Course Analysis for NUMN20 Numerical Methods for Differential Equations, Autumn 2020

Lecturer: Tony Stillfjord
Teaching assistants: Julio Careaga, Måns Williamson, Carina Geldhauser, Vilmer Dahlberg
Number of students: 8 registered NF-students and 121 registered LTH students (course-code FMNN10)
Examination results:
3 students were registered for the ordinary written examination, but only one of them participated, and this student did not hand in a solution. Thus no students have passed the whole course at the time of this writing.
2 students have passed all three mandatory computer projects, and 2 more have completed two out of three.

Course evaluation

Summary of students answers:

Since this course is mainly a LTH course (FMNN10), the standardized LTH course evaluation system CEQ was meant to be used also for the NF students. However, due to a administrative mistake, it was only sent out to LTH students. For this reason, a separate survey was made available a few weeks later, which was open for only one week.

Out of 8 students, only one response was received. The answers in this response were in general very positive about all aspects of the course, but no real conclusions can be drawn from such a small sample size.

There were 50 responses to the CEQ survey, corresponding to 42% of the LTH students. The majority of these students are satisfied with the teaching, the contents of the course, and the examination. They also think that the course is very relevant to their study programme. They are not at all satisfied with the work load (too high).

Changes from the previous course realisation:

This instance of the course was given during the COVID-19 pandemic, which necessitated a switch to fully remote teaching. Both the lectures and the computer project help sessions were therefore given virtually via Zoom. The (live) lectures were in addition recorded and the (unedited) videos published on the Canvas course webpage. Due to already having Beamer slides for the lectures, this switch was not as drastic as in other courses, and the recorded videos were appreciated by the students.

The total amount of course material was decreased, mostly by streamlining the treatment of the finite element method. Several minor non-essential topics were also skipped as the course progressed, when it became apparent that the essential topics needed more time.

There was one extra lecture in the first week, and there was one extra teaching assistant.

In order to make the lectures more interactive, minor experiments that took advantage of the remote teaching style, such as Zoom quizzes, were tried.

Teacher's comments:

The complaints about too high workload unfortunately persist from the previous year, even though the amount of material was decreased. It seems to be mainly due to the computer projects, which many students spend more time on than might be desirable. Even though it was emphasized more clearly this year that both the theoretical and the practical parts are equally important, many students seem to miss the general picture and only focus on the next project deadline. This might be a problem mostly for the LTH students, and not the NF students; both the F and Pi students are taking other heavy courses in parallel, and there were several comments about outdated or insufficient programming skills. The NF students have more programming experience, in particular for numerical computations. They also (in general) do not seem to take similarly heavy courses in parallel. This is exemplified by the one survey response, which claimed that the workload was perfect with 20 hours per week spent on the course. Regardless, this is something which should be taken into account once more. See the next section for suggestions.

With regards to the remote teaching, the lectures seemed to work well, except for the lack of student feedback. With no student cameras on, it was difficult to judge whether something had been understood or not. As a result, much time was likely spent on over-explaining certain concepts. The attempt to get feedback via Zoom quizzes and similar did not work as well as hoped, both due to a lack of experience, a lack of attendance, and a lack of interest on the part of the students.

Being able to directly annotate on the Beamer slides also turned out to be both good and bad. Good, because the students mentioned they liked the handwritten extra explanations. Bad, because it was too easy to annotate; the threshold for picking up a chalk and moving to the blackboard to write something is much higher than moving the electronic pen (that is already in the hand) a few centimetres. This aggravated the over-explaining issue and led to a lack of time for other things.

Compared to last year, more time was nevertheless spent on helping explain how to tackle the study questions. Partially at the lectures, but mostly by discussions in the Canvas discussion forum. Due to the remote teaching, this was used more than normally, and completely replaced the normal after-lecture or in-the-break short question sessions. Several students mentioned in the CEQ survey that even though they did not post a question themselves, they still read the responses to those who did, and that this was very helpful. It did, however, require a lot of work, and this amount of interaction is not sustainable in the long run.

The main reason for the many questions in the forum is because there are no

published solutions to the study questions. This is and has been a pedagogical choice, which is still relevant. However, during the course, many hints and partial solutions were posted in the forum and were thus made available to all the students anyway. These questions provide an idea of what the students thought most difficult, so they should be reviewed in order to improve the lectures. The answers should also be reviewed and could be compiled into a document that can be made available some time after the study questions.

The remote help sessions for the computer project worked somewhat less well than the lectures. This seems to be mostly because of the extra communication delays, when the teaching assistants had to ask the students to e.g. scroll in a file or share a different window. Such delays occur also in non-remote sessions, but to a lesser extent, probably due to more obvious body language. It was also an issue that two of the assistants were completely new to the course and needed more time to find causes of problems that might be obvious to those who had done the job before. This cancelled out most of the benefit of the extra teaching assistant.

Finally, it is unclear why such a low percentage (0) of the NF students passed so far, while a higher than usual number of LTH students passed the course on the first try. It seems to be a combination of several NF students (about 50%) being registered but not actually following the course (indicated by 0 finished projects) and not registering or showing up for the exam. The latter might be due to feeling uncomfortable with the virtual examination. If so, this will hopefully be solved before the next instance of the course.

Suggestions for the next course realisation:

Until next year, the structure of the three computer projects should be reviewed, because the main work-load complaint concerns too extensive projects. Conversations with some students indicate that it is not the writing of the reports which is most time-consuming, but the actual programming. For this reason, it should be investigated if the number of tasks might be decreased without sacrificing what makes them so educational.

An attempt should also be made to arrange a review session of important Matlab/Python programming concepts and typical programming structures. Both this and last year, the first help session was very sparsely populated, so this should be repurposed to give the students a better starting point.

Finally, better instructions for the teaching assistants should be provided, including lists of common problems and things to be aware of.

Course leader, date

Tony Stillfjord, 8 March 2021.

