LUNDS UNIVERSITET

Matematikcentrum
Matematik NF

Kursbokslut, Course review MATB24, Linear Analysis, autumn 2023

Course responsible: Marcus Carlsson
Number of students: 23.
Grades: 2 VG, 5 G. 14 exams were handed in during the two exams, some with repetition, so among active students the approval rate was above 50%.

Evaluation

13 student did the evaluation, and the overall comments are unusually positive.
Sammanfattning av kursvärderingen, student evaluation:

On the downside, the students complain that the mandatory assignment, which consisted in presenting problems at the blackboard, was no good since it had the side effect that much of the seminar time went into presenting easy problems rather than discussing the hard ones. Another comment is that there is too much course literature, and that they end up buying expensive books that are then only used briefly (I suppose they mean Spivak).
Lärarnas kommentarer, teachers comments:

The teacher agrees with the two points raised above. The problem is how to improve the situation, since the course plan demands that we do some side project and also that the students train their skills in mathematical communication. In any case, before next round we should come up with a better solution, allowing the seminar teacher to spend more time on helping students with the more difficult exercises.

As in Spring 2022, there was a heavier focus on Hilbert space theory (relying on the book by Bridges), both because it fits well with the material and reduces the overlap with Fourier Analysis. I recommend this be kept, although for next year I have to write some (better organized) additional material, particularly on ℓ^2 which is missing in the current literature.

Concerning the fact that there is too much literature, I completely agree, it is astonishing that no book covers this material in a self-contained manner.
Evaluation of changes:

No changes.
Suggestion for changes:

Maybe we could preassign one solution to each student on one specific occasion. Then every lecture would consist of one student presenting and the rest of the time could be used more freely.

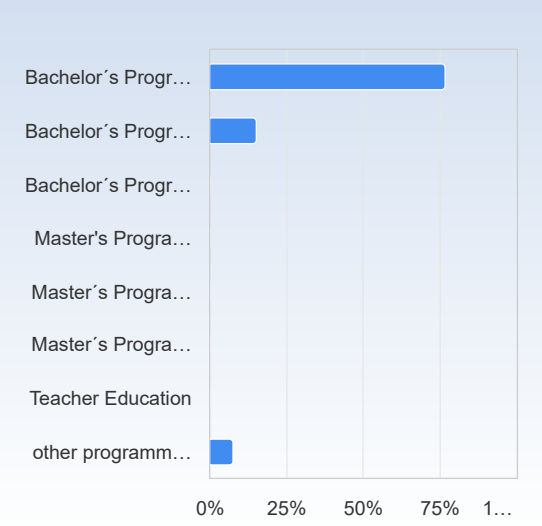
Look (again) for a more suitable book.
Evaluator: Marcus Carlsson.

Linear Analysis Autumn 23

Answer Count: 13

I have studied this course as part of

I have studied this course as part of	Number of responses
Bachelor´s Programme in Mathematics	10 (76,9%)
Bachelor´s Programme in Physics, Theoretical Physics, Astronomy	2 (15,4%)
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	0 (0,0%)
other programme or as stand alone course	1 (7,7%)
Total	13 (100,0%)

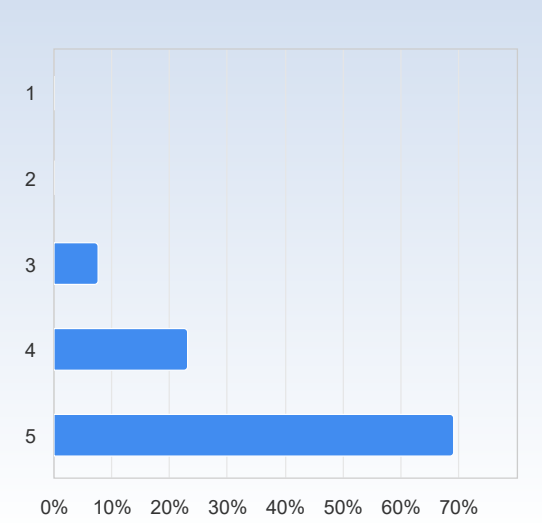


	Mean	Standard Deviation
I have studied this course as part of	1,7	1,9

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.

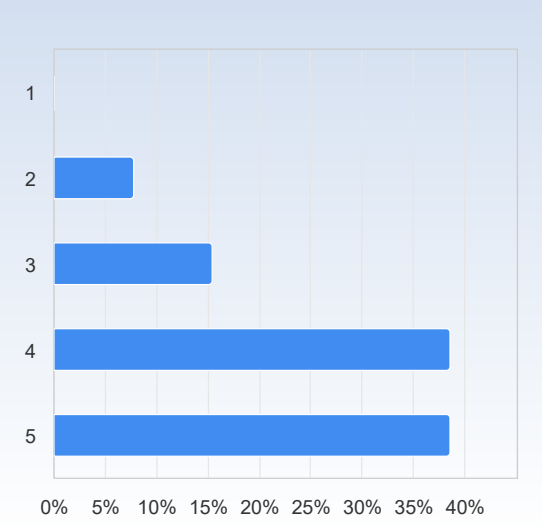
2. My prior knowledge has been sufficient to assimilate the contents of this course.	Number of responses
1	0 (0,0%)
2	0 (0,0%)
3	1 (7,7%)
4	3 (23,1%)
5	9 (69,2%)
Total	13 (100,0%)



	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.

