Course Analysis

IS1200
Computer Hardware Engineering
(Datorteknik, grundkurs)

Quantitative Data
- **Course code:** IS1200
- **Year:** Spring 2017 (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):** 303 participants in Daisy
- **Number of participants at the exam:** 206 (Students that received a grade. May include retake exam students)
- **Students that passed the first exam:** 103 (50%)
- **Students that have finished all parts of the course: see LADOK.**

Course Summary
The course teaches the fundamentals of computer organization, including 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 two LADOK parts:
1. Labs and home labs (4.5 hp)
2. Written Exam (3hp)

There are in total 12 lectures, 5 exercise sessions, 4 seminars, 4 laboratory exercises, and one mini project. The course ends with a 5-hour written 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 207 students. The answering frequency was 24.6 %.

Changes from Previous Years

In the fall 2014, this course got a new examiner: David Broman. The last time the course was given was in the spring 2016. The major changes of the course this year, compared to before fall 2014 are the following:

- Completely new lectures (introduced in 2014)
- The course got completely new labs. Students in groups of two can borrow ChipKIT embedded boards and bring them home during the course (introduced in 2015)
- A new mini project where one or two students create a small project in C. Students chose the project topic on their own (introduced in 2015)
- 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 (introduced in 2015).

Since the last time the course was given (spring 2016), only minor updates have been made.

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 course feedback from the students is in general very positive, both concerning its content and structure. Basically all students are very positive about the lectures and the lecture slides. In particular, many students emphasize that the structure with modules is good and that the teachers and teaching assistants are knowledgeable, pedagogical, and really willing to help.

