



Report - EL2520 - 2019-09-03

Respondents: 1
Answer Count: 1
Answer Frequency: 100.00 %

Please note that there is only one respondent to this form: the person that performs the course analysis.

Course analysis carried out by (name, e-mail):

Elling W. Jacobsen, jacobsen@kth.se

COURSE DESIGN

Briefly describe the course design (learning activities, examinations) and any changes that have been implemented since the last course offering.

Lectures, Exercises, Homeworks, Labs, Exam. Grade A-F is based on exam only.

Last year I wrote quite extensive lecture notes that were made available to the students. These were updated this year based on feedback from students and course assistants. The lecture notes complement the course book and lecture slides.

We added new exercises to the exercise collection this year.

THE STUDENT'S WORKLOAD

Does the students' workload correspond to the expected level (40 hours/1.5 credits)? If there is a significant deviation from the expected, what can be the reason?

According to the course evaluation most students seem to spend less than 20h per week, which is within the expected.

THE STUDENTS' RESULTS

How well have the students succeeded on the course? If there are significant differences compared to previous course offerings, what can be the reason?

109 students took the ordinary exam, out of which 10% got an A, 15% a B and 30% got F or FX. This was a somewhat better result than last year, and significantly better than in 2017. The result is considered reasonable.

OVERALL IMPRESSION OF THE LEARNING ENVIRONMENT

What is your overall impression of the learning environment in the polar diagrams, for example in terms of the students' experience of meaningfulness, comprehensibility and manageability? If there are significant differences between different groups of students, what can be the reason?

Seems overall good, the weakest point is nr 10 (ability to learn from concrete examples) with score 5.5 out of 7. No significant differences between different groups of students.

ANALYSIS OF THE LEARNING ENVIRONMENT

Can you identify some stronger or weaker areas of the learning environment in the polar diagram - or in the response to each statement - respectively? Do they have an explanation?

Hard to point out any specific weaknesses or strenghts; the scores vary between 5.5 and 6.2 out of 7.



ANSWERS TO OPEN QUESTIONS

What emerges in the students' answers to the open questions? Is there any good advice to future course participants that you want to pass on?

As previous years, relatively many students consider their background somewhat insufficient when they start the course and therefore recommend future students to review the basic control course before this course starts. I also encourage the students to do so during the first lectures.

Several students complained about the water tank lab. We had some issues with the lab processes not working properly in the beginning, and I believe this may be one reason. Previous years the same labs have received positive comments for the most part.

PRIORITY COURSE DEVELOPMENT

What aspects of the course should primarily be developed? How could these aspects be developed in the short or long term?

Following the final course meeting we decided to revise and upgrade the computer labs, in particular lab 3 on H-infinity synthesis which currently is too much of a recipe act. We also decided to add some new exercises with motivating examples, partly in response to the students comments on ability to learn from concrete examples.

Will also write lecture notes on the subjects that have not been covered so far; Model Predictive Control and Constraint Handling.

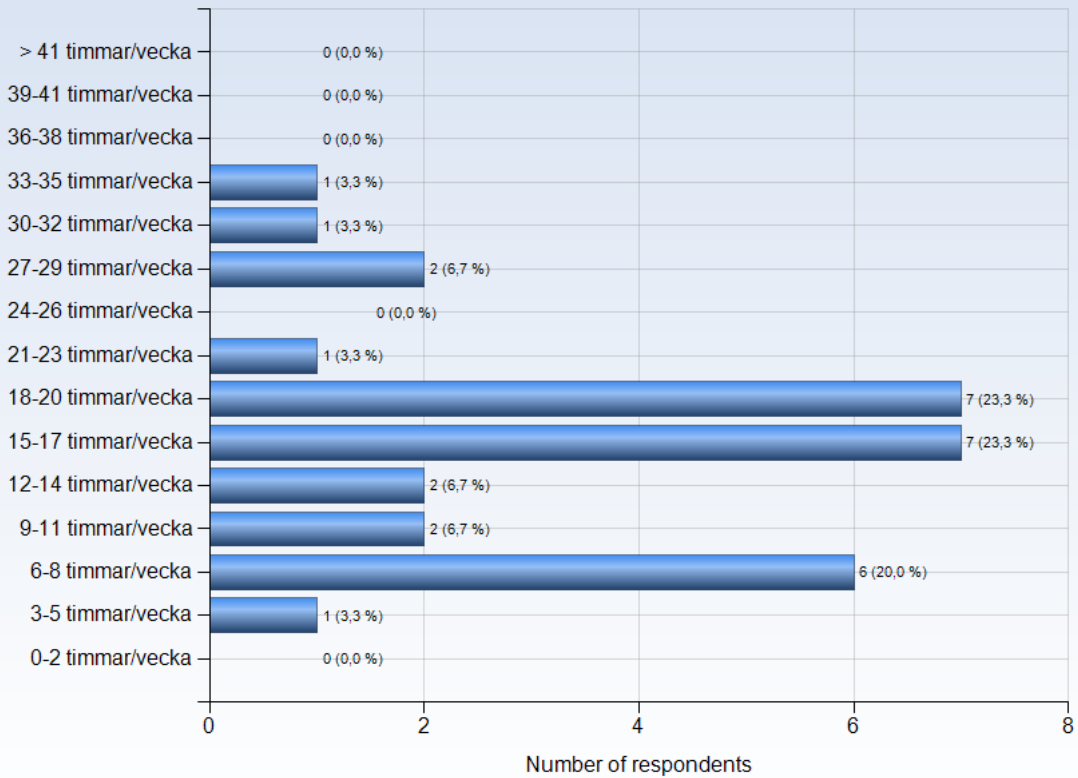


EL2520 - 2019-06-07

Antal respondenter: 143
Antal svar: 30
Svarsfrekvens: 20,98 %

ESTIMATED WORKLOAD

On average, how many hours/week did you work with the course (including scheduled hours)?





Comments

Comments (I worked: 3-5 timmar/vecka)

I wanted to spend more time, but the thesis took up all available time.

Comments (I worked: 6-8 timmar/vecka)

Labbarna tar en del tid, men jag hängde inte med i kursens utveckling och pluggade därför inte tillräckligt med timmar per vecka pga oförståelse av innehållet.

Although there was so much to study and read in this course, but Well defined lecture notes and references from the book helped a lot.

Comments (I worked: 9-11 timmar/vecka)

The course was well organised and we were provided with a lot of resources, which meant that it was easier to study and understand the material. Hence, about 10 hours/week was enough to follow along.

Comments (I worked: 15-17 timmar/vecka)

Heavy workload during the course but worth it because it reduced the study time for the exam

One of the more demanding courses, but overall not too bad.

I didn't do much work myself outside scheduled hours, except for the computer exercises.

Reasonable work load

Comments (I worked: 18-20 timmar/vecka)

Decent amount of hours

Normal. Didn't do too much.

Comments (I worked: 27-29 timmar/vecka)

Achievable as long as you're taking another course that does not require a lot of time.

Comments (I worked: 30-32 timmar/vecka)

The workload is appropriate

Comments (I worked: 33-35 timmar/vecka)

With the computer labs, project and 5h exam the workload was too much. Still didn't have time to regularly practice calculations.

