Course evaluation for [Dynamic Problems in Solid Mechanics](#) (SE2134, 7.5 credits, VT2016)

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Background

This was the fifth year I was responsible for the course. The overall structure of the course described in the previous evaluation was preserved. I will start with the problems identified during the fourth round (see the previous evaluation for further details).

Problems and implemented solutions from the previous course round

Problem 1. Delayed feedback on the homework assignments.

Due to the work load associated with a licentiate thesis of a teaching assistant, the responses on the homework were delayed and the quality was reduced, in particular on the last one.

Solution proposed: We will develop a routine in which we will go through the assignment in two stages. In the first stage, we will identify the main problems and elaborate on them in the lectures and tutorials. This will provide even faster feedback and enrich the activities during tutorials, which is consistent with students' suggestions.

Solution implemented: The implemented solution was similar to the proposed. The communication was mainly performed during the lectures and through KTH social. This showed to be not enough and will be discussed later.

Problems identified during the current course round

Problem 1. Home tasks were perceived as being difficult by many students. Some of the students complained about not having a clear idea of the criteria used in evaluation.

The current group of the students was exceptionally good, which became clear after the first homework. We decided to increase the complexity of the tasks to challenge the students and match their capabilities. It soon became clear that we slightly underestimate the time required for the task. Furthermore, the newly introduced problems contained hidden traps, which we did not foresee. The complexity of the task completed the correction, which made it very

time-consuming. As a number of the students may increase, we have to secure that this problem does not repeat.

Solution proposed: We will complete most of the problems with a FEM solution in a form of an uncommented script. This will solve two problems. First, the students will have a reference solution. Second, the students will familiarize with the solution technique, post-processing and pitfalls of the FEM. We have already tested some of the problems using this method, and we noticed that the interest to solving the problems accompanied with FEM solution was greater on average.

When it comes to criteria, we decided to abstain from posing them explicitly. We expect to have higher quality and originality of the presentation when students rely on their own quality criteria. However, in giving the feedback, we will boldface the essential points to be addressed.

Problem 2. Proficiency in using ANSYS is degrading.

Since ANSYS in no longer used in FEM modelling course, there is no possibility for the students to acquire the minimum skills required for the task. This year, we struggle to find the students to lead the lab teams.

Solution proposed: We hope that the measured to address the previous problem, which involves developing and publishing the model as a part of the home work task will contribute to the improved prerequisite for the lab. We will also consider publishing step-by-step tutorials prior to the lab.

Other observation

Apart from the named problems, the seminar was perceived as being not as useful by a few students. It happened to one groups, which experienced tension working under the preparation seminar. The purpose of the seminar is to develop communication skills and leadership properties. We will be more explicit explaining it during the next round giving some examples of why some groups experience problems or failed apart during the preparation.

The exchange students do not have the benefit of networking that the track students have. They cannot use the track room thereby limiting the chance to seek immediate help. This limits their ability to work in groups and engage in the course. However, we cannot think of anything that could possibly mitigate this unfortunate situation since the capacity of the track room is limited.

The second year in a row we probe the opinion of the students toward peer-review activities during the homework correction. We observe negative expectations toward it. We will continue communication this with the next groups and consider trying it for one of the homework as non-mandatory activity.

Some of the problems in the tutorials should be revised, according to the teaching assistant, who had this course of the last time.

Students' responses to course evaluation questionnaire

Note: the original punctuation and wording are preserved.

Course evaluation for Dynamic Problems in Solid Mechanics (SE2134, 7.5 credits, VT2016)

Respondents: 23
Answer Count: 17
Answer Frequency: 73.91 %

Please, tell the reason why you decided to take this course.