The feedback from the survey (See Figure 9.) clearly shows that the majority of the students feel that they understand what the teachers are talking about. However, some students also point out that the subject is difficult and that it can be hard to understand everything the first time the information is presented at a lecture. This is very natural, and this is also the reason why we have several different learning activities, including computer labs, exercise sessions, and seminars.
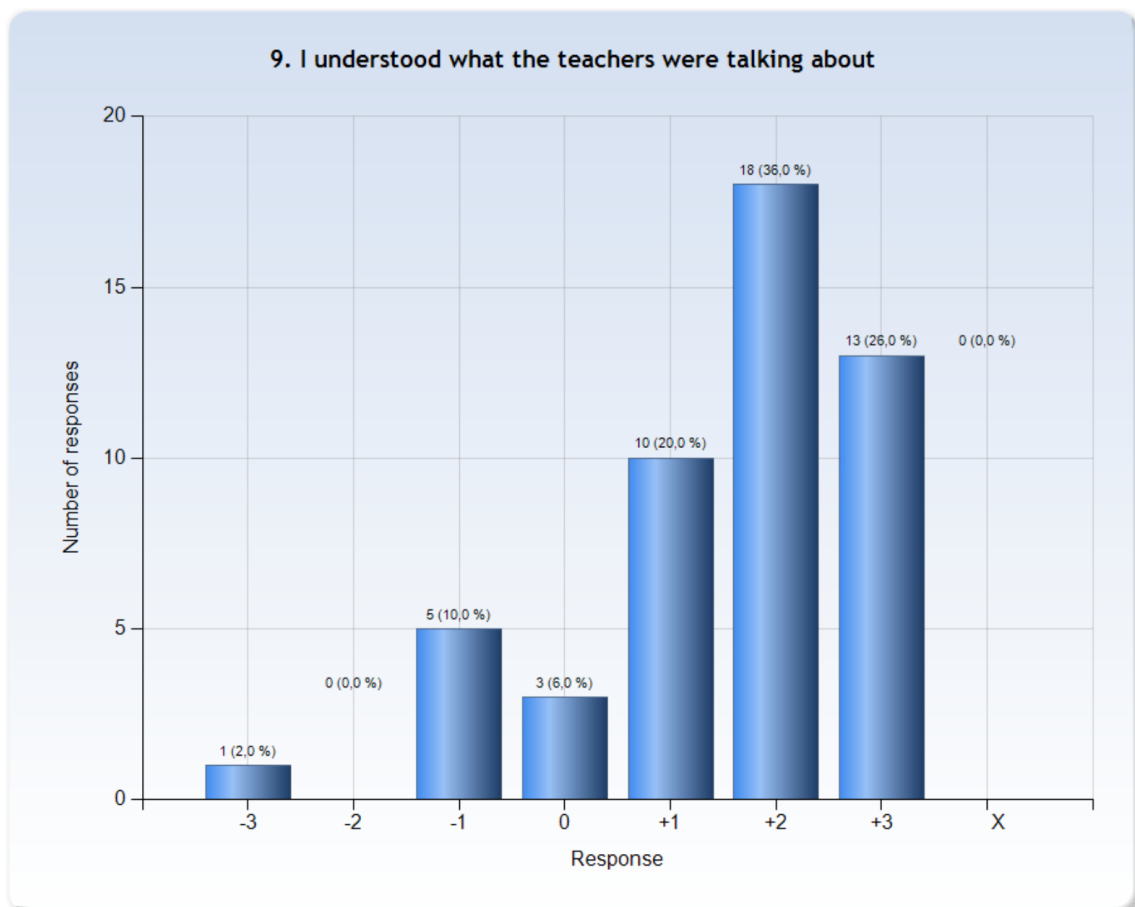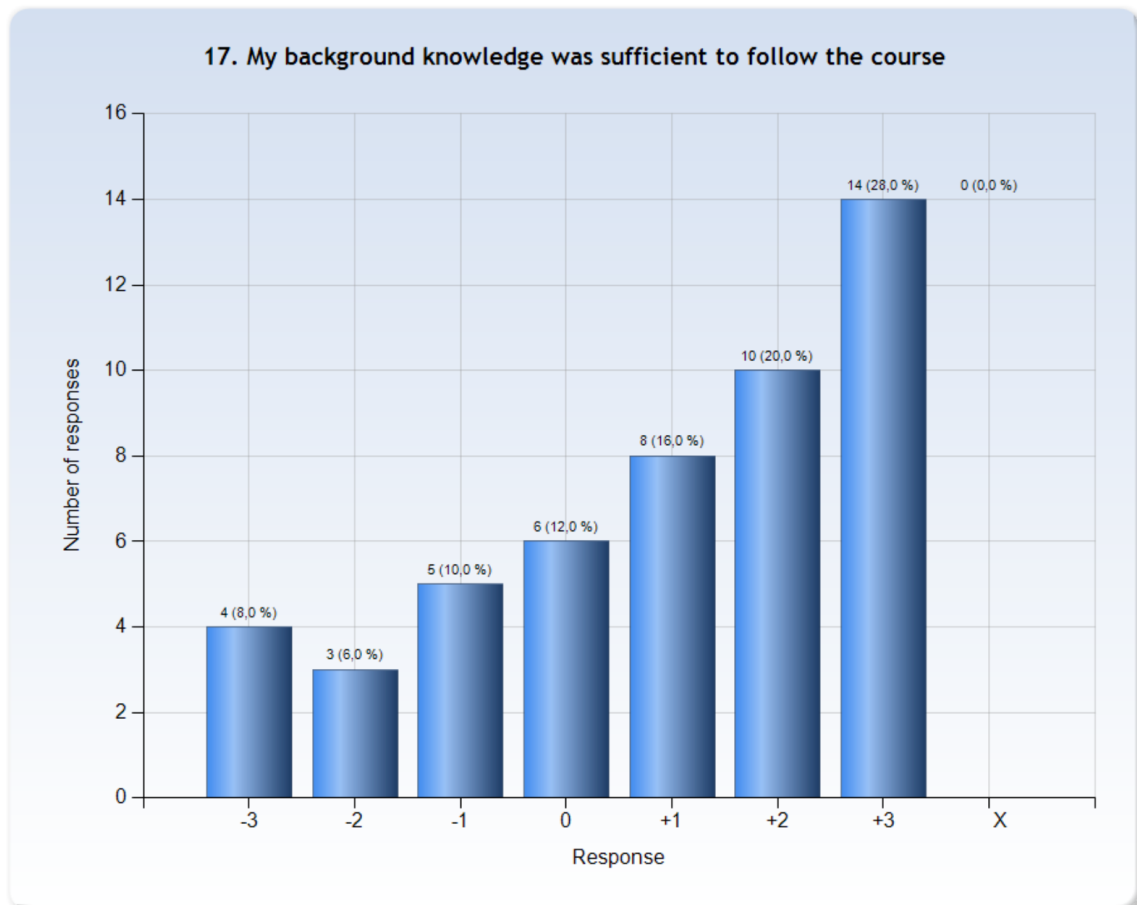

9. I understood what the teachers were talking about

Figure 8 below shows that a majority of the student found the organization of the course clear, and that it was clear what to do.