LEARNING EXPERIENCE

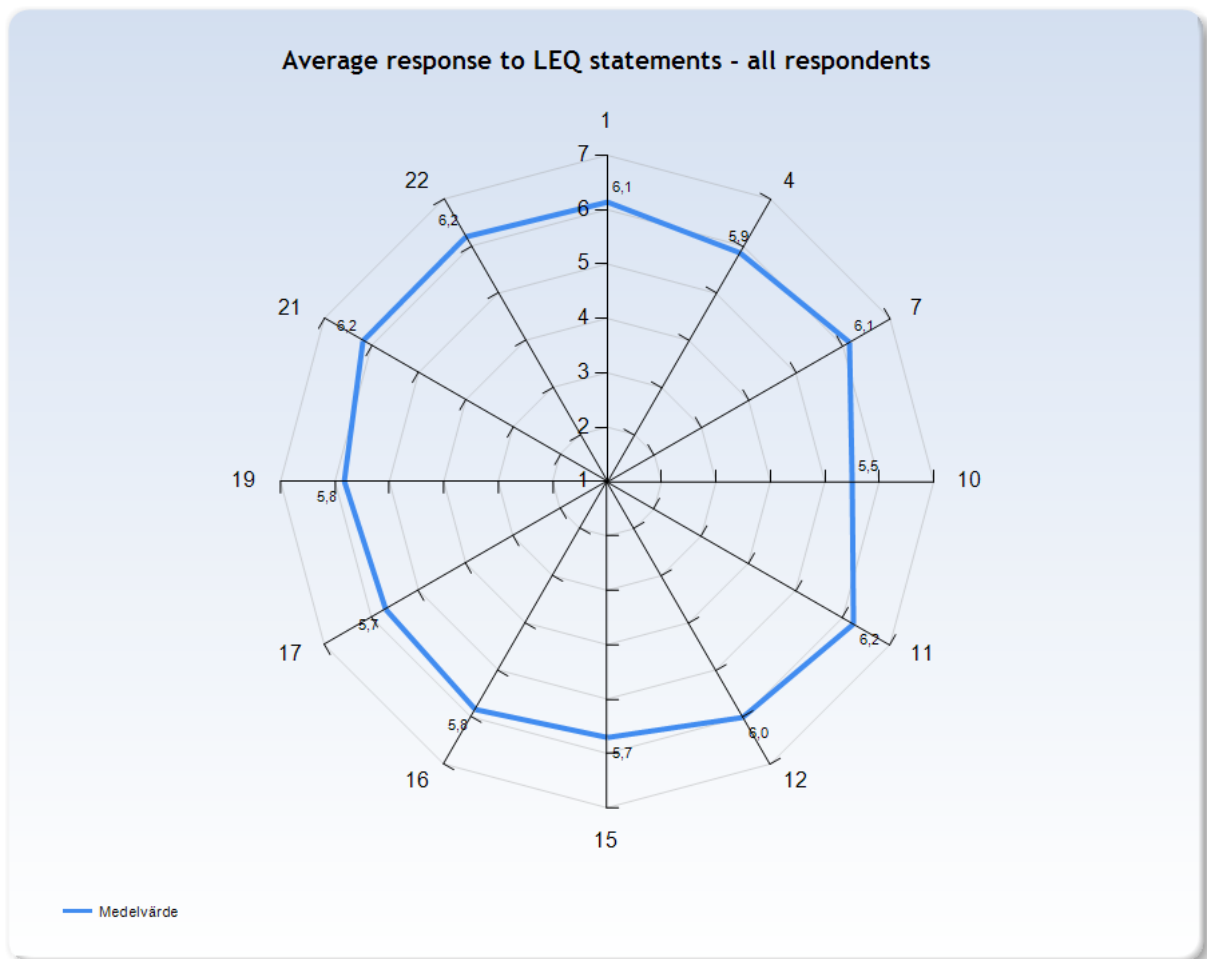
The polar diagrams below show the average response to the LEQ statements for different groups of respondents (only valid responses are included). The scale that is used in the diagrams is defined by:

1 = No, I strongly disagree with the statement

4 = I am neutral to the statement

7 = Yes, I strongly agree with the statement

Note! A group has to include at least 3 respondents in order to appear in a diagram.





KTH Learning Experience Questionnaire v3.1.4

Meaningfulness - emotional level

Stimulating tasks

1. I worked with interesting issues (a)

Exploration and own experience

2. I explored parts of the subject on my own (a)

3. I was able to learn by trying out my own ideas (b)

Challenge

4. The course was challenging in a stimulating way (c)

Belonging

5. I felt togetherness with others on the course (d)

6. The atmosphere on the course was open and inclusive (d)

Comprehensibility - cognitive level

Clear goals and organization

7. The intended learning outcomes helped me to understand what I was expected to achieve (e)

8. The course was organized in a way that supported my learning (e)

Understanding of subject matter

9. I understood what the teachers were talking about (f)

10. I was able to learn from concrete examples that I could relate to (g)

11. Understanding of key concepts had high priority (h)



Constructive alignment

- 12. The course activities helped me to achieve the intended learning outcomes efficiently (i)
- 13. I understood what I was expected to learn in order to obtain a certain grade (i)

Feedback and security

- 14. I received regular feedback that helped me to see my progress (j)
- 15. I could practice and receive feedback without being graded (j)
- 16. The assessment on the course was fair and honest (k)

Manageability - instrumental level

Sufficient background knowledge

- 17. My background knowledge was sufficient to follow the course (f)

Time to reflect

- 18. I regularly spent time to reflect on what I learned (l)

Variation and participation

- 19. The course activities enabled me to learn in different ways (m)
- 20. I had opportunities to influence the course activities (m)

Collaboration

- 21. I was able to learn by collaborating and discussing with others (n)

Support

- 22. I was able to get support if I needed it (c)



Learning factors from the literature that LEQ intends to examine

We tend to learn most effectively (in ways that make a sustained, substantial, and positive influence on the way we think, reflect, act or feel) when:

- a) We are trying to answer questions, solve problems or acquire skills that we find interesting, exciting or important
- b) We are able to speculate, test ideas (intellectually or practically) and learn from experience, even before we know much about the subject
- c) We are able to do so in a challenging and at the same time supportive environment
- d) We feel that we are part of a community and believe that other people have confidence in our ability to learn
- e) We understand the meaning of the intended learning outcomes, how the environment is organized, and what is expected of us
- f) We have adequate prior knowledge to deal with the current learning situation
- g) We are able to learn inductively by moving from concrete examples and experiences to general principles, rather than the reverse
- h) We are challenged to develop a true understanding of key concepts and gradually create a coherent whole from the content
- i) We believe that the work we are expected to do will help us to achieve the intended learning outcomes
- j) We are able to try, fail, and receive feedback before, and separate from, each summative assessment of our efforts
- k) We believe that our work will be considered in an honest and fair way
- l) We have sufficient time for learning and devote the time needed to do so



m) We believe that we have control over our own learning, and not that we are being manipulated

n) We are able to collaborate with other learners struggling with the same problems

Literature

Bain, K. (2004). *What the Best College Teachers Do*, Chapter 5, pp. 98-134. Cambridge: Harvard University Press.

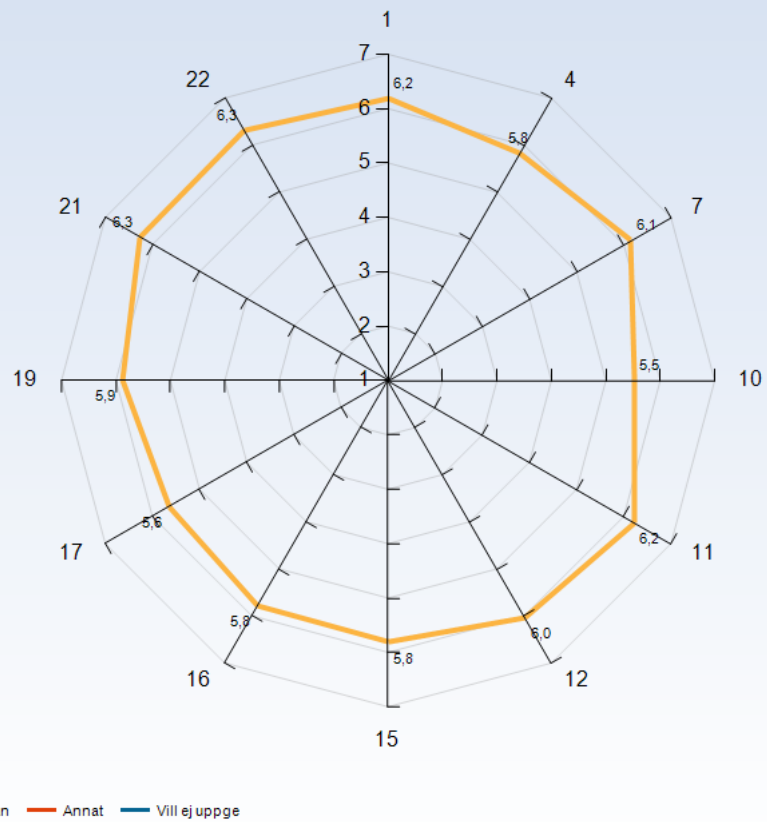
Biggs J. & Tang, C. (2011). *Teaching for Quality Learning at University*, Chapter 6, pp. 95-110. Maidenhead: McGraw Hill.

Elmgren, M. & Henriksson, A-S. (2014). *Academic Teaching*, Chapter 3, pp. 57-72. Lund: Studentlitteratur.

Kember, K. & McNaught, C. (2007). *Enhancing University Teaching: Lessons from Research into Award-Winning Teachers*, Chapter 5, pp. 31-40. Abingdon: Routledge.

Ramsden, P. (2003). *Learning to Teach in Higher Education*, Chapter 6, pp. 84-105. New York: RoutledgeFalmer.