I have studied this course as part of

I have studied this course as part of	Number of Responses
Bachelor´s Programme in Mathematics	0 (0.0%)
Bachelor´s Programme in Physics, Theoretical Physics, Astronomy	0 (0.0%)
Bachelor´s Programme, other specialization	0 (0.0%)
Master's Programme in Mathematics	1 (100.0%)
Master´s Programme in Mathematical Statistics	0 (0.0%)
Master´s Programme, other specialization	0 (0.0%)
other programme or as stand alone course	0 (0.0%)
Total	1 (100.0%)
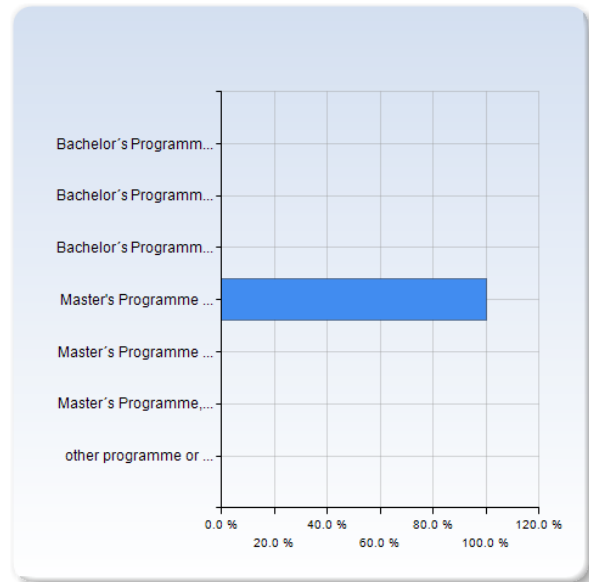
	Mean	Standard Deviation
I have studied this course as part of	4.0	0.0

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	0 (0.0%)
4	0 (0.0%)
5	1 (100.0%)
Total	1 (100.0%)

	Mean	Standard Deviation
2. My prior knowledge has been sufficient to assimilate the contents of this course.	5.0	0.0

3. I have participated actively in the course.

3. I have participated actively in the course.	Number of Responses
1	0 (0.0%)
2	0 (0.0%)
3	0 (0.0%)
4	0 (0.0%)
5	1 (100.0%)
Total	1 (100.0%)
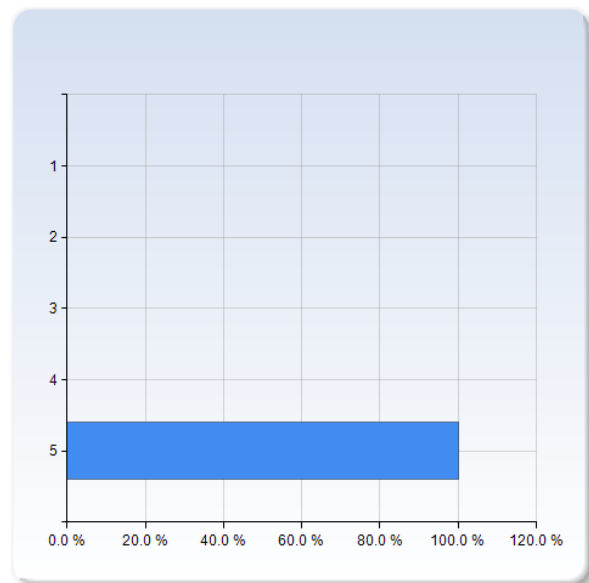
	Mean	Standard Deviation
3. I have participated actively in the course.	5.0	0.0

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
16	0 (0.0%)
17	0 (0.0%)
18	0 (0.0%)
19	0 (0.0%)
20	1 (100.0%)
21	0 (0.0%)
22	0 (0.0%)
23	0 (0.0%)
24	0 (0.0%)
25	0 (0.0%)
Total	1 (100.0%)
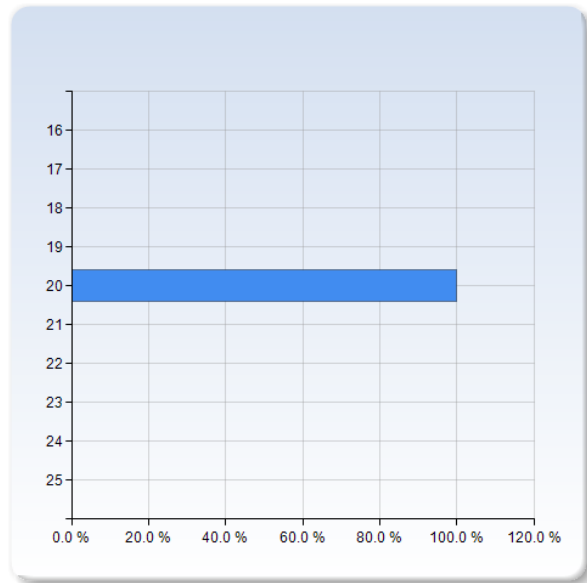
	Mean	Standard Deviation
Average number of hours spent in total on the course per week (including scheduled activities):	20.0	0.0

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

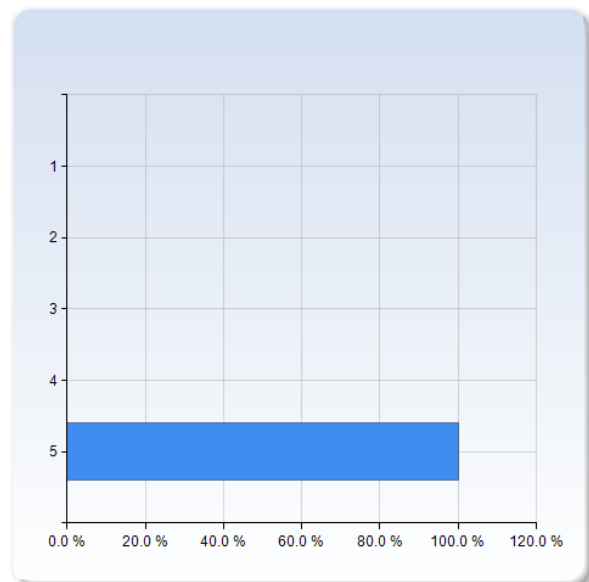**The way the course was taught and organised suited me.**

