Report - AH2923 - 2020-07-06

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):
Anna Jensen, abjensen@kth.se

DESCRIPTION OF THE COURSE EVALUATION PROCESS
Describe the course evaluation process. Describe how all students have been given the possibility to give their opinions on the course. Describe how aspects regarding gender, and disabled students are investigated.
The course analysis was carried out using the online LEQ, Learning Experience Questionnaire at the KTH intranet. Students were given two weeks to answer the extended questionnaire (16 questions + questions about the student), reminders were sent to the students both automatically through the system and manually by me. Unfortunately only 29.4% of the students answered the questionnaire.
Aspects regarding gender and disabilities were included in the questionnaire.
Normally, I would also discuss the course with the students in class. This was, however, not done this year.

DESCRIPTION OF MEETINGS WITH STUDENTS
Describe which meetings that has been arranged with students during the course and after its completion. (The outcomes of these meetings should be reported under 7, below.)
No meetings regarding course development have been held with students this year.

COURSE DESIGN
Briefly describe the course design (learning activities, examinations) and any changes that have been implemented since the last course offering.
This year the course was composed of online lectures, labs and reports which the students worked on individually at home. The examination was an open book four hour written exam, all aids allowed.
Because of the Corona situation many changes were made this year. Most important is that all lectures (except the first) were online, the outdoor lab with field work in groups was replaced by individual computer labs and the exam was changed from closed book to open book.

THE STUDENTS' WORKLOAD
Does the students' workload correspond to the expected level (40 hours/1.5 credits)? If these is a significant deviation from the expected, what can be the reason?
The students who answered the LEQ say on average 12 hours per week.
The course is 7.5 credits, the total work load should therefore be 200 hours. The course period is 11 weeks so this should be an average workload of 18 hours per week.
This means that students, on average, spent less time per week than expected.
Generally, with a low percentage replies on course evaluation questionnaires, it is my experience that the students who answer are the ones who do well in the course. So I expect with only 29.4% of the students answering the questionnaire that these are some of the students who did well in the course and therefore perhaps spent less time than the average student.
However, this in only a guess. I do not have a good answer to the question.

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?

The students succeeded very well this year.
All students who handed in their lab reports, passed the labs.
All students who registered for the written exam, passed the exam.
The marks from the written exam were very good this year. It should be noted that the exam was open book with all aids allowed this year, and since this is the first time I have done an exam like this, the reason for the good marks may be, that the exam was too easy.
But, giving the students the benefit of the doubt, perhaps they just did better this year, because they were more focused when working from home.

STUDENTS´ANSWERS TO OPEN QUESTIONS
What does students say in response to the open questions?

Good things about the course:
The labs give better understanding of the material and provided good opportunities for the students to show their knowledge, the lectures were a good aid and good preparation for the exam, the content of the course was good.

Suggested improvements for the course:
Lectures: Better explanation of some details such as clock biases and satellite communication, but at the same time not too many in-depth details. Some lectures contained too much information and the abstraction level was too high.
Labs: Instructions can be improved with better explanations of variables and notation, also data should be provided in m-files in stead of Excel files.
One student missed interaction with the other students because of online teaching.

Finally, one student wrote "Thank you for a well organized course given the circumstances...." This is an acknowledgement which I am really happy about.

SUMMARY OF STUDENTS' OPINIONS
Summarize the outcome of the questionnaire, as well as opinions emerging at meetings with students.

The replies from the students regarding the lectures are somewhat contradicting.
But the suggestions to improve the lab instructions with better explanations of variables and notations is given by more than one student.

OVERALL IMPRESSION
Summarize the teachers' overall impressions of the course offering in relation to students' results and their evaluation of the course, as well as in relation to the changes implemented since last course offering.

Objectively, the course went very well this year, all students passed and the marks were good.

However, as a teacher there are certainly things I would like to change next year, if the course is given online again. Most important is the missing field work. Apart from the learning experience of doing field work, it also has a social effect because the students work in groups and therefore get to know each other better. So if the course is given online next year, I will include some group work, so the students will not do all labs individually. It is also clear in the students response to the questionnaire, that the worst evaluation on average is a negative response to the question of whether the course enabled the students to learn in different ways. If field and/or group work has been included in the course, this may have provided a better reply from the students on that question.
Also work can be done in making online lectures more interactive.

ANALYSIS
Is it possible to identify stronger and weaker areas in the learning environment based on the information you have gathered during the evaluation and analysis process? What can the reason for these be? Are there significant difference in experience between:
- students identifying as female and male?
- international and national students?
- students with or without disabilities?

Gender: Unfortunately the number of replies from female students was too low to evaluate whether there are any gender aspects in the course.
Type of students: Unfortunately only Swedish students (year 4-5) answered the questionnaire, so evaluation by type of student can not be made
Disabilities: No students with disabilities answered the questionnaire, so evaluation by disability can not be made

PRIORITIZED COURSE DEVELOPMENT
What aspects of the course should be developed primaily? How can these aspects be developed in short and long term?

This is very much dependent on whether the course will run online or not next year.
If online; introduce labs to be carried out by groups of students and make the lectures more interactive
If non-online; make lectures more interactive and also refine some of the lab descriptions based on the feedback from students this year (e.g. harmonize notation)

OTHER INFORMATION
Is there anything else you would like to add?

It has been a lot of work for the teacher to run the course online this year, especially the preparations needed in order to replace the field work with other labs and to develop a new type of exam. So I am really happy that the students performed as well as they did despite of the circumstances.
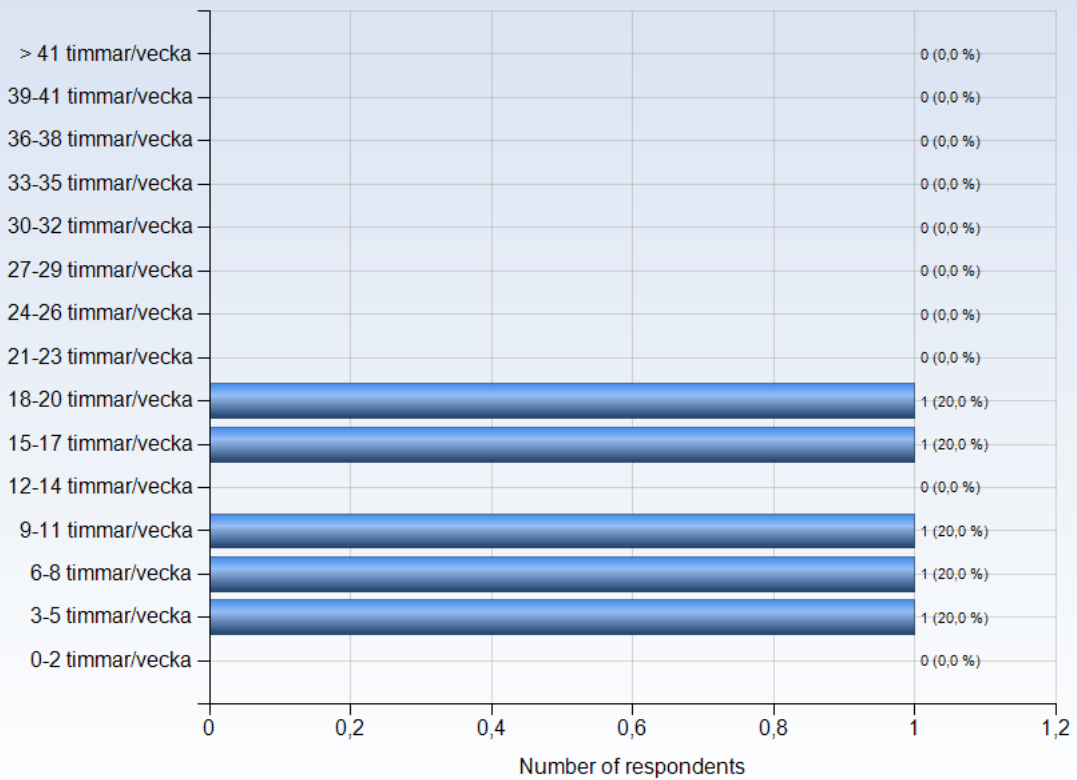
AH2923 - 2020-06-01