| Please, tell the reason why you decided to take this course. |
| --- |
| I found the content of this class very interesting. |
| I am at the end of my studies and try to pick courses which could be important during work life. |
| I am an exchange studies and this course is gonna taken into account at my home university |
| Vibration in solid mechanics seems like a interesting and useful field of problem |
| The subjects in the course are quite interesting. |
| I needed this course as an exchange student, because my home school asked me some mandatory courses to take |
| My home university forced me to take a course in Solid Dynamics. The contents of this course were approved by my university. |
| I took this course because it was recommended and also I think that this course would be great for my education and a good preparation for future work. |
| I'm interested in dynamic problems. |
| Because of my interest in body vibrations. I studied Vehicle Engineering for my Bachelor and I was curious how I can find out different vibrations in a vehicle. |
| I think many problems within the engineering field will involve dynamics to some extend. So this course was an obvious choise. |
| Seemed interesting and rewarding. |
| I'm specializing in fluid mechanics and turbomachinery. During a lecture about turbo engines we discussed the reponse of the rotor/stator blades to the aero loads. I noticed that I lacked the fundamentals of dynamics of solid mechanics. That's why I took this course. |
| It has good contents. |
| I thought it would be interesting to solve dynamic problems and not only static problems in solid mechanics. |
| Thought it was a good course |
| Dynamic problems are all around us. They are really important when it comes to engineering. I wanted to improve my skills in this subject and had heard great things about this course. |
| interesting topic, i believe it to be a important topic |

What is the grade you aim at in this course?

What is the grade you aim at in this course?	Number of Responses
A	10 (58.8%)
B	4 (23.5%)
C	0 (0.0%)
D	2 (11.8%)
E	1 (5.9%)
Total	17 (100.0%)
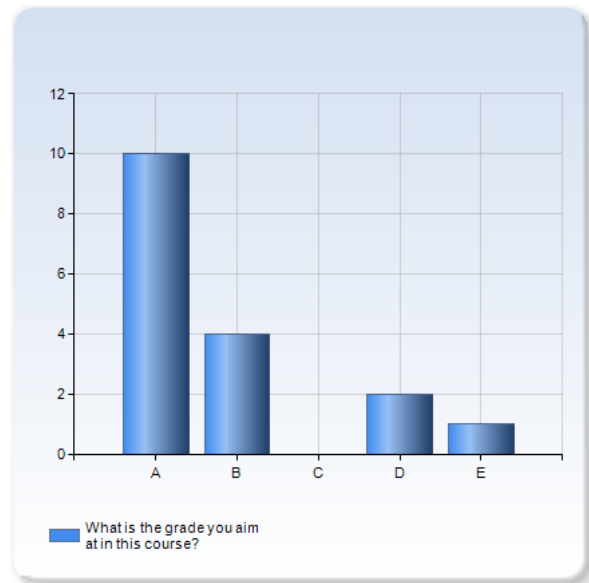
	Mean	Standard Deviation	Coefficient of Variation	Min	Lower Quartile	Median	Upper Quartile	Max
What is the grade you aim at in this course?	1.8	1.3	70.5 %	1.0	1.0	1.0	2.0	5.0

Comment
It is a course were I have learned a lot of interesting stuff and I am happy to have taken it. However, the homework provided myself with a constant load of work for all the period, by I recognize the benefits of it.
I understood the course idea and think I solved the problem as good as I could.
If the grade will be an A or B I'll try to get the course admitted at my home university. Only if it is admitted it will count for my masters degree. However, I did not plan to get the course admitted beforehand so it would be more like a bonus of the erasmus year at KTH.
I got lazy when I thought there was too much to do in order to achieve a higher grade.

What is the grade you aim at in this course?
2
2
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1
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4
1
1
2
1
4
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1
1

Please, list the previous courses which you think are needed to succeed in this course?