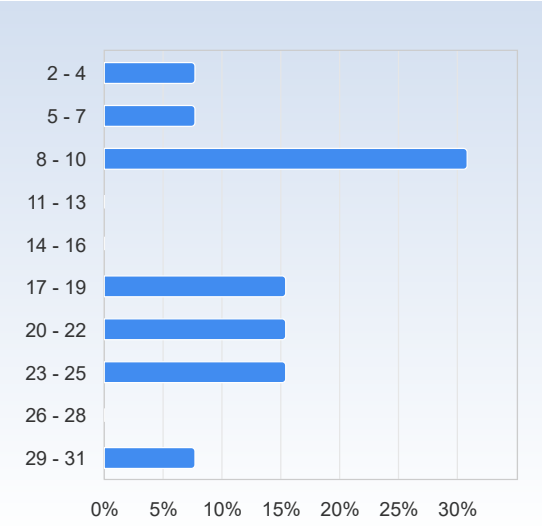
3.I have participated actively in the course.	Number of responses
1	0 (0,0%)
2	1 (7,7%)
3	2 (15,4%)
4	5 (38,5%)
5	5 (38,5%)
Total	13 (100,0%)



	Mean	Standard Deviation
3.I have participated actively in the course.	4,1	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
2 - 4	1 (7,7%)
5 - 7	1 (7,7%)
8 - 10	4 (30,8%)
11 - 13	0 (0,0%)
14 - 16	0 (0,0%)
17 - 19	2 (15,4%)
20 - 22	2 (15,4%)
23 - 25	2 (15,4%)
26 - 28	0 (0,0%)
29 - 31	1 (7,7%)
Total	13 (100,0%)



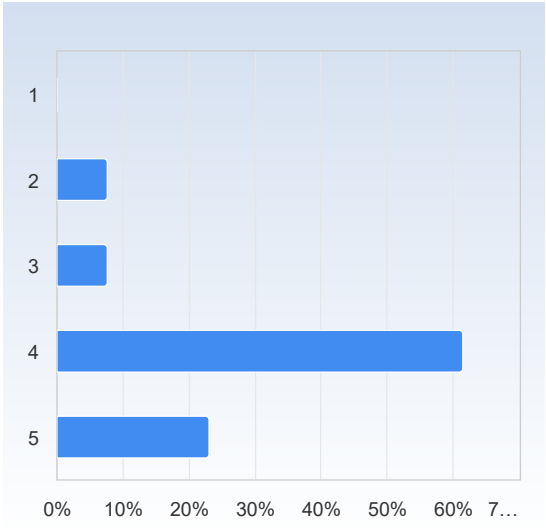
	Mean	Standard Deviation
Average number of hours spent in total on the course per week (including scheduled activities):	15,4	8,6

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.

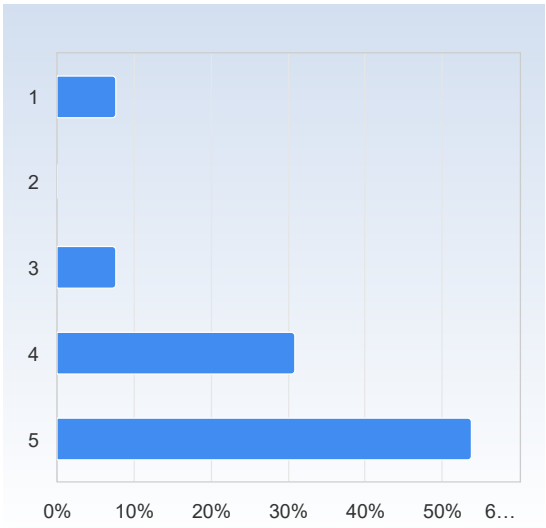
The way the course was taught and organised suited me.	Number of responses
1	0 (0,0%)
2	1 (7,7%)
3	1 (7,7%)
4	8 (61,5%)
5	3 (23,1%)
Total	13 (100,0%)



	Mean	Standard Deviation
The way the course was taught and organised suited me.	4,0	0,8

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

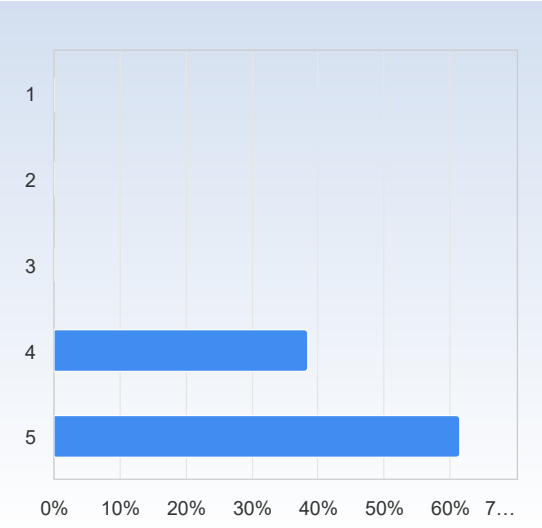
The number of teacher lead activities (lectures, seminars etc.) has been satisfactory.	Number of responses
1	1 (7,7%)
2	0 (0,0%)
3	1 (7,7%)
4	4 (30,8%)
5	7 (53,8%)
Total	13 (100,0%)



	Mean	Standard Deviation
The number of teacher lead activities (lectures, seminars etc.) has been satisfactory.	4,2	1,2

The lectures were valuable for my learning.

