Course Analysis

IS1200
Computer Hardware Engineering
(Datorteknik, grundkurs)

Quantitative Data
- **Course code:** IS1200
- **Year:** Spring 2016 (Periods 1)
- **Credits:** 7.5 hp
- **Main programs:** CINTE, TIDAB, TIEDB, TCOMK
- **Examiner:** David Broman
- **Course responsible:** David Broman
- **Responsible for lectures:** David Broman
- **Number of students (in Daisy):** 269 course registered in Daisy
- **Number of participants at the exam:** 218 (may include retake exam students)
- **Students that passed the first exam:** 110 (50%)[1]
- **Students that have finished all parts of the course: see LADOK.**

Course Summary
The course teaches the fundamentals of computer organization that includes both software and hardware. The course is divided into 5 modules:
- C and Assembly Programming
- I/O Systems
- Processor Design
- Memory Hierarchy
- Parallel Processors and Programs

The course is divided into 2 LADOK parts:
1. Labs and home labs (4.5 hp)
2. Written Exam (3hp)

There are in total 12 lectures, 4 exercise sessions, 4 seminars, 4 laboratory exercises, and one mini project. The course ends with a 5 hour written exam.

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[1] The students that were registered and reported to LADOK according to the time of the report (April 28, 2016). 19 students received FX, which means that the number of students that pass the exam can increase if the FX students receive a pass grade. This number may also include students taking the exam as a retake exam.

Course Evaluation Methods

The course was evaluated in three ways:

- We performed a Muddy Cards evaluation in the middle of the course, where the students could on a voluntary basis answer anonymously on a sheet of paper what they thought was good with the course and what they thought should improved. The teacher then collected the information and gave feedback on the response at one of the following lectures.

- We formed a course evaluation group (kursnämnd) that consists of students and the examiner. One meeting was held in the middle of the course and another after the course.

- Course questionnaire using the KTH Social system. The course evaluation was performed after the course. The system sent out the questionnaire to 229 students. The answering frequency was 33%.

Changes from Previous Year

In the spring 2015, this course got a new examiner: David Broman. The last time the course was given was in the spring 2015. The major changes of the course this year, compared to previous years, are the following:

- The course got completely new labs. Students in groups of two can borrow ChipKIT embedded boards and bring them home during the course.
- A new mini project where one or two students create a small project in C. Students chose the project topic on their own.
- New concept of seminars where students can get bonus points to the exam. The purpose of the seminars is to train the student on the more theoretical aspects of the course and prepare them for the written exam. The seminars are optional.

Feedback from Students

The following section summarizes the most essential feedback that was received from the Muddy cards, the course evaluation group (kursnämnd), and via the course questionnaire form. The figures are taken from the web-based course evaluation.