Antal respondenter: 17
Antal svar: 5
Svarsfrekvens: 29,41 %

ESTIMATED WORKLOAD

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

Hours/week	Respondents
> 41 timmar/vecka	0 (0,0 %)
39-41 timmar/vecka	0 (0,0 %)
36-38 timmar/vecka	0 (0,0 %)
33-35 timmar/vecka	0 (0,0 %)
30-32 timmar/vecka	0 (0,0 %)
27-29 timmar/vecka	0 (0,0 %)
24-26 timmar/vecka	0 (0,0 %)
21-23 timmar/vecka	0 (0,0 %)
18-20 timmar/vecka	1 (20,0 %)
15-17 timmar/vecka	1 (20,0 %)
12-14 timmar/vecka	0 (0,0 %)
9-11 timmar/vecka	1 (20,0 %)
6-8 timmar/vecka	1 (20,0 %)
3-5 timmar/vecka	1 (20,0 %)
0-2 timmar/vecka	0 (0,0 %)

Number of respondents

Comments

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

With laboratory sessions almost every week with regular classes, the course requires atleast 10 hrs per week .

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

Reasonable amount of work load, but would have liked a bit more information as to what the exact mathematical operations where. Hence, clarifying instructions a bit as this would aid in the overall understanding

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

The most time spent on the course was with the labs outside of the scheduled time. This might have been due to it being performed from home, but if it is continue like this it would be good to have more lab time with help available.

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:
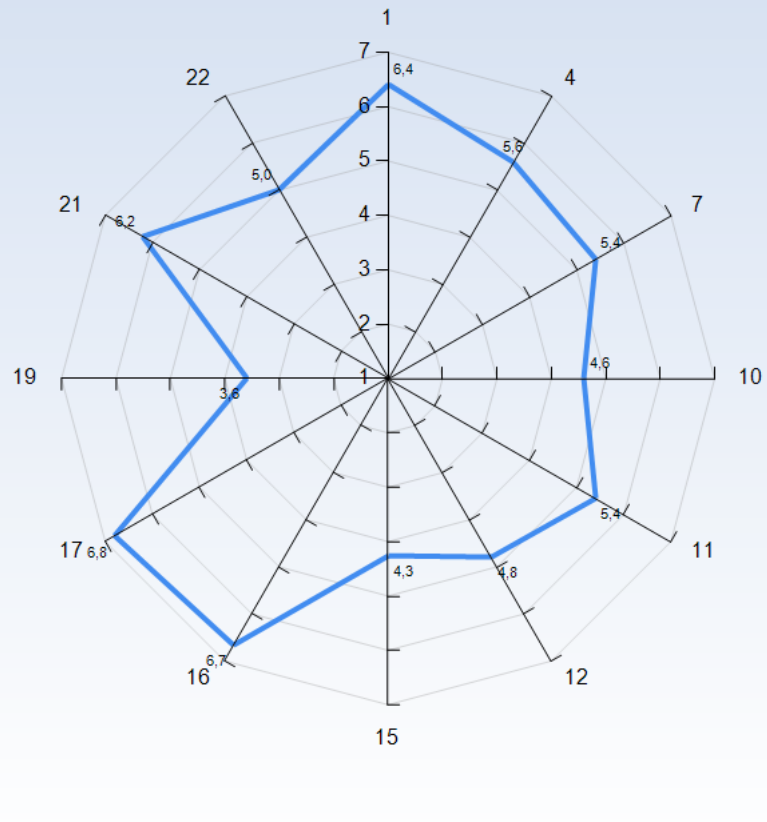
1 = No, I strongly disagree with the statement
4 = I am neutral to the statement
7 = Yes, I strongly agree with the statement

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

Average response to LEQ statements - all respondents

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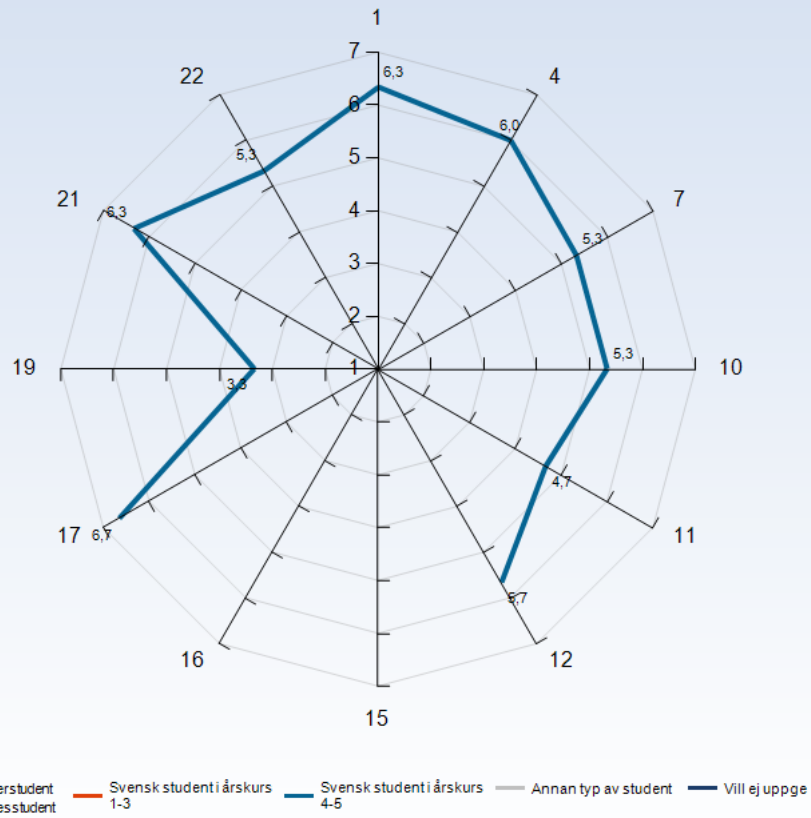
Ramsden, P. (2003). *Learning to Teach in Higher Education*, Chapter 6, pp. 84-105. New York: RoutledgeFalmer.

Average response to LEQ statements - per gender

Legend: Kvinna — Man — Annat — Vill ej uppge
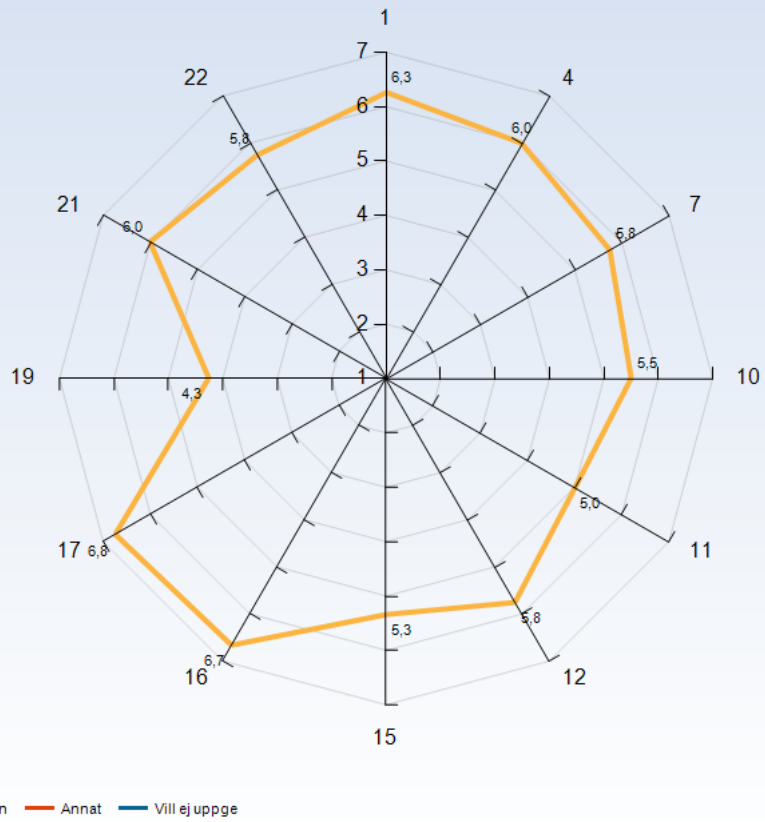
Comments

