Module specification

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Module Code	BUS7E3
Module Title	Linear Programming and Time Series Prediction
Level	7
Credit value	20
Faculty	Social and Life Sciences
HECoS Code	100085
Cost Code	GABP

Programmes in which module to be offered

Programme title	Is the module core or option for this programme
MSc International Business and Supply Chain Management	Core pathway
MSc International Business and Supply Chain Management with Advanced Practice	Core pathway

Pre-requisites

None

Breakdown of module hours

Learning and teaching hours	20 hrs
Placement tutor support	0 hrs
Supervised learning e.g. practical classes, workshops	0 hrs
Project supervision (level 6 projects and dissertation modules only)	0 hrs
Total active learning and teaching hours	**20** hrs
Placement / work based learning	0 hrs
Guided independent study	180 hrs
Module duration (total hours)	200 hrs

For office use only	
Initial approval date	8th August 2022
With effect from date	January 2023
Date and details of revision	
Version number	1

Module aims

The aim of this module is to equip students with the fundamental Linear Programming (LP) simulation and modelling techniques required to solve managerial problems and optimise any Supply Chain (SC) decisions. All SC and manufacturing problems can be solved by using LP because all solutions are geared to maximizing profits (subject to the variable costs of the company) or minimizing costs (subject to availability of logistic modes). Other commercial examples are finding the shortest delivery modes and estimating the most efficient routes for delivery companies and postal services. LP has also been used widely by well-known multinationals such as Amazon, British Airways, FedEx and other companies to schedule their SC activities and find the most economical solution (the most profitable activities, the least expensive or the shortest journeys etc.) to any managerial problem. Many fields in SC planning, manufacturing production, stock portfolio optimisation, financial accounting, microeconomics, marketing and management use LP to make the processes more efficient.

Module Learning Outcomes - at the end of this module, students will be able to:

1	Critically analyse core concepts and a variety of techniques in linear programming (LP)
2	Critically evaluate computing software packages such as Python, Mplus, MATLAB or others to assess and implement LP techniques from a business perspective.
3	Critically evaluate simulation and modelling within LP using machine learning concepts to find optimal solutions.
4	Critically analyse supply-chain problems using LP techniques, and present innovative business solutions.

Assessment

Indicative Assessment Tasks:

All assessment reports for both Assessment One and Assessment Two must be presented professionally with proper flow and without spelling or grammatical mistakes. Harvard referencing style must be used.

Assessment One (Theoretical Aspects – Group Assessment) (30%)

You are required to use LP to solve a company's SC problems using a chosen company. After defining the objective function, students are required to solve the minimisation or maximisation problems identified by them, and to critically explain LP concepts, review the literature on LP and apply LP techniques to manually solve a company's problem. (1,500 words).

Assessment Two (Practical Aspects – Individual coursework) (70%)

You will be assessed on your ability to apply the LP theories from assessment one (progression). In this assessment, you are required to predict time-series data by using LP and software packages from chosen data (i.e. New York Stock Exchange, ONS).

Students may select any data on the internet. This can be data on stock prices from Yahoo Stock markets, New York Stock Exchange or others. Other data that can be used are economic and population data from the Office for National Statistics, International Monetary Fund, World Trade Organisation, Japanese Statistical Bureau and others. Detailed examples will be given in class.

This assessment is broken into two parts:

Part 1: You are to present a 10 minute presentation on a chosen topic, relational to the assessment brief.

Part 2: You are required to then submit a 2,500 word report.

Assessment number	Learning Outcomes to be met	Type of assessment	Weighting (%)
1	1, 3	Written Assignment	30%
2	2, 4	Coursework	70%

Derogations

None

Learning and Teaching Strategies:

The learning and teaching strategy will consist of formal lectures and/or guest speakers to present theory and practices, which will form the foundation of the learning outcomes. Students will be encouraged to interact and contribute to classroom learning as a means of developing critical skills, and to strengthen their knowledge and understanding of theory to practice. Lectures will be structured to encourage individual and group activities using real world case studies and live business examples enabling students to develop their collaborative, decision making, judging and evaluating skills, as well as key transferable employability skills. In addition, students will be encouraged to undertake self-directed study and further research on their chose area of study, as well as related topics, to acquire additional perspectives, which will provide them with a greater understanding of the SC topics within organisations and the wider environment.

Indicative Syllabus Outline:
- Introduction to LP, the duality theory and matrix algebra.
- The properties and formulation of general LP problems.

- The theory of the simplex algorithm as an optimal solution technique.
- Time-series prediction theories, models and forecasting errors.
- LP and machine learning using software packages.
- Special topics in LP problems (minimisation and maximisation problems).
- Special topics in LP problems (time-series prediction and forecasting errors).

Indicative Bibliography:

Essential Reads

Sultan, A. (2014). ***Linear programming: An introduction with applications***, Scotts Valley, USA, Publisher: CreateSpace.

Other indicative reading

Darst, R.B. (2020). ***Introduction to linear programming: applications and extensions***, Boca Raton, USA, Publisher: CRC Press.

Journals

Data analytics
Statistics for business
Business insights and analytics
Business strategy
The economists
Linear programming

Employability skills – the Glyndŵr Graduate

Each module and programme is designed to cover core Glyndŵr Graduate Attributes with the aim that each Graduate will leave Glyndŵr having achieved key employability skills as part of their study. The following attributes will be covered within this module either through the content or as part of the assessment. The programme is designed to cover all attributes and each module may cover different areas.

Core Attributes
Engaged
Enterprising
Creative
Ethical

Key Attitudes
Commitment
Curiosity

Practical Skillsets
Digital Fluency
Organisation
Communication