6.8 Data Analytics Project

6.8.1 Headline information about the module

Module title	Data Analytics Project
Module NFQ level (only if an NFQ level can be demonstrated)	9
Module number/reference	M8
Parent programme(s) the plural arises if there are embedded programmes to be validated.	MSc in Data Analytics
Stage of parent programme	AWARD
Semester (semester1/semester2 if applicable)	3
Module credit units (FET/HET/ECTS)	ECTS
Module credit number of units	30
List the teaching and learning modes	Full time & Part time blended learning
Entry requirements (statement of knowledge, skill and competence)	This is a capstone module that can only be attempted provided the learner has successfully completed all the taught modules or acquired exemptions through advanced entry.
Pre-requisite module titles	
Co-requisite module titles	none
Is this a capstone module? (Yes or No)	Yes
Specification of the qualifications (academic, pedagogical and professional/occupational) and experience required of staff (staff includes workplace personnel who are responsible for learners such as apprentices, trainees and learners in clinical placements)	Academic and Professional: PhD desirable and a minimum of an MSc is required. However, in exceptional cases, NFQ Level 8 in Data Analytics, Computer Science, Software Development, Software Engineering or equivalent may be acceptable when combined with significant industrial experience. Pedagogical: Teaching experience is desired. Completion of postgraduate CPD/Certificate in Teaching and Learning or similar preferred. Experience in blended learning delivery required. In absence of experience, training will be mandatory and will be provided.
Maximum number of learners per centre (or instance of the module)	120
Duration of the module	1 semester full-time 1 semester part-time
Average (over the duration of the module) of the contact hours per week (see * below)	Learning will be delivered through a combination of synchronous and asynchronous learning, with 30 hours dedicated to directed e-learning activities (which includes live online classes), 10 hours (minimum) dedicated to face to face and 20 hours of other types of contact hours which can be used flexibly as face to face or online to be determined by the pedagogy, needs of the cohort and the particular activity.

Module-specific physical resources and support required per centre (or instance of the module)	Physical resource requirements are 1 laptop or PC/workstation per student. On campus and online resources as per programme specification.

Analysis of required learning effort									
*Effort while in contact with staff									
On campus Lecture / Classroom demonstrations		Mentoring and small-group tutoring		Other (Reflective development, group work)		Online classes & Directed e-learning (hours)	Independent learning (hours)	Other hours (specify)	Work-based learning hours of learning effort	Total effort (hours)
Hours	Minimum ratio teacher/learner	Hours	Minimum ratio teacher/learner	Hours	Minimum ratio teacher/learner					
10	1:60	30	1:5	30	1:60	48	500	N/A	N/A	750

Allocation of marks (within the module)						
	Continuous assessment	Supervised project	Proctored practical examination	Proctored written examination	Total
Percentage contribution	100%				100%

6.8.2 Module aims and objectives

1. To give the students the opportunity to coalesce their knowledge from the taught elements of the programme into a coherent real-world project supplied by our industry partners.

2. To facilitate the investigation and integration of insights gained throughout the course of study and disseminate these findings to diverse audiences.

3. To facilitate the formation of a personalised world view of the students own learning through the use of reflective techniques to identify skill and knowledge gaps and to actively seek out new knowledge to enhance their contribution to both their own professional development and self-efficacy.

6.8.3 Minimum intended module learning outcomes

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

1. Critique, select and justify a suitable research methodology for a specific research enquiry. (Linked to PLO7, PLO8)
2. Proactively plan and implement self-directed learning to further knowledge and understanding to Integrate holistic theoretical knowledge obtained from previous modules in the MSc programme, and the application of theory to practice to a specific research enquiry. (Linked to PLO1, PLO 7, PLO 8)

3	Develop a detailed project proposal, including an initial literature review, project scheduling techniques and perform a resource and risk analysis, synthesizing and incorporating technical knowledge and insight gained through the course of study. Use various best practice approaches and be able to coherently articulate and defend this research and development work to peers and appraise feedback received. (Linked to PLO 4, PLO 6)
4	Design and build a working artefact using various systems design, analysis approaches and related systems development methodologies, while acting autonomously and thinking independently through the iterative design and development process. (Linked to PLO2, PLO3, PLO 7)
5	Author a coherent research project document outlining the research progress and decisions made through critical reflection, feedback and analysis. (Linked to PLO5)
6	Evaluate ethical and legal issues, and diversity and multiculturalism of the chosen data driven project with a view toward a real-world application. (Linked to PLO1)
7	Confidently present the results of the project in a succinct, efficient manner and show how the artefact was planned, developed, and managed referencing areas for improvement and further development. (Linked to PLO8)

6.8.4 Rationale for inclusion of the module in the programme and its contribution to the overall IPLOs

This module deals with the application of knowledge gained in the taught modules of the course in a structured environment, while allowing the learner the freedom to engage with a specialist area of particular interest. The module also deals with Project management tools and theory as well as the practical implementation of these tools to formulate, plan and deliver on a chosen area of research and application.

