Module 2: Technology and Innovation

Module title			
Technology and Innovation			
Module NFQ level	**Module number / reference**	**ECTS Value**	**Duration**
9	MSC-PBM-TI	10	12 Weeks
Parent programme(s)		**Stage of parent programme**	**Semester No.**
Master of Science in Pharmaceutical Business Management		1	1 or 2
Postgraduate Diploma in Science in Pharmaceutical Business Management		1	1 or 2
Certificate in Pharmaceutical Business Management		1	1 or 2
Teaching and Learning modes	**Proportion** (% of Total Directed Learning)		
Classroom / Face to Face	80%		
Workplace			
Online			
Other (Identify)	Blended: 20%		
Entry requirements (statement of knowledge, skill and competence)			
Learners should normally hold an honours (NFQ Level 8) degree in a cognate or non-cognate discipline or equivalent qualification, from an approved tertiary/or professional institution.			
Maximum number of learners per instance of the module	100		
Average (over the duration of the module) of the contact hours per week	3		
Pre-requisite module title(s) (if any)			
Co-requisite module title(s) (if any)	N/A		
Is this a capstone module? (Yes or No)	No		
Module-specific physical resources and support required per centre (or instance of the module)			
Lecture room with internet access, audio-visual equipment and white board. Moodle Area.			
Specification of the qualifications (academic, pedagogical and professional/occupational) and experience required of staff working in this module.			
Role e.g. Tutor, Mentor etc	**Qualifications & experience required:**		**# of Staff with this profile (WTEs)**
Lecturer	Lecturing staff are required to hold at least a master's degree in a related discipline and/or an equivalent professional qualification. Industry experience is beneficial but not a requirement. Ideally, they would also hold a third level teaching qualification (e.g. the Griffith College Certificate in Education, Learning and Development).		0.4

Analysis of required learning effort		
***Effort while in contact with staff**	**Minimum ratio teacher / learner**	**Hours**
Classroom and demonstrations	1:100	60
Mentoring and small-group teaching	1:20	12
Other (specify)		
Independent Learning		
Directed e-learning (hours)		-12
Independent Learning (hours)		178
Other hours (specify)		-
Work-based learning hours of learning effort		-
Total Effort (hours)		250

Allocation of Marks					
	Continuous Assessment	**Supervised Project**	**Proctored Practical Exam**	**Proctored Written Exam**	**Total**
Percentage Contribution	50%	-	-	50%	**100%**

1.1.1 Module aims and objectives

The primary purpose of the module is to explore the principles and enablers to drive continuous improvement in the global Pharmaceutical and Biotechnology industry. This module aims to introduce learners to the general subject of business transformation through continuous improvement and innovation as applied in the industry. A business transformation framework is a fundamental aspect of the module and its application is demonstrated to the learner through exposure to recognised industrial continuous improvement including problem-solving methodologies and management tools and techniques.

This module demonstrates the relevance of continuous improvement in industry today and identifies key elements in which learners can apply as leaders to transform their business. This module aims to:

- Demonstrate the role which continuous improvement and business transformation play in global pharmaceutical and biotechnology organisations.
- Enable learners to review their current improvement processes and change management approach; identify ways to integrate process applications and technology; and create or contribute to an environment that supports innovation and human performance excellence.
- Investigate how managers and leaders can review their program management structure; consider how to effectively create and communicate program objectives; techniques to aid stakeholder Management and Program Risk Management.

1.1.2 Minimum intended module learning outcomes

On successful completion of this module the learner will be able to:

MIMLO 2.1 Expertly apply the concepts of lean 6σ to pharmaceutical business management.
MIMLO 2.2 Critically appraise the benefits and impact of lean 6σ, 5S on global pharmaceutical and biotechnology organisations.
MIMLO 2.3 Critique the use of the DMAIC methodology and a continuous improvement toolbox within management of the pharmaceutical organisation.
MIMLO 2.4 Distinguish between Programme Management and Project Management and evaluate their importance with Business Transformation.
MIMLO 2.5 Evaluate the importance of strategy planning and understand the key elements of the Hoshin Planning process.

MIMLO 2.6 Critically assess the role of Change Management and Human Performance Excellence in enabling business transformation and delivering continuous improvement.

MIMLO 2.7 Evaluate how innovative applications and technology benefit organisations and contribute to continuous improvement business strategies.

MIMLO 2.8 Evaluate and debate the role of business transformation in delivering high performing, integrated, innovative organisations.