Average response to LEQ statements - per gender



Comments

Comments (I am: Kvinna)

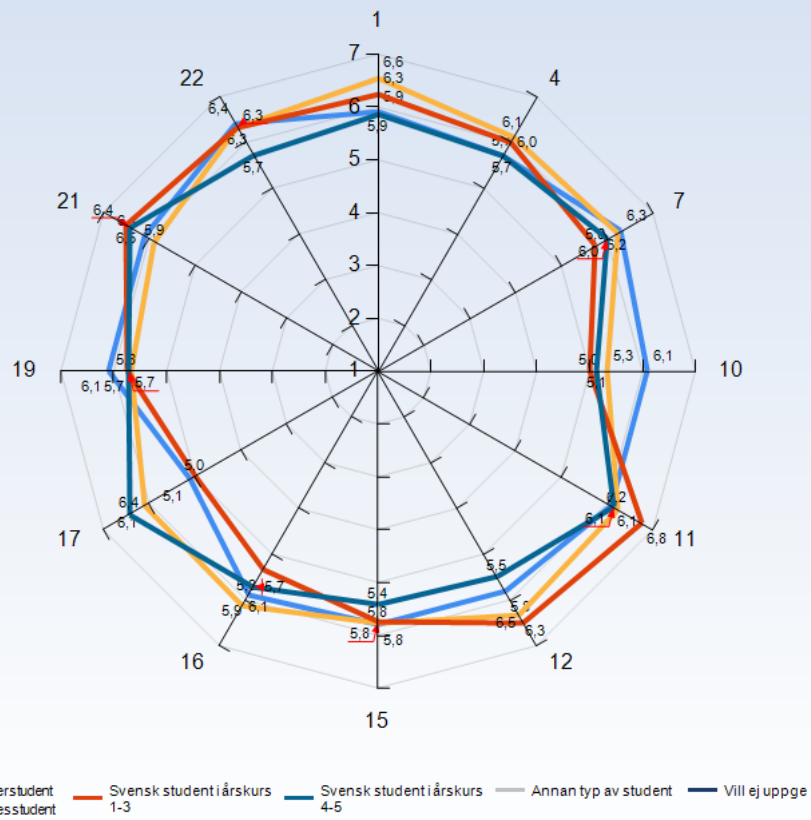
It would be fun if there were any women present in the course as teachers assistants or teacher

Comments (I am: Man)

What?

Nothing to comment

Average response to LEQ statements - per type of student



Comments

Comments (I am: Internationell masterstudent)

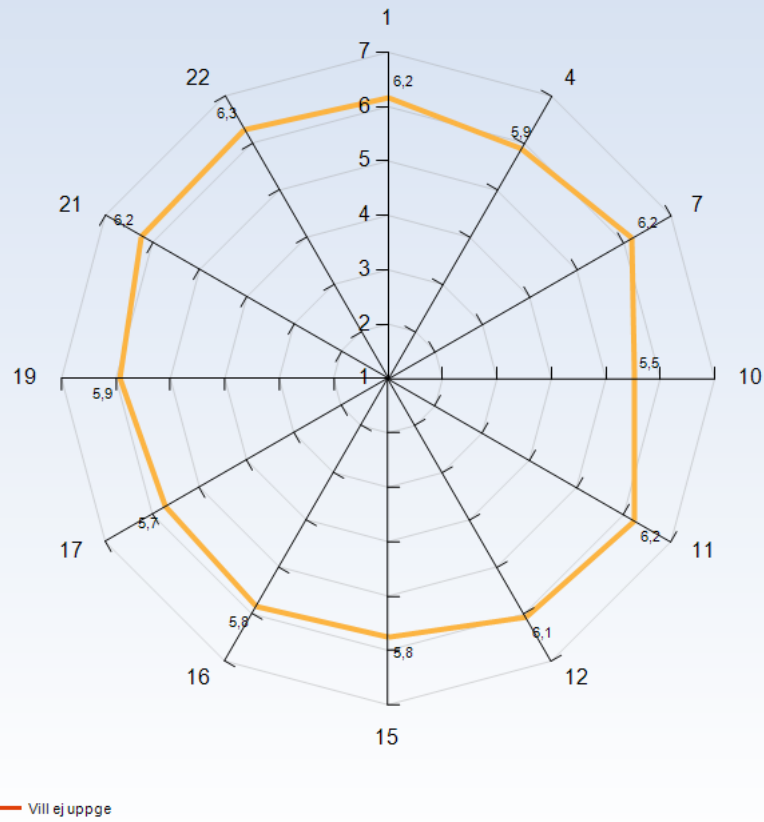
Nothing to comment

Comments (I am: Svensk student i årskurs 1-3)

Lots of exchange students

It made me really interested in understanding the theories applied properly during the master.

Average response to LEQ statements - per disability



Comments

Comments (My response was: Nej)

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GENERAL QUESTIONS

What was the best aspect of the course?

What was the best aspect of the course? (I worked: 3-5 timmar/vecka)

Good lectures

What was the best aspect of the course? (I worked: 6-8 timmar/vecka)

Det man inte förstod så mycket i grundkursen förstår man bättre nu, så som rollen av S och T. Frikoppling var också intressant, då man skulle tro att det aldrig skulle gå att koppla isär ett MIMO-system.

Learning about the practical Tools and methods for building advanced controllers.

Nicely structured lectures, great delivery by the teacher.
TA's for exercise sessions were great.

What was the best aspect of the course? (I worked: 9-11 timmar/vecka)

I liked the lectures (it was easy to follow those given on the whiteboard) and exercise sessions (the brief summaries and repetitions given in most sessions were very useful).

The course was very well organised (the best I have seen so far at KTH) and a lot of material was available. Professor Elling Jacobsen presented the material in a clear way in the lectures and the TA Lars Lindemann gave really good exercise session, always making a small theoretical summary before doing the exercises, which was extremely helpful.

What was the best aspect of the course? (I worked: 12-14 timmar/vecka)

MIMO and Limitations

What was the best aspect of the course? (I worked: 15-17 timmar/vecka)

The final lab where the theory of the course was put into practical use

The assignments where interesting to work with

The lectures and the exercise sessions were well taught. The computer exercises were fun to do and helped with understanding.

The TA sessions where very helpful as were the labs and the lectures. They all complemented each other very well.

What was the best aspect of the course? (I worked: 18-20 timmar/vecka)

The labs and exercise sessions were placed perfectly to immediately understand the lectures.

The problem lectures

That the labs was quite simple (or at least the rating) but I still learned things doing them.

Passionate teachers.

Exercise session and lecture notes provided by the course instructor along with lecture slides

I liked the lectures, Elling was very clear, and he was able to understand every question quickly and answer it in a very straight-forward explanation. In my opinion, we were not afraid to ask questions, which is a good thing in a such a large audience course

The lecture and exercise are pretty good.

What was the best aspect of the course? (I worked: 21-23 timmar/vecka)

The labs were really interesting and made me learn. The lecture notes were really handy.

What was the best aspect of the course? (I worked: 27-29 timmar/vecka)

Good professor, great TAs, extremely good lecture notes and study material.

What was the best aspect of the course? (I worked: 30-32 timmar/vecka)

The structure of the lessons, especially at the blackboard. The lab experience



What would you suggest to improve?

What would you suggest to improve? (I worked: 3-5 timmar/vecka)

Something else than water tanks

What would you suggest to improve? (I worked: 6-8 timmar/vecka)

Laborationer: Var tydligare med vad som ska redovisas i laborationer. I tidigare reglerteknikkursen så betydde "ha 60 graders fasmarginal" att man hade minst 60 grader fasmarginal, i denna kurs så ska fasmarginaler vara exakta, samma med skärfrekvensen.

Laborationer skulle också gynnas av att ha tydligare feedback. I varje avseende som vi skulle komplettera var det (1) otydligt om vad som var fel, det kunde vara vaga benämningar som "Ni har inte gjort en kontroll" trots att vi hade gjort det i våra ögon, same (2) inkonsekvent vart feedbacken lämnades. Ibland var den på min sida, ibland på min labbpartners. Jag skulle vilja ha denna information på båda, så uppmuntra folk att gå med i Canvas-grupper inför labbarna så att inlämningarna synkroniseras. Ett exempel på en konsekvens var att min labbpartner inte såg en kommentar förrän 3 dagar senare, och därmed riskerade jag att inte kunna komplettera labben i tid om jag inte skulle ha påmint honom. I övrigt svarade dock assistenten väldigt snabbt och tydligt på mail, och var mer hjälpsam när man gjorde detta.

While TA's for exercise sessions were great, more detailed feedback on the submitted computer exercises/homework/reports would definitely help.

To have an assisstant available on the labs, because the setup is advanced

What would you suggest to improve? (I worked: 9-11 timmar/vecka)

Maybe there could be some more exercise sessions.

What would you suggest to improve? (I worked: 12-14 timmar/vecka)

The project on the water tanks has to be improved.

