

Course Analysis – SH2702 Spring 2024

Course analysis carried out by:

Pavel Kudinov, pkudinov@kth.se

1. 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 are invited to participate in the course evaluation using the Learning Experience Questionnaire (LEQ). During the course, the students were regularly invited to express their concerns or questions by any means including arranging a meeting. At the end of the last seminar, students and teachers are asked to discuss the course, which constitutes the course meeting. Aspects regarding gender and disabled students are investigated in the dedicated LEQ questions.

2. DESCRIPTION OF MEETINGS WITH STUDENTS

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

Students were invited to request meetings (see above) and a few took the opportunity. Out of 33 students that finished the course 21 participated in LEQ.

3. COURSE DESIGN

Describe briefly the course design, the constructive alignment (intended learning objectives, learning activities, assessment, and how they interact), and the development that has been implemented since last course offering.

Intended learning outcomes this year were the same as last year: after completion of the present course, students will be able to:

ILO1: Define key elements of the nuclear power plant design and safety features,

ILO2: Explain the principles of nuclear reactor operation and control,

ILO3: Develop simplified design and perform analysis of (a) nuclear reactor core, (b) primary systems, (c) balance of plant.

ILO4: Reflect on nuclear core design constraints in terms of limiting important operating parameters such as (a) Critical Heat Flux (CHF), (b) maximum cladding and fuel pellet temperature.

The course is based on three main learning activities

- Home reading of the course handbook (to support achievement of ILO1-4)
- Lectures (that go in depth for some selected topics) (to support achievement of ILO1-4)
- Exercises solved by students (to support achievement of ILO3 - 4)
- Project work and oral presentations given by students (to achieve ILO1 - 4)
- Peer review of the project (to achieve ILO1 - 4)
- Final written exam (to assess achievement of ILO1-3)

There are 8 lectures, 4 exercises and 6 seminars. The exercises have been refocused on topics directly relevant to Task 4-6 in the project (see below).

The project is presented in oral presentations (seminars) and as a written report (one draft version and one final report per team).

The topics of the oral presentations are as follows:

1. Reactor design overview (students select which type of reactor they would like to work with)
 - i) General design specification of the nuclear power plant with the selected reactor type (Task 1).
 - ii) Operation principles of the nuclear power plant with the selected reactor type (Task 2).
 - iii) Safety features of the nuclear power plant with the selected reactor type (Task 3).
2. Results of calculation of selected core parameters (Task 4).
3. Results of calculation of CHF margins in hot channel (Task 5).
4. Results of calculation of the maximum cladding and fuel temperature (Task 6).

Assessment and grading:

- 1) Project contribution to the final grade 70% and exam is 30%.
- 2) Peer review serves as formative (for the students that receive peer reviews and should provide necessary changes in the final report) and summative (quality of the peer review is now graded and students can get extra points for writing a review with constructive suggestions on improvement of the draft project report).
- 3) Changes in the final exam format and scope were relatively minor to get more information on how it works and plan future changes.

Course schedule:

To give more time for feedback on the students' project progress the number of students in the group has been increased from 3 to 4. This reduced the number of groups. Also, the time for the presentation of Tasks 4-6 (most exciting part for the students) has been increased by increasing the allocated time for the seminars.

4. 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

The total workload of the course reported by students is still slightly below the expected level for 8 hskp, but has increased on average since the last time.

At the same time student report quite high workload and sometimes admit that it was "difficult to provide a good estimate" and that it was "a very busy study period".

Overall, it seems that current course load and intensity is quite reasonable now and further increase of the load can only be done if the course is extended into periods 3 and 4, which might, in turn, limit some opportunities for the EMINE exchange students to take the course.

5. 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?

2021: 21 students	1A (4.8%)	12B (57%)	6C (28.6%)	2D (9.5%)	
2022: 15 students	4A (26.6%)	7B (46.6%)	4C (26.6%)		
2023: 32 students	3A (9.4%)	23B (71.9%)	3C (9.4%)	2D(6.2%)	1E(3.1%)
2024: 33 students	7A (21.1%)	18B (54.6%)	8C (24.3%)		

This year 2 students registered but never started the course.

Over the years, the results seem to be relatively stable with some fluctuations of the A/B/C split. This year the number of A doubled and Cs slightly increased (by ~5%) in expense of Bs, Ds and Es, which is considered as an overall improvement of the grades. This might be attributed to some experience gained from last year in arrangement of the Project, peer review and seminars.

6. STUDENTS' ANSWERS TO OPEN QUESTIONS

What does students say in response to the open questions?

Overall, there were no major issues raised.

This year the number of students that participated in the feedback was quite large, so we try to summarize the main themes of the responses below.

What was the best aspect of the course?

Practically all students agree that "the project was the best aspect" and that "the idea of the project was fun".

It was also appreciated that "the project was 70% of the grade".

Some students mentioned that they "really enjoyed the lectures", that "the exercise sessions were helpful" and that "the best aspect of the course was the application of what learned during the classes in the final project".

One student even provided a more comprehensive view that we are very pleased to cite here "The best aspects of the nuclear reactor technology course are its comprehensive coverage of theoretical concepts and practical applications. The course delves deep into the fundamental principles underlying reactor design, operation, and safety protocols, providing a solid theoretical foundation for understanding nuclear processes. Additionally, the inclusion of hands-on exercises, simulations, and real-world case studies enhances the learning experience, allowing students to apply their knowledge in practical scenarios. Overall, the combination of theoretical rigor, practical relevance, and expert guidance makes this course an invaluable learning experience for anyone interested in nuclear reactor technology."