1.1.3 Rationale for inclusion of the module in the programme and its contribution to the overall MIPLOs

The global Pharmaceutical and Biotechnology industries are high-tech, highly competitive, industries subject to almost continual change. The primary purpose of the module is to explore the principles and enablers to drive continuous improvement in the global Pharmaceutical and Biotechnology industry. This module aims to introduce learners to the general subject of business transformation through continuous improvement and innovation as applied in the pharmaceutical and biotechnology industry. It provides an industry specific skill-set that is crucial to the programme and the success of its graduates.

In this context, this module supports the achievement of the following MIPLOs (per each award):

Programme Title	MIPLOs achieved
MSc in Pharmaceutical Business Management	(i), (ii), (v), (vii), (viii), (x)
PgDip in Science in Pharmaceutical Business Management	(i), (ii), (iv), (vi) to (viii)
Certificate in Pharmaceutical Business Management	(i), (ii), (iv) to (vii)

1.1.4 Information provided to learners about the module

This module aims to introduce learners to the general subjects of business transformation and continuous improvement, and to improve learner knowledge and understanding of these subjects. It examines concepts, theories, and practices around these and the application of these to real 'life' situations which are relevant to learners now and in their future working lives.

The module draws on material from a variety of sources – academic works, case studies, documentaries, etc., to achieve a multi-layered scaffolded approach to developing an understanding of leading change projects in modern organisations. Learners are also supported with resources including, lecture notes and reading materials as well as a detailed module curriculum which includes the module learning outcomes, a class schedule, the necessary reading material and the assignment strategy. Participants also have access to Moodle, the College's Virtual Learning Environment (VLE).

1.1.5 Module content, organisation and structure

<u>Module Curriculum</u>

- **Lean 6σ Methodologies**
  - The role of business transformation in delivering high performance, integrated, innovative organisation
  - Understand the Definitions and concepts of lean and 6σ
  - Lean & 6 Sigma Principles & structures
  - Lean 6 Sigma Tools
  - The benefits of 6σ and impact of lean 6σ on global pharmaceutical & biotechnology organisations

- **DMAIC Methodology with Statistics**
  - DMAIC Methodology
  - DMAIC toolbox
  - Introduction to statistics
  - Multi Vari Charts
  - Statistical Process Control
  - Variable and attribute control charts
  - Introduction to Design of Experiments

- **Human Performance Excellence**
  - Human Error theory & models
  - Analysing human factors as part of systematic investigation process
  - Human Error Prevention Strategies & Hierarchy
  - Benefits of Human Performance excellence to an organisation
  - Regulatory expectations regarding human error elimination

- **People & Change**
  - Understanding change from the human perspective
  - Understanding the management required for change
  - Change management model and frameworks to enable Business Transformation

- **Project / Programme Management**
  - Programme Management vs Project Management – understanding the elements of both and roles within
  - Project life cycle management
  - Project management tools and techniques

- **Strategy Execution**
  - Understanding strategic planning and strategy execution for continuous improvement
  - Deploying the hoshin strategic planning process to enable business transformation
  - Cascading Objectives & Shortlisting Projects
  - The benefits of strategy alignment for C suite to shopfloor

- **Innovation and Technology**
  - Types of Innovation
  - Innovation enabling business and product transformation
  - The impact of innovation with the product life cycle and the value chain
  - The current innovation trends within the pharmaceutical industry
  - Digital transformation and Industry 4.0
  - The importance of Knowledge Management

- **Assignment Workshop**
  - Review activities introduced in Lectures 1 – 6
  - Relate theoretical concepts to practice.
  - Assess the case study.

Indicative Teaching Plan

Week 1	Lean 6 Sigma Overview
Week 2	Lean & 6 Sigma tools
Week 3	DMAIC
Week 4	Statistics & Human performance
Week 5	Change & Change Management Strategies
Week 6	Hoshin Planning
Week 7	Assignment workshop
Week 8	Project & Programme management
Week 9	Innovation in Pharmaceutical Industry
Week 10	Innovation & Technology
Week 11	Knowledge management
Week 12	Knowledge management

Subject to change Assignment workshop

1.1.6 Module teaching and learning (including formative assessment) strategy

Along with a clear statement on the relevant learning objectives and expectations at the beginning of each topic, learners are directed to the range of relevant materials to support the deepening of their learning experience and knowledge of the topic. The module is delivered through a mixture of lectures, workshops, case studies, group discussions (lecturer-led inside class and independently by learner groups outside class), online readings and activities, group-research, and self-directed reflective development. Lectures cover the fundamentals of each topic and include contemporary perspectives on different topics with a view to encouraging a critical and constructive approach to existing and new ideas. In-class teamwork, group, and whole-class activities and discussions reinforce key learning points. In-class and take-home activities, coupled with personal research, help learners to 'build' the case study required for their continuous assessment assignment.

