

**The Hong Kong Polytechnic University
Hong Kong Community College**

Subject Description Form

Subject Code	CCN3142
Subject Title	Signal and System Analysis
Level	3
Credit Value	3
Medium of Instruction	English
Pre-requisite / Co-requisite/ Exclusion	Nil
Objectives	This subject provides students with basic concepts and techniques for the modelling and analysis of continuous-time signals and systems. It also provides students with an analytical foundation for further studies in Communication Engineering and Digital Signal Processing.
Intended Learning Outcomes	<p>Upon completion of the subject, students will be able to:</p> <ul style="list-style-type: none"> (a) describe the representations and classifications of the signals and systems. (b) produce mathematical model of linear continuous-time systems. (c) analyse signals and systems using time-domain, frequency-domain, and s-domain techniques. (d) identify the advantages and disadvantages of using different representations and modelling approaches. (e) apply software tools to analyse the design of continuous-time signals and systems.
Subject Synopsis/ Indicative Syllabus	<p>Signal Representation Signal classification; Continuous-time and discrete-time signals; Time-domain and frequency-domain representations.</p> <p>Continuous-Time Systems Impulse representation; Linear time-invariant (LTI) systems; Properties of systems: causality, time invariance, linearity, systems with memory; Convolution representation.</p> <p>Fourier Representations for Continuous-Time Signals Concept of frequency and spectrum; Frequency-domain representation of</p>

	<p>continuous-time signals; Continuous-time Fourier series and transform.</p> <p>System Analysis Frequency response of LTI continuous-time systems; Ideal filters classification and frequency responses; Bandwidth; Examples of filters; Bode diagram; Applications of filters.</p> <p>Laplace Transform Definition and properties; Inverse Laplace transform; Transform analysis of LTI systems; Poles and zeros; Relationship of Laplace Transform and Fourier Transform.</p>																																																																	
Teaching/Learning Methodology	<p>Lectures will focus on the introduction and explanation of basic concepts and essential knowledge of linear systems and signals, and how these can be applied to analyse and design continuous-time signals and systems. Tutorials will provide students with the opportunity to deepen their understanding of the concepts taught in lectures. Laboratory sessions provide students with the opportunity to use software tools in assisting the analysis and design of signals and systems.</p>																																																																	
Assessment Methods in Alignment with Intended Learning Outcomes	<p>A variety of assessment tools will be used to develop and assess students' achievement of the subject intended learning outcomes.</p> <table border="1" data-bbox="507 1021 1378 1729"> <thead> <tr> <th rowspan="2">Specific assessment methods/tasks</th> <th rowspan="2">% weighting</th> <th colspan="5">Intended subject learning outcomes to be assessed</th> </tr> <tr> <th>a</th> <th>b</th> <th>c</th> <th>d</th> <th>e</th> </tr> </thead> <tbody> <tr> <td>Continuous Assessment*</td> <td>40</td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>▪ Test</td> <td>16</td> <td>✓</td> <td>✓</td> <td>✓</td> <td>✓</td> <td></td> </tr> <tr> <td>▪ Assignment 1</td> <td>8</td> <td>✓</td> <td>✓</td> <td>✓</td> <td></td> <td></td> </tr> <tr> <td>▪ Assignment 2</td> <td>8</td> <td></td> <td></td> <td>✓</td> <td>✓</td> <td></td> </tr> <tr> <td>▪ Laboratory Report</td> <td>8</td> <td></td> <td>✓</td> <td>✓</td> <td></td> <td>✓</td> </tr> <tr> <td>Final Examination</td> <td>60</td> <td>✓</td> <td>✓</td> <td>✓</td> <td>✓</td> <td>✓</td> </tr> <tr> <td>Total</td> <td>100</td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> </tbody> </table> <p><i>*Continuous assessment items and/or weighting may be adjusted by the subject team subject to the approval of the College Programme Committee.</i></p> <p>To pass this subject, students are required to obtain Grade D or above in both the Continuous Assessment and Final Examination.</p>					Specific assessment methods/tasks	% weighting	Intended subject learning outcomes to be assessed					a	b	c	d	e	Continuous Assessment*	40						▪ Test	16	✓	✓	✓	✓		▪ Assignment 1	8	✓	✓	✓			▪ Assignment 2	8			✓	✓		▪ Laboratory Report	8		✓	✓		✓	Final Examination	60	✓	✓	✓	✓	✓	Total	100					
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▪ Laboratory Report	8		✓	✓		✓																																																												
Final Examination	60	✓	✓	✓	✓	✓																																																												
Total	100																																																																	
Student Study Effort Expected	Class contact				Hours																																																													
	▪ Lecture				26																																																													

	▪ Tutorial/Laboratory	13
	Other student study effort	
	▪ Self-study	52
	▪ Continuous Assessment	42
	Total student study effort	133
Reading List and References	<p>Recommended Textbook</p> <p>Roberts, M. J. (2008). <i>Fundamentals of signals and systems</i>. McGraw Hill.</p> <p>References</p> <p>Haykin, S. & Veen, B. V. (2003). <i>Signals and systems</i>. Wiley.</p> <p>Kamen, E. W. & Heck, B. S. (2000). <i>Fundamentals of signals and systems: Using the Web and MATLAB</i>. (2nd ed.), Prentice Hall.</p> <p>McClellan, James H., Schafer, Ronald W. & Yoder, Mark A. (2003). <i>Signal processing first</i>. Prentice Hall.</p> <p>McClellan, James H., Schafer, Ronald W. & Yoder, Mark A. (1999). <i>DSP first: A multimedia approach</i>. Prentice Hall.</p>	