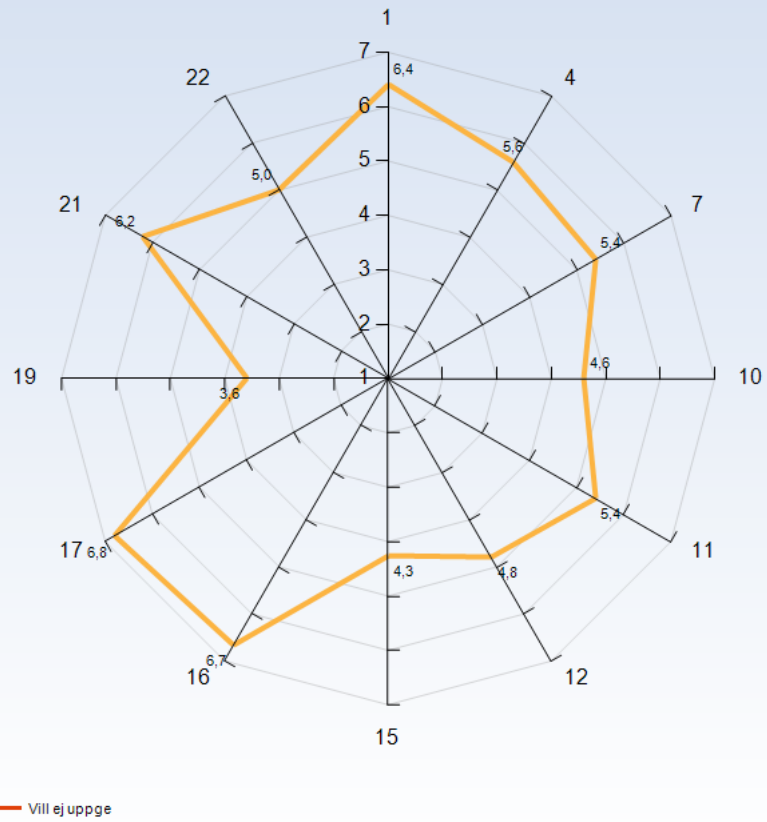Average response to LEQ statements - per type of student

Comments

Comments (I am: Svensk student i årskurs 4-5)

Aerospace engineer considering to work in the GNSS industry

Average response to LEQ statements - per disability

Comments

GENERAL QUESTIONS

What was the best aspect of the course?

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

Laboratory sessions which gave us better understanding of positioning implementation in receivers.

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

A lot of information on the power points which directly correlated to the exam. Aided the in studies very well!

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

It was good to have labs using real data as well as labs that allowed the student to show his/her knowledge in different ways.

What would you suggest to improve?

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

This course was extremely confusing initially. Until the last day before the exam I still did not understand how the GNSS system actually worked. It was only when I found a really good website explaining everything in detail without losing the reader with way to in-depth details and mathematics that I actually understood how it worked. Several key aspects that are cruical for understanding were never properly adressed in the book or during the lectures. Not once did you explain where satellite clock biases come from for example, something that, once I understood on my own, really helped me grasp the overall system architecture better.

And the labs... I realize that reading the RINEX files is good for understanding the communication, but what is the point of us having to extrapolate hundreds of variables to use in the matlab codes? why not give us a .mat file that would literally have saved hours of pointless copy /pasting so we could focus more on the actual theory of the course?

I loved the content and I'm truly amazed by the GNSS systems and could definitely see my self working with it in the future, but I think you need to be clearer with some of the abstract things that you just assume that we would understand and the labs need to be revised and updated for them to actually be informative.

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

In the step-by-step instructions to the labs explain each variable in the formulas provided. The notations and indexes are not always obvious.

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

At times there were a lot of topics covered during 2 hour lectures which lead to difficulty in getting a good picture of the lecture. It will be better to not include too much content or topics in a single lecture and to distribute them among different lectures.

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

An overall view of the communication between satellites, stations etc would have been good. I found this on an external source and helped a lot in understanding the GNSS procedure

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

If possible, it would be good to use the same notations for variables all the atime. Alternatively, have more teacher led exercises so that it is clear what data resides where.

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)

Use this website primarily: https://www.e-education.psu.edu/geog862/node/1407
Use the book secondarily
Use the lecture notes third

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

Spend enough time on the course to get a better understanding of concepts which will be beneficial for lab sessions and ofcourse for exams later on. Laboratory sessions are very important as they help in understanding the concepts better. It is important to not procrastinate the lab work as it would pile up and it wouldn't be easy to manage too many labs at once.

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

Go through the power points thoroughly and put time into the labs

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

Make sure you attend the labs and work with them since the deadlines are not too far away.

Is there anything else you would like to add?

Is there anything else you would like to add? (I worked: 15-17 timmar/vecka)

