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June 27, 2023

Teacher's Feedback: CHEM-E1150 Biomass Pretreatment and Fractionation - in Class

Course facts: 5 cr; periods III-IV (2023); teachers: Kyösti Ruuttunen (responsible teacher, lectures), Tiina Nypelö (teacher, lectures), Kaarlo Nieminen (MatLAB exercises); number of students: 25 (22 students in total passed the course, 88%); grades: 1-5 (average passing grade 2.4)
MyCourses: https://mycourses.aalto.fi/course/view.php?id=36505

Teaching and learning methods: Lectures, independent studying, MatLAB simulation exercises (group activity), and course exam or a literature review on a given topic. Mostly lectures given in class, some online sessions were included (mostly the ones with industry representatives). Also, some of the in-class lectures were recorded. The course includes theoretical teaching on the biomass availability and structure, as well as the technology and chemistry of industrial processes for chemical modification of biomass for manufacture of value-added products. The lectures also cover description of the pretreatment processes for the feedstock; in Finnish context the emphasis is on northern hardwood and softwood species. The MatLAB section of the course included a couple of introductory lectures as well as written material for independent study. Details on the course contents can be found in MC (click the link above).

Assessment methods: Standard grading was used (passing grades 1-5). The maximum points to be earned was 100, containing the exam or literature review points (max. 80 p) and the MatLAB group exercise points (max. 20). Minimum 40 points were required for obtaining the lowest passing grade (1). The exam was organised electronically as a MyCourses (MC) quiz through the Exam e-examination system in the exam rooms on campus. Optionally, the students could write a literature assignment on a given topic. The submission of the literature review was realised in MC through Turnitin originality check online software. In addition to detecting plagiarism, the Turnitin software can be used for detecting usage of artificial intelligence tools (*e.g.* Chat GPT).

Feedback summary: Feedback was collected with the standard electronic survey (Webropol) – see Table 1 for a summary of the results.

Table 1. Summary of the student feedback from the electronic (Webropol) survey. The figures are averages from the students' responses. The deviation of the answers is described presenting the range of the given responses (the column titled Min.-Max.). The number of respondents (n) was 13 in 2023 and 6 in 2022 (52% and 24% of the participants, respectively). **Note that the numbering of the questions has changed from last year because a new open question has been added to the survey (number 5).**

	Aver. 2023	Min.-Max.	Aver. 2022	Min.-Max.
1. Overall assessment	3.46	3-5	3.33	2-5
2. Teaching methods	3.61	3-4	3.33	2-4
3. I am pleased with my study effort	3.54	2-5	3.67	2-5
4. Workload compared to other courses	3.61	3-5	3.50	3-5
6. Correspondence to the description	4.08	3-5	4.00	3-5
7. Effect on the study motivation	3.46	2-5	3.00	2, 5
8. Difficulty compared to other courses	3.61	3-5	3.83	3-5
9. The course enhanced my general skills	4.00[*]	3-5	2.83	2-4

[*]*n=12*

The numerical averages of the students' feedback are very good, and improved from last year, which is remarkable, especially when considering the rather high response rate for this year (52%). It feels good to continue developing this course from here, as it seems that we are on the right track. In the

open questions, the students' answers concentrated on describing the materials and the general contents of the lectures and the simulation exercise. There seemed to be too much of material, and some of the lectures were seen not very engaging; on the other hand, some students have also liked the lectures (the industry experts' participation, as well as Tiina's interactive teaching style received positive comments). Constructive and helpful feedback was given also for the MatLAB assignment. Generally, the assignment was seen to be demanding, and the connection with the lecture topics was not evident to the students. The exam received positive comments, although some concern was expressed of the literature review to be less demanding than the exam. The exam arrangements were not seen completely successful.

Development actions for next year: The MatLAB assignment is the biggest development point for next year: the connection with the lecture topics and the MatLAB exercise topics must be made much clearer. Also, we must look into the workload of the exercises and assure that the tasks are not too demanding taking into account students' skills in programming and mathematics.

Next year, we will continue giving most of the teaching as contact sessions. Some of the sessions can be arranged in the remote mode, of course, especially if that suits better for the visiting lecturers. During the lectures I plan to go through some quiz questions, so that the students will be better prepared for the exam – this way the teachers will have a better picture of the students' knowledge and learning, and the lectures will be more interactive. Also, other methods for student activation will be implemented. The assessment methods will be investigated to ensure equality among the students (*e.g.*, writing the literature review and taking the electronic exam should be as challenging). It seems that students generally liked the electronic exam. There were some technical issues with the Exam system, and I will do everything I can to ensure that these technical faults will be avoided in the future.

General feedback from the teacher: It was nice to teach this course because the students were very motivated and the participation in the lectures was at a good level. I was happy to collaborate with Kaarlo and Tiina and it is excellent that this collaboration will continue in the future. In general, I am happy about the feedback survey's result. Even though I have said this earlier, I say it once more: I am extremely proud of our skilful students, who know how to give feedback in a constructive way.