

Overview

In this unit, you are required to write an academic research paper based on data and/or prototype of a topic of your interest, unless advised otherwise by your lecturer. Your research can make use of quantitative, qualitative or mixed methodologies.

For quantitative research you may search and use datasets from <https://kaggle.com>, <https://huggingface.com>, <https://paperswithcode.com>, <https://archive.ics.uci.edu/>, or any other relevant repository. Any datasets and code related to your research area are accepted, with the exception of the complete dataset and code solution used for your own dissertation. You may make use of a readily-available alternative algorithm/s from Git or other sources in your topic of interest, which can also potentially serve as a benchmark for what you did in your dissertation. For qualitative methods you may make use of publicly available interviews, podcasts, talks, and/or relevant documents. Data from these sources can then be transcribed, coded and analysed using QDA software like MAXQDA/NVivo.

The aim of this unit is to learn how to conduct research employing a rigorous and valid methodology, namely: how to draw up a testable hypothesis, choose the appropriate research methodology to address the hypothesis, design an experiment, collect data, evaluate results and discuss in relation to existing studies and the original hypothesis.

A staggered assessment approach shall be undertaken, so that you can build your reflections documented in your paper gradually. Regular communication with your lecturer is key. Following is a schedule and outline of the milestones and respective deliverables:

Schedule

Milestone		Deliverable	Marks	Deadline
Task 1	Section 01	Introduction, Positioning, Research Onion	10%	10/03/2025
	Section 02	Review of research methodologies & map	20%	21/04/2024
	Section 03	Reflection on the chosen Methodology	20%	
	Section 04	Results, analysis and discussion.	24%	
	Section 05	Conclusion	5%	18/05/2025
Task 2		Reference Management System	7%	
Task 3		Final Paper	7%	
Task 4		Oral review + video	7%	19-30 /05/2025

You are to pay particular attention to topics learnt in class including the different research paradigms and methodologies, experiment design, evaluation of results, and aspects which improve quality of research like rigor, validity and reliability. This unit follows up on the first *Research Design I* unit, which focused on algorithm development and prototyping, with this unit focusing more on methodological congruence, hypothesis testing and evaluation methods.

It is very important that you conduct proper research by reading multiple books & papers focusing on research methodology within your subject area, rather than the subject area itself.

Plagiarism & Referencing

MCAST operates under a strict plagiarism policy, and failing to adhere to this can lead to severe consequences. Regarding the use of Chat GPT, you should not use it as a substitute for your own research and writing. While AI tools like GPT-4 are powerful tool for generating text, it is important for you to understand the material you are writing about and to be able to communicate your ideas in your own words. Using GPT-4 as a reference source can also lead to the inclusion of inaccurate or inappropriate information in your work. It is essential for you to properly cite all sources used in your writing, to ensure that they are giving proper credit and avoiding plagiarism.

To reduce the risk of plagiarism, you must use git commits while working on the research paper. The git commits should be spread across a couple of days to show that you are taking the work seriously and that it is not a last-minute assignment. Your first git commit needs to be the current state of your dissertation or research design I project or as applicable.

Every task should be well argued using citations and cross referencing between different references. It is highly recommended to use the MCAST library or other platforms such as IEEE. Avoid citations from videos or online blogs. Reading is going to take time, so make sure you schedule your time correctly. It is suggested you make use of the book “Research Design: Qualitative, Quantitative, and Mixed Methods Approaches” by J.D. Creswell to undertake your research endeavour. You can also consult Multivariate Data Analysis vi(8th ed) - (Joseph F. Hair Jr., William C. Black, Barry J. Babin, Rolph E. Anderson) for quantitative research and Qualitative Interviewing: The Art of Hearing Data (2nd ed.) - (Herbert J. Rubin & Irene S. Rubin) for qualitative research.

Please note that this assignment is assessed independently of the dissertation and carries its own assessment criteria.

Deliverables

At the different milestones within this unit, you are expected to deliver the following:

- a) All related content including data and software should be uploaded on a **Git repository**, where necessary.
- b) Show the ability to use a reference management tool.
- c) Show the ability to use a tool suitable to write scientific papers or journal articles.
- d) Produce a 3-5 page 2-column document in the format of an **academic paper** that documents your research undertaking.
- e) Present a video presentation during an oral review.

