The Hong Kong Polytechnic University

Subject Description Form

Please read the notes at the end of the table carefully before completing the form.

Subject Code	LGT5150
Subject Title	Quality Management Approaches for Operational Enhancement
Credit Value	3
Level	5
Pre-requisite/ Co-requisite/ Exclusion	None
Objectives	This subject seeks to achieve the following objectives: 1. To assimilate and excel the application of contemporary quality management approaches and methodologies, as well as the latest Theory of Constraints, to enhance throughput and productivity, optimize resource utilization, and steer organizations towards operational enhancement. 2. To equip students with unparalleled proficiency and application of the contemporary quality management tools and techniques to identify, pinpoint, manage, and mitigate constraints and bottlenecks in processes and systems that hinder and limit productivity, efficiency, enhancement, and finally profitability, especially in manufacturing, service, project management, and supply chain management. Through augmenting the operational enhancement, organizations are capable to increase customer satisfaction, attain rapid improvement, enhance productivity, reduce lead and cycle times, minimize inventory and waste, and collectively and ultimately increase and enhance organizational performance and business excellence. 3. To enhance students' knowledge and practical applications how to assure operational enhancement with a practitioner-oriented statistical analysis of processes. 4. To provide students with the methodology for sustaining operational enhancement through Statistical Process Control (SPC). This subject contributes to the following Intended Learning Outcomes for the following programme(s): MSc in Operations Management

	#2: Develop the specific operations management knowledge. [Note: In addition, students, who have completed and passed this subject, are eligible to apply for the professional qualifications and designations of 'Registered Leader in Business Development (RLBD)' and 'Registered Statistical Process Control Practitioner (RSPCP)' with Six Sigma Institute (Hong Kong) (SSI)].
Intended Learning Outcomes *(Note 1)*	Upon successful completion of this subject, students will be able to: a. Identify, diagnose, evaluate, and manage critical areas (constraints and bottlenecks that impede and hinder operational productivity, efficiency, and enhancement) within complex organizational processes and systems for operational enhancement. b. Formulate and execute strategies and tactics for leveraging operational enhancement to maximize throughput, optimize flow, and minimize inventory and waste. c. Comprehend and master Throughout Accounting to supplement conventional cost accounting to strengthen informed decision-making. d. Frame and deploy performance measurement metrics to measure, drive, control, and monitor operational enhancement to align with organizational objectives and performance. e. Recognize the challenges of production planning and control through implementing Drum-Buffer-Rope (DBR) method in manufacturing, service, project management, and supply chain management. f. Organize, manage, measure, and monitor supply chain to ensure orderly and timely flow of works, inventories, information, services, and liquidity throughout the supply chain network. g. Strengthen operational enhancement of single and multi-project management through Critical Chain Project Management to ensure projects are completed on time, within budget, and meet the required and expected deliverables. h. Comprehend the role and use of statistics in operations management and utilize statistical tools and methods for operational enhancement. i. Design and analyze SPC in both manufacturing and service sectors.
Subject Synopsis/ Indicative Syllabus *(Note 2)*	**Overview of Quality Management Approaches for Operational Enhancement**

	A. Recapitulation of Quality Management Approaches and Statistical Process Control Relating to Operational Enhancement • Quality management tools and techniques for operational enhancement and continuous improvement. • Statistical concepts in operational control and management. • Sampling distribution and statistical inference. • Statistical variations and their impact on operational efficiency and performance. **B. Process Variations and Statistical Process Control** Univariate and multivariate control chart; process capacity analysis; applications of control chart; principles of SPC implementation; SPC framework for measuring, monitoring, controlling, improving, and enhancing operational enhancement. **C. Key Issues of Operational Enhancement** Techniques for managing 'simple' and 'complex' operations; identification and elimination of blocking factors and critical areas (constraints and bottlenecks) in operations; five-step approach for ongoing operational enhancement; role and impacts of constraints and bottlenecks on operational efficiency and performance. **Application of Contemporary Quality Management Approaches and Applications for Operational Enhancement** • Fundamental knowledge and understanding of the traditional and contemporary quality management approaches and applications in the following five key areas: - V.A.T.I. plants' flow structures, - internal supply chain management and logistics, - throughput accounting and performance measurements, - approach to manage single and multi-projects, and - high-speed automated production lines. • Development of an effective plan for managing internal supply chain using Simplified-DBR and V.A.T.I. flow classification, including constraint and bottleneck identification, appropriate buffer management, understanding the differences between time and stock buffers, and establishing the necessary communication links. **Application of Operational Measures and Throughput Accounting for Operational Performance Measurement and Management** • Throughput Accounting to overcome the shortfalls of conventional cost accounting to leverage and optimize dramatic gains in the following five key areas: - increase market share and sales revenue, - reduce cycle or lead times, - improve value of quality (quality, cost/price and delivery),

