MASTER IN ADVANCED STUDIES IN LINGUISTICS

NATURAL LANGUAGE PROCESSING: THEORY & PRACTICE

Academic year 2025-2026

GHENT UNIVERSITY

MASTER IN ADVANCED STUDIES IN LINGUISTICS
NATURAL LANGUAGE PROCESSING: THEORY & PRACTICE

In a world increasingly driven by data and automation, understanding how language works and how it can be processed computationally has never been more crucial. The Master in **Advanced Studies in Linguistics: Natural Language Processing – Theory & Practice** is a **one-year master's program** designed to equip students with the theoretical insights and practical skills needed to analyze and process language automatically.

Designed for graduates from **diverse** backgrounds, the program welcomes students with a keen interest in c**omputational linguistics**. Whether you are particularly drawn to corpus linguistics, cutting-edge natural language processing (NLP) applications or AI ethics, this program provides the tools to navigate and contribute to the evolving landscape of **human-centered AI** and **language technology**.

Whether you aspire to pursue an **academic** career or apply NLP techniques in the **industry**, this program offers a unique interdisciplinary approach at the intersection of linguistics, cognitive science and artificial intelligence.

The curriculum combines **foundational courses** in corpus linguistics, psycholinguistics and language variation with **specialized training** in programming, machine learning and neural networks for NLP. With a strong **emphasis on research**, students will set up their own projects and complete a master's dissertation, preparing them for careers in academia or the language technology industry.

> *After completing my Master's in Literature and Linguistics at Ghent University in 2022, I found myself interested in language processing questions that required AI knowledge I didn't have. This led me to enroll in the Master in Advanced Linguistics with a focus on Natural Language Processing, a program that provided me with the skills to address linguistic questions using computational methods. While the two-semester program couldn't cover everything about NLP, it provided me with a strong foundation to learn and adapt in an academic setting.*
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> *For anyone interested in applying computers to linguistics research but unsure where to start, the Master in Advanced Linguistics program at Ghent University is a practical entry point into the field of NLP.*
>
> Thomas Moerman (2022 - 2023)
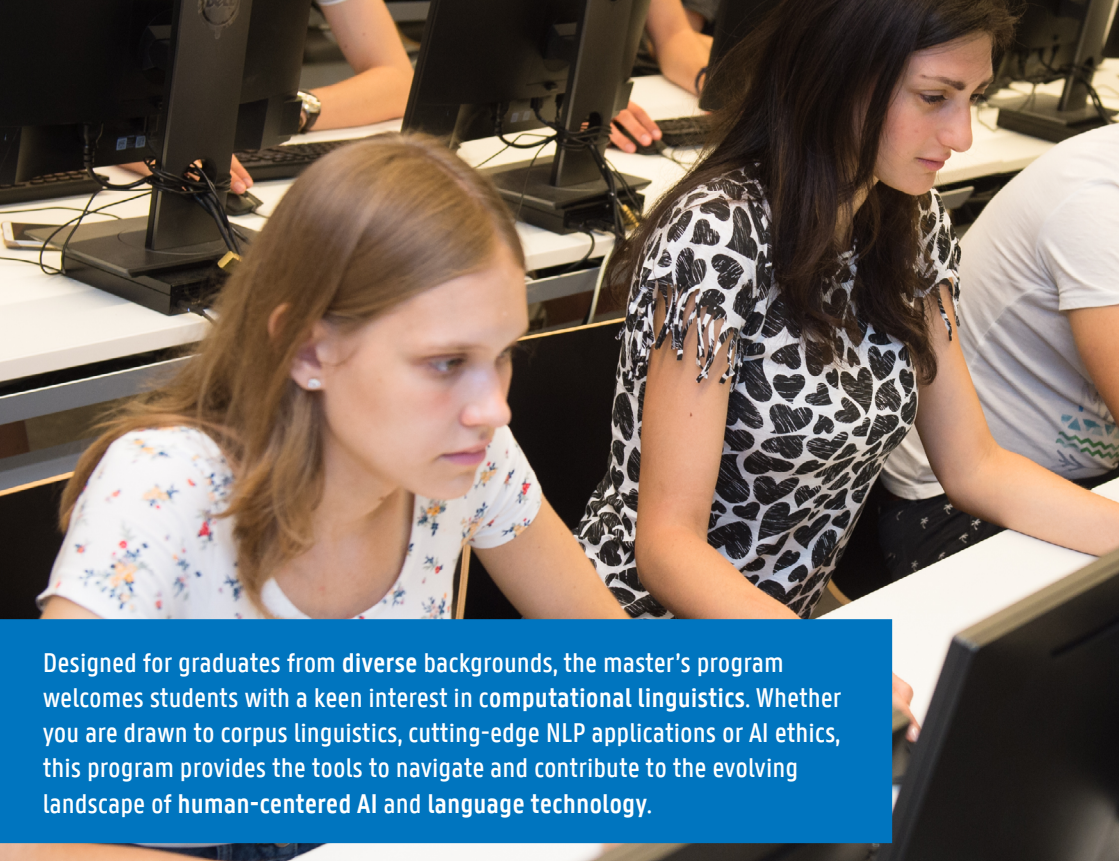
Designed for graduates from **diverse** backgrounds, the master's program welcomes students with a keen interest in **computational linguistics**. Whether you are drawn to corpus linguistics, cutting-edge NLP applications or AI ethics, this program provides the tools to navigate and contribute to the evolving landscape of **human-centered AI** and **language technology**.

