

Course analysis

General information

This document provides the course analysis about the master degree course

Introduction to Signal Theory EQ 1210 and Signal Theory EQ 1220

given in the first period 2014. The course responsible was Tobias Oechtering, Communication Theory, EES, KTH. Email: oech@kth.se, tel.: 08 790 8462. The course "Introduction to Signal Theory" covers the first 2/3 of the course "Signal Theory." Further, the requirements to pass the project and the difficulty of the exam are lower. The tutorials and projects were given/guided by the teaching assistants Zuxing Li, Marie Maros, and Duo Xu.

Course organization:

- 12 x 2h lectures
- 12 x 2h tutorial given in two groups with group work
 - o 5 voluntary group solutions can be handed in
- 5 voluntary reflective questions essays
- 1 knowledge diagnostic test (**new**)
- Two mandatory take home project assignments
- One written exam, 5h.

Requirements:

- Passed project assignments (PRO1: 1cu, PRO2: 1cu) , grading: passed/failed
- Exam (TEN: 5.5cu), grading: A-F
 - o Exam consists of two parts:
 - Part A: Questions, graded pass/fail,
 - Part B: Problem solving, graded only if part A passed and graded A-F

Material:

- Lecture notes: "Signal theory" by P. Händel, R. Ottoson, H. Hjalmarsson, and M. Jansson.
- Collection of problems in Signal Theory
- Old exams available at the course homepage
- The KTH table of signal processing formulas (in English)
- Two project assignments (made available online during the class)
- Report templates in Word & Latex
- 5 reflective question sets for reading assignment
- 1 knowledge diagnostic test (**new**)
- 4 lectures where clicker were used for student feedback (**new**)
- Lecture slides
- Solutions from suggested tutorial problems

Statistics

- 44 students registered for the course EQ1220
from programs: CDATE, CELTE, CTFYS, TIKTM, TIVNM, TMETM, TSCRM, TTLSM, exchange students
- 0 students registered for the course EQ1210

All students have to do two homework project assignments which are allowed to be done in groups of at most two. The students have the opportunity to revise their project report after a first evaluation of the project report.

Project 1:

- 32 failed and 10 passed in the 1st round and 38 passed after the 2nd round.

Project 2:

- 38 failed in the 1st round and 38 passed in the 2nd round.

Exam written on Oct 28th, 2013, 14:00-19:00: Results see *Section Exam results*

Re-exam written on Jan 9th, 2014, 14:00-19:00

Course history and development

This was the fourth time that I gave this course after 2011. The course was previously given by Magnus Jansson, SP and I did not do any major change on the topics covered by the course, but I revised and updated the slides from last year. In particular, I revised four lectures for which I developed questions to use clickers to collect feedback from the students. Further, jointly with TA Marie Maros we developed an online diagnostic test to identify the background of the students. I kept the course material, course book, problem collection, project assignments, and reflective questions on the reading assignments of the previous year. We kept the style of the tutorial and exam as well as the incentive for students to provide feedback of the previous year. We updated the course page on KTH social accordingly which was used again by a few students to post questions. In the re-exam we tested a new problem formulation which considered a problem beyond the problems and course book (on the Yule-Walker equation for ARMA processes). In the problem we guided the students through the derivation. Since we saw that students can master it, I intend to look for those problems also in the future.

We kept the responsibility matrix of the previous which was supposed to help the teaching staff (teacher and TAs) to clarify the roles, responsibilities, and deadlines when something was supposed to be done. The responsibilities were discussed and distributed before the course in an early course planning meeting. Zuxing was the designated main TA who supposed to take more responsibility and help Marie and Duo who acted as TAs for the first time. Unfortunately, Duo often missed to follow the plan.

Course feedback and discussion

The questions and the answers can be found in *Appendix Course Evaluation Results*. This year we changed the tool to obtain course feedback to current survey tool *artologik* which is more complicated than the previous tool. In particular the generation of report takes unnecessary time. Further, the teacher collected feedback from the TAs.

The feedback from the students shows that the students are mostly happy with the course. Most of the students are happy with the tutorial style, reading assignments, projects, bonus point system, diagnostic test, clickers and lectures. However, one student complains to have a longer break which suggestion I will try to follow. I will also try to look for more examples and intuitive discussions, but I will keep the derivations on the white board. One student would like to have the slides before the lecture. Since I always revise them in my course preparation, I will have difficulties to do so, but I intend to make the slides from the previous year available. Also, I will try to improve the alignment of the lecture with the reading assignment.

The students were very happy with the TAs Marie and Zuxing and unhappy with the TA Duo, which is an agreement with the assessment of the teacher. Marie and Zuxing did a great job! Again, the overhead projector did not work in one lecture room (same as in the year before) so that I had to give the lecture spontaneously on the white board.

In the following I will discuss the new developed course elements separately:

Diagnostic test

The online diagnostic test was a great success. The students got one bonus point for answering the test. In the end of the test the students were linked to a pdf where they got the answers of the questions. The question covered the required pre-knowledge on probability theory and signals and systems. The diagnostic test showed the diverse background in the course which was suspected previously (bachelor degrees with various backgrounds + many different master programs). We used the input to adapt the tutorial a little bit but I believe the biggest impact had the student self-reflection on it. In class, while showing the statistics of the tests, I explicitly told students what background is expected/required and gave references to material to catch up for those who feel that they are lacking some background. In the course feedback only two said that it did not help them at all and 50% of the students reported that it helped them a lot to assess their own pre-knowledge (answers: very much 16%, pretty much 34%, so and so 16%, only a little 28% not at all 6%, did not do 0%). Once developed, this activity does not cost much time, reveals the student background and most important reveals every student its own weaknesses. We might offer next time two extra tutorials with a recap on probability theory and signal and systems.

Clicker questions

In this course I tested to use clickers in four lectures, in 3-4 questions. Personally, I felt that one lecture went very well, two went ok, and in one lecture I lost too much time so that I hurried up in the end which was not good. Using clickers is time consuming; it took all spare time in the lectures and caused the miss-alignment of lectures and reading assignments. However, the handling of OMBEA clickers was surprisingly simple, I distributed the clicker in the beginning of the class and I used the most simple mode for data collection not recording the results. The most difficult part was/is the development of good questions and to learn to include it in lecturing. I am sure that I will improve with more experience.

