Report - IL2206 - 2021-12-21

Respondents: 1
Answer Count: 1
Answer Frequency: 100,00 %

Please note that there is only one respondent to this form: the person that performs the course analysis.

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

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DESCRIPTION OF THE COURSE EVALUATION PROCESS

Describe the course evaluation process. Describe how all students have been given the possibility to give their opinions on the course. Describe how aspects regarding gender, and disabled students are investigated.

All students were invited to participate in the learning experience questionnaire (LEQ) of KTH with 12 questions. The LEQ summary also gives separate diagrams per gender, type of student, or disability. The LEQ gives also the opportunity to give free comments. In addition, a course committee meeting was offered, but there has been a lack of volunteering students, which was held on November 23.

DESCRIPTION OF MEETINGS WITH STUDENTS

Describe which meetings that has been arranged with students during the course and after its completion. (The outcomes of these meetings should be reported under 7, below.)

A course committee meeting was held on November 23, where 6 master students, 4 TAs, and the course responsible were present. The discussion was based on the results of the LEQ.

The meeting concluded that the course has a good and working structure, but that some details should be improved. The lectures and lectures notes work very well, and also the structure for the laboratories and the seminars is good. The different parts contribute to a good understanding of the topic of embedded systems.

The following details can be improved.

1. Schedule: the lectures on Ada and the RTOS came a little bit too late in the course and should be given earlier, so that the students have sufficient time to be able to start working with the laboratories.
2. Laboratory instructions:
- The laboratory instructions seem to be unclear at certain stages. They should be checked and clarified before next year.
- A video on 'Getting started with laboratory 2' would help students to get started with the laboratory environment of laboratory 2.
3. Question and answer sessions: a question and answer session (1 hour once a week) would help the students to work more efficiently on the laboratories and the exercises.
4. Seminars: there is a varying quality of the student answers to the questions. Instructions could be extended to clarify the expectations and pointers to the reading material, like links to lecture notes or articles, could be added.

COURSE DESIGN

Briefly describe the course design (learning activities, examinations) and any changes that have been implemented since the last course offering.

The course consists of 17 lectures (2h), 2 seminars (2h) and 3 laboratory sessions (4h). To pass the course, both the written exam (grades: A-F), focusing on the theoretical aspects, and the laboratory course (grades: P,F) have to be passed. The seminars were part of the laboratory course. The written exam determines also the grade of the course. The laboratory course focuses on the practical real-time aspects of embedded single-processor systems.

There have been no major changes in the course. Only the seminars have been conducted in a slightly different form, where four students build a seminar group, which discussed the questions together with a TA.

The students borrow donated Altera FPGA boards, which they can use for the course. In the second laboratory, the students have to implement an application using a commercial real-time operating system (MicroC/OS-II). To finish the two laboratory tasks, three lab sessions are allocated. The course is the first one in the master program "Embedded Systems" with many international students. To support the students and to compensate for the different background of students in this course, we have developed a home laboratory, where students also have access to the full solutions.

The course has worked well in previous years. The course has been designed for around 100 students each year at the advanced level.

Due to the large laboratory part, the course requires a large number of laboratory assistants. This year we have used four PhD students to conduct the laboratory sessions.

THE STUDENTS' WORKLOAD

Does the students' workload correspond to the expected level (40 hours/1.5 credits)? If these is a significant deviation from the expected, what can be the reason?

According to the answers of the students in the learning environment questionnaire, the workload seems to be reasonable. Still, it seems that most students work in average 20 hours per week. However, there is a clear variety between the workload hours reported by the students.

THE STUDENTS' RESULTS

How well have the students succeeded on the course? If there are significant differences compared to previous course offerings, what can be the reason?

Students perform well in this master course. Some students were late with their laboratory assignments.

STUDENTS´ANSWERS TO OPEN QUESTIONS

What does students say in response to the open questions?

It is very difficult to summarise the answers to the open questions. Many students pointed out that the course was well organised and had interesing lectures and laboratories. Most students liked the idea of the seminars, but gave also suggestions for improvement. The lecture notes were seen as a positive addition to the course. In the pandemic situation, classes and seminars have been held both in a lecture room and remote (with recordings), which was seen positive by the students.