The way the course was taught and organised suited me.	Number of Responses
1	0 (0.0%)
2	0 (0.0%)
3	0 (0.0%)
4	0 (0.0%)
5	1 (100.0%)
Total	1 (100.0%)
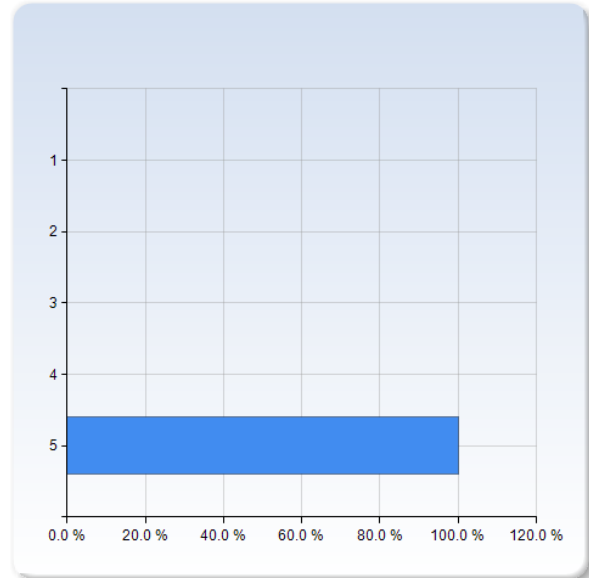
	Mean	Standard Deviation
The way the course was taught and organised suited me.	5.0	0.0

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

The number of teacher lead activities (lectures, computer exercises etc.) has been satisfactory.	Number of Responses
1	0 (0.0%)
2	0 (0.0%)
3	0 (0.0%)
4	0 (0.0%)
5	1 (100.0%)
Total	1 (100.0%)

	Mean	Standard Deviation
The number of teacher lead activities (lectures, computer exercises etc.) has been satisfactory.	5.0	0.0

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	0 (0.0%)
5	1 (100.0%)
Total	1 (100.0%)
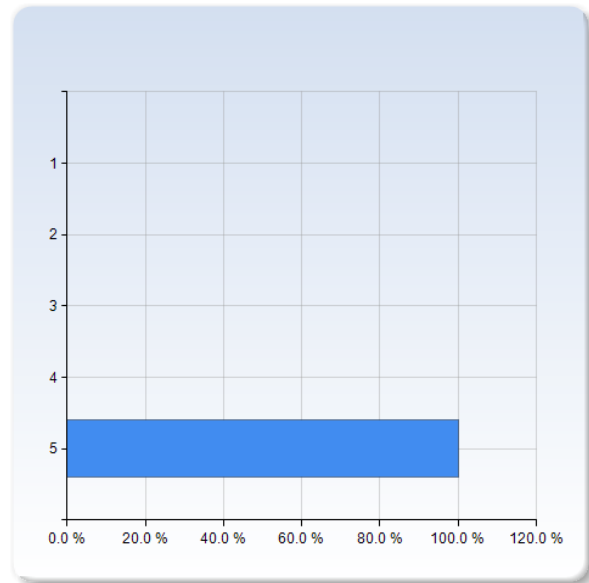
	Mean	Standard Deviation
The lectures were valuable for my learning.	5.0	0.0

The computer exercises were valuable for my learning.

The computer exercises were valuable for my learning.	Number of Responses
1	0 (0.0%)
2	0 (0.0%)
3	0 (0.0%)
4	1 (100.0%)
5	0 (0.0%)
Total	1 (100.0%)
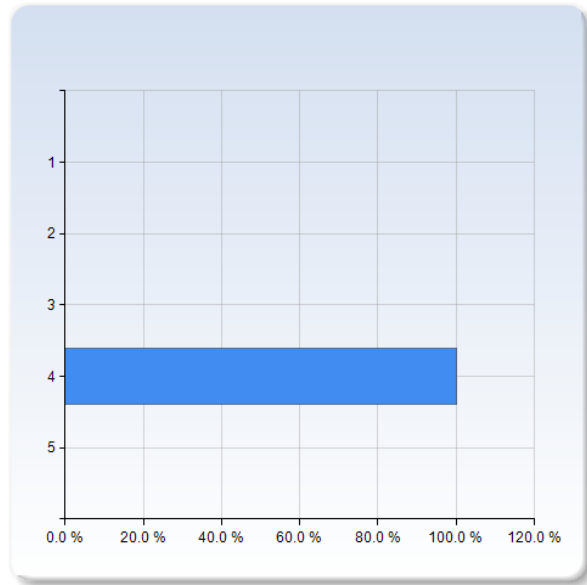
	Mean	Standard Deviation
The computer exercises were valuable for my learning.	4.0	0.0

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	0 (0.0%)
5	1 (100.0%)
Total	1 (100.0%)
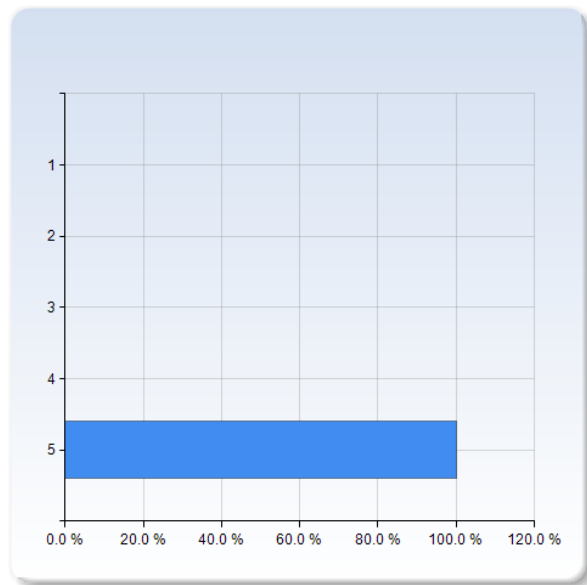
	Mean	Standard Deviation
Studying on my own was valuable for my learning.	5.0	0.0