I reported my experience in the EES Teaching Seminar Nov 19th. The feedback shows that students like it, but I experienced that they apply pattern recognition to answer questions. They see it more as a game and gamble rather than saying honestly "I don't know." Thus, the results have to be considered with care. I had the feeling that they discussed less with me in class when using clickers, but I believe that with clickers I activate (almost) all of them to respond. I tested different procedures where they were asked to discuss with their neighbor before answering or answering after getting some more information. I think the best procedure is to ask them first directly without discussion, then provide hints and/or let them discuss with their neighbor and ask them again. More rounds seem to be not time-efficient. The similar result can be perhaps achieved with a non-anonymous procedure where students show the answer with showing a color of a four-colored paper.

Ideas and concrete actions for future course development

The following actions are suggested based on the experiences from the teacher team and the response from the students as well as from previous years:

- Revise the clicker questions and perhaps use them in two more lectures.
- Revise the diagnostic test and consider two extra tutorials on prob. theory and signal&syst.
- Test if the same result can be achieved with four-colored paper sets.
- Align lectures and reading assignments.
- More small examples and possibly in-class experiments/simulations should be looked for.
- The textbook might be revised, including additional reading or topics beyond for the interested student.
- Develop for each exam one guided exam problem beyond the scope of the lecture.

Ideas from last years which still might be interesting:

- Perhaps students who already solved the problems might be pushed to present their solution to their peers (and the TA).
- Teaching activity suggested by Efthmios and to be discussed: I would instead suggest out-of-the-class work, where people participate and debate. For example there could be a sub-forum where questions/real-world problems are posted and then the students make their suggestions or debate about a solution to an application-oriented problem (e.g. a detection/estimation problem). Each student should make at least one contribution to the discussion or argue in favor of/against someone else's point.
- It could be checked if one should call the 'acf' autocovariance function as done in the book Foundations in Digital Communications. This should be done in agreement with the other teachers in related courses.
- Ask for reflective journals during the lecture period to identify miss-conceptions. Possible implementation: Let the students reflect on the course so far – possibly a first one after the first 1/3 of the course and a second one due before the first project. They should discuss about the most important concepts and report about most difficult concepts. This provides feedback about troublesome knowledge and threshold concepts. First, I would suggest to make the journals voluntarily. To animate students to do them, I propose that a good

reflection will be worth up to two extra points in the final exam (which usually will have around 50 points in total).

- I have good experience with “5-minute” exercises in class, where the students are supposed to directly apply the newly learned methods.

Overall evaluation

I believe that the course is on a very good level and very well appreciated. The course material is good, the bonus points are a good incentive to motivate the students. I believe that the tutorial, if implemented as planned, works perfect. The diagnostic test is a great success. The clickers have been shown to be a good tool to improve the lectures, however there is still room for improvement. In particular the teacher has to gain more experience using clicker questions and more good examples will be always helpful.

