

## Subject Description Form

<b>Subject Code</b>	COMP5423
<b>Subject Title</b>	Natural Language Processing
<b>Credit Value</b>	3
<b>Level</b>	5
<b>Pre-requisite/ Co-requisite/ Exclusion</b>	Nil (but some knowledge in artificial intelligence is preferable)
<b>Objectives</b>	<p>The objectives of this subject are to enable students to acquire:</p> <ol style="list-style-type: none"> <li>1. essential knowledge of natural language processing and its application scenarios;</li> <li>2. practical techniques to handle and process natural language text;</li> <li>3. fundamental skills to develop systems with natural language processing techniques and tools; and</li> <li>4. basic building blocks to design innovative software for different communities.</li> </ol>
<b>Intended Learning Outcomes</b>	<p>Upon completion of the subject, students will be able to:</p> <ol style="list-style-type: none"> <li>a. understand and apply fundamental knowledge and advanced techniques of natural language processing for textual information processing;</li> <li>b. identify and solve technical problems through critical thinking, analytical thinking and creative thinking;</li> <li>c. demonstrate the ability to design, implement and evaluate effective natural language processing systems and applications to fulfill the real-world needs; and</li> <li>d. engage in life-long independent learning for professional development.</li> </ol>
<b>Subject Synopsis/ Indicative Syllabus</b>	<p><b>Natural Language Processing Core Concepts</b> Morphological Analysis, Syntactic Analysis and Parsing, Semantic Analysis, Discourse Analysis, and the Problem of Ambiguity.</p> <p><b>Natural Language Processing Models and Techniques</b> Segmentation, Classification, Sequence Labeling, N-Gram Language Model, Topic Model, Role of Machine Learning and Data Mining in Natural Language Processing, Natural Language Processing Tools.</p> <p><b>Natural Language Processing Applications</b> Machine Translation, Question Answering, Summarization, Opinion Mining and Sentiment Classification, Dialogue and Conversation, Reading Comprehension, Information Retrieval and Extraction, News Recommendation, etc.</p> <p><b>Selected Topics in Natural Language Processing with Deep Learning</b> Word Embedding (Word2Vec), Convolutional Neural Network, Recurrent Neural Network, Recursive Neural Network, Sequence to Sequence Model.</p>

<b>Teaching/Learning Methodology</b>	<p>Lectures teach students on the main concepts of the course, together with comprehensive examples, and class questions and answers for easy understanding.</p> <p>Tutorials and lab sessions help students to review the learned concepts, master the practical techniques and necessary tools for effective system/application development.</p> <p>Group project offers the opportunity to students to develop analytical and problem solving skills through system implementation and interpersonal communication.</p>																															
<b>Assessment Methods in Alignment with Intended Learning Outcomes</b>	<table border="1" data-bbox="517 589 1463 1032"> <thead> <tr> <th data-bbox="517 589 823 790" rowspan="2">Specific assessment methods/tasks</th> <th data-bbox="823 589 979 790" rowspan="2">% weighting</th> <th colspan="4" data-bbox="979 589 1463 723">Intended subject learning outcomes to be assessed (Please tick as appropriate)</th> </tr> <tr> <th data-bbox="979 723 1099 790">a</th> <th data-bbox="1099 723 1220 790">b</th> <th data-bbox="1220 723 1342 790">c</th> <th data-bbox="1342 723 1463 790">d</th> </tr> </thead> <tbody> <tr> <td data-bbox="517 790 823 898">1. Exercise, Project and Quiz</td> <td data-bbox="823 790 979 898">55</td> <td data-bbox="979 790 1099 898">✓</td> <td data-bbox="1099 790 1220 898">✓</td> <td data-bbox="1220 790 1342 898">✓</td> <td data-bbox="1342 790 1463 898">✓</td> </tr> <tr> <td data-bbox="517 898 823 965">2. Final Examination</td> <td data-bbox="823 898 979 965">45</td> <td data-bbox="979 898 1099 965">✓</td> <td data-bbox="1099 898 1220 965">✓</td> <td data-bbox="1220 898 1342 965">✓</td> <td data-bbox="1342 898 1463 965"></td> </tr> <tr> <td data-bbox="517 965 823 1032">Total</td> <td data-bbox="823 965 979 1032">100</td> <td colspan="4" data-bbox="979 965 1463 1032"></td> </tr> </tbody> </table> <p data-bbox="517 1088 1463 1155">Explanation of the appropriateness of the assessment methods in assessing the intended learning outcomes:</p> <p data-bbox="517 1171 1463 1379">Lecture exercises, quiz and final examination evaluate student’s ability to understand fundamental knowledge, to analyze and solve the problem problems through critical thinking, analytical thinking and creative thinking. Lab exercises and project evaluate student’s ability to apply learned techniques and tools to design and implement real-world application systems. Project also evaluates their abilities of independent learning and group communication.</p>				Specific assessment methods/tasks	% weighting	Intended subject learning outcomes to be assessed (Please tick as appropriate)				a	b	c	d	1. Exercise, Project and Quiz	55	✓	✓	✓	✓	2. Final Examination	45	✓	✓	✓		Total	100				
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1. Exercise, Project and Quiz	55	✓	✓	✓	✓																											
2. Final Examination	45	✓	✓	✓																												
Total	100																															
<b>Student Study Effort Expected</b>	Class contact:																															
	▪ Class Activities (Lecture, Tutorial, Lab)		39 Hrs.																													
	Other student study effort:																															
	▪ Assignments, Quizzes, Projects, Exams		65 Hrs.																													
	Total student study effort		<b>104 Hrs.</b>																													
<b>Reading List and References</b>	<p><b>Reference Books:</b></p> <p>(1) Daniel Jurafsky and James H. Martin. Speech and Language Processing: An Introduction to Natural Language Processing, Computational Linguistics and Speech Recognition. Prentice Hall. 2000.</p> <p>(2) Christopher D. Manning and Hinrich Schütze. Foundations of Statistical Natural Language Processing. The MIT Press. 1999.</p> <p>(3) Nitin Indurkha and Fred J. Damerau. Handbook of Natural Language Processing. Chapman and Hall/CRC. 2010.</p> <p>(4) Steven Bird, Ewan Klein and Edward Loper. Natural Language Processing with Python: Analyzing Text with the Natural Language Toolkit. O’Reilly</p>																															

Media. 2009.

(5) Julia Silge and David Robinson. Text Mining with R. O'Reilly Media. 2018.

(6) Li Deng and Yang Liu, Deep Learning in Natural Language Processing. Springer. 2018.

(7) Yoav Goldberg and Graeme Hirst. Neural Network Methods for Natural Language Processing. Morgan & Claypool Publishers. 2017.

(8) Jason Brownlee. Deep Learning for Natural Language Processing. Machine Learning Mastery, 2018.