

**Learner Unit Achievement Checklist**

**SEG Awards Level 5 Diploma in Software Engineering with Artificial Intelligence**

**610/4138/5**

###### SEG Awards Level 5 Diploma in Software Engineering with Artificial Intelligence

## Centre Name: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Learner Name: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Notes to learners – this checklist is to be completed, to show that you have met all the mandatory and required optional units for the qualification.

**Y/651/1382 Introduction to Artificial Intelligence - Mandatory Unit**

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| Assessment Criteria | Evidence (Brief description/title) | Portfolio Reference | Date Completed | Comment |
| **1.1** Explain the following fundamental concepts in artificial intelligence: a) machine learning b) neural networks c) natural language processing  **1.2** Analyse the following principles underlying artificial intelligence systems: a) problem-solving b) reasoning c) learning  **1.3** Discuss the following techniques used in artificial intelligence: a) search algorithms b) optimisation methods c) pattern recognition |  |  |  |  |
| **2.1** Analyse classical artificial intelligence techniques to include: a) expert systems b) rule-based systems c) symbolic reasoning  **2.2** Compare and contrast the strengths and weaknesses of different classical artificial intelligence approaches  **2.3** Evaluate the suitability of classical artificial intelligence techniques for specific problem domains and applications |  |  |  |  |
| **3.1** Explain 3 typical applications of artificial intelligence across various domains  **3.2** Evaluate the potential limitations and challenges associated with different approaches in artificial intelligence to include but not limited to: a) scalability b) interpretability c) bias  **3.3** Discuss 2 real-world examples where AI approaches have succeeded or faced limitations, considering factors such as data availability and model complexity |  |  |  |  |
| **4.1** Explain the importance of ethical considerations in the development and deployment of artificial intelligence models  **4.2** Analyse the potential ethical implications of AI models, including issues related to: a) fairness b) transparency c) accountability  **4.3** Discuss the societal impacts of AI technologies, including concerns related to: a) job displacement b) privacy infringement c) algorithmic bias d) open-source resources  **4.4** Propose strategies for mitigating ethical risks and promoting responsible AI development and deployment practices |  |  |  |  |

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**A/651/1077 Web Application Development - Mandatory Unit**

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| Assessment Criteria | Evidence (Brief description/title) | Portfolio Reference | Date Completed | Comment |
| **1.1** Design a user interface layout that is responsive and user-friendly on mobile devices  **1.2** Implement navigation elements that allow user to interact with the application efficiently  **1.3** Test the user interface on multiple devices to ensure compatibility and usability |  |  |  |  |
| **2.1** Use a chosen programming language to integrate a range of standard mobile application features  **2.2** Apply an appropriate Software Development Kit to support cross-platform compatibility and optimise application performance  **2.3** Incorporate data storage and retrieval mechanisms effectively within the application  **2.4** Develop and integrate user authentication processes to safeguard user access and data |  |  |  |  |
| **3.1** Create a layout that adjusts seamlessly across different screen sizes and orientations  **3.2** Implement touch-friendly navigation elements that enhance user interaction  **3.3** Use adaptive fonts and images that maintain clarity and visual appeal on all devices  **3.4** Test the user interface design for responsiveness on various devices and resolutions |  |  |  |  |
| **4.1** Create, using appropriate architecture, a mobile application that functions consistently across different device platforms  **4.2** Conduct thorough testing to identify and rectify functional or usability issues  **4.3** Debug application code to resolve identified issues and ensure optimal performance  **4.4** Publish the final application to appropriate app stores, ensuring compliance with platform guidelines |  |  |  |  |

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**D/651/1078 Software Project Management - Mandatory Unit**

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| Assessment Criteria | Evidence (Brief description/title) | Portfolio Reference | Date Completed | Comment |
| **1.1** Identify key components necessary for interactive web applications including: a) client-side scripts b) server-side technologies  **1.2** Describe the processes involved in developing and maintaining interactive web applications, including data handling and security measures  **1.3** Explain the technologies commonly used in interactive web application development, including: a) HTML b) CSS c) JavaScript d) backend frameworks |  |  |  |  |
| **2.1** Design a user-friendly interface that incorporates responsive design principles  **2.2** Use front-end functionalities using HTML, CSS, and JavaScript  **2.3** Utilise appropriate frameworks to improve interactivity  **2.4** Demonstrate that the web application is cross-browser compatible for a seamless user experience |  |  |  |  |
| **3.1** Explain the concept of responsive design and its importance in creating adaptable interfaces  **3.2** Evaluate the responsiveness of a web application across different devices and screen sizes  **3.3** Analyse the accessibility features implemented in the interface for a diverse user base  **3.4** Critically assess the user experience design elements for intuitive navigation and interaction |  |  |  |  |
| **4.1** Identify potential security threats and vulnerabilities in web applications  **4.2** Explain how secure communication protocols such as HTTPS protects data in transit  **4.3** Integrate authentication mechanisms like OAuth or JWT for user verification  **4.4** Discuss the importance of conducting regular security audits and testing to ensure the application is resilient to attacks |  |  |  |  |

