Curriculum transition plan for CogSci degree (Addendum to Nov 2018 BoS paper)

7 Apr 2019

1 Overview

Due to upcoming changes to both the Informatics and PPLS UG curricula, we need to update our CogSci DPTs. A sketchy version of this was presented at BoS but this document provides the further details needed and discusses issues raised by the PPLS changes.

UG1 changes are minor and will be completed in 2019-20. UG2 changes are more complicated and will roll out over two years (19-20, 20-21). Details are described below.

2 Background: PPLS changes and implications

2.1 Upcoming changes to Methods courses

We have been told that Psychology are changing their Research Methods courses. Starting in 19-20, they will start teaching methods in Year 1, with a new course called Data Analysis for Psychology in R 1 (DAPR1). So, Psych students will now have 60 required credits: Psych1a, Psych1b, and DAPR1.

Starting in 20-21, they will replace the current Year 2 Methods course with DAPR2, which requires DAPR1 as a prerequisite. They told us they are willing to let in our students without DAPR1 specifically but only if they have done some probability/stats. Unfortunately, taking DAPR1 will not be feasible for our students unless they do an overload, and our probability/stats coverage isn't until Year 2.

2.2 Possible solutions/workarounds

Ideally, PPLS will either (a) accept our new Data Science UG2 course (also planned for 20-21, see below) as an alternative to DAPR2 for entry into honours Psych courses, or (b) accept CogSci students into DAPR2 without DAPR1 if they are taking DMMR (which will cover discrete probability) and/or Inf2: Data Science (which will include some continuous probability and statistics). These couldn't be prerequisites, as they have requested, but would need to be accepted as corequisites.

Both options will require negotiation with PPLS before finalizing DPT updates for 20-21 (ie by next spring). But note that there are a few honours Psych courses that do not require Research Methods as a prerequisite, so I think it's safe to assume that they won't require DAPR2 either—that is, even in the worst case, incoming UG1 students who start taking Psych courses in 19-20 won't be completely shut out from honours Psych courses.

3 Changes to UG1 CogSci DPT (2019-20)

In the coming year, we will be replacing Inf1-DA and Inf1-OP with a single course, Inf1b. I believe the only sensible update to the Year 1 DPT is therefore to leave everything else alone and replace these two courses with the new one:

UG1 DPT

Sem 1	Sem 2
Intro to Linear Algebra (20)	Inf1-CG (20)
Inf1a: Introduction to Computation (20)	Inf1b: OO Programming (20)
PPLS course (20)	PPLS course (20)

As noted in Section 2.1, our students don't have enough free credits to take DAPR1 without an overload.

4 Changes to UG2 CogSci DPT in 2019-20

4.1 Available Informatics UG2 courses, 2019-20

We will run the following courses in 2019-20. New/updated courses are shown in bold and described below.

Sem 1	Sem 2
Inf2: Introduction to Algorithms and Data Structs (20, full year)	
Inf2C-SE (10) [for CS/SE degrees]	**Inf2B: Learning (10) [half of current course]**
Inf2: Computer Systems (20) [for CS/SE degrees]	Probability with Applications (20)
DMMR (20)	Inf2D (20) [for AI degrees]

Inf2: Computer Systems. INF2-CS is a slightly scaled up version of the current 10-credit Inf2C-CS. The number of topics has not increased much, but more time will allow a deeper treatment of current topics and bring it better in line with our workload guidelines.

Inf2: Introduction to Algorithms and Data Structures. INF2-IADS is a new course that will cover material currently taught in the ADS part of Inf2b (10pts), plus some more advanced related material, including some that is currently taught in Inf2A (e.g., dynamic programming, including applications for grammars and parsing), and some that is not currently included in compulsory courses (e.g., the classes P and NP). The course will also include an empirical component (exploring algorithms in practice), introduced using Python.

Inf2A will no longer run. At present, this is a required course for CogSci degrees, so this change alone requires re-thinking the DPTs.