Thank you for a well organized course given the circumstances and have a great summer vacation!
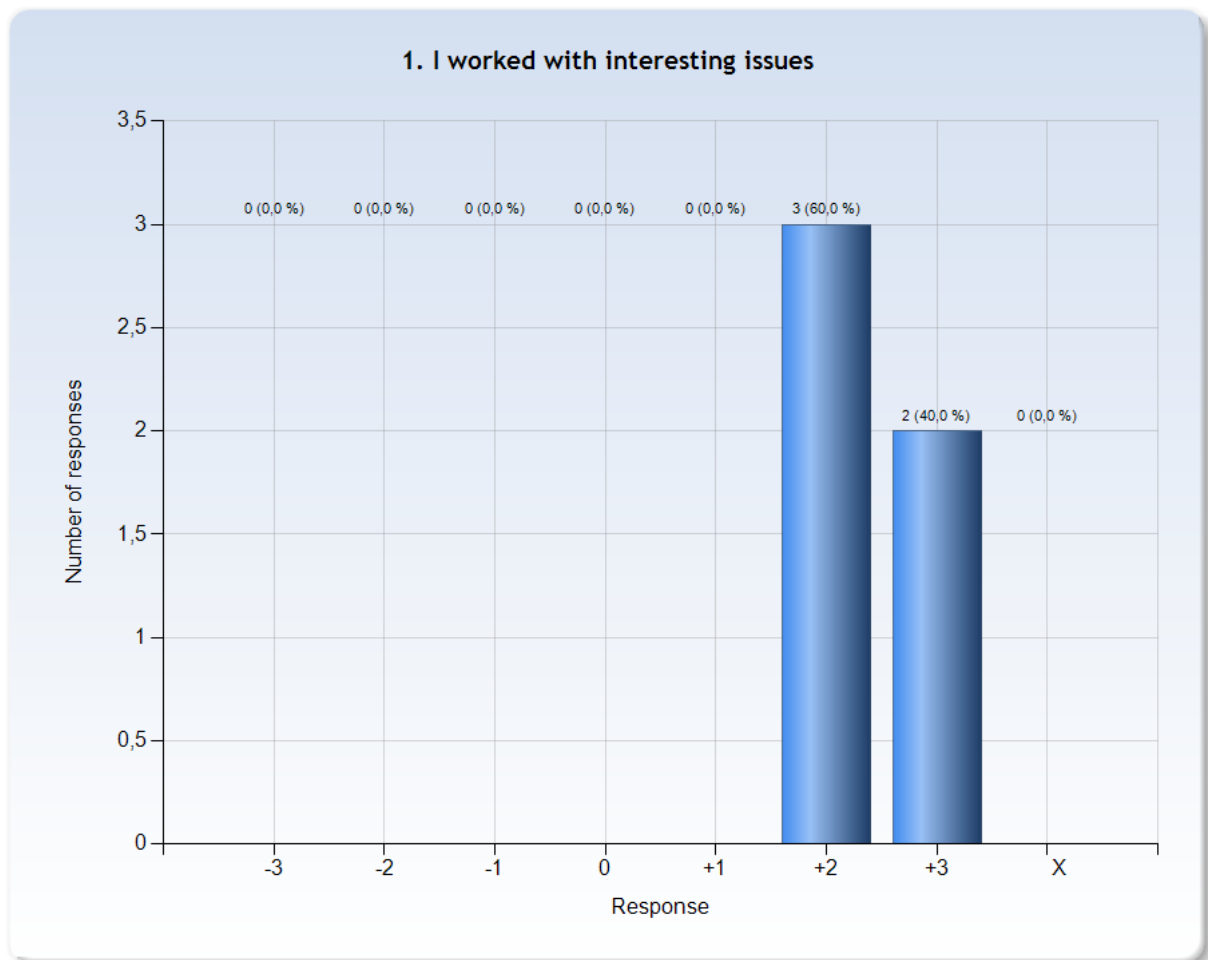
SPECIFIC QUESTIONS

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

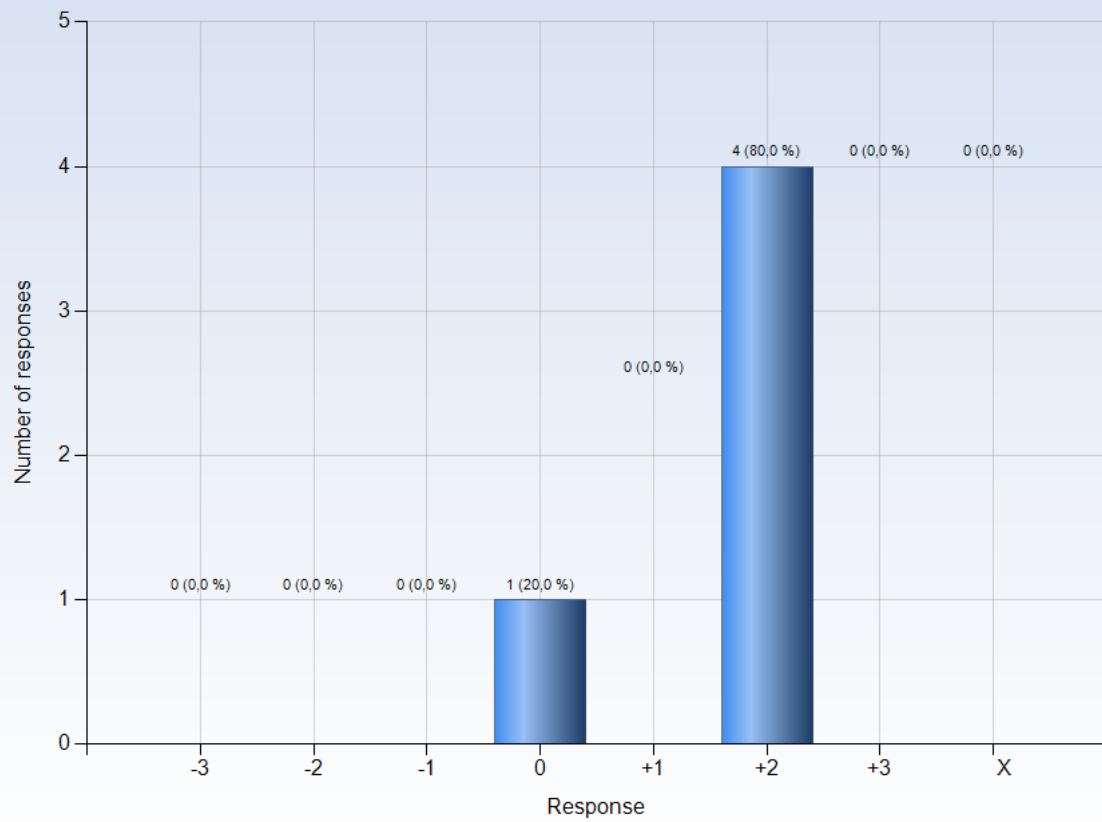X = I decline to take a position on the statement

1. I worked with interesting issues

Response	Number of responses
-3	0 (0,0 %)
-2	0 (0,0 %)
-1	0 (0,0 %)
0	0 (0,0 %)
+1	0 (0,0 %)
+2	3 (60,0 %)
+3	2 (40,0 %)
X	0 (0,0 %)

Comments

Comments (My response was: +2)
Working on god labs would have been both an enjoyable and a learning experience. Unfortunately due to the situation it was not to be.
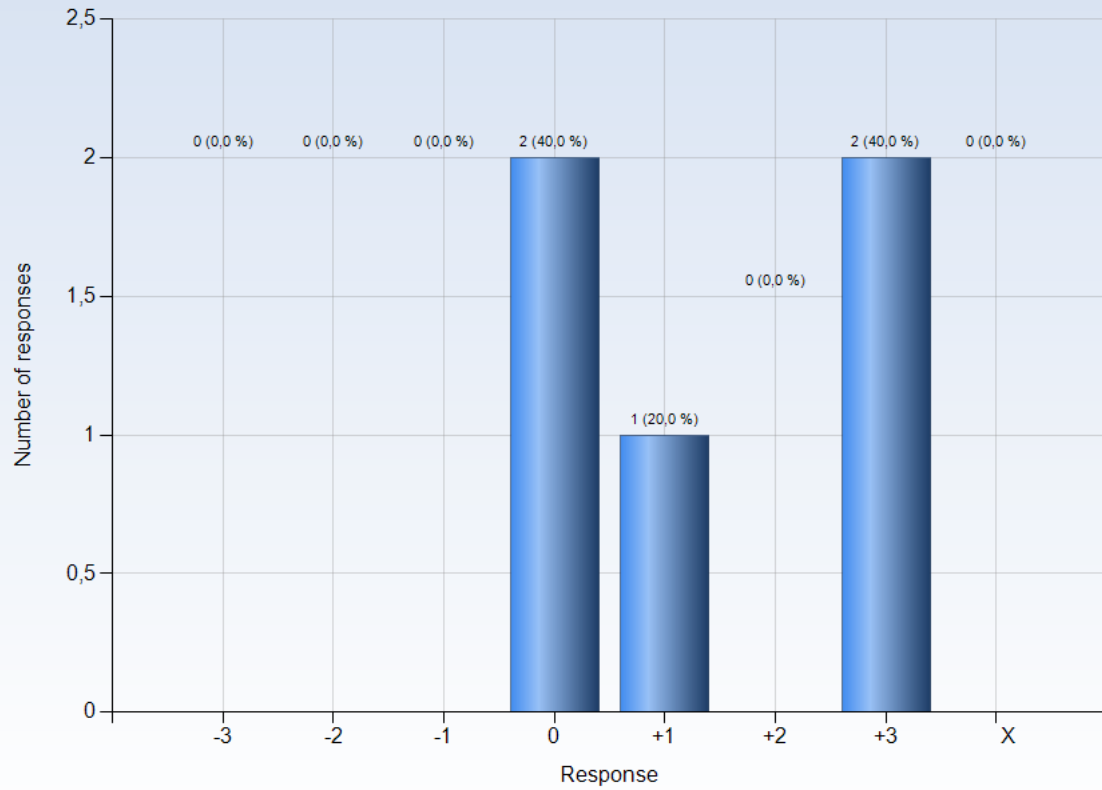
4. The course was challenging in a stimulating way

Number of responses vs Response

Response	Count
-3	0 (0,0 %)
-2	0 (0,0 %)
-1	0 (0,0 %)
0	1 (20,0 %)
+1	0 (0,0 %)
+2	4 (80,0 %)
+3	0 (0,0 %)
X	0 (0,0 %)

Comments

Comments (My response was: +2)

Yes, especially the laboratory sessions.