SUMMARY OF STUDENTS' OPINIONS
Summarize the outcome of the questionnaire, as well as opinions emerging at meetings with students.

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.

23 students participated in the questionnaire.

1. Meaningfulness - emotional level (Questions 1-6)

The course received very high marks in this area (between 5.3 and 5.9). According to the evaluation, students worked with very interesting issues (Q1: 5.9), and was challenging in a stimulating way (Q4: 5.3).

2. Comprehensibility - cognitive level (Questions 7-16)

Also in this area, the course achieved in general very high marks (between 5.3 and 6.2). Students viewed the course to have well-defined learning outcomes (Q7: 6.0). They found the subject and the presentation very understandable (Q10: 6.0, Q11: 6.1), where they could learn from concrete examples (Q10:6.0) and where the understanding of key points had high priority (Q11: 6.1). The course furthermore was regarded to have a good alignment between the learning activities and the intended learning outcomes (Q12: 5.7). Students are in general satisfied with the delivery of the feedback (Q15: 5.3) and regarded the assessment on the course as fair and honest (Q16: 6.2).

3. Manageability - instrumental level (Questions 17-22)

The course achieved in general very high marks (between 5.7 and 6.2) in this area, with the exception of Q22 which only received 4.8. Students regarded their background knowledge as sufficient (Q17: 5.7) and could learn in a way that suited them (Q19: 5.7). They liked that they could collaborate and discuss with others (Q21: 6.1). However, there was a big variance regarding Q22 (4.8), where students expressed, if they were able to get support when needed.

OVERALL IMPRESSION
Summarize the teachers' overall impressions of the course offering in relation to students' results and their evaluation of the course, as well as in relation to the changes implemented since last course offering.

In general, the course seems to run very well and students perform in general very well in the course. Also students find the course interesting, and think that the course has a good structure. However, there are a few details that have to be updated, mainly regarding the schedule and a part of the laboratory instructions.

Also, the course requires a lot of resources and effort from the teaching staff, because of the practical laboratories, where students can borrow FPGA hardware boards.

ANALYSIS

Is it possible to identify stronger and weaker areas in the learning environment based on the information you have gathered during the evaluation and analysis process? What can the reason for these be? Are there significant difference in experience between:
- students identifying as female and male?
- international and national students?
- students with or without disabilities?

It seems that the course has succeeded to create a stimulating and positive learning environment for the students. This in particular important, because IL2206 Embedded Systems is the first course in the KTH master program "Embedded Systems" with depending on the study year between 80 and 150 students, where the major part are international students, who have never studied at KTH before. The course seems to have a clear organisation and structure, which is well aligned with the intended learning outcomes. Students view that the subject is presented in a clear matter and the assessment of the course is fair.

Compared to previous years, where there has not been so much difference between the answers in the LEQ of (a) international master students and Swedish students, and (b) between different genders, there has been a clear difference in the answers of international students and Swedish students, and also a significant but lesser difference between male and female students. Since only 21 students answered the survey, it is difficult to know, if this is a clear and general trend, but it is important to point it out in the analysis. It is difficult to draw any conclusion of the answers from the LEQ on students with disabilities due to the low number of answers, but the curve has the same shape as the curve for all students.

1. International Master and Swedish students: The international master students gave the course marks from 5.8 (Q4,Q22) to 6.7 (Q16), where many of the questions have values of 6.5 and more (Q1,Q7,Q10,Q11,Q15,Q16,Q19). The Swedish students gave the course marks from 3.4 (Q22) to 6.1 (Q16), where the questions Q22 (3.4) and Q15 (3.6) scored clearly the lowest grades. Q12 had a score of 4.8, while all other questions had a score of 5.0 (Q4) or higher. The biggest difference is in the questions Q15 (International Master: 6.5, Swedish: 3.6, Difference: 2.9, All: 5.3) and Q22 (International Master: 5.8, Swedish: 3.4, Difference: 2.4, All: 4.8). Both questions relate to support and feedback, which seem to have evaluated very differently of International and Swedish students. (Q15: I could practice and receive feedback without being graded, Q22: I was able to get support if I needed it).