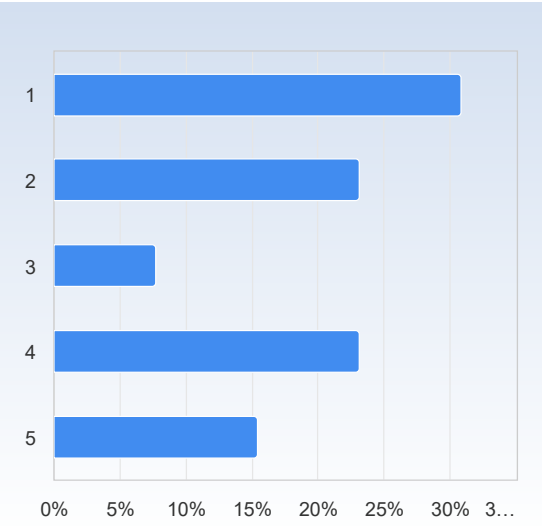
The lectures were valuable for my learning.	Number of responses
1	0 (0,0%)
2	0 (0,0%)
3	0 (0,0%)
4	5 (38,5%)
5	8 (61,5%)
Total	13 (100,0%)



	Mean	Standard Deviation
The lectures were valuable for my learning.	4,6	0,5

The seminars were valuable for my learning.

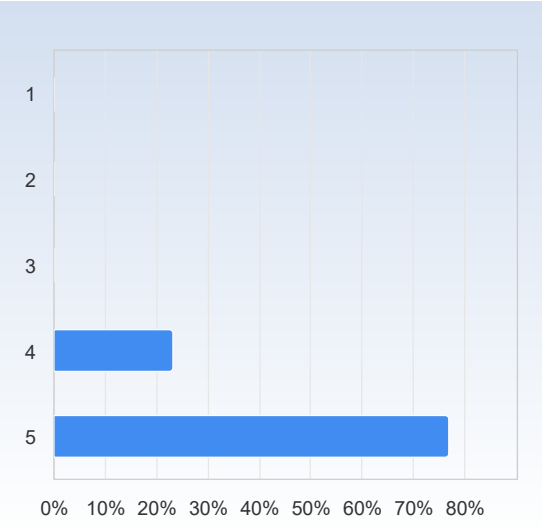
The seminars were valuable for my learning.	Number of responses
1	4 (30,8%)
2	3 (23,1%)
3	1 (7,7%)
4	3 (23,1%)
5	2 (15,4%)
Total	13 (100,0%)



	Mean	Standard Deviation
The seminars were valuable for my learning.	2,7	1,5

Studying on my own was valuable for my learning.

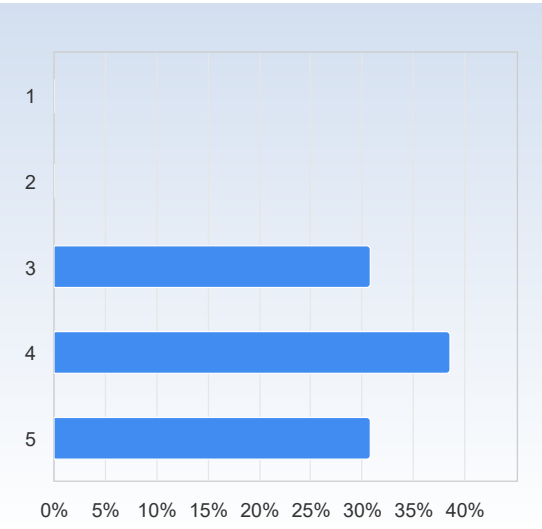
Studying on my own was valuable for my learning.	Number of responses
1	0 (0,0%)
2	0 (0,0%)
3	0 (0,0%)
4	3 (23,1%)
5	10 (76,9%)
Total	13 (100,0%)



	Mean	Standard Deviation
Studying on my own was valuable for my learning.	4,8	0,4

The course literature/material was a valuable learning resource.