Lectures and Organization

The majority of the students express that they liked the course very much. Most students stated that they liked the lectures and the structure of the slides etc. Some students even expressed that this was the best course that they have ever taken, compared both to other courses at KTH and compared to courses that they have taken at other universities. Considering the following figure, it shows that most students, with a few exceptions, understood the main concepts thought by the teachers.
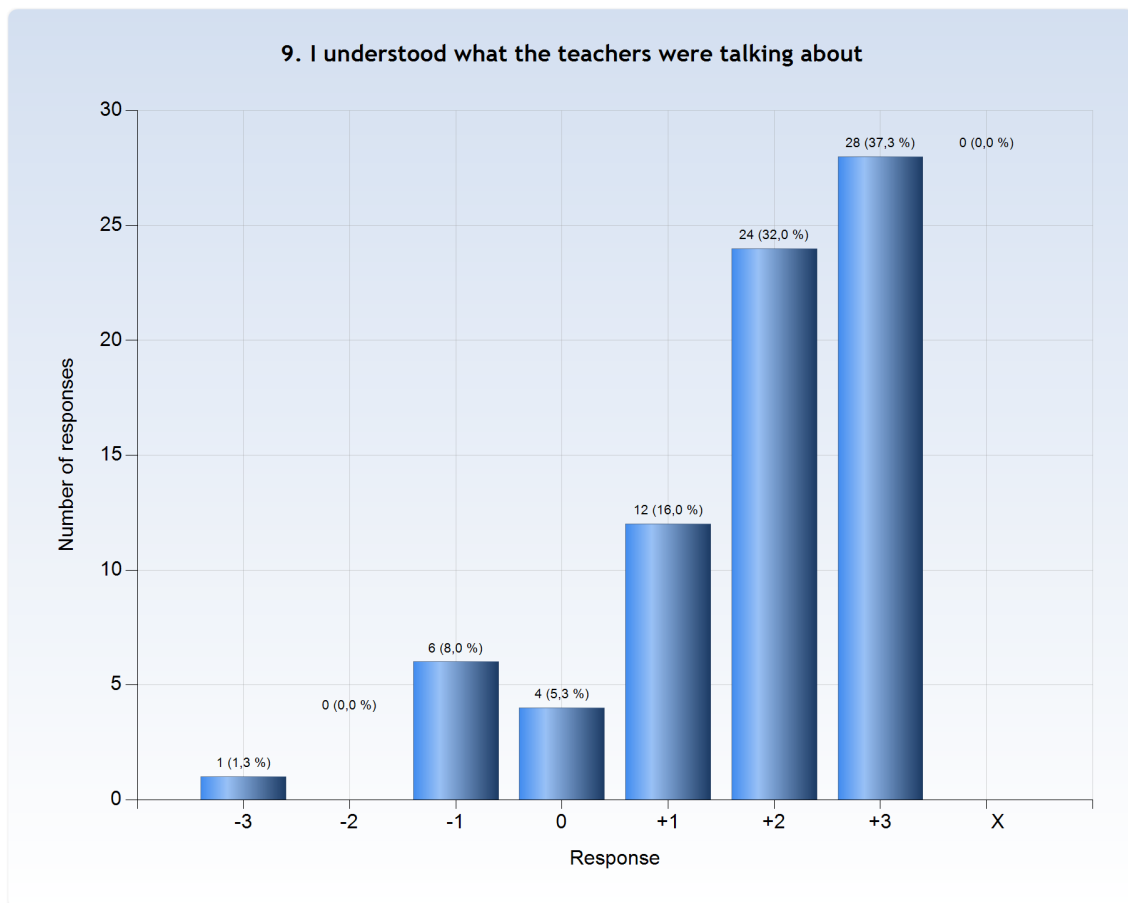
In general, many students express that they like the setup of the course and that it was well organized.

