**ASSESSMENT AND INTERNAL VERIFICATION FRONT SHEET (Individual Criteria)**

**(Note: This version is to be used for an assignment brief issued to students via Classter)**

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| Course Title | BSc (Hons) in Applied Data ScienceBSc (Hons) in Computer Systems and NetworksBSc (Hons) in Creative ComputingBSc (Hons) in CybersecurityBSc (Hons) in Digital Games DevelopmentBSc (Hons) in Software Development | | | **Lecturer Name & Surname** | | Conrad AquilinaKaren Cauchi Connie Livori | |
| Unit Number & Title | | CDKSK-503-2329 English for Dissertation Writing | | | | | |
| Assignment Number, Title / Type | | Research Proposal (Home) | | | | | |
| Date Set | | 07 April 2025 | Deadline Date | 11 May 2025 | | | |
| Student Name | Mattias Tonna | | ID Number | 0318305L | Class / Group | | SWD 6.2A |

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| Assessment Criteria | Maximum Mark |
| R&U1 Identify relevant and suitable information from academic sources. | 10 |
| R&U2 Give sufficient context to a research topic through a research statement and/or research question. | 5 |
| A&A1 Anticipate any contributions arising from the topic being proposed. | 5 |
| E&C1 Prepare an outline of key literature by reviewing and grouping select content from academic sources. | 20 |
| E&C2 Develop a research idea in the form of a well-written and complete research proposal. | 15 |
| Total Mark | 55 |

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| **Notes to Students:** |
| * This assignment brief has been approved and released by the Internal Verifier through Classter. * Assessment marks and feedback by the lecturer will be available online via Classter (<Http://mcast.classter.com>) following release by the Internal Verifier. * Students submitting their assignment on Moodle/Turnitin will be requested to confirm online the following statements:   **Student’s declaration prior to handing-in of assignment**   * I certify that the work submitted for this assignment is my own and that I have read and understood the respective Plagiarism Policy   **Student’s declaration on assessment special arrangements**   * I certify that adequate support was given to me during the assignment through the Institute and/or the Inclusive Education Unit. * I declare that I refused the special support offered by the Institute. |

English for Dissertation Writing

*Assignment 1: Research Proposal*

**Assignment Guidelines**

* This is a **home assignment** of 5 weeks’ duration.
* It assesses pre-dissertation research and the formulation of an initial research proposal as specified by **MCAST Doc164 (also referred to as Statement of Intent form)**.
* For the purposes of this assignment, you are **free to adopt or adapt content intended for ITRSH-506-2101 Research Design 1** since the final intended deliverable is common to both units – an SOI to be submitted to the Institute Research Sub-Committee responsible for vetting initial research proposals for final year degree projects.
* This assignment must be **uploaded in .doc format** on each group’s respective **Turnitin portal** on the VLE by the cut-off date indicated.
* You must **type your work in the respective sections of the SOI template** **provided on pp. 4-10.**
* **Late submissions or submissions by email will not be accepted.**
* A detailed **rubric at the end of the assignment** indicates how marks are allocated.
* In line with MCAST’s *Academic Integrity Policy and Procedure*, any attempts at producing **plagiarised work or work entirely generated via AI software** will be penalised according to such regulations and may lead to invalidation of the document.
* **Proper and consistent use of Academic English is expected in your writing.**

**Background to Assignment 1: Research Proposal**

This assignment focuses on the **academic reading and writing skills** that are required for **pre-dissertation research**.

1. You will need to **identify, select, and consult information from** **6-8** **academic sources**, followed by a **proper review of their content**. For the purposes of this assignment, academic sources would be any of the following: dissertations (local and/or international), scholarly articles from academic databases and journals, reports, conference proceedings, and book chapters.
2. A number of the sources selected need to be **actual studies conducted by others**. This is because your literature review should **analyse,** **compare, and discuss approaches/techniques and results** where available.
3. Your project topic must be **relevant to your area of specialisation** and ultimately conducive to an implementable project respective to your degree programme.
4. All sourced content and ideas must carry in-text citations and a final reference list (in **IEEE 2023** format). Avoid direct quoting, unless absolutely essential.
5. **Your research proposal needs to be typed in the MCAST DOC164 template provided on the following pages**. Please follow instructions in italics for specific word ranges and expected content per section.

