

Teacher's Feedback: CHEM-E1160 Biomass Pretreatment and Fractionation - in Laboratory

Course facts: Teaching periods III-V (2021); number of students 17 (one student left the course before finishing due to personal reasons; 16 students passed the course, grades 2-4)

Link to MyCourses: <https://mycourses.aalto.fi/course/view.php?id=27993>

Teaching and learning methods: Online lectures, workshops, and presentations. Laboratory exercise as contact teaching. Dr. Jaana Suviniitty from Aalto Design Factory (ADF) cooperated in executing the teaching. Metsä Fibre Oy and Andritz Oy were participating in teaching (Emilia Vänskä and Naveen Chenna, respectively), and the wood raw materials were obtained from Metsä Fibre. In the beginning, three teams (5, 5, and 6 students/team) were formed: first one investigating barley straw pulping, the second one extracting wood chips prior to pulping, and the third team investigating leaching of metals out of wood chips prior to pulping. The "story" in this project course was that the teams were start-up companies who were to create process concepts to be realised as a part of Metsä Fibre's Äänekoski bioproduct mill's ecosystem. Firstly, the students planned their process concepts, and secondly the concept was tested in the laboratory environment. As the Äänekoski mill uses the kraft process for wood fractionation, kraft pulping experiments were executed in the laboratory. The laboratory experiments were carried out by methods and equipment available at the Department (air-bath digester, kappa number & viscosity determination, O₂ delignification, as well as O₃ and peroxide bleaching etc.), instructed by KR and Ph.D. and post. doc. students. Due to the ongoing COVID-19 pandemic, planning and performing the laboratory experiments was challenging, but eventually was successfully completed as contact teaching in the Department's labs. The student teams reported their results in many different ways, both orally (online) and in written form. In addition, the students gave feedback on each other's work with the *I like, I wish* method developed at ADF.

Assessment methods: The student teams produced various written documents during the course: Project and Production Plan, Laboratory Report, and Project Report. These accounted for 20%, 40%, and 40%, respectively, of the final grade. The students carried out self and peer evaluation of the team members' input in the team work and based on this, a personal coefficient was calculated for each student. The coefficient's impact on the student's personal grade was limited to ± 1 grade point.

Feedback summary: The average values of the numerical data in the Webropol survey are displayed in Table 1.

Table 1. Average values of the numerical feedback given by the students in 2020 and 2019. The column "Min.-Max." indicates the deviation. Number of respondents: n=10 (2021); n=6 (2020).

	Aver. 2021	Min.-Max.	Aver. 2020	Min.-Max.
1. Overall assessment	3.50	2-5	4.00	3-5
2. Teaching methods	3.80	3-5	4.50	4-5
3. I am pleased with my study effort	4.20	3-5	4.33	4-5
4. Workload compared to other courses	4.10	3-5	3.50	3-4
5. Correspondence to the description	4.00	3-5 ^(*)	3.83	3-4
6. Effect on the study motivation	3.10	2-5	3.83	3-5
7. Difficulty compared to other courses	3.00	3 ^(*)	3.33	3-4
8. The course enhanced my general skills	4.00	3-5	4.17	4-5

^(*)One respondent chose E=Not applicable

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Feedback was collected both by group discussion (16 replies) with the students and by the standard electronic survey (10 replies; Webropol). Summary of the positive aspects mentioned by the students: laboratory work; working in teams; course format: project work and independent planning; collaboration with Metsä and Andritz; approachable teachers; feedback on the reports.

Summary of the things to develop according to the students: clearer communication and planning of the schedule; too many reports/presentations/deadlines; teaching should be over before May; My-Courses workspace not very clear; more comprehensive instructions right from the beginning; lectures on industrial pulping processes.

Development actions for next year: Much more work must be directed to planning the course. Every year the students have given negative feedback on the scheduling and communication of the course but until now I have not been successful in improving this aspect. Another thing is that this course should be developed together with the theory course (CHEM-E1150) – that has not really been successful in the past. Scheduling the courses in a manner where industrial pulping is taught at the same time both in theory and in practice would be a good idea (or the theory course would be arranged before the lab course). Involvement on the companies (Metsä and Andritz) will be continued. I will investigate the possibility of finishing the course earlier, so that in May only finalising the Project Report would remain.

General feedback from the teacher: Again, it was a pleasure to teach this course: big thanks to the students and to my teaching colleagues! The students were extremely motivated and hard-working, especially during the laboratory sessions. Towards the end of the course, everyone seemed to be quite worn-out. This is understandable because this year was extremely heavy to us all due to the pandemic.

For me as the responsible teacher, arranging the course was exceptionally demanding this year. Implementing contact teaching during the pandemic was stressful. Considering the limited resources and the large number of students, I feel that in the end the course was still a success, even though the numeric feedback was not as good as in the previous years (Table 1). I will take this feedback seriously and will require more resources allocated for the course. Also, I will carefully consider the overall structure of the course and try to develop it in such a way that the students' motivation will stay high from the start until the end.

The very good atmosphere and excellent collaboration within the student teams was evident throughout the course, and this was proven by the self and peer feedback given by the students. The great teamwork has always been the best feature of the course; a well collaborating and motivated team will always achieve more than a random group of individuals. I think that the course suffered slightly from having to have all the presentations, meetings, and group works online. Hopefully next year we can go back to more normal ways of working and having (most of) the presentations and meeting as contact events.