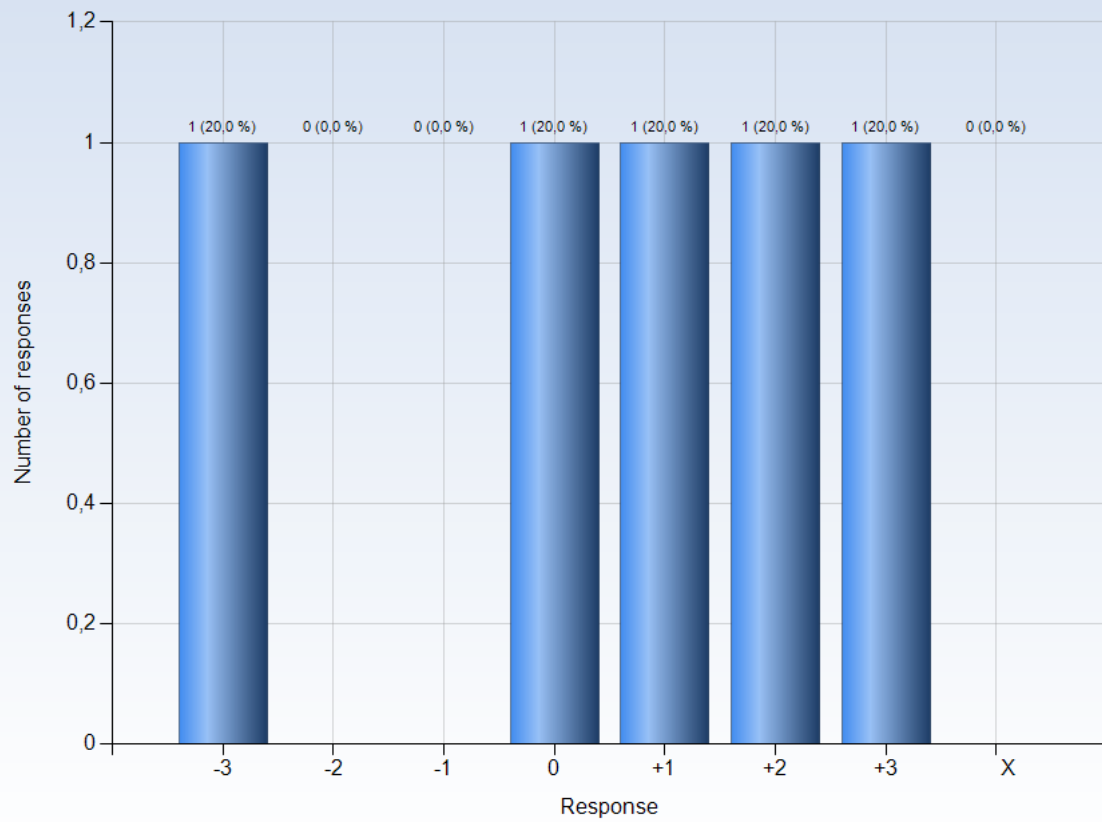## 7. The intended learning outcomes helped me to understand what I was expected to achieve

Comments

Comments (My response was: +3)

List of question before exam would be good as would aid in preparation before the exam

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

Number of responses

Response	-3	-2	-1	0	+1	+2	+3	X
	1 (20,0 %)	0 (0,0 %)	0 (0,0 %)	1 (20,0 %)	1 (20,0 %)	1 (20,0 %)	1 (20,0 %)	0 (0,0 %)

Comments

Comments (My response was: +2)

There were good examples presented in lab sessions, the reading material for topics like modelling of atmospheric errors, etc. The positioning methods were also well explained.
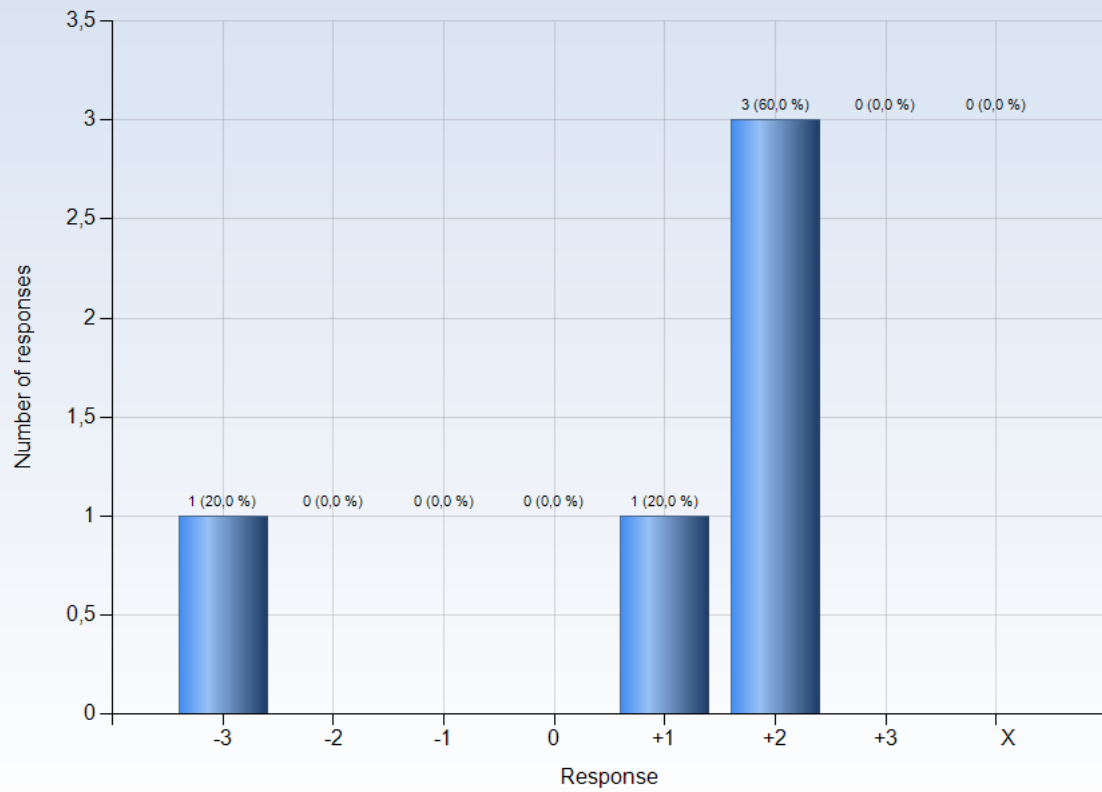
11. Understanding of key concepts had high priority
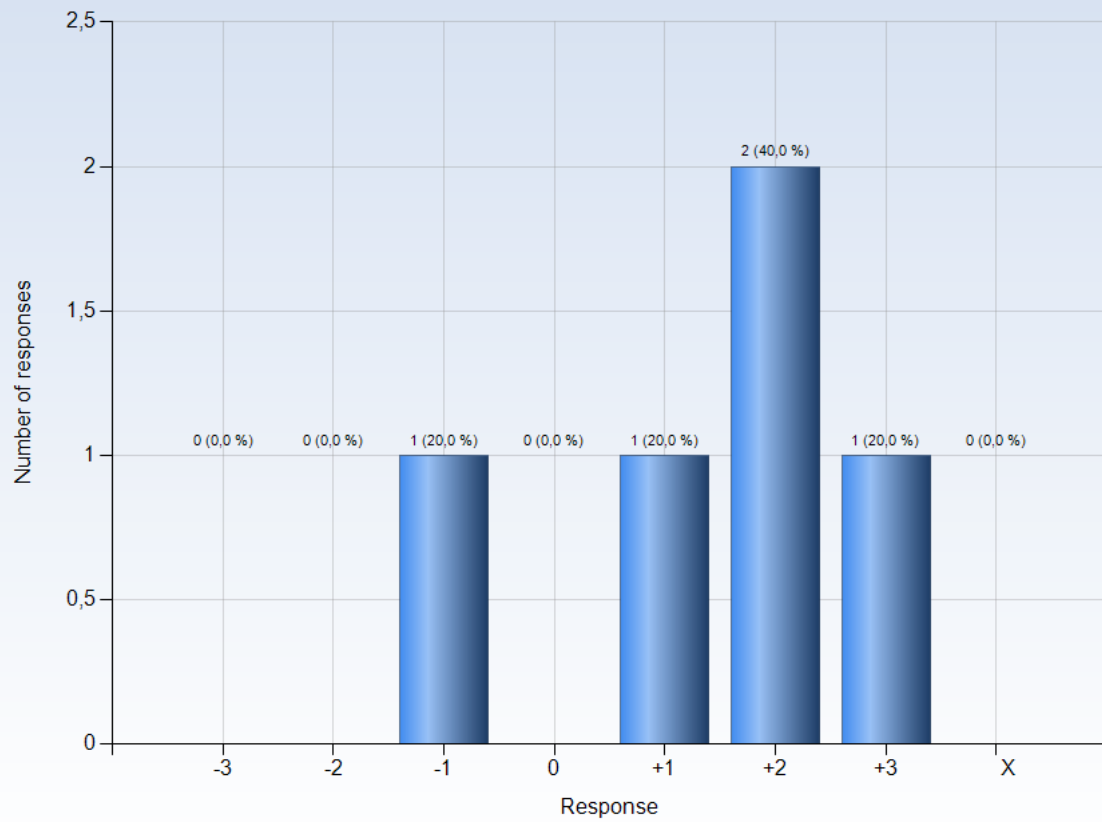
Comments