8. I understood how the course was organized and what I was expected to do

| Response	Number of responses
-3	0 (0,0 %)
-2	0 (0,0 %)
-1	4 (8,0 %)
0	4 (8,0 %)
+1	6 (12,0 %)
+2	12 (24,0 %)
+3	24 (48,0 %)
X	0 (0,0 %)

The main issues that several students have stated with the course concerns i) the students required background knowledge, and ii) that the course is hard and time consuming. The figures with number 17 on this page and the next page show the results from the question "My background knowledge was sufficient to follow the course".

The results from this year for IS1200 are similar to IS1200 last year (2016), although it seems like slightly fewer students think that their background knowledge is enough this year. However, if we compare to IS1500 students (see the figure on the next page), we can see that the large majority of IS1500 students find that their background knowledge is enough. The main difference is that most of the IS1500 students are taking this course during year 2 of their studies, whereas most IS1200 students take the course in year 1.

Above, IS1200 year 2017 (this year).

17. My background knowledge was sufficient to follow the course
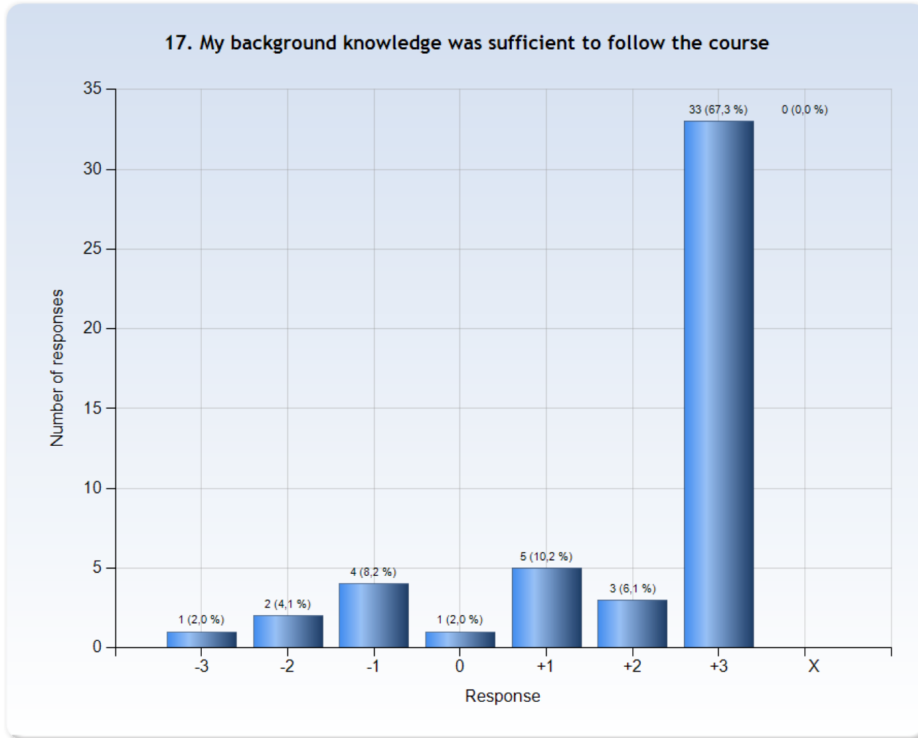
Above, the results from IS1500 year 2016.