Task 1

Section 1

The paper in relation to your research should include:

- i. **Title of this unit with author information**
- ii. **Chosen Research**
 - i. Description of Theme and Topic Rationale.
 - ii. Positioning and Research Onion.
 - iii. Background to this research theme.
 - iv. Hypothesis.
 - v. Research Aim and Purpose statement.

Criteria Assessed

- KU1.1 Explain the purpose of a chosen research using relevant past literature to back up own hypothesis and study.
- KU2.2 Explain the difference between independent and dependent variables when carrying out statistical tests to validate a hypothesis.

Poor quality work (0-2 marks)	Moderate quality work (3-6 marks)	Top quality work (7-10 marks)
Introduction lacks clear description of theme, topic rationale, and research onion. Background of research theme is not clearly explained or missing. Hypothesis, research aim and purpose statement not clearly stated or missing.	A general description of theme and topic rationale and research onion, with room for improvement in clarity. Background of research theme is present but could be more detailed. Hypothesis, research aim, and purpose statement are present but could be clearer.	Clear and detailed description of the theme and topic rationale, including positioning and research onion. Fully explained background of the research theme. Clearly and precisely stated hypothesis, research aim and purpose statement.

Section 2

The paper in relation to your research should include:

f) Review of research methodology

- i. Undertake a short literature review about the methodologies used in other studies;
- ii. Distinguish between academic and non-academic material.
- iii. Recommended 5 articles from peer reviewed journals.
- iv. Contextualised literature and research material.
- v. Add a good element of critical literature arguments. (Compare, contrast and identify knowledge gaps)

Criteria Assessed

- KU1.3 Explain the different research approaches and methodologies undertaken by other researchers, in the chosen research area.
- KU2.3 Identify a set of experimental variables utilized by other researchers, in the chosen research area explaining how this has helped to validate the hypothesis.
- KU2.1 Describe different testing strategies that were utilized by other researchers in a given context.

Poor quality work (0-5 marks)	Moderate quality work (6-10 marks)	Top quality work (11-15 marks)
Fails to undertake a short literature review about the methodologies used in other studies.	Undertakes a literature review about the methodologies used in other studies, but it could be more comprehensive.	Undertakes a comprehensive literature review about the methodologies used in other studies.
Does not distinguish between academic and non-academic material. Does not recommend any articles from peer-reviewed journals.	Distinguishes between academic and non-academic material, but it could be more clearly defined. Recommends some articles from peer-reviewed journals.	Clearly distinguishes between academic and non-academic material. Recommends at least 5 articles from peer-reviewed journals.
Does not contextualize literature and research material.	Contextualizes literature and research material, but it could be more in-depth.	Contextualizes literature and research material in a clear and in-depth manner.
Does not add a good element of critical literature arguments.	Adds some critical literature arguments, but they could be more developed.	Adds a good element of critical literature arguments, highlighting the strengths and weaknesses of existing research.

vi. Construct a Literature Map.

- i. Leaf nodes should be sources supporting a concept.
- ii. No two identical leaf nodes (similar elements should be linked by relationships).
- iii. All relationships should be labelled.
- iv. All referenced papers should be listed in the references section.

Criteria Assessed

- KU3.1 Outline how the data gathered by other researchers in the chosen research area is presented.

Poor quality work (0-1 marks)	Moderate quality work (2-3 marks)	Top quality work (4-5 marks)
No clear structure defined, no understanding of the difference between subtopics and relationships, few to no sources referenced.	Clear structure, good understanding of topics and subtopics, some relationships missing, some sources within the papers omitted.	Clear structure, good understanding of topics and subtopics, all sources included and correctly related and referenced.

Section 3

The paper in relation to your research should include:

g) Reflection on the chosen Methodology

- i. Define your research question/s.
- ii. Define your objectives. (Tasks to be done to address your research questions)
- iii. Show an early understanding of research philosophies, approaches and main research paradigms.
- iv. Choose a suitable methodology from those reviewed.
- v. Initial description of your chosen research methodology, experiment design and method of analysis and why this fits your research objectives.
- vi. Reflections on validity, reliability & generalizability/transferability.
- vii. Any ethical considerations that you may envisage relating to your research endeavour.

