



Course Specification

Course Name: Natural Language Processing

Course Code: [CS462]

I. Basic Course Information

Major or minor element of program: [Major]

Department offering the course: Computer Science Department

Academic level: [400 Levels]

Semester in which course is offered: [First (fall) semester]

Course pre-requisite(s): [Artificial Intelligence CS361]

Credit Hours: 3

Contact Hours Through:

| Lecture | Tutorial* | Practical* | Total |
|---------|-----------|------------|-------|
| 2.5 | [0.0] | [1.5] | 4.0 |

* 1.5 hours for **either** Tutorial or Practical

Approval date of course specification: September 2014

II. Overall Aims of Course

At the end of the course students should

- Be able to describe the architecture of and basic design for a NLP system.
- Be able to discuss the current and likely future performance of several NLP applications, such as machine translation
- Be able to describe brief a fundamental technique for processing language for several subtasks, such as morphological analysis, parsing, word sense disambiguation etc.
- Understand how these techniques draw on and relate to other areas of (theoretical) computer science, such as formal language theory, formal semantics of programming languages, or theorem proving.

III. Program ILOs covered by course

| Program Intended Learning Outcomes (By Code) | | | |
|--|---------------------|---------------------|----------------|
| Knowledge & Understanding | Intellectual Skills | Professional Skills | General Skills |
| [K1,K16] | [I2,I4,I13] | [P13] | [G2,G6,G8] |



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IV. Intended Learning Outcomes of Course (ILOs)

a. Knowledge and Understanding

On completing the course, students should be able to:

- K.1 Describe the behaviour of NLP program for any level of processing.
- K.2 Recognize the types of language models.
- K.3 Describe the difference between Information retrieval and extraction.
- K.4 Recognize the Syntactic and Semantic Analysis.
- K.5 Recognize the basic concepts of machine translation.]

b. Intellectual/Cognitive Skills

On completing the course, students should be able to:

- I.1 Distinguish between the different types of language Models.
- I.2 Analyze an NLP computer program to determine its behaviour.
- I.3 Design a computer program to solve specific problems in NLP.]

c. Practical/Professional Skills

On completing the course, students should be able to:

- P.1 Use Python programming language to produce a program in any NLP subfield such as: Machine translation or text summarization.]

d. General and Transferable Skills

On completing the course, students should be able to:

- G.1 Demonstrate ability in time management, organization skills, communication skills, report writing skills, and presentation skills for a variety of audiences
- G.2 Acquire team working skills.
- G.3 Demonstrate an appreciation and ability to continue professional development and ensure life-long self-learning.]

V. Course Matrix Contents

| | Main Topics / Chapters | Duration (Weeks) | Course ILOs Covered by Topic (By ILO Code) | | | |
|-----|---|------------------|--|----------|-------|--------|
| | | | K & U | I.S. | P.S. | G.S. |
| 1- | Natural Language: An introduction.] | [1] | [K1] | [] | [] | [] |
| 2- | Language Models] | [1] | [K2] | [I1] | [] | [All] |
| 3- | Text Classification] | [1] | [K1] | [I2] | [P1] | [All] |
| 4- | Information Retrieval] | [1] | [K3] | [I2,I3] | [P1] | [All] |
| 5- | Information Extraction] | [1] | [K3] | [I2,I3] | [P1] | [All] |
| 6- | Morphological Analysis and the Lexicon] | [1] | [] | [I2,I3] | [] | [All] |
| 7- | Phrase Structure Grammars] | [1] | [K4] | [I2,I3] | [] | [All] |
| 8- | Grammars and Syntactic Analysis (Parsing)] | [2] | [K4] | [I2,I3] | [P1] | [All] |
| 9- | Grammars and Semantic Interpretation.] | [2] | [K4] | [I2,I3] | [P1] | [All] |
| 10- | Machine Translation] | [2] | [K5] | [I2,I3] | [P1] | [All] |
| | Net Teaching Weeks | 13 | | | | |



