

## **750752, Natural Language Processing**

3 hours per week, 3 credit hours, prerequisite: **none**

**Teaching Method:** 37 hours Lectures (2-3 hours per week), 8 hours Seminars (1 per 2 weeks)

**Aims:** This module provides an introduction to the field of Natural Language Processing (NLP) - the creation of computer programs that can understand, generate, and learn natural language. Natural language understanding will be used as a vehicle to introduce the three major subfields of NLP: syntax

(which concerns itself with determining the structure of a sentence), semantics (which concerns itself with determining the explicit meaning of a single sentence), and pragmatics (which concerns itself with

deriving the implicit meaning of a sentence when it is used in a specific discourse context).

The module also introduces the theory and techniques that are used in building computer systems that

can “understand” a natural language such as English. The concentration is on the four main topics of

syntax, parsing, semantics and semantic processing. The formalisms are used to capture syntactic and semantic knowledge and the algorithms that can use that knowledge.

### **Learning Outcomes:**

On completion of this module, the student should be able to:

- Become aware of the issues involved in various forms of knowledge representation (for syntactic, semantic, pragmatic and world knowledge) that are needed for language processing.
- Become aware of the issues involved in various forms of machine reasoning (parsing, semantic translation, disambiguation, inference drawing) that are needed for language processing.
- Learn how to use the theoretical knowledge they gain in the construction of simple applications systems.

### **Textbooks and Supporting Materials:**

The material will be based on published papers and textbooks. Students are expected to read and understand these.

1- J. Allen, Natural Language Understanding, 2nd ed., Benjamin/Cummings, 1994

2- G. Gazdar and C. Mellish, Natural Language Processing in Prolog, Addison Wesley, 1989

3- F. C. N. Pereira and S.M. Shieber, Prolog for Natural Language Analysis, Stanford University: Center for the Study of Language and Information, 1987

4- Gazdar, Klein, Pullum and Sag, Generalized Phrase Structure Grammar, Blackwell, 1985

**Synopsis:**

1- Introduction to Natural Language Processing (NLP)

2- Syntax: grammar in computational linguistics.

3- Parsing: simple parsing; efficient parsing algorithms ; left-corner and chart parsing; implementation in Prolog.

4- Semantics and semantic processing: compositional semantics; representation - logic and lambda calculus; semantic processing in Prolog; quantification.

**Assessment:** Two 1-hour midterm exams (15% each); Assignments (10%); Seminars (10%); 2-hours

Final Exam (50%)