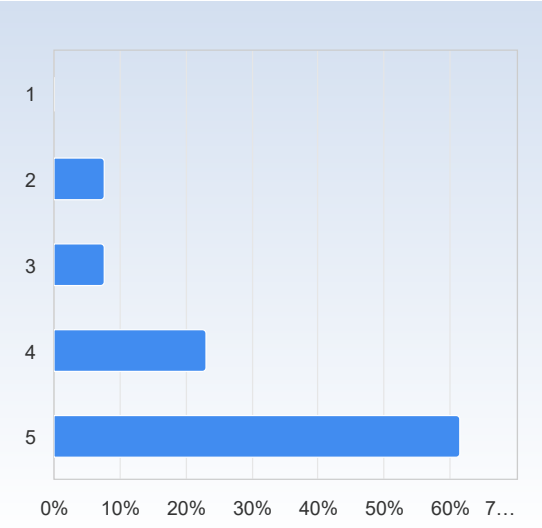
The course literature/material was a valuable learning resource.	Number of responses
1	0 (0,0%)
2	0 (0,0%)
3	4 (30,8%)
4	5 (38,5%)
5	4 (30,8%)
Total	13 (100,0%)



	Mean	Standard Deviation
The course literature/material was a valuable learning resource.	4,0	0,8

The information I received before the course start was satisfactory.

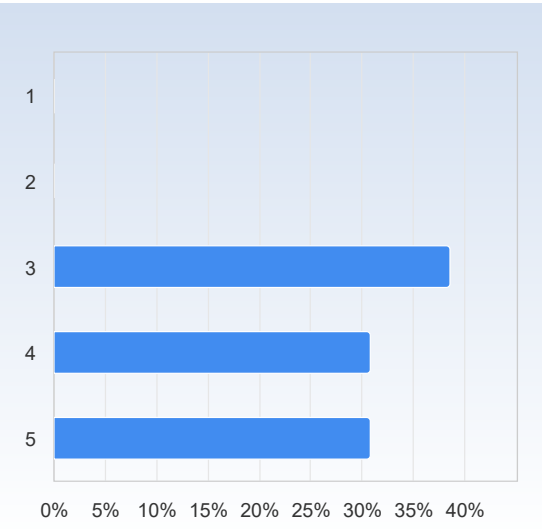
The information I received before the course start was satisfactory.	Number of responses
1	0 (0,0%)
2	1 (7,7%)
3	1 (7,7%)
4	3 (23,1%)
5	8 (61,5%)
Total	13 (100,0%)



	Mean	Standard Deviation
The information I received before the course start was satisfactory.	4,4	1,0

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

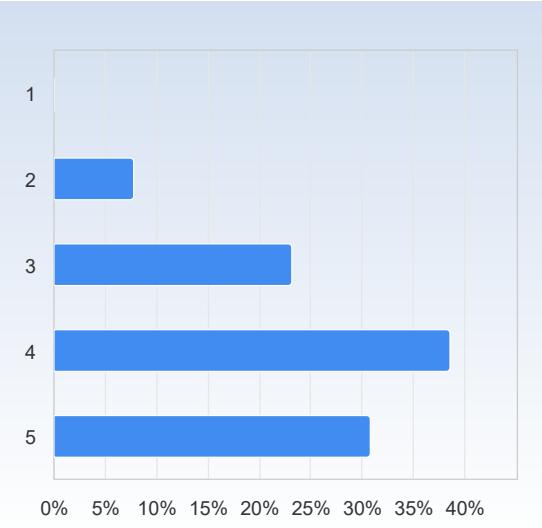
The communication with the teaching staff during the course was good.	Number of responses
1	0 (0,0%)
2	0 (0,0%)
3	5 (38,5%)
4	4 (30,8%)
5	4 (30,8%)
Total	13 (100,0%)



	Mean	Standard Deviation
The communication with the teaching staff during the course was good.	3,9	0,9

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

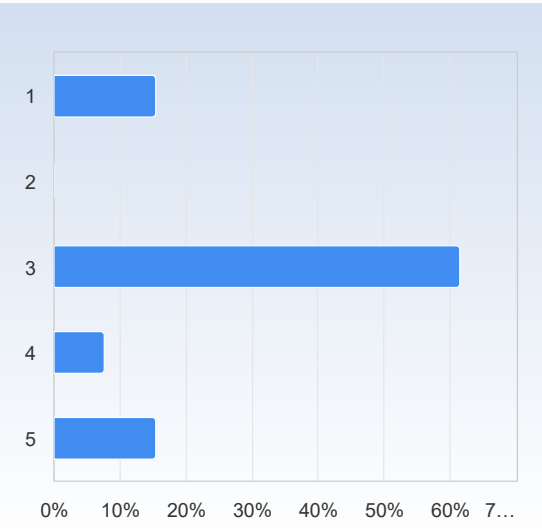
It was clear throughout the course what was expected of me.	Number of responses
1	0 (0,0%)
2	1 (7,7%)
3	3 (23,1%)
4	5 (38,5%)
5	4 (30,8%)
Total	13 (100,0%)



	Mean	Standard Deviation
It was clear throughout the course what was expected of me.	3,9	1,0