1.1.7 Work-based learning and practice-placement

There is no work based learning or practical placement in the module.

1.1.8 E-learning

Griffith College uses Moodle, a virtual learning environment, to support its delivery of e-learning activities in the form of peer-to-peer support based around activities where learners give and receive feedback, forums where learners must contribute, formative quizzes and video links.

1.1.9 Module physical resource requirements

A classroom setting is used for the onsite & virtual delivery of the module through a series of 10-12 lectures including assignment and assessment workshops. Supports for learners include course material, lecture notes, activities, short, self-administered questionnaires, case studies and related assessment tasks. These are supplemented with a module set book and online reading materials, PowerPoint presentations, and other activities using Moodle, the College's Virtual Learning Environment (VLE) provide additional support materials to help with self-study.

1.1.10 Reading lists and other information resources

Core Reference Materials

Gassmann, O., Schuhmacher, A., von Zedtwitz, M. and Reepmeyer, G. (2019) *Leading Pharmaceutical Innovation: How to Win the Life Science Race*. 3rd Edition. Berlin: Springer.

Secondary reading and eResources

Goodman, E. and Riddell, J. (2014) *Knowledge Management in the Pharmaceutical Industry*. Surrey: Gower.

Harpum, P. ed. (2010) *Portfolio, Program, and Project Management in the Pharmaceutical and Biotechnology Industries*. N.J: Wiley-Blackwell.

Jungmittag, A., Reger, G. and Reiss, T. (2011) *Changing Innovation in the Pharmaceutical Industry: Globalization and New Ways of Drug Development*. London: Springer.

Nunnally, B.K. and McConnell, J.S. (2007) *Six Sigma in the Pharmaceutical Industry: Understanding, Reducing, and Controlling Variation in Pharmaceuticals and Biologics*. Boca Raton: CRC Press.

Wheelen, T.L., Hunger, D.J, Hoffman, A.N. and Bamford, C.E. (2017) *Strategic Management and Business Policy: Globalization, Innovation and Sustainability, Global Edition*. 15th edition. Harlow, England: Pearson.

Journals:

Total Quality Management & Business Excellence,
International Journal of Innovation Management

eResources

https://www.linkedin.com/learning/

1.1.11 Specifications for module staffing requirements

Lecturer and other personnel should hold a Masters Level (Level 9) qualification in Business, Engineering, Management or Leadership and have at least 2 years' relevant experience.

Ideally, they would also hold a third level teaching qualification (e.g. the Griffith College Certificate in Education, Learning and Development).

1.1.12 Module summative assessment strategy

This module demonstrates the relevance of continuous improvement; and identifies key elements in which learners can apply as leaders to transform their business. Lecturers cover key concepts of continuous improvement as applied in the pharmaceutical & biotechnology industry. These lectures provide information and background that help learners to make sense of the continuous improvement subject matter and toolkit. The assignment workshop helps learners to complete the continuous assessment element of the module. This assignment is worth 50% of the overall mark. An end of semester examination accounts for the remaining marks on this module.

No.	Weighting	Type	Description	Learning outcomes assessed
1	50%	Written report	Case study-based assessment Learners are required to work on a 50% weighted assignment. This is a Work Based Activity (WBA) which requires learners to identify areas of Continuous Improvement and develop a comprehensive written plan to deploy the tools in a case study organisation, their own workplace or a context in which they play to work in the future.	1-8
2	50%	Written Exam	End of semester examination Learners sit an end of semester examination which contributes 50% towards their final mark for this module. The exam paper focuses on the concepts of lean 6σ, DMAIC, Hoshin Planning, Change Management and Innovation.	1-8

Reassessment/Repeat assessment strategy: Griffith College regulations state that learners must pass all component elements of the module to be deemed to have passed the module.

- In the event of a learner failing components of / this module, they will be required to submit a new individual repeat assignment which will be made available on Moodle to learners, and which must be submitted as per faculty instructions.
- In the event of a learner failing the group assessment element of this module, a new individual repeat assignment will be made available on Moodle to learners which must be submitted as per faculty instructions.

In the event of the learner failing the exam, learners will take the re-sit exam at the next available sitting, details of which will be made available to learners via Moodle.