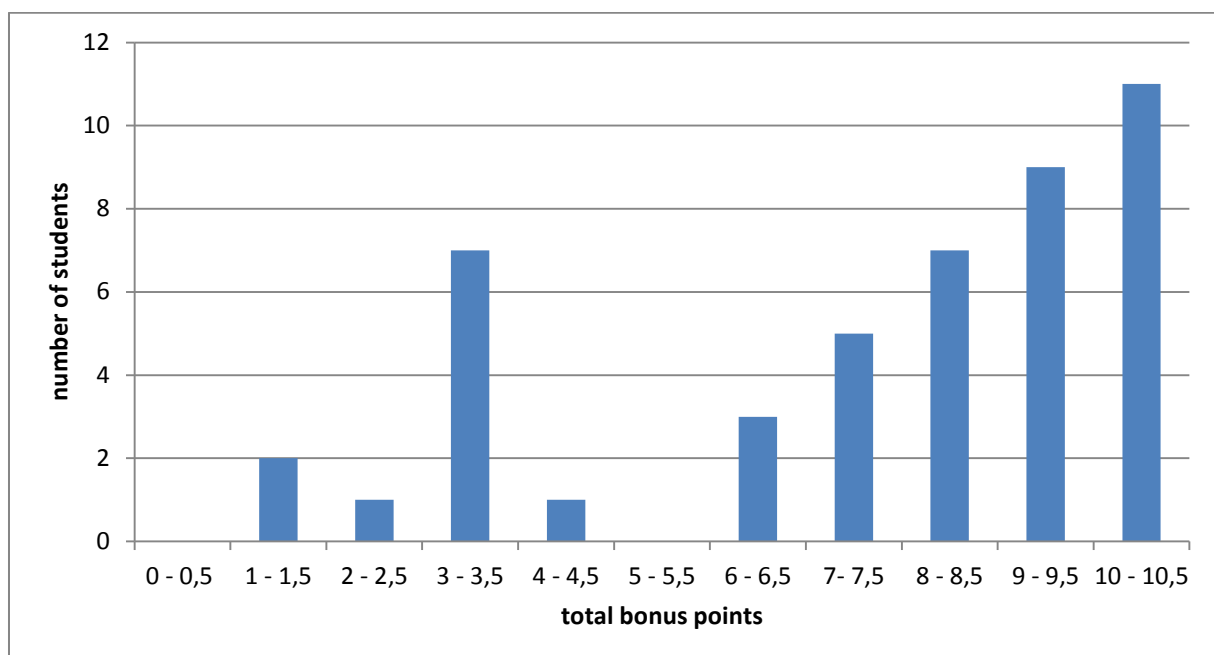
Bonus points statistics

5 bonus points from 5 reading assignments +

5 bonus points from 5 tutorials +

1 bonus point from the diagnostic test

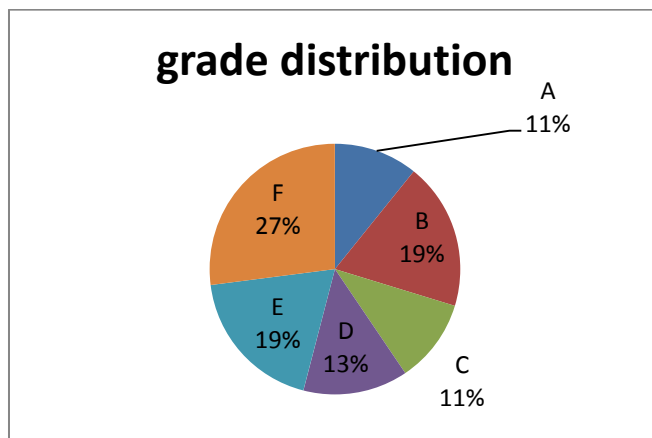
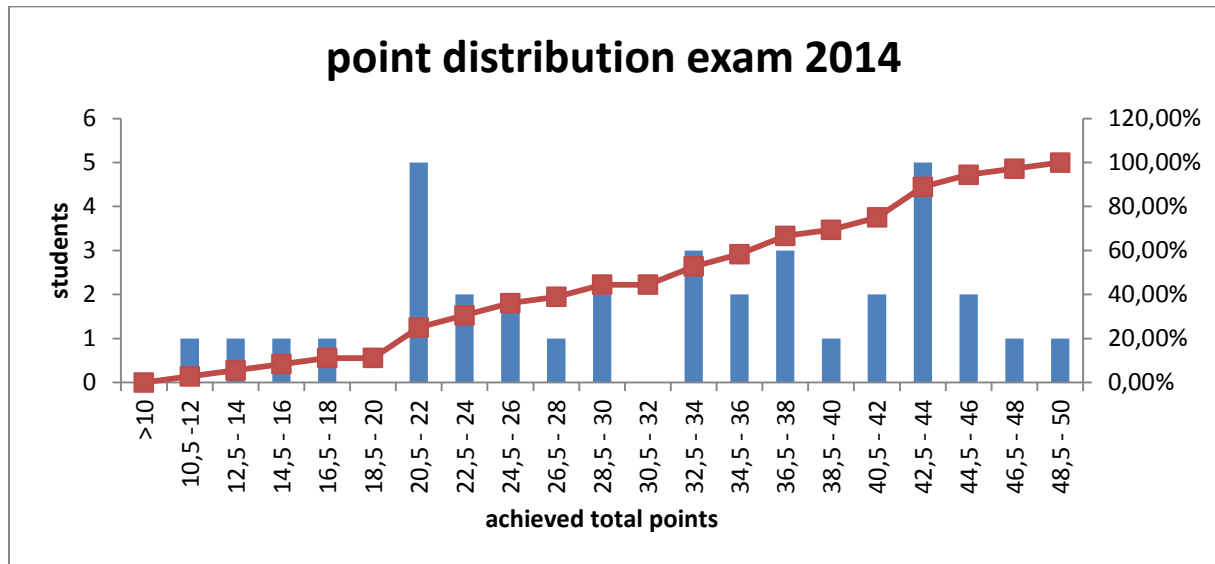
Bonus points count for part A of the exam where 8 points were required. 46 students participated in obtaining bonus points, 27 obtained more than 8 points.



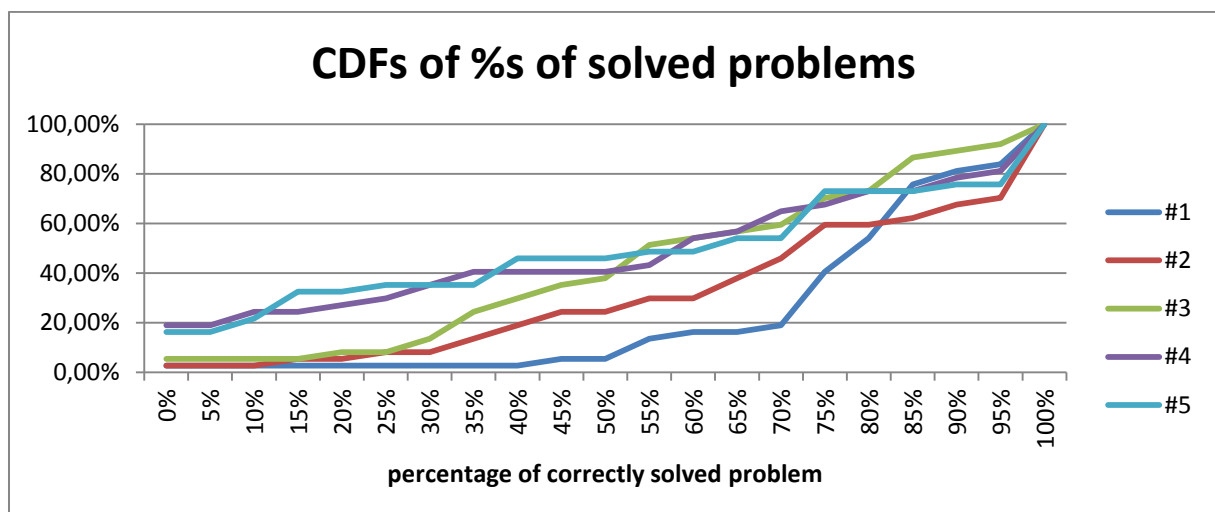
Statistics exam results

Exam 2014-10-28

Number of students EQ1220: 37 (1 returned empty sheets)

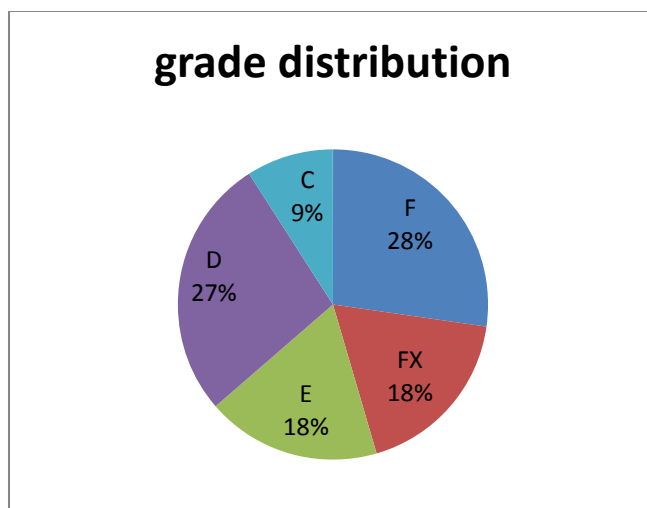
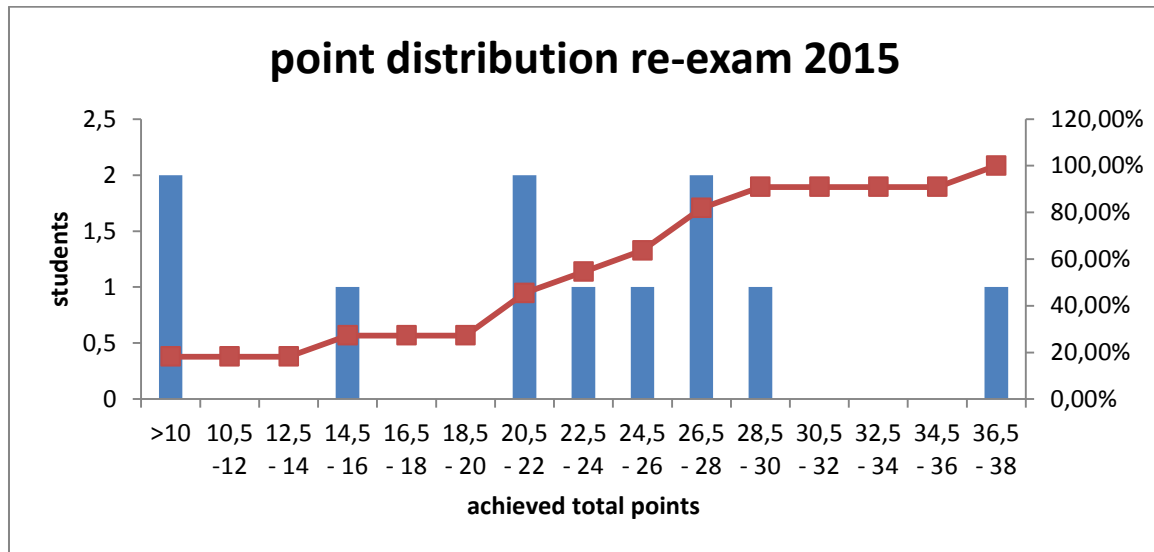