What would you suggest to improve? (I worked: 15-17 timmar/vecka)

Add a help-hour so one could get help with the exercises and ask questions

Have the teacher assistants present during the whole computer exercise time

assignments that are more exam relevant

The deadline of the project was a bit too close to the exam and the set up required us to keep working two extra lab days so achieve reasonable results just because of the pumps and hoses being a bit old and rundown.

strongly suggest to change the labs and due dates. The first lab could be left out or maybe made compulsory to attend if you want the people to reassess their knowledge from previous courses, but with no report due. Then the other labs that are actually about course contents and their report deadlines could be shifted forward. After all the study week before the exams should be for studying and not finishing reports in every course, so you can only start studying for exams the weekend before, which is not enough for this course...

What would you suggest to improve? (I worked: 18-20 timmar/vecka)

None

The material in the lab session, very poor sensors performance

Inform more about the project before the first time slots. My group went to the first time slot and later that day an email were sent out with tips about the lab. We didn't know that you could test your controllers (in a simulation similar to the 4 water tank setup) at home. It was probably our fault but it would be nice if that email were sent earlier so we could use that information. The email was probably sent out due to many groups had problems in the lab but maybe next time the email could be sent earlier since now you know that some groups (next year) will have that problem.

More concrete examples related to reality.

More questions of varying difficulty in the exercise handbook. Almost of the questions were solved in the class.

The book was a necessary complement to the course fr me, so I had to buy it, but I wish there was a pdf on the course website with the basic information that the book provides.

The final lab project is a little bit boring and takes quiet long time for result

What would you suggest to improve? (I worked: 27-29 timmar/vecka)

Lab sessions

What would you suggest to improve? (I worked: 30-32 timmar/vecka)

I would change a computer exercise to cover some other topic, as the anti reset wind-up or MPC techniques, rather than stressing on decentralised and decoupling control or SISO design (Ex 1). I understand this is meant to prepare the lab session, but that topic is not so interesting as the more advanced one. Using Simulink can help to wider the understanding as well.



What advice would you like to give to future participants?

What advice would you like to give to future participants? (I worked: 3-5 timmar/vecka)

Do the recommended exercises

What advice would you like to give to future participants? (I worked: 6-8 timmar/vecka)

Kursen kommer vara tuff. Försök förstå några få koncept bra istället för att försöka förstå allt lite grann, då får du ut det mesta av kursen. Fokusera sedan mer på tentan mot slutet för att faktiskt kunna klara kursen.

Read Before lectures! Take relevant pre-requisite Courses.

Keep pushing teachers and assistants for help regarding theory because it will be difficult to understand later.

What advice would you like to give to future participants? (I worked: 9-11 timmar/vecka)

Make an effort to attend all lectures and absolutely do not miss the exercise sessions.

What advice would you like to give to future participants? (I worked: 15-17 timmar/vecka)

It is worth spending some extra time studying during the course, read the lecture notes in advance and if you can, look at the exercises in advance, then you will have many of the questions answered during the Exercise session
spend time to really understand the theory

Focus more on Elling's lecture notes and use the book as a complement to them not the other way around. The lecture notes are more thorough.

What advice would you like to give to future participants? (I worked: 18-20 timmar/vecka)

It would be easier if they could refresh the basic control course before this course starts.

To stick with the course on a daily basis

Test your controllers in the simulation before doing the project.

Read up on things on your own. Investigate the subject beyond the scope of the course.

Keep up with the concepts taught in the class, as the assignments depend on it.

Practice on the exercises, attend the computer labs, and practice the old exams by comparing with the corrections.

What advice would you like to give to future participants? (I worked: 21-23 timmar/vecka)

Try to study regularly to make the most out of the lectures. Do many exercises it will give sense to the lectures.

What advice would you like to give to future participants? (I worked: 27-29 timmar/vecka)

Start studying from day -10

What advice would you like to give to future participants? (I worked: 30-32 timmar/vecka)

Work with critical thinking on the computer exercises because they can be very useful.

Prepare to the exam using previous year exams because exercises sessions alone aren't sufficient for high grades.

Is there anything else you would like to add?

Is there anything else you would like to add? (I worked: 6-8 timmar/vecka)

Awesome teacher!

Is there anything else you would like to add? (I worked: 18-20 timmar/vecka)

No

Is there anything else you would like to add? (I worked: 30-32 timmar/vecka)

A better coverage of the theoretical basis behind optimal control (the ricatti equation, realization in state-space of the extended system) could be more useful than IMC or than the large amount of time dedicated to examples. Some examples cases are fundamental, others maybe redundant.

SPECIFIC QUESTIONS



RESPONSE DATA

The diagrams below show the detailed response to the LEQ statements.
The response scale is defined by:

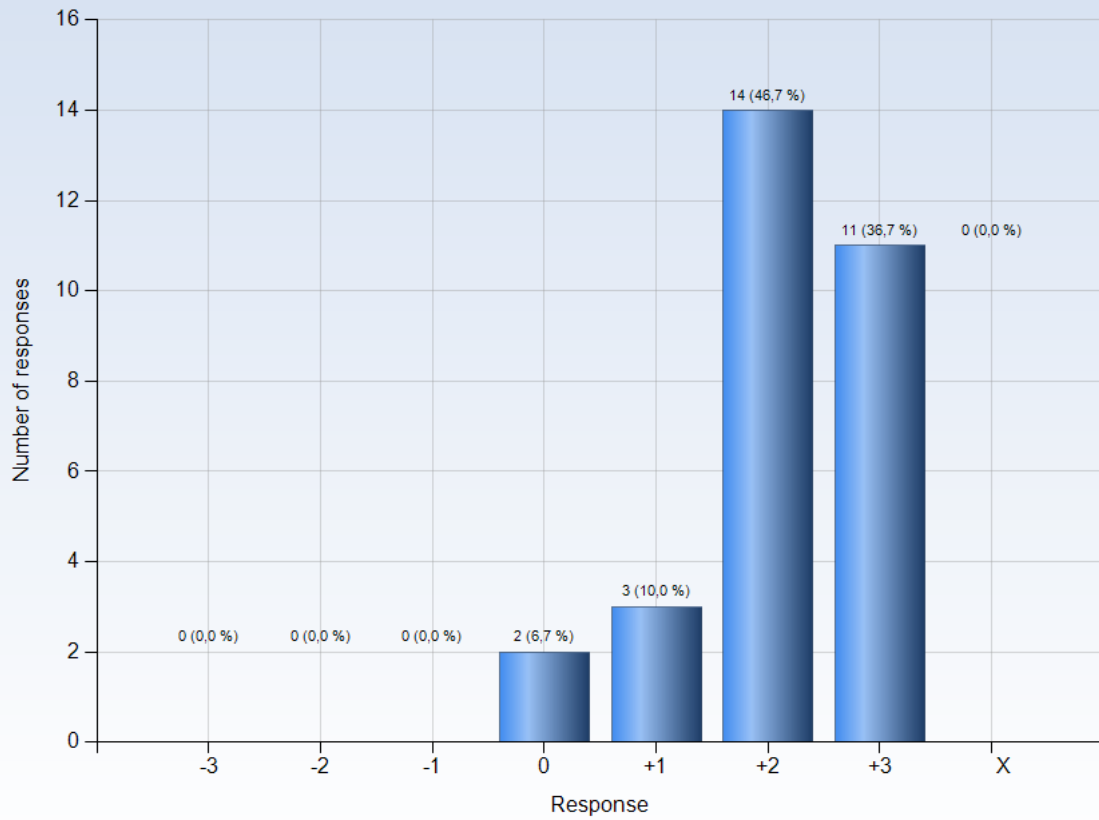
-3 = No, I strongly disagree with the statement

0 = I am neutral to the statement

+3 = Yes, I strongly agree with the statement

X = I decline to take a position on the statement

1. I worked with interesting issues



Comments

Comments (My response was: 0)

De enda konkreta exempel på MIMO som jag kunde förstå var vattentankarna, och de är ett dåligt MIMO-exempel då de lätt kan kopplas isär manuellt.