	- minimize inventory, and - reduce operating and non-operating costs through mitigating hidden costs. • Strategic Business Measures and Operational Measures to drive and maximize operational enhancement for organizational performance and business excellence. **Utilization of Thinking Process to Facilitate Goal Achievement for Operational Enhancement** • Understanding and applications of the typical tools, namely current reality tree, future reality tree, negative branch reservation, prerequisite tree, and transition tree, which help identify, exploit, and alleviate constraints and bottlenecks for operational enhancement. • Optimal product mix for a simplified situation with a functioning constraint. **Managing Changes for Breakthrough Results** • Understanding the sequential layers of resistance to change that must be overcome to gain management buy-in for implementing system-based improvements. • Understanding and application of 'The Evaporating Cloud' for resolving system conflicts. • Understanding the role of "The Thinking Processes" and its application to analyse and resolve operational problems. • "The Strategy and Tactics Tree" for implementing business and operational strategies. **Contemporary Project Management – Strategy to Increase Project Success Rate from 66% to 95%** • Single specific project management according to the project management principles. • Activities in the critical chain, location, and sizing of necessary project and feeding buffers, and prediction of expected total project completion time. • How to manage multi-project without the need for a detailed plan, based on a provided scenario with data. **Emerging Technologies** Applications of emerging technologies in operational enhancement, in particular the deployment and employment of Artificial Intelligence (AI) in operations management; how AI helps reduction

	in inventory and cycle times due to setup time, scrap, and downtime; how AI increases productivity, capacity, profitability, and on-time delivery; LYNX Software and simulation exercises. **Real-world Case Studies** • Real-world case studies, which are provided by SSI, demonstrate the principles and techniques for operational enhancement can be successfully adopted in real-world commercial and business contexts. • Case Study 1 – Operational Strategies and Approaches for Enhancing Manufacturing Performance: A Manufacturing Firm in Hong Kong • Case Study 2 – Achieving Optimal Productivity by Leveraging Untapped Service Capacities: A Private Hospital in Hong Kong • Case Study 3 – Successful Completion of a Delayed Construction Project on Time and Within Budget: A High-speed Railway Station Project in Belgium • Case Study 4 – Innovative Synchronization in Demand-driven Supply Chain Management by Lululemon Students who have successfully completed and passed this subject are eligible to apply for exempting the specialized programmes in Supply Chain Management, Innovative Project Management, Throughput Accounting and Performance Management, Strategic and Tactic Formulation and Execution, and Innovative Operations Management with SSI.
Teaching/Learning Methodology *(Note 3)*	Lecture: Learn and comprehend academic concepts and practical applications of contemporary quality management approaches and practices aim at allowing students to acquire comprehensive and extensive understanding and knowledge of the core subject-matters as outlined in 'Subject Synopsis/Indicative Syllabus' of this subject, and then applying the acquired knowledge into real-world business and commercial contexts. To facilitate and reinforce students' learning and comprehension of the profound knowledge and diverse applications of contemporary quality management approaches, the subject utilizes a variety of interactive teaching and learning methods, which include extensive in-class group discussions and case studies, simulation games, and group exercises, supplemented by computer-aided simulation activities. In addition, videos are also provided to illustrate both the theoretical concepts and real-world examples. A plethora of real-world application examples are also introduced to provide and strengthen practical contexts of this subject as well. Students are also given the opportunity to showcase their understanding and application of the acquired knowledge through presentations of their evaluations and analyses of case studies and other related project assignments. The presentations are conducted in the forms of individual assignment and group assignment

presentation that collectively allow and enhance both individual and collaborative learning experiences of the students.

The statistical analysis methods in this module aim to develop students' knowledge for operational enhancement by managing and improving process variations in both manufacturing and service sectors. Theories and case studies are provided in the lectures to illustrate the concepts and applications of SPC. Students will learn how to use the renowned statistical software to apply analytical tools and techniques to real-world scenarios and business contexts.