Grade	Points	Number of Students
A	45,5 – 50	4
B	40,5 – 45	7
C	37 – 40	4
D	33 – 36,5	5
E	23 – 32,5	7
F	0 - 22,5	10

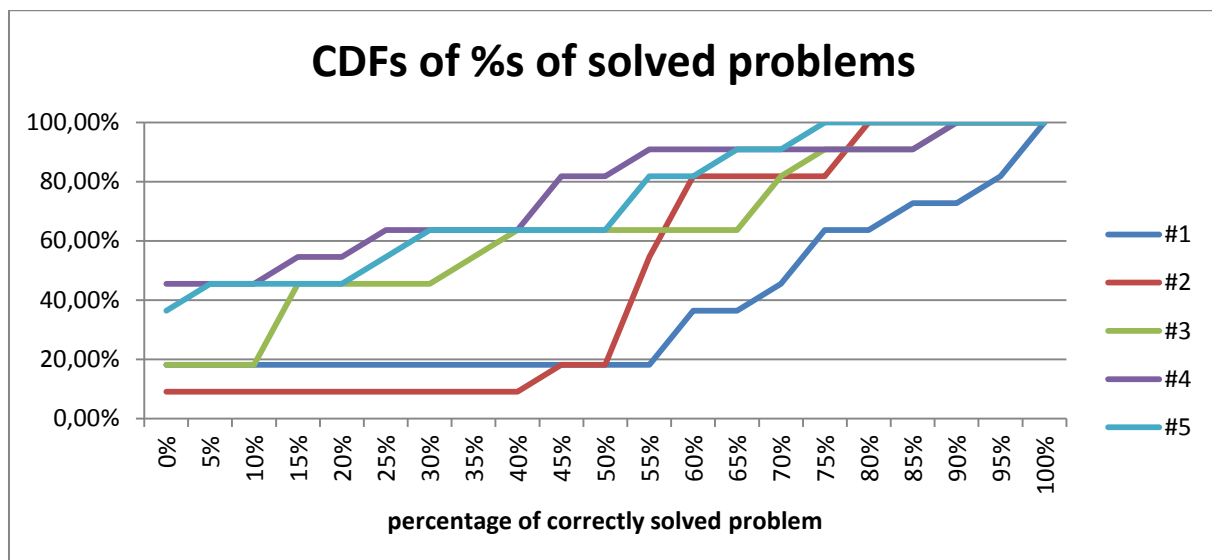


Re-Exam 2015-01-09

Number of students EQ1220: 11



Grade	Points	Number of Students
A	45,5 – 50	0
B	40,5 – 45	0
C	33 – 40	1
D	27 – 32,5	3
E	23 – 26,5	2
FX	20,5 – 22,5	2
F	0 – 20	3



Course Feedback Signal Theory

Respondents: 44
Answer Count: 32
Answer Frequency: 72.73 %

Did the learning activities help you to reach the course goals (mostly learn new concepts and methods in signal theory)?

Did the learning activities help you to reach the course goals (mostly learn new concepts and methods in signal theory)?	Number of Responses	Cumulated Responses
very much	6 (18.8%)	6 (18.8%)
pretty much	20 (62.5%)	26 (81.3%)
so and so	3 (9.4%)	29 (90.6%)
only a little	3 (9.4%)	32 (100.0%)
not at all	0 (0.0%)	32 (100.0%)
Total	32 (100.0%)	32 (100.0%)

Please feel free to add a comment.

The reading assignment forces you to read and keep up with the course content. Also the way the tutorials are and the little surveys with pointers.

I especially liked the concept of the tutorials, that is problem solving in small groups rather than listening to the teacher do it.

Projects were the most effective among other study activities.

The random grouping of tutorials was great.

Threshold concepts are core concepts that once understood, transform perception of a given subject. What threshold concept(s) did you learn in the course?

Threshold concepts are core concepts that once understood, transform perception of a given subject. What threshold concept(s) did you learn in the course?

stochastic process
Power spectrum, cross correlation/auto correlation, stochastic processes. the stationary and stochastic properties I can say it was the most.
filtering and distortion
Stochastics processes, ARMA, filtering,
Arma processes, wiener filtering
filtering, the correlation functions estimation
Estimation and Sampling
no idea
Expected values, ACF, mean,
What a stochastic process is and its properties (ergodicity, stationary,...), Power spectrum and how it is useful in signal theory. Filtering, sampling reconstruction
Probability theory and stochastic models are everywhere in my specialty
Sorry, I don't understand the question..
Analyzing signal in both time and frequency domain.
it is used to identify if the target fulfill the expected requirements
autocorrelation, fourier transforms, that signals can be viewed as stochastic processes
dealing with stochastic processes
Filtering
Randomness of this whole signal , Powerful Gaussian density function, CLT
stochastic process, filtering,etc.
Espected Value, ACF, stochastic process, filtering, sampling
Mathematical model for Random process
autocorrelation
Stochastic process
Filtering
stationarity of a process, optimal filtering
stochastic process, stationary, arma
None

How useful in learning the concepts were the lectures?

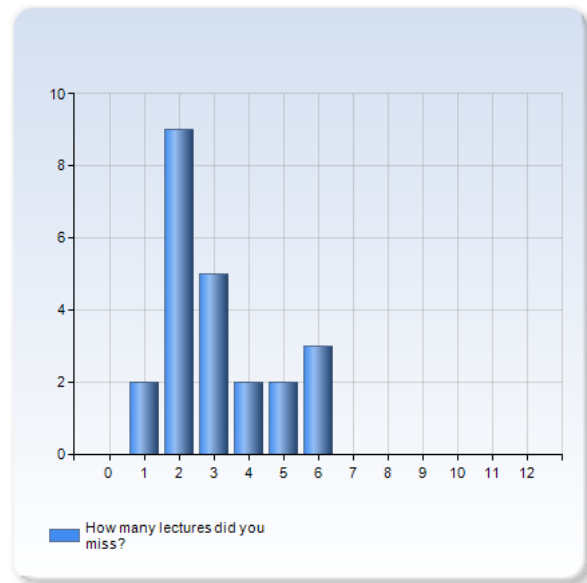
How useful in learning the concepts were the lectures?	Number of Responses
useful	13 (40.6%)
partially useful	19 (59.4%)
useless	0 (0.0%)
did not attend	0 (0.0%)
Total	32 (100.0%)

Please feel free to add a comment.