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

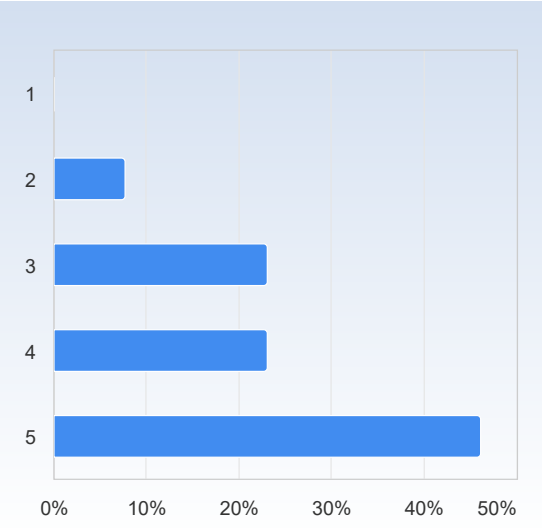
I have received valuable feedback from my teacher /teachers during the course.	Number of responses
1	2 (15,4%)
2	0 (0,0%)
3	8 (61,5%)
4	1 (7,7%)
5	2 (15,4%)
Total	13 (100,0%)



	Mean	Standard Deviation
I have received valuable feedback from my teacher/teachers during the course.	3,1	1,2

The course had a reasonable workload.

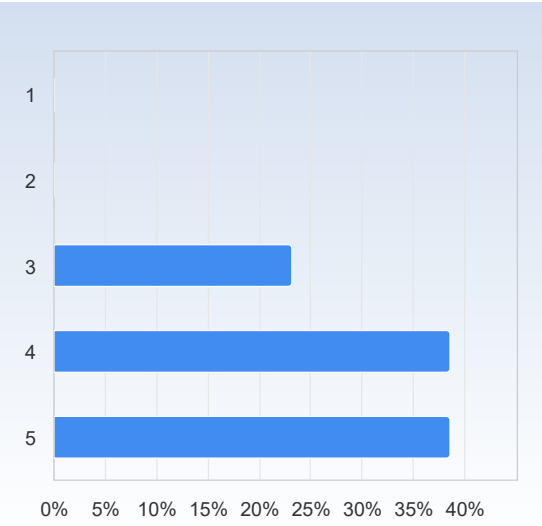
The course had a reasonable workload.	Number of responses
1	0 (0,0%)
2	1 (7,7%)
3	3 (23,1%)
4	3 (23,1%)
5	6 (46,2%)
Total	13 (100,0%)



	Mean	Standard Deviation
The course had a reasonable workload.	4,1	1,0

The workload was evenly distributed throughout the course.

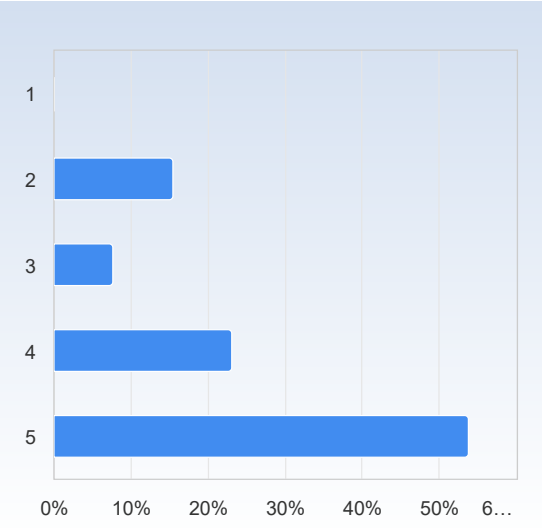
The workload was evenly distributed throughout the course.	Number of responses
1	0 (0,0%)
2	0 (0,0%)
3	3 (23,1%)
4	5 (38,5%)
5	5 (38,5%)
Total	13 (100,0%)



	Mean	Standard Deviation
The workload was evenly distributed throughout the course.	4,2	0,8

The examination matched the contents and level of the course.

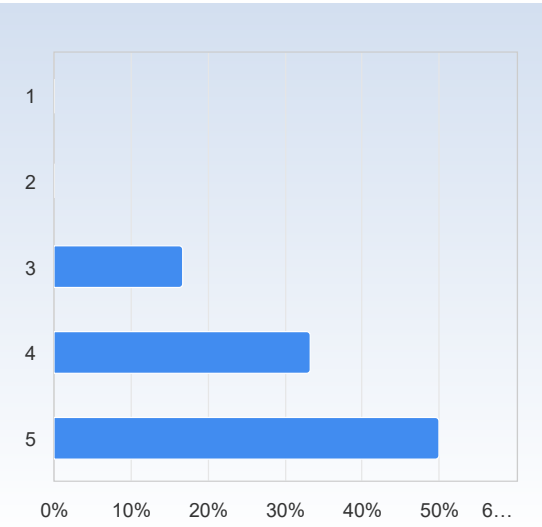
The examination matched the contents and level of the course.	Number of responses
1	0 (0,0%)
2	2 (15,4%)
3	1 (7,7%)
4	3 (23,1%)
5	7 (53,8%)
Total	13 (100,0%)



	Mean	Standard Deviation
The examination matched the contents and level of the course.	4,2	1,1

Overall, I am satisfied with the course.