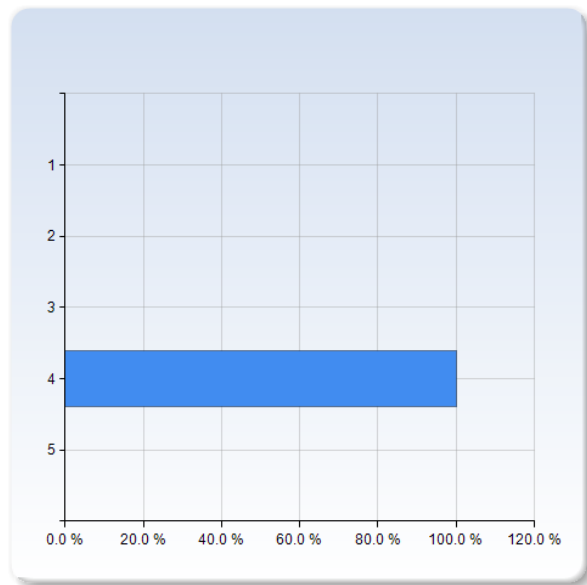## The course literature/material was a valuable learning resource.

The course literature/material was a valuable learning resource.	Number of Responses
1	0 (0.0%)
2	0 (0.0%)
3	0 (0.0%)
4	0 (0.0%)
5	1 (100.0%)
Total	1 (100.0%)
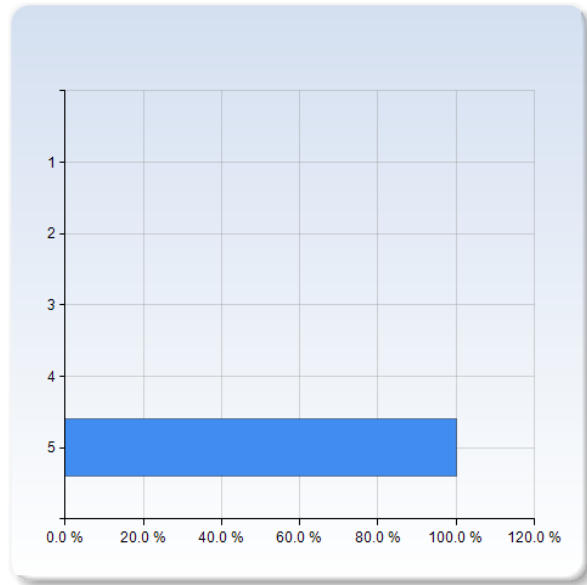
	Mean	Standard Deviation
The course literature/material was a valuable learning resource.	5.0	0.0

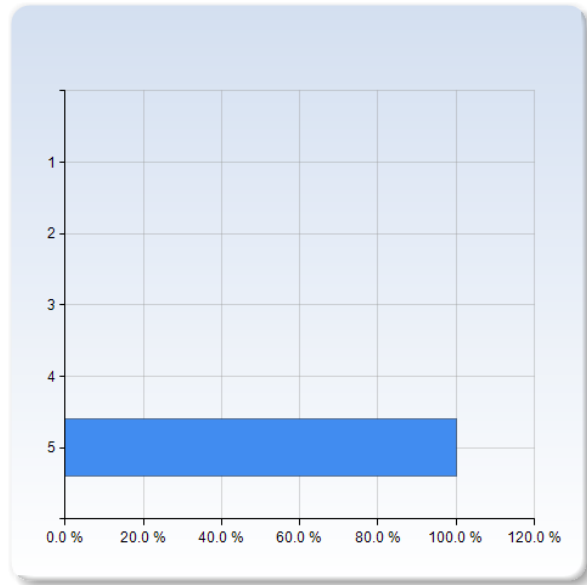## The information I received before the course start was satisfactory.

The information I received before the course start was satisfactory.	Number of Responses
1	0 (0.0%)
2	0 (0.0%)
3	0 (0.0%)
4	1 (100.0%)
5	0 (0.0%)
Total	1 (100.0%)

	Mean	Standard Deviation
The information I received before the course start was satisfactory.	4.0	0.0

## 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	0 (0.0%)
4	0 (0.0%)
5	1 (100.0%)
Total	1 (100.0%)

	Mean	Standard Deviation
The communication with the teaching staff during the course was good.	5.0	0.0

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

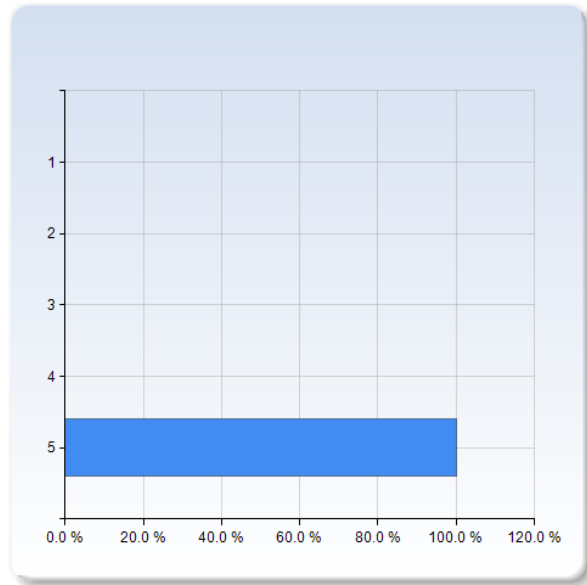| It was clear throughout the course what was expected of me.	Number of Responses
1	0 (0.0%)
2	0 (0.0%)
3	0 (0.0%)
4	0 (0.0%)
5	0 (0.0%)
Total	0 (0.0%)
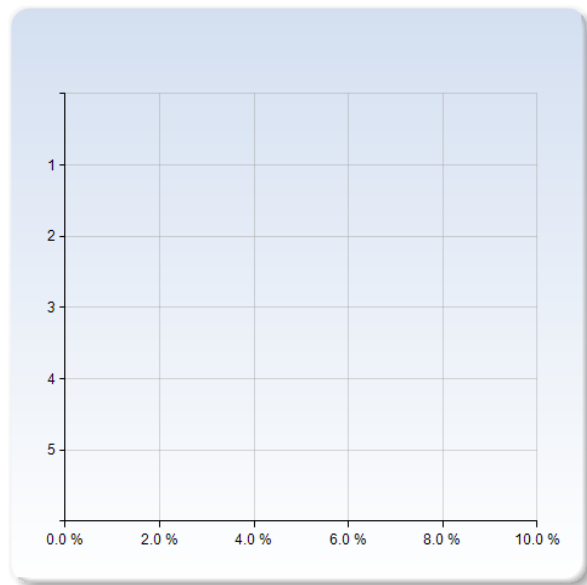
	Mean	Standard Deviation
It was clear throughout the course what was expected of me.	0.0	0.0

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	0 (0.0%)
2	0 (0.0%)
3	0 (0.0%)
4	0 (0.0%)
5	1 (100.0%)
Total	1 (100.0%)

	Mean	Standard Deviation
I have received valuable feedback from my teacher/teachers during the course.	5.0	0.0

The course had a reasonable workload.