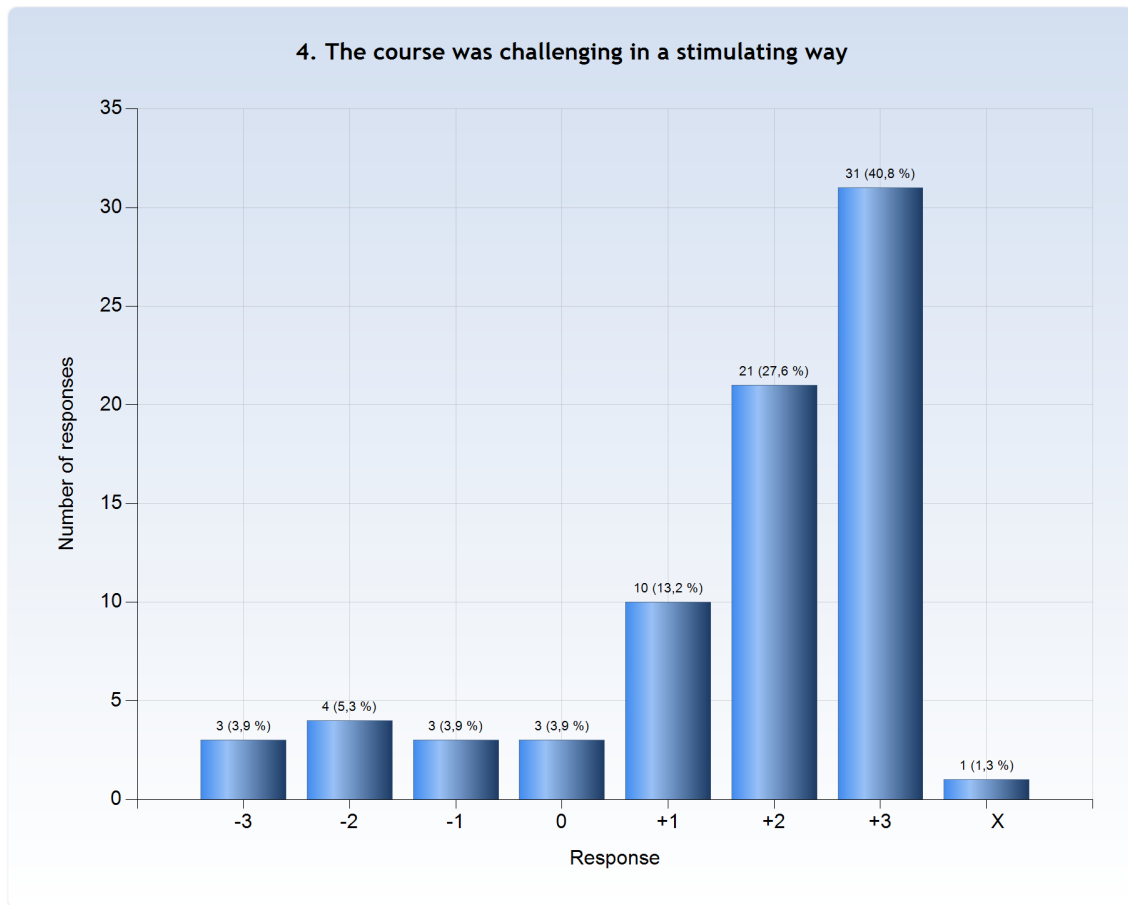**8. I understood how the course was organized and what I was expected to do**
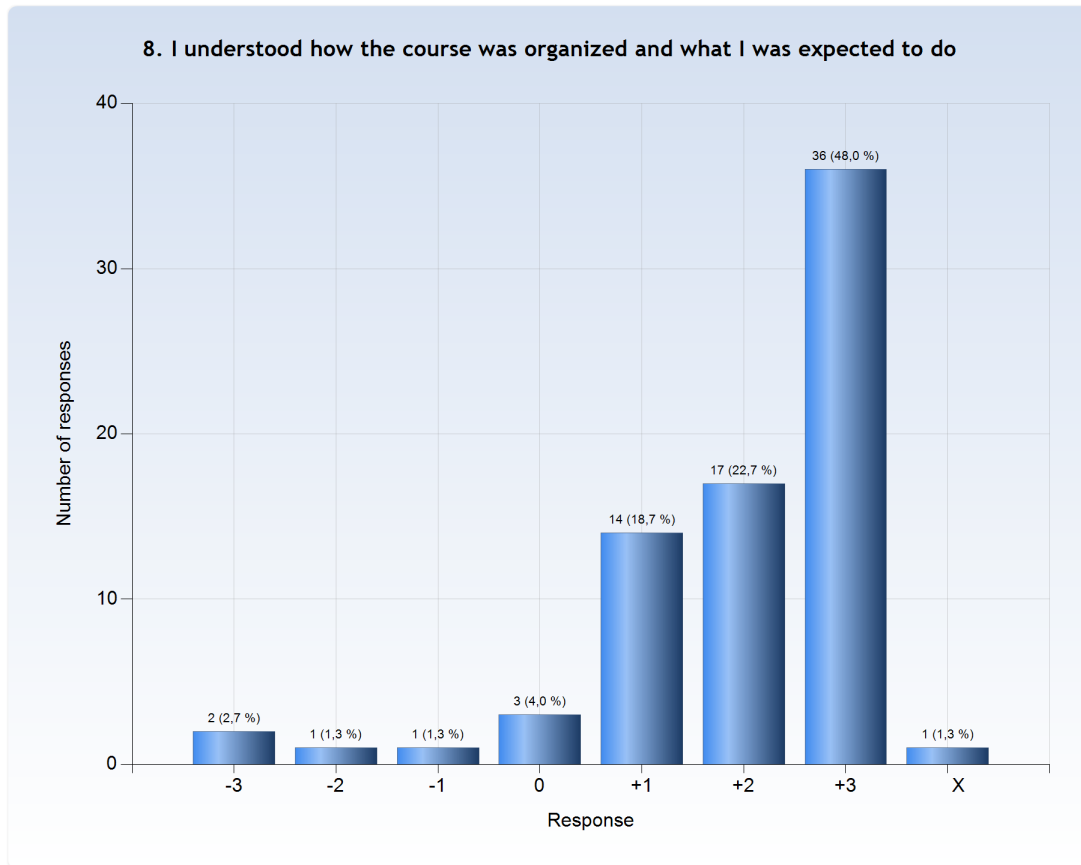
Some students especially stated that they liked how the course was divided into parts. The main criticism of the course is the workload. Some students thought that the course should give more credits. Note, however, that we do not really get the same feedback from IS1500 students that take this course in their second year. Another difference is that they take this course over 2 periods, which is not possible in Kista. Another comment concerned the fact that the course material is in English and not in Swedish. The reason for this is that the course is taught both in Swedish and in English and that is not practically feasible to have consistent material in both English and Swedish.