Comments (My response was: -1)
Since little field labs this year

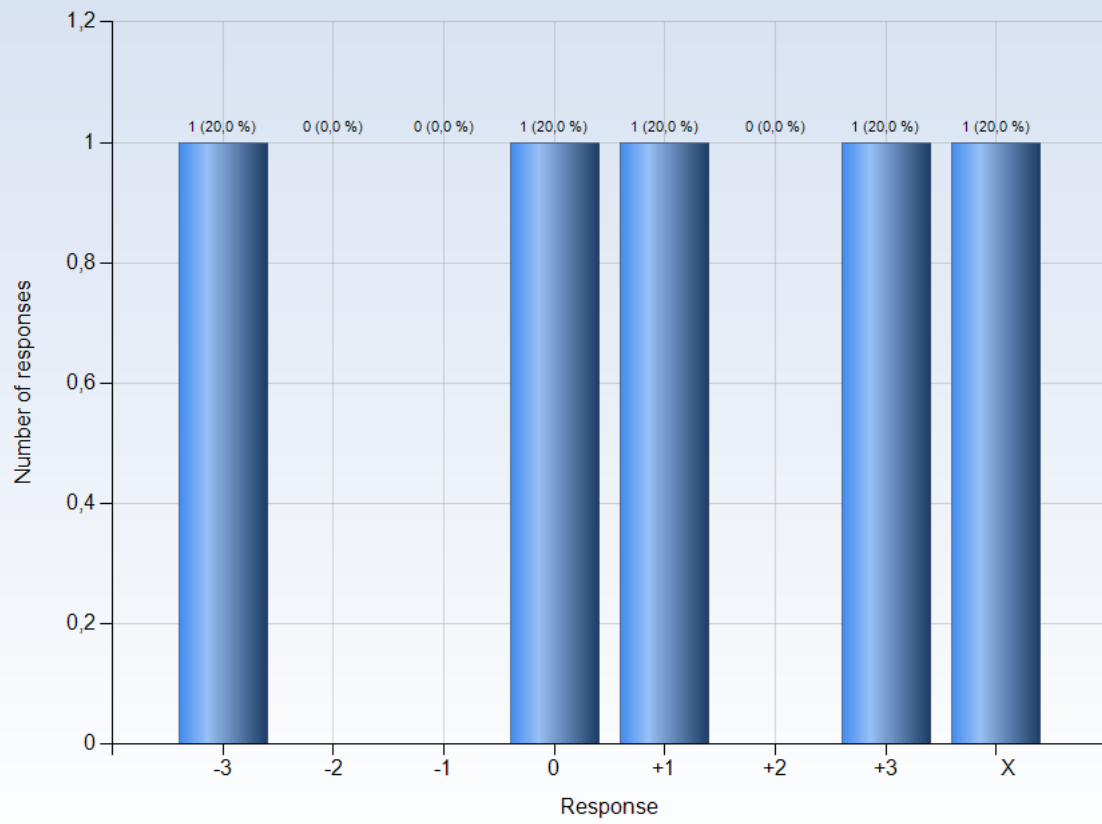## 12. The course activities helped me to achieve the intended learning outcomes efficiently

Comments

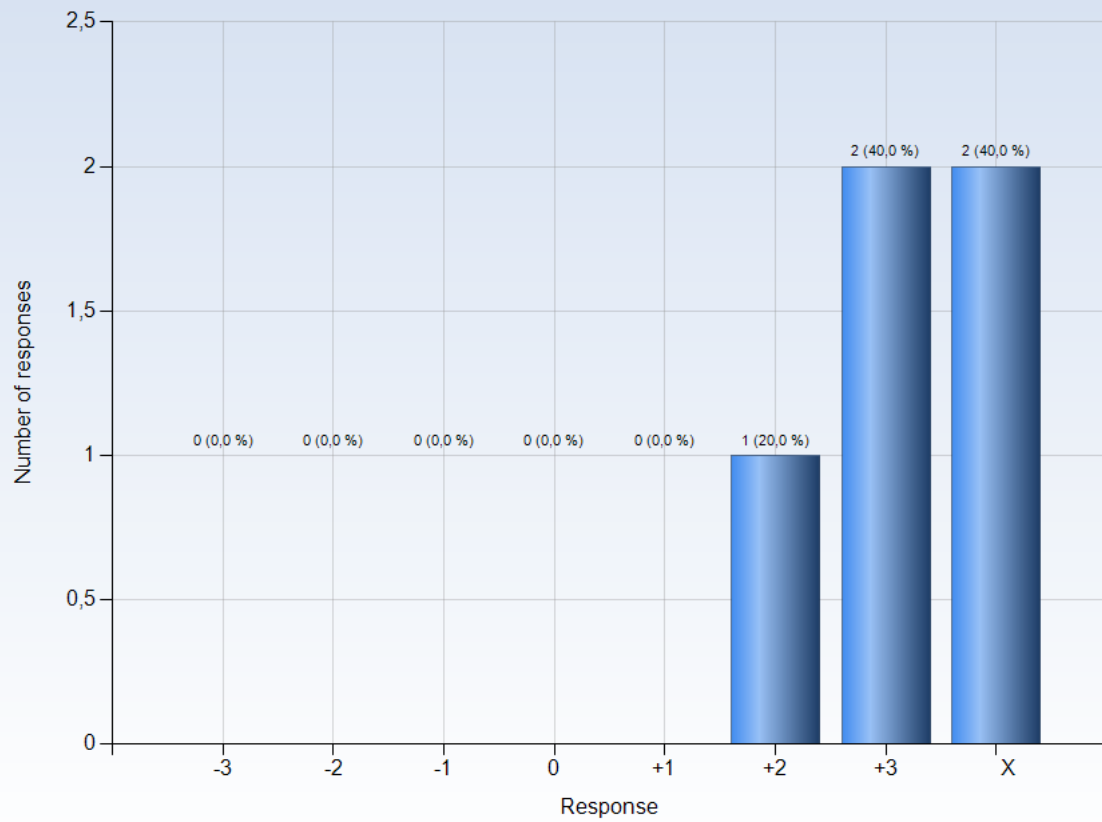Comments (My response was: +2)

