# Introduction to Applied Machine Learning (INFRXXXXX)

## Undergraduate Propose to change to Postgraduate

## Organiser

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## Summary

Since the early days of AI, researchers have been interested in making computers learn, rather than simply programming them to do tasks. This is the field of machine learning. The main area that will be discussed is supervised learning, which is concerned with learning to predict an output, given inputs. A second area of study is unsupervised learning, where we wish to discover the structure in a set of patterns; there is no output 'teacher signal'.

The primary aim of the course is to provide the student with a set of practical tools that can be applied to solve realworld problems in machine learning, coupled with an appropriate, principled approach to formulating a solution.

This 20 credit course replaces INFR10063 Introductory Applied Machine Learning (10 credits).

## **Course Description**

Introduction to Machine Learning and its Goals. Introduction to Data and Models. Memory based methods. Decision Trees. Error functions, Minimizing Error. Regression, Logistic Regression, Neural Networks. Margin Based Methods: Perceptron, Support Vector Machines. Naïve Bayes. Dimensionality Reduction. Clustering: K-means, Simple Gaussian Mixture Models, Hierarchical Clustering. Boosting Approaches. Model Averaging, Mixtures of Experts. Evaluation of Performance.

[We will also use a modern machine learning programming environment]

Course Outline			
College & School	College of Science and Engineering School of Informatics	Course Availability	Available to all students
<mark>SCQF Credit Leve</mark> l	SCQF Level 10 (Yr3 UG) SCQF Level 11 (Postgraduate)	Subject Area(s)	Informatics
SCQF Credit Volume	20	ECTS Credit Volume	10
Enrolment Requirements			
Pre-Requisites			
Co-Requisites			
Prohibited Combinations	Students MUST NOT also be taking Introductory Applied Machine Learning (INFR10063) Distance Learning version INFR11152, and other campus version INFR10069)		
Other Requirements	This course is open to all Informatics students including students where this course is not listed in your DPT, ple course organiser (lecturer).	g those on joint degre ease seek special per	ees. For external mission from the

Maths requirements:

1 - Probability theory: Discrete and continuous univariate random variables. Expectation, variance. Univariate Gaussian distribution. Joint and conditional distributions.

2 - Linear algebra: Vectors and matrices: definitions, addition. Matrix multiplication, matrix inversion. Eigenvectors, determinants quadratic forms.

3 - Calculus: Functions of several variables. Partial differentiation. Multivariate maxima and minima.

4 - Special functions: Log, exp

5 - Geometry: Basics of lines, planes and hyperplanes. Coordinate geometry of circle, sphere, ellipse, ellipsoid and n-dimensional generalizations.

6 - Entropy: is useful, but will be covered in the lectures.

Programming requirements: Students should be able to program in a modern object-oriented language such as Python.

#### **Visiting Student Information**

**Overview** 

Pre-Requisites	Visiting External students are required to have comparable background to that assumed by the	
	course prerequisites listed in the Degree Regulations & Programmes of Study.	
	If in doubt, consult the course organiser (lecturer).	
High Demand Course?	Yes	
Displayed in Prospectus?	No	
Delivery Information		

#### Academic year 2017/18, Available to all students (SV1)

Learn enabled	Yes	Quota	None
Course Start	Semester 1	Course Start Date	18⁄09/2017
Learning and T	eaching Act	ivities	
Lectures			20
Seminar/Tutor	ial Hours		4
Supervised Pra	ctical/Works	shop/Studio Hours	4
Summative Ass	sessment Ho	ours	2
Programme Le	vel Learning	and Teaching Hou	rs 4
Directed and Ir	ndependent	Learning	166
Total			200 Hours

## Additional Information (Learning and Teaching)

#### None

## Assessment

Written Exam 50%

Coursework 50%

Practical Exam 0%

# Additional Information (Assessment)

Coursework - 50% Exam - 50%.

If delivered in semester 1, this course will have an option for semester 1 only visiting undergraduate students, providing assessment prior to the end of the calendar year.

#### Feedback

Not entered

Exam Information

# Exam Diet Details

Main Exam Diet S1 (December)

Resit Exam Diet (August)

## **Teaching Load**

Subject Unit Code	Subject Unit Description	JACS Code	JACS Description	Percentage Split
I100_SU747	Computer science within School of Informatics	1100	Computer science	100

# Learning & Teaching Staff

## Staff member Role Added Updated In use

None found

# Learning Outcomes

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

- 1. Explain the scope, goals and limits of machine learning, and the main sub-areas of the field.
- 2. Describe the various techniques covered in the syllabus and where they fit within the structure of the discipline.
- 3. Students should be able to critically compare, contrast and evaluate the different ML techniques in terms of their applicability to different Machine Learning problems.
- 4. Given a data set and problem students should be able to use appropriate software to apply these techniques to the data set to solve the problem.
- 5. Given appropriate data students should be able to use a systematic approach to conducting experimental investigations and assessing scientific hypotheses.

## **Reading List**

Data Mining: Practical Machine Learning Tools and Techniques (Second Edition) I. H. Witten and E. Frank, Morgan Kaufmann, 2005. ISBN 0-12-088407-0

Additional Information		
Course Website	http://www.inf.ed.ac.uk/teaching/courses/iaml	
Graduate Attributes, Personal and Professional Skills Not entered		
Keywords	Not entered	
The information below is <b>not displayed</b> on DRPS.		
Organisation and Teaching Load		
Convenor of Board of Examiners Not entered		
Contact Hours	20	
Marking Scheme	APT UG Honours Marking Scheme	
Default Course Mode of Study	Classes & Assessment incl. centrally arranged exam	
Fee Code	Not applicable	
Acronym	INFR10069	
Comments (Internal Use Only)	None	