Several students also thought that they did not have enough background knowledge to take the course.

17. My background knowledge was sufficient to follow the course
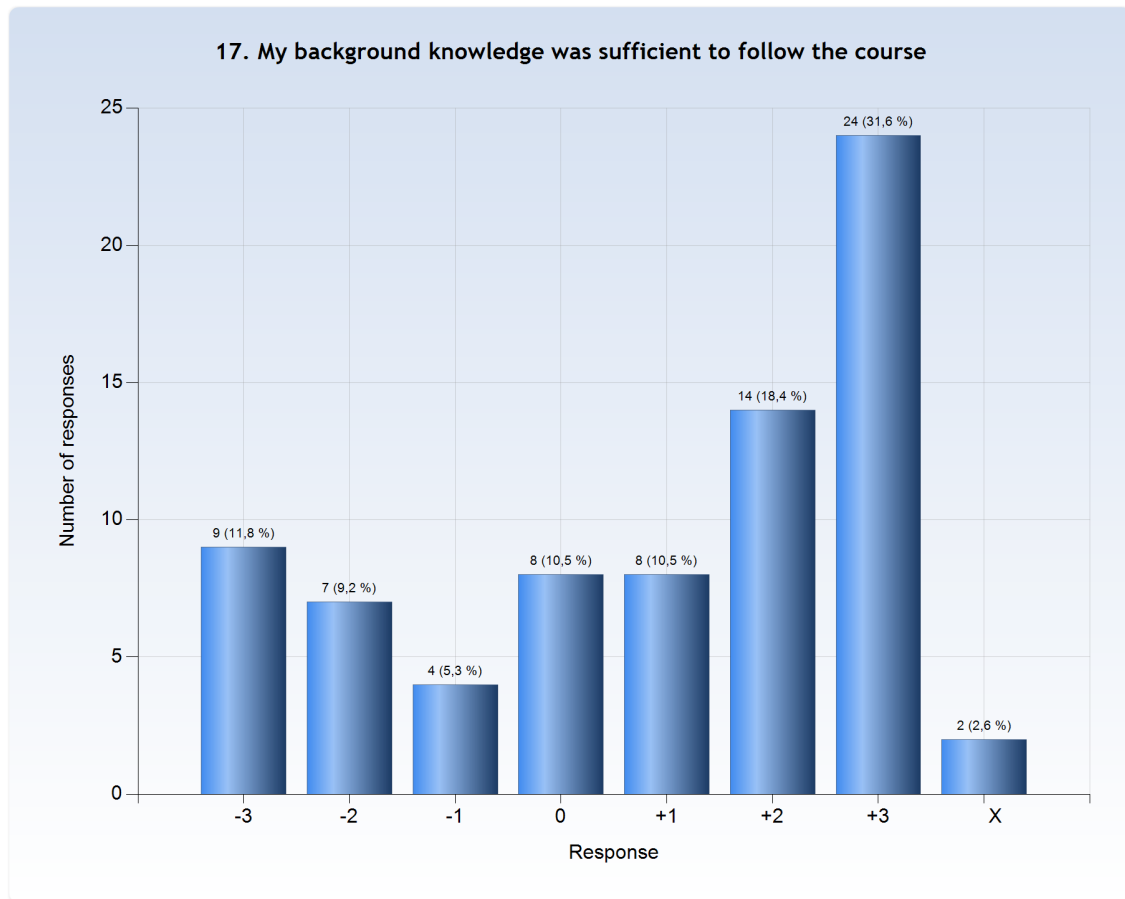
As can be seen from the figure above, most student thought that they did have enough background knowledge, but quite a lot of students did not think so. A problem is that this course is given the second semester in the first year and that the course requires that the students have basic programming knowledge and knowledge of how to use a computer. The course might benefit of being given in the second year instead of the first year. This is something that needs to be discussed with the program responsible of each program.

Despite the fact that many students found that the course requires a lot of work, most students found that the course was challenging in a stimulating way.