**17. My background knowledge was sufficient to follow the course**
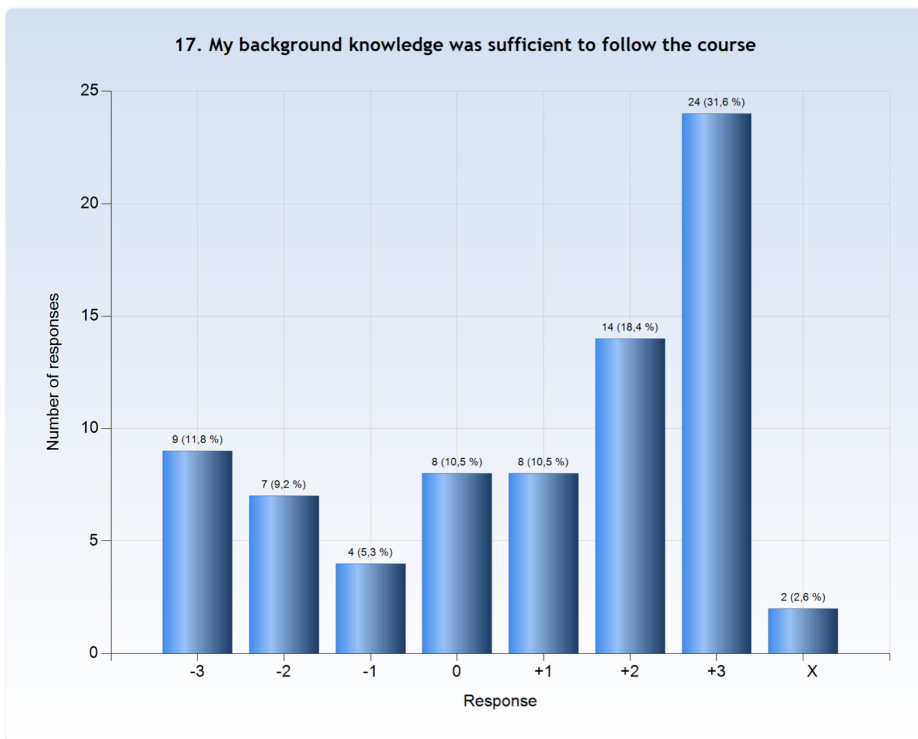
Above, the results from IS1200, year 2016.

Although many students find that the course is rather hard, they clearly thinks that the content is useful and that they have learned a lot. The majority of the students think that the course is challenging in a stimulating way (See Figure 4).

There is a clear scheduling problem for IS1200, since it is scheduled only for one period (as all courses are scheduled in Kista). By contrast, the course IS1500 is scheduled over two periods, which eliminates the overlapping (pipelining) of lectures, labs, and exercises. Unfortunately, we do not see a simple solution for this problem with the current schedule and allocation of the course in just one period.

One thing that some students point out is that the course expects that the students have basic knowledge in UNIX. This seems to be a general problem in many of the computer science programs at KTH, i.e., that there is no course that actually teaches basic UNIX knowledge. Hence, I have added links to UNIX tutorials on the course website, but as an improvement for next year, I will also include some basics about UNIX commands at the lectures.