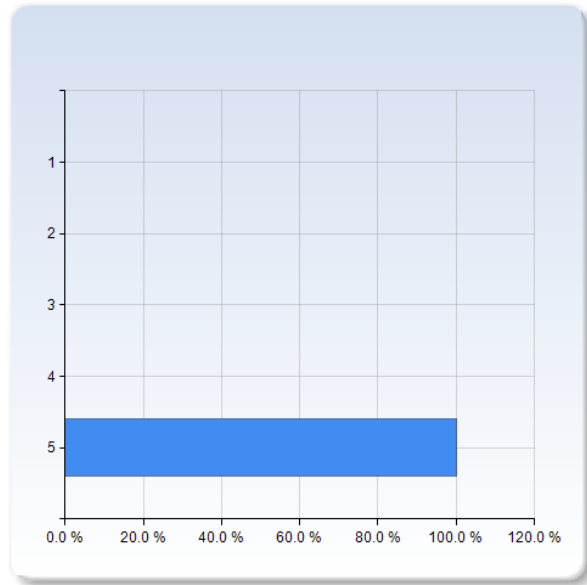| The course had a reasonable workload.	Number of Responses
1	0 (0.0%)
2	0 (0.0%)
3	0 (0.0%)
4	0 (0.0%)
5	1 (100.0%)
Total	1 (100.0%)
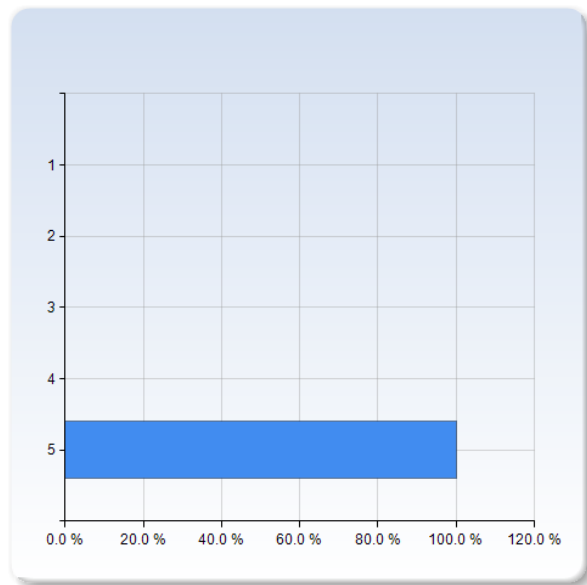
	Mean	Standard Deviation
The course had a reasonable workload.	5.0	0.0

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	0 (0.0%)
4	0 (0.0%)
5	1 (100.0%)
Total	1 (100.0%)

	Mean	Standard Deviation
The workload was evenly distributed throughout the course.	5.0	0.0

The examination matched the contents and level of the course.

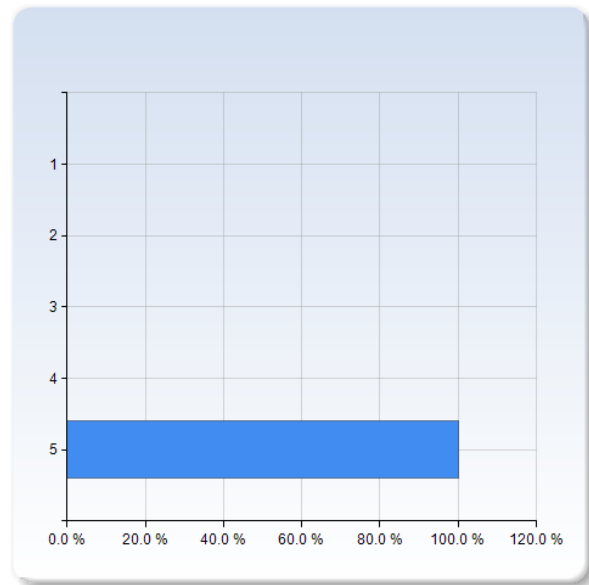| The examination matched the contents and level of the course.	Number of Responses
1	0 (0.0%)
2	0 (0.0%)
3	0 (0.0%)
4	1 (100.0%)
5	0 (0.0%)
Total	1 (100.0%)
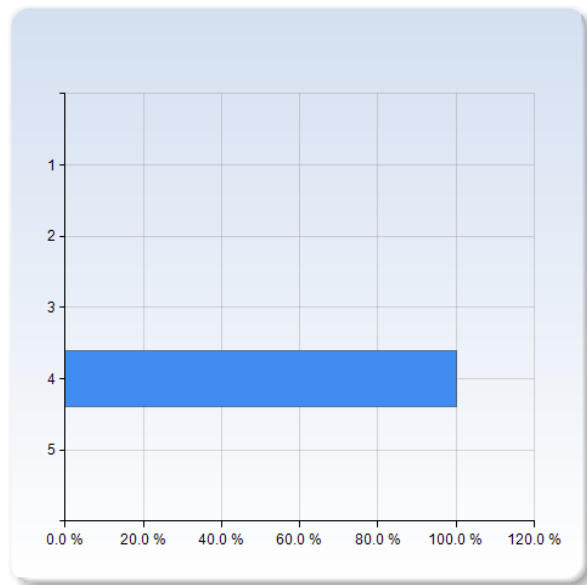
	Mean	Standard Deviation
The examination matched the contents and level of the course.	4.0	0.0

