Propsoal for compulsory courses in ug3

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Summary

This item includes two proposals and one preliminary proposal to introduce some additional compulsory courses for ug3 students.

Compulsory courses reduce administrative burden and help with planning, because students will be pre-registered for them. This reduces work for PTs and gives better estimates of course sizes early on. I have considered our degree structure and the ACM guidelines for Computer Science degrees, and I propose that the following changes are academically well-justified and should be adopted:

- **Proposal 1:** Require IAML for all ug3 students on MInf and AI degrees (i.e.: AI, AI+CS, AI+Maths, AI+SE, AI with management, MInf)
- **Proposal 2:** Require Computer Security for all ug3 students on MInf, CS and SE degrees (excluding joint degrees with other Schools, i.e.: AI+CS, AI+SE, CS BEng, CS BSc, Minf, SE). Move Computer Security into S2 in order to allow students to more easily take both IAML and CompSec if desired.
- **Preliminary proposal 3:** Replace CSLP, SELP, and AILP with a single course, Individual Large Practical, which will still have *at least* two different project options running in any given year, but students can simply pick an option within the same course wrapper.

If approved, Proposals 1 and 2 can be adopted immediately.

If Preliminary Proposal 3 is approved, I will liaise with the current lecturers and ug3 year coordinator to bring a full course proposal for Individual Large Practical to a future BoS.

Consultation

This proposal was prompted by a suggestion from Neil Heatley, and has been discussed with the lecturers of IAML and Computer Security (all in favor; see

notes below) and the members of the Curriculum Committee (also all in favor). Stuart was sent a version but has not responded. The ug3 year organizer was sent a copy just before submitting to BoS, so also has not responded yet.

Justification/considerations for each change:

Proposal 1

This is simply enshrining a de facto reality, which is also well justified academically. According to my data, virtually 100% of AI degree students already take IAML in ug3 or ug4 (most in ug3).

Proposal 2

This would create slightly more of a change. Currently about 70% of CS degree students already take Comp Sec (about 50% in ug3, 20% in ug4). However, there is essentially no required security content anywhere else in our curriculum, and this is an increasingly important area, as noted by UK government and ACM curriculum guidelines.

In particular, based on a detailed comparison between our curriculum and the ACM guidelines, I estimate that our required courses miss out at least 20 lecture hours (probably more) of ACM "core" topics related to Information Assurance and Security, many of which are cross-listed as topics in areas such as networking, operating systems, parallelism, and elsewhere. (These are all areas where ACM guidelines include much more content than our curriculum requires.)

Computer Security is a broad survey course that covers topics in cryptography, networks, usability, operating systems, etc. So in addition to providing important security content, it will also help our students learn a little bit about all those other areas even if they don't take an in-depth course on them.

Making this course mandatory would increase its steady-state enrollment by an estimated 25% (because a large chunk of students in the course are visiting students whose numbers would not be affected). The current lecturers (Kami, Myrto) have been consulted and are generally in favor of making the course compulsory, although with some concerns about finding and organizing the larger number of tutors and tutorial groups. Due to the very broad range of content in the course, tutors are already organized into "area groups" to do bursty work (many tutorial groups for 1-2 weeks). It proves harder to find student tutors for the more theoretical sections of the course, but these could perhaps be resourced using PhD students or lecturers from LFCS.

The change to Semester 2 is needed because some students will need to take both IAML and CompSec, and many will wish to. IAML must remain in S1 due

to MSc cohort, meaning that some students will have a Large Practical, IAML, and PI in S1 (50 credits). To avoid an overload, CompSec needs to move to S2, at least for now. This change is useful anyway, because at the moment S1 has far more course offerings in ug3 than does S2, and the students complain about it.

Note that CompSec moved to S1 a couple of years ago to provide MSc students the opportunity to take it as a prerequisite for some level 11 security courses (BDL, IMC, SP). But in practice this is not happening: only 8 MSc students are enrolled in Computer Security (out of 165 students total), and only 4 of them are doing any other security course. According to Kami, the more advanced courses also only require very small segments of Computer Security as prerequisite knowledge, and MSc students could get up to speed using a few videos or other online materials if need be. The situation may change if the plans for a Security MSc programme progress, but in that case it seems likely that MSc students may want a more advanced introductory course anyway.

Proposal 3

This is basically just an administrative change which would allow students to be pre-enrolled in the new ILP. As noted, in practice we should still offer at least two options each year, and put at least two staff in charge of running the course. But it might mean we don't need to run *three* options, especially if some of them combine aspects of more than one area. For example, previous years have had CS projects that include optimization and search, which are also important in AI; and SE options could include a game with an AI player. (Of course, it could also mean that we offer *more* than three options, if desired. The point is that it's a lot easier to change the number on short notice without upsetting students.)

The learning outcomes for AILP and CSLP are already very similar (mainly focused on designing, planning, and implementing a complex system, considering different options, managing time; writing a report and/or documentation). AILP also mentions running experiments, but this is something students now do in IAML (which is proposed to become compulsory) and even more so in MLP (which lots of students take also). The learning outcomes for SELP are a bit different (again include design/implementation/time management, but also mentions proficiency with current SE development platforms/frameworks/technologies). However I think it would be possible to unify the outcomes of the three courses.

Overall considerations and possible knock-on changes:

The above changes will mean that most students have 70 compulsory credits in ug3 (*LP, SDP, PI, and IAML or CS), and a few will have 90. This will significantly reduce the administrative burden on whoever is responsible for registering students, and will allow for better resource planning. It will obviously also mean students have fewer options, but as far as I can tell if there are

particular Level 11 courses they are aiming at, they should still be able to do the necessary prerequisites in ug3. (For example, the IoT courses require both COMN and OS; these courses are in S1 and S2, respectively, so students should still be able to take both.)

Even after shifting CS to S2, there is a large imbalance in credits offered in each semester. If the above changes are approved, we will consider further semester shifts, such as moving DBS and/or CD into S2 as well.

Students will also have less choice about *when* to take certain courses, and with fewer optional credits in ug3, any course that is limited to ug3 will have more limited uptake. If the above changes are approved, I will ask that lecturers of the 20 point level 9 courses (OS and CD) upgrade them to level 10, to permit students to take them in either ug3 or ug4.