Assessment Methods in Alignment with Intended Learning Outcomes

(Note 4)

Specific assessment methods/tasks	% weighting	Intended subject learning outcomes to be assessed (Please tick as appropriate)								
		a	b	c	d	e	f	g	h	i
1. Attendance and participation	5%									
2. Continuous Assessment – individual assignment	20%	✓	✓	✓	✓	✓	✓	✓	✓	✓
3. Continuous Assessment – group assignment presentation	25%	✓	✓	✓	✓	✓	✓	✓	✓	✓
4. Final Examination	50%	✓	✓	✓	✓	✓	✓	✓	✓	✓
Total	100%									

Explanation of the appropriateness of the assessment methods in assessing the intended learning outcomes:

The continuous assessment components and methods are designed to ensure that all students are able to deliver the above-mentioned intended learning outcomes and objectives upon completion of this subject. Specifically,

- The attendance and participate shall encourage students to attend classes and to actively participate in interactive teaching and learning methods as provided in ‘Teaching/Learning Methodology’ above.

- The individual assignment and group assignment presentation are designed and utilized to enable students to enhance their knowledge and application skills to achieve the intended subject learning outcomes of a – i.

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- The group assignment presentation serves as the evidence and foundation for applying the professional qualification and designation of 'Registered Leader in Business Development (RLBD)' and 'Registered Statistical Process Control Practitioner (RSPCP)' with SSI.

- The final examination is designed to assess and evaluate the overall abilities of the students to master and comprehend the acquired knowledge and practical applications of what have been learned from this subject and to collectively attain the intended subject learning outcomes of a – i.

- 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.

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<tr><td rowspan="6">Student Study Effort Expected</td><td colspan="2">Class contact:</td></tr>
<tr><td>• Lectures/tutorials (if any)</td><td>39 Hrs.</td></tr>
<tr><td colspan="2">Other student study effort:</td></tr>
<tr><td>• Self-study and preparation of coursework (in individual assignment and group assignment presentation)</td><td>43 Hrs.</td></tr>
<tr><td>• Preparation of Final Examination</td><td>44 Hrs.</td></tr>
<tr><td>Total student study effort</td><td>126 Hrs.</td></tr>
<tr><td>Reading List and References</td><td colspan="2">

<u>Reference Books:</u>

General:

- Sproull, B. (2019). Lean and Six Sigma improvement methodology making the case for integration. Routledge, N.Y.: Productivity Press.
- Cox III, J.F., Boyd, L.H., Sullivan, T.T., Reid, R.A. & Cartier, B. (2012). The theory of constraints international certification organization dictionary. 2nd edition.
- Cox III, J.F. & Schleier, J.G. (2010). Theory of constraints handbook. New York: McGraw-Hill.
- Goldratt, E. M. (1990). What is this thing called theory of constraints and how should it be implemented? Croton-on-Hudson, NY: North River Press.

Performance measurement/accounting:

- Masud, A.S.M. (2022). A manager's guide for better decision-making easy to apply tools and techniques. 1st Edition, CRC Press, Boca Raton.
- Moore, J. G. (2021), Theory of Constraints Economics, Reality, Freedom and Progress, Editorial JGGM.
- Lang, L. (2007). Maximizing profitability: The theory of constraints approach to maximizing profits. Throughput Publishing (workbook plus CD).
- Caspari, J.A. & Caspari, P. (2004), Management dynamics: Merging constraints accounting to drive improvement. Hoboken, N.J.: John Wiley.

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- Smith, D. (2000). Measurement nightmare: How the theory of constraints can resolve conflicting strategies, policies, and measures. Boca Raton, Fla.: St. Lucie Press.
- Corbett, T. (1999). Throughput accounting. The North River Press.
- Lockamy, A. & Cox, J.F. (1994). Reengineering performance measures: How to align systems to improve processes, products, and profits. Irwin, Burr Ridge, IL.

Supply chain solutions:

- Fotiadis, T., Folinas, D., Vasileiou, K. & Konstantoglou, A. (2022). Marketing and the customer value chain integrating marketing and supply chain management. Abingdon, Oxon; N.Y.: Routledge.
- Schragenheim, E., Camp, H. & Surace, R. (2019). Throughput economics making good management decision. Routledge, N.Y.: Productivity Press.
- Schragenheim, E., Dettmer, H.W. & Patterson, J.W. (2009), Supply chain Management at warp speed: Integrating the system from end to end. Auerbach Publications, N.Y.
- Ptak, C. & Schragenheim, E. (2004), ERP: Tools, techniques and applications for integrating the supply chain, 2nd Edition, CRC Press, Boca Raton.
- Goldratt, E.M., Schragenheim, E. & Ptak, C.A. (2000). Necessary but not sufficient, North River Press.
- Schragenheim, E. & Dettmer, H.W. (2000), Manufacturing at warp speed: Optimizing supply chain financial performance, Boca Raton: St. Lucie Press.