4.2 Proposed DPT, 2019-20

The overall structure of the DPT is similar to the present one. It replaces Inf2A with Inf2-IADS as the compulsory Informatics course, and keeps the structure of choosing from maths options, Inf2 options, and PPLS options.

The present DPT is complicated because it has two overarching options, separating out students on the Psych path vs the LEL/Phil path. I think we can simplify this by simply adding **guidance notes** to the PPLS course collection. These notes appear in both DRPS and PATH.

New DPT:

- Compulsory 20 credits: Inf2-IADS
- 20-40 credits from: DMMR (20), PwA (20)
- 20-40 credits from: Inf2B (10), Inf2D (20), Inf2C-SE (10)
- 40-60 credits from: PPLS collection (all 20 credits, listed below).

  Notes: (will appear in DRPS/PATH)

  Students planning to take honours LEL courses should register for LEL2A and are recommended to also take at least one of LEL2B and LEL2D.

  Students planning to take honours Psychology courses should register for Psychology 2A and 2B and are strongly recommended to also register for Research Methods and Statistics.

  Students planning to take honours Philosophy courses should register for both Mind, Matter and Language and Knowledge and Reality.

  Course options:

  - LEL2A: Linguistic Theory and the Structure of English (S1)
  - LEL2B: Phonetic Analysis and Empirical Methods (S1)
  - LEL2D: Cross-linguistic Variation: Limits and Theories (S2)
  - Mind, Matter and Language (S1)
  - Knowledge and Reality (S2)
  - Research Methods and Statistics (full year)
  - Psychology 2A (S1)
  - Psychology 2B (S2)
- 0-20 credits from: any level 7/8 course except Medicine/Vet.

5 Changes to UG2 CogSci DPT in 2020-21

5.1 Planned Informatics courses, 2020-21

These courses are all still in the planning stages, so changes to titles and contents are possible. The following descriptions indicate our current intentions. New courses in bold.

Sem 1	Sem 2
Inf2: Foundations of Data Science (20, full year)	
Inf2: Introduction to Algorithms and Data Structs (20, full year)	
Inf2: Computer Systems (20) [for CS/SE degrees]	**Inf2: SE and Professional Practice (20)**
DMMR (20)	Inf2D (20) [for AI degrees]

Changes to DMMR and teaching of probability. We plan to update DMMR to fully cover discrete probability as part of DMMR (with some material on graphs transitioned into Inf2-IADS to make room), and incorporating the teaching of continuous probability into the new Inf2-FDS course (below). Together, these will replace Probability with Applications.

Inf2: Foundations of Data Science. This full-year course will provide an introduction to the theoretical and practical aspects of data science, using examples from a range of areas within and outside of Informatics. The first semester will cover non-probabilistic topics (e.g., data visualization, data wrangling, nearest neighbors) while students are learning discrete probability in DMMR. The second semester will cover continuous probability and estimation, and some basic probabilistic machine learning methods and statistical analysis. We aim to interleave practical skills in Python, critical/scientific thinking, ethical considerations, and writing lab reports.

Inf2: Software Engineering and Professional Practice. Not relevant for CogSci degree.

5.2 Proposed DPT, 2020-21

- Compulsory 60 credits: Inf2-IADS, Inf2-FDS, DMMR
- 0-20 credits from: other Inf2 courses
- 40-60 credits from: PPLS collection
- 0-20 credits from: any level 7/8 course

Notes on Informatics courses: As described above, DMMR and FDS together cover the basics of probability theory, so we need to have students take DMMR as well as FDS. This means slightly less flexibility than the current degree and in particular students who want to do Inf2D will be limited in their PPLS credits. However, on balance I think the structure is considerably better than the complex choices we have now.

Notes on PPLS courses: The options will be the same as in 19-20, except that RMS will be replaced by DAPR2. The problems and possible solutions for this are discussed in Section 2.1, and will need to be ironed out with PPLS.