**F21DL Data Mining and Machine Learning**

**COURSE DETAILS**

<table>
<thead>
<tr>
<th>Course Code:</th>
<th>F21DL</th>
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<tbody>
<tr>
<td>Full Course Title:</td>
<td>Data Mining and Machine Learning</td>
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<tr>
<td>SCQF Level:</td>
<td>11</td>
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<tr>
<td>SCAF Credits:</td>
<td>15</td>
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<td>Available as Elective:</td>
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**DELIVERY LEVEL**

<table>
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<tr>
<th>Undergraduate:</th>
<th>Yes</th>
<th>Postgraduate Taught:</th>
<th>Yes</th>
<th>Postgraduate Research:</th>
<th>Yes</th>
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**Additional Information:**

**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**

- 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:

- Ability to conduct quantitative and qualitative research on real-life, complex data sets
- Ability to ask own research questions about the hidden properties of data
- Ability to ask own research questions about suitability of certain machine learning methods and algorithms for
the given data
• Demonstrate originality and creativity in the application of knowledge

LEARNING OUTCOMES – PERSONAL ABILITIES

The students will be expected to:

" Show capacity for rational problem identification and definition.

" Show capacity for critical analysis and solution selection, deal with complex issues and make informed judgements.

" Use appropriate computer software to process data, and to support and enhance the research tasks.

The students will be expected to:

" Demonstrate the ability to learn independently and demonstrate leadership/initiative in tackling research problems.

" Manage time, work to deadlines, and prioritise workloads.

The students will be expected to:

" 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.

" Communicate with peers and more senior colleagues.
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.

COURSE RELATIONSHIPS

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<tr>
<th>Course</th>
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