S-72.1140 Transmission Methods, Fall 2009

Results for fall 2009

Results include now also January exam and they can be inspected [here](#). Note that if you have any questions about exam or tutorial grading you
may pass them directly to course assistant Lu.Wei@tkk.fi. Other questions you may pass to discussion forum.

General

Welcome to course workspace. For help and discussions use [S-72.1140 discussion forum.](#)
NOTE: If you experience missing figures, download this page in pdf, see noppa in section "additional reading" (the last section)

Objective of this course is to discuss basic analytical tools for analyzing transmission level signals and systems in time and frequency domain and respective figures of merit. We start by a review to signals and systems and channel basic properties. Then we discuss linear and exponental analog modulation and analytical treatment of noise. Course is concluded by overlook to digital modulation techniques and channel coding that strives to reduce channel introduced errors.

Tutorials will utilize Mathcad - program to make theory maybe a bit more easier to grasp. The program is available in computer classes or you may also buy own version with student discounted price EURO 37 at http://www.tkk.fi/atk/lisenssit/ptc/

For info how to use MathCad, please download the easy-to-use manual at:
http://web.abo.fi/fak/ktf/ank/Documents/datank/Mathcad%20User%27s%20Guide%20with%20Reference%20Manual.pdf (about 7 Mb)
It does not matter if you use a higher versio, 99% of the program is still the same.

Course discusses the following topics :

- [Introduction](#)
- [Linear modulation](#)
- [Channels](#)
- [Exponential modulation](#)
- [Noise in linear systems](#)
- [Digital communication](#)
- [Channel coding](#)

Some special topics popped up in lectures are discussed / illustrated in [lecture notices - section](#)

Materials

Course material include lecture handouts, drills and tutorial assignments that all can be accessed in this page. In addition,
there will be web-materials that are referred in lectures and in tutorials. The following books might also prove to be useful:

- Leon W. Couch: Digital and Analog Communication Systems 7th ed - Comprehensive and easy to follow.
  Provides some Mathcad/Matlab examples too. Solved examples for students available in book homesite.
- A. B. Carlson: Communication Systems IV ed. (basic theory)
- B. P. Lathi: Modern Digital and Analog Communication Systems III ed. (basic theory, more text than in Carlson's book)
- Duck, Read: Data Communications and Computer Networks, II ed. (simple to follow)
- A Leon-Garcia et al: Communication Networks, 2nd ed, (good overview to networks in general, more restricted in physical level)

Note: sometimes fastest way is to use internet searches. You may also search inside TKK on-line books in Ebrary:
Go to http://libproxy.tkk.fi/ and select Ebrary from row 29. Works also from outside the university network.

Course personnel

Lecturer: Timo Korhonen (09 451 2351),
Lecture assistants: Konstantinos Koufos (09 451 5684), Wei Lu (045 274 2899)
Discussion forum: If you wish to have any help or discussions about the course you may use the course discussion forum here

Timetable

Lectures start on **10th of Sep at 2 PM in Hall C** main building. Otherwise:

Lectures take place on Tuesdays 14-16, S3 and Thursdays 14-16, S4.

Tutorials take place on Wednesdays 12-14, S4 except in the last week

(see below, lectures indicated by blue and tutorials by green)

M	Tu	We	Th	F	S	S
	1	2	3	4	5	6
7	8	9	10	11	12	13
14	15	16	17	18	19	20
21	22	23	24	25	26	27
28	29	30				

		October				
M	T	W	T	F	S	S
			1	2	3	4
5	6	7	8	9	10	11
12	13	14	15	16	17	18
19	20	21	22	23	24	25
26	27	28	29	30	31	

lecture dates	lecture topics		tutorial expired	tutorial released
10, 15 Sep	Introduction			
17 Sep	Linear modulation			16 Sep
22,24 Sep	Channels		23 Sep	23 Sep
29,1 Oct	Exponential modulation		30 Sep	30 Sep
6,8 Oct	Noise in linear systems		7 Oct	7 Oct
13,15 Oct	Digital communication		14 Oct	14 Oct
20,21 Oct	Channel coding		22 Oct	

Grading

There are two alternative grading schemes:

1. You answer 5 questions in exam only.

2. You answer 4 questions in exam that forms 70% of your points. The rest, 30% of your points is formed based on returned drills (10%) and tutorials (20%).

