



LUNDS  
UNIVERSITET

Matematikcentrum

Matematik NF

## Compilation Report for Linear Algebra 2, Spring 2021

**Module leader:** Kjell Elfström

**Other teachers:** Adem Limani, Tien Truong, Lea Miko Versbach.

**Number of students:** 98.

**Grades in the original examination:** 20 V, 27 G, 11 U

### Evaluation

**Compilation of the evaluation:** See the following pages.

**Teacher's comments:** Lectures were broadcast via zoom. The seminars were held online. After each seminar, I also posted complete solutions to the exercises in Canvas.

The outcome of this survey was similar to the outcome of last term's survey. The students seem to be more pleased with the seminars and less pleased with lectures and the project. Better feedback from the teachers was requested. Maybe that has to do with the fact that so much of the teaching was online. The students could ask questions at the lectures via zoom, but seldom did. There was not much to give feedback on.

Among the comments, there are as usual many opposite views. On the one hand many students found the book well-written and the lectures well-structured, but on the other hand some students found the book difficult to understand and meant that the lectures could be improved in some ways. The lectures were too similar to the book and the lecturer could be better at communicating for example.

**Evaluation of changes since the last time the module ran:** On the request of many students, I worked to bring forward the project reports. It seems to have worked.

**Suggestions for changes prior to the next time the module will be offered:** The result of the survey does not call for any major change.

**Compiler and date of compilation report:** Kjell Elfström, 30 March 2021.

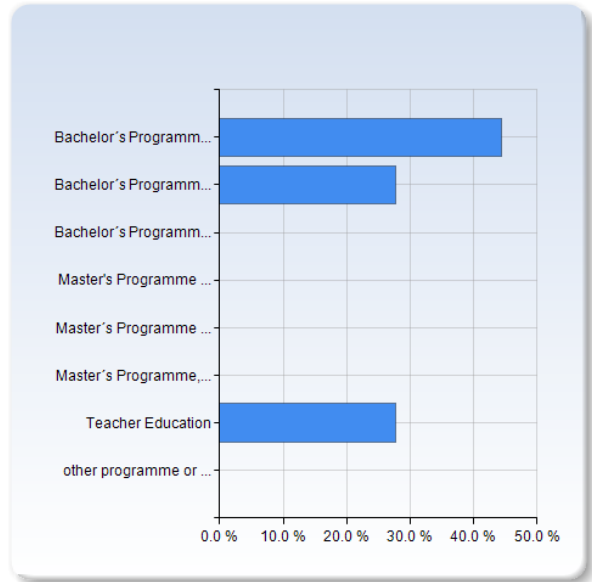


## Kopia av MATB22-vt21

Answer Count: 18

### I have studied this course as part of

I have studied this course as part of	Number of Responses
Bachelor's Programme in Mathematics	8 (44.4%)
Bachelor's Programme in Physics, Theoretical Physics, Astronomy	5 (27.8%)
Bachelor's Programme, other specialization	0 (0.0%)
Master's Programme in Mathematics	0 (0.0%)
Master's Programme in Mathematical Statistics	0 (0.0%)
Master's Programme, other specialization	0 (0.0%)
Teacher Education	5 (27.8%)
other programme or as stand alone course	0 (0.0%)
Total	18 (100.0%)

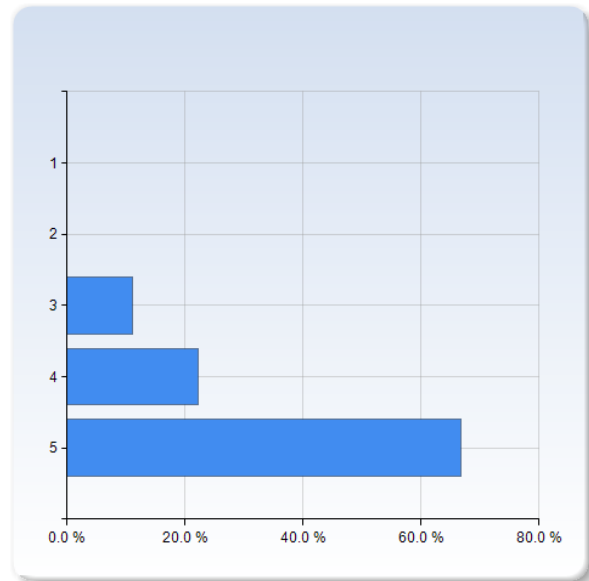


I have studied this course as part of	Mean	Standard Deviation
	2.9	2.6

On the scale 1-5 select the option that best matches your opinion: 1= disagree completely → 3= partly agree → 5= agree completely

**2. My prior knowledge has been sufficient to assimilate the contents of this course.**

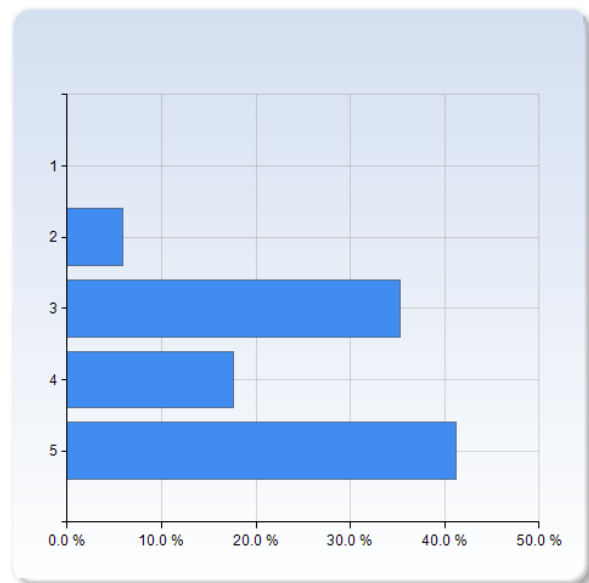
2. My prior knowledge has been sufficient to assimilate the contents of this course.	Number of Responses
1	0 (0.0%)
2	0 (0.0%)
3	2 (11.1%)
4	4 (22.2%)
5	12 (66.7%)
Total	18 (100.0%)



	Mean	Standard Deviation
2. My prior knowledge has been sufficient to assimilate the contents of this course.	4.6	0.7