4. The course was challenging in a stimulating way
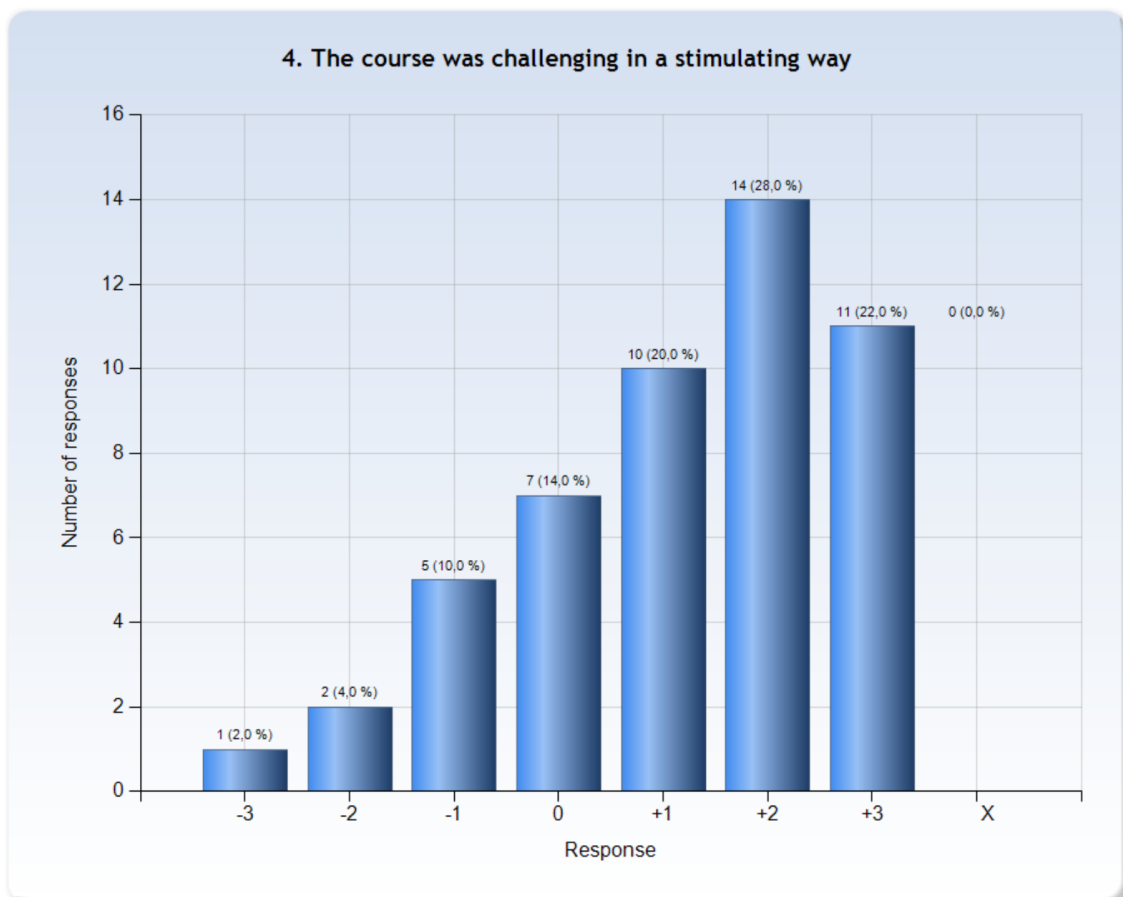
Several students state that the lunch office hours are very good and important. We will continue to include these sessions, but we will at the same time stress that it is even more important that questions are asked on the online discussion forums so that more people can get help from the answers.

Finally, a large majority of the students finds the course open and inclusive (see Figure 6.).
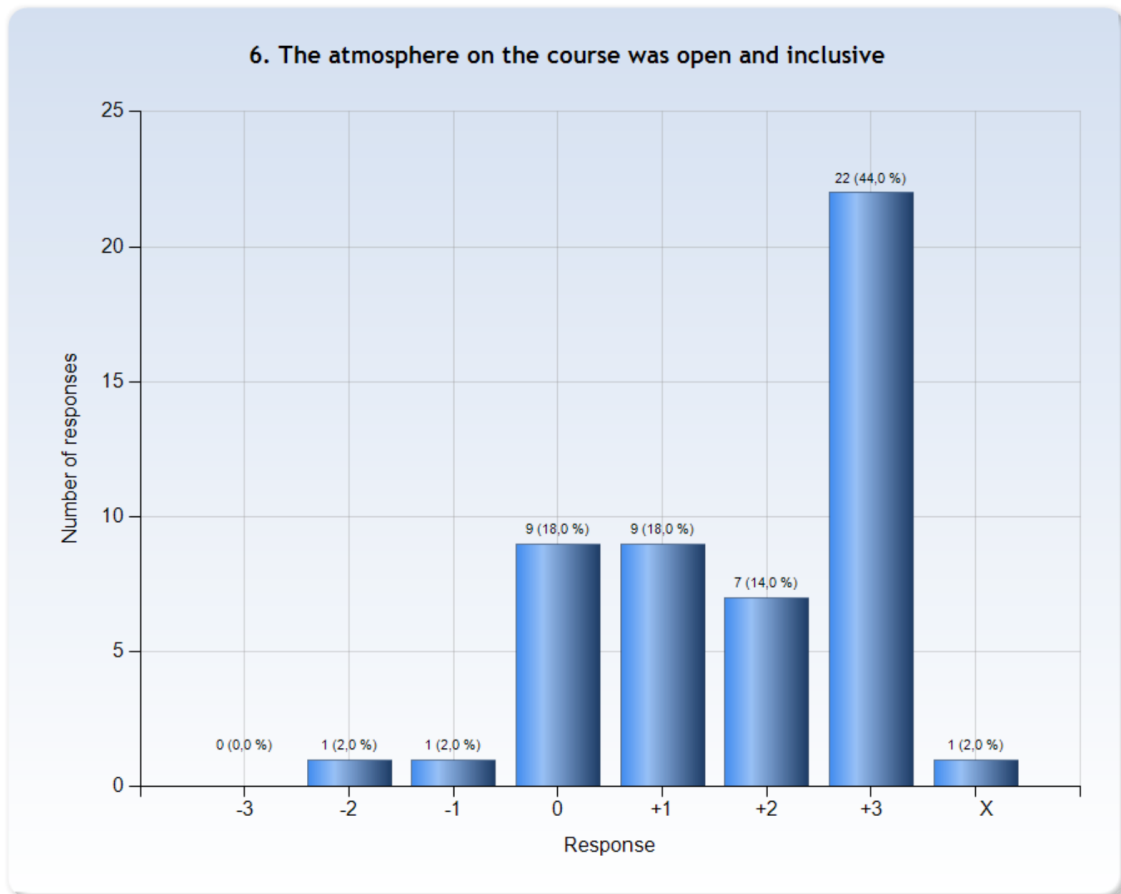
Exercises and Seminars