**RESEARCH PROPOSAL FORM**

*(also referred to as the ‘Statement of Intent Form’, or SOI)*

***To be submitted by the researcher to the Institute Research Sub-Committee (IRC)***

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| **Research title:** Fraud Detection Using Graph Neural Networks (GNNs) Combined with Rule-Based Algorithms | |
| **Institute Name: Institute** of ICT | |
| **Course / Programme:** BSc (Hons) in Software Development | |
| **Level and year of study:** level 6, second year | |
| **Main area of study being proposed**  *Outline the research area more broadly and then focus on the research topic/problem being investigated within this area. This section should serve as a suitable introduction to the topic by defining its scope.*  *(80-100 words approx.)*    Artificial Intelligence (AI) has become central to fraud detection systems, enabling banks and businesses to identify fraudulent transactions among millions in real-time. This study is broadly situated in AI-based fraud, focusing specifically on fraud related to credit cards. Traditional systems often rely on fixed rule-based thresholds, such as flagging transactions exceeding a set amount, but fraudsters adapt to exploit loopholes. Therefore, this research narrows down to credit card fraud detection using Graph Neural Networks (GNNs) augmented with rule-based logic, aiming to capture complex transaction patterns that static rules may miss. | |
| **Name of Researcher:** Mattias Tonna | **Researcher’s I.D. Number:** 0318305 (L) |

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| **Personal Motivation for the Choice of Research Theme** |
| *Explain what real world issue/problem motivated the research you are proposing to pursue next year.*  *(70-80 words approx.)*  Modern fraud schemes have grown highly sophisticated, increasing my interest in more intelligent detection methods. Fraudsters sometimes split large illicit purchases into structured micro-transactions just below alert thresholds, evading classic rules. Such patterns can slip through a merchant’s current defences, causing financial losses. My motivation is to explore graph-based pattern recognition that can detect these subtle fraud behaviours. By combining GNNs with rule-based filters, I hope to contribute a solution that recognises cunning fraud patterns in credit card transactions that would otherwise bypass fixed-rule systems. |