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VI. Course Weekly Detailed Topics / hours / ILOs

| Week No. | Sub-Topics | Total Hours | Contact Hours | |
|-----------------------------|--|-------------|-------------------|------------------|
| | | | Theoretical Hours | Practical Hours* |
| 1 | Natural Language: An introduction | 2.5 | 2.5 | |
| 2 | Language Models | 4 | 2.5 | 1.5 |
| 3 | Text Classification | 4 | 2.5 | 1.5 |
| 4 | Information Retrieval | 4 | 2.5 | 1.5 |
| 5 | Information Extraction | 4 | 2.5 | 1.5 |
| 6 | Morphological Analysis and the Lexicon | 4 | 2.5 | 1.5 |
| 7 | Midterm Exam | | | |
| 8 | Phrase Structure Grammars | 4 | 2.5 | 1.5 |
| 9 | Parsing | 4 | 2.5 | 1.5 |
| 10 | Context Free Grammar | 4 | 2.5 | 1.5 |
| 11 | Augmented grammar rules | 4 | 2.5 | 1.5 |
| 12 | Semantic interpretation | 4 | 2.5 | 1.5 |
| 13 | Machine Translation Systems | 4 | 2.5 | 1.5 |
| 14 | Statistical Machine Translation | 4 | 2.5 | 1.5 |
| 15 | Final Exam | | | |
| Total Teaching Hours | | 51 | 33 | 18 |

* No Practical/Tutorial during the first week of the semester

VII. Teaching and Learning Methods

| Teaching/Learning Method | Selected Method | Course ILOs Covered by Method (By ILO Code) | | | |
|--|-----------------|---|---------------------|---------------------|----------------|
| | | K & U | Intellectual Skills | Professional Skills | General Skills |
| Lectures & Seminars | * | All | All | | G3 |
| Tutorials | | | | | |
| Computer lab Sessions | | | | | |
| Practical lab Work | * | All | All | P1 | All |
| Reading Materials | | | | | |
| Web-site Searches | | | | | |
| Research & Reporting | | | | | |
| Problem Solving / Problem-based Learning | | | | | |
| Projects | * | All | I2,I3 | P1 | All |
| Independent Work | | | | | |
| Group Work | | | | | |
| Case Studies | | | | | |
| Presentations | | | | | |
| Simulation Analysis | | | | | |
| Others (Specify): | | | | | |



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VIII. Assessment Methods, Schedule and Grade Distribution

| Assessment Method | Selected Method | Course ILOs Covered by Method (By ILO Code) | | | | Assessment Weight / Percentage | Week No. |
|---------------------|-----------------|---|-------|------|------|--------------------------------|----------|
| | | K & U | I.S. | P.S. | G.S. | | |
| Midterm Exam | * | K1,K2 | I1 | P1 | G3 | 20% | 7 |
| Final Exam | * | All | I1,I2 | P1 | G3 | 60% | 15 |
| Quizzes | | | | | | | |
| Course Work | | | | | | | |
| Report Writing | | | | | | | |
| Case Study Analysis | | | | | | | |
| Oral Presentations | | | | | | | |
| Practical | | | | | | | |
| Group Project | * | All | All | P1 | All | 20% | 6,12 |
| Individual Project | | | | | | | |
| Others (Specify): | | | | | | | |

IX. List of References

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|--|---|
| Essential Text Books | <ul style="list-style-type: none"> Natural Language Processing with Python, by Steven Bird, Ewan Klein, and Edward Loper, Publisher: O'Reilly Media, 2009 |
| Course notes | <ul style="list-style-type: none"> Course notes are available with all the slides used in lectures in printed and electronic formats. Lab sheets and their solutions are also available in the same way. |
| Recommended books | <ul style="list-style-type: none"> Artificial Intelligent : A Modern Approach - (Third edition) by Stuart Russell and Peter Norvig, Publisher: Prentice Hall, 3 edition, 2009 |
| Periodicals, Web sites, etc.... | <ul style="list-style-type: none"> None |

X. Facilities required for teaching and learning

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| <ul style="list-style-type: none"> Adequate computer lab space and time to accommodate all the students Free lab time open to all students for practice Natural Language Toolkit(NLTK), Python programming language. A lecture theatre that can easily and comfortably accommodate 100 people equipped with a data show for the period of 3 hours of lectures and 1.5 extra tutorial session per week. |
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Course coordinator:[Prof. Ali Ali Fahmy]

Head of Department:[Prof. Abeer El Korany]

Date: September 2014