Criteria Assessed

- SE1.4 Devise a methodology for the chosen research based on clearly substantiated academic theories and past scientific publications.
- SE2.4 Develop a testing strategy using appropriate measures utilising the correct experimental variables for validating the hypothesis.

Poor quality work (0-5 marks)	Moderate quality work (6-13 marks)	Top quality work (14-20 marks)
The research question and objectives are not clearly defined or missing.	The research question and objectives are defined but may need further clarification.	The research question and objectives are clearly defined and well-articulated.
The understanding of research philosophies, approaches, and main research paradigms is lacking or missing.	The understanding of research philosophies, approaches, and main research paradigms is present but could be more detailed.	The understanding of research philosophies, approaches, and main research paradigms is thorough and well-explained.
The chosen methodology does not fit the research objectives or is not explained.	The chosen methodology fits the research objectives, but the explanation could be more detailed.	The chosen methodology fits the research objectives and is well-explained.
The description of the research methodology, experiment design, and method of analysis is missing or inadequate.	The description of the research methodology, experiment design, and method of analysis is present but could be more detailed.	The description of the research methodology, experiment design, and method of analysis is detailed and well-explained.
No or little consideration was made to validity /reliability/generalizability.	Good considerations to validity/reliability/generalizability are present, but are not fully comprehensive and detailed.	Detailed validity /reliability/generalizability considerations were made.
Ethical considerations are not addressed or not adequately addressed.	Ethical considerations are addressed but could be more detailed.	Ethical considerations are addressed in a comprehensive and thorough manner.

Section 4

The paper in relation to your research should include:

h) Results, analysis and discussion.

- i. Present your results using established metrics and aggregations relevant to your chosen methodology, in the form of tables, figures, graphs and other appropriate visuals where applicable.
- ii. Analyse and interpret results.
- iii. Compare, contrast and comment on different results. Criticize in relation to validity, reliability and generalizability aspects.
- iv. Discuss results in relation to the original hypothesis and other studies where appropriate.

Criteria Assessed

- AA3.2 Apply the most appropriate data collection, organization and presentation techniques to facilitate the analysis and communication of findings for the chosen research.
- AA3.3 Analyse the data collected through testing strategies to establish key relationships, themes, observations and patterns from the data obtained.
- SE3.5 Evaluate the overall approach to a chosen research, against the research approach taken by other researchers in the field, to identify an improved course of action for future implementations of the chosen research.

Poor quality work (0-7 marks)	Moderate quality work (8-15 marks)	Top quality work (16-24 marks)
Results are not presented in an organized and clear manner.	Results are presented in an organized manner but could be clearer.	Results are presented in an organized and clear manner, using appropriate visuals where applicable.
No or limited use of appropriate visuals.	Use of some appropriate visuals where applicable but could be more comprehensive.	Detailed analysis and interpretation of results.
Little to no analysis or interpretation of results.	Some analysis and interpretation of results but could be more detailed and critically reflected upon.	Comprehensive critique, comparison and contrast of different results.
Weak comparison or contrast of different results.	Limited comparison and contrast of different results.	In-depth discussion of results in relation to the original hypothesis and other studies.
Weak discussion of results in relation to the original hypothesis or other studies.	Limited discussion of results in relation to the original hypothesis and other studies.	

Section 5

The paper in relation to your research should include:

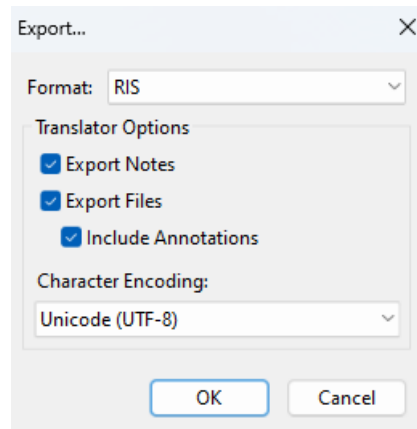
i) Conclusion

- i. State the main conclusion/s of your research.
- ii. Make use of conclusion/s to address your research questions and hypothesis or research objectives.
- iii. Identify any shortcomings in the **methodology**.
- iv. Suggest ideas for further research.