Yes.

Application and theory felt slightly detached at times. Might be due to complexity of the GNSS as a whole

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

Comments

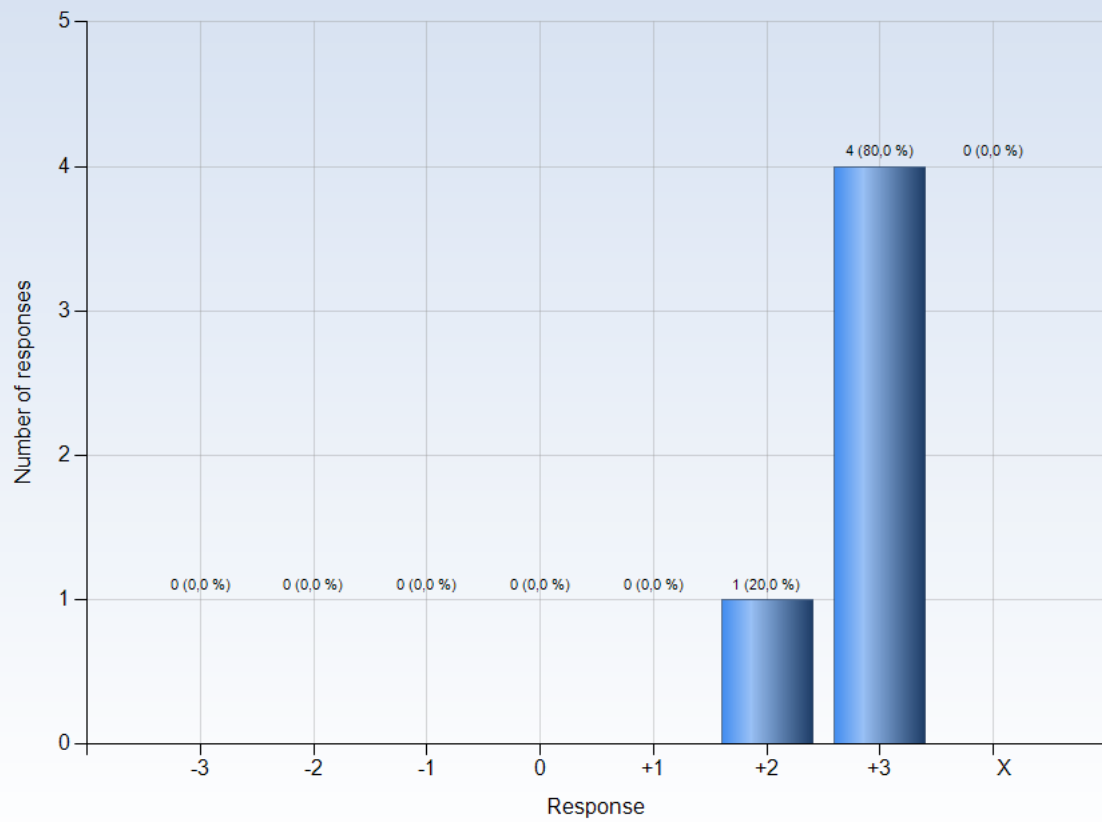## 16. The assessment on the course was fair and honest

Number of responses

Response	-3	-2	-1	0	+1	+2	+3	X
	0 (0,0 %)	0 (0,0 %)	0 (0,0 %)	0 (0,0 %)	0 (0,0 %)	1 (20,0 %)	2 (40,0 %)	2 (40,0 %)

Comments

Comments (My response was: X   )

Waiting for exams to review. As the comments on the reports were quite brief it hard to say

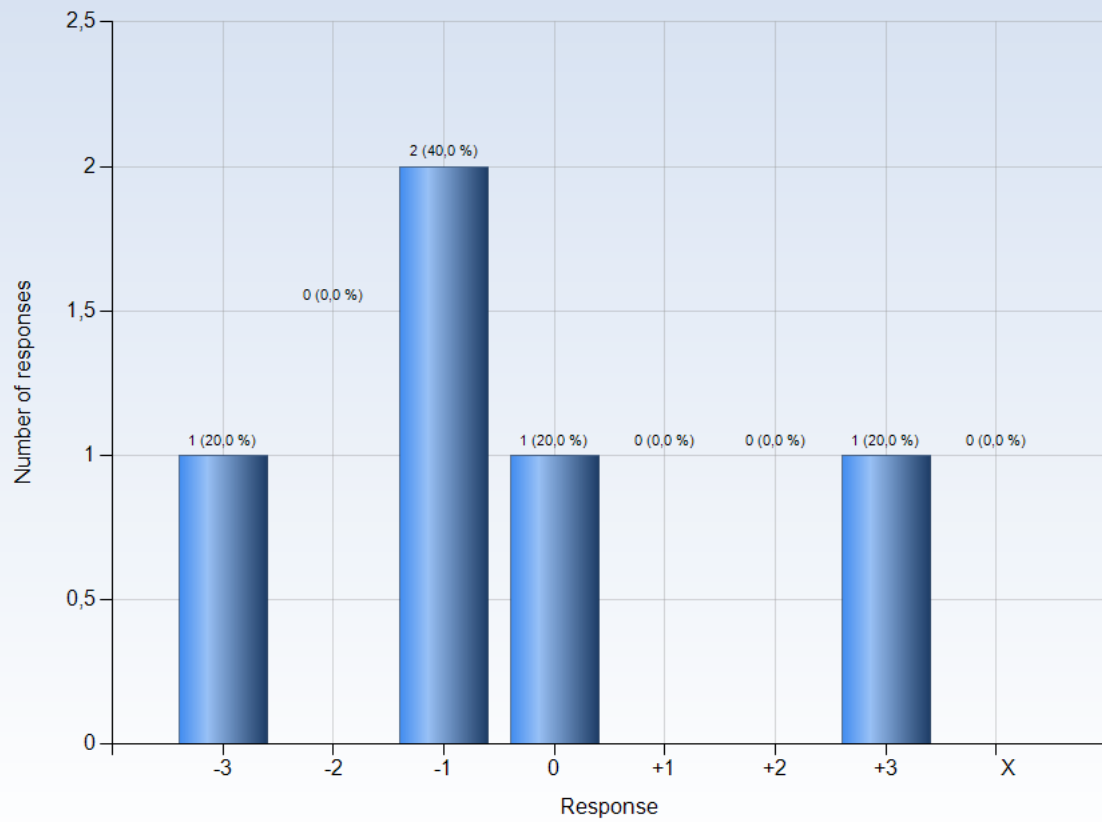## 17. My background knowledge was sufficient to follow the course