**3. I have participated actively in the course.**

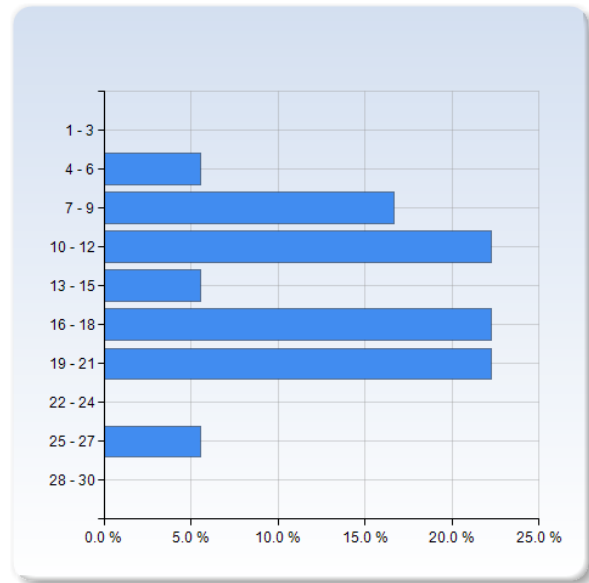
3. I have participated actively in the course.	Number of Responses
1	0 (0.0%)
2	1 (5.9%)
3	6 (35.3%)
4	3 (17.6%)
5	7 (41.2%)
Total	17 (100.0%)



	Mean	Standard Deviation
3. I have participated actively in the course.	3.9	1.0

**Average number of hours spent in total on the course per week (including scheduled activities):**

Average number of hours spent in total on the course per week (including scheduled activities):	Number of Responses
1 - 3	0 (0.0%)
4 - 6	1 (5.6%)
7 - 9	3 (16.7%)
10 - 12	4 (22.2%)
13 - 15	1 (5.6%)
16 - 18	4 (22.2%)
19 - 21	4 (22.2%)
22 - 24	0 (0.0%)
25 - 27	1 (5.6%)
28 - 30	0 (0.0%)
Total	18 (100.0%)



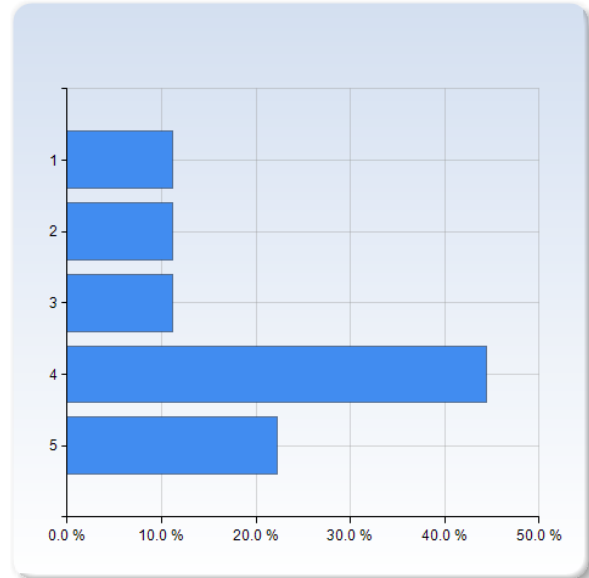
Average number of hours spent in total on the course per week (including scheduled activities):	Mean	Standard Deviation
	14.3	5.7

## The course in general

On the scale 1-5 select the option that best matches your opinion: 1= disagree completely → 3= partly agree → 5= agree completely

The way the course was taught and organised suited me.

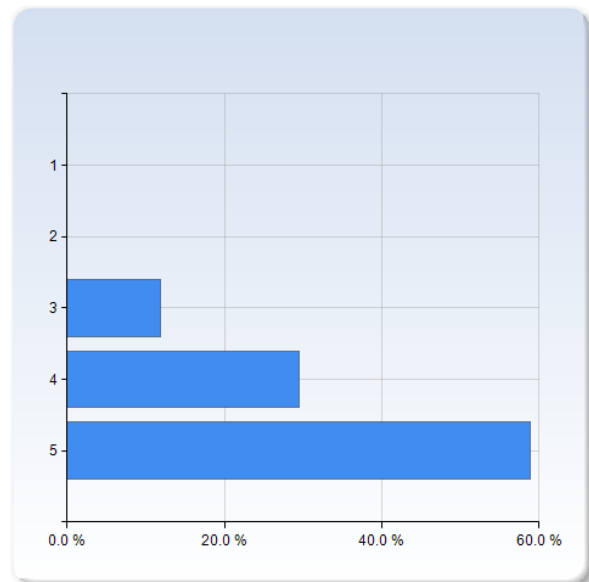
The way the course was taught and organised suited me.	Number of Responses
1	2 (11.1%)
2	2 (11.1%)
3	2 (11.1%)
4	8 (44.4%)
5	4 (22.2%)
Total	18 (100.0%)



	Mean	Standard Deviation
The way the course was taught and organised suited me.	3.6	1.3

The number of teacher lead activities (lectures, seminars etc.) has been satisfactory.

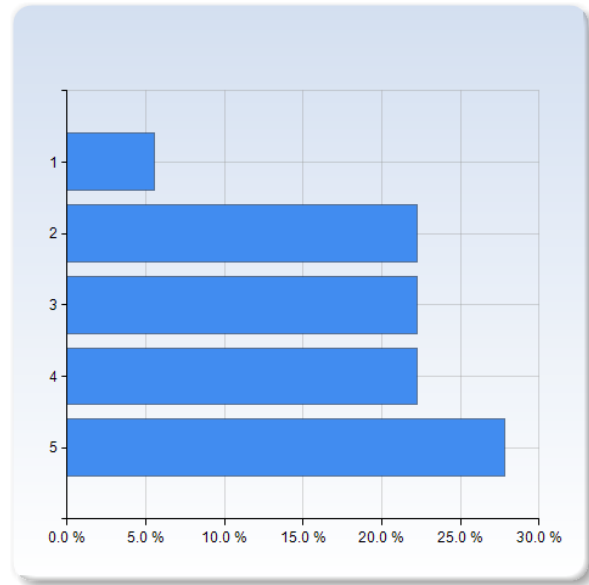
The number of teacher lead activities (lectures, seminars etc.) has been satisfactory.	Number of Responses
1	0 (0.0%)
2	0 (0.0%)
3	2 (11.8%)
4	5 (29.4%)
5	10 (58.8%)
Total	17 (100.0%)



	Mean	Standard Deviation
The number of teacher lead activities (lectures, seminars etc.) has been satisfactory.	4.5	0.7