Please, list the previous courses which you think are needed to succeed in this course?
SE1025 FEM för ingenjörstillämpningar
SE2126 Materialmekanik
SD2125 Signaler och mekaniska system
SF1634 Differentialekvationer II
SG1140 Mekanik II
SG1130 Mekanik I
Basics in Dynamic FEM calculations (which I did not have) Mathematical knowledge and practical use in MATLAB etc.
Math - differential equations and transforms along with basic solid mechanics units
Mechanical design Mechanics of materials A course in ANSYS or at least some previous experience
Basics in dynamic systems
I do not know the previous course of KTH. However, I would say that the basics courses of Solid Mechanics, and Dynamic Systems as well as a sufficient asset in functional analysis is needed. A proficiency in Ansys is reccomended. A course of FEM is required as well. (for example "FEM for engineering application here at KTH (SE1025)")
Differential equations and transforms. Mechanics. Solid Mechanics.
- Basic FEM - Basic mechanic course - Basic solid mechanics - Basic Vibration
Since I did not have a rich background in Materials, Solid Mechanics and Vibrations, I would suggest courses that have connection with these subjects.
Differential eq in solid mech. Series and transforms Basic solid mech. Applied elasticity (Structural dynamics)
Mandatory solid mechanics master courses.
Statics, elasticity (elastostatics), kinetics
Sound and vibrations mechanics 2
Solid mechanics base course, Mechanics I and II. Differential equations. I would also recommend that you have read some acoustics and vibrations/signal analysis course for the first home assignment. People who had not taken any acoustics course before this course was quite confused by the signal analysis in HW1 since it is not so greatly discussed is the course.
Basic solid Mechanics and mechanics II
Basic solid mechanics, basic dynamics and a bunch of calculus.
Hållf GK, Sound and vibration, mekanik 1 & 2, FEM,

Were the objectives of the course (as stated per course description) aligned with the course activities? Please, elaborate on your answer.

Were the objectives of the course (as stated per course description) aligned with the course activities? Please, elaborate on your answer.

Yes

Yes

Yes. But several of the activities could've been skipped. For example the seminar. Interesting? Yes, but didn't contribute much to the learning outcome and do take up some precious time.

Yes.

Several labs and very interesting homeworks, added with excellent lectures and tutorials totally answer the course activities presented in the course description.

Yes they were.
The homework helped to be able to:
• formulate the problems and present the solutions using terms, concepts and vocabulary of the course;
• construct a model for representing a structure with single and multiple degrees of freedom;
• solve dynamic model problems using analytical methods;
• analyse and interpret the results of dynamic analyses;
• carry out comprehensive dynamic analyses of thin beams and plates, which constitute a very broad class of engineering structures;

The labs helped to be able to:
• use numerical finite element analysis to determine natural frequencies and modes of an arbitrary 3D structure;
• perform harmonic analyses of an arbitrary 3D structure with finite element method;
• perform spectrum and random vibration analyses of an arbitrary 3D structure with finite element method;

Reflection together with the stimulation of the seminars helped to be able to:
• modify the structural design to avoid undesirable vibrations.

Yes. except that the seminar was unnecessary. It did not give much and gave to much work considering the credits this course is worth

Yes, the task solving was also a very good way of learning by doing. The lectures are a good support to know what is important or not.

The objectives were aligned with the course, and the activities were interesting and mind challenging.

Yes

Yes, very much so. In the course description it says "After the course, the participants should be able to:". What follows is basically an overview of the topics of the lectures.

Yes

Yes there was a lot of problem formulating, solving and analyzing in the home assignments and the objectives concerning 3D and FE-analysis was dealt with during the labs. I don't if the last point, reconstruction of structures in order to avoid vibrations, was thoroughly discussed in the course but I didn't attend all of the lectures and did not do all of the home assignments.

I don't know

They were clear and time was taken to go into each aspect.

Please, name three activities you have spent most time on during this course.

