COURSE DETAILS
Course Code: F21ML
Full Course Title: Statistical Machine Learning
SCQF Level: 11
SCAF Credits: 15
Available as Elective: No

DELIVERY LEVEL
Undergraduate: No
Postgraduate Taught: Yes
Postgraduate Research: No

COURSE AIMS
In this course, students will develop:

- An understanding of the fundamental concepts and techniques used in data mining and machine learning.
- An understanding of the mathematics underpinning data mining and machine learning.
- A critical awareness of the appropriateness of different data mining and machine learning techniques and the relationships between them.
- Familiarity with common applications of data mining and machine learning techniques.

LEARNING OUTCOMES – SUBJECT MASTERY

- Introduction to the fundamental concepts in data mining and machine learning.

- Detailed and integrated knowledge and understanding of the mathematics underpinning the data mining and machine learning methodologies.

Critical awareness of the appropriateness and performance of the different techniques, as well as the relationships between them.

LEARNING OUTCOMES – PERSONAL ABILITIES

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- Rational problem identification and definition.

- Critical analysis and substantial autonomy in selecting the correct solution to a given problem.

- Manage time, work to deadlines, and prioritise workloads.
- Demonstrate the ability to learn independently, as well as deal with complex issues under time constraints.

- Use appropriate computer software to process data.

- Present results in a way that demonstrates a deep understanding of the technical and broader issues of data mining and machine learning.

SYLLABUS

Basic Concepts: classification, clustering, supervised and unsupervised learning.

Generative Models: probabilistic graphical models; cluster analysis (including k-means clustering, expectation-maximisation and mixture models); regression analysis.

Discriminative Learning: instance-based learning and decision tree learning; artificial neural networks (perceptron, multi-layer perceptron, back-propagation, deep learning architectures); maximum entropy models; support vector machines; ensemble methods (such as bagging and boosting).

COURSE RELATIONSHIPS

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LOCATION AND ASSESSMENT METHODS

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