### The lectures were valuable for my learning.

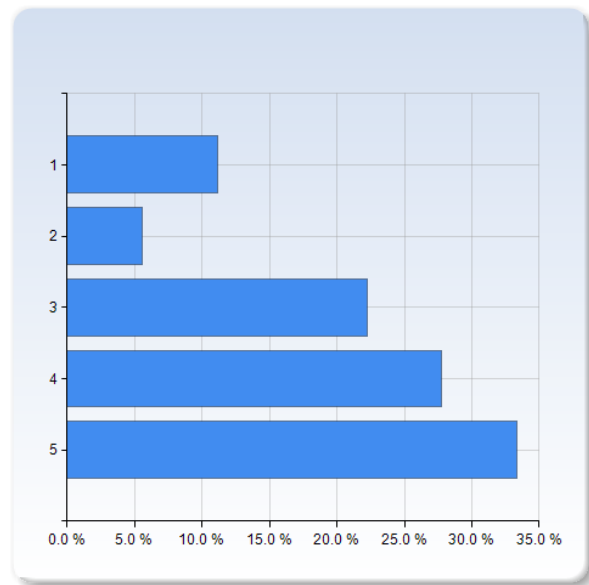
The lectures were valuable for my learning.	Number of Responses
1	1 (5.6%)
2	4 (22.2%)
3	4 (22.2%)
4	4 (22.2%)
5	5 (27.8%)
Total	18 (100.0%)



The lectures were valuable for my learning.	Mean	Standard Deviation
	3.4	1.3

### The seminars were valuable for my learning.

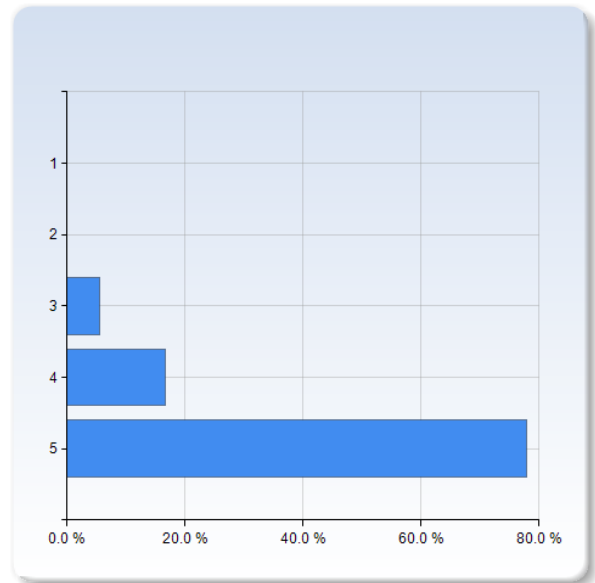
The seminars were valuable for my learning.	Number of Responses
1	2 (11.1%)
2	1 (5.6%)
3	4 (22.2%)
4	5 (27.8%)
5	6 (33.3%)
Total	18 (100.0%)



	Mean	Standard Deviation
The seminars were valuable for my learning.	3.7	1.3

**Studying on my own was valuable for my learning.**

Studying on my own was valuable for my learning.	Number of Responses
1	0 (0.0%)
2	0 (0.0%)
3	1 (5.6%)
4	3 (16.7%)
5	14 (77.8%)
Total	18 (100.0%)

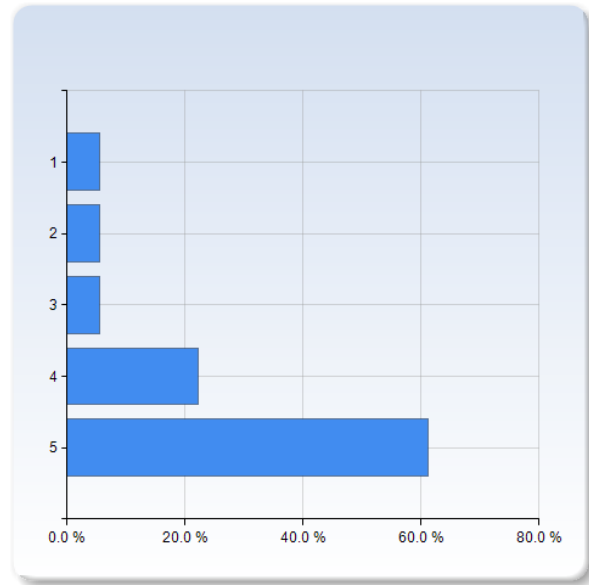


	Mean	Standard Deviation
Studying on my own was valuable for my learning.	4.7	0.6



**The course literature/material was a valuable learning resource.**

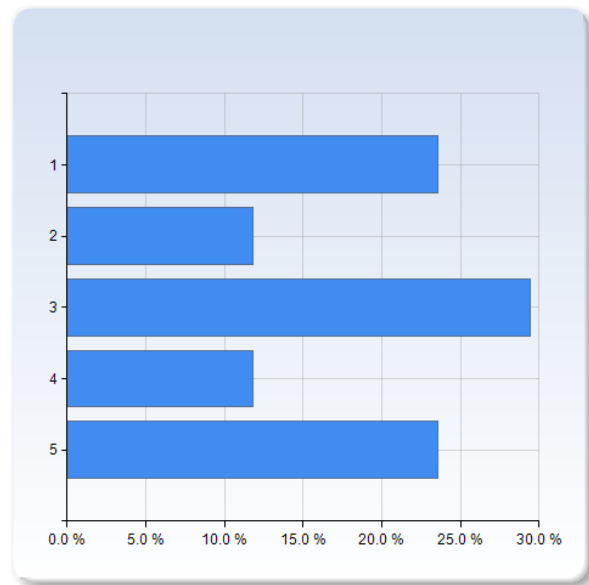
The course literature/material was a valuable learning resource.	Number of Responses
1	1 (5.6%)
2	1 (5.6%)
3	1 (5.6%)
4	4 (22.2%)
5	11 (61.1%)
Total	18 (100.0%)



The course literature/material was a valuable learning resource.	Mean	Standard Deviation
	4.3	1.2

**The assignments were valuable for my learning.**

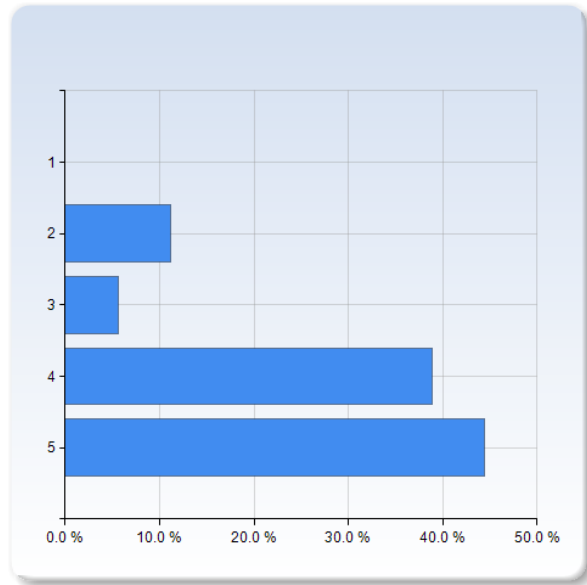
The assignments were valuable for my learning.	Number of Responses
1	4 (23.5%)
2	2 (11.8%)
3	5 (29.4%)
4	2 (11.8%)
5	4 (23.5%)
Total	17 (100.0%)



