MSc Project Plan

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Strategic and Ethical Integration of Generative AI in Higher Education

Problem Outline

This project investigates how higher education institutions can strategically and ethically integrate generative artificial intelligence (GenAI) into teaching, learning, and assessment. The absence of theoretically grounded, comprehensive frameworks to balance GenAI's innovative potential with risks to academic integrity, equity, and institutional accountability represents a critical gap (JISC, 2023). This is highly relevant to the MSc Artificial Intelligence and Data Science programme, combining advanced AI applications with ethical and data-driven solutions to educational challenges.

Background

Generative AI tools (e.g., ChatGPT, Claude) enable personalised learning and assessment innovation but raise concerns about plagiarism, algorithmic bias, and equitable access (Bobula, 2024; Chan & Hu, 2023). Most universities adopt reactive policies—temporary bans or vague guidelines—lacking theoretical grounding in pedagogy or AI ethics (UNESCO, 2023). This project develops a novel framework to guide ethical GenAI integration, leveraging qualitative data analysis in Python and theoretical synthesis, aligning with the data science and ethical focus of the MSc programme (Williamson & Eynon, 2020).

Recent empirical research by Dabis and Csáki (2024) examining policy responses of 30 leading universities to generative AI challenges reveals that institutions primarily focus on four key ethical dimensions: accountability and responsibility, human agency and oversight,

transparency and explainability, and inclusiveness and diversity. Their analysis of first institutional responses demonstrates that universities predominantly adopt a "bottom-up" approach, providing instructors with flexibility to determine AI use in their courses while maintaining clear communication requirements in syllabi. This aligns with the framework developed in this project, which similarly emphasises the need for strategic, theoretically grounded approaches to GenAI integration that balance innovation with ethical responsibility.

Aims/Objectives

The project aims to create a theoretically grounded, practical framework for ethical GenAI integration in higher education. SMART objectives:

- **Specific**: Develop a strategic framework addressing pedagogy, ethics, and governance for GenAI adoption.
- **Measurable**: Produce an artefact (model, policy brief, visual tool, commentary) validated by three EdTech/AI ethics experts.
- **Achievable**: Conduct thematic analysis of 10-12 university policy documents using Python and synthesise pedagogical, ethical, and governance theories.
- **Realistic**: Utilise accessible resources (e.g., JISC databases, open-source policies) within the May–September 2025 timeframe.
- **Time-bound**: Finalise the framework and report by August 2025, preparing for the oral exam in September 2025.

Research Questions

- **Main Question**: How can higher education institutions strategically adopt GenAI while ensuring pedagogical value, ethical responsibility, and institutional accountability?

This investigation builds upon the comprehensive meta-systematic review by Bond et al. (2024), which identified significant research gaps in AI ethics, collaboration, and methodological rigour within higher education contexts. Their analysis of 66 systematic reviews revealed a predominant focus on adaptive systems and personalisation, while highlighting the critical need for enhanced ethical considerations and interdisciplinary approaches to AI implementation. The present study addresses these identified gaps by developing a practical framework that integrates ethical principles with technical solutions for policy analysis and institutional decision-making.

- **Sub-questions**:
    1. What strategic challenges and opportunities exist for GenAI integration in teaching and assessment?
    2. What ethical concerns (e.g., bias, transparency, equity) should universities prioritise in AI policies?
    3. How do existing university policies conceptualise GenAI's role, and what assumptions underlie these approaches?

Artefact Deliverables

The artefact is a software-based system for GenAI policy analysis and recommendation:

- **NLP-Powered Analysis Engine**: A Python application that uses Natural Language Processing techniques to analyse higher education GenAI policies, extract key themes, and classify approaches (restrictive, permissive, transformative).
- **Interactive Web Application**: A Flask-based web interface allowing users to upload policy documents, visualize analysis results, and receive tailored recommendations for their institutional context.
- **Recommendation System**: An algorithm that generates strategic recommendations based on institution type, existing policies, and ethical considerations, supported by a MongoDB database of analysed documents.
- **Data Visualization Dashboard**: Interactive visualizations showing policy trends, comparative analyses, and ethical considerations across institutions, implemented using Matplotlib/Plotly. For example, the dashboard may include:
    - A bar chart comparing the frequency of restrictive vs. permissive policy approaches across institutions.
    - A word cloud highlighting the most common themes (e.g., "ethics", "plagiarism", "equity") in policy documents.
    - A heatmap showing correlations between policy types and ethical considerations (e.g., transparency vs. inclusivity).
- **Commentary**: A written interpretive summary integrated into the web application, providing qualitative insights into the analysis results (e.g., explaining why certain institutions adopt restrictive policies based on extracted themes). This commentary will be accessible as a downloadable PDF report generated by the application, ensuring users can share findings with stakeholders.

