

Course Analysis

IL2238 “Fundamentals of Integrated Electronics” HT21

Course analysis carried out by Ana Rusu, arusu@kth.se

DESCRIPTION OF THE COURSE EVALUATION PROCESS

All registered students have been invited to participate in the learning experience questionnaire (LEQ) of KTH with 12 questions. The LEQ summary gives separate diagrams per gender, type of student, or disability. The LEQ have also free comments.

The course evaluation concluded that the course has a good and working format, but some aspects could be improved. The lectures, exercise sessions and group project work very well. The course different parts contribute to a good understanding of the topic of integrated electronics in general and analog integrated circuits in particular.

COURSE DESIGN

The course is designed for students at the master level. There have been few changes in the course as compared to the previous year. Specifically, a new project and new tutorials have been developed because from 2021, the latest version of Cadence tools and a different design kit are used. The exercise sessions have been conducted in a slightly different format with students' active participation together with the TA.

The course consists of 12 lectures (2h), 6 exercise sessions (2h) and project work (meetings/help from TAs when it was requested).

To pass the course, the students required to pass both

- the written exam (grades: A-F), focusing on the most relevant aspects (problems) on fundamental analog ICs analysis and design, and
- the group project work (grades: A-F), focusing on the design of a fundamental analog IC using professional CAD tools.

The written exam consists of two parts: Part1 for grade E assessing the LOs for pass, and Part2 for higher grades (D-A) assessing same LOs, but at an advanced level.

The written exam represents 60% and the project work (design, report and presentation) represents 40% of the final grade of the course.

For continuous examination without grading, students were encouraged to solve 6 HWs and upload their solutions before the exercise sessions. HWs have not be graded, but instead students received max 10 bonus points in the written exam (corresponding to a jump in grade) if they uploaded 75% correct solutions. The bonus points were applied only if the student passed Part1 of the written exam. For the group project work, to make sure that the students' intermediate steps are correct and to receive feedback and advice at an early stage, they needed to submit 3 milestones reports, which are not graded.

STUDENTS' WORKLOAD

According to the students' answers in the learning environment questionnaire, the workload seems to be reasonable for most of the students. However, there is variation between the workload hours reported by the students, which its believed that it depends mainly on the students' background and previous knowledge on circuit theory, analog circuits and familiarity with CAD tools for analog circuits.

STUDENTS' RESULTS

Most of the students perform well in this course. Some students have some difficulties mainly due to their marginal achievement of the course pre-requisites.

Out of 21 registered students for the exam and/or re-exam and project work, 18 students passed the course.

STUDENTS' ANSWERS TO OPEN QUESTIONS

Many students indicated that the course was well organized, and it covered very interesting topics and an exciting group project. Most students liked the homeworks, but they consider them too difficult. Due to pandemic restrictions and risks, lectures and seminars have been held online (zoom) or in a lecture room. The lecture handouts, recorded lectures and uploaded solutions for exercises were considered as a good addition.

SUMMARY OF STUDENTS' OPINIONS

The KTH learning experience questionnaire has been used for the evaluation. The questionnaire has 12 questions, where students give marks from 1 (strongly disagree) via 4 (neutral) to 7 (strongly agree). Only 7 students participated in the questionnaire.

Here are few relevant aspects from the students' opinion:

Best aspects:

1. Excellent project with medium workload, which allowed students to apply what was taught in class.
2. The teacher and TAs were enthusiastic at helping students.
3. Interesting concepts and subject. Very knowledgeable and helpful teachers. Very exciting project.
4. "Everything is great."

The following aspects can be improved:

1. Homeworks were too difficult, and some students did not even try to solve them.
2. Some students were afraid to be accused of cheating and they did not discuss and helped each other to understand different concepts. This will be better clarified. Students can discuss and help each other to understand the concepts, but after that they should come with their own solutions for HWs and project.
3. Some students worked the entire Christmas vacation to finish the project.

Students have considered that the course has well-defined learning outcomes and the understanding of key points was prioritized. Additionally, students appreciated the opportunity to practice analog IC design by doing a group project as in industry. The course has been considered to have a good alignment between learning activities and intended learning outcomes. Students highly appreciated the feedback and support from the teachers. Furthermore, students considered their background knowledge as sufficient. They also liked working and collaborating in groups, but some of them were unhappy due to unsuitable choice of the teammate.

OVERALL IMPRESSION

Students find the course well organized and very interesting. However, there are a few aspects that could be improved, mainly regarding the difficulty of homeworks and the student work period for finalizing the group project.

ANALYSIS

The course is well aligned with the intended learning outcomes and has created a motivating and constructive learning environment for students.

PRIORITIZED COURSE DEVELOPMENT

The course evaluation concluded that the course has a well working format. The lectures, exercise sessions and group project work very well. The different activities/parts contribute to a good understanding of the topic of integrated electronics with focus on analog ICs and gain some experience in the design of a fundamental analog IC using professional CAD tools, as in industry.

The following points are planned to be addressed in the course development for the next year:

1. Homeworks will be simplified to allow students to learn and practice simple concepts before doing more difficult problems during the exercise sessions.
2. Improve the scheduling of the project work (submission deadlines mainly) as much as its possible in relation with the study term and the scheduled lectures and exercises, so that the students don't need to work during Christmas vacation to finish it.