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**F/651/1079 Object-Oriented Design and Development - Mandatory Unit**

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| Assessment Criteria | Evidence (Brief description/title) | Portfolio Reference | Date Completed | Comment |
| **1.1** Explain the following conception Object-Oriented programming: a) encapsulation b) inheritance c) polymorphism  **1.2** Identify the significance of the following in software design: a) classes b) objects c) message passing  **1.3** Discuss how fundamental OO principles contribute to software reuse and maintenance  **1.4** Analyse the impact of using OO concepts on enhancing software scalability and maintainability |  |  |  |  |
| **2.1** Develop an OO software application using a chosen programming language  **2.2** Use efficient coding practices to optimise the performance of the software application  **2.3** Demonstrate the reusability of code components within the OO software application  **2.4** Evaluate the effectiveness of the chosen programming language in facilitating OO design principles for the software application |  |  |  |  |
| **3.1** Identify suitable data structures for storing and manipulating data in an OO program  **3.2** Implement the identified data structures effectively within the OO program  **3.3** Demonstrate the use of the chosen data structures to manipulate data accurately  **3.4** Evaluate the efficiency of the selected data structures in terms of performance and scalability within the OO program |  |  |  |  |
| **4.1** Explain the advantages of software reuse in developing object-oriented software applications  **4.2** Discuss the limitations associated with utilising objects in software development  **4.3** Analyse how software reuse can enhance productivity and efficiency in software development  **4.4** Evaluate the potential challenges and drawbacks of relying on object-oriented design in software applications |  |  |  |  |

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**A/651/1383 Machine Learning Algorithms - Mandatory Unit**

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| Assessment Criteria | Evidence (Brief description/title) | Portfolio Reference | Date Completed | Comment |
| **1.1** Explain the following key concepts in machine learning: a) supervised learning b) unsupervised learning c) semi-supervised learning d) reinforcement learning  **1.2** Examine the fundamental principles underlying machine learning algorithms  **1.3** Explain the use of the following common techniques used in machine learning a) feature engineering b) model evaluation c) hyperparameter tuning |  |  |  |  |
| **2.1** Design effective evaluation strategies for artificial intelligence tasks, considering appropriate metrics and performance measures  **2.2** Implement evaluation procedures using a variety of tools and methods recording results accurately  **2.3** Analyse evaluation results to assess the performance and effectiveness of machine learning models, identifying areas for improvement  **2.4** Optimise and refine evaluation methodologies based on feedback and insights gained from the analysis in 2.3 |  |  |  |  |
| **3.1** Analyse the theoretical foundations of various machine learning algorithms  **3.2** Identify appropriate machine learning algorithms for different types of tasks and data characteristics, considering factors such as data complexity and problem domain  **3.3** Apply machine learning algorithms to real-world datasets, demonstrating skills in implementation and parameter tuning  **3.4** Explain the underlying theories, concepts and principles behind the performance of machine learning algorithms, including: a) optimisation techniques b) model interpretation methods |  |  |  |  |
| **4.1** Select appropriate programming libraries for machine learning for 2 given scenarios  **4.2** Implement machine learning algorithms and workflows using programming languages such as Python or R, leveraging relevant libraries and frameworks  **4.3** Carry out data preprocessing, model training, and evaluation tasks using programming libraries and tools  **4.4** Modify machine learning workflows to address specific project requirements or objectives, leveraging the capabilities of programming libraries effectively |  |  |  |  |

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**L/651/1081 Software Project - Mandatory Unit**

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| Assessment Criteria | Evidence (Brief description/title) | Portfolio Reference | Date Completed | Comment |
| **1.1** Develop a detailed project specification aligning with the outlined problem brief  **1.2** Create a comprehensive project plan outlining key milestones and deliverables  **1.3** Identify suitable processes to be implemented throughout the project lifecycle  **1.4** Select appropriate resources and tools necessary to carry out the programme of work effectively |  |  |  |  |
| **2.1** Explain the importance of adhering to professional codes of conduct throughout project activities  **2.2** Apply legal and ethical principles to decision-making processes within the project  **2.3** Use safety and security measures in all project-related tasks  **2.4** Discuss social responsibilities associated with the project work |  |  |  |  |
| **3.1** Examine the importance of data confidentiality in project environments  **3.2** Analyse the significance of maintaining data integrity in software projects  **3.3** Identify strategies to ensure data availability throughout project execution  **3.4** Explain the interplay between data confidentiality, integrity, and availability in project contexts |  |  |  |  |
| **4.1** Explain the importance of using appropriate development approaches to scope, time-manage and organise a project  **4.2** Apply relevant theoretical frameworks to analyse system requirements effectively  **4.3** Specify clear and achievable objectives for system testing procedures  **4.4** Implement system components in accordance with specified requirements  **4.5** Evaluate system performance against predefined criteria recommending improvements where necessary |  |  |  |  |

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