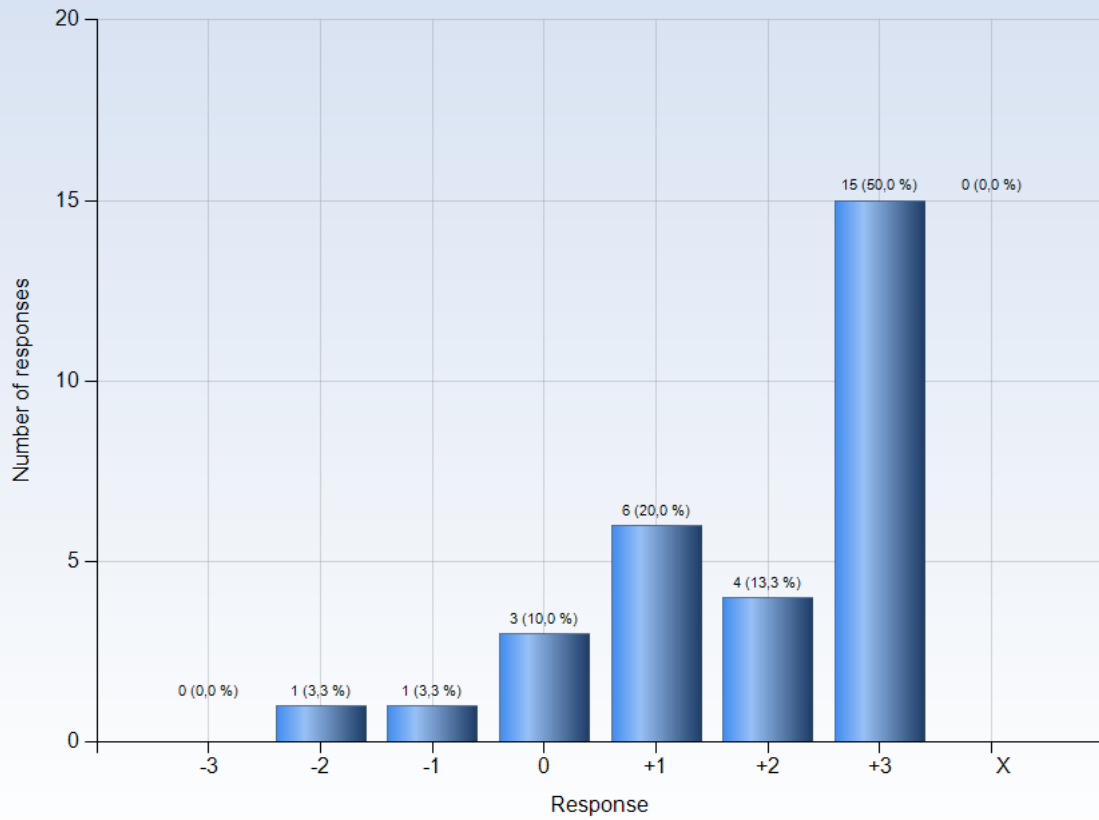
Comments (My response was: +1)

very theoretical problems

Comments (My response was: +2)

Not my favourite subject but was still quite fun.

4. The course was challenging in a stimulating way



Comments

Comments (My response was: -1)

Too much time spent on computer exercises. Could have spent a lot less time and learned the same if they were designed better.

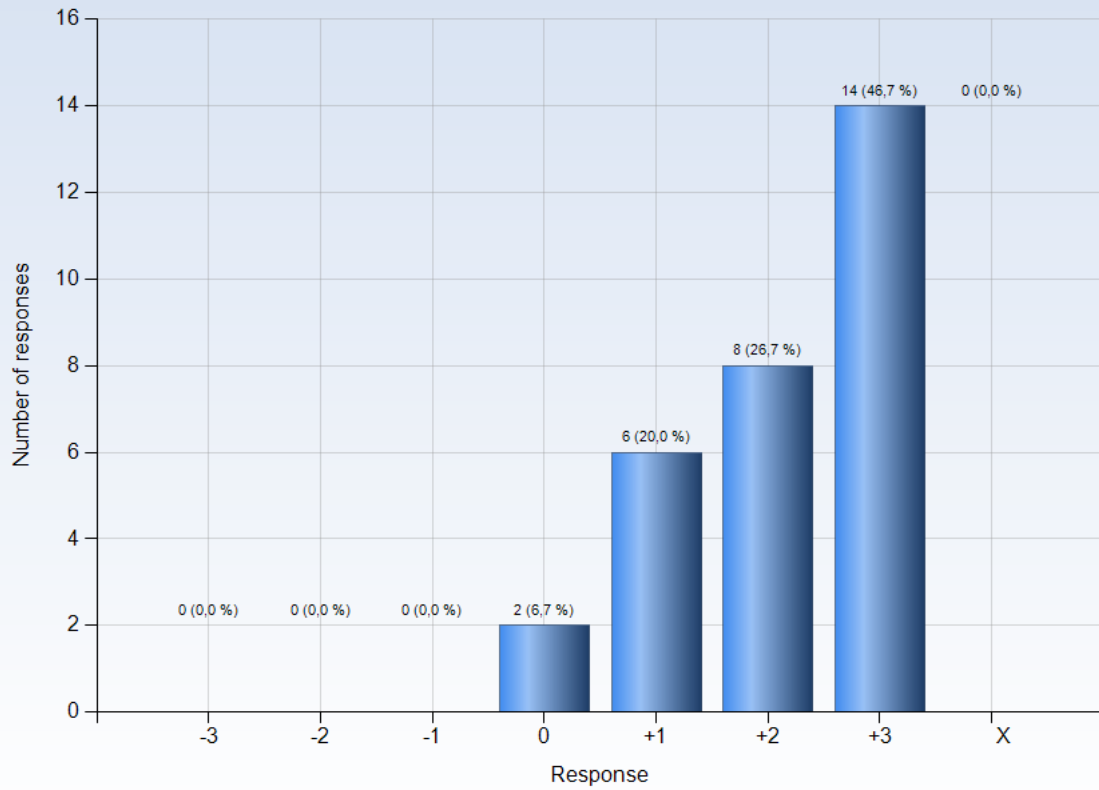
Comments (My response was: 0)

Mycket var inte möjligt att förstå, speciellt i lösningsförslag, och därmed känns det som att man inte har en chans inför vissa uppgifter

Comments (My response was: +3)

The labs helped. I liked to be able to test newly learned theories in the labs.

7. The intended learning outcomes helped me to understand what I was expected to achieve

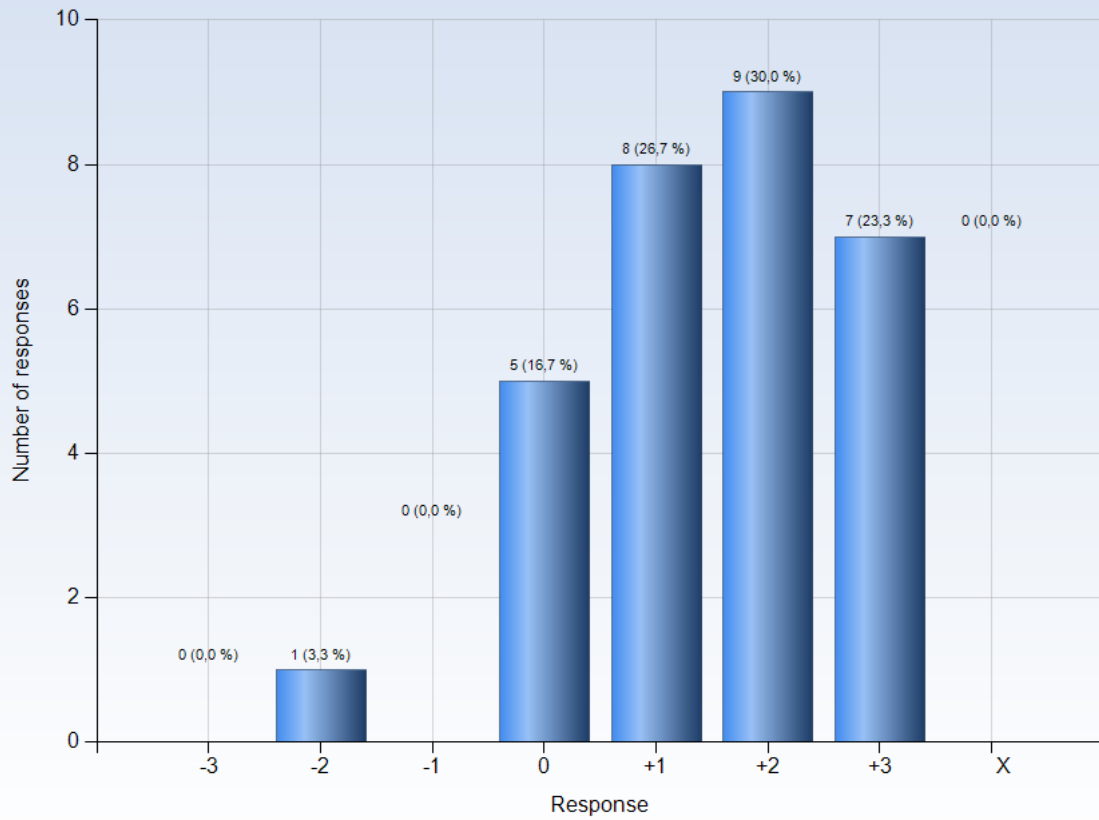


Comments

Comments (My response was: +2)

The learning outcomes were clearly stated in the beginning of the course which helped me get a good overview of the course.