Most students are in general very positive about both the exercises and the seminars. Several students have explicitly stated that they learn a lot at the seminars. Some of the teaching assistants (TAs) have received better comments than others. We will continue to talk to the TAs and help them to improve their pedagogical skills.

Some students think that the exercises are too hard. Hence, I will try to improve the exercises and add some simpler exercises that make it easier to start with. Some students want to have more exercises, but this is unfortunately not realistic since the schedule is already quite dense.

Labs and the Mini Project

The general feedback about the labs is very positive, both in terms of content and learning perspective. Some students say that the lab exercises are very clear and easy to understand, whereas some students think that the lab instructions are hard to grasp. We are continuously trying to improve the lab instructions. All concrete feedback is always welcome.

Some students state that they like that the labs and the project forces them to use real manuals and not just to read text books.

Many students state that both the labs and the mini project are really fun. In particular, students like that they can borrow the ChipKIT board and use it during the course. The main issues are still that many students think that the labs take too much time and that they are hard. We understand this, but it should also be noted that we do not get the same comments at the same levels for the parallel course IS1500, which has the same labs. Again, the reason for this can be that IS1200 students are first year students, whereas IS1500 students are mainly second year students.

Another problem seems to be the schedule, i.e., that the last lab (Lab 4) overlaps with the project work. This is a direct consequence of that the course is given during just one period. There is, however, no dependency between Lab 4 and the project, so the students can (and should) start with the project early. We will try to stress this in a clearer way next year.

Examination

We did no get much feedback about the written exam, but most students seem to be positive about the examination (See Figure 16), although some students said that the exam was hard.

The main issue seems to be that some teaching assistants are harder and some are not so hard when it comes to lab examinations. We have already prepared instructions for how the examination should be done, but we will try to improve this for the next year.

Another comment was about the examination and that it took place in Sal A for some students. This is, unfortunately, necessary because there are so many students that are writing the exam each year.


