Changes to Degree Programme Table: Informatics 1 - Cognitive Science (INFR08020)

Deletions are striked through and additions are in bold

Summary

This course is designed as a first introduction to Cognitive Science. It will provide a selective but representative overview of the subject, suitable for all interested students, including students on the Cognitive Science degrees and external students.

The aim of the lecturing team is to present a unified view of the field, based on a computational approach to analysing cognition. The material is organized by cognitive function (e.g., language, vision), rather than by subdiscipline (e.g., psychology, neuroscience).

The course covers language, vision, memory, control and action, and reasoning and generalization. All topics will be presented from a computational point of view, and this perspective will be reinforced by lab sessions in which students implement simple cognitive models. ~~The course will also provide a basic grounding in the methods of Cognitive Science, focusing computational modelling and experimental techniques.~~

Course Description

The syllabus covers the following topics.
They are listed separately here, but in some cases they will be presented in an interleaved fashion:

1. Language
~~- the language faculty~~
~~- models of linguistic data, words and rules theory~~
- cognitive instinct or cognitive technology?
- linguistic representations: productivity and reuse
- Connectionist **and Bayesian** models of language
- language acquisition: speech segmentation **and** word learning~~, learning syntactic categories~~
- categorization and models of word meaning
~~- understanding sentences~~

2. Reasoning and generalization
- inductive reasoning
- fallacies and (ir)rationality
- models of abstraction and generalisation
- theory formation and the origins of knowledge

3. Fundamentals of cognitive neuroscience
- basic brain anatomy and function
- experimental techniques to record brain activity

- simple models of neurons

4. Vision
- the anatomy of vision, neural correlates of visual perception
- comparison of biological and artificial visual systems

5. Memory and Attention
- types of memory, memory impairments
- computational models of memory

6. Actions and behaviour
- reinforcement learning

Note that this course is intended to give a high-level introduction to the topics listed; subsequent courses (e.g., Computational Cognitive Science) will then provide a more detailed coverage.

Learning Objectives

On completion of this course, the student will be able to:

1. Demonstrate knowledge of key areas of cognitive science, and be able to take an integrated, rather than disciplinary perspective on the field.
2. Evaluate the most important conceptual problems in cognitive science and discuss the solutions that have been proposed.
3. Analyze and modify simple computational models in a variety of modeling paradigms.
4. ~~Demonstrate understanding of experimental design and statistics and apply it to simple problems in cognitive science.~~
5. Understand how cognition and cognitive science is societally situated and the ethical issues raised in researching cognition

Other Requirements

This course does not assume prior programming skills, but students are required to learn how to code. **There will be no explicit instruction on programming in lectures. Students**~~They~~ will receive an introduction to a contemporary programming language**, Python,** in the labs and use it to experiment with simple cognitive models in the assignments. **While there are resources provided in labs, some students with no prior programming/maths experience have reported difficulty completing the assignments.**

Reasoning: We change the summary and remove the 4th learning objective above because there is no explicit instruction on experimental design and/or statistics as most students will receive that in 2nd year courses and there's not enough time to cover everything else in the course description elsewise. We make the minor changes to the Course Description to better reflect the content being taught, which now provides more initial context on what is cognitive science, where does cognitive modelling fit in and broadens the coverage of relevant computational modelling approaches (e.g., Bayesian modelling). Lastly, we further clarify the support given for learning programming, which is a requirement for the course but not a pre-requisite. We anticipate that this clarification might decrease enrollment but the number of students has increased drammatically the past two years and setting the right expectations can only increase student satisfaction.