TARGET GROUP

This master's program is intended for students with a special interest in the (automated) analysis of language data and targets students with a **Master's degree** in (Applied) Linguistics, History, Communication Sciences, Political Sciences, Sociology, Psychology, Pedagogy, Law, Economics, Archaeology, Literary Studies, Art History, Languages and Cultures, Gender and Diversity, Global Studies, Criminology, Social Work, Social Welfare Studies, and Conflict and Development Studies. Students are admitted upon **file review** and an **interview**.

Given its focus on **research**, this program is also an excellent preparation for students who aim to start a **research project** (PhD) in the field of linguistics or other fields that make use of NLP techniques.

COURSE STRUCTURE

This master's program is a one-year, 60-credit academic program comprising four course types:

- General courses and free elective courses (15 credits)

- Research project (5 credits)

- Four courses from the NLP specialisation module (20 credits)

- Master's dissertation (20 credits)

GENERAL AND FREE ELECTIVE COURSES
(15 credits with min. 5 credits from general courses)

METHODS IN CORPUS LINGUISTICS AND EXPERIMENTAL LINGUISTICS (SEM 1)

This course introduces students to **advanced corpus analysis techniques** within cognitive and functional linguistics, emphasizing the study of language in real communicative contexts. Students will explore **corpus-based methodologies** to address theoretical linguistic questions. By the end of the course, students will have the skills to analyze corpus data, apply statistical techniques and present findings in a scientific paper.

LANGUAGE VARIATION AND CHANGE (SEM 2)

This course explores the relationship between language variation and the language system, using examples from various languages to illustrate how variation reflects language change. Students will engage with theories, models, and methods for analyzing **spatial and social variation**, as well as **diachronic change**. The course has two main components: a **theoretical section** focused on seminal literature on language variation and change, and an **empirical research project** where students investigate a specific syntactic change utilizing a parsed corpus from languages such as English, French or Chinese. Practical sessions at the beginning of the course will provide hands-on experience working with these corpora.

INTRODUCTION TO PSYCHOLINGUISTICS (SEM 1)

This course covers fundamental topics in **psycholinguistics**, focusing on the cognitive and neurobiological aspects of language. Key themes include the **relationship between language and cognition**, **linguistic representation**, and **comprehension and production processes**. Through lectures and exercises, the students will gain a foundational understanding of language processing in the mind and brain while engaging with research methods and empirical results in this domain.

ADVANCES IN PSYCHOLINGUISTICS (SEM 2)

This course contributes to a deeper **knowledge of psycholinguistics**, with special attention to recent developments in the domain. Additionally, the course contributes to the strengthening of several **scientific skills**, including critical reflection about research, spoken and written presentation, and the ability to jointly take a stand on complex matters. The course zooms in on three timely and theoretically important themes that are treated in-depth (multiple classes, papers, presentations, and discussions) using a flipped classroom approach.

FREE ELECTIVE COURSES (SEM 1 OR 2)

Besides the general courses listed above, students may enroll in other course(s) that align with the scientific profile they have selected. Eligible are: courses from master's programs from a Belgian or foreign university as well as the remaining courses in the NLP specialisation of this program. **Elective courses are subject to approval** by the program committee.

RESEARCH PROJECT (5 credits)

This course is designed to deepen the students' **expertise in linguistics or literary studies**. Students select a research topic, formulate an initial research question, and collaborate with a tutor, who may be their thesis supervisor or another qualified university staff member, to develop a **comprehensive research project**. The course involves independent work, which includes drafting a detailed research proposal and engaging in practical research activities.

NLP SPECIALISATION

(20 credits)

INTRODUCTION TO LANGUAGE PROCESSING WITH PYTHON (SEM1, W1-3)

This course offers an **introduction to programming**, focusing on automatic text processing. No prior programming knowledge is required. **Python**, a widely used programming language for natural language processing, serves as the primary tool.

NLP AND LINGUISTIC ANALYSIS (SEM 1, W4-8)

This course provides a comprehensive introduction to the **fundamentals of natural language processing**. Students will explore techniques for analyzing text at multiple levels (morphological, syntactic, semantic, and discourse) to develop a deeper understanding of **computational language understanding and generation**. The course covers key theoretical concepts in language technology, such as language models and dynamic programming, alongside practical tasks like part-of-speech tagging, lemmatization, parsing, and named entity recognition.