The assignments were valuable for my learning.	Mean	Standard Deviation
	3.0	1.5

**The information I received before the course start was satisfactory.**

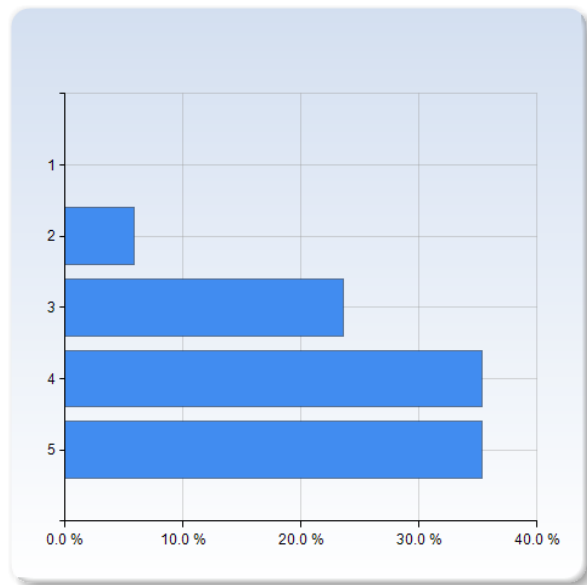
The information I received before the course start was satisfactory.	Number of Responses
1	0 (0.0%)
2	2 (11.1%)
3	1 (5.6%)
4	7 (38.9%)
5	8 (44.4%)
Total	18 (100.0%)



	Mean	Standard Deviation
The information I received before the course start was satisfactory.	4.2	1.0

**The communication with the teaching staff during the course was good.**

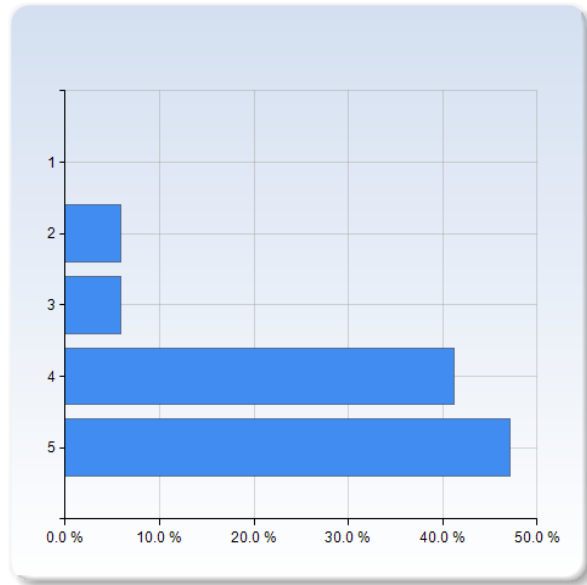
The communication with the teaching staff during the course was good.	Number of Responses
1	0 (0.0%)
2	1 (5.9%)
3	4 (23.5%)
4	6 (35.3%)
5	6 (35.3%)
Total	17 (100.0%)



	Mean	Standard Deviation
The communication with the teaching staff during the course was good.	4.0	0.9

**It was clear throughout the course what was expected of me.**

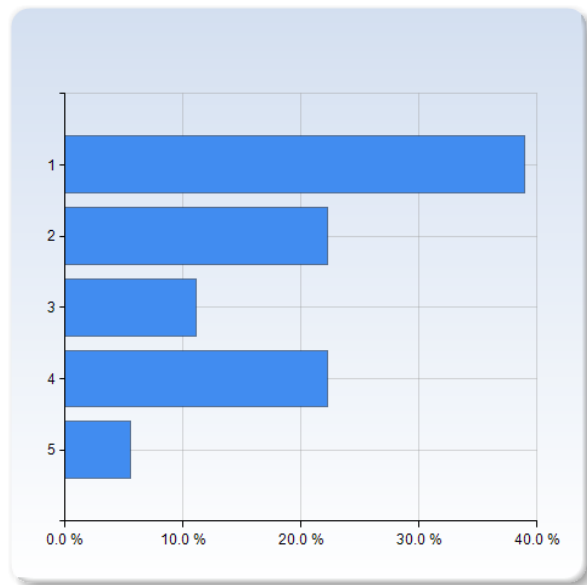
It was clear throughout the course what was expected of me.	Number of Responses
1	0 (0.0%)
2	1 (5.9%)
3	1 (5.9%)
4	7 (41.2%)
5	8 (47.1%)
Total	17 (100.0%)



It was clear throughout the course what was expected of me.	Mean	Standard Deviation
	4.3	0.8

**I have received valuable feedback from my teacher/teachers during the course.**

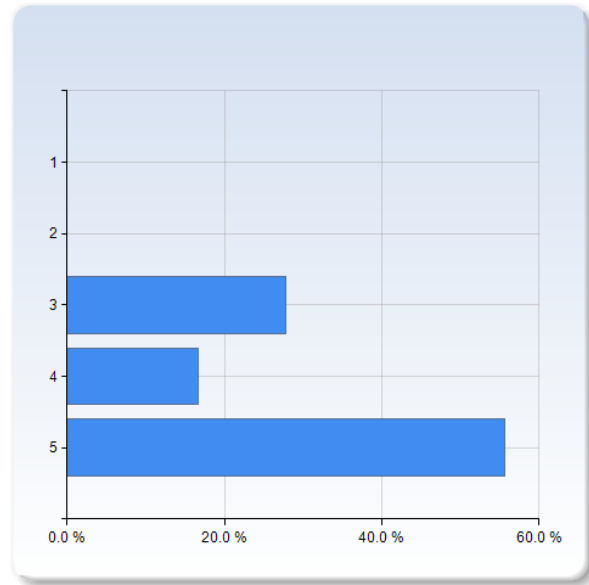
I have received valuable feedback from my teacher /teachers during the course.	Number of Responses
1	7 (38.9%)
2	4 (22.2%)
3	2 (11.1%)
4	4 (22.2%)
5	1 (5.6%)
Total	18 (100.0%)



I have received valuable feedback from my teacher/teachers during the course.	Mean	Standard Deviation
	2.3	1.4