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| **Outline of Key Literature and Theoretical Framework or Propositions** |
| *Conduct secondary research to collect information within the selected research field and then write a literature review which summarises and compares approaches from these prior studies. In this section you should also clarify any specialist terms or concepts associated with the topic. Comment on any significant findings as well as any limitations/shortcomings present in these prior studies. (1000-1200 words approx.)*  Fraud detection has received a considerable amount of attention in machine learning and deep research due to its financial implications. Bhattacharyya et al. [1] emphasise that class imbalance in fraud datasets is a challenge, since legitimate transactions vastly outnumber fraudulent ones, often biasing classifiers. Demicoli (2020) [2] addressed this using the Synthetic Minority Over-Sampling Technique (SMOTE) and evaluated models such as XGBoost, Random Forest and Gaussian Naive Bayes, finding that gradient-boosted trees are particularly effective. Afriyie et al. (2023) [3] evaluated models including Logistic Regression, Decision Tree, and Random Forest, with Random Forest achieving the best results, 96% accuracy and 0.989 AUC. These findings underscore the effectiveness of the grouped methods in fraud detection. However, researchers state that high accuracy on imbalanced datasets may be misleading; therefore, assessing metrics like recall, precision, and false positive rates is more reliable for evaluation.  A limitation in classical ML studies is the trade-off between detecting more fraud and raising false alarms. Bhattacharyya et al. (2011) noted that substantial fraud detection improvements require careful calibration due to skewed data. Demicoli’s work addressed imbalance via synthetic data, but it is limited by the quality of generated samples and may not capture unique fraud patterns. Afriyie et al. report that their best ML model faced challenges, as the static model might struggle with evolving fraud strategies and concept drift in transaction behaviour. They acknowledge the need for adaptive algorithms or continuous learning to adapt to fraudsters’ tactics. In summary, classical ML techniques like decision trees and SVM form a strong baseline and can achieve high accuracy, but they require extensive data preprocessing, such as oversampling or cost-sensitive learning, to handle class imbalance. Their static nature means they may not detect new fraud patterns differing from historical data.  With AI improvements, researchers use deep learning and neural networks to detect fraud, leveraging their ability to capture complex patterns. However, applying deep learning to credit card fraud is challenging due to the rarity of fraudulent transactions, which can lead to overfitting on sparse anomalies. One approach uses autoencoders for anomaly detection. Sudharson et al. (2022) [4] proposed a hybrid model featuring an attention-based Convolutional Autoencoder (CAE) and a Bidirectional LSTM. The CAE’s 1D convolutional layers learn compressed representations of transaction sequences, while an attention mechanism identifies significant features in unusual spending spikes. These features are then processed by a BiLSTM to capture temporal context from past and future transactions, using reconstruction error to detect anomalies indicative of fraud. This method employs both supervised and unsupervised learning, allowing the model to learn normal patterns without explicit fraud labels. Sudharson et al. report 97% accuracy and a high ROC AUC, demonstrating the model’s effectiveness in distinguishing fraudulent from legitimate transactions. While promising, it's important to note that accuracy alone may not reflect missed fraud cases, though the high AUC indicates a good balance of sensitivity and precision.  Alharbi et al. (2022) [5] suggested an innovative deep learning approach that transforms tabular transaction data into grayscale images, enabling the use of convolutional neural networks (CNN) for fraud detection. Their “text2IMG” method encodes transaction features as image pixels, which are fed to CNN layers with class weights to tackle the imbalanced target class problem. The use of deep features reduced the time complexity for machine learning classifiers. The best performance was achieved by a K-nearest Neighbours classifier (KNN), which achieved 99.87% accuracy; however, despite the high accuracy, the F1-score for fraud detection was only 33% and with the highest achieved by the Coarse-KNN of about 57%, indicating poor precision-recall balance for the minority class. This brings out a common issue that high overall accuracy in imbalanced datasets often conceals weak fraud detection performance due to many legitimate transactions in the dataset. Alharbi et al.’s approach demonstrates the potential of CNNs in handling non-image data creatively, suggesting possibilities like applying pretrained models. Other deep learning strategies, such as recurrent neural networks and transformers, also aim to model temporal and contextual patterns in transaction sequences. These models can outperform classical methods, which are given sufficient data but require substantial computational resources and careful tuning. Hafez et al. (2025) [6] noted that while deep learning has improved in fraud detection, challenges remain in terms of scalability, data demands and effectiveness. New architectures like Graph Neural Networks (GNNs) and transformers are being explored in this area to make complex interactions better in transactions.  