Coursework 2

This assignment contributes 60% to the overall coursework mark for COM759.

Note: remember plagiarism is a serious offense – ensure that you use your own words even when referencing a source. Also reference libraries or code that you used.

Part I: Investigative Report on Ontology in Practice and its Link to Large Language Models (LLMs)

This assignment contributes 80% to the CW2 mark.
Release Date: Friday, 26th September 2025 (Week 1)
Submission Deadline: 12:00pm, Friday 28th November 2025 (Week 10)
Feedback Return Date: 20 working days after submission as per University Guidance

In Artificial Intelligence, knowledge representation studies the formalization of knowledge and its processing within machines. Ontology is recognized and widely used in areas such as knowledge engineering, context awareness, knowledge integration, and knowledge management and modeling. Ontologies do not only introduce a sharable and reusable knowledge representation but can also add new knowledge about the domain. Recently, the emergence of Large Language Models (LLMs) has raised new opportunities and challenges for ontology-based approaches. Exploring how ontologies can complement, constrain, or enhance LLMs — and vice versa — has become an important research frontier in AI.

For this coursework, you are expected to demonstrate understanding of ontology concepts, methodologies for ontology construction, and their application to real-world scenarios. You will apply practical tools (e.g., **Protégé**) to design and test an ontology-based solution. In addition, you are required to critically evaluate the role of ontologies in relation to modern LLMs, considering both synergies and limitations. This assignment will assess your ability to exercise analytical, critical thinking and problem-solving skills, apply knowledge representation theory to practice, and communicate findings with scholarly rigor.

To this end, you are required to produce an investigative report that includes: (1) Problem Identification and Justification: describe a real-world case and justify the use of ontology; (2) Knowledge and Data for Ontology Design: identify data sources, domain knowledge, and key representation approaches (e.g., classes, relations, axioms); (3) Methodology for Ontology Construction: provide a structured methodological description of the ontology construction process (e.g., specification, conceptualization, formalization, implementation); discuss the tools and technologies used; analyse the challenges, trade-offs, and effort involved in developing the ontology; (4) Ontology Evaluation and Case Study Analysis: demonstrate the ontology's reasoning, querying, and integration capabilities; (5) Ontology & LLMs: critically discuss their complementarity, opportunities, pitfalls, and integration strategies; (6) Discussion & Conclusion: reflect on the value of ontology in your case and broader AI, summarizing insights and future directions; (7) References and Academic Rigor: provide appropriate citations; ensure that arguments and methodologies are justified with scholarly evidence.

This assignment combines independent study, library research, and hands-on practice with ontology tools. You are free to select your own case study problem, but your choices must be explicitly justified. Each week, you should incorporate insights from lectures, readings, and practical sessions into your cumulative report. By the end of the term, your final report should reflect a coherent investigative study, progressively built up over time.

Format: you are expected to summarise this work in the form of an IEEE format (2 column) paper style (with 4000-5000 words including table/images/graphics, etc., the reference list is not counted in the word limit though). Your Protege script file is required to copy and paste as an appendix in a separate one column pages at the end of the report (script file/s do NOT count towards the page limit).

Marking Scheme: The assessment rubric is enclosed with this specification.

Submission: The electronic copy in **PDF** of the report should be uploaded to Blackboard by the deadline. Please use your 'email' for your filename (e.g., 'smith-j1.pdf' - you do not need to add the @ulster.ac.uk).

Feedback: 20 working days after submission as per University Guidance.

Part II: Group Peer-Reviewed Online Presentation (via the Team)

This assignment contributes 20% to the CW2 mark
Release Date: Friday, 26th September 2025 (Week 1)
PPT file Submission Deadline: 12:00pm, Thursday 11th Dec. 2025 (Week 12)
Online presentation date: Friday 12th Dec. 2025 (Week 12)
Feedback Return Date: 20 working days after submission as per University Guidance

For this coursework element, you need to demonstrate your ability to present your work to different audiences, by making use of appropriate communication tools, demonstrating in presenting findings with scholarly rigor.

To that end, you are requested to create a short presentation (**no more than 10 minutes – with 2 minutes additional for questions**) to introduce your work from Part I of this assessment. Your presentation should summarize and consolidate the work you carried out in Part I.

Submission: Your presentation file (ppt or pdf) should be submitted **electronically via BBL by 12pm, Thursday 11th Dec in Week 12**. Please use your 'email' for your filename (e.g., 'smith-j1.pdf' - you do not need to add the @ulster.ac.uk). The presentation will be carried out in different groups (depending on the size of the group) on **Friday 12th Dec in Week 12** (the breakdown time slot of each group to be scheduled).

Marking Scheme: In marking this assignment, peer review will be used. All students will mark each other. So be prepared to mark and be marked by your peers and justify your decisions. The distribution of marks along with detailed mark criteria is given in a separate presentation marking rubric enclosed with this specification, which mainly covers:

1) structure/organization;

2) content relevance and completeness;

3) communication;

4) use of media; and

5) time management.

The group peer-review marking using presentation assessment rubric follows the weight scheme of Module Coordinator/Peer Group average: 70%/30%, that means 70% the presentation marks will be from the Module Coordinator and 30% from the average mark of the Peer Group.

Feedback will be returned electronically via Blackboard and consist of marks and individual comments in the marking breakdown form 20 working days after presentation as per University Guidance.