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## Report - IK2217 - 2021-04-24

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Respondents: 1  
Answer Count: 1  
Answer Frequency: 100.00%

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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.**

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The course gave various opportunities to students to give their own feedback:

- in class where the students have expressed their preferences on how to organize certain parts of the project
- an intermediate meeting with the students' representatives who collected feedback from all students
- the LEQ course evaluation
- a final meeting with the students' representatives

As for gender balance, the students were 25% female and 75% male. One student was working in a company and could complete the course by relying on the pre-recorded lectures and a flexible scheduling from our side. One student had a child at home during the exam. She agreed to take the exam but needed a separate Zoom room as her environment was noisy. No specific requirements for disabled needs applied to this edition of the course.

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## 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.)

\*\*\* Summary of the intermediate meeting with the students \*\*\*

The feedback received from the students in the course (summarized by the representatives) has been summarized as follows. For the intermediate meeting, the summary also contains the actions that have been performed to address the issues.

- Technical:

- o Lack of background knowledge for Linux, GitHub, and Python. Students have heterogeneous background and not all of them are proficient with the required tools

- § Actions: We added a short tutorial during the same week to help the students with learning Python, GitHub, and Bash.

- o PacketTracer could be used instead of the current emulation for STP. The STP lab has however been well received by the students.

- § Actions: The rationale for the emulation is that then we use one single VM for the entire course so also for the P4 lab. Voravit will investigate whether the PacketTracer from Cisco is a valid alternative for the next edition of the course.

- o Lack of access to real-world devices, only emulation. Mostly focused on STP.

- § Actions: We could not change things for this year. Giving remote access to real devices is problematic. The P4 lab must be emulated because working on the real Tofino switches requires signing a Non-Disclosure Agreement.

- o Unclear structure of the canvas quiz. Getting more feedback than manual correction.

- § Actions: Voravit will look into this issue for the next year edition.

- Lecture engagement:

- o The breakout discussions were well received as they force to think about the questions without the teacher.

- § Actions: we added two breakout rooms sessions in the second part of the course

- o Paper summaries help in engaging with the content of the lecture but some students may not be prone to follow the teacher during the lecture as they already know the content. Moreover, it was unclear if the systems discussed in the papers have been really deployed or not.

- § Comment: DCTCP and MPLS are the only fully deployed once. The other ones are conceptually valuable but were either implemented in different technologies or their limitations (which we discussed or you identified) did not make them fly.

- § Action: We cannot avoid re-explaining the paper because from the feedback of the previous years the students asked to go through the papers as not everyone understands them deeply by reading them. One can skip the presentation, which is easy to do with online classes.

- o Recordings are good but some students skip the class and only listen to the recording, thus not encouraging participation in the class:

- § Actions: we added some quizzes (either Zoom polls or Mentimeter) and breakout rooms to make the lecture more engaging than a pre-recorded video.

- o P4 labs are good and very well explained but it is hard to do them while the teacher goes through the lab. Also, the early morning schedule and remote teaching does not help.

- § Actions: we cannot change the schedule this year. We have however changed the start time at 9am instead of 8am.

- o Having more blackboard-like style drawings would help

- § Actions: we used "Drawing" functions during the exercise sections in the second part of the course. In general, we have preferred to add slide-based animations in the slides so that the drawings could be re-used each year and are present in the slides.

\*\*\* Summary of the final meeting with the students' representatives \*\*\*

- o The pandemic situation has been problematic in several aspects as people did not get to know each other as much as they wanted to.

- o The project activity has been well received by the students.

- o Starting the project before getting to the theoretical part was a good idea as it gave more time for the students to get hands-on experience.

- o It has been suggested to add Pass/Fail homework while taking the P4 tutorial. This would force the students to all have a sufficient preparation to help in the group project. It seems that only few people work on the project and those who did not take the tutorial at the beginning will get lost.

- o There is a need to think about how situations in which a student does not deliver one part of the project should be handled. For instance, one group divided the work among its members but one member suddenly said that he/she was not going to deliver any code. Since the grade is shared, it creates problems.

- o The grading criteria are good but may be complex to verify. It was not a big problem but it could be simplified.

- o A comment mentioned that "Some more guidance in the practical aspect of the course will be beneficial". The students' representatives said that this could have been biased by the pandemic and it is unclear what else could be done. There were many labs and feedback sessions.

