Joint analysis of MJ2380-2381

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.

The course evaluation happens in different ways and at different stages.

The course responsible made an open call for two student representatives for the course during the first lecture. Two persons volunteered and were assigned. The two persons had different backgrounds and represented different genders.

Interim evaluation surveys were created by the course student representatives and shared with all students. The course responsible discussed with the course representatives the responses and acted on them (and informed all students).

A course evaluation survey was also opened using the KTH course evaluation template at the end of the course. One evaluation was opened and shared with both MJ2380 and MJ2381 students (who took the course together for the largest part).

DESCRIPTION OF MEETINGS WITH STUDENTS

Describe which meetings that has been arranged with students during the course and after its completion.

Two meetings were arranged with the student representatives for feedback during the course, so that adjustments could be made for the current edition of the course as much as possible. Ahead of one of the meetings, the student representatives also designed a survey (reviewed also by the course responsible and agreed by the three) and shared it with the course participants for collecting feedback. The course responsible and the student representatives had an open Canvas message channel for any communication throughout the course. Important feedback collected concerned e.g. the course schedule (some mistakes and inconsistencies), which was corrected accordingly, and suggestions for improvements to the course (addressed later in this course analysis). One open question was regarding the positioning of what now is HEM2 in the course. The students had different views on it.

COURSE DESIGN

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

No significant changes were made to the course structure compared to the previous year: the reason is that in the previous edition the course was extensively restructured, and in this year's edition we aimed at consolidating the new course structure and its formative offer.

All course activities and the assessment aimed at guiding the students in developing critical understanding of the process of creating and using an energy system modelling tool for generating

insights. While several theoretical concepts were taught in class, most of the learning was supposed to happen through learning-by-doing, individually and in groups.

Three projects constituted the examination, which also drove the learning. All were graded A-F.

- PROA (1.5 ECTS) Understanding linear programming and the long term energy system modelling tool OSeMOSYS
- PROB (1.5 ECTS) Developing a simple energy system model in OSeMOSYS
- PROC (3 ECTS, group project) Country analysis - least cost electricity system capacity expansion plan, using OSeMOSYS.

6 lectures introducing key theoretical concepts were given in class in hybrid form (in-person and online), for improved accessibility and for including groups that were attending remotely.

Numerous lab sessions, tutorials and Q&A sessions were organised for supporting the hands-on work leading to the three home assignments (PROA, PROB, PROC). All these occasions were meant as spaces to provide the students with guidance and ungraded feedback.

For PROC there were a number of milestones (ungraded) scheduled, to help the groups plan their work timely. Key ones were the submission of a project plan, and an interim project report submission followed by an interim group project presentation.

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?

Of the 15 responses obtained on the workload from the course evaluation, 7 indicate a load lower than or equal to the intended load for the course. The comments confirm a very manageable load. 8 indicate a higher load. Looking more into this, the comments by the latter group are the following:

- Initially it took a lot of time to get adjusted to the software and start modelling. After getting a hang of the software, the workload in terms of number of hours reduced. Since it was a group project, the workload was divided well between the group members.
- Depended on what phase in the course we were in.
- The course is worth every hour spent. The transition from the foundational topics to PROC.
- The working hours were very different from week to week. But, a minimum average hour was allocate to work on this class for sure.
- The workload depended on when during the semester one looked. During proA and proB there was a lot of time spent and the same during the final weeks of proC.
- PROC felt like way too much work than 3 credits.

These comments make the picture less worrying than the numbers above would lead to intend. Still, we reflected on the workload and took actions to improve it, especially at the beginning (PROA) and the end (PROC).

The teachers observed that several students dedicated much more effort than expected on PROA and that overall performance on the same was lower than on PROB and PROC. We worked with the student representatives to analyse potential structural causes for this. **We decided to shift the equivalent of PROA (now HEM2) to later in the course**, where the students will have more knowledge supporting them in that part of the work. We also changed the assignment, **removing**

some parts that created great misunderstanding and caused a number of FXs (with consequent need to re-submit and spend more time on the assignment). That should reduce load and stress.