Please, name three activities you have spent most time on during this course.	Number of Responses
Solving the recommended problems.	3 (17.6%)
Working on the homework assignments.	17 (100.0%)
Attending the lectures and recitations.	15 (88.2%)
Reading the recommended material.	11 (64.7%)
Preparing for the seminar.	5 (29.4%)
Something else (please, specify)	0 (0.0%)
Total	51 (300.0%)
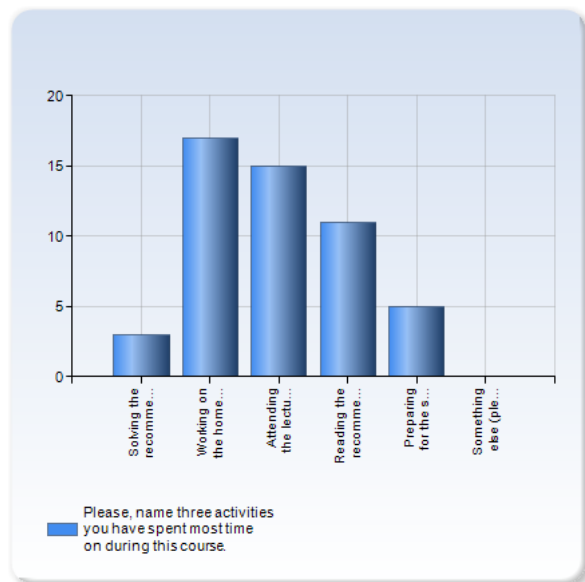
	Mean	Standard Deviation	Coefficient of Variation	Min	Lower Quartile	Median	Upper Quartile	Max
Please, name three activities you have spent most time on during this course.	3.0	1.1	37.0 %	1.0	2.0	3.0	4.0	5.0

Comment

It was near impossible to read before every lecture since the Homework assignments alone took nearly 40 hours per week to solve through out the course.

I also spent time reading the material, but it was more as a support to solve the homework assignments.

Home assignments was by far the most time consuming.

90% homework problems. No time for recommended problems unfortunately. Halfway through the course I didnt have time to read the recommended chapters anymore. Just hw..

The homework assignments has by far been the most time consuming part of the course.

Please, name three activities you have spent most time on during this course.
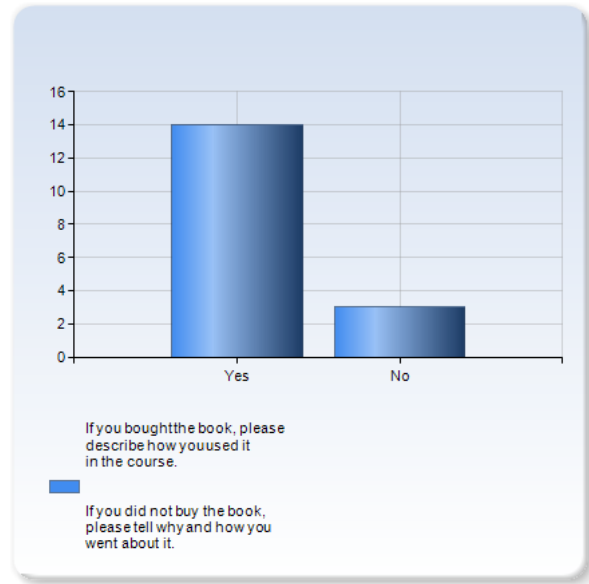
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20 (51)

Did you purchase the Timoshenko book?

If you bought the book, please describe how you used it in the course. If you did not buy the book, please tell why and how you went about it.	Number of Responses
Yes	14 (82.4%)
No	3 (17.6%)
Total	17 (100.0%)

	Mean	Standard Deviation	Coefficient of Variation	Min	Lower Quartile	Median	Upper Quartile	Max
If you bought the book, please describe how you used it in the course.								
If you did not buy the book, please tell why and how you went about it.	1.2	0.4	33.4 %	1.0	1.0	1.0	1.0	2.0

Comment
Yes I did, I bought it from Amazon. It was a very good book for the homeworks.
I am not used to buy books for study purposes and especially not for 700 SEK.
Read the chapters..
I used it to read while solving the homeworks.
I think that the compendium furnishes a lot of informations, and I did not feel any need to buy it.
I used it to help me understand the concepts that were not explained in the compendium, and I used it as well to help me solve the homeworks.
I tried to read before lectures and I used it as a help for solving the homework assignments.
It was very useful to solve the tasks and it has some example to check if we solve the problem with the right method.
You need it
I bought the book but unfortunately due to problems in the delivery it took about a month to finally get it. So i didn't really use it but instead used the primer.
The Timoshenko book was great. It should be clearer that you NEED this book in this course. The compendium is not sufficient.
I read (most of the times) the recommended chapters before the lectures, but most of all the book was very useful when solving the home assignments.
Used it to slove the problems
The book was very expensive at KTH, so I bought it cheaper on Amazon. This book is very detailed with numerous of examples. I will be keeping on my bookshelf for future reference.
the book was helpful to solve the homework
If you bought the book, please describe how you used it in the course.
If you did not buy the book, please tell why and how you went about it.

