INTERNATIONAL QUALIFICATIONS

AND ASSESSMENT CENTRE (IQAC)

«Approved»

2025 y. «16»

Programme	**Level 6 Diploma in Artificial Intelligence**		
Unit Number/ Unit Title	UNIT 6 RESEARCH METHODS AND AI INNOVATION		
Cohort Code:	L06RMAII-U6		
Unit Level	6		
Total GLH	Total qualification time 200/ Total Guided learning hours 90/ Self-guided learning hours 110		
Credits	20 CATS/ 10 ECTS		
Lecturer			
Start Date		**End Date**	

Unit Aims	This unit prepares learners for advanced research and innovation in AI. It covers research design, literature review, hypothesis testing, prototyping, and publication. Learners will also explore emerging AI trends and pitch innovative solutions.
Differentiation Strategies *(e.g. planned activities or support for individual learners according to their needs)*	The total number of students to be in the lesson is approximately 20. This is a multicultural group of students predominantly between the ages of 24 – 45, with numerous ethnic, gender, and creed background. These are UK academic level 5 students; hence it is assumed that they have practical, theoretical, or technological knowledge and understanding of a subject or field of work to find ways forward in broadly defined, complex contexts. These students must be able to generate information, evaluate, synthesise the use information from a variety of sources. Various approaches to addressing the various identified students needs will be adopted throughout the lesson. Such will include:- 1. Progressive tasks 2. Digital resources 3. Verbal support 4. Variable outcomes

	5. Collaborative learning 6. Ongoing assessment 7. Flexible-pace learning
Equality & Diversity	Variety of teaching techniques will be employed to ensure that the needs of each individual learner are met.
Safeguarding & Prevent	Safeguarding policies and the Prevent duty are strictly observed to ensure the safety, well-being, and inclusivity of all students and staff.
Health & Safety	SIRM H&S policies will be maintained.
Learning Resources	**Teaching and Learning Materials** • Creswell, J. (2018). Research Design. • Russell, S. & Norvig, P. (2020). Artificial Intelligence: A Modern Approach. • Arxiv.org & NeurIPS Proceedings. • MIT Technology Review (AI Section).

Learning Outcome	Assessment Criteria
LO1. 1. Conduct academic and industry literature reviews.	1.1Identify gaps and formulate research questions. 1.2Critique existing research and approaches.
LO2. 2. Apply appropriate research methods in AI.	2.1 Select qualitative or quantitative methods. 2.2 Use statistical or experimental design tools.
LO3. 3. Prototype innovative AI applications.	3.1 Design and implement proof-of-concept solutions. 3.2 Evaluate potential impact and scalability.
LO4. 4. Communicate research findings effectively.	4.1 Prepare research papers or technical blogs. 4.2 Present work at academic/industry events.
LO5. 5. Understand ethics and IP in AI research.	5.1 Apply ethical standards and citation practices. 5.2 Understand IP protection and open-source licensing.

No	Learning Outcome / Topic	Learning and Teaching Activities	Which assessment criteria does the session relate to?	Day/month/year/ signature
1.	**Research Fundamentals in AI**	**Research Fundamentals in AI** Types of research (applied, theoretical), research lifecycle	LO1: Literature Review & Research Design	
2.	**Literature Search Strategies**	**Literature Search Strategies** Google Scholar, arXiv, IEEE Xplore, PubMed	LO1: Literature Review & Research Design	
3.	**Identifying Research Gaps**	**Identifying Research Gaps** Systematic reviews, meta-analyses, benchmarking SOTA models	LO1: Literature Review & Research Design	
4.	**Formulating Research Questions**	**Formulating Research Questions** SMART criteria, hypothesis development	LO1: Literature Review & Research Design	
5.	**Critiquing AI Research Papers**	**Critiquing AI Research Papers** Assessing methodology, reproducibility, bias	LO1: Literature Review & Research Design	
6.	**Quantitative vs. Qualitative Methods**	**Quantitative vs. Qualitative Methods** When to use each (e.g., surveys vs. case studies)	LO2: Research Methods in AI	
7.	**Experimental Design for AI**	**Experimental Design for AI** Control groups, randomization, confounding variables	LO2: Research Methods in AI	
8.	Half-Term Exam	- Review of LO1 topics - Practice questions and mock assessment - **Half-term assessment** based on LO1 (theory)	LO1 LO2	
9.	**Statistical Tools for AI Research**	**Statistical Tools for AI Research** p-values, confidence intervals, effect sizes	LO2: Research Methods in AI	
10.	**Simulation & Synthetic Data**	**Simulation & Synthetic Data** Generating data for edge cases (GANs, domain randomization)	LO2: Research Methods in AI	
11.	**Reproducibility in AI**	**Reproducibility in AI** Code sharing (GitHub), Docker for environment consistency	LO2: Research Methods in AI	

12.	**Proof-of-Concept (PoC) Development**	**Proof-of-Concept (PoC) Development** Rapid prototyping with Jupyter, Streamlit, Gradio	LO3: Prototyping AI Innovations	
13.	**Design Thinking for AI**	**Design Thinking for AI** User-centered AI, empathy mapping	LO3: Prototyping AI Innovations	
14.	Final Exam Preparation & Review	- Comprehensive review of all learning outcomes - Practice questions and revision of key topics		
15.	Final Exam	- **Final-term assessment** covering all learning outcomes (theory and practical elements)		
16.	Feedback & Reflection	- Review of final exam - Individual feedback on performance - Reflective discussion on key learning points		
17.	**Scalability Assessment**	**Scalability Assessment** Load testing, latency optimization	LO3: Prototyping AI Innovations	
18.	**Impact Evaluation Frameworks**	**Impact Evaluation Frameworks** Cost-benefit analysis, societal impact assessment	LO3: Prototyping AI Innovations	
19.	**Failure Analysis in AI Research**	**Failure Analysis in AI Research** Learning from negative results	LO3: Prototyping AI Innovations	
20.	**Writing Technical Papers**	**Writing Technical Papers** IMRaD structure, LaTeX/Overleaf	LO4: Communicate research findings effectively	
21.	**Creating Effective Visualizations**	**Creating Effective Visualizations** Matplotlib, Seaborn, Plotly for research findings	LO4: Communicate research findings effectively	
22.	**Technical Blogging**	**Technical Blogging** Medium, Towards Data Science, company blogs	LO4: Communicate research findings effectively	
23.	Half-Term Exam	**Capstone Project** Full research cycle: Literature review → PoC → Paper/Poster		
24.	**Conference Presentations**	**Conference Presentations** Slide design, storytelling, handling Q&A	LO4: Communicate research findings effectively	

25.	**Poster Sessions & Demos**	**Poster Sessions & Demos** Designing research posters, live coding demos	LO4: Communicate research findings effectively	
26.	**Research Ethics in AI**	**Research Ethics in AI** Informed consent, data privacy, IRB approval	LO5: Ethics & Intellectual Property	
27.	**Citation & Plagiarism Avoidance**	**Citation & Plagiarism Avoidance** Zotero/Mendeley, citation styles (APA, IEEE)	LO5: Ethics & Intellectual Property	
28.	**Intellectual Property (IP) Basics**	**Intellectual Property (IP) Basics** Patents vs. copyrights, trade secrets **Open-Source Licensing** MIT, GPL, Apache licenses; commercialization rights	LO5: Ethics & Intellectual Property	
29.	Final Exam Preparation & Review	LO1, LO2, LO3, LO4	LO1, LO2, LO3, LO4	
30.	Final Exam		LO1, LO2, LO3, LO4	