16. The assessment on the course was fair and honest
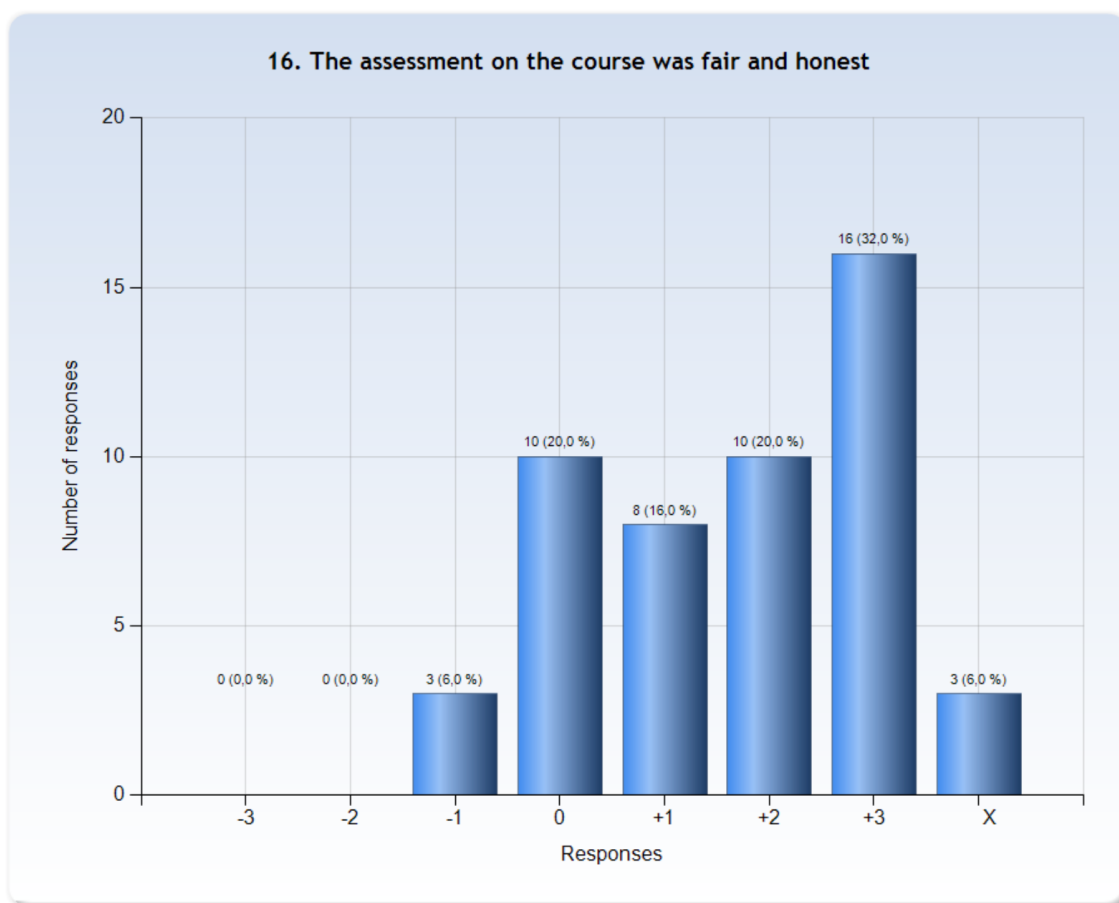
Course Literature

There were very few comments about the course literature. Some students expressed that the course books were very good, but a few students were not so positive. It is hard to draw any conclusions about this, but over the years, it seems like most students are positive or very positive 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 2017 and the second graph shows the result for
the previous time the course was given (2016).
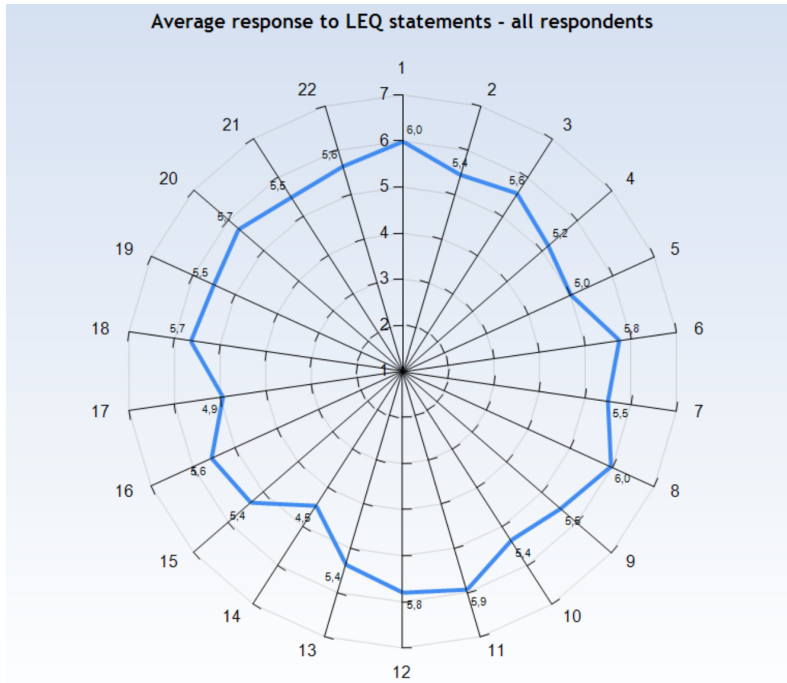
Result for spring 2017
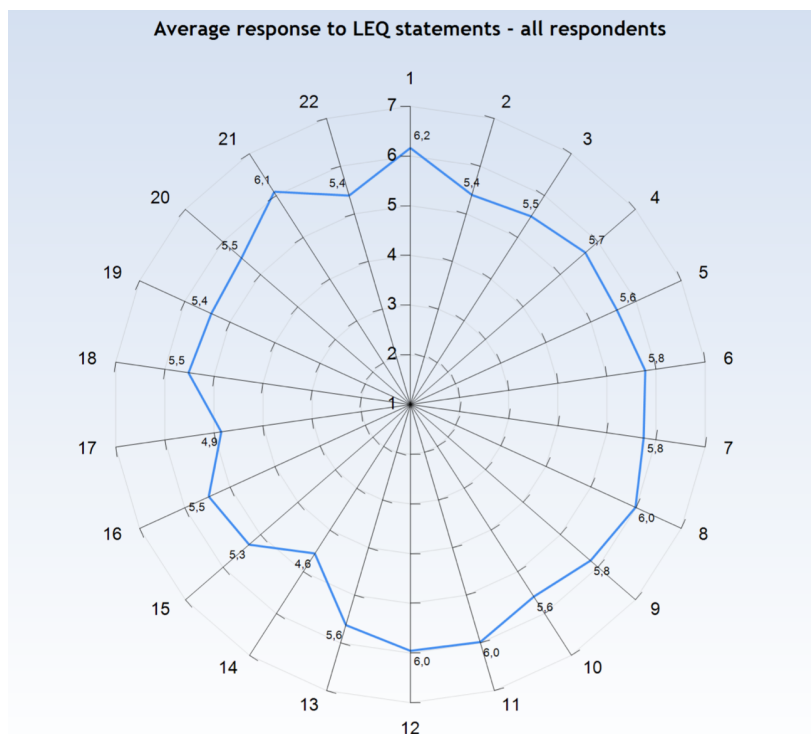
As we can see, the results are very stable with a few variations over the years.

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 section, 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?". We have chosen a subset of the comments that gives constructive advice to future students.

"as always start early and dont throw away good opportunities to learn"

"Plugga och häng med, i början känns det omöjligt men om man följer med, läser kursböckerna och övar på tentor så kommer allt falla på plats"

"Put the necessary time into it and start studying properly from the very beggining. For the most part, make sure you understand a concept before moving onward."

"Start studying/reading the chipkit manuals etc. as soon as possible."

"Titta genom lecture slides innan föreläsningarna för det är många nya knepiga begrepp. Läs H&H, extremt bra kurslitteratur som går genom allt David pratar om. Gör seminarierna så gott det går, inte i förstahand för extrapoängen men för lärandets skull."

"Sammanfatta föreläsningarna tillsammans med boken"

"Take the course seriously"

"Getting started with the project early, make sure to attend all the lectures, look at a lot of the previous exams."

"Try to finish the last lab as soon as possible so that you have time for the mini project "

"Read the preslides thoroughly before each lecture. I did, mostly, and I think it helped a lot."

"Put in the work required to stay on track, its worth it"

"Lägg ner mycket tid på labbarna, det har man igen både i projektet och på tentan."

"Plugga från dag 1. Titta på gamla extentor tidigt för att få ett hum om svårighetsgraden. Jobba mycket med labbarna! Gör seminarierna."