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MODULE DESCRIPTOR

Module Title

Advanced Data Science

Reference	CMM536	Version	6
Created	December 2019	SCQF Level	SCQF 11
Approved	April 2015	SCQF Points	15
Amended	January 2020	ECTS Points	7.5

Aims of Module

To introduce students to complex datasets, showing how processing and analysis techniques can be adapted to address the challenges posed by the nature of such data in real-life applications.

Learning Outcomes for Module

On completion of this module, students are expected to be able to:

1	Critically appraise the challenges posed by the management and processing of complex datasets and data inputs.
2	Discuss, compare and contrast advanced techniques and algorithms for working with complex datasets and data types using data science.
3	Critically evaluate and select state-of-the-art data science techniques and algorithms for selected/given applications involving complex data.
4	Apply advanced techniques and algorithms and critically analyse and evaluate the results.

Indicative Module Content

Introduction to Python (including use of IDEs, Environments and modules such as Numpy, Pandas, Keras, Tensorflow/TensorBoard). Complex Data: Image data (Pixel grid, colour channels, feature extraction); Streaming data (concept drift, streaming rate, class imbalance). Data pre-processing. Classification: Convolutional Neural Networks for Images; Streaming Data Classification.

Module Delivery

This is a lecture-based module with practical exercises that will feature a number of advanced data mining techniques as applied to complex datasets high-speed data streams. Online materials and online sessions will be used to support online learning students.

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Indicative Student Workload	Full Time	Part Time
Contact Hours	30	30
Non-Contact Hours	120	120
Placement/Work-Based Learning Experience [Notional] Hours	N/A	N/A
TOTAL	150	150
Actual Placement hours for professional, statutory or regulatory body		

ASSESSMENT PLAN

If a major/minor model is used and box is ticked, % weightings below are indicative only.

Component 1

Type:	Examination	Weighting:	50%	Outcomes Assessed:	1, 2
Description:	A closed-book written examination.				

Component 2

Type:	Coursework	Weighting:	50%	Outcomes Assessed:	3, 4
Description:	A coursework involving selection, implementation and evaluation of advanced techniques and algorithms to for a complex dataset.				

MODULE PERFORMANCE DESCRIPTOR

Explanatory Text

The calculation of the overall grade for this module is based on equal weighting of C1 and C2 components. An overall minimum grade D is required to pass the module.

		Examination:						
		A	**B**	**C**	**D**	**E**	**F**	**NS**
Coursework:	**A**	A	A	B	B	C	E	
	B	A	B	B	C	C	E	
	C	B	B	C	C	D	E	
	D	B	C	C	D	D	E	
	E	C	C	D	D	E	E	
	F	E	E	E	E	E	F	
	NS	Non-submission of work by published deadline or non-attendance for examination						

Module Requirements

Prerequisites for Module	None.
Corequisites for module	None.
Precluded Modules	None.

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INDICATIVE BIBLIOGRAPHY

1	AGGARWAL, C. C. (2007). Data streams: models and algorithms (Vol. 31). Springer.
2	GAMA, J. and GABER, M. M. (2007). Learning from data streams. Springer-Verlag Berlin Heidelberg.
3	Python, Toby Donaldson, Peachpit Press (2013)
4	Python Essentials. Steven F. Lott, Packt Publishing Ltd(2015)
5	Think Python: How to Think Like a Computer Scientist. Allen Downey, O'Reilly Media, Inc. (2012)
6	Fluent Python. Luciano Ramalho. O'Reilly Media, Inc. (2015)
7	Python Cookbook: Recipes for Mastering Python 3. David Beazley, Brian K. Jones, O'Reilly Media, Inc. (2013)
8	Deep Learning with Python. Francois Chollet. Manning. (2018)