4. The course was challenging in a stimulating way

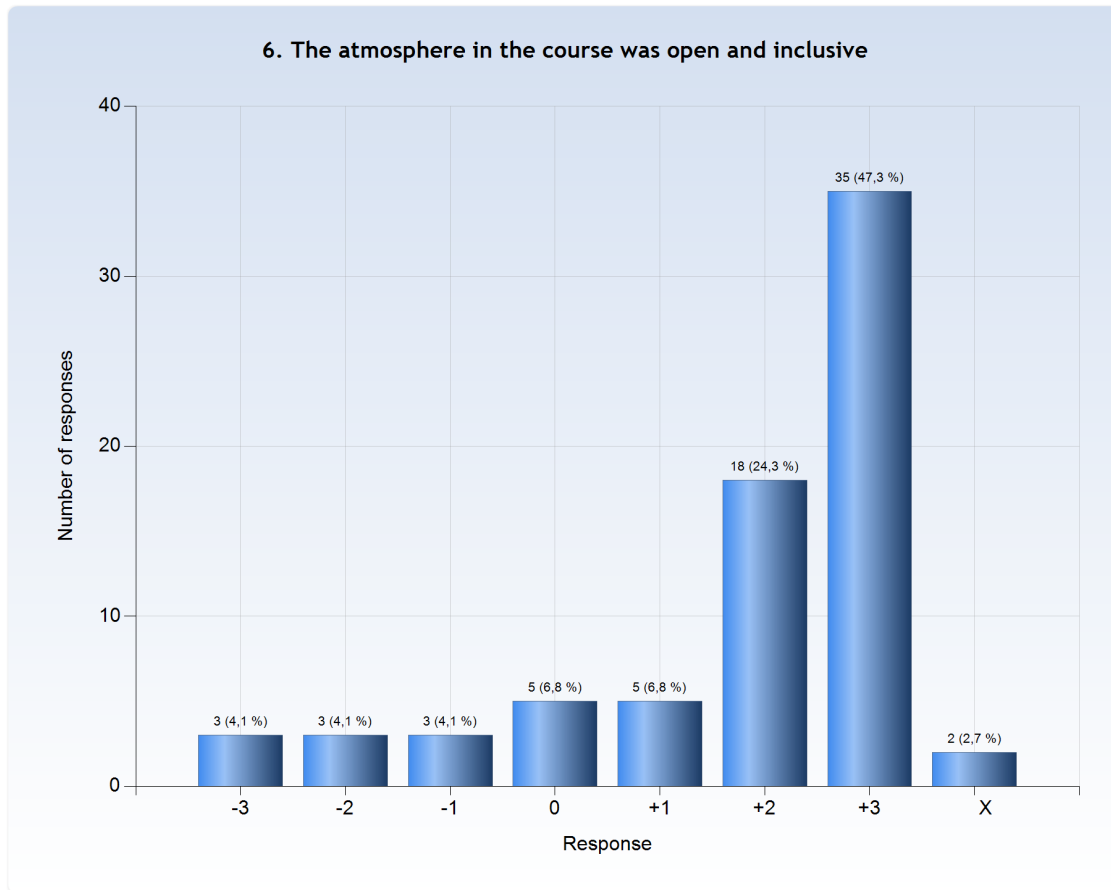| Response	Number of responses
-3	3 (3,9 %)
-2	4 (5,3 %)
-1	3 (3,9 %)
0	3 (3,9 %)
+1	10 (13,2 %)
+2	21 (27,6 %)
+3	31 (40,8 %)
X	1 (1,3 %)

Exercises and Seminars

Several students expressed explicitly that the seminars were good. At the exam, there is clear correlation between the students that passes the exam and the students that have done the optional seminar exercise. Some students want more lectures, which is unfortunately hard to accomplish with the limited resources we have for the course.

Labs

Many students state that the labs were good and that they learned a lot. At the same time, some students complain that the labs were too hard and difficult. We believe that the labs are very important for the students to learn the fundamentals and to get a practical understanding of how things work.

Most students found that the course was inclusive and had a good atmosphere.