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What are the activities you benefited the most in this course? Please, reason your answer.

What are the activities you benefited the most in this course? Please, reason your answer.
The homeworks and the lectures.
Homework assignments
Read the book and do precalculated examples.
The homework, but only because 70% of my time went into TRYING to solve them.
The homeworks ; they learn us how to look for the informations we need to solve a task, and how to adapt it for the problem we have in question. That was really interesting.
The homework since they are the part of the course in which I spent the most of my time, but only for the gain in problem solving skills. I benefited a lot with the seminars. They have stimulated my mind to the "everyday applications" of what we learned and gave me a better understanding of why we were doing what we do. I found it very interesting! (together with the facebook group as well). Finally, I learned a lot with the Labs (even if I did not have the sufficient knowledge of Ansys to solve them alone). It is interesting to solve "real" problems with the software and understand what is represented by the results.
Homework assignment since they really gave one a good practice on the course contents
The homework assignments, even if it was very time consuming. I think it is great to solve realistic case that don't have a single answer. Some assumptions need to be done and I think it will be helpful in the industry later in order to save time.
I believe that the laboratories made a clear image of the complicated formulas that were shown during the lectures. Also the preparation for the seminar was really fun, and the fact that you have to present your work before a group that is very well prepared about the subject, can be challenging but you can learn a lot.
Homework! These task really made you learn the course content inside and out.
HW; they were challenging but we learned a lot
I learned the most solving the homeworks. The assignments helped me to understand the theroy better ex. doing a mode superposition helped me understand the concept.
Homework problems since I spent 90% of the time doing them. Timoshenko book gave good understanding and insight.
The home assignments since they are quite complicated and you really had to understand the problems in order to solve them.
Homeworks
Reading the material.
homework. interesting questions but NEEDS to be shorter

Was there anything you lacked in the feedback on the first submission in order to finalize the solutions? In addition, what do you think about the possibility of having a peer-review session right after each submission in which you would check each other's homework and provide unofficial feedback in order to speed-up the correction procedures?

It was very unclear what was needed to be corrected in order to pass the homework. The possibility of having a peer-review is not recommended because the workload on the students is already to high.

Sometimes I did the wrong solution strategy and therefore some things were missing.
Peer-Review sounds oogd.

Didn't lack any information. It was although unclear what was needed for. Your side in order for us to pass.i think it Would've been better to use peer review.

I dont think that peer-review would have helped me at all in this course.

Some notions were difficult to sometimes understand, but most of the time the feedback of Prashanth was enough to fill in the gap of precision situated between the statement of the exercise and what we had to solve exactly. A peer review can be very useful, and it could also push people to talk to each other, to create a nice environment in the class.

For most of the problems, the feedback was sufficient. However, I think that a first check (before the first submission), only to verify that the student have done the right assumptions could be a plus.

The peer-review session would be a good idea, helping people that have taken a wrong direction in the problem solving. However, it is also a bad idea because it will give "almost correct" answers to those peer-reviewing good students, and they will then probably just copy what they read from the good student.
A possibility is that the professor or the assistant review the solutions and during class they discuss of some wrong examples.

The feedback is enough, maybe a lecture where the teacher goes through the problem to show how he solved it would have been good. Peer-review would have just increased the workload for the students. Almost everyone in the class compared their results with each other before handing it in, which is why peer-review would have been unnecessary.

No, it is great that you can provide individual feedback quite fast and also focused on what we should do in order to improve our submission. No a peer review would not be good, the reason is that it will take time and this course is already a big course regarding the rewarded credits. Moreover, we often work quite together in the track room and have a discussion on our ideas which is great.

This idea with checking other's solution might be effective. I struggled with the homework, but this was mainly my fault. But I believe it is interesting to see how other's think.