Overall, I am satisfied with the course.	Number of responses
1	0 (0,0%)
2	0 (0,0%)
3	2 (16,7%)
4	4 (33,3%)
5	6 (50,0%)
Total	12 (100,0%)



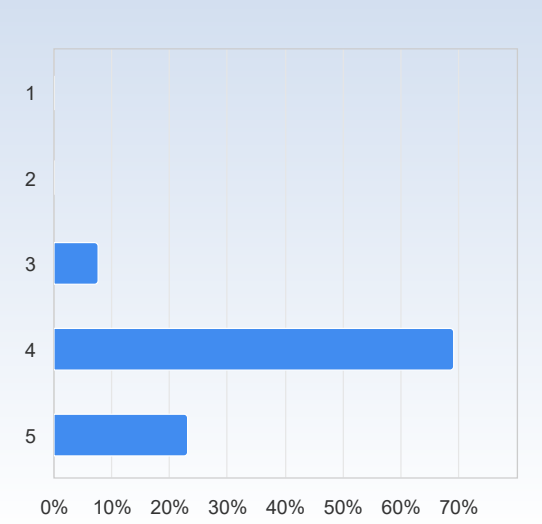
	Mean	Standard Deviation
Overall, I am satisfied with the course.	4,3	0,8

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.

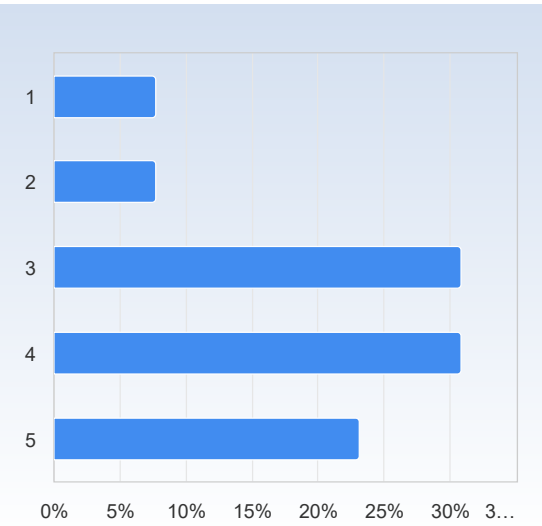
The course has increased my ability to read a mathematical text.	Number of responses
1	0 (0,0%)
2	0 (0,0%)
3	1 (7,7%)
4	9 (69,2%)
5	3 (23,1%)
Total	13 (100,0%)



	Mean	Standard Deviation
The course has increased my ability to read a mathematical text.	4,2	0,6

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

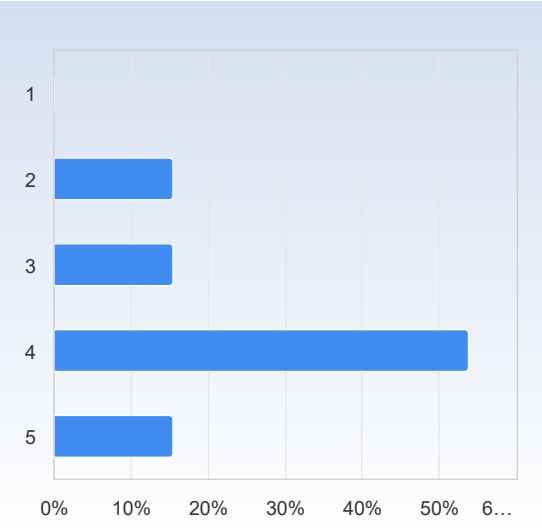
The course has increased my ability to communicate the subject in writing.	Number of responses
1	1 (7,7%)
2	1 (7,7%)
3	4 (30,8%)
4	4 (30,8%)
5	3 (23,1%)
Total	13 (100,0%)



	Mean	Standard Deviation
The course has increased my ability to communicate the subject in writing.	3,5	1,2

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

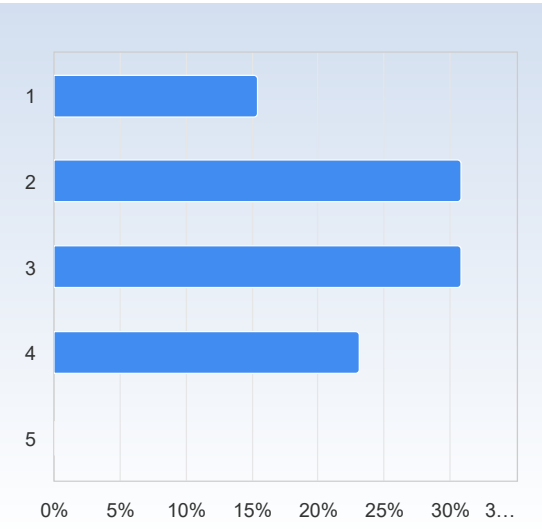
The course has increased my ability to communicate the subject orally.	Number of responses
1	0 (0,0%)
2	2 (15,4%)
3	2 (15,4%)
4	7 (53,8%)
5	2 (15,4%)
Total	13 (100,0%)



	Mean	Standard Deviation
The course has increased my ability to communicate the subject orally.	3,7	0,9

The course has increased my ability to cooperate.

