City University of Hong Kong
Course Syllabus

offered by Department of Linguistics and Translation
with effect from Semester A 2022/23

Part I Course Overview

Course Title:	Computational Linguistics
Course Code:	LT3233
Course Duration:	One Semester
Credit Units:	3
Level:	B3
Proposed Area: *(for GE courses only)*	☐ Arts and Humanities ☐ Study of Societies, Social and Business Organisations ☐ Science and Technology
Medium of Instruction:	English
Medium of Assessment:	English
Prerequisites: (Course Code and Title)	(i) LT2231 Introduction to Language Technology (applicable to students of BA in Linguistics and Language Applications), OR (ii) CS2311 Computer Programming (applicable to students of BSc.in Data Science and students of BEng in Data and Systems Analytics), OR (iii) MS3111 Quantitative Business Analysis with Visual Basic for Applications or CS2360 Java Programming or IS2240 Python Programming for Business (applicable to students of BBA in Business Analysis)
Precursors: *(Course Code and Title)*	LT2229 Fundamentals of Linguistics or LT2290 Introduction to Language Studies
Equivalent Courses: *(Course Code and Title)*	CTL3233 Computational Linguistics
Exclusive Courses: *(Course Code and Title)*	Nil

Part II Course Details

1. Abstract

(A 150-word description about the course)

This course aims at introducing students to some of the major issues and solutions in natural language processing. The underlying computational properties of natural languages are considered at the lexical, syntactic, and semantic level from linguistic and statistical perspectives. Both traditional rule-based context-free models and modern corpus-based quantitative techniques will be discussed. Selected natural language applications will also be introduced. Concepts taught in class will be reinforced by hands-on practical exercises.

2. Course Intended Learning Outcomes (CILOs)

(CILOs state what the student is expected to be able to do at the end of the course according to a given standard of performance.)

No.	CILOs[#]	Weighting* (if applicable)	Discovery-enriched curriculum related learning outcomes (please tick ✓ where appropriate)		
			A1	*A2*	*A3*
1.	Identify the major areas of study in computational linguistics and natural language processing (NLP)	30%	√	√	
2.	Explain the major issues in NLP and discuss, competently and critically, computer programming for different approaches to their solution in general and with particular reference to English and Chinese	40%	√	√	√
3.	Write computer programs to compile and use lexical, syntactic and semantic resources to tackle various NLP subtasks	30%		√	√
** If weighting is assigned to CILOs, they should add up to 100%.*		100%			

[#] Please specify the alignment of CILOs to the Gateway Education Programme Intended Learning outcomes (PILOs) in Section A of Annex.

A1: Attitude
Develop an attitude of discovery/innovation/creativity, as demonstrated by students possessing a strong sense of curiosity, asking questions actively, challenging assumptions or engaging in inquiry together with teachers.

A2: Ability
Develop the ability/skill needed to discover/innovate/create, as demonstrated by students possessing critical thinking skills to assess ideas, acquiring research skills, synthesizing knowledge across disciplines or applying academic knowledge to self-life problems.

A3: *Accomplishments*
Demonstrate accomplishment of discovery/innovation/creativity through producing /constructing creative works/new artefacts, effective solutions to real-life problems or new processes.

3. Teaching and Learning Activities (TLAs)

(TLAs designed to facilitate students' achievement of the CILOs.)

Final details will be provided to students in their first week of attendance in this course.

TLA	Brief Description	CILO No.						Hours/week (if applicable)
		1	2	3				
1	**Lectures** to explain the major issues in NLP and introduce computer programming for different approaches to their solution. Interaction between teacher and students is expected.	✓	✓					3 hours
	Demonstration of computer programming for handling various NLP subtasks to students in lectures and/or tutorials.		✓					
	Teacher-facilitated class/group discussions on the technical issues and the strengths and weaknesses of different approaches to NLP subtasks in lectures and/or tutorials.		✓					
	In-calss hands-on exercises on computer programming to handle various NLP subtasks, which might involve the design and preparation of various linguistic resources (e.g. writing context-free rules for parsing) and/or simple program fragments. (We assume that the students' main working programming language is Python.)			✓				

4. Assessment Tasks/Activities (ATs)

(ATs are designed to assess how well the students achieve the CILOs.)