In the last few years, Graph neural networks have emerged, promising a way forward for fraud detection. Unlike traditional models that treat transactions as independent records, GNNs can exploit relationships between entities, for example, linking transactions by common cardholder, merchant, device, or IP address to form a transaction network. By performing message-passing on this graph, a GNN can detect suspicious patterns like a sequential fraud attack that would be hard to identify in isolation. Several studies on financial fraud have embraced graph learning. Yan et al. (2023) [7] introduced a Feature Importance-based Weighted Graph Neural Network (FIW-GNN) tailored for credit card fraud detection. Their model assigns weights to input features based on importance and learns on a heterogeneous graph, such as one that includes different node types like cards and merchants. FIW-GNN was shown to be an effective, stable, and practical solution in their experiments, outperforming basic classifiers. By including feature importance into the graph model, it improved interpretability and handled the skewed data more robustly. Graph-based methods in fraud detection often report better recall of fraudulent instances since they can spot a fraudster using the same card across many merchants or linking to known bad entities. Another recent study by Rahmati et al. (2024) [8] combined GNNs with federated learning to enable real-time fraud detection across multiple institutions. In their framework, an adaptive GNN continuously updates the transaction graph with new data and detects fraud patterns as they emerge rather than relying only on historical fraud signatures. At the same time, federated learning allows different banks to collaboratively train the model on their collective data and a synthetic dataset. This hybrid approach, consisting of GNN + FL, yielded significant gains in evaluations on financial datasets, improving fraud detection accuracy by 15 to 30% while reducing false positives compared to traditional machine-learning solutions. Such results show that GNN’s especially when combined with other advanced techniques, can substantially boost detection performance, thus catching more fraud and improving precision with fewer false alarms. The ability of GNNs to integrate structural information gives them an edge in identifying fraud rings or coordinated attacks that stump purely transaction-focused models.  Given recent advances, there is increasing interest in hybrid fraud detection models that combine domain knowledge with AI. Hafez et al. highlight the potential of “neural-symbolic” approaches, which integrate machine learning with a rule-based system to enhance model interpretability and adaptability. Traditional rule-based methods, such as blocking transactions from blacklisted countries or flagging unusual large purchases, are known fraud patterns but struggle with new unfamiliar attacks. ML models like GNNs can detect emerging patterns, but may generate false positives; hence, a combined approach could offer much greater robustness. Pisani (2021) [9] found that fraud detection in Maltese acquiring banks remains largely reactive, and identifying fraud relies on internal tools and manually set rules that vary from company to company. It was concluded that the fraudsters are “always one step ahead” of existing measures and that there is always room for improvement in detection methods.  The gap between static rule-based systems and dynamic fraud threats highlights that hybrid approaches are needed. Existing literature shows a progression from traditional machine learning to deep learning and graph-based models, each improving certain aspects such as accuracy and pattern recognition. However, no prior study has explicitly combined GNN with rule-based logic for credit card fraud detection. While banks rely on manually set rules and researchers focus on complex models, this research aims to combine these 2 methods. By integrating GNNs with rule-based constraints, the hybrid system can capture complex fraud patterns while reducing false positives with predefined rules. This approach builds directly on the key findings and limitations in the literature, targeting a solution that is accurate, adaptive and practical for real-world merchant use. |