No peer-reviewing of the homework. This would further increase an already ridiculous workload.
This would also lower the standard on the feedback. It was worth waiting theese extra days for a well written and thoughtful induvidual feedback.

We already organized that ourselves. Don't think mandatory is a good approach.

The feedback was very helpful. I can't think of any improvements. I think the peer review would probably only work if the two students are about at the save level. Otherwise the student who solved the problem will most likely just give the other student the solution. Whereas the official feedback didn't provide the solution but instead helped the students find the solution themselfs.

Yes the feedback was hard to work with in written form. It needs to be given with speech as well to clarify. Also it NEEDS to be much clearer what part of the feedback is "needed to have an acceptable solution" and what is "voluntary if you have time". Having peer-review sounds good.

I could be more clear what you have to do and what i optional if you want to hand in a better resubmission.

I don't think the peer-review suggestion is so good since a lot of people already think they spend too much time doing the home assignments, peer-reviewing would take even more time. A didn't think that when we got the feedback was an issue.

I liked the feedback and I don't think more feedback or anything else is needed

The feedback lacked clear indication on what needed to be fixed, as opposed to when was "interesting" to do. I think it would be beneficial for the students who don't have much time to only focus on what needed to be fixed in order to be able to get a full grade.
Peer reviewing would be questionable. Say that someone only does one problem out of three in the homework. This person lacks experience in the other problems and thus would probably not be able to give good feedback.

the feedback could have been more clear on what was needed to do. if peer reviewing is added something else needs to be taken away for time reasons

Please, suggest how the course can be improved (homework, lectures, tutorials, labs, seminar, etc.). In addition, if you think that the course load does not correspond to 7.5 credits, what are the activities that should be dropped in order bring the workload to the expected level?

Homeworks: They were ridiculously hard, and in in some cases important material parameters was missing. So it seems like the homeworks had not be solved in advance.
Tutorials: Good.
Labs: The labs was good, but the labreports was a joke, the expectations was to high and the feedback questions was to hard and took to much time.
Seminar: The seminar was totally unnecessary and should be dropped at once, or made voluntary.

Conclusion: Seminar should be dropped, Lab report should be not as hard, homeworks can be at this difficulty level of the seminar is dropped and the lab reports are dropped.

Drop the seminar.

Drop the seminar and maybe offer some more help with the homework in the form of "räknestuga". Some of the tutorials where just to far fetched.

I would have liked to have regular help session where students could show up with questions regarding the homework. I think that the homework was the biggest load on this course. They were to difficult.

I think that this course is very well taught, and do not really have any suggestion to do about how it can be improved.

Maybe a less precise feedback for the homework (sometimes we get partial solutions directly). But I realize that this would mean much more work for the assistant, since he would get more answer...
Also, it was complicated for me to know how much I could bother the assistant or the professor with questions. I did it when asked to or when lacking of alternatives, resulting in having sometimes to ask simple questions at the end of the course. Maybe giving an example of how we should behave at the beginning of the course would have helped, but this is just personnal.

The course lay up was very good. I liked it. However the course credit was far to low considering how much time one had to spend. I almost spent equal amount of time on this course, worth 7.5 credits, as on my bachelor's thesis, which was worth 15 credits. If this course would have been worth 12 or 15 credits it would have been one of the best course so far.

The only think I would improve is to have an application of the lab on a homework exercise (using Ansys workbench instead of classic). 7.5 credits is not a lot compared to the amount of work, but it is also quite easy to know where we are with the grade (at least I hope since we don't have the final grade now). So if it is to much, it is mostly because we wanted to perform good assignments. Maybe it would be possible to have 1 or 2 homework problem less.

The course is very interesting, mind challenging but it's one of the best I have ever attended. Both teachers have very good explaining methods and even though the subject is a difficult one, they made it easier just by taking their time to explain.

The homeworks corresponded to a major part of the workload but these must stay. The seminar however felt obsolete.

Each homework was atleast 60-80 hours, without the resubmission. The seminar was about another 15-20 hours. I would say that the course is more work than 7.5 credits.