Additionally, we perceived high workload towards the end of the course, when the report for PROC had to be delivered likely at similar times as many other project reports. This prompted us to reflect on the type of assessment we used for PROC. We now **significantly reduced the writing load for PROC (now TEN1)**, from a report to a short factsheet. The core of the examination will be oral.

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?

For the 6 HP course (MJ2381), out of 64 students 57 got a final grade (after completing all the assignments). 2 received A, 21 B, 24 C, 9 D and 1 E. For the 9 HP course (MJ2380), out of 22 students, 18 completed all assignments and obtained a final grade. Of these, 6 received B, 8 C, 4 D.

There are no significant differences with previous course offerings. There is a lower number of 'excellent' results (As), but there is a high number of B and C in general (similar to previous years). These are good grades, indicating good to very good understanding of the subject, so the overall picture seems to indicate successful learning from the class overall.

There are a number of students, however, who failed to submit some assignments. We need to understand the reasons better with discussions at Program level. We expect that the change in the progression and nature of the two most challenging assignments will reduce pressure and allow improvement on this aspect.

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.

The results are overall positive, although there was a relatively high number of students who dropped the engagement in specific moments (and for specific assignments) or from some point onwards in the course.

In the course evaluation, there were a couple of comments on missing alignment of the course activities and learning with the ILOs. The comments are by 1-2 persons and concerning especially the role of PROA. They are not statistically significant. Nonetheless, they raise points for attention and indicate possibilities for improvement. Changes in the assignment and its position in the progression should have addressed them.

From the teachers' perspective, we did notice more struggles with one of the assignments (PROA), and this follows a trend from previous years, and potentially confirms what expressed also in the evaluation. Additionally, we noticed that the requirement of a project report for PROC may be critical from a few points of view: 1) it adds to an already high (repeatedly highlighted by the students) load of project reports; 2) it introduces some repetition with other courses; 3) it makes it challenges to fully evaluate individual contributions (even when we ask for individual reflections and tables of

contributions); 4) it makes it difficult to assess how and how extensively language models (e.g. Chat GPT) have been used. We made changes to the course accordingly (see points below).

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?

The experiences by the students who responded were very diverse, and that may also be linked to the different backgrounds of the students taking the course. Overall, challenges emerge related especially to PROA and PROC, in line with what discussed also elsewhere in this analysis. This confirms the need for improving the learning environment, connection to the ILOs and assessment for these two. One very good suggestion was also to provide examples of expected outcomes for the assignments, especially the 3HP project work. This will be implemented in VT25.

According to the evaluation, the hands-on work with a modelling tool and its application to real cases was stimulating and enjoyable for the students, despite challenges with bugs and data. The latter can be handled in the tutoring sessions.

From the teachers' point of view, the observed learning aligns in general very well with the objective of gaining a deep understanding of the theory and practice of energy systems modelling. The intended high focus of the course on practical work and hands-on modelling experience seems to be matched by the students' experiences, which indicates a successful alignment of the ILOs, course activities and type of assessment. We'll however improve the aspects raised by the students, and also keep an open mind to change the teaching methods as the science and societal needs evolve.

The number of respondents is not high, so it is hard to make statistics on potential differences in experience between different groups of students.

PRIORITIZED COURSE DEVELOPMENT

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

For the VT25 offering of this course, we are working on one key area for improvement that emerged: the assessment method. We are trying a new approach for PROA (which has a high component of theoretical reflection and abstraction), where we place it later in the course (it has become HEM2 in the updated syllabus) as a reflection prompted **after** the students have worked with more practical questions. We have also changed the assessment method for the group project (now TEN1), which will require the submission of a 'brief' on the modelling work (not a lengthy report anymore) and then have a group and individual oral examination. The latter will grant that the assessment requires much less writing work (reducing students' load on activities with little learning involved), that it is individual, will avoid risks of unethical use of AI, and will also create a learning environment more similar to professional environments the students will face after graduating.

We are also changing PROB (now HEM1) to an extent, adding complexity and multiple reflections to it. This improves its connection with the ILO, but also addresses a potential overlap with the course MJ2508, which has also been significantly revised for HT24.