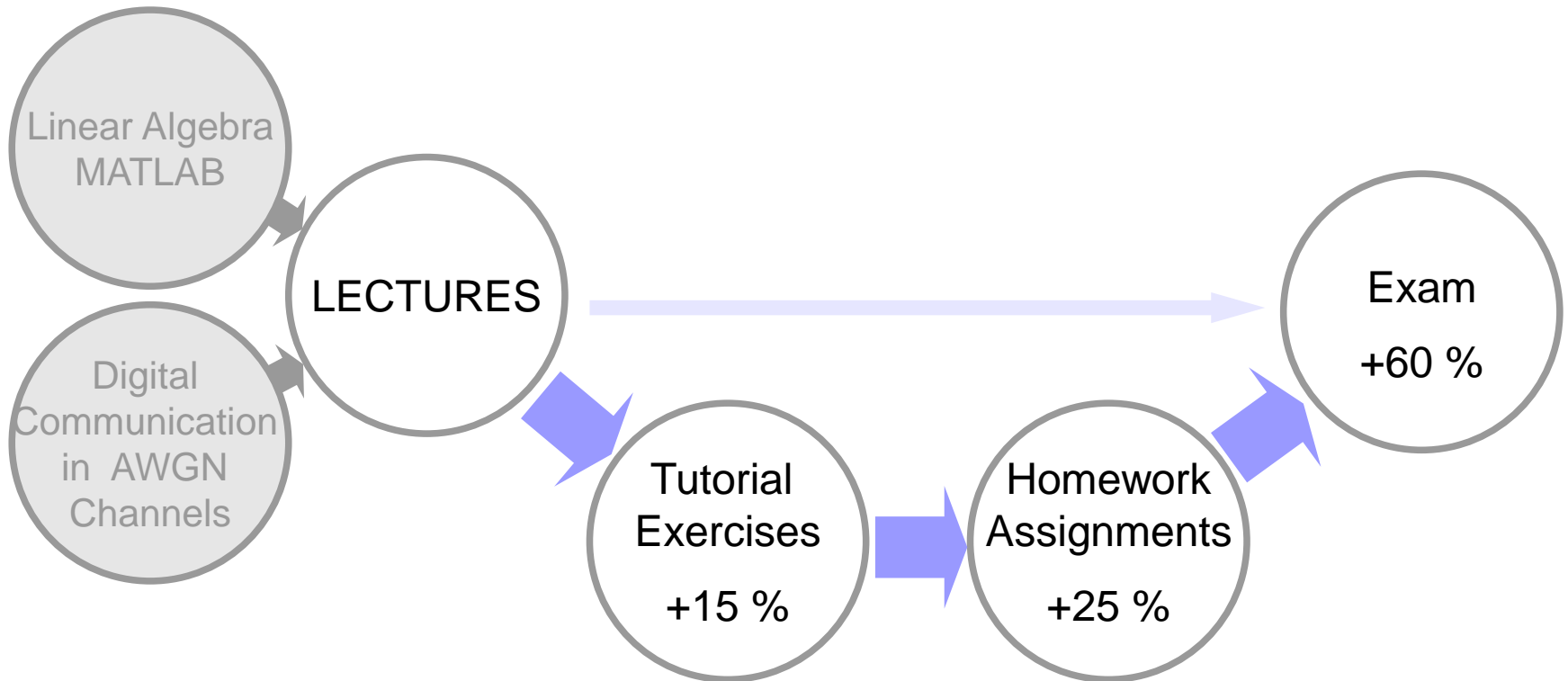
# Exam

- ❑ The Exam will have 5 questions
- ❑ 1-2 questions are based on explaining theoretical concepts, of the type discussed in the lectures
- ❑ 3-4 questions are analytic calculations of the kind discussed in the tutorials



# Flow of Knowledge & Evaluation

Prerequisites:



# Assumed Starting Level & Equalization

- B.Sc. course level knowledge on principles of digital communications in AWGN channels
  - As exemplified by course by O. Tirkkonen
  - The material of this course will be disseminated in MyCourses
    - Lectures 2-8,10-11 of the course
    - The material has references to the textbook B.P. Lathi & Z. Ding: Modern Digital and Analog Communication Systems, International 4th ed, Oxford University Press 2010.

Questions, comments?