6. The atmosphere in the course was open and inclusive

Number of responses

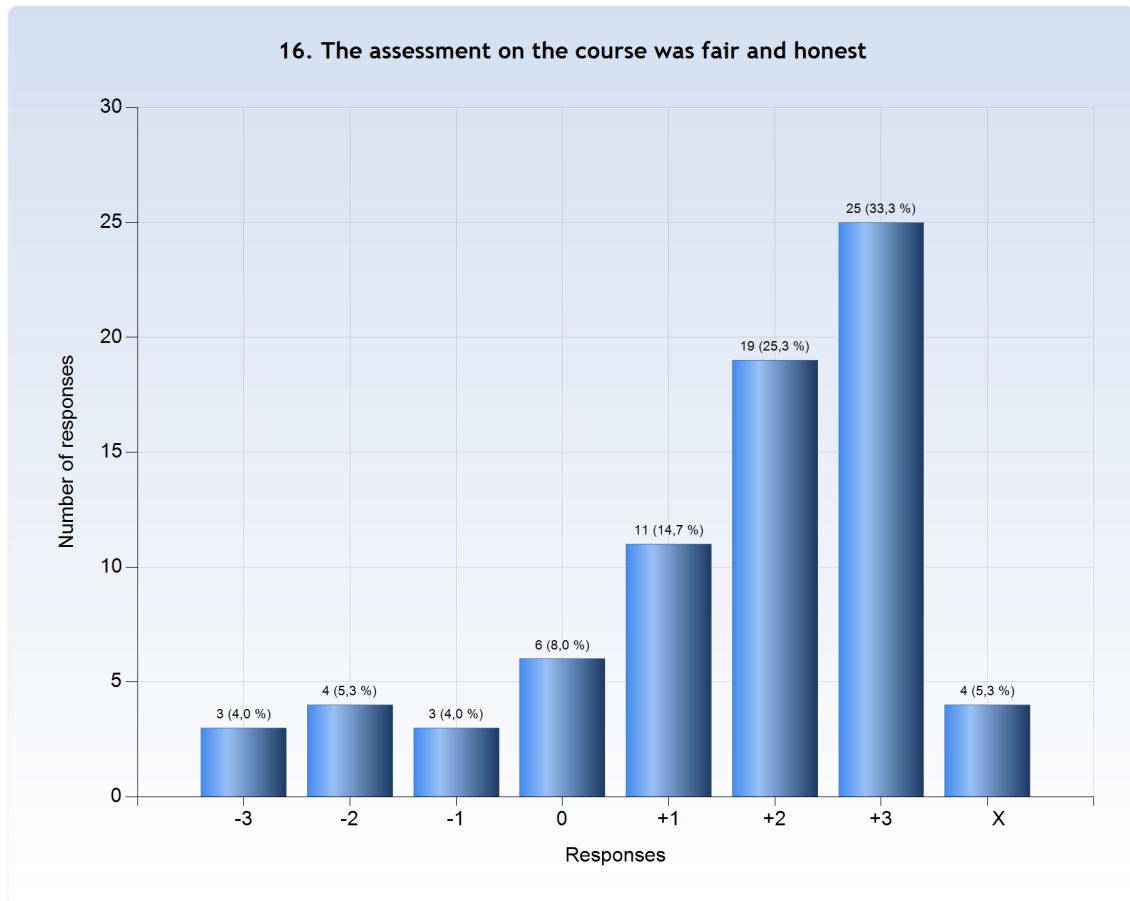| Response	Count
-3	3 (4,1 %)
-2	3 (4,1 %)
-1	3 (4,1 %)
0	5 (6,8 %)
+1	5 (6,8 %)
+2	18 (24,3 %)
+3	35 (47,3 %)
X	2 (2,7 %)

There were a few complaints about how the examination of the labs was done and also how some students were approached by the assistants. We taking this very seriously and we are trying to make the situation better next year.

Mini Project
Most students were very positive about the project, especially after that they have finished the project. In particular, students express that they liked the freedom to be able to choose their own project. On the other hand, some students remarked that it was hard to understand what was expected from them and what can be counted as a "valid project" or what was the requirements for an advanced project. We understand these comments and will try to improve the descriptions of the requirements for next year.

Examination

In general, most students were satisfied with the assessment and the examination.

16. The assessment on the course was fair and honest

Number of responses

| Response	Count
-3	3 (4,0 %)
-2	4 (5,3 %)
-1	3 (4,0 %)
0	6 (8,0 %)
+1	11 (14,7 %)
+2	19 (25,3 %)
+3	25 (33,3 %)
X	4 (5,3 %)

Responses

Some students said that some assistants were harder than others at the labs. There were only a few comments about the written exam. Some students would prefer more technical questions at the advanced part of the exam. We will try to make it clearer that the advanced part of the exam tests the students ability to analyze, discuss and construct solutions, not just to answer closed questions and to solve small problems.

