KTH Industrial Engineering and Management

Report – MJ2380 22-01-04

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Respondents: 38

Answer Count: 6

Answer Frequency: 15.79 %

COURSE DESIGN

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

Viktoria Martin was course examiner, Francesco Gardumi course responsible and several teachers delivered part of the teaching and supported the assessment: Vignesh Sridharan, Nandi Moksnes, Emir Fejzic, Shravan Kumar, Ioannis Pappis and Will Usher. The course responsible took overall responsibility for organisation of the course, communication with students and assessments and delivered several lectures and labs. The course examiner took charge of the final grading.

The course is organised in 5 lectures and 6 computer labs. The lectures are intended to provide key concepts for the lab activities and the labs deal with both individual and group tasks that are delivered as assignment and graded. The final grade is a weighted average of the grades from the assignments, with modality extensively described on Canvas and during the first lecture. Since this is a 9 credits course, significant workload is required of the students beyond in-class hours, especially for the final 3 HP project.

The Intended Learning Outcomes of the course had been changed in 2019, to better reflect the overall objective. The course responsible strived to communicate to the students that critical thinking and analytical mindset were the most important outcome. He also kept remarking, at the end of each class, that feedback by the students was essential to improve the course's quality. In this view, besides the Course evaluation, he published on Canvas a short survey after each lecture: this included one quiz question ('How do you evaluate today's lecture on a scale from 1 (lowest) to 5 (highest)?'; and one open question ('Kindly motivate your answer and provide suggestions for improvement, if any').

THE STUDENT'S 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?

The students reporting highest workload reported an average maximum 24-26 hours/week (with peaks of 40 hours/week towards the end of the course, close to the final project's deadline), which means around 210 hours over the entire course duration. This is more or less in line with the 240 hours that would be required of the 9 credits.

Some students remarked in the course evaluation that significant workload is required, especially due to the project work and the non-intuitive/faulty software used. Some also pointed out that the workload is unbalanced through the course and it increases considerably when the project work ramps up. In part, this is due to the course being all concentrated in P3. This must be addressed at a program's level, by extending the course to P4. It will happen in academic year 2022/2023, but it unfortunately cannot yet happen in 2021/2022. The unbalanced workload has been addressed by re-structuring the course, re-shaping the project deliverable and including non-mandatory project kick-off and tutoring sessions in the schedule, early in the course. The software issues have been fixed by use of a new version of the software. It must however be emphasized that part of the learning experience is dealing with software that is not off-the-shelf. This means not using ready-made interfaces and getting the hands 'dirty' with modelling issues and bugs. 'Debugging' has been made an active part of the learning, with its own learning occasion, to help the students through this.

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?

No student failed. The average grade was B, with few lower grades. That is considered a very good results.

However, I am concerned that most students struggled more than expected with the critical analysis of the model dynamics and with the lab activity where they had to write a linear optimization problem. This seems to be related to their study background, since the colleagues registered to MJ2381 (given jointly with MJ2380) had no issues on this. After discussions with EGI's teachers and students representatives, this was addressed by introducing clearer requirements for the course, especially as related to knowledge of linear algebra and systems thinking.

OVERALL IMPRESSION OF THE LEARNING ENVIRONMENT

What is your overall impression of the learning environment in the polar diagrams, for example in terms of the students' experience of meaningfulness, comprehensibility and manageability? If there are significant differences between different groups of students, what can be the reason?

Student's satisfaction seems in general to be strongly skewed towards positive values and the comments confirm this. In the course evaluation responses, 1 of 6 students seemed on average to have more markedly negative remarks about the workload and the learning process associated with the modelling tools used in the course. Although not statistically significant, some of the negative comments seem grounded in potentially real challenges related to the learning process in the course. They were analysed and will be addressed as discussed below. No difference in learning environment between groups of students was reported.

ANALYSIS OF THE LEARNING ENVIRONMENT

Can you identify some stronger or weaker areas of the learning environment in the polar diagram - or in the response to each statement - respectively? Do they have an explanation?

The response rate of students to the requests for feedback was not high. This may have bad and good reasons. The good reason could be that most students did not feel like voicing any particular concern. This could be confirmed from the fact that from the very start no strong criticism or dropout occurred. The bad reasons might lie in the lack of trust in the course evaluation. Between the previous course edition and this, we worked to show the students how much their feedback mattered for the course design: at the course start we presented the feedback from the previous year and how it was addressed. This however did not result in a higher rate of response. The rate of response became actually lower (from around 20% to around 16%).

The – few – evaluations show general satisfaction with the course, especially regarding the involvement and helpfulness of the teachers, and the focus on learning concepts.