Artefact Development

- **Methods**

  1. **Document Analysis & NLP Pipeline**: Development of Python algorithms using NLP libraries (spaCy, NLTK) to process, analyse, and classify policy documents, extracting key themes, approaches, and ethical considerations. The methodological approach draws upon frameworks established by Barnes and Hutson (2024), who emphasise the critical importance of mitigating algorithmic bias through technical solutions, diverse datasets, and strict adherence to ethical guidelines in higher education AI applications. Their comprehensive review of bias mitigation strategies informs the NLP pipeline design, ensuring that policy classification algorithms incorporate fairness considerations and avoid perpetuating existing institutional inequalities. This ethical-technical integration approach ensures that the recommendation system promotes equitable GenAI adoption across diverse institutional contexts.
  2. **Web Application Development**: Creating a Flask-based web interface with HTML/CSS/Bootstrap for user interactions, document uploads, and results display.
  3. **Recommendation Engine**: Implementation of a rule-based system combining theoretical ethical frameworks with practical policy considerations to generate tailored recommendations.
  4. **System Integration & Testing**: Connecting the NLP backend with the web frontend, database integration (MongoDB), and user testing with 3-5 educational professionals.

- **Key Requirements**
  User-friendly interface with minimal technical barriers, compliance with UK accessibility standards (WCAG 2.1), and alignment with ethical principles (BERA, 2018).

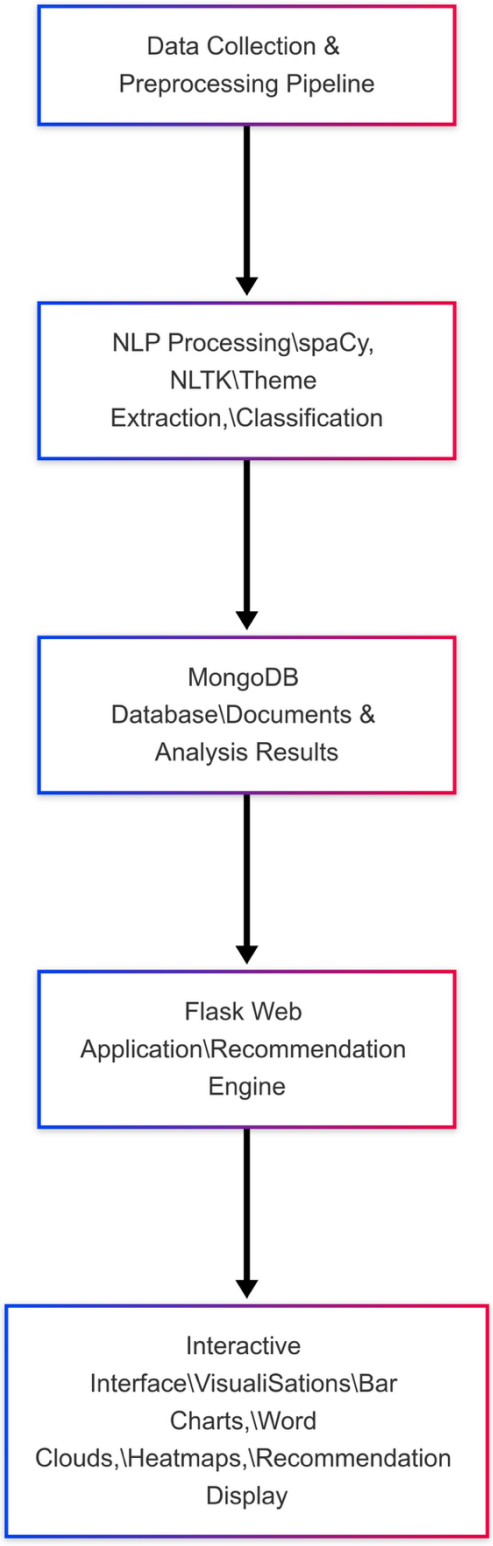
- **Limitations**
  Analysis limited to English-language policies; recommendation quality dependent on corpus size and diversity.