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	0 (0.0%)
4	0 (0.0%)
5	1 (100.0%)
Total	1 (100.0%)

	Mean	Standard Deviation
Overall, I am satisfied with the course.	5.0	0.0

Online study environment

To avoid the spread of Covid-19 all teaching activities have been held online. On a scale 1-5 select the option that best matches your opinion: 1= disagree completely → 3= partly agree → 5= agree completely

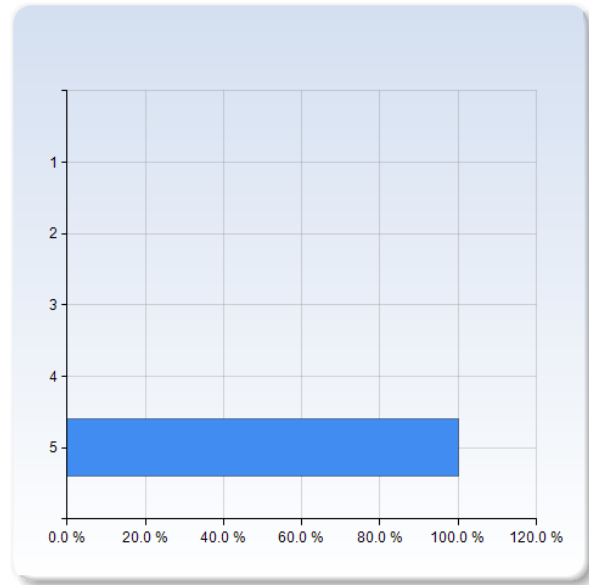**Following the lectures via Zoom worked fine for me.**

Following the lectures via Zoom worked fine for me.	Number of Responses
1	0 (0.0%)
2	0 (0.0%)
3	0 (0.0%)
4	0 (0.0%)
5	1 (100.0%)
Total	1 (100.0%)
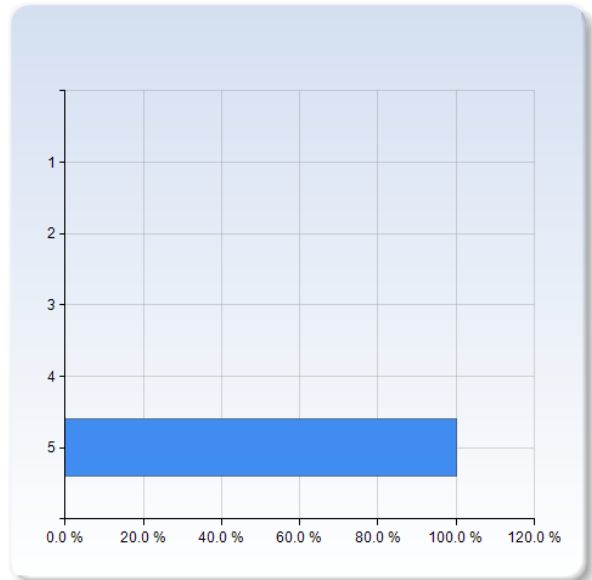
	Mean	Standard Deviation
Following the lectures via Zoom worked fine for me.	5.0	0.0

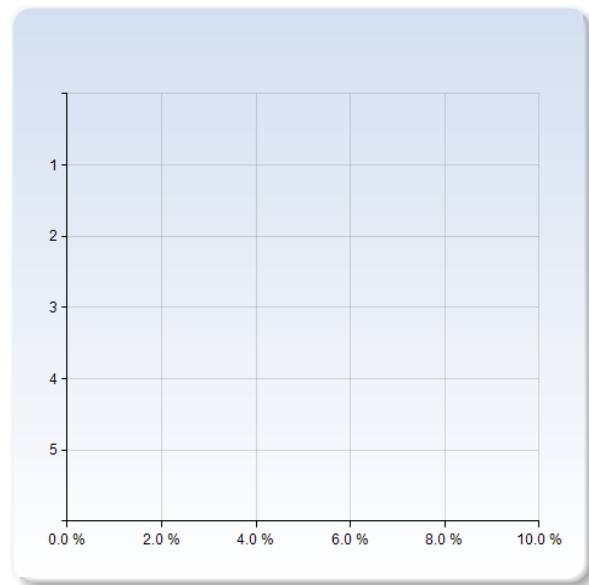## Receiving help at the computer exercises via Zoom worked fine for me.

Receiving help at the computer exercises via Zoom worked fine for me.	Number of Responses
1	0 (0.0%)
2	0 (0.0%)
3	0 (0.0%)
4	0 (0.0%)
5	1 (100.0%)
Total	1 (100.0%)

	Mean	Standard Deviation
Receiving help at the computer exercises via Zoom worked fine for me.	5.0	0.0

Participating in the written examination via Zoom worked fine for me.

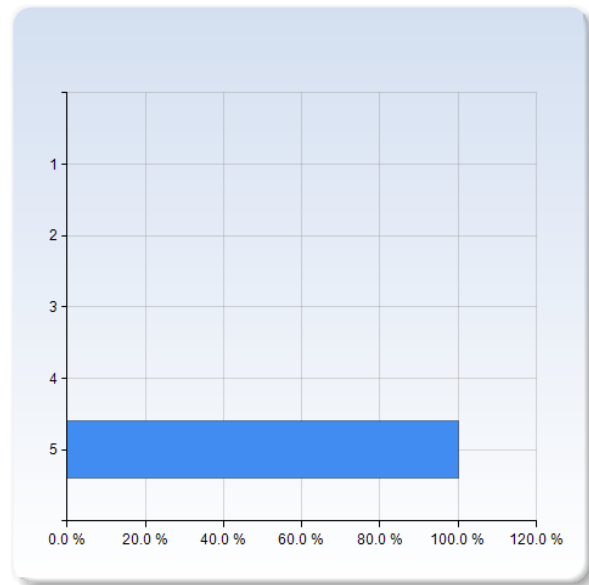| Participating in the written examination via Zoom worked fine for me.	Number of Responses
1	0 (0.0%)
2	0 (0.0%)
3	0 (0.0%)
4	0 (0.0%)
5	0 (0.0%)
Total	0 (0.0%)

	Mean	Standard Deviation
Participating in the written examination via Zoom worked fine for me.	0.0	0.0

## Collaborating with the other students in my project group worked well.

Collaborating with the other students in my project group worked well.	Number of Responses
1	0 (0.0%)
2	0 (0.0%)
3	0 (0.0%)
4	0 (0.0%)
5	1 (100.0%)
Total	1 (100.0%)

	Mean	Standard Deviation
Collaborating with the other students in my project group worked well.	5.0	0.0

Online teaching has had a negative impact on my studies.