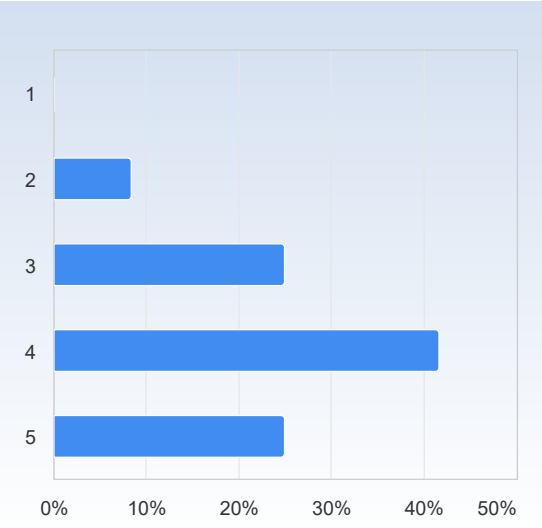
The course has increased my ability to cooperate.	Number of responses
1	2 (15,4%)
2	4 (30,8%)
3	4 (30,8%)
4	3 (23,1%)
5	0 (0,0%)
Total	13 (100,0%)



	Mean	Standard Deviation
The course has increased my ability to cooperate.	2,6	1,0

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

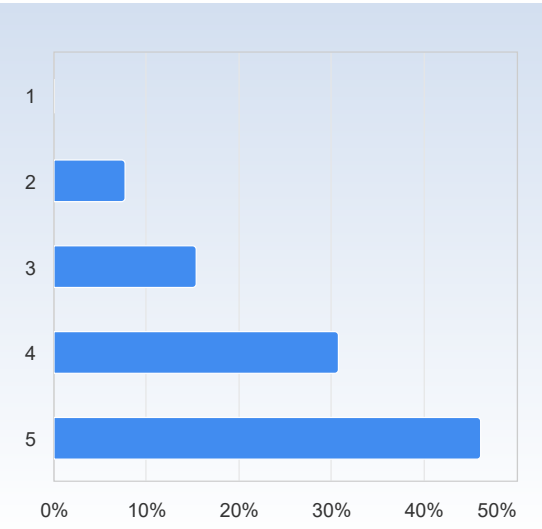
The course has increased my ability to search and process information.	Number of responses
1	0 (0,0%)
2	1 (8,3%)
3	3 (25,0%)
4	5 (41,7%)
5	3 (25,0%)
Total	12 (100,0%)



	Mean	Standard Deviation
The course has increased my ability to search and process information.	3,8	0,9

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

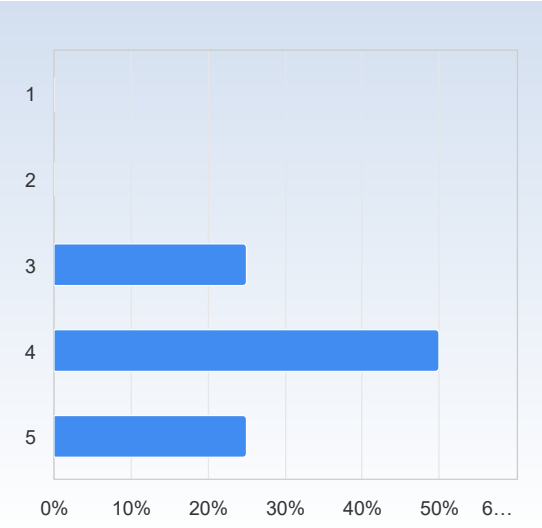
The course has increased my ability to analyze and solve problems.	Number of responses
1	0 (0,0%)
2	1 (7,7%)
3	2 (15,4%)
4	4 (30,8%)
5	6 (46,2%)
Total	13 (100,0%)



	Mean	Standard Deviation
The course has increased my ability to analyze and solve problems.	4,2	1,0

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	0 (0,0%)
3	3 (25,0%)
4	6 (50,0%)
5	3 (25,0%)
Total	12 (100,0%)



	Mean	Standard Deviation
As a result of this course, I feel confident about tackling unfamiliar problems.	4,0	0,7

What did you appreciate most with the course?

What did you appreciate most with the course?
I appreciated the lectures. The pace was good and time was spent on actually understanding the material. I also believe that the seminar leader was good, as they provided clear solutions to the problems and answered any questions well.
The lectures were well structured snd interesting.
It was very interesting, especially towards the end
The dry humor :)
It's so cool that now in advanced mathematics most of the things we learn can be expressed as different types of spaces. This gets me very motivated to learn more
The way Hilbertspaces (specifically L^2) were introduced was very nice. Everything in the courses is connected and builds up towards this concept. I feel like this course will also be very helpful in my further studies.
I thought the lectures were well-presented, engaging, and informative. The seminar-leader was also helpful and friendly.
The motivation, summaries and "intuition" behind the maths often presented in the lectures was very useful! I also liked the idea of making the presentation of exercises in the seminars necessary in order to pass the course. It's good for motivation and I think more people regularly came to the seminars because of it, and then had use of them even though they didn't expect they would!

What do you think should be improved?

