COURSE DESCRIPTION FORM

INSTITUTION   FAST School of Computing, National University of Computer and Emerging Sciences, Peshawar

BS-CS SPRING 2023

PROGRAM(S) TO BE EVALUATED

Course Description

(Fill out the following table for each course in your computer science curriculum. A filled out form should not be more than 2-3 pages.)

Course Code	CS-458
Course Title	NATURAL LANGUAGE PROCESSING
Credit Hours	3
Prerequisites by Course(s) and Topics	Data Structures
Assessment Instruments with Weights (homework, quizzes, midterms, final, programming assignments, lab work, etc.)	*100% Theory* Assessment items of Theory Part (see table below)

100% Theory
Assessment items of Theory Part

Assessment Item	Number	Weight (%)
Assignments	6	30
Midterm Exams	~~2~~	~~20~~
Project	1	30
Presentation	1	10
Final Exam	1	30

Course Instructors	Shahzeb Khan
Lab Instructors (if any)	
Course Coordinator	Shahzeb Khan
URL (if any)	
Current Catalog Description	Deterministic and stochastic grammars, Parsing algorithms, CFGs, Representing meaning/Semantics, Semantic roles, Temporal representations, Corpus-based methods, N-grams and HMMs, Smoothing and Backoff, POS tagging and morphology, Information retrieval, Vector space model, Precision and recall, Information extraction, Language translation, Text classification, categorization, Bag of words model, Text Ranking.
Textbook (or **Laboratory Manual** for Laboratory Courses)	Daniel Jurafsky and James H. Martin. 2018. **Speech and Language Processing: An Introduction to Natural Language Processing**,. Third Edition. Prentice Hall

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Reference Material	Foundations of Statistical Natural Language Processing, Manning and Schütze, MIT Press. Cambridge, MA: May 1999
Rules and Regulations	● All the quizzes will be considered. ● All assignments will be considered. ● No late submissions will be allowed. ● Plagiarism in one item of the assessment instrument will result in cancellation of all items of corresponding instrument.
Course Learning Outcomes	

A. Course Learning Outcomes (CLOs)

The course objective is to prepare students for effective use of Natural Language Processing tools. After completion of the course, the student shall be able to:

1. Identify techniques for information retrieval, language translation, and text classification.

2. List the advantages of using standard corpora. Identify examples of current corpora for a variety of NLP tasks.

3. Define and contrast deterministic and stochastic grammars, providing examples to show the adequacy of each.

4. Simulate, apply, or implement classic and stochastic algorithms for parsing natural language.

B. Program Learning Outcomes (CLOs)

PLO 1	Computing Knowledge	Apply knowledge of mathematics, natural sciences, computing fundamentals, and a computing specialization to the solution of complex computing problems.
PLO 2	Problem Analysis	Identify, formulate, research literature, and analyze complex computing problems, reaching substantiated conclusions using first principles of mathematics, natural sciences, and computing sciences.
PLO 3	Design/ Develop Solutions	Design solutions for complex computing problems and design systems, components, and processes that meet specified needs with appropriate consideration for public health and safety, cultural, societal, and environmental considerations.
PLO 4	Investigation & Experimentation	Conduct investigation of complex computing problems using research based knowledge and research based methods
PLO 5	Modern Tool Usage	Create, select, and apply appropriate techniques, resources and modern computing tools, including

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		prediction and modelling for complex computing problems.
PLO 6	Society Responsibility	Apply reasoning informed by contextual knowledge to assess societal, health, safety, legal, and cultural issues relevant to context of complex computing problems.
PLO 7	Environment and Sustainability	Understand and evaluate sustainability and impact of professional computing work in the solution of complex computing problems
PLO 8	Ethics	Apply ethical principles and commit to professional ethics and responsibilities and norms of computing practice.
PLO 9	Individual and Team Work	Function effectively as an individual, and as a member or leader in diverse teams and in multi-disciplinary settings.
PLO 10	Communication	Communicate effectively on complex computing activities with the computing community and with society at large.
PLO 11	Project Management and Finance	Demonstrate knowledge and understanding of management principles and economic decision making and apply these to one's own work as a member or a team.
PLO 12	Life Long Learning	Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological changes.

C. Mapping of CLOs on PLOs
(CLO: Course Learning Outcome, PLOs: Program Learning Outcomes)

		PLOs											
		1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**
CLOs	1	✔	✔	✔									
	2					✔							
	3		✔	✔									
	4					✔				✔			

Topics Covered in the Course, with Number of Lectures on Each Topic (assume 15-week instruction and one-hour lectures)	Topics to be covered:			
	List of Topics	No. of Weeks	Contact Hours	CLO(s)
	Basic Text Processing	**1**	**3**	**1,2**
	Minimum Edit Distance	**1**	**3**	**1,2,3**
	Language Modeling	**2**	**6**	**1, 2,3**
	Spelling Correction	**1**	**3**	**2, 3**
	Text Classification	**1**	**3**	**1,2,3,5**
	Bag of Words	**1**	**3**	**1,2**
	Sentiment Analysis	**1**	**3**	**1,2,3**
	Semantics and Vector models	**2**	**6**	**1,2,3,5**
	Information Retrieval	**1**	**3**	**1,2,3**
	Relation Extraction and Q&A	**1**	**3**	**2,3**
	Text Rank and Page Rank	**1**	**3**	**2,3**
	Emerging trends & Advanced topics	**1**	**3**	**2,3**
	Project Presentations	**1**	**3**	**5,9**
	Total	**15**	**45**	

Programming Assignments Done in the Course	Using NLTK and SpaCy in Python.			
Class Time Spent (in hours)	**Theory**	**Problem Analysis**	**Solution Design**	**Social and Ethical Issues**
	28	10	5	2

Oral and Written Communications	Every student is required to submit at least __1__ written reports of typically __10_ pages and to make __2___ oral presentations of typically __15___ minute's duration. Include only material that is graded for grammar, spelling, style, and so forth, as well as for technical content, completeness, and accuracy.