Aalto University
School of Electrical
Engineering

Lecture 1:

Introduction

ELEC-E7410 Communication Transmission Lines

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Introduction

After finishing this course, you will be familiar with:

- Cables and optical fibres in telecommunication networks
- Measuring cables and optical fibres
- Open generic cabling in access networks
- Electromagnetic properties of cables
- Theory of crosstalk and screening (or shielding)

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Exercises:	Lauri Mela	(lauri.mela@aalto.fi)
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Course timetable

- Course will start on Monday 24.5.2021 at 14:15 using Teams video meeting
- There are four lectures in May and June, each one including a demo session illustrating or highlighting a specific topic
- Exercise sessions are held in every Tuesday at 15:15 using Teams video meeting. You are welcome to participate and discuss exercises or laboratory works during that time
- Invitation to Teams workspace is sent to registered students

Course timetable, continue

Week	Lectures	Exercise sessions	Laboratory exercises
21	24.5.		
22	31.5.	1.6.	1
23	7.6.	8.6.	2
24	14.6.	15.6.	3
25		22.6.	1, 2 & 3

Submit the first version of your laboratory report one week after you have made the measurements. You will get feedback for your laboratory reports and be able to refine them, if necessary, before the final deadline.

Course Grading

		Points	Required
Home exercises	15 %	20	0
Simulation exercise	35 %	46	14
Laboratory exercises	50 %	66	21
- each report			7
Course grade	100 %	132	

All exercises are published at once and the final day for submitting them is 25.7.2021 at 23:55 (MyCourses time). All exercises are submitted via MyCourses.

Percentage values for course grades are:
1: 30 %, 2: 45 %, 3: 60 %, 4: 75 %, 5: 90 %.

Lecture Topics

Lecture 1

- Introduction
- Transmission Lines
- Level Concepts
- Cut-off Frequency of a Coaxial Cable
- Demo: Introduction to Transmission Line Properties Using Simulation

Lecture 2

- Transmission Lines, part II
- 2-Port Theory
- Connector Care
- Demo: Vector Network Analyzer

Lecture Topics

Lecture 3

- Optical Cables and Components
- Demo: Optical Time Domain Reflectometer

Lecture 4

- Electromagnetic Shielding
- Crosstalk and Coupling of Symmetrical Lines
- Generic Cabling
- Demo: Screening Efficiency and External RF-disturbances

Course Materials

Books and other material:

- Halme, L. *"Transmission on lines and electromagnetic screening"* is available from MyCourses to be used in this course. Referenced as LH xx.yy.
- Dunsmore, J. *"Handbook of Microwave Component Measurements"*. Referenced as JD xx.yy.
- Pozar, D. M. *"Microwave Engineering"*.
- Ulaby, D and Ravaioli, U. *"Fundamentals of Applied Electromagnetics"*
- Fleisch, D. *"A Student's Guide to Maxwell's Equations"*
- Nestor cables *"FTTX Principles, Technologies and Installation Solutions"*
- SFS-EN 50173-1, Generic cabling systems. Part 1: General requirements
- SFS-EN 50173-4, Generic cabling systems. Part 4: Homes
- TRAFICOM 65 D/2019 M, Regulation on internal networks and telecommunications contracting in properties