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| **Significance of the Study** |
| *Identify the aims behind your proposed study and justify why it should be carried out/merits investigation.*  *(70-80 words approx.)*  This study aims to advance fraud detection for payment merchants by targeting fraud patterns that evade current systems. Merchant acquirers deal with complex fraud schemes that are not easily caught by simple rules. Improving detection can save significant revenue and protect consumer trust. The proposed solution is carried out by combining a Graph Neural Network with rule-based filters. GNNS offer adaptive pattern recognition in transaction networks, while business rules inject domain expertise, thus together can promise higher fraud detection with fewer false alarms. |

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| **Hypotheses and/or Research Question/s** |
| *Develop the hypothesis or set 2-3 research questions concerning the proposed study.*  *(70-80 words approx.)*   1. How does a GNN and a rule-based model compare to standalone ML and GNN models in terms of precision and recall in fraud detection? 2. How can integrating domain-specific rules into a GNN reduce false positives in credit card fraud detection? 3. How does the use of graph-structured data in GNNs enhance the detection of coordinated or hidden fraud patterns compared to traditional ML models? |

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| **Target Participants and Research Methods for Data Collection and Analysis** |
| *Describe the research design and data collection methods that you will adopt to gather data and evaluate your research prototype. This section should also describe how the data/prototype will be analysed/tested. The research methods proposed should align with research identified in the literature review.*  *(200-300 words approx.)*  This research will use credit card transaction data from a merchant acquiring bank perspective to develop and test a fraud detection model. Ideally, the dataset would include transaction amount, timestamp, merchant ID, card/account ID, and fraud labels. A sanitised dataset would be used from my workplace, which is reviewed by the company, and it is anonymised due to confidentiality issues. While anonymised, this dataset supports the creation of a sanitised transaction graph by linking transactions based on temporal or behavioural similarity.    The graph-based model will represent transactions through nodes, for example, credit cards and merchants, and edges that represent the transactions. A graph structure will be constructed where a transaction links a card node to a merchant node. In the absence of real identifiers, pseudo-identifiers will be generated based on transaction patterns. Features will be engineered for each node and edge, for example, average spending or merchant fraud history.  A graph neural network will be trained to classify transactions as fraudulent or legitimate by combining features across the network. Data will be split chronologically into training, validation, and test sets to reflect real-time conditions. Performance will be evaluated using metrics such as precision, recall, F1-score, and ROC AUC, with a focus on reducing false positives and maximising fraud detection.  Additionally, rule-based filters will be designed using domain knowledge, for example, flagging transactions over 1000 euros or a card being used at multiple merchants in a short time. The study will test both cascade and ensemble models, combining GNN outputs with rules. Results from the hybrid system will be compared with rule-only and GNN-only baselines to assess performance improvements. |

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| **Anticipated Contributions of the Study** |
| *Show how the proposed study could contribute to society or specific sectors/industries. If a research/knowledge gap has been identified in your research field, position your study accordingly. Alternatively, explain how your study intends to supplement or replicate prior research to obtain fresh results.*  *(70-80 words approx.)*  This research proposes a hybrid fraud detection framework that combines the use of Graph Neural Networks with rule-based reasoning. It addresses a knowledge gap by applying GNNs to merchant fraud, a domain where structured fraud is often not detected by traditional methods. The study also offers practical benefits by reducing false positives and false alerts. The findings aim to inform adaptive, aligned fraud screening tools for fintech companies, particularly those that support merchant acquirers and high-volume payment systems. |

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| **Dissertation Project Plan** |
| *Produce a simplified, monthly action plan from July 2025 (further work on early proposal) until May 2026 (submission of ICT project and dissertation).*  July 2025   * Begin work on the proposal and literature review. * Refine research questions based on the mentor’s feedback. * Set up a repository for the project. * Download and get familiar with the datasets.   August 2025   * Complete detailed literature review and theoretical framework. * Define system architecture by choosing a GNN model, listing rules, and identifying data requirements. * Begin sanitising the data that is needed.   September 2025   * Clean and preprocess the data to handle class imbalance, create train/validation splits and develop node and edge features. * Construct transaction graph schema for the GNN. * Set up a development environment to experiment with machine learning.   October 2025   * Train baseline ML models with Random Forest or XGBoost. * Implement basic rule-based detection logic. * Evaluate baseline models on the validation data by precision and recall.   November 2025   * Build and train the GNN model using PyTorch Geometric or TensorFlow. * Tune hyperparameters by learning rate and graph layers. * Monitor validation, performance and fraud case recall. * Address underfitting or overfitting issues.   December 2025   * Design and integrate the hybrid GNN + rule-based system. * Add the rules to the system. * Run the hybrid model and begin analysis. * Refine the rules or model inputs based on false positive/negative cases.   January 2026   * Conduct a full evaluation on the test dataset. * Compare performance across ML baseline, GNN-only and GNN + rules models. * Perform statistical testing. * Assesses computational performance. * Draft result summaries and visuals.   February 2026   * Optimise the hybrid model if needed. * Perform cross-validation or use data variations to test robustness. * Outline dissertation structure by focusing on the methodology and results chapters.   March 2026   * Draft the dissertation with the methodology, updated literature review and the results and discussion. * Address the limitations and generalisability. * Explore real-world applicability to merchant environments.   April 2026   * Receive the mentor’s feedback and implement it. * Revise for clarity, coherence and strength of the argument. * Write the introduction and conclusion chapters. * Ensure correct referencing and formatting.   May 2026   * Final proofreading and formatting. * Confirm all ethical and submission requirements are met. * Prepare supplementary materials. * Submit final dissertation and prepare for any presentation or viva. |