6.8.5 Information provided to learners about the module

This module specification is replicated in the programme handbook and made available on Moodle.

This information is further supplemented by information given to learners at induction as an overview of the module.

6.8.6 Module content, organisation and structure

Syllabus Content

Reflective Learning
   • Continuous Learning, Reflection-in-action (Gibbs, Schön)
   • Critical Thinking – Reflective Journal Writing

Project Management
   • Project Planning (CRISP DM, PMBOK, PRINCE2)
   • Software Development Methodologies
   • Project Costing and ROI analysis
   • Resource Management
   • Total Quality Management
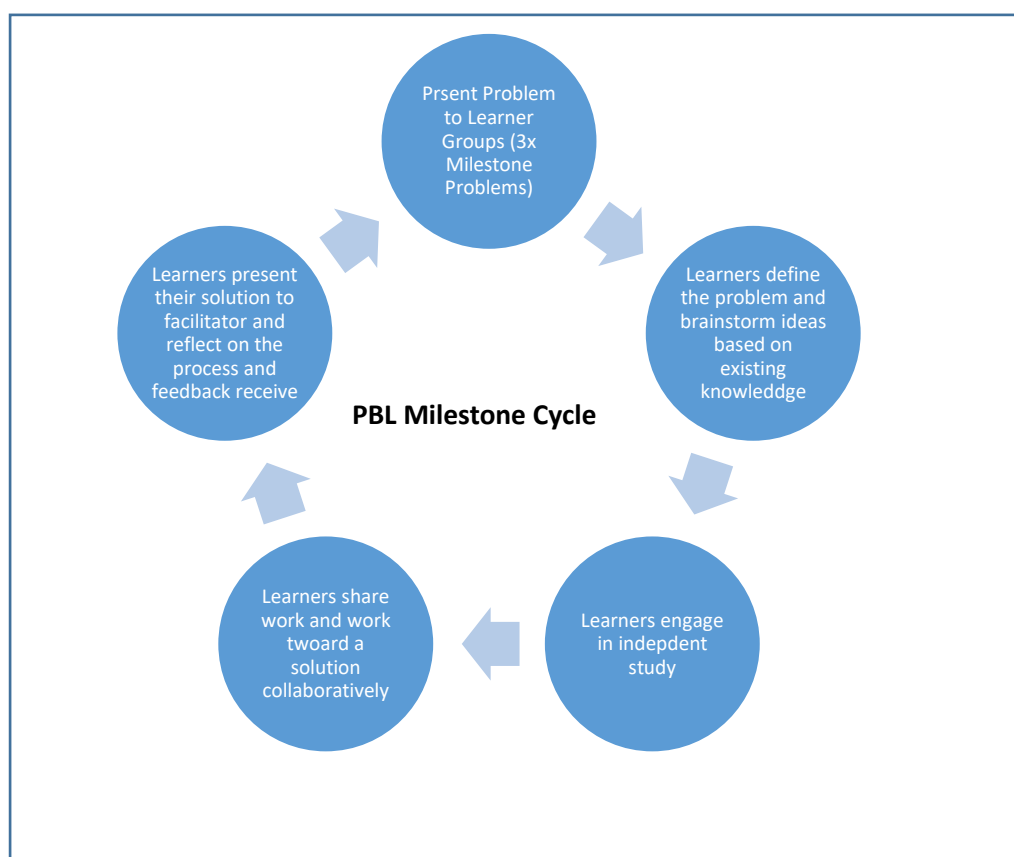   • Commercialisation

6.8.7 Module teaching and learning (including formative assessment) strategy

To provide formative assessment for this module the learner will:

• Be provided an opportunity at the beginning of each week to engage in group discussion on the material covered the previous week, thereby allowing reflection and ensuring their competency