10. I was able to learn from concrete examples that I could to relate to

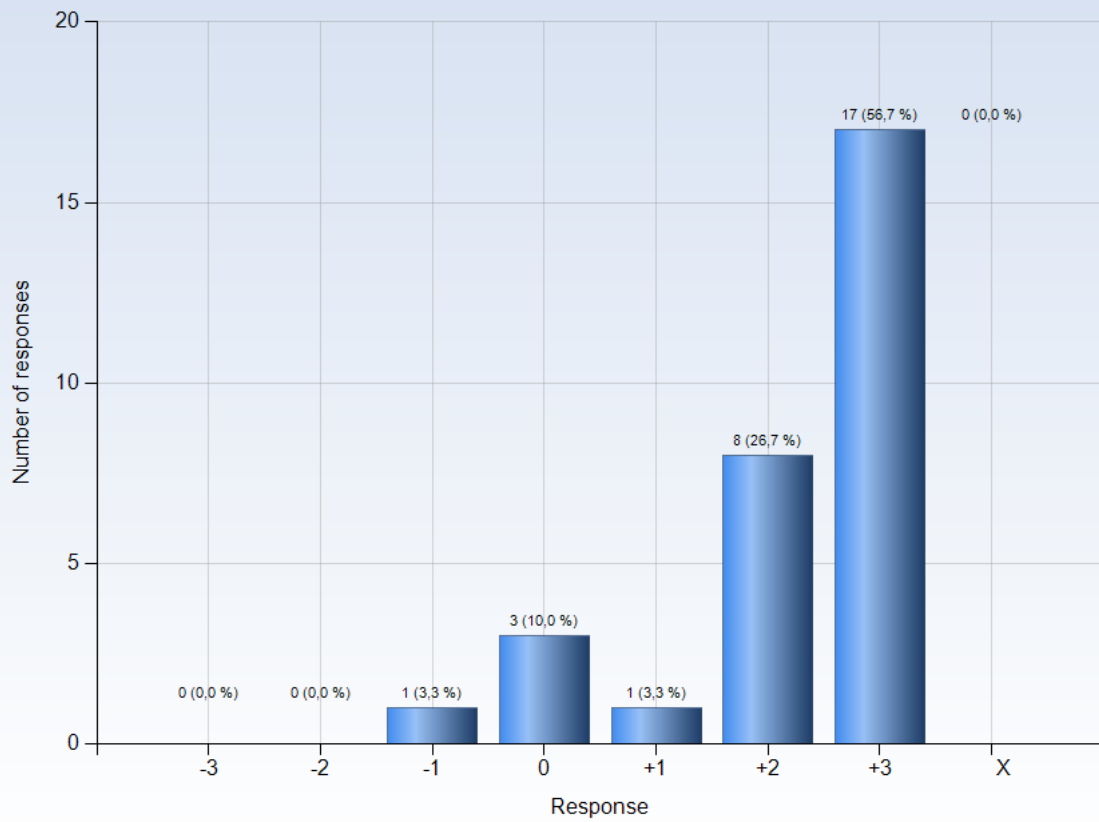


Comments

Comments (My response was: 0)

Reglerteknik är sjukt svårt att visualisera, speciellt MIMO. Vattentankarna räcker inte.

11. Understanding of key concepts had high priority

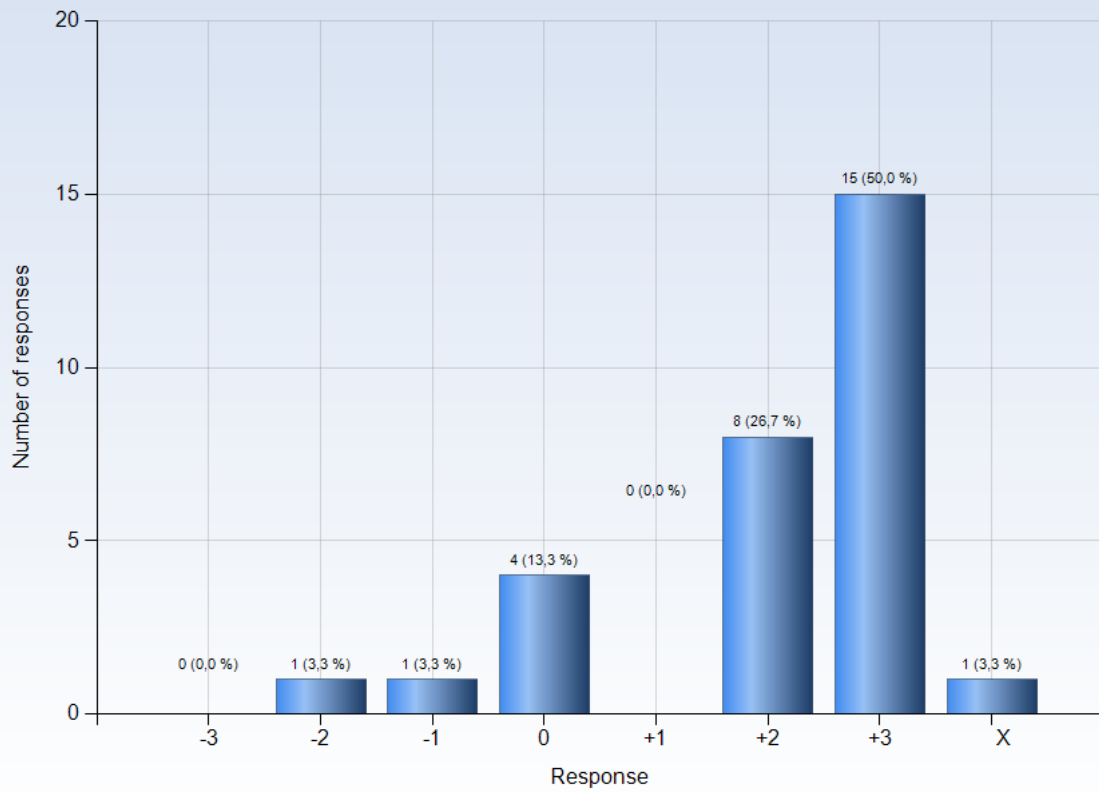


Comments

Comments (My response was: 0)

Kursen säger sig fokusera på MIMO men repeterar mycket SISO. Det är bra, men jag kunde inte plocka ut så många centrala MIMO-koncept förutom att beräkna poler/nollställen och hur dessa måste reflekteras i S och T.

12. The course activities helped me to achieve the intended learning outcomes efficiently



Comments

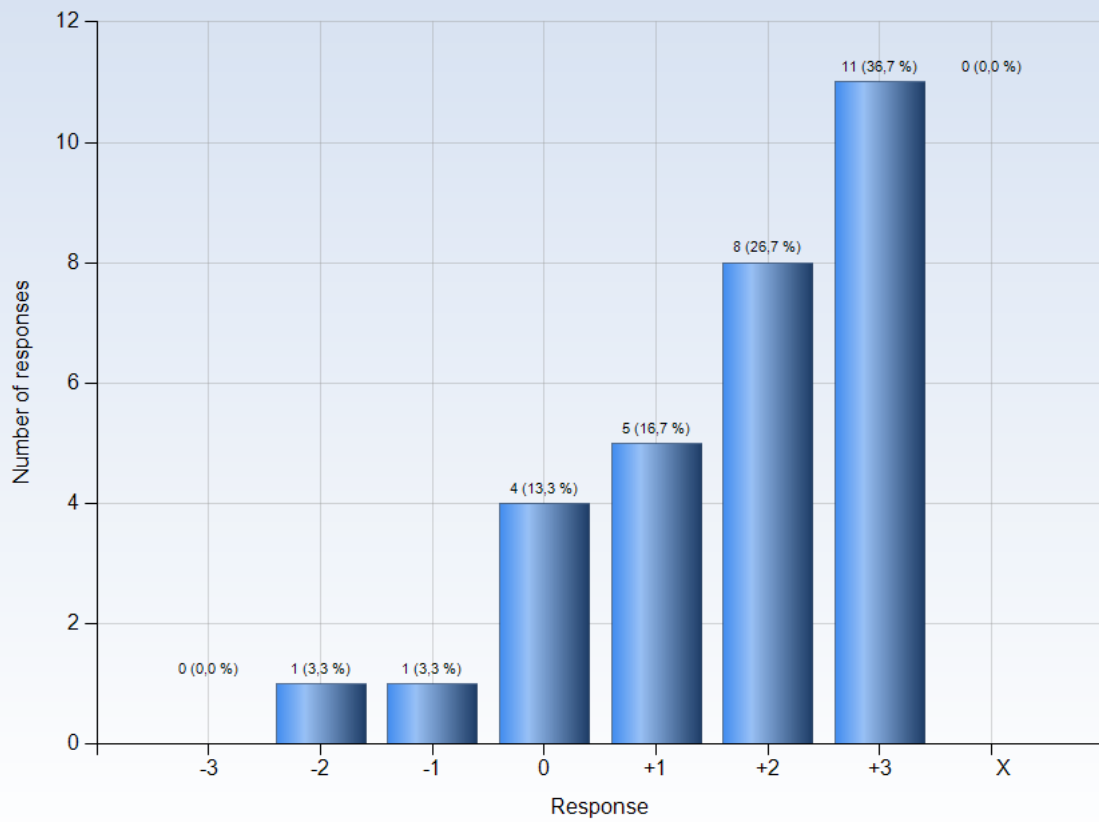
Comments (My response was: -2)

Inefficient computer exercises.

