



# Introduction to Natural Language Processing

## Course Information

**Course Number:** COSC 4P84  
**Term/Year/Duration:** 2024 Fall D1  
**Course Title:** Introduction to Language Processing

## Instructor Information

**Instructor Name:** Ali Emami  
**Email:** aemami@brocku.ca  
**Office Locations:** Mackenzie Chown J318  
**Contact:** Email  
**Teaching Assistants:** Nikta Gohari Sadr (niktagoharisadr@gmail.com)

## Times and Locations

*Lectures 3 hours per week, TH246, 10:30 am to 1:30 pm.*

*A Student may make or share an audio or video recording of a lecture, presentation, or lesson, **only with the permission of the instructor.***

## Course Calendar Description

This course will serve as a theoretical and methodological introduction to the computational modelling of natural language, including techniques and algorithms, formalisms, and applications. Fundamental topics that underlie current Natural Language Processing technologies will be covered in detail, including but not limited to computational morphology, lexical and compositional semantics, syntactic parsing, language modelling, summarization, machine translation, and coreference resolution. The course will also cover a variety of machine learning techniques that have recently shown promising results on many Natural Language Processing benchmarks.

## Learning Outcomes:

- Students who complete this course will gain a foundational understanding of the field of Natural Language Processing.
- They will also learn strategies to evaluate the capabilities and limitations of current natural language technologies and frameworks by gaining practical experience through the NLP toolkits made available.
- They should also acquire an understanding of the theoretical underpinnings of Natural Language Processing in linguistics and formal language theory.

## Required Readings or Texts

Speech and Language Processing. Jurafsky and Martin. any edition. (Link will be provided on Brightspace)

## Course Communications

Brightspace: All official communication, including announcements, lecture material, assignments, grades will be found on Brightspace.

Office Hours: Please take a look at all posted office hours. Come to those times without appointment.

## Course Topics

**This list is tentative and subject to modifications.**

- Introduction to NLP
- Language modelling
- Syntax and parsing
- POS tagging
- Lexical semantics
- Compositional semantics
- Computational discourse
- NLP applications
- Machine learning for NLP
- Bias in NLP
- Current Trends

## Sequence and Dates of Topics and Tasks

Week	Topic	Assignment/Due Date
1: Sep 4	Introduction to course + Introduction to NLP	Paper Reviews Assigned (RAs)
2: Sep 11	Classification + Linear Models	Paper Signup Due
3: Sep 18	Non Linear Models + N-gram Language Modelling	
4: Sep 25	Smoothing + POS Tagging	RA1 Due, RA Presentations begin (3 Presentations)
5: Oct 2	Recurrent Neural Networks + Transformers (LLMs)	A1 Released + 3 Presentations
6: Oct 9	Lexical Semantics + Distributional Semantics	Final Project Released+ 3 Presentations
<b>Reading Week</b>		
7: Oct 16	Applications: Coreference Resolution + Machine Translation	A1 Due, A2 Released
8: Oct 23	Applications: Neural Machine Translation + Summarization	RA2 Due RA2 Presentations begin
9: Oct 30	Natural Language Generation (+LLMs)	
10: Nov 6	Evaluation in Natural Language Processing	A2 Due
11: Nov 13	Guest Lecture	
12: Nov 20	Bias and Mitigation Techniques + Current Trends in NLP	Project Presentations Begin
13: Nov 27	In-class test	Projects due December 4

## Assessment Components and Due Dates

Assessment Component	Grade Weight	Due Date
Reading Assignment 1 (written)	10%	Sep 25
Reading Assignment 1 (presentation)	5%	Sep 25- Oct 9 (signup sheet)
Assignment 1 (coding + report)	10%	Oct 16
Reading Assignment 2 (written)	10%	Oct 23
Reading Assignment 2 (presentation)	5%	Oct 23-Nov 6 (signup sheet)
Assignment 2 (coding + report)	10%	Nov 6
Final Project Presentations	10%	Nov 20
<b>Final In-Class Test*</b>	10%	Nov 27
Final Project (report + material)	30%	Dec 4

### Assignments, Reports, Final Exam (in class)

There will be two assignments, worth 10% each, which will involve programming, and writing a report about it.

To receive full grades, assignments (as well as all other course work) MUST represent your own personal efforts (see the section on Plagiarism Policy and Assignments below). In addition, there will be two paper reviews (10 % each) and two report presentation (5% each) on topics covered throughout course.

There will also be a final project (30%) and a project presentation (10%), with descriptions that will be provided on Brightspace.

**\*The final exam (in-class, 10%), requires at least a 50% grade to pass the course.**

### Late Submission Policy

Check the section on sessional or important dates in the relevant online [University Calendar](#)

The penalties for late submission of assigned coursework are 20% per day to a maximum of 3 days late, unless accompanied by medical documentation. See Medical Exemption Policy and the medical health certificate at the [Registrar's Website \(Forms\)](#).