Number of responses

Response		
-3	0 (0,0 %)	
-2	0 (0,0 %)	
-1	0 (0,0 %)	
0	0 (0,0 %)	
+1	0 (0,0 %)	
+2	1 (20,0 %)	
+3	4 (80,0 %)	
X	0 (0,0 %)	

Comments

Comments (My response was: +3)

Yes, for sure

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

Number of responses / Response

- -3: 1 (20,0 %)
- -2: 0 (0,0 %)
- -1: 2 (40,0 %)
- 0: 1 (20,0 %)
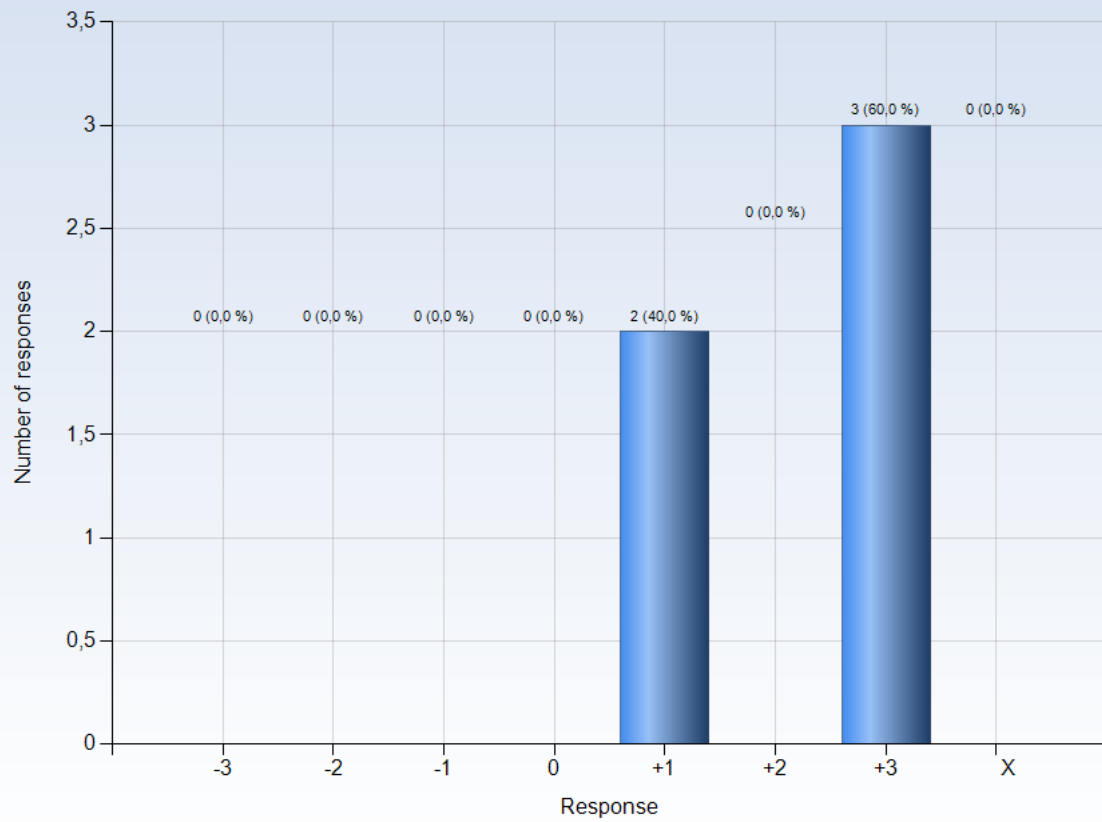- +1: 0 (0,0 %)
- +2: 0 (0,0 %)
- +3: 1 (20,0 %)
- X: 0 (0,0 %)

Comments

Comments (My response was: +3)

Yes. Labs, reading material and classes all helped in learning concepts in different manner.

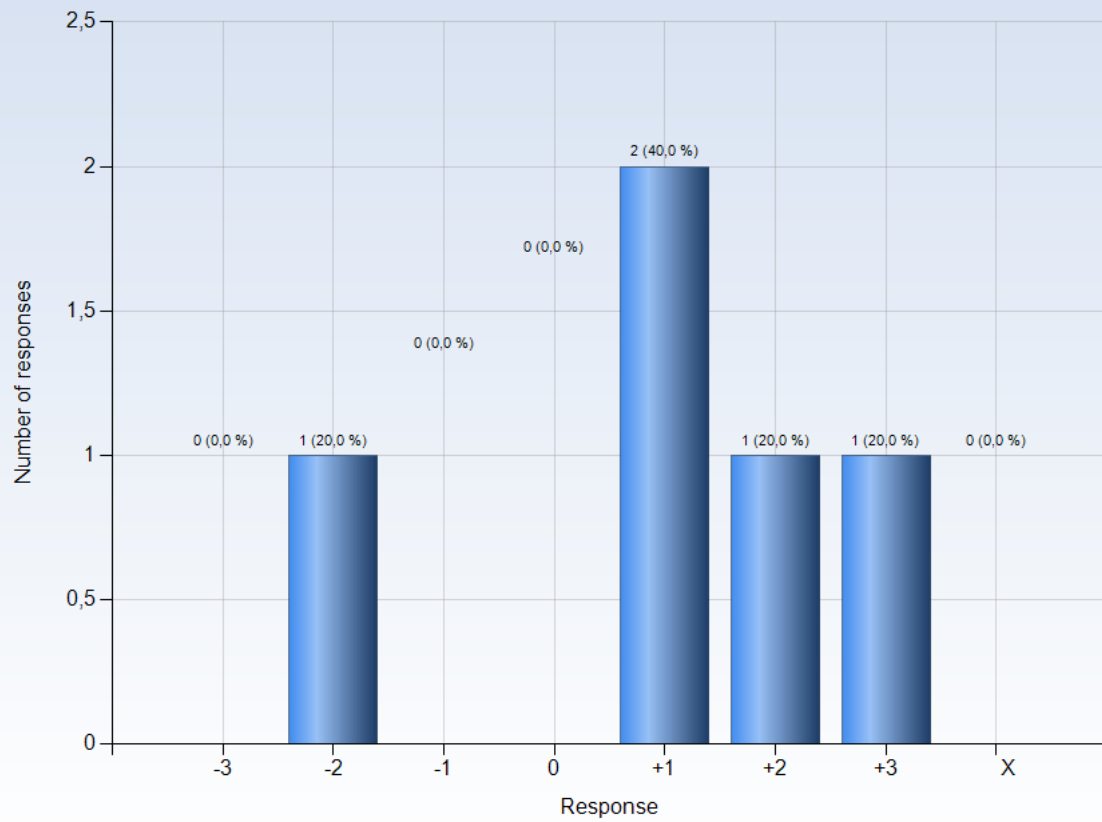# 21. I was able to learn by collaborating and discussing with others

Comments

Comments (My response was: +1)

There were no team or group projects. Since it was online, the interaction between students was further reduced. But we did manage to converse and discuss at times.

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

Number of responses vs Response

- -3: 0 (0,0 %)
- -2: 1 (20,0 %)
- -1: 0 (0,0 %)
- 0: 0 (0,0 %)
- +1: 2 (40,0 %)
- +2: 1 (20,0 %)
- +3: 1 (20,0 %)
- X: 0 (0,0 %)

Comments

Comments (My response was: +3)

Yes