

Syrian Arab Republic	 الجامعة الافتراضية السورية SYRIAN VIRTUAL UNIVERSITY	الجمهورية العربية السورية
Ministry of Higher Education		وزارة التعليم العالي
Syrian Virtual University		الجامعة الافتراضية السورية

## Course Description: **Natural Language Processing**

### 1- Basic Information:

Course Name	<b>Natural Language Processing1</b>
Course ID	<b>Ise_nlp</b>
Contact Hours (Registered Sessions)	<b>15 sessions (1 hour 30 min each)</b>
Contact Hours (Synchronized Sessions)	<b>16 sessions (1 hour 30 min each)</b>
Mid Term Exam	-
Exam	<b>75 min</b>
Registered Sessions Work Load	<b>22.5 h</b>
Synchronized Session Work Load	<b>24 h</b>
Credit Hours	<b>4</b>

### 2- Pre-Requisites:

Course	ID
Artificial Intelligence	AE

### 3- Course General Objectives:

This course which comes after Artificial Intelligence aims to teach techniques and applications of natural language processing as texts and as speech signals, in view of interaction in Arabic Language with computers. (Aiming to split the module in two: one for speech processing and the other for text processing)

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#### 4- Intended Learning Outcomes (ILO):

Code	Intended Learning Outcomes
ILO1	Knowing speech signal characteristics
ILO2	Arabic Speech synthesis from text (Arabic Text to Speech)
ILO3	Speech recognition
ILO4	Text Analysis: Morphological, syntactic and semantic
ILO5	Automatic Text summarization and Translation applications
ILO6	Text Mining
ILO7	Matlab and other tools
ILO8	

#### 5- Course Syllabus (16 sessions of 1 hour and a half each of total synchronized sessions; 15 sessions of 1 hour and a half each of total Recorded Sessions)

- **RS:** Recorded Sessions; **SS:** Synchronized Sessions;

ILO	Course Syllabus	RS	SS	Type	Additional Notes
ILO1	Measuring time parameters from speech signal and deducing fundamental frequency. Measuring frequency parameters from FFT of signal and deducing formant frequencies.	3	3	<input checked="" type="checkbox"/> Exercises <input checked="" type="checkbox"/> Assignments <input type="checkbox"/> Seminars <input type="checkbox"/> Projects <input checked="" type="checkbox"/> Practices <input type="checkbox"/> Others	
ILO2	Measuring other parameters. Speech synthesis techniques from texts (TTS)	1.5	1.5	<input checked="" type="checkbox"/> Exercises <input checked="" type="checkbox"/> Assignments <input type="checkbox"/> Seminars <input type="checkbox"/> Projects <input checked="" type="checkbox"/> Practices <input type="checkbox"/> Others	
ILO3	Deducing suitable parameters	3	3	<input checked="" type="checkbox"/> Exercises	

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	for recognition. Recognition techniques: Dynamic Time Warping (DTW) and Hidden Markov Models (HMM)			<input checked="" type="checkbox"/> Assignments <input type="checkbox"/> Seminars <input type="checkbox"/> Projects <input type="checkbox"/> Practices <input type="checkbox"/> Others	
<b>ILO4</b>	Morphological Analysis techniques. Syntactic and semantic analysis techniques	6	6	<input checked="" type="checkbox"/> Exercises <input checked="" type="checkbox"/> Assignments <input type="checkbox"/> Seminars <input checked="" type="checkbox"/> Projects <input type="checkbox"/> Practices <input type="checkbox"/> Others	
<b>ILO5</b>	Automatic Text summarization and Translation applications	1.5	1.5	<input checked="" type="checkbox"/> Exercises <input checked="" type="checkbox"/> Assignments <input type="checkbox"/> Seminars <input type="checkbox"/> Projects <input type="checkbox"/> Practices <input type="checkbox"/> Others	
<b>ILO6</b>	Text mining techniques	1.5	1.5	<input checked="" type="checkbox"/> Exercises <input checked="" type="checkbox"/> Assignments <input type="checkbox"/> Seminars <input checked="" type="checkbox"/> Projects <input type="checkbox"/> Practices <input type="checkbox"/> Others	
<b>ILO7</b>	Tools: Matlab and text analysis	6	6	<input checked="" type="checkbox"/> Exercises <input checked="" type="checkbox"/> Assignments <input type="checkbox"/> Seminars <input checked="" type="checkbox"/> Projects <input type="checkbox"/> Practices <input type="checkbox"/> Others	
<b>ILO8</b>	Pre-Exam session		1.5	<input checked="" type="checkbox"/> Exercises <input type="checkbox"/> Assignments <input type="checkbox"/> Seminars <input type="checkbox"/> Projects <input type="checkbox"/> Practices <input type="checkbox"/> Others	

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## 6- Assessment Criteria (Related to ILOs)

ISC	Interactive Synchronized Collaboration	Ex	Exams	Rpt	Reports
PF2F	Presentations and Face-to-Face Assessments	PW	Practice Work		

ILO Code	ILO	Intended Results	Assessment Type				
			ISC	PW	Ex	PF2F	Rpt
ILO1	Knowing speech signal characteristics	<b>Understanding signal sampling, autocorrelation function, periodicity principle and fundamental frequency</b>	√	□	√		√
ILO2	Arabic Speech synthesis from text (Arabic Text to Speech)	Understanding Linear Prediction Coding (LPC) technique, signal modeling as source-filter. Synthesis speech parameters' extraction. Components of a speech synthesizer	√	□	√		√
ILO3	Speech recognition	<b>Cepstrum parameters for recognition, recognition units and recognition techniques: DTW, and HMM</b>	√	□	√		√
ILO4	Text Analysis: Morphological, syntactic and semantic		√	√	√		√
ILO5	Automatic Text summarization and Translation applications		√	□	√		□
ILO6	Text mining		√	√	√		√

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ILO7	Matlab and other tools		√	<input type="checkbox"/>	√		<input type="checkbox"/>
ILO8			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>

### 7-Practice Tools:

Tool Name	Description
<b>Matlab</b>	Tool for engineering computation with a speech toolbox
<b>AraMorph</b>	Tool for Arabic Morphological analysis
<b>Arabic Stanford Parser</b>	Tool for Part of Speech Tagging and Parsing of Arabic Sentences.

### 8-Main References

- Daniel Jurafsky, James H. Martin, Speech and Language Processing, 2nd Edition, 2009, Pearson Edition.
- Dutoit T. "Introduction au traitement automatique de la parole", Notes de cours, 2000, (Faculté Polytechnique de Mons, Belgique).
- J. Deller et al. "Discrete Time Processing of Speech Signals", IEEE press & Wiley, 2000.
- Rabiner L. & Shafer R.: "Digital Processing of Speech Signals", Prentice Hall, 1978

### 9-Additional References

Lectures of NLP courses in IT faculty and HIAST given by Al Dakkak and Ghneim.