**The course had a reasonable workload.**

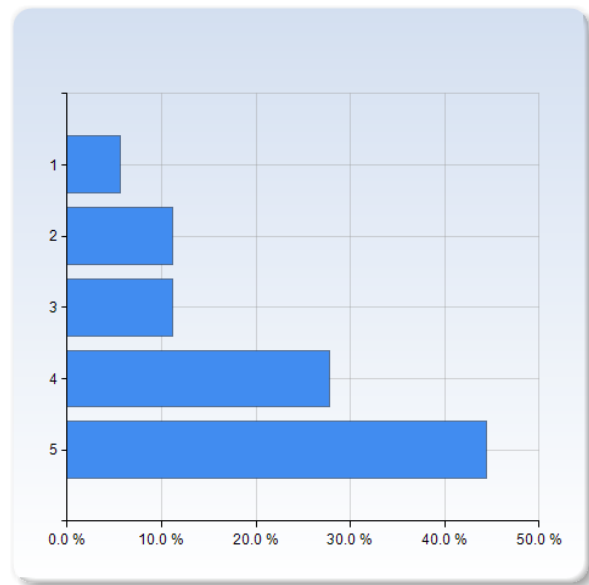
The course had a reasonable workload.	Number of Responses
1	0 (0.0%)
2	0 (0.0%)
3	5 (27.8%)
4	3 (16.7%)
5	10 (55.6%)
Total	18 (100.0%)



The course had a reasonable workload.	Mean	Standard Deviation
	4.3	0.9

**The workload was evenly distributed throughout the course.**

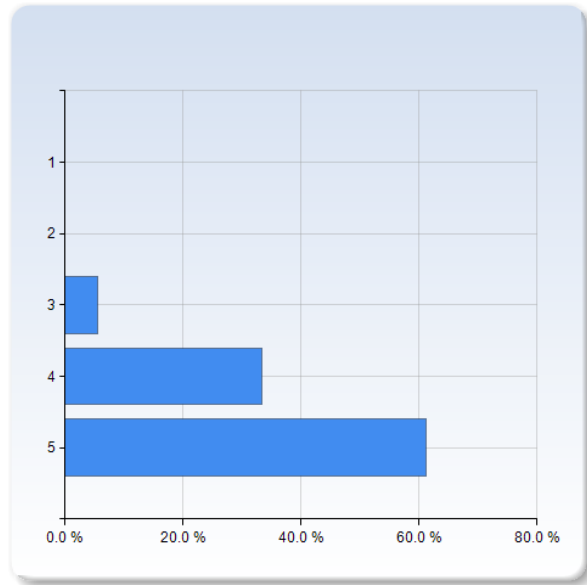
The workload was evenly distributed throughout the course.	Number of Responses
1	1 (5.6%)
2	2 (11.1%)
3	2 (11.1%)
4	5 (27.8%)
5	8 (44.4%)
Total	18 (100.0%)



The workload was evenly distributed throughout the course.	Mean	Standard Deviation
	3.9	1.3

**The examination matched the contents and level of the course.**

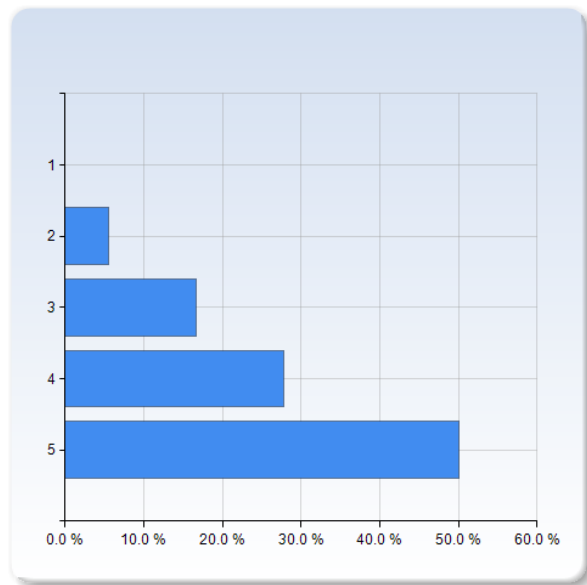
The examination matched the contents and level of the course.	Number of Responses
1	0 (0.0%)
2	0 (0.0%)
3	1 (5.6%)
4	6 (33.3%)
5	11 (61.1%)
Total	18 (100.0%)



	Mean	Standard Deviation
The examination matched the contents and level of the course.	4.6	0.6

**Overall, I am satisfied with the course.**

Overall, I am satisfied with the course.	Number of Responses
1	0 (0.0%)
2	1 (5.6%)
3	3 (16.7%)
4	5 (27.8%)
5	9 (50.0%)
Total	18 (100.0%)

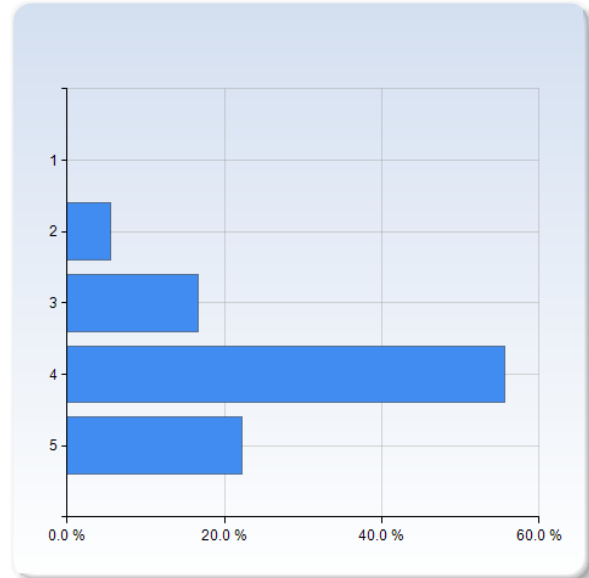


	Mean	Standard Deviation
Overall, I am satisfied with the course.	4.2	0.9

## On the development of generic skills

On a scale 1-5 select the option that best matches your opinion: 1= disagree completely → 3= partly agree → 5= agree completely  
 The course has increased my ability to read a mathematical text.

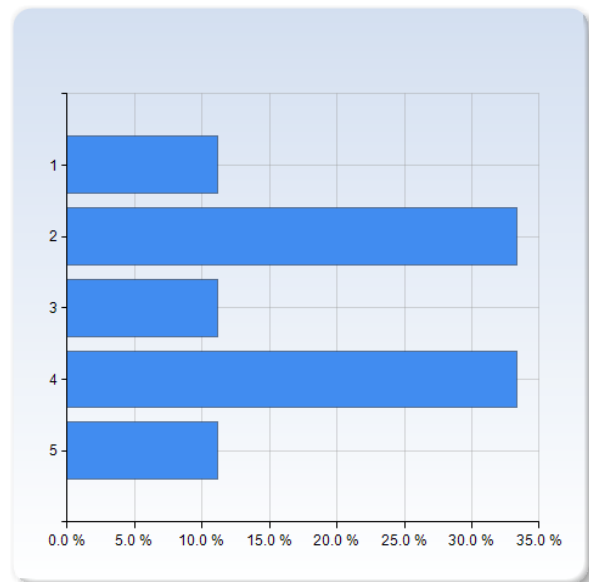
The course has increased my ability to read a mathematical text.	Number of Responses
1	0 (0.0%)
2	1 (5.6%)
3	3 (16.7%)
4	10 (55.6%)
5	4 (22.2%)
Total	18 (100.0%)



	Mean	Standard Deviation
The course has increased my ability to read a mathematical text.	3.9	0.8

The course has increased my ability to communicate the subject in writing.

