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DM545/DM554 - Linear and Integer Programming Action plan after students' evaluations

This is the handling plan for the courses DM554 and DM545. These courses had the following 4 groups of students:

- DM554 2nd year computer science
- DM545 3rd year computer science
- DM545 2nd year math-economy
- DM545 2nd year applied mathematics

DM554 is worth 10 ECTS, it runs through the Spring semester and contains linear algebra and linear and integer programming. DM545 is worth 5 ECTS, it runs through the fourth quarter and contains the linear and integer programming part of DM554. Students who take DM545 have previously taken linear algebra as a separate course. Students in DM554 must also attend the course NAT508, Innovation Project, which is worth 0 ECTS but whose working load must be accounted for in DM554.

The edition 2015 of these courses was transitory. From the next year, the courses will be offered for these group of students:

- DM554 2nd year computer science
- DM545 2nd year math-economy
- DM545 3rd year applied mathematics (elective course)

Hence, there will be no 3rd year students of computer science. Moreover, DM554 will be worth 7.5 ECTS, the remaining 2.5 ECTS will be earned by NAT508, Innovation Project.

Course organization

DM554 had two obligatory assignments: Assignment 0 on linear algebra (LA) and Assignment 1 on linear and integer programming (LP/IP).

DM545 had only one obligatory assignment: Assignment 1 (LP/IP). Assignment 1 included an anonymous peer revision process in which each student had to review with grade two submissions from peers. The final decision was however taken by the teacher or the instructor. A further obligatory assignment was cancelled for both courses due to the working load that students had during the semester (as it arises from the students' feedback, they had up to 11 submissions during the semester). Both Assignment 0 and Assignment 1 had a re-submission possibility (in both cases on a new topic).

The elements that account for the difference in ECTS between DM554 and DM545 were:

- the syllabus was broader for DM554, including linear algebra
- the number of obligatory assignments was 2 for DM554 and 1 for DM545
- some of the 10 ECTS of DM554 are actually for NAT508.
- the written exam for DM554 contained two tasks on LA and some less tasks on LP/IP.

DM554 in numbers

DM554 had 21 students in the protocol of the mandatory assignments and 17 in the protocol of the final written exam. At the end of the course the number of students enrolled in BlackBoard was 20.

	Submissions	Passed	Submissions	Passed
Assignment 0	20	17	1	1
Assignment 1	19	15	4	3

The final written exam had 16 submissions. Half of these submissions were before the time deadline, indicating a lack of preparation and pre-planning for a re-exam. This group of students had three exams within 2/3 days of distance each. At the moment of writing the number of students expected to fail the evaluation is 12.

The number of students that filled the course evaluation before the exam is 12.

DM545 in numbers

DM545 had 76 students in the protocol of the mandatory assignments and 53 in the protocol of the final written exam. At the end of the course the number of students enrolled in BlackBoard was 79.

	Submissions	Passed	Submissions	Passed
Assignment 1	76	61	6	4

The final written exam had 53 submissions. Only 3 were considerably earlier than the time deadline.

The number of students that filled the course evaluation before the exam is 33.

Students' comments aggregated from the two courses

I resume below the result of students' evaluation using italic font for the elements that call for an action.

The majority of the students finds:

- indifferent the quality of the text books and exercises in class while satisfactory the lecture notes and the slides.
- satisfactory the preparation, engagement and subject competence of the teacher while indifferent or *dissatisfactory his pedagogical competencies. Some comments hint at the teacher being annoyed when asking something "trivial"*.
- *dissatisfactory the instructor Qingsong* and highly satisfactory the instructor Bo. *In DM545, Marco often taught the exercise sessions too. Some point out that he has too high expectations and no understanding of where the students are.*
- the goals of the course were made clear
- the course was intellectually stimulating
- *the volume of work necessary to complete this course means that it cannot all be thoroughly comprehended. There was NOT enough time to understand the things learned in this course. There is the perception that lectures are too full and that there is too much material. Above all the LP/IP part is regarded as worth 10 ECTS alone.*
- *that there were too many exercises for the exercise sessions. The language in the exercises contains heavy mathematical notation and it is not easy to understand.* On the other side it was good having the solutions available.
- motivation was given for some topics and their relevance was made clear
- the obligatory assignments were too difficult
- the review process in Assignment 1 was positive.
- *the low attendance was due to i) several assignments during the*

semester including other courses ii) the lagging behind due to lack of attendance in exercise sessions

- in general the course was pleasant.

The final assessment of the written exams is not concluded at the time of writing. It seems however that a large number of students will not pass the exam. I did not receive complaints about its hardness. However, nobody succeeded in doing 100% of its content. Hence, it might have been too difficult. A confusing element is however that several students came unprepared aiming at the re-exam in August.

Actions

In response to the feedback received from the students, I plan to undertake the following actions for the next edition.

- Improve my pedagogical skills: going slowly, using more the blackboard, pausing and checking understanding, emphasizing few important concepts in lectures and presenting all in the light of those concepts, planning each lecture more carefully in such a way that it ends where expected without giving the feeling of being behind, becoming aware that this material is perceived as difficult from the average student, presenting more mechanical exercises that repeat what has been done in class without trying to introduce new material through exercises, speak with short and clear sentences without opening parenthesis, taking all questions with the due respect and enthusiasm.
- Create or give possibilities for those lagging behind to recover material and catch up. I have not yet an idea on how to achieve this.
- Put more care in the selection of the instructors. Unfortunately, being the written exam anonymous it is impossible to know who performed well. However, I can put more attention in the assignment process rejecting low candidates.
- Discuss the issue of the language in the exercises. I find that understanding and using proper technical and mathematical language is one of the goals of this course. However, I have never stated this directly to the students. I plan to do it the next time and make them more sensible on the issue, inviting them to point out where the language is difficult for them so that it can be explained.
- Every edition of this course I have removed material from the list of contents and tried to simplify the exam. Looking at the numbers of students that will not pass the written exam this year, it seems that the simplification process must continue. I experi-

enced a considerable difference between students from the second and those from the third year. The next year I will have mostly students from the second year. In particular, the part on LP/IP is perceived as worth 10 ECTS alone. I plan to remove the infeasibility starting via auxiliary problem (the dual simplex being enough) and I will think what else I can remove. The part on linear algebra must also be rethought. The written exam must be shortened by one task.

- Prepare better the exercise sessions. There should be material for the two hours and not more. It must be clear what will be done in those sessions and which preparation they require. There has been positive comments on doing the exercises in class, however for this to happen there must be less exercises. It is better with short exercises rather than long ones.
- Consider splitting the obligatory assignments into more submissions spread throughout the semester with more focused feedback. The experience on students' competencies in Python has been disappointing. Assignment 1 took more time than expected for this reason. The learning curve must be made less steep by means of preparatory, well focused, exercises. A system for handling automatic submission and feedback of small coding tasks could be helpful in this direction and it will be pursued.
- Finish the lecture notes on the LP/IP part and revise them.

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