Exam is based on calculations. All formulas will be given, you don't need to to learn them by heart, but to understand them. Example of a formula sheet that is distributed for you in exam here. Also, table of Bessel-function and graph of Q-function will be provided if required, this one.

It is recommended that you participate to drills and tutorials what ever grading policy you choose. Note that you will finally express your grading strategy in the exam. Participation to drills and tutorials makes it easier to pass the exam. We have decided that this time 2 of 5 exam question are directly based on drills. I addition there can be assignments from tutorials in the exam. Do follow the drills as the lectures proceed. **Taking the drills just a couple of days before deadline can be too difficult.**

Note that you can always earn **up to 1.1x(your points) bonus** by creating Mathcad example illustrating course topics (question and answer). This is returned to the bonus folder by 26.10.09. **Note: Return your all examples in a single file (mcd, pdf, doc).** Pay attention to make your examples self-supporting by using figures and comparison to analytical results. File naming convention: family_name_first_name_E.extension.

Recommended reading from Leon W. Couch: Digital and Analog Communication Systems 7/E

Lecture drills

Lecture drills can be accessed here for each course topic. Return your reply as soon as possible after each lecture topic is discussed (takes sometimes 2x2 hours). Note: You can try 2 times for each questions in a drill. All lecture drills should be answered by 8.11.09 (changed to be a bit later)

Note: For the reason that you have only two tries to insert you replies, first just download the pdf-version of drill questions.
Then find the respective lecture and have access to Mathcad. Solve the drill. When your answers are ready,
go to the respective drill to feed in your replies. Two question out of five in exam are based on drills only.

Drill topic 1: [Introduction] ([Drill 1 in pdf]) We have noticed that assignments 1 and 4 have misprints in answers so you may skip them, they will be not graded.

Drill topic 2: [Linear modulation] ([pdf]) The last assignment in this set will reply "Correct" for the correct answer. However, the system does not give points from your correct answer. Also, for 2th question there is no correct answer listed. Therefore, you may ignore these assignments.

Drill topic 3: [Channels] ([pdf]) assignment 5b does not include the correct answer - it is not counted for

Drill topic 4: [Exponential modulation] ([pdf]) (in excercise 2 frequency is missing, set it to 5 Hz)

Drill topic 5: [Noise] ([pdf])

Drill topic 6: [Digital transmission] ([pdf])

Drill topic 7: [Channel coding] ([pdf]) Note: assignments 3a-c are not graded still the correct answers are included to the question. You may inspect solution [here]

Tutorials

Return tutorial solutions to the respective return folders (links to tutorial assignments will also be published here):

- [1st tutorial] is released at **16 Sep** '09 and it needs to be submitted **23 Sep** ' 09 at noon - in this [folder 1] . [Solutions] for 1st tutorial.
- [2nd tutorial] is released at **23 Sep** '09 and it needs to be submitted **30 Sep** ' 09 at noon - in this [folder 2] [Solution updated 1.10.09] for 2nd tutorial
- [3rd tutorial] is released at **30 Sep** '09 and it needs to be submitted **07 Oct** ' 09 at noon - in this [folder 3] (missing figure added 3.10.09) [Solutions]
- [4th tutorial] is released at **7 Oct**'09 and it needs to be submitted **14 Oct'** 09 at noon - in this [folder 4] [solutions]
- [5th tutorial] is released at **14 Oct**'09 and it needs to be submitted **22 Oct**' 09 at 2 PM - in this [folder 5] [solutions] [mathcad_for_Ex6]

In your return use the format: nn_family name+first name.doc,nn.pdf or nn.mcd, for example 03_Paras_Pekka.pdf that is the tutorial solution for assignment number 3 for Pekka Paras.