What would you suggest to improve?

In summary, several students felt that the course should be spread over two periods to make it less intensive.

Better instructions for the exam and for the peer review were mentioned as areas for potential improvement.

There are mentioning of the potential for improvement of lectures without "too much emphasis on information".

What advice would you like to give to future participants?

The main suggestions can be summarised as:

Focus a lot on the project and try to start Tasks 4 to 6 of the project very early on.

Don't hesitate to ask teachers for help.

It is important for the exam to follow the exercise sessions.

7. SUMMARY OF STUDENTS' OPINIONS

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

On average, the outcome of the LEQ are quite positive.

On a scale where a neutral answer is 3, the average response to all question is 5.59 while the smallest average response was 4 to the statement "I had opportunities to influence the course activities". At the same time the response to the LEQ statement "I was free to use my own methods, as long as they produced acceptable results." was on average 6. It might be because course aspects such as schedule and deadlines for the project presentations, peer review and the report are necessarily fixed to make the group activities and peer review processes work, while for course learning activities such as selection of the reactor design to be studied in the project and approaches to the analysis, etc. students had complete freedom of choice.

The average responses were positive regardless of students' gender, origin or disability, but had some small variations with respect to average (5.59), namely for male students responses were slightly more positive by 3.9%, for female students slightly negative -8.1% and for students with disability also a bit more positive by 0.8%. While the averages are positive, and variations are not dramatic there is a space for further improvement of the course experience for all students.

Overall, according to students responses (on the scale 1 to 7) they feel that:

Stimulating tasks

1. I worked with interesting issues: 6

Exploration and own experience

2. I explored parts of the subject on my own: 5.5

3. I was able to learn by trying out my own ideas: 6

Challenge

4. The course was challenging in a stimulating way: 5.8

Belonging

5. I felt togetherness with others on the course: 6.2

6. The atmosphere on the course was open and inclusive: 5.9

Clear goals and organization

7. The intended learning outcomes helped me to understand what I was expected to achieve: 5.2

8. The course was organized in a way that supported my learning: 4.9

Understanding of subject matter

9. I understood what the teachers were talking about: 5.6

10. I was able to learn from concrete examples that I could relate to: 5.3

11. Understanding of key concepts had high priority: 5.8

Constructive alignment

12. The course activities helped me to achieve the intended learning outcomes efficiently: 5.8

13. I understood what I was expected to learn in order to obtain a certain grade: 5.5

Feedback and security

14. I received regular feedback that helped me to see my progress: 5.3

15. I could practice and receive feedback without being graded: 5.8

16. The assessment on the course was fair and honest: 5.9

Sufficient background knowledge

17. My background knowledge was sufficient to follow the course: 6

Time to reflect

18. I regularly spent time to reflect on what I learned: 5

Variation and participation

19. The course activities enabled me to learn in different ways (m)20. I had opportunities to influence the course activities: 5.4

Collaboration

21. I was able to learn by collaborating and discussing with others: 6.6

Support

22. I was able to get support if I needed it: 5.5

8. 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.

Overall, the teachers are quite happy to see that students like the course, succeed in achieving ILOs and are able to get good grades.

The changes that were made to the course format seem to work well.

More time allocated for the seminars and feedback during their presentations was appreciated by the students and improved the quality of the reports.

There is still space for further improvement according to the students feedback to the open questions, namely improvement in the alignment of lectures, exercises and the exam.

Arrangement of the peer reviews can be further improved with more instructions and maybe even examples to make them more powerful.

9. ANALYSIS OF THE LEARNING ENVIRONMENT

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?
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There are no significant differences in learning experience of students with different gender, ethnicity, disabilities etc.

10. PRIORITIZED COURSE DEVELOPMENT

What aspects of the course should be developed primarily?

How can these aspects be developed in short and long term?

I see a couple of main opportunities for further improvement:

Peer review needs further destabilization of instructions as some students seem to have very limited experience with such activities and need time to understand what is required from them. We can also consider how to make the reviews more effective using good reviews as examples at the beginning of the course.

Consider allocating extra points for more detailed reviews that ask more questions. The issue is how to balance quantity vs quality of question. We need more questions that can help to improve the report more substantially.

Schedule for the Project seminars and number of people per group. If the number of students will increase further, we will need to adjust the length of the seminars for presentations of the groups.

We want to further increase engagement of students in asking questions during the seminars.

We can consider disclosing the peer-reviewers and mandating them to ask questions during the seminar. There are some potential downsides of disclosing the peer-reviewers identities.

Another approach can be mandating other presenting groups to ask questions.

The format of the lectures can be improved further to increase engagement for all students.

Allocation of the last 5-10 minutes of each lecture to short quizzes and for questions from students (about the lectures and project) can be helpful in this respect.

Exam format and content was not a major issue this year. We will keep watching it to see if there are further improvements needed.

We can also further strengthen connection between the project work and exercises, e.g. by allocating time during the exercises for questions from and feedback to the project groups. For this to work, students will be incentivized to start the calculations even earlier.

11. OTHER INFORMATION

Is there anything else you would like to add?

No