Comments (My response was: +3)

The labs was good.

15. I was able to practice and receive feedback without being graded



Comments

Comments (My response was: -2)

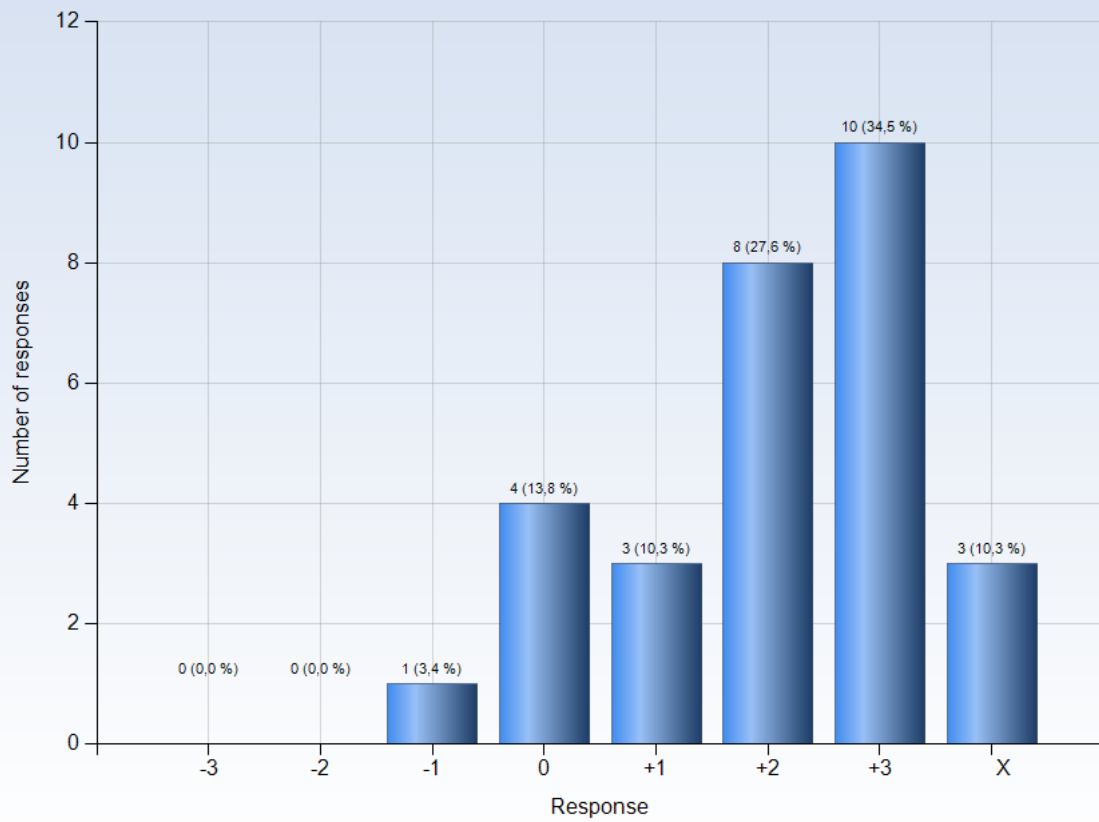
The exercises were not properly assessed. Noticed a crucial error on the project that had been passed by exercise 2&4. Again, poor design.

Comments (My response was: +3)

Mycket bra redovisningsprocedur för laborationer. Assistent Joakim Björk var mycket kommunikativ och lätt att diskutera med.

Yes. The computer exercises were a good way of practicing the concepts

16. The assessment on the course was fair and honest



Comments

Comments (My response was: -1)

All the work do e during the course barely helped studying for the exam and gave nothing to the grade.

Comments (My response was: +2)

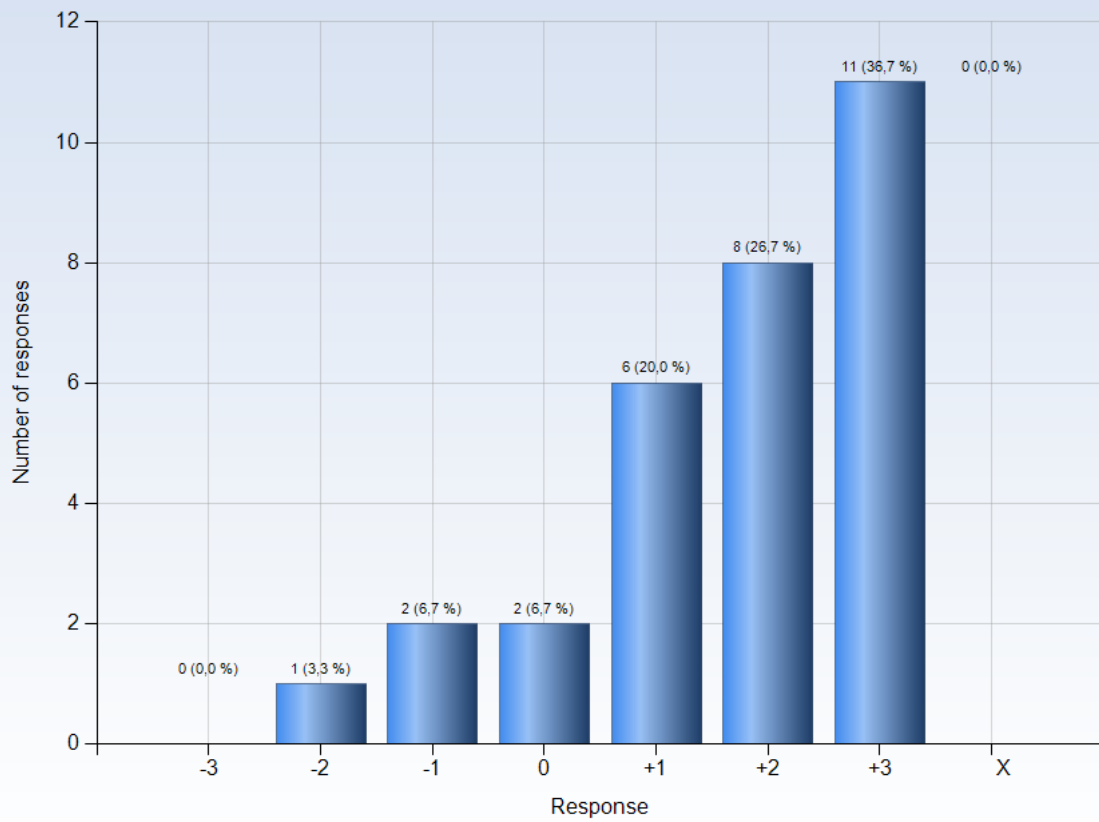
I think so. I haven't received the graded exam yet.

I don't know the result of the exam yet.