- Complete student-suggested tasks in a peer learning environment to encourage collaboration and allow learners to self-evaluate their current knowledge while gaining new knowledge and insights (this strategy links directly to PLO 7, PLO 8)

- Join additional discussions covering any lab-based exercises which have been provided to the learner. In addition to the above formative processes that exist in all modules, this Capstone module is underpinned through a group-based Problem Based Learning (PBL) approach. The PBL approach fosters group collaboration and reflection in which pointed discussions are held in scheduled weekly sessions to allow for formative feedback throughout the programme. PBL requires group formation with roles and responsibilities and these roles will be shared, swapped and developed as the learners explore the problem under investigation, this ensures all leaners have the opportunity to act out a number of roles typically found within industry formed teams, such as team player and team leader and project manager. A structured PBL approach will be used, this will require groups to work the problem through a number of problem stages with each stage output informing the next, similar to the process of action research. This process allows learner groups investigate and develop solutions that will vary across the cohort furthering the learning of the class as a whole. The final stage of the PBL project will require the learner groups to present their solution in the form of a Poster Presentation and demonstration. Industry representatives will also be invited to witness these presentations informally at the end of the module furthering the formative feedback nature of the programme. The programme PBL milestone cycle is presented below:

PBL Milestone Cycle

PBL Milestone Cycle

Circle diagram nodes:
- Prsent Problem to Learner Groups (3x Milestone Problems)
- Learners define the problem and brainstorm ideas based on existing knowleddge
- Learners engage in indepdent study
- Learners share work and work tic tic tic toward a solution collaboratively
- Learners present their solution to facilitator and reflect on the process and feedback receive

Online and on campus learning activities according to learning type.

Learning Type	Online activities	On campus activities
Knowledge Acquisition	• Pre-recorded presentations / demonstrations • Multi-media text-based materials • Videos	• Face to face lecturers • Practical Demonstrations

	• Guest speakers • Open ed resources	
Collaboration	• Group projects • Discussion forums • Virtual classroom peer learning • Team virtual lab activities • Group presentations	• Group projects • Group presentations
Discussion	• Discussion forums (synchronous and asynchronous) • Zoom breakout room discussions • Online tutorials • Project supervision • Webinars (industry experts) • Reflective activities	• Class discussion • Project supervision • Face to face lab / practical activities
Investigation	• Open ed resources • Project research • Information and data sourcing, analysis and evaluation • Flipped Learning	• Text / data sourcing and analysis
Practice	• Case studies • Analysis of data sets • Presentations • Online quizzes / MCQs	• Practical workshops • Group work
Production	• E-portfolio • Reflective journal • Assessment outputs • Case studies • GitHub records	• Case studies • Final Project • Student demonstration

6.8.8 Work-based learning and practice-placement

Not Applicable

6.8.9 E-learning

Collaborative blended learning strategies will be utilised for this module to ensure peer learning can be experienced not only through face-to-face traditional learning but also through online approaches as indicated in the table in 7.1.7. This integrated learning approach ensures learning can be both reflective and collaborative while developing the efficacy of the individual student as the module progresses.

6.8.10 Module physical resource requirements

Physical resource requirements are 1 laptop or PC/workstation per student. Student are required to provide their own laptop to fully engage with the programme. Opensource software is used.

6.8.11 Reading lists and other information resources

Books and eBooks
Betz, F. (2016) *Strategic Thinking: A Comprehensive Guide*. London: Emerald Group Publishing Ltd.
Database: eBook Business Collection (EBSCO)
Chevallier, A (2016) *Strategic Thinking in Complex Problem Solving*. New York: Oxford University Press.
ISBN: 9780190463908

Grundy, T. (2014) *Demystifying Strategic Thinking: Lessons from Leading CEOs*. London: Kogan Page.
Database: ebook Business Collection (EBSCO)
Kerzner, H. (2017) *Project Management: A Systems Approach to Planning, Scheduling and Controlling* 12th edn. London: Wiley ISBN :9781119165354
Sloan, J. (2019) *Learning to Think Strategically* London: Routledge ISBN: 9780367141462

6.8.12 Module summative assessment strategy

The principal assessment will be a group project that spans the semester and integrates knowledge and skills from all modules within the course of study. The assessment will utilise Problem Based Learning. Learners will work in groups to research and address a real-world or industry informed data centric problem.