- **Skills to Acquire**
  Advanced NLP techniques for policy document analysis, data visualization for complex policy data, web application development with Flask.

- **Resources**
  Python environment (including NLP libraries), MongoDB database, Flask web framework, visualization libraries (Matplotlib/Plotly), hosting environment (local or cloud-based for demonstration).

Technical Architecture

The diagram illustrates the system architecture, depicting the flow of data through the system. It shows policy documents being input into an NLP pipeline (using spaCy and NLTK for theme extraction and classification), stored in a MongoDB database, processed by a recommendation engine, and presented to users via a Flask-based web interface with interactive visualizations (e.g., bar charts, word clouds, heatmaps).



Risk Analysis

Risk	Severity (0-5)	Likelihood (0-5)	Action/Mitigation
Technical complexity of NLP implementation	4	3	Leverage JISC databases and public repositories; contact institutions for additional documents.
Integration challenges between components	3	3	Adhere to strict timeline; bi-weekly supervisor check-ins to monitor progress.
Database performance issues with large documents	3	2	Engage a broader pool of experts (e.g., 3-4 contacts); use literature-based validation as a fallback.
Web application security vulnerabilities	4	2	Request an extension if needed; prioritise early task completion.
Insufficient number or diversity of policy documents	3	3	If fewer than 10-12 diverse policy documents are available, supplement analysis with secondary sources (e.g., academic literature on AI policies, such as JISC, 2023, or UNESCO, 2023) to ensure robust thematic analysis.

Consideration of Issues

- **Ethical**: Addresses algorithmic bias, academic freedom, and equity of access, adhering to BERA (2018) guidelines. Expert consultations will follow informed consent protocols.
- **Legal**: Ensures compliance with GDPR for document analysis; no sensitive personal data will be collected.
- **Diversity and Inclusion**: The framework considers diverse student needs (e.g., accessibility for disabled students, cultural inclusivity) to promote equitable GenAI adoption.
- **Societal**: Aims to reduce educational inequalities by guiding fair AI use.
- **Environmental**: Digital artefact delivery minimises environmental impact.
- **Commercial**: Potential for framework adoption by educational consultancies or institutions.

Ethics Approval Process

Remember: You MUST NOT collect any data until you have ethical approval from the University.

If you wish to use the Standard Protocol in order to speed up the process of ethical approval, you must answer "**no**" to **ALL** the following questions:

- *Will you be collecting data about identifiable individuals?* ***No***
- *Will you be collecting sensitive personal data*?* ***No***
- *Will you be collecting data from any participants who may be classed as vulnerable**?* ***No***
- *Will you be collecting data in any other location than an LTU campus or your home address?* ***No***
- *Will you be using datasets that are not open source?* ***No***