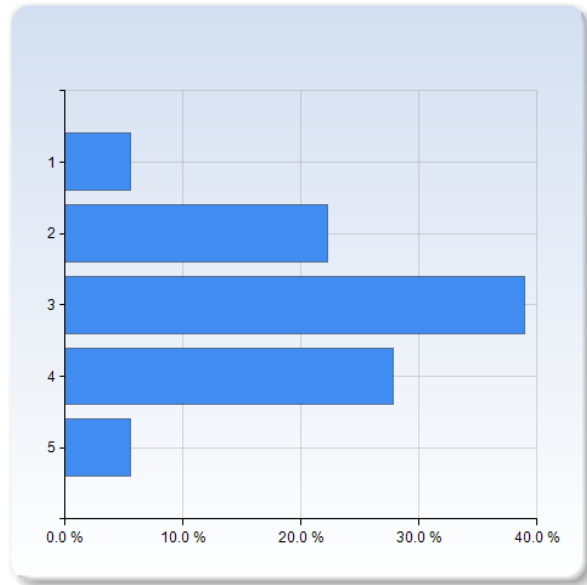
The course has increased my ability to communicate the subject in writing.	Number of Responses
1	2 (11.1%)
2	6 (33.3%)
3	2 (11.1%)
4	6 (33.3%)
5	2 (11.1%)
Total	18 (100.0%)



	Mean	Standard Deviation
The course has increased my ability to communicate the subject in writing.	3.0	1.3

**The course has increased my ability to communicate the subject orally.**

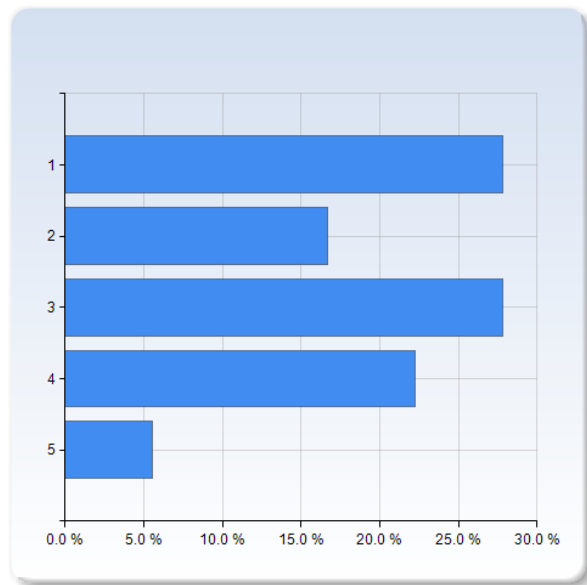
The course has increased my ability to communicate the subject orally.	Number of Responses
1	1 (5.6%)
2	4 (22.2%)
3	7 (38.9%)
4	5 (27.8%)
5	1 (5.6%)
Total	18 (100.0%)



	Mean	Standard Deviation
The course has increased my ability to communicate the subject orally.	3.1	1.0

**The course has increased my ability to cooperate.**

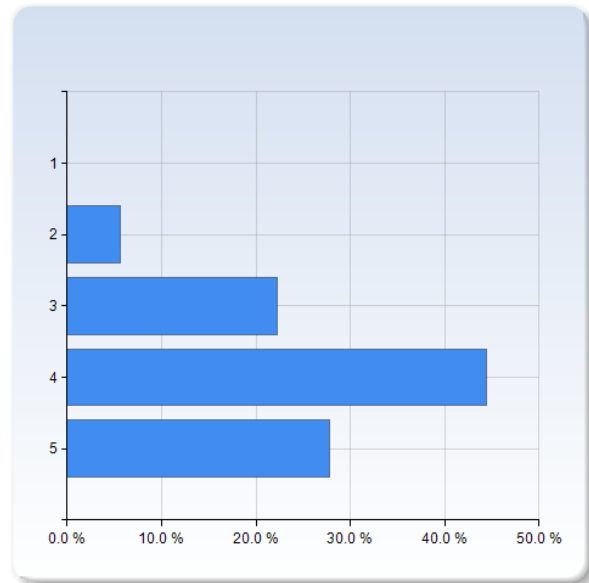
The course has increased my ability to cooperate.	Number of Responses
1	5 (27.8%)
2	3 (16.7%)
3	5 (27.8%)
4	4 (22.2%)
5	1 (5.6%)
Total	18 (100.0%)



	Mean	Standard Deviation
The course has increased my ability to cooperate.	2.6	1.3

**The course has increased my ability to search and process information.**

The course has increased my ability to search and process information.	Number of Responses
1	0 (0.0%)
2	1 (5.6%)
3	4 (22.2%)
4	8 (44.4%)
5	5 (27.8%)
Total	18 (100.0%)

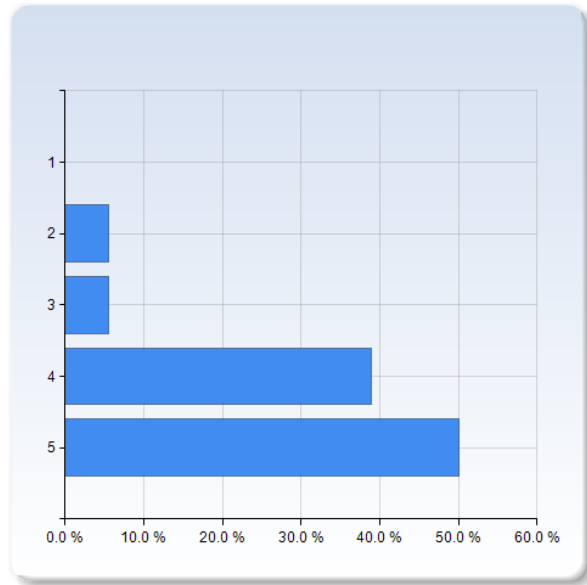


	Mean	Standard Deviation
The course has increased my ability to search and process information.	3.9	0.9



