

Module/Course Title: Computational Linguistics

- **Code number:**
- **Level of Module/Course (under-/postgraduate):**
- **Type of Module/Course:**
- **Year of Study**
- **Semester**
- **Number of ects allocated:**
- **Number of teaching units:**
- **Name of lecturer / lecturers :**
- **Content outline:**

Computational Linguistics is a relatively new discipline that focuses on understanding, processing and producing Natural Language. Issues such as Speech Recognition, Natural Language Understanding, Natural Language Production, Speech Synthesis, Machine Translation, Information Retrieval and Extraction and Summarization are among those dealt in Computational Linguistics and the closely related discipline of Natural Language Processing.

During the course, students are introduced to: the discipline and its relation to Computer Science and Linguistics, its history, applications, problems, current and future research and development issues. Emphasis is given to the important computational linguistics tools, Regular Expressions and Finite State Automata. Regarding regular expressions, students are introduced to how they are used in computational linguistics, their syntax and special characters, writing a regular expression for language applications and recognizing what a regular expression can accept or produce. Regarding Finite State Automata, students are introduced to their use in computational linguistics, their construction and formal description for language processing purposes, the differences between a Deterministic Finite State Automaton and a Non-Deterministic Finite State Automaton, recognizing what a given Finite State Automaton accepts and what it produces and matching a Finite State Automaton to a Regular Expression and vice versa.

The course of Computational Linguistics provides students of a theoretical background the ability to deal with research and development issues in a formal, algorithmic way.

- **Learning outcomes:**

After the successful completeness of the course, students should:

- Know what Computational Linguistics is, its history and the scientific fields that evolves.
- Know what Regular Expressions are and their use in computational linguistics.
- Know the syntax and the special characters of regular expressions.

- Know how to write regular expressions for given problems.
- Know how to write regular expressions for specific computational linguistics applications.
- Know what a given regular expressions recognizes and what it produces.
- Know what Finite State Automata are and their use in computational linguistics.
- Be able to design a finite state automaton and describe it formally.
- Know the difference between a Deterministic Finite State Automaton and a Non-Deterministic Finite State Automaton.
- Be able to design a finite state automaton for specific computational linguistics applications.
- Know what a given finite state automaton recognizes and what it produces.
- Be able to match a finite state automaton to a regular expression and vice versa.

The course “Computational Linguistics” gives students with a theoretical background the ability to deal with issues and problems in a formal, algorithmic way, an ability acquired when studying mathematics/computing subjects.

- **Prerequisites:** -

- **Recommended Reading:**

a) Basic Textbooks:

Φραντζή, Κ. 2012. Εισαγωγή στην Επεξεργασία Σωμάτων Κειμένων. Αθήνα: Ίων.

Kyriakopoulou, T. 2005. L' analyse automatique des textes écrits. University Studio Press
A.E

b) Additional References:

Μαρκόπουλος, Γ. Α. 2006. Ζητήματα Υπολογιστικής Γλωσσολογίας. Γ. Α. Μαρκόπουλος.

Τάντος, Αλ. 2016. Υπολογιστική Γλωσσολογία. Ελληνικά Ακαδημαϊκά Ηλεκτρονικά
Συγγράμματα και Βοηθήματα - Αποθετήριο "Κάλλιπος".

Friedl, Geoffrey E.F. (2006) Mastering Regular Expressions. O'Reilly Media.

Goyvaerts, J. 2012. Regular Expressions Cookbook. O'Reilly Media.

Grishman, R. 1986. Computational Linguistics: An Introduction (Studies in Natural
Language Processing). Cambridge University Press

Jurafsky, D. & J. H. Martin (2008) Speech and Language Processing: International Version:
an Introduction to Natural Language Processing, Computational Linguistics, and
Speech Recognition. Prentice Hall.

Hausser, R. 2001. Foundations of computational linguistics: human-computer
communication in natural language. Springer-Verlag.

Hollos, Stefan, J. Richard Hollos (2013) Finite Automata and Regular Expressions:
Problems and Solutions. Abrazol Publishing.

Mitkov, R. 2005. The Oxford Handbook of Computational Linguistics. Oxford: OUP.

Clark, A., Fox, C. & S. Lappin 2012. The Handbook of Computational Linguistics and
Natural Language Processing (Blackwell Handbooks in Linguistics), Wiley-
Blackwell.

- **Learning Activities and Teaching Methods:** interactive lectures
- **Assessment/Grading Methods:** end-of-semester written exams
- **Language of Instruction:** Greek/English
- **Mode of delivery (face-to-face, distance learning):** face-to-face