Liked clickers.
I think the lectures are useful when you read the correspondents chapters hanbook and it makes things clear.
I personally learned more during the first lectures when the slides were available before the lecture which allowed me to take notes on the slides.
In fact, the book covered the material we saw in class and more. The fact we have to read it before hand, makes the course not so exciting anymore
I am sorry to say this. But the lectures have much improvement potential. First and foremost: Take the 15 min break at the start of the second hour! Let it be 15 min. After 45 minutes we students can't manage more information without a pause! And, you need the break! Take 15 minutes, think through what you will teach the next hour and you'll see you didn't lose 15 minutes. (I noted that you usually tried to end the lecture early when there was no break, it is much better to have the break and not finish the days content or skip a slide that wasn't as important - Because, I say it again, without the break the last 45 minutes are wasted for most of the students.)
When writing on the board, if you feel that what you are writing gets in a tight position, you can be sure that the students have no idea what you are writing. Erase something old and write it large and clear!
Also when writing, make sure that it is important for understanding, please keep the lectures on a basic level and try to explain everything with intuitive explanations that stick in the students brain. Few students manage to get intuition by reading math off the board, if you feel that the equations are essential, give them more time, structure and explanation. If they are not that important, scan them to a pdf and upload to the course page.
the clickers to answer the questions were a good addition
I would have like to have less math and jargon, and more "this results in this" (intuition-wise, not math-wise) in the lectures. I'm of the opinion that lectures should be about deepening understanding, rather than to show derivations of equations (which is something I expect to do in my own time at home, at my own speed). By "deepening understanding" I mean, use plain English to describe concepts and provide intuition, for example: $V=IR$ may be an equation that says everything that need be said about the voltage and the flow of current in a resistor, but to explain it to someone in an intuitive way, a good explanation would be to say that "you can think of current as a water current, the voltage can be thought of as pressure, and the resistance in an electrical circuit can be thought of as proportional to the radius of a water pipe". I hope what I'm trying to convey is received with an open mind. What I'm trying to say is: it's always helpful to point out specific cases where theory is put to practice, and that could've done more in the course.

How many lectures did you miss?

How many lectures did you miss?	Number of Responses
0	0 (0.0%)
1	2 (8.7%)
2	9 (39.1%)
3	5 (21.7%)
4	2 (8.7%)
5	2 (8.7%)
6	3 (13.0%)
7	0 (0.0%)
8	0 (0.0%)
9	0 (0.0%)
10	0 (0.0%)
11	0 (0.0%)
12	0 (0.0%)
Total	23 (100.0%)



The teacher wants students to be active in the lecture. What activities help most to keep you engaged? Please answer from the learning efficiency point of view and not only fun. Multiple answers are possible

The teacher wants students to be active in the lecture. What activities help most to keep you engaged? Please answer from the learning efficiency point of view and not only fun. Multiple answers are possible	Number of Responses
Open discussion when the teacher asks students and the answer is developed jointly.	9 (28.1%)
Questions where the students use clickers for their feedback.	26 (81.3%)
Questions where you have discussions with your neighbor before open discussion.	9 (28.1%)
Questions where you have discussions with your neighbor before using clickers.	14 (43.8%)
Short derivations and problems solving done in class by the students.	13 (40.6%)
Lecturing using slides.	11 (34.4%)
Lecturing using the board.	11 (34.4%)
If other, please specify	1 (3.1%)
Total	94 (293.8%)

If other, please specify

Connections to practice for better understanding

Please feel free to add a comment.

I need to confess that i hate this kind of interaction.. discuss with the neighbors. But sometimes it is good, sometimes everybody is shy and the talking does not flow and make the lecture slow and boring.

Unfortually, the lecturer did not take a break in the middle of the lecture. It is almost impossible to pay attention for two straight hours, and therefor e I missed a lot of important information. Breaks are important for the student to think through the content presented in the first hour, to be able to get some fresh air and clean the head so the student can pay more attention and not fall asleep during the second half of the lecture. I yo want to have active students during the lecture the you HAVE to take a 15 minutes break in the middle.

Clickers are really good, but takes a lot of time in the lecture. We should not discuss with each other before hand, just answer it and discuss all together afterwards.

Using slides is counterproductive when lecturing - since a teacher should develop the most important mathematical ideas with a clean sheet, commenting derivations so that students could follow the teacher. It is impossible when he is just speaking and showing ready formulas on a slide. In addition, handouts with derivations, comments and more additional information should be distributed IN THE CLASS so that students could make notes on them and save them for the future.

Active students are given in an environment where they feel it's OK not to understand. Adding "I know this can be hard to grasp at first glance, so" to "are there any questions?" may give more questions.

I prefer to be able to just sit and listen during lectures, to get the "main points" and take them to heart, the details of derivations are best kept for home/library when alone and with enough time to go through it

The teacher tried to use clickers for the first time. What do you think about them?

The teacher tried to use clickers for the first time. What do you think about them?	Number of Responses
Clickers help the understanding much more than everything else. Try to use them in every class even if you have to shorten /skip the presentation of other content.	11 (35.5%)
Clickers do not help to understand the concept better, but they are fun.	2 (6.5%)
It is good to use them sometimes if it suits the course content.	14 (45.2%)
I don't like clickers, I recommend not to use them.	1 (3.2%)
I missed the lectures where clickers were used.	1 (3.2%)
If other, please specify	2 (6.5%)
Total	31 (100.0%)

If other, please specify

Good for feedback

See comment

Please share your experience, what kind of questions are good and which are bad from a learning experience perspective.

I think it is pretty good but need I think need to have some ways to not make the lecture slow. maybe not discussions.. I do not know.. But it is good because when you think about the answer you have an idea about what you know.. and then with the professor's explanation you can understand things better and see kind your deviation regarding the answer. But the professor's explanation is more important then the discussions with the neighbors, in my opinion.

They're good both for the teacher to get feedback on how much the students are learning as well as creating discussions.