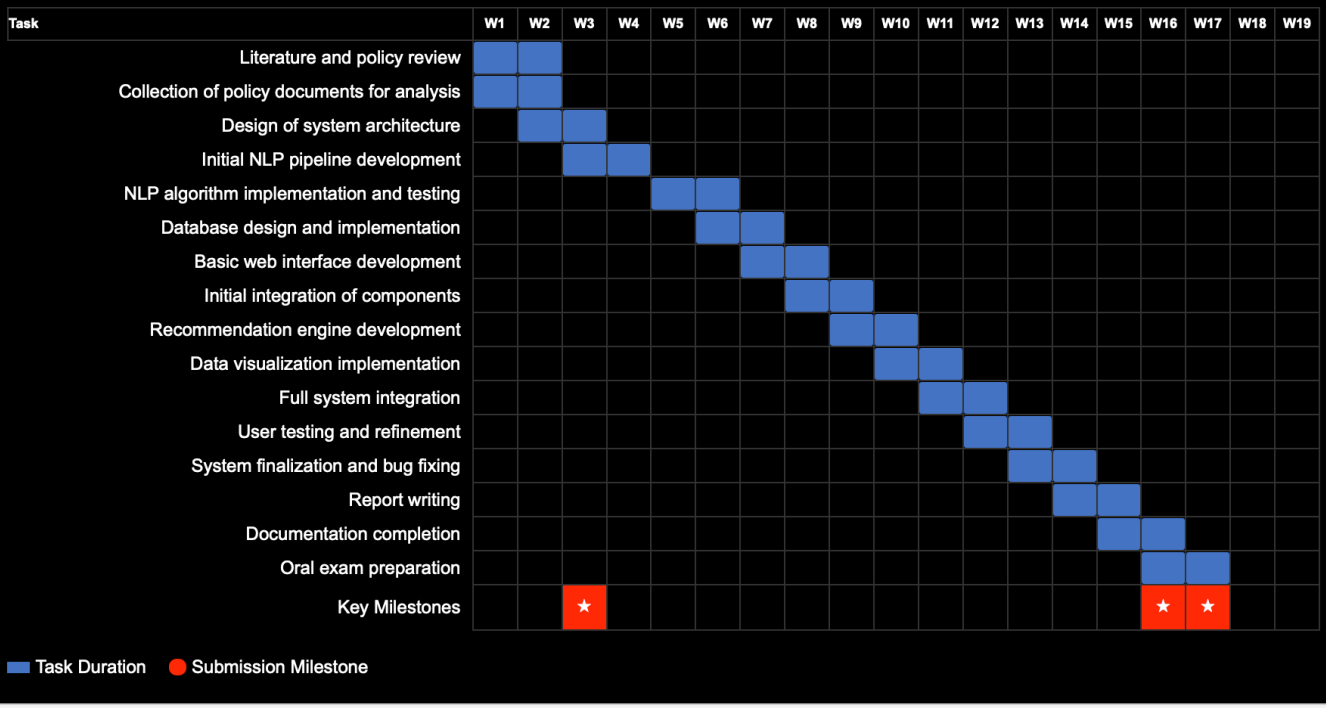
Do you intend to use the Standard Protocol for your ethics application? **Yes**

Project Timeline

Project Schedule

Week	Week Commencing	Date in Week	Time	Milestone/Deliverable
1	05-May	Thu 8th	17:00	Last chance to submit initial project idea form
2	12-May	Tue 13th	09:00	Supervisor allocation available
3	19-May	**Fri 23rd**	**12:00**	**Proposal Submission (10%)**
4	26-May			Proposal signed off -> Ethics application
5	02-Jun			
6	09-Jun			
7	16-Jun			Progress Review 1, Draft Literature Review
8	23-Jun			
9	30-Jun			
10	07-Jul			
11	14-Jul			Progress Review 2, "Minimum Viable Product" Artefact
12	21-Jul			
13	28-Jul			Draft Report
14	04-Aug			
15	11-Aug			
16	18-Aug	**Fri 22nd**	**12:00**	**Dissertation (40%) Submission**
17	25-Aug	**Fri 29th**	**12:00**	**Artefact (40%) Submission**
18	01-Sep			
19	08-Sep			Date to be arranged Viva (Presentation/oral exam) (10%)

Gantt Chart



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* Sensitive data includes personal data revealing racial or ethnic origin; personal data revealing political opinions, personal data revealing religious or philosophical beliefs, personal data revealing trade union membership, genetic data, biometric data (where used for identification purposes), data concerning health, data concerning a person's sex life, and data concerning a person's sexual orientation.

** Participants classed as vulnerable might include: Children under 16 years of age; Adults with learning disabilities; Adults with other forms of mental incapacity or mental illness; Adults in emergency situations; Prisoners or young offenders; Other persons who may be or become vulnerable in the context of their involvement.

AI Usage Statement

- This project used generative AI tools such as ChatGPT and Claude during the development phase for brainstorming, planning and editing.
  * Note: While AI tools were used during development, screenshots and conversation logs were not preserved at the time.
  * This transparency statement is being added retrospectively to ensure compliance with academic requirements.