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| **Ethical Considerations** |
| **Refer to *guidance points below. You are also additionally required to read MCAST Document 074 ‘Research Ethics Policy and Procedure’ that is available on the College website***  *Research shall be conducted in such a manner so as to avoid any psychological and physical harm to humans and animals and financial damage to organizations:*   1. *Only the supervisor and examiners will have access to any data gathered.* 2. *Participants will remain free to withdraw from the study at any time without having to provide any reason. In the case of withdrawal, all the records and information collection will be deleted.* 3. *The participant, who is the sole proprietor of the data provided, is granting that such data would be processed for this study purposes only.* 4. *The data collection process will be a transparent process.* 5. *All transcriptions and/or electronic recordings reflecting the data collected, once exhausted, are to be deleted* 6. *Confidentiality, anonymity and data protection procedures are to be ethically abided by.* 7. *The researcher would provide a soft copy of the study to the participant, if required.* |
| *Enter details here regarding possibility of issues regarding confidential personal data (if applicable).*  *How will you ensure that:*   * *No personal data or confidential data is divulged?* * *Participants’ identities are not divulged (i.e. kept anonymous)? (70-80 words approx.)*   Although this study does not involve human participants, the dataset provided by the workplace will be fully anonymised, with no access to personally identifiable information. All the data used is pre-sanitised and reviewed by the company manager to ensure that no client names, transaction ID’s, credit card numbers or any other sensitive business details will remain private and not shared. This research will comply with data protection policies and ensure that private data remains undisclosed until the study is finished. |
| *Enter details here regarding possibility of physical harm (if applicable).*   * *How will you ensure that no person or animal gets hurt during the implementation of the research?* * *What Personal Protective Equipment (PPE) will you be needing/using? (70-80 words approx.)*   NOT APPLICABLE |
| *Enter details here regarding possibility of moral harm (if applicable).*   * *What steps will you take to avoid unduly offending or disturbing the well-being of the participants?* * *How will you avoid any possible psychological, spiritual or cultural offence to participants?* * *How will you ensure that the interests and rights of minors / vulnerable / disabled persons / specific social groups are safeguarded where necessary? (70-80 words approx.)*   NOT APPLICABLE |
| *Enter details here regarding possibility of business harm (if applicable).*  *How will you ensure that:*   * *Participants do not suffer any competitive disadvantage as an outcome of the research?* * *Confidential business ideas and data are protected and not divulged? (70-80 words approx.)*   The dataset provided by my workplace is fully anonymised to protect client and transaction-level information. Before use, it is reviewed and approved by the company manager to ensure that no sensitive data is included. All the results will be reported, avoiding disclosure of patterns that could give competitors an advantage. No algorithms or business logic will be shared. Data will be stored securely and used only for academic purposes, not violating organisational data policies |

