

# The Hong Kong Polytechnic University

## Subject Description Form

<b>Subject Code</b>	LGT5158
<b>Subject Title</b>	Statistical Quality Control for Manufacturing and Service
<b>Credit Value</b>	3
<b>Level</b>	5
<b>Normal Duration</b>	One Semester
<b>Exclusion</b>	ITC501 Industrial Quality Control
<b>Objectives</b>	<ol style="list-style-type: none"> <li>1 To develop students with a practitioner-oriented statistical thinking for quality management in both manufacturing and service industries;</li> <li>2 To provide students with the methodology of establishing and managing an effective SPC program in manufacturing and service organizations;</li> <li>3 To help students improve the performance of operations process consistently and predictably over time.</li> </ol> <p>This subject contributes to the following Intended Learning Outcomes for the following programme(s):</p> <p>MSc in Operations Management</p> <p>#2: Develop the specific operations management knowledge</p>
<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 the role of statistics in quality management;</li> <li>b. Design and manage SPC in both manufacturing and service sectors;</li> <li>c. Understand the concept of acceptance sampling and be familiar with different sampling plans;</li> <li>d. Make use of statistical methods and tools to improve process quality.</li> </ol>
<b>Subject Synopsis/ Indicative Syllabus</b>	<p><u>Fundamental Concept</u> Specifications and tolerances; the gap model of service quality; process variation; foundations of statistical concepts in quality control and management; quality and data characteristics; sampling distribution and statistical inference.</p> <p><u>Management of process variation</u></p>

	<p>Deming circle, SPC strategy analyzing, and framework for monitoring controlling, and improving process performance; key quality characteristics to identify and measure in production and service industries; principles of SPC implementation.</p> <p><u>Statistical process control</u> Univariate and multivariate control charts; short run SPC; process capacity analysis; control charts for non-manufacturing applications.</p> <p><u>Acceptance sampling</u> Operating curve; lot-by-lot attribute sampling plans; characteristic continuous sampling plan; sampling plans for variables.</p> <p><u>Information technology (IT) and software applications</u> The concepts and applications of IT and improving quality and software in the related processes. Latest technological development in the following five dimensions: Artificial Intelligence, Blockchain, Cloud computing, Data science and Entrepreneurship and their impact on quality management.</p>																																	
Teaching/Learning Methodology	<p>This subject develops knowledge in students for managing process variations in both manufacturing and service industries. Theories and case studies are provided in the lectures to illustrate the concepts and applications of statistical process control (SPC) and acceptance sampling plan. This course adopts Deming’s PDCA continuous improvement cycle principles to implement SPC for quality control and enhancement. Simulation of an actual business environment is used to demonstrate challenges in executing SPC by role playing and to strengthen students’ management skills in applying related theories and tools in the real world.</p>																																	
Assessment Methods in Alignment with Intended Learning Outcomes	<table><tr><th rowspan="2">Specific assessment methods/tasks</th><th rowspan="2">% weighting</th><th colspan="5">Intended subject outcomes to be assessed (Please tick as appropriate)</th></tr><tr><th>a</th><th>b</th><th>c</th><th>d</th><th></th></tr><tr><td>Continuous Assessment</td><td>50%</td><td>✓</td><td>✓</td><td>✓</td><td>✓</td><td></td></tr><tr><td>Final Examination</td><td>50%</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></table> <p>Explanation of the appropriateness of the assessment methods in assessing the intended learning outcomes:</p>	Specific assessment methods/tasks	% weighting	Intended subject outcomes to be assessed (Please tick as appropriate)					a	b	c	d		Continuous Assessment	50%	✓	✓	✓	✓		Final Examination	50%		✓	✓	✓		Total	100 %					
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Continuous Assessment	50%	✓	✓	✓	✓																													
Final Examination	50%		✓	✓	✓																													
Total	100 %																																	

	To reflect the significant technology content in this subject, 10% (or more) of the overall weighting of this subject is based on individual assessment concerning technology-related knowledge	
<b>Student Study Effort Expected</b>	Class contact:	
	Lectures / tutorials	39 Hrs
	Other student study effort:	
	Preparing for lectures,	45 Hrs
	Assignment and project	42 Hrs
	Total student study effort	126 Hrs
<b>Reading List and References</b>	<p><i>References</i></p> <p>Mitra, Amitava (the latest edition). <i>Fundamentals of Quality Control and Improvement</i>, Hoboken, N.J.: John Wiley &amp; Sons.</p> <p>Aikens, C. Harold (the latest edition). <i>Quality Inspired Management: The Key to Sustainability</i>. Upper Saddle River, N.J.: Prentice Hall.</p> <p>Grant, Eugene L. and Leavenworth, R.S. (the latest edition). <i>Statistical Quality Control</i>, New York: McGraw-Hill Co. Inc.</p> <p>Montgomery, C. Douglas (the latest edition). <i>Introduction to Statistical Quality Control</i>, Hoboken, N.J.: John Wiley &amp; Sons.</p> <p>Ryan, P. Thomas (the latest edition). <i>Statistical Methods for Quality Improvement</i>, Hoboken, N.J.: John Wiley &amp; Sons.</p> <p>DeVor, E. Richard, Chang, T.H. and Sutherland, J.W. (the latest edition). <i>Statistical Quality Design and Control: Contemporary Concepts and Methods</i>, Upper Saddle River, NJ: Pearson/Prentice Hall.</p> <p>George, Michael L. (the latest edition). <i>Lean Six Sigma for Service: How to Use Lean Speed and Six Sigma Quality to improve Services and Transactions</i>, New York: McGraw-Hill.</p> <p>Kenett, Ron and Zacks, S. (the latest edition). <i>Modern Industrial Statistics: Design and Control of Quality and Reliability</i>, Pacific Grove, Calif.: Duxbury Press.</p> <p>Fuchs, Camil and Kenett, R.S. (the latest edition). <i>Multivariate Quality Control: Theory and Applications</i>, New York: M. Dekker.</p> <p>Casella, George and Berger, L. (the latest edition) <i>Statistical Inference</i>, Pacific Grove, Calif.: Duxbury/Thomson Learning.</p>	