



University: *Fayoum University*
Faculty: *Computers and Information*
Department: *Computer Science*



Course Specification

1- Basic Information								
Code: GEN 113	Course Title: Computational Linguistics	Year/Level: First year – First term						
Programme: B.Sc degree in Computer Science	Number of units:	<table border="1"> <tr> <td>Lecture:</td> <td>2 hrs/ week</td> </tr> <tr> <td>Tutorial:</td> <td>0 hrs/ week</td> </tr> <tr> <td>Practical:</td> <td>0 hrs/ week</td> </tr> </table>	Lecture:	2 hrs/ week	Tutorial:	0 hrs/ week	Practical:	0 hrs/ week
Lecture:	2 hrs/ week							
Tutorial:	0 hrs/ week							
Practical:	0 hrs/ week							

2- Aims of Course:	<p>The aim of the course is to introduce students to the fundamental concepts and ideas in computational linguistics, including computational approaches to language modeling, methods and techniques for the processing of human (natural) language, as well as recent applications in the area. The focus is on methods and algorithms for morphological analysis, part-of-speech tagging and parsing. Since the course will be covering a wide range of material, it will not be possible to cover everything in depth. So, students should not expect to come away from this course with everything they need to be a practicing computational linguist. On the other hand, students should expect to come away with an understanding of what the issues in computational linguistics are, and they should know enough to start to look more in depth at particular problems that (hopefully) will interest them in the future.</p>
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3- Intended Learning Outcomes	
A- Knowledge and Understanding:	<p>A2) List the Fundamental topics in Computer Science related to software engineering principles, computer organization and architecture.</p> <p>A5) Explain essential concepts, principles, and theories related to computer science such as computer graphics and image processing.</p> <p>A7) Demonstrate essential facts, concepts, principles and theories relating to computing and information and computer applications as appropriate to the program of study</p> <p>a1) Describe and explain the main theoretical, empirical and modeling approaches to computational linguistics.</p> <p>a2) Describe and explain morphological parsing and tokenization techniques.</p>

	<p>a3) Explain the uses of, and various techniques for, part of speech tagging.</p> <p>a4) Describe and explain the bottom-up and top-down parsing.</p>
B- Intellectual Skills:	<p>B5) Discuss factors other than computational efficiency that influence the choice of algorithms, such as programming time, maintainability, and the use of application-specific patterns in the input data.</p> <p>B7) Determine goals for problem solving and test the result of the solution of the problems</p> <p>b1) Describing and clarifying methods to formulate and solve problems.</p> <p>b2) Applying different techniques in solving problems.</p>
C- Professional and Practical Skills:	<p>C9) Deploy different modeling techniques to model and analyze real life computing problems.</p> <p>c1) Conduct and analyze empirical studies of natural language processing.</p> <p>c2) Apply morphological analysis for English/Arabic words.</p> <p>c3) Apply part of speech tagging for English/Arabic sentences.</p> <p>c4) Identifying how context free grammars can be used to implement generators and parsers.</p>
D- General and transferable Skills	<p>D3) Work as a member of a development team, recognizing the different roles within a team and different ways of organizing teams.</p> <p>D5) Communicate effectively through oral, written, and visual means.</p> <p>d1) Working in a group and learning the time management.</p>

4-Course Content:	<ol style="list-style-type: none"> 1. Introduction to natural language processing, different levels of language analysis. Linguistic background, words, verbs and phrases. 2. Grammar and parsing, sentence structure, top-down and bottom up charts, 3. Finite state models. Feature and augmented grammar, morphological analysis, parsing with features. 4. Auxiliary verbs, relative clauses. Human preference in parsing, 5. deterministic parser and efficient encoding of ambiguity, statistical methods for ambiguity resolution, 6. Arabic/English semantics and logical forms. Linking syntax and semantic interpretation using feature unification. 7. Ambiguity resolution using selectional restrictions. 8. Different strategies for Arabic/English semantics
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	<p>interpretation and reasoning frames.</p> <p>9. Hybrid knowledge representation using knowledge about action and causality.</p> <p>10. Symbolic computation, symbol data structure, matching, search and unification algorithms.</p>
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5- Teaching and Learning Methods:	<ol style="list-style-type: none"> 1. Lectures. 2. Class discussions 3. Problem-based Learning
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6- Teaching and Learning Methods for handicapped students :	-
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7- Student Assessment	
A- Assessment Methods:	<ol style="list-style-type: none"> 1. Midterm written exam 2. Final written exam
B- Assessment schedule:	<p>Midterm examination: Week 7</p> <p>Final examination: Week 15</p>
C- Weighting of assessments:	<p>Assignments and Quizzes: 0%</p> <p>Mid-Term Examination: 20%</p> <p>Final-term Examination: 80%</p>

8- Books and References	
A- Notes:	Handouts and notes prepared by the instructor
B- Essential Books (Text Books):	<ul style="list-style-type: none"> ▪ -
C- Recommended Books:	<ul style="list-style-type: none"> ▪ NUGUES, P., "An Introduction to Language Processing with Perl and Prolog. An Outline of Theories, Implementation, and Application with Special Consideration of English, French and German". Cognitive Technologies Series, 2006. Springer ▪ JURAFSKY, D. and MARTIN, J., "Speech and Language Processing. An Introduction to Natural Language Processing, Computational Linguistics, and Speech Recognition", Second edition, Prentice Hall, 2009.
D- Periodicals, Web sites, ... etc	<ul style="list-style-type: none"> ▪

Course Content Intended Learning Outcomes Matrix

Course Title: Computational Linguistics

Course Code: GEN 113

Course Content	Week	Knowledge & Understanding				Intellectual Skills			Professional & Practical Skills							General & Transferable Skills		
		a1	a2	a3	a4	b1	b2	b3	c1	c2	c3	c4	c5	c6	c7	d1	d2	d3
Introduction to natural language processing, different levels of language analysis. Linguistic background, words, verbs and phrases.	1	x				x	x	x	x						x	x	x	x
Grammar and parsing, sentence structure, top-down and bottom up charts,	2	x			x	x	x	x					x	x	x	x	x	x
finite state models. Feature and augmented grammar, morphological analysis, parsing with features.	3	x	x			x	x	x		x			x	x	x	x	x	x
Auxiliary verbs, relative clauses. Human preference in parsing,	4					x	x	x					x		x	x	x	x
deterministic parser and efficient encoding of ambiguity, statistical methods for ambiguity resolution,	5					x	x	x		x			x		x	x	x	x
Arabic/English semantics and logical forms. Linking syntax and semantic interpretation using feature unification.	6					x	x	x			x				x	x	x	x
Ambiguity resolution using selectional restrictions.	7					x	x	x							x	x	x	x
Different strategies for Arabic/English semantics interpretation and reasoning frames.	8					x	x	x			x				x	x	x	x
Hybrid knowledge representation using knowledge about action and causality.	9					x	x	x							x	x	x	x
Symbolic computation, symbol data structure, matching, search and unification algorithms.	10					x	x	x							x	x	x	x
Speech processing and recognition.	11				x	x	x	x				x			x	x	x	x

Course Professor: Ayman Alhelbawy

Head of Department: Amira Idreas