Manufacture and logistics solutions:

- Srinivasan, M.M. (2022). Building lean supply chains with the theory of constraints. New York : McGraw-Hill.
- Richards, G. & Grinsted, S. (2020). The logistics and supply chain toolkit over 100 tools for transport, warehousing and inventory management. London : Kogan Page.
- Cohen, O. (2010). Ever improve: A guide to managing production the TOC way. 2nd Edition, Tallinn, Estonia.
- Stein, R.E. (2003). Re-engineering the manufacturing system: Applying the theory of constraints. 2nd Edition, New York, Basel : Marcel Dekker.
- Goldratt, E.M. & Cox, J. (1992). The goal: A process of ongoing improvement. Minneapolis, Minn.: HighBridge Audio.
- Goldratt, E.M. & Cox, J. (1984). The goal: Excellence in manufacturing. North River Press.

Project management:

- Nielsen, K. (2021). Agile portfolio management: A guide to the methodology and its successful implementation knowledge that sets you apart. Milton : Productivity Press.
- Newbold, R.C. (2008). The billion dollar solution: Secrets of ProChain project management. Lake Ridge, VA: ProChain Press.
- Leach, L.P. (2005), Critical chain project management. 2nd Edition, Artech House, Boston.
- Kendall, G.I. & Rollins, S.C. (2003), Advanced product portfolio management and the PMO: Multiplying ROI at warp speed. J. Ross Publishing Inc.

	• Goldratt, E.M. (1997). Critical chain project management. North River Press. **Thinking processes:** • Dettmer, H.W. (2007). The logical thinking process: A systems approach to complex problem solving. Milwaukee: ASQ Quality Press. • Dettmer, H. W. (1998). Breaking the constraints to world-class performance, Breaking the constraints to world-class performance, ASQC Quality Press. • Goldratt, E.M. (1994). It's not luck. Great Barrington, Mass.: North River Press. • Bauer J.M., Vargas, A., Sellitto, M.A., Souza, M.C. & Vaccaro, G.L. (2019). The thinking process of the theory of constraints applied to public healthcare. *Business Process Management Journal*, 25(7), p. 1543-156. https://doi.org/10.1108/BPMJ-06-2016-0118. **Statistical Analysis and Control:** • Harold, A.C. (the latest edition). Quality inspired management: The key to sustainability. Upper Saddle River, N.J.: Prentice Hall. • George, M.L. (the latest edition). Lean Six Sigma for Service: How to Use Lean Speed and Six Sigma Quality to improve Services and Transactions, New York: McGraw-Hill. • Fuchs, C, & Kenett, R.S. (the latest edition). Multivariate quality control: Theory and applications, New York: M. Dekker. • DeVor, R.E., Chang, T.H., & Sutherland, J.W. (the latest edition). Statistical quality design and control: Contemporary concepts and methods, Upper Saddle River, NJ: Pearson/Prentice Hall. **<u>Relevant Academic Journals:</u>** • European Journal of Operational Research • International Journal of Operations and Production Management *** • International Journal of Production Economics • International Journal of Production Research *** • International Journal of Productivity and Quality Management • International Journal of Project Management • Journal of Operations Management • Production and Operations Management

<u>Note 1: Intended Learning Outcomes</u>
Intended learning outcomes should state what students should be able to do or attain upon subject completion. Subject outcomes are expected to contribute to the attainment of the overall programme outcomes.

<u>Note 2: Subject Synopsis/Indicative Syllabus</u>
The syllabus should adequately address the intended learning outcomes. At the same time, overcrowding of the syllabus should be avoided.

<u>Note 3: Teaching/Learning Methodology</u>
This section should include a brief description of the teaching and learning methods to be employed to facilitate learning, and a justification of how the methods are aligned with the intended learning outcomes of the subject.

<u>Note 4: Assessment Method</u>
This section should include the assessment method(s) to be used and its relative weighting, and indicate which of the subject intended learning outcomes that each method is intended to assess. It should also provide a brief explanation of the appropriateness of the assessment methods in assessing the intended learning outcomes.