2. Male and female students. The male students gave the course marks from 5.4 (Q4) to 6.4 (Q10). The female students gave the course marks from 2.7 (Q22) to 6.4 (Q11), where in particular the question Q22 (2.7), but also the question Q15 (4.4) scored clearly the lowest grades. All other questions have values of 5.4 or higher. The biggest difference is in the questions Q22 (Male: 5.9, Female: 2.7, Difference: 3.2, All: 4.8) and Q15 (Male: 6.1, Female: 3.4, Difference: 2.7, All: 5.3). Both questions relate to support and feedback, which seem to have evaluated very differently of male and female students. (Q15: I could practice and receive feedback without being graded, Q22: I was able to get support if I needed it).

The very large difference between the marks of both international and Swedish students, and male and female students regarding in particular Q15 and Q22 is new for this study year.

- In the previous study year, the international master students gave Q15 the value 6.2, while the Swedish students gave the value 5.8, thus the difference was only 0.4 points compared to 2.9 points in this study year. In Q22 international master students gave Q15 the value 5.8, while the Swedish students gave the value 5.5, thus the difference was only 0.3 points compared to 2.4 points in this study year.

- In the previous study year, the male students gave Q15 the value 6.0, while the female students gave the value 6.1, thus the difference was only 0.1 points compared to 2.7 points in this study year. In Q22 the male students gave Q15 the value 5.9, while the female students gave the value 6.0, thus the difference was only 0.1 points compared to 2.4 points in this study year.

It is very difficult to explain, why in the current study year there is a so clear difference in Q15 and Q22 between both international and Swedish students, and male and female students. There has been no obvious larger change in the course structure or the course staffing from previous year. Since the number of answers is clearly lower than in the previous year (2021: 21, 2020: 35), maybe part of the explanation can be in a low answer frequency. However, the trend is noted, and it will be important to check, if the evaluation of the coming year confirms this trend.

PRIORITIZED COURSE DEVELOPMENT

What aspects of the course should be developed primaily? How can these aspects be developed in short and long term?

It seems that the course has succeeded to create a stimulating and positive learning environment for the students. This in particular important, because IL2206 Embedded Systems is the first course in the KTH master program "Embedded Systems" with depending on the study year between 80 and 150 students, where the major part are international students, who have never studied at KTH before. The course seems to have a clear organisation and structure, which is well aligned with the intended learning outcomes. Students view that the subject is presented in a clear matter and the assessment of the course is fair.

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* Priority Course Development

The course committee meeting concluded that the course has a good and working structure, but that some details should be improved. The lectures and lectures notes work very well, and also the structure for the laboratories and the seminars is good. The different parts contribute to a good understanding of the topic of embedded systems.

Thus, the following points are planned to be addressed in the course development for the next study year. However, it will very likely not be possible to increase the amount of lectured activities. Thus a careful planning is required.

1. Schedule: the lectures on Ada and the RTOS came a little bit too late in the course and should be given earlier, so that the students have sufficient time to be able to start working with the laboratories.
2. Laboratory instructions:
- The laboratory instructions seem to be unclear at certain stages. They should be checked and clarified before next year.
- A video on 'Getting started with laboratory 2' would help students to get started with the laboratory environment of laboratory 2.
3. Question and answer sessions: an additional question and answer session (1 hour once a week) would help the students to work more efficiently on the laboratories and the exercises.
4. Seminars: there is a varying quality of the answers to the questions. Instructions could be extended to clarify the expectations and pointers to the reading material (link to lecture notes or article) could be added.

In addition, the course responsible will also have to take into account that the laboratory course requires very large resources and effort from the teaching staff. It has to be investigated how the laboratories can run more efficiently, because the current setup using donated FPGA boards and a complex software structure is fragile and requires a lot of operational effort.


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