About clickers: Use them as a way to give students a chance of showing that they don't understand without having to admit it publicly. Teach something, ask a basic question on what you just said and let the answers be something like "I understand", "I think I understand", "I am confused", "Didn't listen" - This way, the use of clickers will be efficient and you get a great response on your teaching and what to focus more on.

I would like to have the lectures recorded to be able to review them later; this requires just about as much preparation as the clickers and is 10x more useful (if you don't understand something during a lecture, you (as a student) can re-read the relevant chapters of the book and then listen again to what it was the teacher said)

The teacher thinks that using clickers takes much time in class. How efficient was the learning experience for you?

The teacher thinks that using clickers takes much time in class. How efficient was the learning experience for you?	Number of Responses
Clicker questions and discussions provide the best learning experience and are always worth the time.	5 (15.6%)
If clickers are used with good questions and adequate discussions, the learning experience is worth the time effort.	24 (75.0%)
Other teaching activities provide similar understanding and are more efficient.	0 (0.0%)
Clicker questions and discussions are not worth the time.	2 (6.3%)
I missed the lectures where clickers were used.	1 (3.1%)
If other, please specify	0 (0.0%)
Total	32 (100.0%)

Please feel free to add a comment.

I think they should be kept but need to work on it to make it faster. But i think it helps a lot regarding learning.

Yes, clicker sessions are definitely good because it shows how other students in a class think on the important conceptions and therefore how misunderstanding actually looks like :)

This year we also introduced the diagnostic test. Did the test help yourself to assess your own pre-knowledge?

This year we also introduced the diagnostic test. Did the test help yourself to assess your own pre-knowledge?	Number of Responses
very much	5 (15.6%)
pretty much	11 (34.4%)
so and so	5 (15.6%)
only a little	9 (28.1%)
not at all	2 (6.3%)
did not do	0 (0.0%)
Total	32 (100.0%)

Please provide any comment regarding the diagnostic test.

Knew what I lacked before (everything).

I felt kind of frustrating. I felt i did not know enough. But it also motivated me to learn more and extract as much as I could from the course.

I already had seen the material but it took a long time to remember/find the properties.

I took it just after holidays, and so, as every students, I forget everything during holidays, and it comes back after a week of classes. So, most of the question I did forget how to solve it

Mostly for the diagnostic test I didn't remember. If I had a book I could probably lookup more questions. I think the questions should be more fundamental and also have a answer "I don't remember"

At the beginning of the year nobody remembers anything, and the test was too large

But I didn't get to know my result, or maybe I didn't understand how to obtain the result?

Were the reflective questions useful for your preparation?

Were the reflective questions useful for your preparation?	Number of Responses
useful	8 (25.8%)
partially useful	18 (58.1%)
useless	4 (12.9%)
did not do	1 (3.2%)
Total	31 (100.0%)

Please feel free to add a comment.

The first two were helpful as they were more focused on core concepts.

I think it is useful in the sense you need to keep reading and keep up with the course.

very good way to motivate students to study concepts continuously. Also an effective way to start thinking on what the concepts really mean and why.

The second half of the course the questions were one or two lectures behind the current lecture. This was not good.

please also provide model answers right after we submit the HW

Just took me more time, as I am doing a summary for myself, where I emphasize the material that I don't understand. Where the question were mostly on some material I did understand and therefore worthless trying to re-explain it.

It helps to understand the general concepts and to reformulate them (the best way to learn is to understand, isn't it?)

It's a good way to get students reading the book, but it didn't help me understand the lectures.

What would increase the usefulness a lot is, return the handins fast and comment them! If I get 0.5 and no explanation, I have not learned anything, how bad was my answer? What was wrong? Is any of my understanding correct?

The same goes for 1p, but to a lesser extent, usually leading the student to assume that they were spot on if there's no comments.

How useful in learning the methods were the tutorials?

How useful in learning the methods were the tutorials?	Number of Responses
useful	18 (56.3%)
partially useful	12 (37.5%)
useless	1 (3.1%)
did not attend	1 (3.1%)
Total	32 (100.0%)

Please feel free to add a comment.

In the begging i did not like it because I like the way the other courses do, they just solve the exercises and that is it. But in the end I realized you learn more in this way. Because even you are in the wrong way to solve the exercise you start thinking about solutions for the problems.. and in the end you have a couple of ideas to how to solve a exercise. And then after solve it, when you see the correct solution you know if you were wrong and how much far away...

And I think it was really nicee the way Marie solved the exercises, she speaks a little bit fast but she explains really well, she is really organized and she posts all her solutions online with some explanations. For me it was the best.

An opportunity to both learn new problem solving methods and explain to others why and how certain methods work. Very effective!

We had good TAs who made good recaps at the start of the tutorials. They were really useful.

It depended a lot on the teaching assistant - one was very good and I truly understood the concepts when she was explaining. The others didnt even try to explain, and then if felt a bit useless.

We had one great Assistant. Maria. She is a bit harsh, but that is good for us, too. Thank you very much to her.

The tutorials are not helpful at all without a prior preparation and solving, so its better to make them in a form of tick sessions.

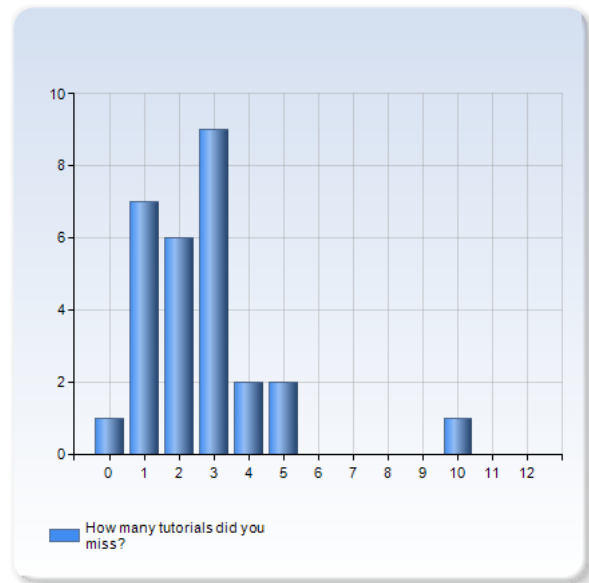
The tutorials is where I learned most of the course.

Some TAs were much better than others

I feel there was always confusion with this "group set-up" where everybody was assigned to groups, didn't really like that.

How many tutorials did you miss?

How many tutorials did you miss?	Number of Responses
0	1 (3.6%)
1	7 (25.0%)
2	6 (21.4%)
3	9 (32.1%)
4	2 (7.1%)
5	2 (7.1%)
6	0 (0.0%)
7	0 (0.0%)
8	0 (0.0%)
9	0 (0.0%)
10	1 (3.6%)
11	0 (0.0%)
12	0 (0.0%)
Total	28 (100.0%)



What do you think about the tutorial style having a brief repetition, group work, and solution presentation?

