Course code | F21DL
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Course title | Data Mining and Machine Learning
Credits | 15
School | Mathematical and Computer Sciences
SCQF Level | 11
Semester | 1

**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.

**Syllabus**

**Basic Concepts:** datasets, dealing with missing data, classification, supervised vs unsupervised learning.

**Generative Models:** naïve Bayes, probabilistic graphical models, cluster analysis (such as k-means clustering, EM algorithm).

**Discriminative Learning:** linear regression, decision tree learning, perceptron, advanced models such as multi-layer perceptron and deep learning architectures.

**Learning Outcomes**

**Subject Mastery**

- Extensive understanding of the data mining process and machine learning algorithms.
- Detailed 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.
- Critical awareness of data quality and the appropriate use of data mining and machine learning for decision making.
- Ability to apply this knowledge for practical data mining and machine learning purposes

The students will develop their research abilities, and in particular:
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<th>Personal Abilities</th>
<th>The students will be expected to:</th>
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<td>• Show capacity for rational problem identification and definition.</td>
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<td>• Show capacity for critical analysis and solution selection, deal with complex issues and make informed judgements.</td>
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<td>• Use appropriate computer software to process data, and to support and enhance the research tasks.</td>
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<td>• Demonstrate the ability to learn independently and demonstrate leadership/initiative in tackling research problems.</td>
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<td>• Manage time, work to deadlines, and prioritise workloads.</td>
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<td>• Use a wide range of resources to present results in a way that demonstrates a good understanding of the technical and broader issues of data mining and machine learning.</td>
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<td>• Communicate with peers and more senior colleagues</td>
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| Assessment method | 50% course work | 50% examination |