Final details will be provided to students in their first week of attendance in this course.

Assessment Tasks/Activities	CILO No.						Weighting*	Remarks
	1	2	3					
Continuous Assessment: 50%								
Homework assignments on the concepts of computer programming and on the major issues in natural language processing.	✓	✓	✓				50%	
Examination: 50% (duration: 2 hours, at the end of the semester) (CILO No. 1, 2, 3)								
** The weightings should add up to 100%.*							100%	

5. Assessment Rubrics

(Grading of student achievements is based on student performance in assessment tasks/activities with the following rubrics.)

Assessment Task	Criterion	Excellent (A+, A, A-)	Good (B+, B, B-)	Fair (C+, C, C-)	Marginal (D)	Failure (F)
1. Homework Assignments	Knowledge, attitude creativity and performance in presenting and completing demons/assignments	• Excellent knowledge of major issues in language processing and various approaches to their solution. • Excellent, creative application of computing and programming knowledge to basic language processing subtasks.	• Good knowledge of major issues in language processing and various approaches to their solution. • Good application of computing and programming knowledge to basic language processing subtasks.	• Adequate knowledge of major issues in language processing and various approaches to their solution. • Fair application of computing and programming knowledge to basic language processing subtasks.	• Basic familiarity with the subject matter. • Marginal ability to apply basic computing and programming knowledge to basic language processing subtasks.	• Poor familiarity with the subject matter. • Poor ability or fail to apply computing and programming knowledge to basic language processing subtasks.
2. Examination	Knowledge, attitude creativity and performance in presenting and completing demons/assignments	• Excellent knowledge of major issues in language processing and various approaches to their solution. • Excellent, creative application of computing and programming knowledge to basic language processing subtasks.	• Good knowledge of major issues in language processing and various approaches to their solution. • Good application of computing and programming knowledge to basic language processing subtasks.	• Adequate knowledge of major issues in language processing and various approaches to their solution. • Fair application of computing and programming knowledge to basic language processing subtasks.	• Basic familiarity with the subject matter. • Marginal ability to apply basic computing and programming knowledge to basic language processing subtasks.	• Poor familiarity with the subject matter. • Poor ability or fail to apply computing and programming knowledge to basic language processing subtasks.

Part III Other Information (more details can be provided separately in the teaching plan)

1. Keyword Syllabus

(An indication of the key topics of the course.)

Tokenisation, Part-of-speech tagging, N-gram models, Context-free grammars, Parsing, Linear classifiers, Feedforward neural networks, Computational graph and backpropogation, Word embeddings, Recurrent neural networks, LSTMs and GRUs, Attention and transformers, Transfer learning

2. Reading List

2.1 Compulsory Readings

(Compulsory readings can include books, book chapters, or journal/magazine articles. There are also collections of e-books, e-journals available from the CityU Library.)

1.	Lecture notes for the course
2	Jurafsky, D. and Martin, J.H. (2021) *Speech and Language Processing (3rd Edition)*. : https://web.stanford.edu/~jurafsky/slp3/
3.	Bird, S., Klein, E. and Loper, E. *Natural Language Processing with Python*. https://www.nltk.org/book/

2.2 Additional Readings

(Additional references for students to learn to expand their knowledge about the subject.)

1.	Manning, C. and Schutze, H. *Foundations of Statistical Natural Language Processing*, MIT Press, 1999.
2.	Eisenstein, J. *Introduction to Natural Language Processing*, MIT Press, 2019.
3.	Rao, D. and McMahan, B., *Natural Language Processing with PyTorch: Build Intelligent Language Applications Using Deep Learning.* O'Relly, 2019.
4.	Stanford NLP course: Natural Language Processing with Deep Learning: http://web.stanford.edu/class/cs224n/