What do you think about the tutorial style having a brief repetition, group work, and solution presentation?	Number of Responses
Good idea, well carried out by the TAs.	9 (28.1%)
Good idea, but some TAs did not follow the concept.	18 (56.3%)
Good idea, but I would prefer to work alone.	1 (3.1%)
I do not like the concept and prefer solution presentation only.	2 (6.3%)
I do not like the concept and prefer group work only.	1 (3.1%)
If other, please specify	1 (3.1%)
Total	32 (100.0%)

If other, please specify
Skip the group work

Please feel free to add a comment.

As I said before, in the begging i did not like the idea, specially working with people who i dont know.. but I think it was really helful sometimes when I got people from the same level as mine, because otherwise they will be too slowly and i got bored or too fast and i could not follow them.

I could not follow the TA Duo Xu. He did thinks in a different concept as well. He is not a good TA. He should be changed. Marie and Zuxing are really good and understandable.

I want to be able to go to the TA I find best, and not having to go to a worse TA when I know there is someone better.

I like the concept. But the time is sometimes short during these tutorials.

Brief repetition does not work - when it comes to difficult mathematical subjects it is impossible to follow other's thoughts on board. Students need to develop its own ideas.

I think the repetition took too much time from the tutorial, I think it would be better to skip the repetition, and then help the students if they don't understand and if multiple groups don't understand, explain that part on the board.

I feel only Maros followed is very nicely and she was quite good in explaining questions.

The tutorials' impact depends on TA's preparation and performance. Maria did an excellent job, I learnt something in the tutorials hosted by her.

I don't feel the need to get to know the other students, and don't really like the presentations, I just want to do my work and make sure I understand it, when I don't understand something, I'd like to be able to ask a TA a question specific to what I don't understand.

Do you feel that you got constructive feedback from the TAs on the project and during the tutorials?

Do you feel that you got constructive feedback from the TAs on the project and during the tutorials?	Number of Responses
very much	7 (21.9%)
pretty much	17 (53.1%)
so and so	7 (21.9%)
only a little	0 (0.0%)
not at all	1 (3.1%)
Total	32 (100.0%)

Please feel free to add a comment.

Not from one TA. They (Marie and Zuxing) were available ALL THE TIME for questions and doubts. I really like their support.

However, the correction guide itself is useless. The checked in boxes did not correspond to the comments which they wanted me to correct. It seemed the TAs checked one box on fail at random to allow us to improve for the revision, the comments to be improved upon was however really good.

Marie maros is the best TA ever!

Yes, when asking the TA about troubles in the projects a student will get a great personal feedback on its own work, which is excellent!

It was good for the tutorials. But it wasn't always clear for the projects.

The projects were never mentioned during the tutorials

While working on project 2, Maria replied to my email in 30 minutes with an explanation more than 400 words. She really understood what our doubts were and gave good suggestions.

The TAs were really good with respect to the project work feedback (especially Zuxing Li).

Do you feel that the projects required from you to learn or improve relevant skills (programming, report writing, etc.)?

Do you feel that the projects required from you to learn or improve relevant skills (programming, report writing, etc.)?	Number of Responses
very much	8 (25.0%)
pretty much	17 (53.1%)
so and so	6 (18.8%)
only a little	1 (3.1%)
not at all	0 (0.0%)
Total	32 (100.0%)

Please feel free to add a comment.

I learn more about the course I think.. I do not think I have improved my report writing skills.. And about programming I think I have learnt some new functions in Matlab..

A programming method I had not used before.

It improved my matlab and latex coding skills.

Had to learn latex, never used before

Matlab. I had courses before and I am glad.

Especially report writing

It takes time to draft the report besides solving the problems.

Did the project assignments improve your understanding of the material?

Did the project assignments improve your understanding of the material?	Number of Responses
very much	11 (34.4%)
pretty much	14 (43.8%)
so and so	7 (21.9%)
only a little	0 (0.0%)
not at all	0 (0.0%)
Total	32 (100.0%)

Please feel free to add a comment.

It demanded me to read up on some theory for the course. The result was that I learned more of how the theory translated into practice.

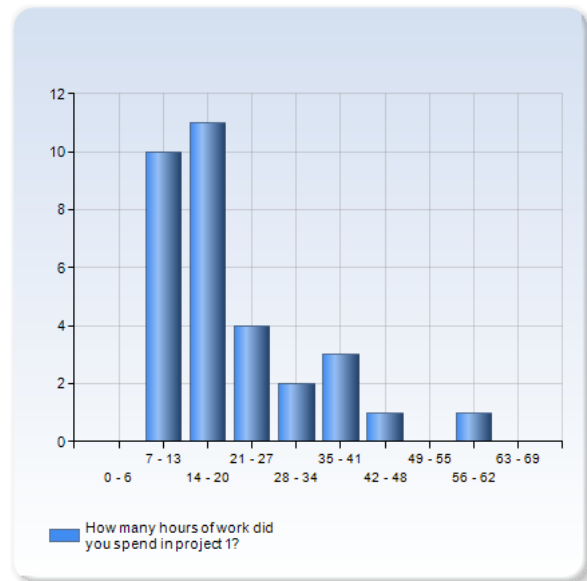
More for project 1 than 2 which was more focused on one topic,

The most effective way of study!

It took time and effort, I felt really involved with the course.

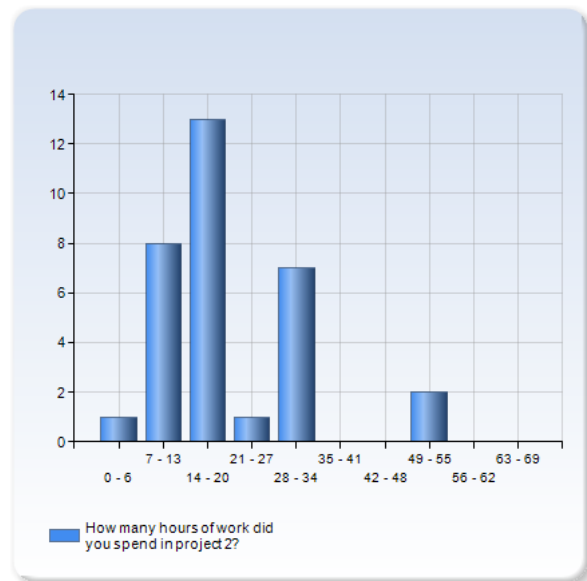
How many hours of work did you spend in project 1?