The groups will be formed through several formation techniques depending on the cohort and context, for example, randomisation, prior knowledge and experience or self-selection. The group size will be typically between 3 to 4 members.

The problem to be investigated will be broken down into three supplied Problem Milestones. This process ensures learners are working towards deadlines and facilitates guidance as new learning and knowledge is acquired as the curriculum progresses. The structure of the PBL project in phases is expressed in the below:

Phase	Description	Learner Activity
Phase 1	Overarching Problem Expressed, with Problem Milestone 1 presented	Learner groups are formed, and groups begin reflecting on the overarching problem and initially express their understanding and concerns. Learner groups work towards the development of a solution to milestone 1.
Phase 2	Problem Milestone 2 presented to learners	Learner groups use the output of Problem Milestone 1 to inform the planning for Problem Milestone 2. Learner groups now work towards the development of a solution for Phase 3.
Phase 3	Solution Presentation to Problem under investigation	Learner groups summarise their findings from Phase 1 and 2 and present their proposed solution to address the problem as a whole.

Summary of Assessed Deliverables and Timeline:

Phase	Deliverables	Description	% Weighting	
			Individual Contribution	Group Contribution
Week 3 Phase 1	Problem Milestone Plan 1	Learner groups will put forward a project plan with roles and responsibilities to address Problem Milestone 1	n/a	5%
	Individual Weekly Reflection	Each learner will be required to complete a weekly reflection-in-action journal entry	5%	n/a
	Group Reflection Report	The group will be required to complete an end of milestone summary reflection report	n/a	5%
	Problem Milestone 1 Output Report	The group will produce their solution to Problem Milestone 1	5%	5%
Phase 1 Total Marks			**10%**	**15%**
Week 8 Phase 2	Problem Milestone Plan 2	Learner groups will reflect on their Problem Milestone 1 Output report and put forward a project plan with roles and responsibilities to address Problem Milestone 2	n/a	5%
	Individual Weekly Reflection	Each learner will be required to complete a weekly reflection-in-action journal entry	5%	n/a
	Group Reflection Report	The group will be required to complete an end of milestone summary reflection report	n/a	5%
	Problem Milestone 2 Output Report	The group will produce their solution to Problem Milestone 2	10%	5%
Phase 2 Total Marks			**15%**	**15%**
Week 12 Phase 3	Problem Solution Report	Learner groups will produce a summary report to merge their key findings from Problem Milestone 1 and 2.	5%	20%

	Solution Poster	Learner groups will create a Poster Presentation to succulently capture their staged approach to addressing the overarching project problem and proposed solution.	n/a	5%
	Solution Peer Presentation	Learner groups will present their poster and results/findings/artefact to their peers and facilitators in a conference style event.	10%	5%
Phase 3 Total Marks			**15%**	**30%**
Total Individual and Group Marks*			**40%**	**60%**

*The group contribution mark issued reflects the individual contribution to the groups functioning and output as a whole, such as collaborative tasks, team integration and communication and cohesiveness. Their ability to work in a group is what is being assessed within the group component mark thus each individual within a group will be assigned an individual mark.

Assessment	Online Assessment	On Campus Assessment
Knowledge Acquisition	• Pre-recorded presentations / demonstrations	• Live presentations / demonstrations
Collaboration	• Group projects • Team virtual lab activities • Group pre-recorded presentations / demonstrations	• Team lab activities • Group presentations / demonstrations
Formative	• Project (individual & group) supervision • Reflective activities	• Project (individual & group) supervision
Investigation	• Theoretical and practical project research • Problem Based Learning • Case Study Analysis	• Problem Based Learning
Practical	• Virtual lab • Analysis of data sets • Online quizzes / MCQs • Technical tasks (individual and group)	• Lab • Analysis of data sets • Technical tasks (individual and group)
Production	• Artefacts • Student code repository records	• Artefacts • Student code repository records

Mapping of summative and formative assessment: MIMLO to MIPLO

A ✓ indicates that the PLO has been formatively assessed as per the teaching and learning strategy for the programme	Module Learning Outcomes					Programme Learning Outcomes							
	1	2	3	4	5	1	2	3	4	5	6	7	8
Summative Assessment	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

6.8.13 Sample assessment materials

Sample problems to be investigated for the PBL assessment will be generated through dialogue with relevant programme faculty and consultation with our Industry Engagement Forum. Examples will be provided to the panel.