# Computational Linguistics

## Program of Study

Computational Linguistics is an academic discipline rooted in Linguistics that uses computational methods to study and model language structure, use, and meaning: it is fundamentally about understanding how language works using the tools and ideas of computer science. It differs from Natural Language Processing (NLP), which is more engineering-focused and aims to build practical systems that can process, understand, and generate human language for real-world applications like machine translation, chatbots, or sentiment analysis. Computational linguists aim to develop theories about linguistic behavior that are equally informed by linguistic and computational principles, while practitioners of NLP are typically more concerned with creating tools that work effectively, even if they use statistical or machine learning methods that don't necessarily reflect linguistic theory. In practice, the two fields inform each other significantly, and many researchers work at their intersection. The minor in Computational Linguistics will thus equally well complement a major in Linguistics or Computer Science, and will also be of interest to students from other majors who are interested in developing a better understanding of human language from a computational perspective.

College students from any field of study may complete a minor in Computational Linguistics. Students are encouraged to construct individual programs and should regularly consult with the Computational Linguistics Minor Coordinator (see below for contact information) as well as their College advisor about their pathway through the program.

## Program Requirements

The minor in Computational Linguistics requires 6 courses (600 units), all taken for quality grades, structured as follows:

1. LING 28620 “Computational Linguistics” (100 units)
2. LING 22800 “Advanced Computational Linguistics” (100 units)
3. Two approved courses in Linguistic Theory and Methods (200 units)
4. Two approved courses in Computational Theory and Methods (200 units)

Students who have taken any of these courses as part of a major may substitute alternative courses from either the Linguistic Theory and Methods or the Computational Theory and Methods categories towards the Minor, but no course may be double-counted towards both the Minor and a major.

## Approved Courses

Approved Linguistic Theory and Methods courses and Computational Theory and methods courses are listed below. If a student wishes to petition for approval of a course that is not on these lists, they should contact the Program Coordinator for the Minor in Computational Linguistics (see below for contact information).

### Linguistic Theory and Methods Courses

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| LING 20001 | Introduction to Linguistics | 100 |
| LING 20101 | Introduction to Phonetics and Phonology | 100 |
| LING 20201 | Introduction to Syntax | 100 |
| LING 20301 | Introduction to Semantics and Pragmatics | 100 |
| LING 21000 | Morphology | 100 |
| LING 27010 | Introduction to Psycholinguistics | 100 |
| LING 26002 | Language in Society | 100 |
| LING 22500 | Quantitative Research Methods in Linguistics | 100 |
| LING 27340 | Corpus Linguistics | 100 |
| LING 22860 | The Linguistics of Large Language Models | 100 |

### Computational Theory and Methods Courses

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| LING 26602 | Programming for Linguists | 100 |
| LING 22890 | Computational Models of Speech | 100 |
| COGS 20002 | Cognitive Models | 100 |
| COGS 20010 | Advanced Cognitive Models | 100 |
| COGS 20011 | Bayesian Modeling in Language and Cognition | 100 |
| CMSC 14100 | Introduction to Computer Science I | 100 |
| CMSC 25300 | Mathematical Foundations of Machine Learning | 100 |
| CMSC 25400 | Machine Learning | 100 |
| TTIC 31020 | Introduction to Machine Learning | 100 |

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| CMSC 25700 | Natural Language Processing | 100 |
| CMSC 25500 | Introduction to Neural Networks | 100 |
| CMSC 23900 | Data Visualization | 100 |
| DATA 12000 | Computer Science for Data Science | 100 |
| DATA 23700 | Visualization for Data Science | 100 |
| CMSC 28000 | Introduction to Formal Languages | 100 |

## Advising

The Minor in Computational Linguistics is coordinated by Assistant Instructional Professor Craig Thorburn (cthorburn@uchicago.edu). Professor Thorburn can answer students' questions about the minor, assist them with course selection, and approve petitions for the minor.

## Program Learning Outcomes

Students completing the minor in Computational Linguistics will:

- Have an understanding of core linguistic concepts in at least one subdomain of linguistics (phonology, morphology, syntax, semantics, pragmatics, sociolinguistics, psycholinguistics) and their relevance to computational modeling of language.
- Have an understanding of core concepts in computer science, and how they can be used to model language and test hypotheses in linguistic theory.
- Critically evaluate the strengths and limitations of computational approaches to language, including statistical methods, neural networks, and symbolic approaches.