

# **Proposal for 20pt Introductory Applied Machine Learning in 2016/17**

## **Background**

IAML is a 3<sup>rd</sup> year course typically taken by 50-70% of UG3 and 40-60 % of MSc students (e.g., in 15/16 there were about 90 of each, plus some visiting UG4 and visiting UGs). For all students it is intended to be an introduction to standard machine learning methods, focussing more on a conceptual understanding and ability to apply the methods to real data than on the mathematical underpinnings, although the maths covered does require/include elementary calculus, linear algebra, probability and statistics. For our UG students it revisits some of Inf2D – Data and Analysis. In relation to other courses, IAML covers many of the same methods as Machine Learning and Pattern Recognition (MSc), but MLPR goes into the mathematical underpinnings and variations, whereas IAML skims or elides these. Data Mining and Exploration uses methods covered in IAML and MLPR and introduces some extensions, but focusses mostly on the students understanding how to prepare real-world data for these methods, apply them, and present/evaluate the results.

IAML already exceeds the guidelines for a 10 point course in terms of assessment (2 summative/formative assessments, reduced from 4 last year) and in terms of hours of work per week (the base load is 3 contact hours and 3 non-contact hours, but when summative assessments are running they add 7 hours over 2 weeks, so even with perfect balance this amounts to 10 hours per week during those weeks, exceeding the 10 point limit of 6-7 hours; and with imperfect balance approaches the 20 point limit of 13 hours). It is in fact close to a 20 point course as it is.

## **Proposal**

The proposal is to make IAML a 20 point course. The material covered will be expanded minimally – we will re-introduce the segment on neural networks, brought up to date for deep learning. (In the unlikely event there is room in the syllabus, we will also introduce a segment on basic time series methods e.g, AR-based).

Delivery is planned to change to include more formative assessment by flipping the classroom. Lectures will be delivered by short online videos, supplemented with links to related online material, followed with online self-assessment quizzes in Learn. Lecture slots will be re-purposed for in-depth review of the areas that the students are having trouble with, as indicated by quiz statistics. We trialled this method with half the lectures in 15/16.

The video/quiz/review method does increase structured student learning opportunities – in addition to the online version of the hour-long lecture (split into 10-20 segments), they now have a quiz (20 minutes, but with further study and retake this can expand), and a review session (30-60 minutes depending on need). These activities add about 1-2 hours a week to expected time commitment, but to some extent these increased opportunities will replace previous self-study so the overall increase is probably less than an hour a week.