Syrian Arab Republic		الجمهورية العربية السورية
Ministry of Higher Education	SVU	وزارة التعليم العاليي
Syrian Virtual University	الجامعــة الإفتراضيــة السوريــة Syrian Virtual University	الجامعة الافتراضية السورية

# **Course Description: Natural Language Processing**

### 1- Basic Information:

Course Name	Natural Language Processing1
Course ID	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)
Mid Term Exam	-
Exam	75 min
Registered Sessions Work Load	22.5 h
Synchronized Session Work Load	24 h
Credit Hours	4

## 2- Pre-Requisites:

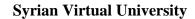
Course	ID
Artificial Intelligence	AE

# **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	<b>Additional Notes</b>
ILO1	Measuring time parameters from speech signal and deducing fundamental frequency.  Measuring frequency parameters from FFT of signal and deducing formant frequencies.	3	3	√Exercises √Assignments □ Seminars □ Projects √ Practices □ Others	
ILO2	Measuring other parameters. Speech synthesis techniques from texts (TTS)	1.5	1.5	√Exercises √Assignments □ Seminars □ Projects √Practices □ Others	
ILO3	Deducing suitable parameters	3	3	√Exercises	

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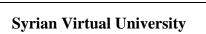
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	for recognition. Recognition			√Assignments	
	techniques: Dynamic Time			□ Seminars	
	Warping (DTW) and Hidden			□ Projects	
	Markov Models (HMM)			□ Practices	
				☐ Others	
				√Exercises	
	Morphological Analysis			√Assignments	
ILO4	techniques. Syntactic and	6	6	☐ Seminars	
	semantic analysis techniques			√ Projects	
	semantie unarysis teeriniques			□ Practices	
				□ Others	
				√Exercises	
	Automatic Text summarization and Translation applications			$\sqrt{\text{Assignments}}$	
ILO5			1.5	□ Seminars	
1230			1.0	□ Projects	
				□ Practices	
				☐ Others	
				√Exercises	
	Text mining techniques	1.5		√Assignments	
ILO6			1.5	□ Seminars	
1200			1.0	√ Projects	
				□ Practices	
				Others	
				√Exercises	
	Table Mattala and tast analysis			√Assignments	
ILO7	Tools: Matlab and text analysis	6	6	☐ Seminars	
				√ Projects	
				□ Practices	
				Others	
				√Exercises	
				☐ Assignments	
ILO8	Pre-Exam session		1.5	☐ Seminars	
				□ Projects	
				□ Practices	
				□ 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 Wo	rk			

ILO			Assessment Type							
Code	ILO	Intended Results	ISC	PW	Ex	PF2F	Rpt			
ILO1	Knowing speech signal characteristics	Understanding signal sampling, autocorrelation function, periodicity principle and fundamental frequency	<b>V</b>		<b>V</b>		<b>V</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	<b>√</b>		<b>√</b>		√			
ILO3	Speech recognition	Cepstrum parameters for recognition, recognition units and recognition techniques: DTW, and HMM	<b>V</b>		<b>V</b>		<b>V</b>			
ILO4	Text Analysis: Morphological, syntactic and semantic		$\sqrt{}$	√	√		√			
ILO5	Automatic Text summarization and Translation applications		1		<b>V</b>					
ILO6	Text mining		√	<b>V</b>	<b>V</b>		<b>V</b>			

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ILO7	Matlab and other tools	<b>√</b>	<b>√</b>	
ILO8				

#### **7-Practice Tools:**

Tool Name	Description
Matlab	Tool for engineering computation with a speech toolbox
AraMorph	Tool for Arabic Morphological analysis
Arabic Stanford Parser	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.