Course Literature

We did not receive many comments about the course literature.

Learning Experience Questionnaire (LEQ)

The LEQ graphs shown below are part of the web-based course evaluation system. The first graph shows the results for 2016 and the smaller graph at the bottom shows the results for 2015 (English edition to the left and Swedish edition to the right).

Average response to LEQ statements - all respondents
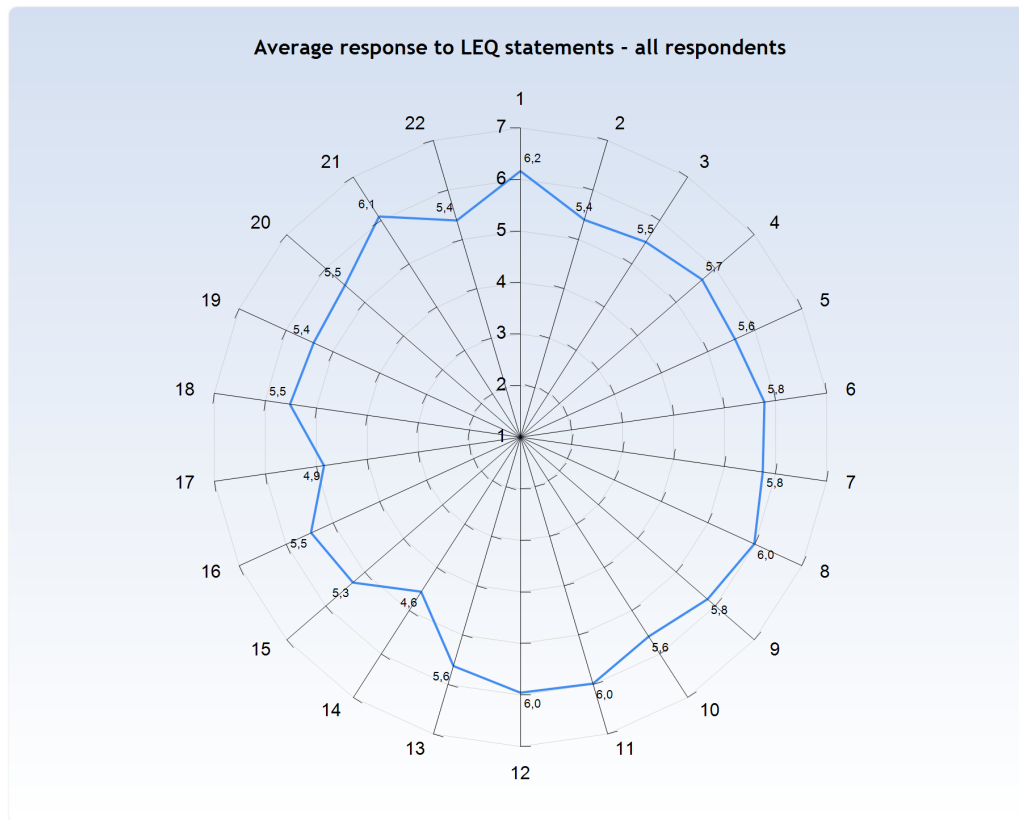
Genomsnittlig respons på påståenden om lärmiljön
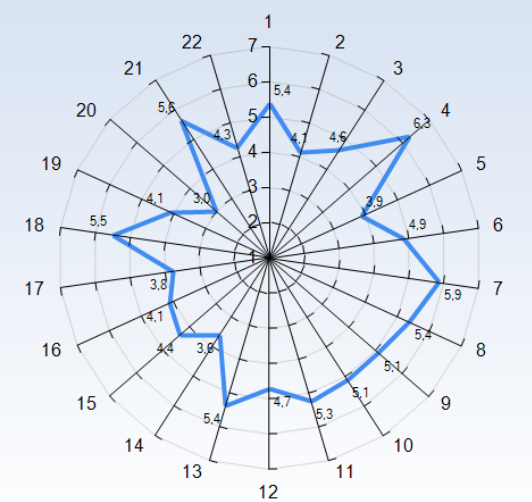
Genomsnittlig respons på påståenden om lärmiljön
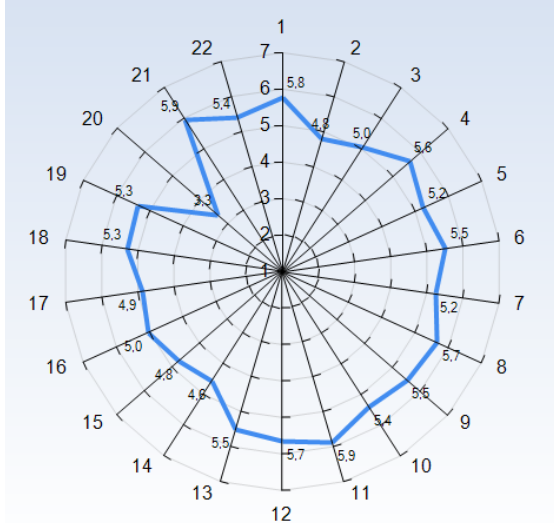
The meaning of the different numbers can be seen below. Note that we can see significant improvements on topics 2, 14, and 20. It is interesting to see that more students explored the topic on their own (2) and had the opportunity to chose what to do (20). We believe that the main change that improved these numbers is the introduction of the mini project. More students also found that they received feedback (14), which is good, despite the fact that it is really hard to give good feedback since the course is very large.