**The course has increased my ability to analyze and solve problems.**

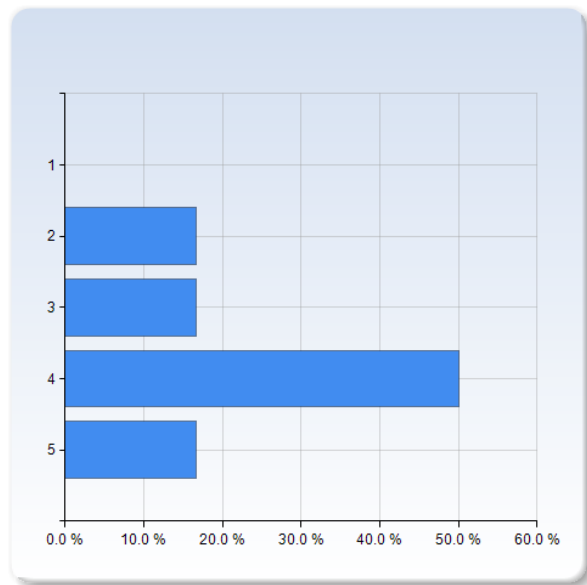
The course has increased my ability to analyze and solve problems.	Number of Responses
1	0 (0.0%)
2	1 (5.6%)
3	1 (5.6%)
4	7 (38.9%)
5	9 (50.0%)
Total	18 (100.0%)



The course has increased my ability to analyze and solve problems.	Mean	Standard Deviation
	4.3	0.8

**As a result of this course, I feel confident about tackling unfamiliar problems.**

As a result of this course, I feel confident about tackling unfamiliar problems.	Number of Responses
1	0 (0.0%)
2	3 (16.7%)
3	3 (16.7%)
4	9 (50.0%)
5	3 (16.7%)
Total	18 (100.0%)

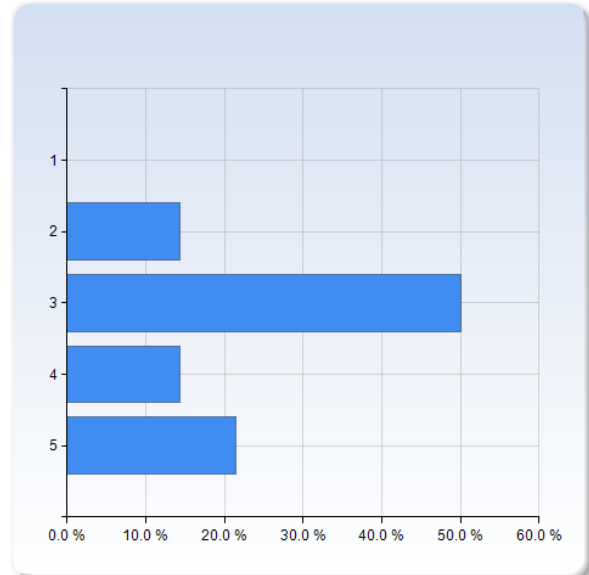


As a result of this course, I feel confident about tackling unfamiliar problems.	Mean	Standard Deviation
	3.7	1.0

## On the programming project

On a scale 1-5 select the option that best matches your opinion: 1= disagree completely → 3= partly agree → 5= agree completely  
 The programming project is closely related to the course contents.

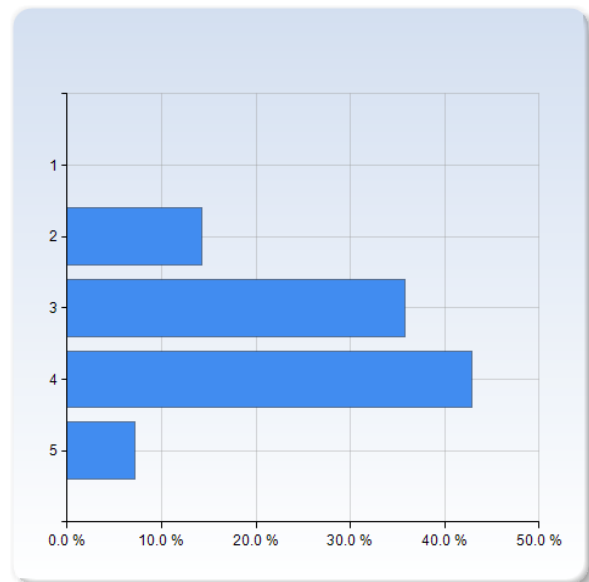
The programming project is closely related to the course contents.	Number of Responses
1	0 (0.0%)
2	2 (14.3%)
3	7 (50.0%)
4	2 (14.3%)
5	3 (21.4%)
Total	14 (100.0%)



The programming project is closely related to the course contents.	Mean	Standard Deviation
	3.4	1.0

## Owing to the programming project, I have increased my programming skills in Python.

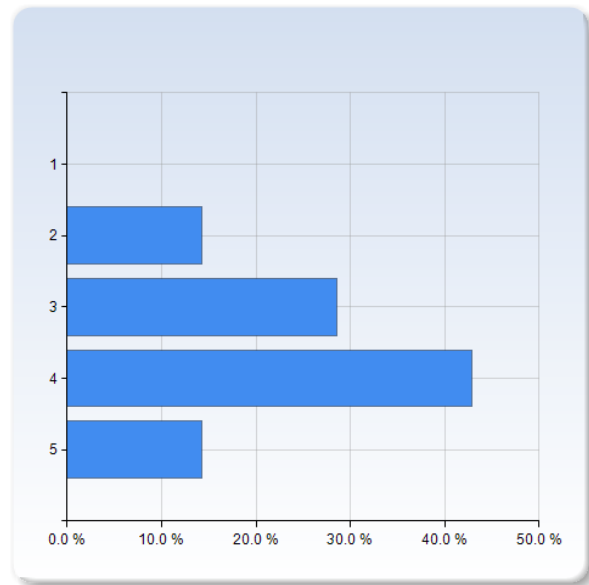
Owing to the programming project, I have increased my programming skills in Python.	Number of Responses
1	0 (0.0%)
2	2 (14.3%)
3	5 (35.7%)
4	6 (42.9%)
5	1 (7.1%)
Total	14 (100.0%)



Owing to the programming project, I have increased my programming skills in Python.	Mean	Standard Deviation
	3.4	0.9

### I believe that the programming project has been valuable for my future learning.

I believe that the programming project has been valuable for my future learning.	Number of Responses
1	0 (0.0%)
2	2 (14.3%)
3	4 (28.6%)
4	6 (42.9%)
5	2 (14.3%)
Total	14 (100.0%)



I believe that the programming project has been valuable for my future learning.	Mean	Standard Deviation
I believe that the programming project has been valuable for my future learning.	3.6	0.9

## What did you appreciate most with the course?

What did you appreciate most with the course?

The seminars were really good, it helped a lot to understand the material - instead of only attending the lectures and reading the lecture notes.