INTRODUCTION TO MACHINE LEARNING AND FEATURE ENGINEERING FOR NLP (SEM 1, W9-12)

Machine learning enables computers to learn from and make predictions based on data without being explicitly programmed. This course provides a **comprehensive introduction to machine learning techniques** and the role of feature engineering in building effective models. Students will explore **fundamental machine learning principles**, learn to extract meaningful **features** from data, and generate new ones through analysis. Hands-on exercises and real-world applications will help them develop practical skills to implement these techniques and improve predictive accuracy and **model interpretability**.

NEURAL NETWORKS AND NLP APPLICATIONS (SEM 2, W1-9)

In recent years, artificial neural networks have excelled in a wide range of natural language processing tasks. Inspired by the human brain, these algorithms process input through interconnected neurons, passing through hidden layers to generate output. This course offers a comprehensive introduction to **neural networks**, covering key architectures, including the innovative transformer model and its components. The course also explores **pre-trained large language models (LLMs)** and **fine-tuning strategies** for specific tasks. Through a blend of theory and hands-on practice, students will actively develop and experiment with Python code in each session.

ETHICS FOR HUMAN-CENTERED AI (SEM 1, W4-12)

This course raises awareness of the risks involved in building and implementing AI-systems and explores what **'human-centered' AI** would look like. Each session addresses concerns raised by AI ethicists, such as **environmental and financial costs, bias, stereotyping, data privacy**, and copyright, along with existing or needed mitigation strategies. Grounded in current news, debates, and recent academic research, the course emphasizes **fairness, accountability and transparency** in AI development. It also explores key challenges in human-centered design of AI products.

MASTER'S DISSERTATION (20 credits)

The dissertation is a crucial requirement for obtaining a Master's degree, serving as an original research project that enhances students' research skills and capacities. Each student selects a specific topic and receives guidance from a supervisor throughout the process. The dissertation can be formatted as a **traditional master's paper** of approximately 25,000 words or as a **scientific article** intended for submission to a scholarly journal, with the selection of appropriate journals decided in collaboration with the supervisor. Additionally, the article must include appendices that contain data, transcriptions, and analyses to ensure a thorough evaluation of the study's scientific quality. The completed dissertation will be assessed by a committee consisting of the supervisor and two reviewers, culminating in an **oral defence** where the candidate discusses their work.

CAREER PERSPECTIVES

The program offers a strong foundation for students aiming to pursue a PhD in linguistics or related fields that utilize natural language processing techniques. It equips them with **essential research skills and academic expertise** for further study and careers in linguistics or the language technology industry.

PRACTICAL INFORMATION

APPLICATION PROCEDURE

→ International students

Follow the UGent application procedure (www.ugent.be/admission) and submit all of the following documents:

- a **motivation letter** (in English) with **CV**;
- legalised copies of the Master's and Bachelor's **diplomas** and their **transcripts**; the diplomas and the transcripts must be translated by a sworn translator into either Dutch, English, French or German if they were originally drafted in another language.
- two **recommendation letters**. At least one letter should be from an academic referee (e.g. the university where the applicant has been studying); the second letter can also be provided by a company at which the applicant has been gaining work experience.

The International Admissions Desk will first verify all submitted documents and check whether the application is complete. Next, the steering committee of the program will examine all applications on an individual basis. **Applicants who meet all requirements will be invited for an online interview.**

DEADLINES

- For international students who need a visa: hand in application packages before **April 1st 2025**.
- For students who do not need a visa: hand in application packages before **June 1st 2025**.

The applicants will be notified of the outcome of their application via email. Once students have been accepted, they will have to go through the administrative enrolment procedure.

→ Students with a degree from a Belgian or Dutch University

All applicants have to submit a motivation letter with a CV, a copy of the obtained Master's diploma and its transcript of records to Arda.Tezcan@UGent.be (with subject line: application to Master in Advanced Studies in Linguistics).

There are three **deadlines** for application submission: **July 21st 2025, August 12th 2025** and **September 12th 2025**. After these deadlines, the steering committee will examine all applications on an individual basis. **Applicants who meet all requirements will be invited for an interview**.

Applicants will be notified of the outcome of their application via email. Once students have been accepted, they will have to go through the administrative enrolment procedure, see also:

- www.ugent.be/inschrijven (for students with a Belgian degree);
- www.ugent.be/admission (for students with a Dutch degree).

LANGUAGE REQUIREMENTS

CEFR level B2 for English (no Dutch language proficiency is required).

TUITION FEE: 2249 EUR (60 credits).

GENERAL INFORMATION

https://www.ugent.be/lw/vtc/en/education/advancedmaster/linguisticsnlp

ACADEMIC YEAR

- Semester 1: September 22nd 2025
- Semester 2: February 9th 2026

MORE INFORMATION:

Contact Arda.Tezcan@UGent.be.

EDUCATION AND EXAMINATION CODE

The program follows the **education and examination code** of **Ghent University**: https://www.ugent.be/student/en/class-exam-exchange-intern/class-exam/education-examination-code