Subject Description Form

Subject Code	DSAI1101
Subject Title	Fundamentals of AI and Data Analytics
Credit Value	2
Level	1
Pre-requisite/ Co-requisite/ Exclusion	Nil
Objectives	This subject introduces the basic concepts and techniques of data analytics and artificial intelligence based on knowledge in statistics and computational tools. It also illustrates the application of data analytics and artificial intelligence in real-life situations.
Intended Learning Outcomes	Upon completion of the subject, students will be able to: (a) demonstrate an understanding of the fundamental concepts of AI and Data Analytics (AIDA); (b) acquire basic skills in using AIDA technologies and applications; (c) articulate examples of how the adoption of AIDA could enhance their chosen disciplines; (d) demonstrate an awareness of global contemporary ethical issues and the impact of AIDA applications in daily life; (e) apply statistical reasoning to describe and analyze different types of data sets; (f) understand the mathematics and statistics knowledge behind data analytics and artificial intelligence; (g) implement an AIDA approach for studying and reporting statistical data.
Subject Synopsis/ Indicative Syllabus	<u>General introduction to data science</u> Data collection, data types, data structures, selected case studies <u>Data preparation and exploration</u> Data cleaning/processing, data summary, frequency table, density plot, data visualization, computational tools of statistics and data analytics (e.g., R/Python) <u>Foundation statistics</u> Descriptive statistics, measures of central tendency and dispersion, measures of association, linear regression

<table>
<tr><td></td><td>Artificial intelligence
Concept of machine learning, artificial neural network, algorithms for classification via Python API such as scikit-learn

Application
Application of artificial intelligence and data analytics in specific topics such as finance analytics, regression analysis, prediction, etc.</td></tr>
<tr><td>Teaching/Learning Methodology</td><td>The subject will be mainly delivered through lectures/ tutorials/ labs/ seminars. The lectures and tutorials will be conducted to introduce the basic data analyticsconcepts of the topics in the syllabus which are then reinforced by learning activitiesinvolving demonstration and tutorial exercises. Labs will be conducted to introducepractical techniques in computer programming. Seminars will be given by guest speakers on specific topics. An e-module “Foundation Statistics” will be adopted as a self-learning aid for studying fundamental statistics knowledge.</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="7">Intended subject learning outcomes to be assessed (Please tick as appropriate)</td></tr>
<tr><td>(a)</td><td>(b)</td><td>(c)</td><td>(d)</td><td>(e)</td><td>(f)</td><td>(g)</td></tr>
<tr><td>1. Assignments / tests / quizzes</td><td>30%</td><td>✓</td><td>✓</td><td></td><td></td><td>✓</td><td>✓</td><td>✓</td></tr>
<tr><td>2. Term paper / mini-project</td><td>30%</td><td>✓</td><td>✓</td><td>✓</td><td>✓</td><td>✓</td><td></td><td>✓</td></tr>
<tr><td>3. Examination</td><td>40%</td><td>✓</td><td>✓</td><td></td><td></td><td>✓</td><td>✓</td><td>✓</td></tr>
<tr><td>Total</td><td>100%</td><td colspan="7"></td></tr>
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Explanation of the appropriateness of the assessment methods in assessing the intended learning outcomes:

Continuous Assessment comprises of two parts.
(1) Assignments / tests / quizzes</td></tr>
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<tr><td>Assessment Methods in Alignment with Intended Learning Outcomes (Cont'd)</td><td colspan="2">This will allow the instructor(s) to observe and assess individual student's achievement of a particular learning outcome based on the coverage of the assigned problem set questions. Some of the assignment or test questions might require students to self-learn with online teaching materials as part of the e-learning module.

(2) Term paper / mini-project
Students are required to submit an individual term paper / mini-project. This should include a proposal addressing problems in their chosen discipline (finance, social science, marketing, etc), literature review of related papers, data analysis, and the application of AIDA knowledge as a solution to the problem.

Examination
A written final examination is held at the end of the semester to assess students' overall understanding of AIDA knowledge.</td></tr>
<tr><td rowspan="5">Student Study Effort Expected</td><td>Class contact:</td><td></td></tr>
<tr><td>▪ Lectures/ Tutorials/ Labs/ Seminars</td><td>26 Hrs.</td></tr>
<tr><td>Other student study effort:</td><td></td></tr>
<tr><td>▪ Self-study, e-learning</td><td>54 Hrs.</td></tr>
<tr><td>Total student study effort</td><td>80 Hrs.</td></tr>
<tr><td>Reading List and Reference</td><td colspan="2">Raschka, S. and Mirjalili, V. (2019). Python Machine Learning: Machine Learning and Deep Learning with Python, Scikit-Learn, and TensorFlow (3rd Edition). Packt Publishing.

Adhikari, A. and DeNero, J. (2019). Computational and Inferential Thinking: The Foundations of Data Science. GitBook.

Davy, C., Meysman, A. D. B., and Ali, M. (2016). Introducing Data Science: Big Data, Machine Learning, and More, Using Python Tools. Manning Publications.

Utts, J.M. (2014). Seeing Through Statistics (4th edition). Cengage Learning.

Utts, J. M. and Heckard, R. F. (2015). Mind on Statistics (5th edition). Cengage Learning.

Wickham, H. and Grolemund, G., R for Data Science, O'Reilly Media, 2017.</td></tr>
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