ECON3120/4120 – Mathematics 2: Calculus and Linear Algebra

The course until now has 13 x 2 lectures, 4 seminar groups and a plenary session where there need to be three teachers present. Since we experience that students struggle with the course, cutting back on teaching may not be the best solution. Moreover, this is the standard amount of teaching for an undergraduate 10 study point course at the department of mathematics.

We still suggest reshaping the teaching. It is important that the students are active and try to solve problems on their own. Regular seminars have limited success in this respect, it is all too common that students arrive at the seminar without having worked on the problem on their own, and just copies the solution. For this reason, there have been workshops where students are working on given problems and where teachers are present to help answering questions they have. At the same time there are 4 seminars where the seminar leader present solutions to given seminar problems. *Our suggestion is that we make the seminars in plenum and have 4 parallel workshops.* This is similar to how it is done at the department of mathematics, where workshops are called groups.

Another idea borrowed from the math department is to introduce a "stumble group" or workshop in our terminology. With four workshop, one of them is for working on easier problems, suitable for the weaker students. The "stumble workshop" will also replace the pre-course that we have sometimes offered. The experience with pre-courses is that the conscientious students – who do not need them – attend. The ones who need them don't think about math until the regular classes start.

We thus suggest the following structure on teaching

	Comment
2 x 13 Regular lectures	Since the math is needed in both Micro 3 and Macro 3, there extra intensive teaching at the start of the semester.
13 Plenary seminars	One teacher solves problems given in advance, in plenum.
1 Stumble workshop	This is a workshop with rather trivial problems, sufficiently easy that the majority of student will find that they need not attend. Still, it should be available to all, but we should make clear that those who find the problems trivial need not attend. My experience is that such simple problem help boost students' confidence that they actually know some math.

	Until most students realize they do not need it, we need 2 teachers.
3 Regular workshops	These are workshops with more regular problems. All students should be assigned to one of these three groups. The stumble group should not replace the regular groups. Also weak student need to work on non-trivial problems.

Note that this requires less resources than the previous plan. Seminar teachers has to be prepared while workshop teachers are there to answer questions students have, which require no preparation. 1 seminar and 4 workshops thus require less than 4 seminars and 1 workshop. Moreover, a plenary workshop requires 3 teachers, while 1 teacher should be sufficient in the smaller workshop. Even though the stumble workshop needs more resources in the beginning, it is still less than H21. In addition, a pre-course is not needed when we offer stumble workshop.

The course has 4 mandatory assignments and students are required to pass three of them. Those who have failed in the 4th attempt will have a new chance, making it almost 5 mandatory assignments. While students thus have to put in effort throughout the semester, it is still important that they solve seminar problems and work at the workshops. To provide incentives and deadlines for the seminar problems we thus suggest that we make simple voluntary assignments based on the seminar problems. E.g. to hand in answers to subproblem a) and perhaps b) for each seminar problem. Any answer to the voluntary problem is awarded points towards the mandatory such that those who hand in many voluntary problem will pass the mandatory more easily while those who do not will ned 50% score.

We know that only course responsibility is decided, but we would still suggest the following. Framstad teaches linear algebra, Pasnicu do integration and differential equation and Brekke do the rest and also the plenary seminars. In addition we need teachers for the workshops.