

Subject Description Form

Subject Code	COMP1004
Subject Title	Introduction to Artificial Intelligence and Data Analytics
Credit Value	2
Level	1
Pre-requisite/ Co-requisite/ Exclusion	Nil
Objectives	The objectives of this subject are to: 1. introduce to students the concept and principles of Artificial Intelligence and Data Analytics (AIDA); 2. introduce students to examples of how AIDA can be applied in their own discipline; 3. prepare students for subsequent selection of minor and secondary major in AIDA through strengthening their understanding of using AIDA to solve practical problems; and 4. raise students' awareness of ethical and societal issues stemming from AIDA in daily life.
Intended Learning Outcomes	Upon completion of the subject, students will be able to: a. demonstrate an understanding of the foundational concepts of Artificial Intelligence 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; and d. demonstrate an awareness of global contemporary issues of ethics and impact from AIDA applications in daily life.
Subject Synopsis/ Indicative Syllabus	1. Data analytics basics • Definition of data requirements; Data collection, cleaning, processing, and analytics; • Basic concepts of data analytics methods, e.g., Regression, classification and prediction; Clustering; • Basic concepts of Big data and the cloud. 2. Machine Learning Introduction • Overview of artificial intelligence, machine learning and deep learning; • High-level ideas of supervised vs unsupervised learning techniques;

	- Performance and accuracy measures, e.g., false positive, false negative, recall, precision, F1 score. 3. Introduction to AIDA applications and their impacts - Chatbots and Conversational AI; - Recommender systems (e.g. Netflix, Amazon.com); - Other AIDA applications: Decision support system, customer relationship and click stream analysis, social network and sentiment analysis, recommender system, text translation and summarisation, robot, intelligent transportation system, auto-driving, face recognition, medical image analysis and diagnosis, biometrics and bioinformatics, etc. 4. Societal implications of AIDA - Concerns of data privacy; AI ethics; - Global and societal impacts of AIDA applications.
Teaching/Learning Methodology	1. e-Learning Module The e-learning module is developed and delivered by the Department of Computing at PolyU, consisting of readings, exercises and assessments that are designed to introduce students to the basic concept and practice of AIDA. The e-learning module will provide basic foundation concepts about AIDA, as well as their potential global and societal context impacts. A brief understanding about the technology and applications will also be provided. Students are required to successfully complete the e-learning module (including video watching, an after-class exercise, and a lab with the AIDA interactive playground) <u>within the first seven weeks</u> of the semester in which they are taking the subject. 2. Lectures and Seminars AIDA concepts and fundamental skills will be given through lectures. During seminars, there will be in-class activities (e.g., discussions and exercises) to better engage students in active learning. The following are examples of topics to be covered - Concepts of data analytics and its applications. - Concepts of artificial intelligence and its applications in computer vision and natural language processing.

	• Trendy concepts of machine learning and big data. • The key steps to build AIDA projects, such as sentiment analysis and house price prediction. • The impact of AIDA to our society and various disciplines.																																								
Assessment Methods in Alignment with Intended Learning Outcomes	Students’ performance in this subject will be assessed using a letter-grading system in accordance with the University’s convention from grade F (failure) to A+. The relative weighting of the different assessment components are as follows: <table><tr><th rowspan="2">Specific assessment methods/ tasks</th><th rowspan="2">% weighting</th><th colspan="4">Intended subject learning outcomes to be assessed</th></tr><tr><th>a</th><th>b</th><th>c</th><th>d</th></tr><tr><td>e-Learning module and seminars</td><td>15%</td><td>✓</td><td>✓</td><td></td><td>✓</td></tr><tr><td>Exercises and assignments</td><td>20%</td><td></td><td>✓</td><td></td><td></td></tr><tr><td>Quizzes</td><td>45%</td><td>✓</td><td>✓</td><td></td><td>✓</td></tr><tr><td>Group-based Project or Essay</td><td>20%</td><td>✓</td><td>✓</td><td>✓</td><td>✓</td></tr><tr><td>Total</td><td>100%</td><td></td><td></td><td></td><td></td></tr></table> <i>Explanation of the appropriateness of the assessment methods in assessing the intended learning outcomes:</i> The e-learning module contains assessment questions and lab tasks involving basic foundation concepts about AIDA (ILO a), their potential global and societal context impacts (ILO d), covering also some basic understanding about the technology and applications (ILO b). Participation in seminars will strengthen the elements covered in the e-learning module for the three learning outcomes. Hands-on exercises will enable students to practice and apply data analytics techniques (ILO b). Quizzes are given to help students better understand the points discussed in lectures (ILO a), and to gain more related knowledge via after-class reading (ILO d) and learn how to employ the knowledge to solve AIDA problems (ILO b).	Specific assessment methods/ tasks	% weighting	Intended subject learning outcomes to be assessed				a	b	c	d	e-Learning module and seminars	15%	✓	✓		✓	Exercises and assignments	20%		✓			Quizzes	45%	✓	✓		✓	Group-based Project or Essay	20%	✓	✓	✓	✓	Total	100%				
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	Students should work in groups to either work on a project or a research essay. The former requires a student to study a specific problem within his/her chosen discipline (e.g., business, public health, and social science) (ILO c) and to carry out data analytics tasks related to the problem for a possibly AI-related solution (ILO a,b). Larger group size might be allowed for larger projects. A brief report will summarise the process and findings. The latter requires a student to read related papers and write a literary review (ILO a,b) to discuss how the AIDA knowledge is applied to handle a specific task in his/her discipline (ILO c). Through the assessment task on project or essay, students can appreciate how AIDA methods could help in their career and realise the impact to the society (ILO d).	
Student study effort expected	e-Learning Module	3 hours
	Class Contact	
	• Lecture / Seminars	23 hours
	Other student study effort:	
	• Self-study	22 hours
	• Literary review and essay writing / project development and report writing	22 hours
	Total student study effort	70 hours
Reading list and references	1. Peter Bruce and Andrew Bruce, <i>Practical Statistics for Data Scientists: 50 Essential Concepts</i>, O'Reilly Media, 2017. 2. McFedries, P., <i>Excel data analysis for dummies</i>, John Wiley & Sons, 4th Edition, 2019. 3. Bissett, B., <i>Automated data analysis using Excel</i>, 2nd Edition, CRC Press, 2021. 4. Zhou, H., <i>Learn Data Mining Through Excel A Step-by-Step Approach for Understanding Machine Learning Methods</i>, Apress, 2020. 5. Hastiem, T., Tibshirani, R., and Friedman, J., <i>The Elements of Statistical Learning: Data Mining, Inference, and Prediction</i>, 2nd Edition, Springer, 2009. 6. Russell, S. and Norvig, P., <i>Artificial Intelligence: A Modern Approach</i>, 4th Edition, Pearson, 2021. 7. Bishop, Christopher M., <i>Pattern Recognition and Machine Learning</i>. Springer, 2016.	