Online teaching has had a negative impact on my studies.	Number of Responses
1	1 (100.0%)
2	0 (0.0%)
3	0 (0.0%)
4	0 (0.0%)
5	0 (0.0%)
Total	1 (100.0%)
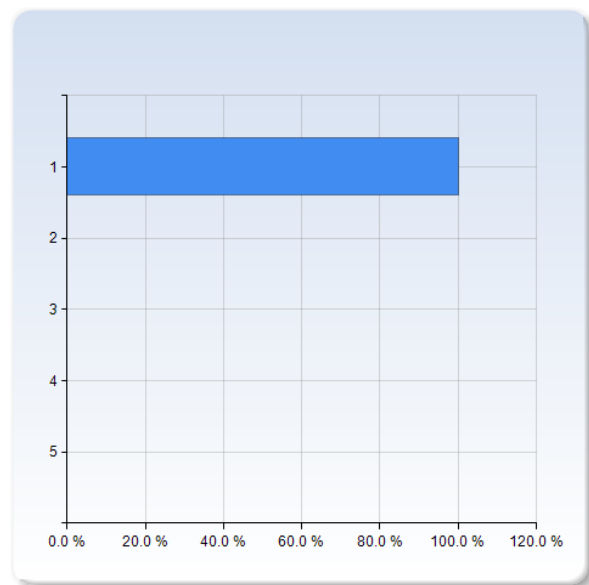
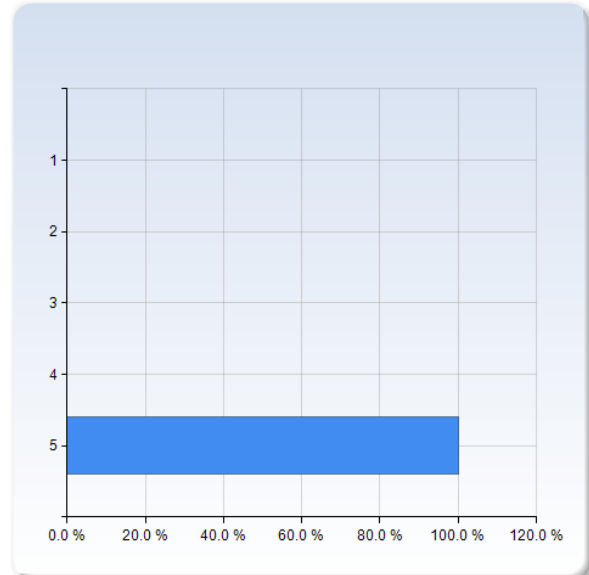|	Mean	Standard Deviation
Online teaching has had a negative impact on my studies.	1.0	0.0

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
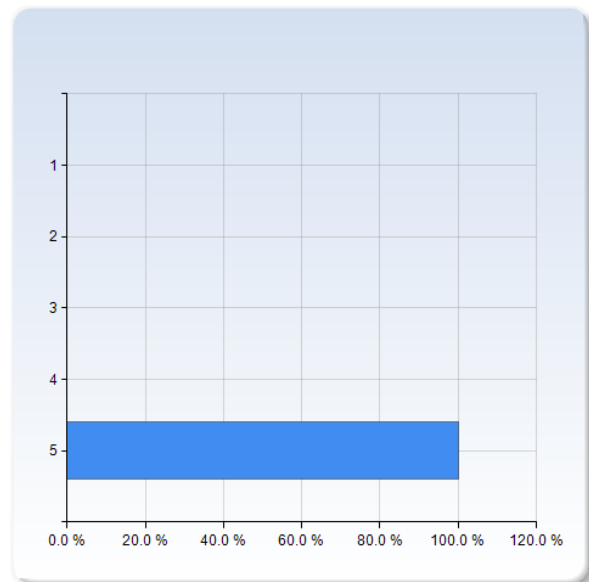### The course has increased my ability to read a mathematical text.

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

	Mean	Standard Deviation
The course has increased my ability to read a mathematical text.	5.0	0.0

The course has increased my ability to communicate the subject in writing.
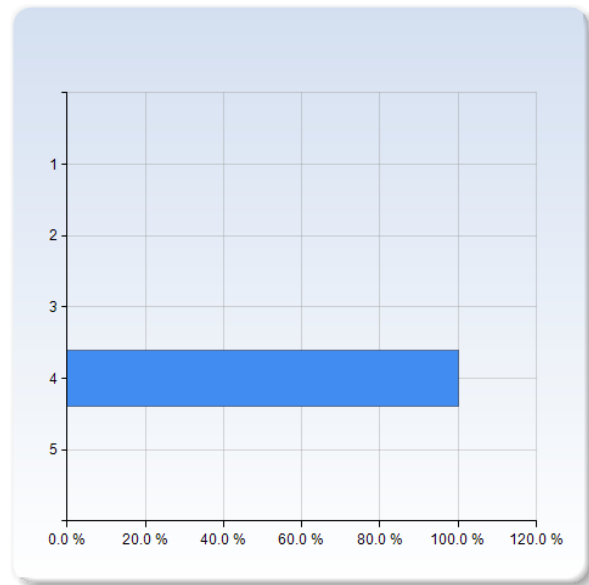
The course has increased my ability to communicate the subject in writing.	Number of Responses
1	0 (0.0%)
2	0 (0.0%)
3	0 (0.0%)
4	0 (0.0%)
5	1 (100.0%)
Total	1 (100.0%)