- o Another comment that we discussed was: "The STP lab was fine to understand the concepts but it is more like a "watch things happening" instead of "learn how to handle it/play with it". But then it would be harder to evaluate."

The students' representatives mention that this comment is related to the intermediate meeting discussion. It would be nice for instance to be able to change the priority of the switches. The Cisco tool for emulation has been suggested.

- o Engaging students with online lectures is harder. The students representatives say that it may help to force more the students to submit some pass/fail assignments to remain more engaged.



## **COURSE DESIGN**

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

The course is divided into several types of teaching activities aimed at fulfilling the ILOs of the course.

The course contains 8 frontal lectures of 1h30' each, 3h of laboratory work, 15h of programming lectures, 6h of exercise sessions. The course is fully accessible online (one working student could only watch pre-recorded videos).

The examination consists of the following parts:

LABA - Laboratory work, 1.0 credits, Grading scale: P, F

PROA - Project, 2.5 credits, Grading scale: A, B, C, D, E, FX, F

SEMA - Summary of scientific papers, 1.0 credits, Grading scale: P, F

TENA - Written exam, 3.0 credits, Grading scale: A, B, C, D, E, FX, F

Modifications from 2020:

We made two main modifications with respect to the physical lectures: (i) We organized more breakout rooms to discuss specific topics and (ii) I introduced quizzed using Mentimeter that the students could answer after some specific modules. The main goal was to check what was the students' understanding of the lectures and to spur some social interactions and engagement within the class, trying to recreate the spirit of a real in-person physical class.

A new teaching assistant helped to run the projects. We improved the tutorials and project descriptions to resolve all the problems mentioned in the previous edition. We also tried to give more freedom to the students on how to form the groups, letting the students choose the size and the team members with even more freedom than before. We also experimented a different learning method for the programmable network part. Instead of presenting the context and theory and then let the students start working on the project, we first gave the project description and programming tools to the students and let them explore these. The theory came while they were already well acquainted with the practical tools. We also added weekly 20-minute per-group meetings to give feedback to the students about their project.

Finally, we have re-aligned the learning outcomes with the grading criteria of the course.

## **THE STUDENTS' WORKLOAD**

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

We see that the variance in the workload is high. It is unclear whether the low number of hours corresponds to a student who also managed to pass the exam or not. The median workload is 15-17 hours/week, which seems to be below the 40hours/1.5 credits load. Yet, the comments from the course evaluation state that the course is demanding.

## **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?**

The results are inline with the previous year:

2 A

5 B

2 C

1 D

1 E

2 FX

4 did not receive a final grade because they did not complete some parts of the course.

## **STUDENTS' ANSWERS TO OPEN QUESTIONS**

**What does students say in response to the open questions?**

There were no open questions this year.



### **SUMMARY OF STUDENTS' OPINIONS**

#### **Summarize the outcome of the questionnaire, as well as opinions emerging at meetings with students.**

In the course evaluation, we received the highest average score since the course has been redesigned in 2019, with an average score of 6.4/7. The students mentioned several best aspects from the course:

"This is a fun but demanding course"

"For the first time by the end of the course, I feel that I will miss this course"

"The teachers were available for any question or doubt"

"The lectures, videos, paper summary, lectures were well-organized, clearly presented, and interesting, the content of the course was fascinating. I think the professor and the TAs, was the best aspect of the course."

The only score below 6 has been again "I was able to learn by collaborating and discussing with others", which seems to be hard to improve, probably because there are still students who do most of the work in their group projects without learning from others. One of the two students' representatives mentioned that he/she has been able to learn from one student in his project group. After having aligned the new grading criteria and having explained them to the student, we have observed that the grade for the question "The intended learning outcomes helped me to understand what I was expected to achieve" has increased from 6 in 2019 to 6.9 in 2021.

### **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.**

We are satisfied with the positive trend in the course where the average score in the course evaluation has been 5.9 in 2019, 6.0 in 2020, and 6.4 in 2021.

We believe that the course can be further improved by taking into account the feedback from the students' representatives.

### **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?

Social and lecture engagements could be improved during online classes. More breakout rooms and exercise sessions would help. We do not see differences in experience between different categories.

### **PRIORITIZED COURSE DEVELOPMENT**

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

We will introduce a homework during the project group tutorial to guarantee that the students all proceed at the same pace.

We will look into more recent technologies in the area of network virtualization, such as Kubernetes.