Comments (My response was: +3)

Don't have results of examination yet

17. My background knowledge was sufficient to follow the course

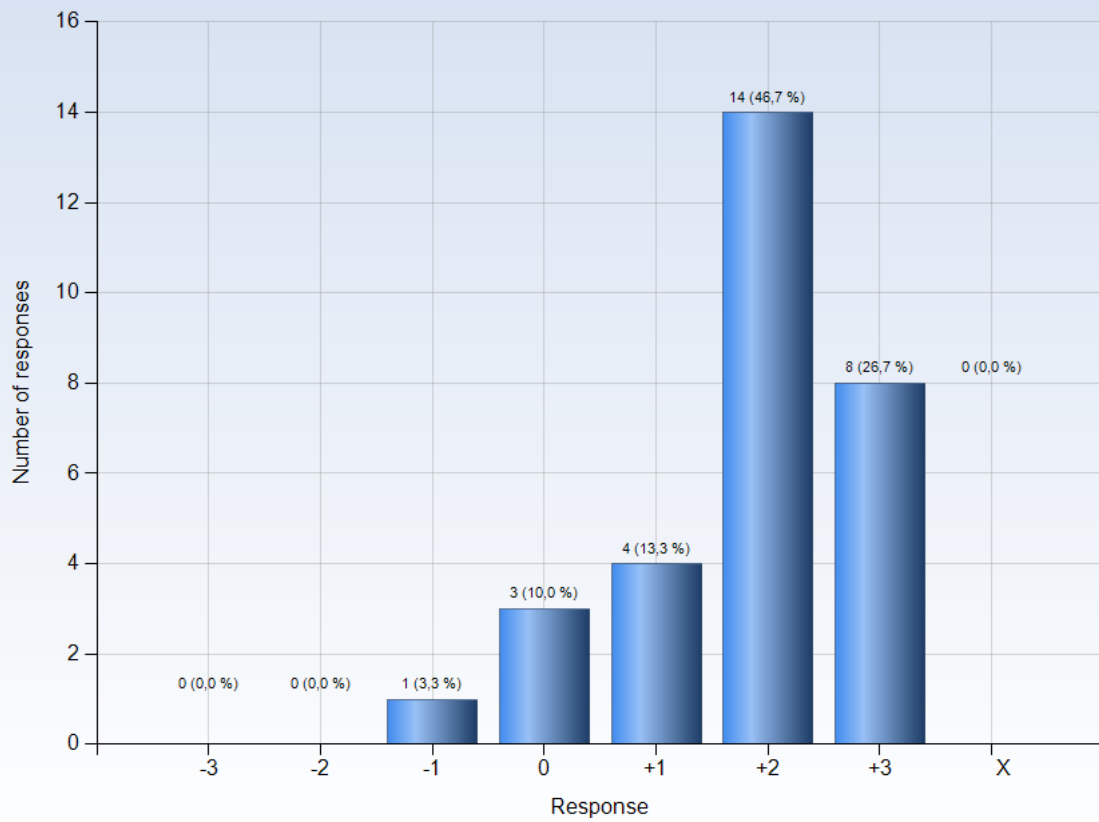


Comments

Comments (My response was: +2)

Lite ny matte, som supremum, skulle kanske vara bra att ha en sorts mattelexikon

19. The course activities enabled me to learn in different ways

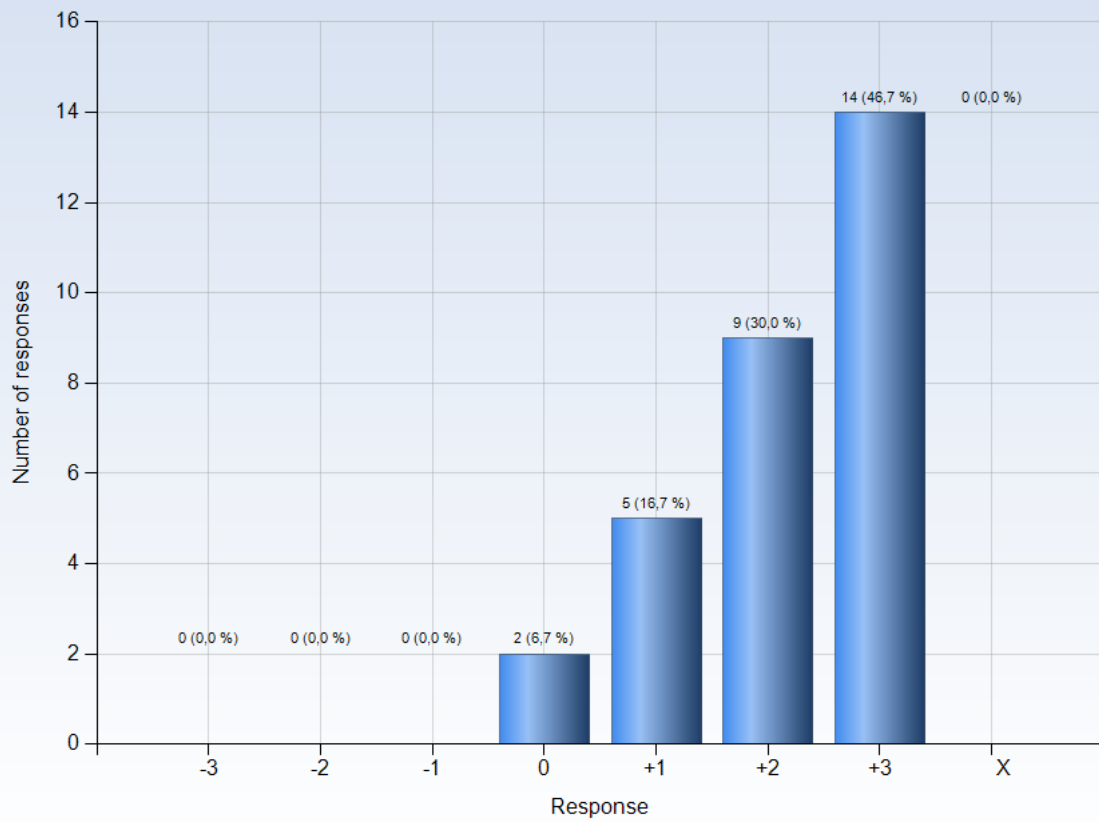


Comments

Comments (My response was: +2)

Själv lärde jag mig mest från extentor. Övningar var något svåra att följa, men anteckningarna var bra

21. I was able to learn by collaborating and discussing with others



Comments

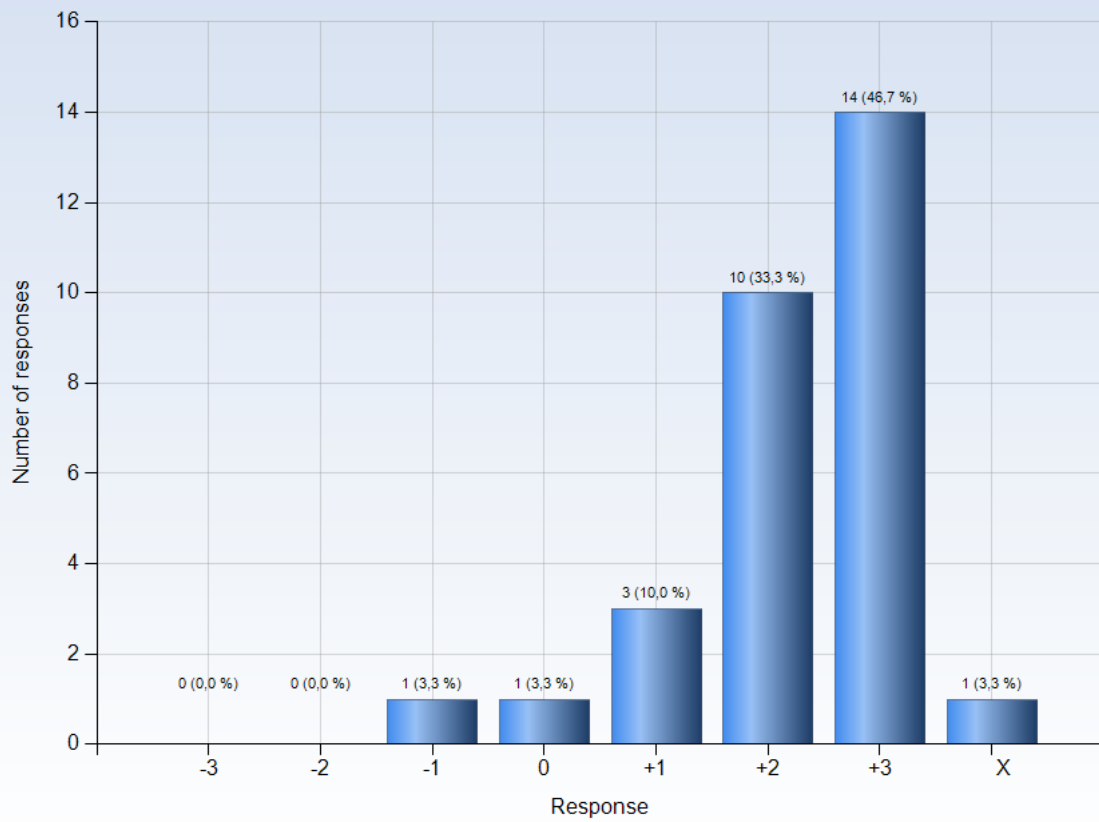
Comments (My response was: +2)

Mostly during the computer exercise and lab sessions

Comments (My response was: +3)

Yes, through the labs.

22. I was able to get support if I needed it



Comments

Comments (My response was: -1)

It was very difficult to ask teachers/assistants for help, they were mostly busy and not available on the labs

Comments (My response was: +3)

Both Elling and all the TAs where super helpful and welcoming