Meaningfulness - emotional level

Stimulating tasks
1. I worked with interesting issues

Exploration and own experience
2. I explored parts of the subject on my own
3. I could learn by trying out my own ideas

Challenge
4. The course was challenging in a stimulating way

Belonging
5. I felt togetherness with other course participants
6. The atmosphere in the course was open and inclusive

Comprehensibility - cognitive level

Clear goals and organization
7. The learning objectives helped me understand what I was expected to achieve
8. I understood how the course was organized and what I was expected to do

Understanding of subject matter
9. I understood what the teachers were talking about
10. I could learn from concrete examples that I was able to relate to
11. Understanding of key concepts was given high priority

Constructive alignment
12. The course activities helped me to reach the learning objectives efficiently
13. I understood what I was expected to learn in order to get a particular grade

Feedback and security
14. I regularly received feedback that helped me see my progress
15. I could practice and receive feedback without any grading being done
16. The assessment on the course was fair and honest

Manageability - instrumental level

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

Time to reflect
18. I regularly spent time to reflect on what I learned

Variation and choices
19. I could learn in a way that suited me
20. I had opportunities to choose what I was going to do

Collaboration
21. I could learn by collaborating and discussing with others

Support
22. I could get support if I needed it

Advice from Students

In the following, we have copied and pasted some of the comments that students gave anonymously on the question "What advice would you like to give to future course participants?". Some answers were given in Swedish.

"Study hard and go to lectures, because those are really good"

"Go to every lecture, exercise and seminars and ask as many questions as you need. It will help to pass the exam with very high grade! "

"Start studying from the beginning and keep up with lectures and seminars. Be creative and ambitious in the project (but with a backup plan). "

"Play around a lot with what you're learning. This is a course where it's very easy to apply your knowledge. Learn by doing. "

"Figure out what to do in the project early on"

"study hard for the lab assignments, they will help you a lot"

"De första veckorna är de tuffaste. Om man satsar lite extra i början så man inte sackar efter, borde det gå lättare sen. "

"Go to the lectures, remember that the labs doesn't include everything you need to learn. "

"Fantastic Course, but work hard and start early -- It is worth it! "

"Take the course seriously from the beginning "

"Be prepared to spend a lot of time on this course. It is hard work but run very well. David Broman is an awesome lecturer. "

"Försök läsa kursen parallellt med någon lätt kurs eftersom den har så många delar som examineras som kräver mycket arbete. (Inte negativt med labbarna men tar mycket tid) "

"Start the project early to see what you dont understand and get help with it and find people to study with so you can help each other. "

"Följ med kursen hela tiden och plugga i tid. "

"Att se till att starta tidigt då den första labben var den som omfattade mest arbete. "

"Start with the Project in time! "
"Remember to also give other courses time"

"Plugga konstant, tung kurs men rolig "

"Keep up, do NOT get sick and miss too many lectures/days of study. It's very difficult to catch up. "

"börja direkt med att jobba med kursen så du inte hamnar efter! "

"Häng med under hela kursens gång! Var nyfikna, det är en väldigt intressant kurs. "

"Study everyday after school. Try to get a routine. And do not procrastinate with stuff. And also, look at the lecture powerpoints before the lectures. It is easier to understand a concept during a lecture if you are already familiar with the new words "

"Start study right away and try everything with writing it in c or assembly. "