What do you think should be improved?
First of all, I did not like the decision to essentially make the seminars into an examination, where one had to present solutions to pass the course. The purpose of the seminars shifted from discussing solutions to difficult problems, to collecting points to pass. Before the shift, I went to the seminars to get solutions to problems I couldn't solve. We had the opportunity to request problems to be presented and we usually focused on more difficult ones that most didn't solve. After the shift, the focus became "easier" problems, since these were the ones people had solved and therefore could present. In other words, I didn't benefit as much from the seminars anymore since the problems that were presented mostly were problems I had already solved on my own. Only if there was time left, we could request problems. But this was rarely the case. Moreover, this assignment was announced halfway through the course. Not only was there not even enough time for everyone to present four problems, but I found it a bit stressful that the assignment appeared out of nowhere, and also that I now felt the need to solve problems early, so that I could "claim" a problem to present at the next seminar, knowing that other students also wanted to claim problems. To conclude, I do not believe in the format of this assignment. Most importantly, it made the seminars way less valuable for me. I believe that seminars should be a learning opportunity, not an examination. And if it for some reason has to be this way, please annonce it earlier. Secondly, the amount of problems to prepare for each seminar was unreasonable for me. It was simply mostly impossible for me to solve all of them. I believe that the amount of problems should be looked into and reduced. At least you could make a selection of the more important problems, where the rest is extra for those who want. I don't benefit from a large selection of problems to prepare. I just feel overwhelmed by the workload and demotivated when I sometimes don't even get through half of them within a reasonable timeframe. If we weren't supposed to solve all of them, but rather make a selection ourselves, I just believe that it would have been easier if the teachers made the selection from the beginning.
The oral exam was very late so it affected my studying for my next courses a lot
Less course literature.
Other universities teach measure theory as a compulsory course of their math program. Since this makes up a great part of course MASA02 (which I believe is intended by the department to be taken simultaneously with MATB24) it makes sense to maybe introduce measure theory and some of its key theorems (i.e. dominated convergence, Fubini) in a course before MATB24 (possibly as a replacement of Algebrans Grunder) to maybe relieve some of the course's workload and introduce some concepts in a more rigid manner. One big problem of the course is that most of the course material is scattered over many different pdf documents and some contents are not covered at all in written materials which makes it hard to follow if one can not attend a class for some reason - specifically the coverage of the sequence space l^2 was very bad, it was not mentioned in Vredblad or Bridges and the proof of the completeness of l^2 provided as a pdf was messy. It was also bad that students were intended to buy expensive course literature that was only used for a short amount of time during the course. Introducing the course literature in a more organized manner will not only improve the understanding of students but will also help the lecturer in teaching the course. The 'compulsory project' consisting of presentations of problems during the exercise classes had a very negative effect on the seminars. a) this 'project' was introduced to the students too late in the course and b) it led to students unnecessarily presenting many 'easy' problems during the seminars so that they lost a lot of their value.
— Issues that I (and at least 2 others in each case) experienced: • The structure of the seminars rendered them almost useless (through no fault of the seminar-leader), yet they were made pseudo-mandatory.* • The exercises were often beyond the scope of the teaching, and 2/6 written exam questions concerned topics we didn't have time to cover well in class. • The oral exam was very poorly defined and administered: deceivingly vague advice was given for preparing ("study the general course content"), yet very specific, minor theorems were expected to be proved in explicit detail. Additionally, the examiner didn't pay attention during the process (opting to use his phone instead), and was interested in only the final results, rather than the explanation of the logic behind them.** — Details and suggestions *: The students were meant to present exercises one at a time during the seminar. This has the following problems: • In order to prepare for the seminar you would have to do the exercises before the lecture that shows you how to solve them. If you can already do this, what's the point of either the lecture or seminar? • If you don't solve the problems before learning how to solve them, you then you sit and watch other people writing the solutions. It's much more useful to do them yourself. • If you try to solve the exercises beforehand, but can't, then you don't have anyone around to get advice from. When you go to the seminar to ask or see the right way of doing things, you instead have to sit through endless solutions to problems that people could solve, instead. My suggestion is for the students to instead solve the exercises in the seminar, with the leader around to answer questions that crop up. This has none of the above issues, and, in my experience of other courses, leads to the most useful seminars I've attended. **: My suggestion here is that decent preparatory advice and description should be given, that the examiner should actually pay attention to the student during the exam, and that the oral exam should take one or a mix of the following forms: • A general discussion between student and examiner about the overall course content and its structure (what leads to what, why things work, what is the meaning of this or that, etc.); • A proof presentation chosen or selected from a known list of actually relevant results for the course.
I'd suggest maybe going systematically throughout all the homework exercises on the board in the seminars (or making a selection to work though beforehand if there's too many), with stress on the exercises students have questions about, because that might pedagogically suit the most number of students (both those who solved everything except those few exercises they have questions about and those who had a lot more trouble working through the homework). And of course, having that list of exercises going around class where we can mark which ones we want to present for the class is great, keep that! Maybe also give extra points to people who present on the board.

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

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No
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No, I haven't.