	Mean	Standard Deviation
The course has increased my ability to communicate the subject in writing.	5.0	0.0

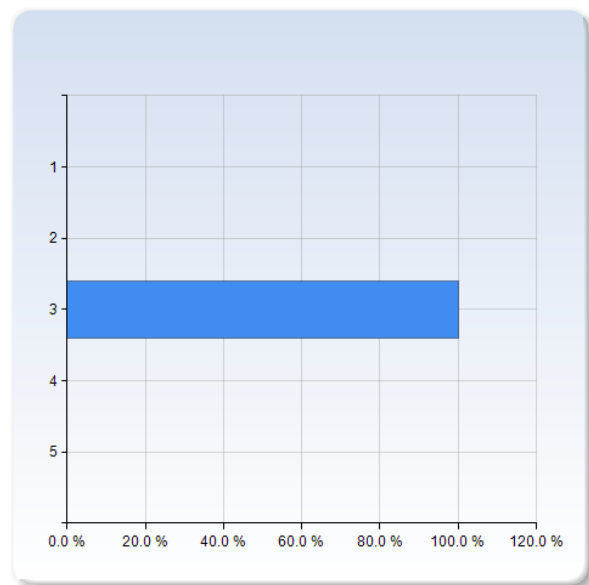## The course has increased my ability to communicate the subject orally.

The course has increased my ability to communicate the subject orally.	Number of Responses
1	0 (0.0%)
2	0 (0.0%)
3	0 (0.0%)
4	1 (100.0%)
5	0 (0.0%)
Total	1 (100.0%)

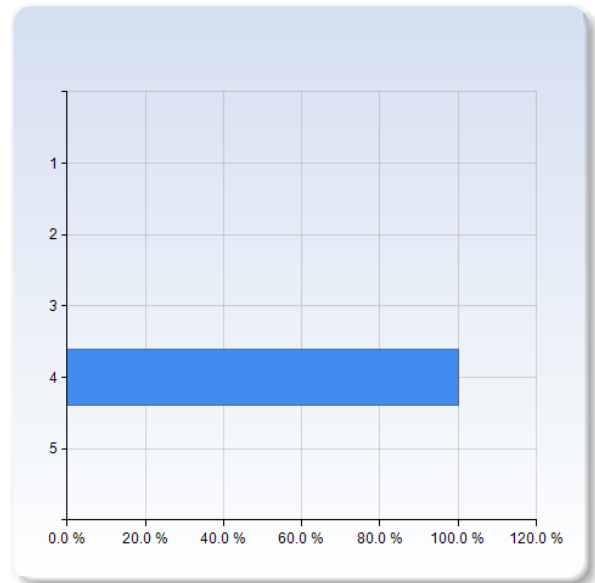|	Mean	Standard Deviation
The course has increased my ability to communicate the subject orally.	4.0	0.0

The course has increased my ability to cooperate.

The course has increased my ability to cooperate.	Number of Responses
1	0 (0.0%)
2	0 (0.0%)
3	1 (100.0%)
4	0 (0.0%)
5	0 (0.0%)
Total	1 (100.0%)

	Mean	Standard Deviation
The course has increased my ability to cooperate.	3.0	0.0

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

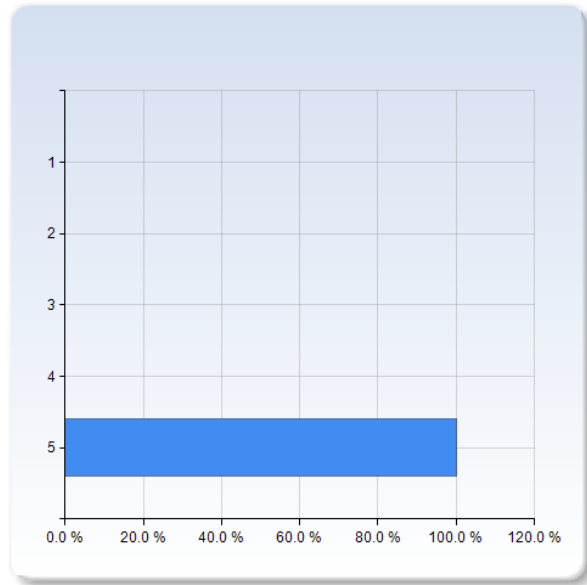| The course has increased my ability to search and process information.	Number of Responses
1	0 (0.0%)
2	0 (0.0%)
3	0 (0.0%)
4	1 (100.0%)
5	0 (0.0%)
Total	1 (100.0%)

	Mean	Standard Deviation
The course has increased my ability to search and process information.	4.0	0.0

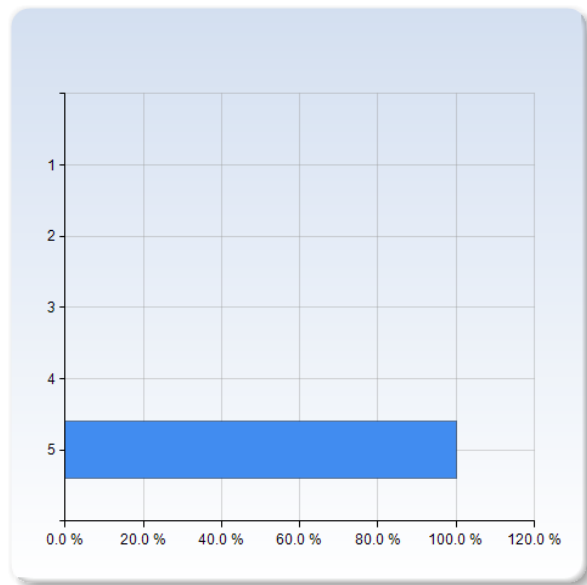## The course has increased my ability to analyze and solve problems.

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

	Mean	Standard Deviation
The course has increased my ability to analyze and solve problems.	5.0	0.0

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	0 (0.0%)
4	0 (0.0%)
5	1 (100.0%)
Total	1 (100.0%)

	Mean	Standard Deviation
As a result of this course, I feel confident about tackling unfamiliar problems.	5.0	0.0