How many hours of work did you spend in project 1?	Number of Responses
0 - 6	0 (0.0%)
7 - 13	10 (31.3%)
14 - 20	11 (34.4%)
21 - 27	4 (12.5%)
28 - 34	2 (6.3%)
35 - 41	3 (9.4%)
42 - 48	1 (3.1%)
49 - 55	0 (0.0%)
56 - 62	1 (3.1%)
63 - 69	0 (0.0%)
Total	32 (100.0%)



How many hours of work did you spend in project 2?

How many hours of work did you spend in project 2?	Number of Responses
0 - 6	1 (3.1%)
7 - 13	8 (25.0%)
14 - 20	13 (40.6%)
21 - 27	1 (3.1%)
28 - 34	7 (21.9%)
35 - 41	0 (0.0%)
42 - 48	0 (0.0%)
49 - 55	2 (6.3%)
56 - 62	0 (0.0%)
63 - 69	0 (0.0%)
Total	32 (100.0%)



Did the bonus points increase your motivation to participate?

Did the bonus points increase your motivation to participate?	Number of Responses
In both, lecture & tutorial.	23 (71.9%)
In lectures only.	3 (9.4%)
In tutorials only.	5 (15.6%)
No additional motivation.	1 (3.1%)
Total	32 (100.0%)

Please feel free to add a comment.

It increased participation, not that sure about motivation.

Yes. It motivated me to keep up with the reading and also going to the tutorials. The first tutorial I got the TA who I do not think he is a good TA, in my opinion, and I almost gave up about going to the tutorials because it was not helpful at all for me. I only kept going because of the bonus points.

as for the lectures: the assignments with bonus points are a good way to motivate continuously reading, it does however not affect the motivation of attend lectures since you good leave the essay before the lecture started and then go if you did not want to attend it for some reason. In the tutorials the attendance was a criteria for the bonus and therefore the motivation to attend was affected.

Could be more clear that there is no bonus points for the last two tutorials, if there's one bonus point left and there's three tutorials left, you really want to know that there's 100% chance of bonus instead of 33%

How would you rate the level of difficulty of the course?

How would you rate the level of difficulty of the course?	Number of Responses
too easy	0 (0.0%)
easy	1 (3.1%)
ok	16 (50.0%)
tough	11 (34.4%)
too tough	4 (12.5%)
Total	32 (100.0%)

What was good and should not be changed?

What was good and should not be changed?
reading assignment with bonus, clickers
Nothing, very few things followed a strict structure and it is therefore difficult to evaluate something that is good and should not change.
The way the good TA's work. The way the professor teaches.
the concept behind the bonus points!
tutorial and reading assignments
Tutorials, reading assignments (could be more up to date with the lectures), projects (but not too long)
The teacher, material covered
Have Marie as TA next year aswell.
Lecture Style
no
The teacher tobias was good and should not be changed
Maria is a good TA. I do not like the essays, but is a good way to have bonus points. Good book next to lecture. Perhaps add some variety in the course and trying not to repeat too much what is written in the book. Give more examples. Spend more time on clickers for instance.
Projects and ticking sessions
The bonus points, it motivated me a lot!
preparatory questions and exercise sessions.
Tutorial
the way how you hold the lectures should not be changed
Project2
BONUS POINTS
The course was overall good
Course content and its tight alignment with text book.
Everything
Bonus Points
the projects
bonus points
The projects are very good, and put our knowlege into some practical problems
the way tutorials work
Tutorials
the bonus point structure which stimulate students studying, the projects with which you can apply what you're studying
Reading assignments and projects.
Tutorials
The review questions of the lectures (the hand-ins)

How can the course be improved?

How can the course be improved?
more clickers
Consistency and structure and clickers.
change one TA. Make the clickers faster
Making slides available before lectures
related tutorial goes after lecture
Maybe going a bit slower
Have breaks in the lectures, let us choose TA to go to
If teacher can himself solve a few mathematical problems in the class along with theory would be a great advantage
-
I dont know
see question 20...
see the previous answers
I don't know
Just maintain everything it has now.
more exercises can be taken and analysed
See previous comments
Improve tutorials
Less PP on lectures, more board
Sampling and PAM i.e the last two chapters can be taught some where in middle, probably just after having lectures for Power spectrum and with decent knowledge of Fourier. As i was not able to fully grasp the last two chapters towards the end of course.
By adding more real-life examples in the lectures
the book is not really organized, we can not differentiate the importante part, like important formula from all the rest.
tutorials some time even exceed what the lecture said.
Starting a bit more slowly
Feedback about the reading assignment
by focusing more on the second part of the program, and less on the first one
The tutorials should be better organized.
Less calculations and more on the meaning of formulas in real life
Skip the clickers, try to add more intuition during the lectures (as I previously talked about), record the lectures and post them online if possible, skip the groups in the exercises.

Did the course schedule conflict with other courses (simultaneous classes, etc)?

Did the course schedule conflict with other courses (simultaneous classes, etc)?	Number of Responses
Yes	14 (45.2%)
No	17 (54.8%)
Total	31 (100.0%)

If yes, please provide the name of course (course code) and the frequency of collision.
There were two exercises session 14-16... All classes have lectures/exercises/labs/whatever 13:00-15:00 or 15:00-17:00 so that maximises the possibility of conflict.
scientific programming (but a few lectures)
Modelling and dynamic systems, EL1820, a couple of exercises collided with some of the lectures in the other course.
DH2320
8:00-10:00 every tuesday
Once with EQ2310 digital communications
some
project management once a week sometimes
DD2300 - one tutorial (with bonus!)
Just once
Electrical machines and drives EJ2201
Embedded Systems IL2206
Electrical machines and drives occasionally
Embedded systems occasionally
Entrepreneurship for Engineers (ME2072) (about 2 times)
Introduction to Visualization and Computer Graphics (DH2320) (about 2 times)
swedish language, 4-5 times
Entrepreneurship for engineers, three times
Introduction to computer graphics and visualization, 2 times

Please feel free to add any other comment?

Please feel free to add any other comment?

Marie did a great job!

Really enjoyed this class!

no

Nothing else

Thank you for this course!

Please remember that many of the international students have read a course similar or identical to this before. That means that overall results for the course is a bad measure of how well it is taught.

no other comment, the teacher is very nice, and I wanna see him again.

Thank you for your effort on improving the course.

Very interesting material, the course book however could be switched out for a better one (or two!). I would rather want to get two good course books than one more of those homebrew "compendiums" that KTH always insists on using. International books that are used by thousands of students get much more feedback and are generally better maintained and improved from edition to edition. The only downside is that they cost more, but if you factor in the fact that a student's time is money, it renders the extra cost irrelevant.