Most negative comments revolved around the project workload and distribution of workload. There is criticism (growing from the previous year) around the impracticality of some piece of software used during the course. Two comments highlighted the lack of ungraded feedback. One comment highlighted the bias towards practical aspects, more than theoretical aspects.

The positive feedback will greatly help the course responsible and teachers identify what worked well and needs not changing. I feel it responds indeed to what I wanted to communicate. The criticism is well taken and understood: most seems due to problems in some of the practical arrangements and I did realise that myself during the course. Corrective actions were taken as detailed below.

ANSWERS TO OPEN QUESTIONS

What emerges in the students' answers to the open questions? Is there any good advice to future course participants that you want to pass on?

Both in their positive comments and criticism, students definitely provided important feedback for the future development of the course. This responded to a constant and repetitive call for feedback that the course responsible made during the teaching sessions and is highly appreciated.

PRIORITY COURSE DEVELOPMENT

What aspects of the course should primarily be developed? How could these aspects be developed in the short or long term?

The course undergoes regular updates, taking into account the teaching and learning experiences from within the course and beyond. From reflections in previous editions, the course structure and content were significantly modified to improve the constructive alignment between objectives, contents, activities and assessment.

From the reflections in this course evaluation, the following major aspects have been changed (among several others):

- We have moved away from the piece of software that was causing problems among the students, hindering their learning process and significantly increasing their load in the wrong direction. The new software should ensure smoother learning and more focus on the core aspects of the course (understanding of the dynamics occurring in an energy system model). However, it must be highlighted that the objective of this course is looking ‘under the hood’ of energy modelling. As such, it will not use ready-made interfaces and it will be by default confusing to a certain degree. This will be better communicated to the students.

- The project has been re-organised so that the workload associated to it is more balanced throughout the course. The activities in the course will provide the students with the knowledge necessary to carry out the project tasks starting from the beginning of the course. Time consuming aspects like data mining have been removed, since they were not in line with the course objectives and they were causing imbalances between groups. A kick off session and two dedicated tutoring sessions for the project have been introduced from early on in the course, to guide students in a more structured way. However, high workload is still required because that is in line with the number of credits of the course. Students taking the course (which is not mandatory) are made aware of this upfront.
- Specific pre-requisites for the course have been added to the course website and course memo, to make students aware of the knowledge needed to excel in the course. These are needed to be able to keep up with the course activities without struggling and to obtain the highest outcomes. Material will be suggested to make up for the needed knowledge, for students who do not entirely possess the pre-requisites. The pre-requisites are expected to pose a barrier for students and potentially decrease the number of registered students. However, they are also expected to improve the learning experience and align it between the MJ2380 and MJ2381 group.
- In future editions, the course will be spread between P3 and P4, to decrease the peaks of workload and separate better the learning and assessment moments. However, this is not possible in the current edition of the course (VT 2022).
- A more extensive description of the course, its objectives, its contents and the grading criteria has been published upfront in a course memo, to better inform the students' expectations. There, the link to sustainable development issues has also been clarified, to the extent allowed.
- An occasion for ungraded feedback has been introduced at the start of the course, to guide students toward how they should write their assignments and reflects during the rest of the course.
- The bias towards practical experience was not considered of concern. The course is described as highly focused on learning-by-doing and problem-based-earning. It is meant to provide modelling and analytical skills, on top of theoretical knowledge mostly given in other parts of the program. However, more attention will be given to ensuring that all the theoretical background is available to the students and that they are aware of it.
- Debugging, i.e. struggling with modelling issues, software issues, installation issues, lack of proper inputs, lack of results, etc., was introduced as an official learning occasion (Lab 2). This is meant to make the students understand that debugging is a part of modelling, always present in the modelling process, key to model and software development. Skills related to model debug are going to be an outcome of this course and they are highly valued in the work environment.

OTHER INFORMATION

Is there anything else you would like to add?

I reflected on a few aspects beyond those raised by the students. The first one is the lack of references to sustainable development in the course description, objectives and intended learning outcomes. This does not correspond to reality, since the course content has high focus on sustainable development challenges related to energy, land use, water use and climate action. Correcting this requires time, since the course syllabus (including the learning outcomes) needs to be

changed. The changes will be fully implemented by 2022-2023. However, some minor changes have already been implemented, to the benefit of students of the edition 2021-2022.

Also the taxonomy of the ILOs needs to be updated, to better reflect the skills and competences that the students acquire (and are expected to acquire) with this course. This would also address some – sporadic – comments by students that somehow highlighted a mis-alignment between course content and learning objectives.