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| **List of Key References** |
| *All sources used (between 6-8) must be cited throughout the document and reproduced in full as IEEE 2023 references.*  [1] S. Bhattacharyya et al., “Data mining for credit card fraud: a comparative study,” *Decision Support Systems*, Feb. 2011. [Online]. Available: <https://www.sciencedirect.com/science/article/pii/S0167923610001326>  [2] J. Demicoli, “Credit card fraud detection with oversampling,” B.Sc. dissertation, University of Malta, 2020. [Online]. Available: <https://www.um.edu.mt/library/oar/handle/123456789/76771>  [3] J. K. Afriyie et al., “A supervised machine learning algorithm for detecting and predicting fraud in credit card transactions,” *ResearchGate*, 2023. [Online]. Available: <https://www.researchgate.net/publication/367133523>  [4] K. Sudharson et al., “Financial Transactional Fraud Detection using a Hybrid BiLSTM with Attention-Based Autoencoder,” *International Research Journal of Multidisciplinary Technovation*, 2022. [Online]. Available: <https://www.journals.asianresassoc.org/index.php/irjmt/article/view/2733/1016>  [5] A. Alharbi et al., “A novel text2IMG mechanism of credit card fraud detection: a deep learning approach,” *Electronics*, Mar. 2022. [Online]. Available: <https://www.mdpi.com/2079-9292/11/5/756>  [6] I. Y. Hafez, et al., “A systematic review of AI-enhanced techniques in credit card fraud detection,” *Journal of Big Data*, Jan. 2025. [Online]. Available: <https://journalofbigdata.springeropen.com/articles/10.1186/s40537-024-01048-8>  [7] K. Yan et al., “Credit card fraud detection using deep learning with graph neural networks,” *IEEE Access*, 2023. [Online]. Available: <https://ieeexplore.ieee.org/document/10302538>  [8] M. Rahmati, “Real-time financial fraud detection using adaptive graph neural networks and federated learning,” *ResearchGate*, 2024. [Online]. Available: <https://www.researchgate.net/publication/389053167>  [9] K. Pisani, “Analysis on fraud detection in local acquiring banks,” B.Sc. dissertation, University of Malta, 2021. [Online]. Available: <https://www.um.edu.mt/library/oar/handle/123456789/84515> |

