Subject Description Form

Subject Code	COMP5152
Subject Title	Advanced Data Analytics
Credit Value	3
Level	5
Pre-requisite/ Co-requisite/ Exclusion	Nil (but some knowledge in machine learning and data analytics is preferable)
Objectives	The goal of this course is to introduce students to a variety of data analytics methods that are useful for understanding, visualizing and getting insight of data from different researches and applications. In addition to concentrate on formulas and how they are computed, students will be able to learn how existing machine learning/data mining/data analytics algorithms and techniques can be used to tackle different data types. Students will get to use existing software or be told how to write programs to explore a variety of data analytics problems concerning structured and unstructured data types that include relational or transactional data, text, graphical or network data, image and video data, temporal, spatial, temporal-spatial and sequential data.
Intended Learning Outcomes	Upon completion of the subject, students will be able to: a. deeply understand various algorithms and techniques for data analytics and how they should be used to analyze data that they encounter in their research and/or job; b. expose to various applications such as social media analytics, financial analytics, news analytics, video and image analytics, data analytics, etc.; c. carry out in-depth analysis of the data encountered in sophisticated applications and/or research.
Subject Synopsis/ Indicative Syllabus	1. Machine learning vs data mining vs data science vs data analytics vs big data analytics vs pattern recognition vs statistical analysis: definitions, similarities and differences. 2. Data types and characteristics which include relational data, transactional data, graph and networked data, univariate and multivariate time series data, temporal data, spatial data, temporal-spatial data, text data, image and video data, sequence data, genome data, etc. 3. Statistical method for data analysis which include linear and logistic regression, principal component analysis, independent component analysis, hypothesis testing, ANOVA, ARMA and ARIMA. 4. Data analytics involving special data types such as texts, sequential and genomic data, temporal, spatial, temporal-spatial data. 5. Computational intelligence technique such as fuzzy logic, evolutionary algorithms and artificial neural networks in data analytics. 6. Advanced analytics techniques: Convolutional networks, autoencoders, deep belief networks, recurrent neural networks, long short term memory, deep reinforcement learning, deep and restricted Boltzmann machines, generative adversarial network. 7. Programming languages and tools for data analytics. 8. Useful applications in financial analytics, news analytics. Social media

<table>
<tr><td></td><td>analytics.</td></tr>
<tr><td>Teaching/Learning Methodology</td><td>Lectures teach students on the main concepts and methods of the course, together with comprehensive examples, and class questions/answers/discussions for easy understanding.

Tutorials and lab sessions offer the opportunity for students to review and consolidate the lecture and reference materials through exercises and also software tools.

Project assignments give students the opportunity to solve practical data analysis problems.

Written assignments help students to develop a solid foundation of data analytics.</td></tr>
<tr><td>Assessment Methods in Alignment with Intended Learning Outcomes</td><td>
<table>
<tr><td rowspan="2">Specific assessment methods/tasks</td><td rowspan="2">% weighting</td><td colspan="3">Intended subject learning outcomes to be assessed (Please tick as appropriate)</td></tr>
<tr><td>a</td><td>b</td><td>c</td></tr>
<tr><td>1.Assignments</td><td>30</td><td>✓</td><td>✓</td><td>✓</td></tr>
<tr><td>2. Projects</td><td>25</td><td></td><td></td><td>✓</td></tr>
<tr><td>3. Examination</td><td>45</td><td>✓</td><td>✓</td><td>✓</td></tr>
<tr><td>Total</td><td>100</td><td colspan="3"></td></tr>
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Assignment(s): assessment of the theoretic studies with respect to the understanding of the relevant subject matters including new concepts, algorithms and techniques by proving answers to the assignment questions.

Project: assessment of the ability for problem solving through real case studies and implementation of a prototype system for demonstration .

Examination: assessment of the overall performance by written report , oral presentation and exam or quiz.
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<tr><td rowspan="6">Student Study Effort Expected</td><td>Class contact:</td><td></td></tr>
<tr><td>▪ Lecture/Tutorial/Lab</td><td>39 Hrs.</td></tr>
<tr><td>Other student study effort:</td><td></td></tr>
<tr><td>▪ Reading</td><td>40 Hrs.</td></tr>
<tr><td>▪ Prepare written and project and assignments, quizzes/tests, examination</td><td>25 Hrs.</td></tr>
<tr><td>Total student study effort</td><td>104 Hrs.</td></tr>
<tr><td>Reading List and References</td><td colspan="2">To be provided at the beginning of the semester.</td></tr>
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