

## Course Analysis ID1021 ht21

This was the first offering of the course. The course was offered in a Swedish and an English version. The course was examined by four labs and a written exam covering the areas Fundamentals, Sorting, Searching and Graphs consistent with the course literature. The course book used was Algorithms 4<sup>th</sup> edition by Sedgewick and Wayne. The main parts of the book is available as free pdfs as well as an extensive code library and video lectures by Sedgewick.

### About the course

The course was taught by ZOOM. In total 36h of lectures, 8h of question&answer sessions, 16h of scheduled guidance and the possibility to get guidance for the students after each scheduled lecture were offered. Labs were performed individually and presented as “kryssfrågor” in scheduled seminar sessions with 15-20 students per session. The course used the learning management system Canvas for everything concerning the course, lecture notes, labPM, lab up-loads and written exams.

### Throughput

Several students were transferred to the course from the previous course ID1020. This complicates an analysis of the results as many students have shown little or no activity in the course.

In total 209 students were registered for the course (from LADOK). 91 students were registered for the first time for the Swedish version and 16 were registered for the first time for the English version (from the Course participants service at kth.se). That is in total 107 students were true first registered students.

However, of the 209 registered students only 149 students have shown some activity in the course by handing in labs or taking the exams.

Of these 149 students a total of 104 students have completed the course as of today (a few students still are active with make-up labs). That is 70% of the students that have shown activity in the course have passed the course. In total this gives the following results:

Registered total	Registered first time	Active students	Completion rate, total	Completion rate, active students
209	107	149	50%	70%

The course was built around a lab course in which students work with (all) the algorithms and data structures covered in the course by applying them to small examples. Students have been allowed to use code for the data structures and algorithms from the library of the course book, Algorithms 4<sup>th</sup> ed. at Princeton, provided they could explain the code.

It is evident that passing the labs gives the students a good chance of also passing the written exam, see table 2 below.

TCOMK completed labs	TCOMK completed course (lab+exam)	Completion rate %	CINTE completed labs	CINTE completed course (lab+exam)	Completion rate %
16	12	75%	115	90	78%

### **Increasing the throughput – causes and measures**

A problem is that too many of the first time registered students never start with the lab course. A questionnaire at the first lecture about the programming knowledge of the students entering the course, checking fundamental content and learning outcome from pre-requisite courses, gave the following result:

20% stated that they did not think they could write a JAVA program

35% stated that they did not know what a reference is in JAVA

65% failed to get the correct answer on the example of parameter passing below

```
public static void f(int i)
{ i = 44; }

...
int a = 0;
f(a);
//what is the value of the variable a at this point in the code?
```

The results were discouraging and indicated that many (a majority) of the students, when entering the course, had not yet acquired a working knowledge of the programming fundamentals which are pre-requisites for ID1021.

To attempt to amend this, 10h of lectures were used to try to get some of the fundamentals in place. The labs were performed individually and consisted of seven relatively small assignments per lab. This was done to ensure individual knowledge and to cover most, but not all, content.

OBS! To not overload the students some content were not covered including: numerical methods, selection sort, heapsort, heaps, problem trees and best-first search

### **Student feedback**

No students volunteered to be part of a course committee. Feedback from the program responsible student of TCOMK focused on issues relating to the fact that the examiner was on sick leave when the exam should have been corrected and other details which have been resolved.

The LEQ was performed after the second written exam and as usual rather few students answered (1/5). What came through was that relatively few had worked more than 20h/week on the course, yet many expressed that they had had to work more than usual on this course and that the examination was more extensive than usual.

### **Lessons learned – suggestions for development**

The content and intended learning outcomes of the course should be pruned. Given the knowledge of the students it is not realistic to cover numerical methods or all algorithms mentioned in the content.

One should also consider introducing programming fundamentals as part of the content and learning outcomes. This has to be mandatory. A test with a non-mandatory repetition/repair lab for basic programming failed as the students which would have benefited most from the lab did not do the lab as they were busy trying to cope with parallel courses.

This was the first time (compared to ID1020) that students did not complain on a lack of guidance sessions. It appears the students for some unknown reasons want to interact with the examiner rather than assistants. However this also comes at a cost – spending 35-45h in teaching and guidance in ZOOM takes its toll. Previously having 4h of scheduled guidance sessions for each lab with teachers as assistants have not attracted but few students but yet generated complaints on a lack of guidance. Similarly, when guidance on-site each week at Mondays and Wednesdays from 17.00 and on Fridays from 15.00 manned by excellent student tutors available as long as there were students wanting guidance also failed. On average no or only one or two students attended these sessions. A reason for this being put forward by the students was that the sessions were scheduled to late (which is hard to avoid as the course is offered for five programs)

**Summary**

The throughput at a first glance of the course is obfuscated by the large number of students that have been transferred from ID102 to the course of which not all have been active. In terms of active students 70% has passed the course as of today.

Students have been examined on all content and learning outcomes. Students passing the course should have a working knowledge of the course content sufficient for them to do well on future courses. An advice for future course rounds is to address the understanding of programming and the practical programming skills many students enter the course with.