END OF ASSIGNMENT

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| Criteria and Total Mark | Category | Minimal / Marks Not Awarded | Needs Improvement | Satisfactory | Good | Excellent |
| R&U1  10 marks | *Academic*  *Sources* | Information given is unidentifiable and/or uncited.  No academic sources are used.  Dubious sources used, possibly due to dependence on GenAI prompting.  **0 marks** | Fewer than 4 sources and the majority of are not reputable or reliable academic sources of information.  Source information may also be largely irrelevant to research topic. **1-3 marks** | Between 5-6 reputable sources of information, which may not all be entirely academic.  Some source information may not be entirely relevant to research topic.  **4-6 marks** | Between 7-8 reputable and reliable academic sources of information.  Attempt made at sourcing local studies.  Source information is generally relevant and necessary to research topic. **7-8 marks** | Eight or more reputable and reliable academic sources of information.  All content retrieved from journal databases or scholarly sources.  Attempt made at sourcing local studies.  Information is entirely relevant to research topic. **9-10 marks** |
| R&U2  5 marks | *Main area proposed*  *Hypothesis / Research questions* | These sections are missing or severely underwritten.  Scope of proposed study is not clarified.  Hypothesis and/or research questions are incorrectly phrased nor do they properly address the proposed study.  **0 marks** | Both sections are included but a well-defined scope is lacking and/or does not outline issues being addressed.  Similarly, a hypothesis and/or research questions are included but imprecise.  **1-2 marks** | Both sections are included.  Scope of proposed study is clear and research issues are addressed.  A hypothesis and/or research questions are included but imprecise.  **3 marks** | Both sections are included.  Scope of proposed study is clear and research issues are addressed.  A hypothesis and/or research questions are included and are mostly clear and accurate.  **4 marks** | Both sections are included.  Scope of proposed study is well-defined and raises the necessary issues.  A hypothesis and/or research questions are included and are clear and accurate (within scope).  **5 marks** |
| A&A1  5 marks | *Significance of study*  *Anticipated contribution* | These sections are missing or severely underwritten.  Why and how the proposed study merits investigation is never made clear. **0 marks** | Both sections are included but the anticipated contribution section requires further development.  **1-2 marks** | Both sections are included, with a moderate attempt at situating the proposed study within a local and/or international context.  Any research/knowledge gaps arising are not acknowledged.  **3 marks** | Both sections are included, with a good attempt at situating the proposed study within a local and/or international context.  Any research/knowledge gaps arising are acknowledged.  **4 marks** | Both sections are included, with a good attempt at situating the proposed study within a local and/or international context.  Any research/knowledge gaps arising are acknowledged.  How the proposed study intends to fill this gap or increment previous research is discussed.  **5 marks** |
| E&C1  20 marks | *Outline of key literature* | Literature review section is missing or severely underwritten.  No use of specialist terms/definitions.  No attempt to group sourced information sourced by similarity or theme.  Content appears to be randomly listed.  There is little to no analysis, contrast or discussion of source data.  **0-4 marks** | Literature review section is somewhat undeveloped and based on very few studies (less than 2).  It lacks use of specialist terms/definitions.  There is little attempt to provide context.  Sourced content is not entirely grouped by similarity or theme.  Research data mostly lacks analysis or comparison and is simply paraphrased without much evaluation.  Limited discussion of key approaches and findings in prior studies.  **5-9 marks** | Literature review section meets length requirements and based on more than 2 studies.  Specialist terms/definitions are included.  Context to proposed study within research field is given.  Sourced content is grouped by similarity of content or theme but flow is not always present.  Research data is discussed with some attempt at comparison and contrast, but with infrequent or incorrect use of in-text citations.  Some discussion of key approaches and findings which are made relatable to the proposed study.  **10-13 marks** | Literature review section meets length requirements and based on more than 4 studies.  Specialist terms/definitions are included.  Context to proposed study within research field is given.  Sourced content is grouped by similarity of content or theme with adequate flow of information.  Research data is appropriately discussed and contrasted, but with infrequent or incorrect use of in-text citations.  Good discussion of key approaches and findings which are made relatable to the proposed study.  **14-17 marks** | Literature review section meets length requirements and based on more than 4 studies.  Specialist terms, definitions, and context allow fuller clarity of the research problem being investigated.  Sourced content is grouped by similarity of content or theme with good flow of information, providing a coherent picture of the state of affairs.  Research data is properly discussed and contrasted, with correct use of in-text citations.  Good discussion of key approaches and findings which are made relatable to the proposed study.  **18-20 marks** |
| E&C2  15 marks | *Completion of Doc 164 form*  *Mechanics of writing* | Doc 164 form has multiple gaps concerning mandatory information.  Writing is generally and extensively impaired in all sections, with little to no application of Academic English and proper use of citations where necessary.  Arguments and information lack flow.  Writing does not demonstrate an understanding of relationships between ideas or content.  **0-2 marks** | Doc 164 form has multiple gaps concerning mandatory information.  Writing is generally and extensively impaired in all sections, with little to no application of Academic English and proper use of citations where necessary.  Arguments and information tend to lack flow.  Writing demonstrates a limited understanding of relationships between ideas or content.  Limited or incorrect paraphrasing of content.  **3-5 marks** | Doc 164 form has some gaps concerning mandatory information.  Writing could have been revised further to limit mistakes in syntax and expression.  Occasional non-use of Academic English which affects style.  Arguments and information flow, with cohesion being generally present, demonstrating an understanding of relationships between ideas or content.  Most content paraphrased but citations are not always appropriately used/placed.  **6-8 marks** | Doc 164 form has all mandatory sections completed.  Writing could have been revised further to limit mistakes in syntax and expression.  Good use of Academic English.  Arguments and information flow, with cohesion being generally present, demonstrating an understanding of relationships between ideas or content.  Most content paraphrased but citations are not always appropriately used/placed.  **9-12 marks** | Doc 164 form has all mandatory sections completed and properly developed.  Writing demonstrates evidence of proper proofreading before submission, with hardly any mistakes in syntax and expression that impair argument flow or coherence.  Good and extensive use of Academic English.  All content properly paraphrased and citations appropriately used when and where necessary.  **13-15 marks** |

\*Marks deducted for under-writing as well as frequent mistakes in language use, lack of cohesion, and syntax. Properly revise your writing before submission.