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### Important dates

The most recent listing of Important Dates for all durations is at <https://brocku.ca/important-dates/all/>

*First day of classes:* 4 September

*Last day of lectures:* 4 April

*Last day of exams:* 24 April

*Deadline for withdrawal without academic penalty:* 17 January

### Relationship between attendance and grades:

Example: Students are expected to attend all classes and must submit all assignment to pass this course.

Course that include a mandatory Academic Integrity component should describe it here, including deadlines and consequences for non-completion by the deadline.

## Academic Policies

### Academic Integrity

Academic misconduct is a serious offence. The principle of academic integrity, particularly of doing one's own work, documenting properly (including use of quotation marks, appropriate paraphrasing and referencing/citation), collaborating appropriately, and avoiding misrepresentation, is a core principle in university study. Students should consult Section VII, "Academic Misconduct", in the "Academic Regulations and University Policies" entry in the [Undergraduate Calendar](#) to view a fuller description of prohibited actions, and the procedures and penalties. Information on what constitutes academic integrity is available at [Brock University Academic Integrity Website](#).

#### Plagiarism software:

This course may use Turnitin.com, phrase-matching software. If you object to uploading your assignments to Turnitin.com for any reason, please notify the instructor to discuss alternative submissions.

### Penalties for Academic Misconduct in the Faculty of Mathematics and Science

#### **Penalties for misconduct in course work, including mid-term tests**

First offence: Zero grade on assignment, additional penalty of 100% of the weight of the assignment to be subtracted from the final grade, mandatory completion of the AZLS Academic Integrity workshop

Second offence: Zero grade on assignment, 4-month suspension

Third offence: Zero grade in course, 1-year suspension, permanent removal from major program.

Fourth offence: Permanent suspension / debarment.

#### **Penalties for misconduct in final tests:**

First offence: Zero grade in course

Second offence: Zero grade in course, 4-month suspension

Third: Zero grade in course, 1-year suspension, permanent removal from major program,

Fourth offence: Permanent suspension / debarment.

### Intellectual Property Notice

All slides, presentations, handouts, tests, exams, and other course materials created by the instructor in this course are the intellectual property of the instructor. A student who publicly posts or sells an instructor's work, without the instructor's express consent, may be charged with misconduct under Brock's Academic Integrity Policy and/or Code of Conduct, and may also face adverse legal consequences for infringement of intellectual property rights.

### Accommodations

The University is committed to fostering an inclusive and supportive environment for all students and will adhere to the Human Rights principles that ensure respect for dignity, individualized accommodation, inclusion and full participation. The University provides a wide range of resources to assist students, as follows:

- a) If you require academic accommodation because of a disability or an ongoing health or mental health condition, please contact Student Accessibility Services at [askSAS@brocku.ca](mailto:askSAS@brocku.ca) or 905 688 5550 ext. 3240.

**b) Medical Self-Declaration Forms (brief absence up to 72 hours)**

In the case of a short-term medical circumstance, if a student wishes to seek an academic consideration, please use the [Medical Self-Declaration Form](#). The request is to be made in good faith by the student requesting the academic consideration due to a short-term condition that impacts their academic activities (e.g., participation in academic classes, delay in assignments, etc.).

The period of this short-term medical condition for academic consideration must fall within a 72-hour (3 day) period. The form must be submitted to the instructor either during your brief absence or if you are too unwell, within 24 hours of the end of your 3 day brief absence.

**Medical Verification Form (extended duration)**

In cases where a student requests academic consideration due to a medical circumstance that exceeds 72 hours (three days) and will impact their academic activities (e.g., participation in academic classes, delay in assignments, etc.), or in the case of a final exam deferral, the [medical verification form](#) must be signed by the student and the health professional as per process set out in the [Faculty Handbook III:9.4.1](#).

- c) If you are experiencing mental health concerns, contact the Student Wellness and Accessibility Centre. *Good2Talk* is a service specifically for post-secondary students, available 24/7, 365 days a year, and provides anonymous assistance: [Good 2 Talk](#) or call

**1-866-925-5454.** For information on wellness, coping and resiliency, visit: [Brock University \(Mental Health\)](#)

- d) If you require academic accommodation on religious grounds, you should make a formal, written request to your instructor(s) for alternative dates and/or means of satisfying requirements. Such requests should be made during the first two weeks of any given academic term, or as soon as possible after a need for accommodation is known to exist.
- e) If you have been affected by sexual violence, the Human Rights & Equity Office offers support, information, reasonable accommodations, and resources through the Sexual Violence Support & Education Coordinator. For information on sexual violence, visit [Brock's Sexual Assault and Harassment Policy](#) or contact the Sexual Violence Support & Response Coordinator at [humanrights@brocku.ca](mailto:humanrights@brocku.ca) or 905 688 5550 ext. 4387.
- f) If you have experienced discrimination or harassment on any of the above grounds, including racial, gender or other forms of discrimination, contact the Human Rights and Equity Office at [humanrights@brocku.ca](mailto:humanrights@brocku.ca)

