GHENT UNIVERSITY

Course Specifications

Valid as from the academic year 2025-2026

Neural Networks and NLP Applications (A005875)

Course size *(nominal values; actual values may depend on programme)*

Credits 5.0 **Study time 150 h**

Course offerings in academic year 2026-2027

A (semester 2)	English	Gent

Lecturers in academic year 2026-2027

Singh, Pranaydeep	LW22	staff member
Tezcan, Arda	LW22	lecturer-in-charge

Offered in the following programmes in 2026-2027	**crdts**	**offering**
Postgraduate Certificate Computer-Assisted Language Mediation	5	A

Teaching languages

English

Keywords

neural networks, machine learning, natural language processing, Python

Position of the course

This course familiarizes students with artificial neural networks, including state-of-the-art architectures such as Transformers. Throughout the course, theoretical concepts are closely integrated with practical work: classes combine lecture with hands-on coding exercises. Students will apply their knowledge using neural networks and large language models and explore real-world applications of natural language processing.

Contents

The course introduces students to artificial neural networks and their applications in natural language processing. It covers key architectures, including the transformer model, and explores pre-trained large language models (LLMs) and fine-tuning strategies for specific NLP tasks. The course combines theory with hands-on practice, where students develop and experiment with Python code. Topics include neural network architectures, generative AI, and practical applications in NLP. The course also covers word representation techniques and tokenization strategies.

Initial competences

1 Having the theortical knowledge of natural language processing and linguistic analysis
2 Having the practical knowledge and skills to integrate NLP libraries in Python code
3 Having the practical knowledge and skills to build machine-learning models and to evaluate their performance using Python.
4 Ability to apply NLP tools and machine-learning skills to large-scale programming projects

Final competences

1 Students will be able to develop a comprehensive understanding of the theoretical foundations and working of artificial neural networks
2 They will acquire hands-on experience to implement, train and evaluate various neural network architectures.
3 They will be able to understand the working of various large language models and acquire practical knowledge of fine-tuning them for specific NLP end tasks

using Python

4 They will be able to understand and practically apply various word representation techniques.

Conditions for credit contract

This course unit cannot be taken via a credit contract

Conditions for exam contract

This course unit cannot be taken via an exam contract

Teaching methods

Seminar, Lecture, Independent work

Extra information on the teaching methods

Classes will alternate between theoretical lectures and practical sessions. Lectures introduce core concepts, while subsequent sessions focus on hands-on programming exercises that build on the previously covered material.

Study material

None

References

Neural Networks and Deep Learning by Michael Nielsen
Free online book.
Natural Language Processing with Transformers by Lewis Tunstall, Leandro von Werra, and Thomas Wolf (O'Reilly, 2022)

Course content-related study coaching

Assessment moments

end-of-term assessment

Examination methods in case of periodic assessment during the first examination period

Oral assessment, Written assessment, Assignment

Examination methods in case of periodic assessment during the second examination period

Oral assessment, Written assessment, Assignment

Examination methods in case of permanent assessment

Possibilities of retake in case of permanent assessment

not applicable

Extra information on the examination methods

The final grade consists of two equally weighted components:
– A written closed-book exam (50%) that assesses the student's understanding of theoretical concepts covered in the course.
– A practical assignment (50%) involving the development of Python code to solve a real-world NLP task using neural networks. This component is split into two parts:
• Implementation and code quality (25%)
• An oral exam (25%) during which the student presents their work and answers questions about their approach and results.
To pass the course, students must achieve an average score of at least 10 out of 20, with a minimum of 50% on both the written exam and the assignment. If either component falls below 50%, the maximum final grade that can be awarded is 9 out of 20.

Calculation of the examination mark

– A written closed-book exam (50%)
– A practical assignment (50%) split into two parts:
• Implementation and code quality (25%)
• An oral exam (25%)