Adems seminars were extremely helpful! Best seminar teacher i've had so far!

The content of the course was very interesting.

I appreciate the seminars, I got detailed explanation for everything.

The content, workload and pedagogical solutions to past papers.

Linear algebra

The clear structure with the exam, the book, the lectures and the seminars. The book was nice as well, books written by the professor teaching the course is always appreciated.

Course literature and lecture were the same. This made it easy to selflearn if my internet were down.

Seminars

What I appreciated the most was that the theory was developed in a logical order in the course, as in that theorems that relied on previous theorems were also presented and proved after the theorems they relied upon (in contrast to the manner of presentation in the one variable analysis course). Also, the theory preceded the examples (applications) of said theory (also in contrast to the manner of presentation in the one variable analysis course).

The other thing I appreciated very much was that the weekly course plan existed and was shared with the students at the start of the course (also in contrast to the one variable analysis course where the schedule for the coming week was typically published the Friday before).

Yet another thing I appreciated was that the lectures were carefully planned by Kjell and covered the most central aspects of the course (also in contrast to the one variable analysis course where there was a questionnaire "just-in-time" before each lecture and the teacher spent the lecture addressing questions from 1 or 2 students).

I also very much appreciated that the theorems in the compendium were (typically) clearly stated and that the proofs were correct (unlike both the one-variable analysis course and the several-variable analysis course).

Another thing I very much appreciated is that Kjell had posted solutions to the assigned problems. I sometimes looked at these solutions and it was nice to get confirmation that I had solved a problem in a good way or see another way to think about it. Personally, I appreciate posted solutions like that much more than I appreciate the opportunity to attend seminars to see solutions because I have access to the posted solutions exactly when I need them (unlike with seminars) and it saves me lots of time. Moreover, I like that Kjell has a lot of detail and appropriate references to theorems in his solutions. In my experience, this is often not the case, which can result in students looking at solutions and following them without understanding why they work.

I was also very grateful that we did not need to do group homework and spend hours each week correcting each others solutions, nor did we need to attend mandatory weekly mentor meetings (like we did in one variable analysis). This meant that there was time to actually read the material and think about it

The lecture notes and the well-designed canvas page made it very clear where to find everything.

The consistency in expectation. It was clear what was important and why.

The seminars have been very valuable to gain a better understanding of the course's content.

Pace, and quality of lectures.

## What do you think should be improved?

What do you think should be improved?

The lectures are very clear and informative, but it would be nice to have some more explanations apart from all theorems etc. It can be somewhat difficult to only go through the compendium, since it's a lot of heavy reading.

The only things I thought was bad is related to Corona. I miss talking with teachers and discussing things in a classroom. Not sure if anything can be done about this though.

The interaction between students (chats about questions/problems or other similar channels of communication).

I think the way that the course was pretty nice taught by teachers and assistants. The only thing that should be improved is my skills at computing fast things.

To stop being overly abstract. Lectures are incomprehensible and students can never use or get any conceptual understanding. It all just comes down to knowing what problems are coming on the exam and try to solve those kinds of problems. It doesn't become interesting when the lecture notes are just theorem-proof-theorem-proof etc.

Kjell providing more insight or an overview before the lecture just so it's clearer what we are doing and why

I would have enjoyed some assignments with regular problems throughout the course, they stimulate learning and force us to communicate with our peers.

Lecture communication between teacher/student. More assignments throughout the course

Cooperation among students should be emphasized more. Especially now during Corona times it seems that the Center of Mathematics is taking no responsibility of the well being of their students. The adaption to distance learning lacks a spirit of compassion for the current situation of a number of students. In particular, cooperation with other students is completely lacking for many students now. The programming project can hardly be a substitute for the kind of interaction on campus teaching allows. Mentor groups like in MATA21 may be expensive or time consuming - or whatever else the reason they are only used in the first semester - but in the current setting there lies a responsibility at the university, more concretely at the level directly above first cycle courses (I suppose the director of studies) that, for example for students living alone, a course of 20 hours workload involves some, any kind of social interaction. Engaged students have to be given the opportunity to exchange with other interested students, and when it comes to this many of them currently need a helping hand, which the Center of Mathematics has to provide. The extent to which originality was involved in the adaption of distance learning in this course is insufficient, or rather; shamefully limited.

The beginning of the course needed to have a better plan on how the teaching should be done, if it's still with corona restriction.

The way of teaching, making sure everyone understands.

I did not like the fact that the programming task 3 was due before surfaces were covered. It forced me to solve the problem mechanically without viewing it as an illustration of theory from the course. I actually did not find that the programming tasks deepened my understanding of linear algebra much in proportion to the time spent on them. Most of that time was spent reading Python documentation (without much guidance). What I think would have been more useful would be if we had 3 opportunities (not necessarily mandatory) to submit proofs we have written to Kjell to receive feedback on our work.

What I personally would have liked would have been if there was a Q&A session with Kjell or a forum where one could post questions about the compendium directly to Kjell. I know this can be done during the lectures, but most of my questions do not appear during the lectures but when I am reading the material on my own and have had some time to process it. To me, that would have been more valuable than the seminars and programming assignments combined.

More generally, I think it would be better if we had a course that constructs the real numbers and also the complex numbers before we have a course on linear spaces. (The only definition we have received for the complex numbers is  $i^2 = -1$  in the one-variable-analysis course, which is not a rigorous definition, and the axioms given for the real numbers in that course were incomplete). I think the course would also benefit if the Fundamental Theorem of Algebra had been proved in a previous course. I also think it was unnecessary to introduce complex linear spaces (it was done very shortly so the student had to spend a lot of time to verify that it works on their own) to prove just one Lemma (Lemma 6.27), when a real version of said Lemma (about symmetric matrices instead of Hermitian) could have been proved instead.

At times, the course material is quite heavy. At such times, the examples were very helpful, but it was not always the case that there was an example showcasing the previous conclusions, and as such, it put a bit more pressure on the student, especially for those that have a harder time with social situations.

I think my learning would have improved if the content of the lectures hadn't exactly mimicked the lecture notes. I would also have appreciated if the lectures were slightly more interactive, with more focus being on stuff that the students find difficult.

Would like to learn from additional literature as well. (Books from other authors). If you did not get the idea in the Lecture, course literature might not help since it is written in a similar approach. Literature from other sources might give you a different perspective on the problem.

## Have you during this course experienced course literature, staff or teaching methods to be discriminatory in any way (gender, ethnicity, etc.)?

Have you during this course experienced course literature, staff or teaching methods to be discriminatory in any way (gender, ethnicity, etc.)?

No

No

No

No

No, never

No

No

No

No

No

No

No

No

No