The course is very very good. The way it is structured enables the student to learn a lot as long as the student has enough time. For me the course load was higher than 7.5 credits. The workload could be decreased by less homework problems. The homework is the main factor for the high time consumption of the course.

The HW were good but they simply took too much time. Perhaps workshops with the teaching assistant too speed up the work.
The tutorials were not that good. They could have been used better or actually skipped.
Lectures were good.

The work load does not nearly correspond to 7.5 credits. Given the time you had to put in it should be at least 15 credits. I know that you (teachers) are aware of this but that you want to include all the assignments in the course. This problem needs to be solved either by giving more credits (because we really do have OTHER courses at the same time), or some parts of the course could be skipped/simplified.

I think the course could be improved by decreasing the workload. Otherwise the course was good. It has a great setup but there is just too much to do, it does not correspond to 7.5 credits. I would recommend to either make the home assignments smaller (a little easier or maybe only 2 problems per submission), or remove the labs or the seminar.

Make the homeworks less time consuming and let the focus one the basics of the course. According to me I found the first homework most effective and beneficial. The other two was less basic and they didn't give me as much understanding as the first.

Less analytical (or less complicated at least) and add more FEM activities. I think the course would benefit from if the assignments would be less complicated and would focus more on grasping the fundamentals, with connection to FEM.

I think the seminar was a waste of time. In my option, it could be dropped. That would, however, not change the work load an awful lot, because (seminar work load) << (homework work load). My biggest problem with this course was that it was so interesting. I found myself spending way too much time on it, such that I did not do very well in the other courses I took.

the workload is unreasonable, i did not have time to follow my other courses as i was expected to by those teachers.

.the seminar could be dropped and the homework assignments could be reduced in size.

Would you recommend taking this course to your younger colleague? If so, what would be your recommendation on how to succeed in this course?

Would you recommend taking this course to your younger colleague? If so, what would be your recommendation on how to succeed in this course?

I would not recommend this course if you are taking any other courses at the same time due to the dificulty level, but if you only have this course I can recommend this course beacuse the content is good. I recommend buying the Timoshenko book, work in groups and don't hesitate to ask the teachers.

Yes.

Yes, one of the best units at kth. Very competent lecturer and assistant. Do not forget, read the chapters!

I would definitely recommend this course and to succeed you will have to solve and understand the homeworks 100% and to do that u will have to be in contact with the teachers quite regularly.

Yes of course. I would advise him to start working on the homework as soon as possible.

Yes i recommend it as it is a great preparation to the world of solid mechanics after the master. To succeed in the course, work hard on the homework.

I recommend this course as this was one of the greatest course I've taken so far.

Yes I would, but I would also tell him that it is a big and very interesting course. In order to succeed it is important to share ideas with classmates. It is often that we find a good idea by working together.

Yes, I would. In order to succeed you need to have a background common with this subject, you need to put a lot of hard work, but I believe it is worth it.

Read your timoshenko and start the homework 2 weeks before due.

Don't take any other demanding courses at the same time

Yes absolutly! The student should have all the material ready from the beginning and read the chapers befor the lecture. Also, the student should make sure to have enough time (not a lot of other courses) in the term.

Yes I would because you learn a lot BUT this does not justify having too few credits.

To succeed you need to give up your private life outside school and work really f***ing hard

I would recommend it but only if you have the time, and are willing to spend it, solving and writing reports on home assignments all day every day.

Yes/no. Depends if they are interested in dynamics and whether theye think they can benefit of knowledge for this course. If they just want to take a course that are interested in general I wouldn't recommend the course since I didn't find it that interesting in a general sense. I think the course could be much more interesting if some of the tasks in the homework was of the same kind as lab 2.

This course should be mandatory for the Solid Mechanics track. Not only does it practice dynamic problems to great extent, it also practices important aspects of being an engineer in general.

The key to success: Read ALL the material and try to plan your courses such that you do not read many credits at the same time as this course.

only if the person are ready to spend a lot of time.

spend a lot of time!