

Course Analysis IS1300

Course analysis carried out by (name, e-mail):

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1 Description of the course evaluation process

The course evaluation process started in the first lecture on 28th October where we asked students to act as student representative. Unfortunately, no student agreed to be student representative. However, regular feedback was obtained through discussions with students during the lab-sessions and after lectures.

In the last lecture of the course on 2nd December, we aimed to establish a course committee. Follow up invitations were sent to students via Canvas. Two students agreed to participate in the course committee meeting which took place on 17th of February 2025.

The course evaluation using LEQ with 22 questions was available to students after the exam in the period 2025-01-22 - 2025-02-04. Feedback from 15 of 70 students was recorded. This is a response rate of 21.43% which is comparable to previous years. The LEQ summary gives separate diagrams per gender, type of student, or disability. The LEQ also gives the opportunity to write free comments

2 Description of meetings with students

Students were invited for the role of student representative as well as to the course committee meeting. In this course instance, no student representative could be found.

A course committee meeting was held with two students after the course activities, examination, and grading completed. This way, the students could give feedback on all parts of the course. The meeting has a duration of one hour. General feedback was given by the students, with emphasis on parts that can be improved. Feedback was collected from students on planned course development activities.

In addition, feedback from students was informally obtained during the different laboratory occasions conducted throughout the duration of the course.

3 Course design

The course consist of 9 lectures (2h), 2 seminars (2h) as well as 6 laboratory sessions (4h, each with 2 opportunities to attend, respectively).

The course starts with an introductory lab assignment “PingPong” that introduces the students step by step to the Integrated Development Environment (IDE) that is used in the course, as well as to Test Driven Development and code documentation.

The two seminars focus on hardware development for embedded systems and software development for embedded systems respectively. Both seminars are connected to the project task PRO1 and provide a common starting point for the project task for all students.

The project focuses on the development of an embedded system where hardware is provided by the teacher and students develop the software. The project is the basis for PRO1 that also determines the grade of the student on a scale A to F. Each student borrows a custom lab-kit for the duration of the course. The lab-kit contains the development board (Nucleo-L476RG) as well as a custom extension board, necessary cables etc.

The grade for the project and PRO1 is determined based on:

- Panning, architecture, structure, testing and documentation
- Complexity of the project (several features are requested from the students and can be selected. The composition of realized features determines the points for this part)
- Written report
- Utilizing a Real-Time Operating System for the project

The requirements to obtain points towards the final grade from each grading category are well defined in the project description and also discussed during the project introduction lecture.

The theoretical part of the course is structured in 5 thematic modules which consist of 9 lectures. The lectures cover all aspects of embedded systems development, but focus most on hardware, software and real-time aspects. Lectures directly link to the practical aspects that are investigated in laboratory exercises and later in the project.

The written exam has a Pass/Fail grade. Passing the exam is required to pass the course.

Implemented development: The project task has been further developed from last year based on student's feedback. The main changes compared to the previous year focused on the formulation of the customer requirements.

One laboratory assistant was supporting the course during the laboratory sessions.

4 Students' workload

Based on the students answers in the course evaluation, the workload differed between students, while the majority spent a reasonable time for the course. The average reported workload is around 20h which is as expected (12 of 15 students that filled in the LEQ reported to spent ≤ 23 h per week for the course).

The reason that some students reported larger or smaller workload can be explained by the possibility to implement more or less customer requirements for PRO1 which affects the obtained points for one of the grading criteria. This has been mentioned as positive by students in the course evaluation LEQ.

5 Students' results on the course

The students perform well in the course. A clear majority of the students have passed the course. 62 students actively participated in the course (counted if the student participated in both mandatory seminars). Out of those, 44 students completed the course. 56 students passed the written exam and 49 students completed the project. This is comparable to previous years.

6 Students' answers to open questions

The feedback from students to the open questions of the LEQ is consistent with previous years. The students highlighted the good combination of different learning activities of the course, the pedagogical structure and course material (both lecture slides and pre-recorded videos for each course module). Students also highlighted the relevance of the topic and content of the course.

To the question on advice to future course participants students answered to participate on all occasions (attendance is not mandatory in some lab sessions) and to start the work on the project early.

7 Summary of students' opinions

The KTH learning experience questionnaire has been used for the evaluation. The questionnaire has 22 questions, where students give marks from 1 (strongly disagree) via 4 (neutral) to 7 (strongly agree). The questions are grouped into the following three areas. 9 students participated in the questionnaire.

Meaningfulness - emotional level (Questions 1-6)

The course received high marks in this area (min: 5.6, max: 6.4, avrg.: 6.05). The answers indicate that students worked with interesting issues (Q1: 6.0) and could explore the subject on their own (Q2: 5.6). The course also allows students to explore own ideas (Q3: 6.4) and work in an interesting and stimulating way (Q4: 6.2). Students felt togetherness with other students (Q5: 5.8) and the course is open and inclusive (Q6: 6.3).

Comprehensibility - cognitive level (Questions 7-16)

The course received high marks in this area (min: 5.6, max: 6.2, avrg.: 6.03). Students indicated that the intended learning outcomes are clear and helpful (Q7: 6.1) and that the course is organized in a way that is supporting their learning (Q8: 6.2). Material was presented clear and understandable by the teacher (Q9: 5.6) and concrete examples helped the learning process (Q10: 6.0) with focus on the understanding of key-concepts (Q11: 6.1). The alignment of the course and the ILOs was good (Q12: 6.2). Students understood what was expected for different grades (Q13: 6.2) and feedback was helpful and regularly provided (Q14: 5.8 and Q15: 5.9). Students agree that the assessment of the course was honest and fair (Q16: 6.2).

Manageability - instrumental level (Questions 17-22)

The course received good grades in this area (min: 4.2, max: 6.7, avrg.: 5.87). The students see their background knowledge as sufficient (Q17: 6.0) and students regularly reflected on what they learned (Q18: 5.7). The different learning activities in the course enabled students to learn in different ways (Q19: 6.1). The students answered very mixed to the question if they could influence the course activities, where the large majority is positive (Q20: 4.2). Only 3 out of 15 students evaluated the questions with a negative score of -1 (on a +/- 3 scale.). Students could collaborate with others (Q21: 6.7) and could get support when needed (Q22: 6.5).

8 Overall impression

The course runs well and students appreciate it. Students perform well and highlight the good structure and underlying pedagogical concepts of the course.

This instance continued using the new hardware platform (first used in HT 2022) with modified task descriptions to reflect student's feedback and suggestions.

The course has a large focus on practical aspects and a big part of the course are laboratory exercises and the project. This has a high administrative demand before during and after the course.

9 Analysis

The course has received a positive evaluation from the students which indicates that it could create a good learning environment. There has been no big difference between the response of different student groups to the course evaluation.

10 Prioritized course development

A number of concrete changes are planned for the next course instance:

- As the schedule in P2 is typically very fast, it was decided to introduce the project task already in the first lecture (at a higher abstraction level). This gives the students more time to relate the content of early lectures to the project task. In addition, students will be more familiar with the project task during the seminars which allows for more deep work, benefiting the students' projects.
- As a consequence of the first item, seminar tasks will be redeveloped to allow for more deep and meaningful exercises to benefit the students project tasks.
- The next course instance will take place at campus Valhallavägen. This means special care is needed to make sure the labs can be performed at the new lab locations with minimal disturbances to the students.