Criteria Assessed		
<ul style="list-style-type: none"> KU3.4 Present conclusions as to whether a hypothesis for a chosen research has been proven or not based on the findings for such research. 		
Poor quality work (0-1 marks)	Moderate quality work (2-3 marks)	Top quality work (4-5 marks)
<p>The conclusion does not state the main conclusion/s of the research or they are not clear.</p> <p>The conclusion does not address the research questions and hypothesis.</p> <p>Shortcomings in methodology are not identified or discussed.</p> <p>No suggestions for further research are provided.</p>	<p>The conclusion states the main conclusion/s of the research, but they could be more clearly presented.</p> <p>The conclusion addresses the research questions and hypothesis but could be more thorough.</p> <p>Shortcomings in methodology are identified but could be more extensively discussed.</p> <p>Suggestions for further research are provided but could be more detailed.</p>	<p>The conclusion states the main conclusion/s of the research in a clear and concise manner.</p> <p>The conclusion addresses the research questions and hypothesis thoroughly and effectively.</p> <p>Shortcomings in methodology are identified and discussed in detail.</p> <p>Suggestions for further research are provided in a comprehensive and well-thought-out manner.</p>

Task 2

You are required to make use of a reference management tool such as Zotero, Mendeley, RefWorks or otherwise, to ensure that you stay organised with the research material you have been reviewing. All the references mentioned in Task 1 should be stored in the reference management tool. Make sure that you utilise well the reference management tool of your choice, such as making use of multiple collections, tags, assign related articles and add relevant notes. Finally, you are required to export the library as RIS file and submit on VLE accordingly. Below is an example how this can be done in Zotero:



Criteria Assessed

AA4.1 Use an appropriate reference management tool to facilitate the storage and citing of bibliographic references when writing scientific documents.

- At least 5 references correctly added [3 marks]
- At least 2 collections are created [1 mark]
- At least 3 tags are assigned to references [1 mark]
- Make use of the *related* feature [1 mark]
- Add relevant notes to references [1 mark]

These criteria adapt to the reference management tool of your choice.

Task 3

You are required to make use of Latex to write the academic paper mentioned in Task 1. Make sure that the academic paper is well formatted with IEEE citations. When you are finished, export the project as .zip and upload on VLE accordingly. You can make use of Overleaf, VSCode, TeXstudio or otherwise to write the report in Latex.

Criteria Assessed

AA4.2 Use an appropriate document preparation tool to present chosen research in a format which is suitable for publication as a scientific paper or journal article.

- Document is properly formatted in overleaf [3 marks]
- In-text citations are properly numbered and referenced using IEEE [2 marks]
- References section is correctly written [2 marks]

Task 4

An oral review supported with a 5-minute video showing your research process. Focus should be on the research process i.e., the reviewed methodologies, own choices, experiment design, data collection, results, analysis and conclusions in relation to the hypothesis or research objectives.

Criteria Assessed

- AA1.2 Analyse a hypothesis in relation to its research aims, objectives and scope for an applied problem in a chosen domain.

Poor quality work (0-1 marks)	Moderate quality work (2-4 marks)	Top quality work (5-7 marks)
<p>The oral presentation is poorly prepared and not well-structured.</p> <p>The video does not effectively demonstrate the research process and is not well-produced.</p> <p>The focus on the research process is not clearly shown and the relationship to the hypothesis is not well-explained.</p>	<p>The oral presentation is adequately prepared and structured but could be improved.</p> <p>The video effectively demonstrates the research process but could be more polished.</p> <p>The focus on the research process is clear, but the relationship to the hypothesis could be more explicit.</p>	<p>The oral presentation is well-prepared, structured, and engaging.</p> <p>The video effectively demonstrates the research process in a polished and professional manner.</p> <p>The focus on the research process is clear and the relationship to the hypothesis is well-explained and understood.</p>

--End of Assignment--