Unit information:Optimisation &Algorithms in 2025/26

Please note: Programme and unit information may change as the relevant academic field develops.We may also make changes to the structure of programmes and assessments to improve the student experience.

Unit name	Optimisation &Algorithms
Unit code	MGRCM0021
Credit points	20
Level of study	M/7
Teaching block(s)	Teaching Block 2(weeks 13-24)
Unit director	Dr.Kremantzis
Open unit status	Not open
Units you must take before you take this one(pre-requisite units)	None
Units you must take alongside this one (co-requisite units)	None
Units you may not take alongside this one	None
School/department	School of Management -Business School
Faculty	Faculty of Social Sciences and Law

Unit Information

Why is this unit important?

Optimisation,which is also referred to as mathematical programming,is among the most widely used techniques in operational research and management science.In many cases,its application has been so successful that its use has passed out of operational research departments to become an accepted routine planning tool.Mathematical programming,which is related to computer programming only in the sense of ?planning?,becomes involved with computing as practical problems almost always involve big data and arithmetic that can only be tackled by the calculating power of a computer

Building on the modelling analytics unit of the first teaching block,students will be exposed to different problem formulations and more mathematical algorithmic techniques to solve real-life problems;in this way,they willbe able to convey the results from modelling a managerial situation to the relevant stakeholders and to respond to their concerns.

How does this unit fit into your programme of study?

Building on the modelling analytics in the first teaching block,the two units embrace a comprehensive and sought-after skillset to students,who would be interested in pursuing a PhD degree or a specialist career in management science-related fields.This unit is elective and if selected by students,it willoffer them the opportunity to deepen into well-established, and in some cases,efficient algorithms for solving linear,integer,non-linear,and dynamic (mathematical)programming problems.They will also be more familiar with the process of building optimisation models to reveal the interconnections of elements within more challenging real-life applications.

Your learning on this unit

An overview of content

Students will be given the chance to thoroughly explore widely used topics in effectively solving optimisation models such as the simplex algorithm and its variants to effectively solve Linear Programming (LP)models;the sensitivity analysis and simplex algorithm;duality and LP problems;the branch-and-bound and the cutting plane algorithms to solve integer programming models;the Dantzig-Wolfe and the Benders decomposition algorithms for solving large-scale optimisation problems;the gradient descent and Newton?s method to deal with non-linear programs;and the dynamic programming.More advanced and special applications will also be considered in the unit?s teaching portfolio with respect to gaining experience on more complicated model building processes.

How will students,personally,be different as a result of the unit

On completion of this unit,students will realise that the knowledge of consolidated and efficient optimisation algorithms and techniques to formulate and solve real-life problems, plays a key role in various sectors involving marketing,finance,operations,and supply chain management.They will be able to select appropriate and powerful (mathematical programming)techniques for different contexts with the aim to obtain the desired results, interpret them into useful insights,and communicate them to key stakeholders.

Learning Outcomes

On completion of this unit,students will be able to:

ILO1:utilise principles collaboratively to construct mathematical models and explore the functioning of systems,
ILO2:demonstrate a sound knowledge of various sets of mathematical rules(algorithms)for solving linear,integer,non-linear,and dynamic programming models,
ILO3:apply appropriate optimisation techniques and algorithms,individually and as part of a group,to model and solve a wide range of managerial problems,
ILO4:utilise a variety of digital platforms,as a team,to support computer-based prescriptive analytics,
ILO5:convey the results from modelling a managerial situation to the relevant stakeholders and to respond to their concerns.

How you will learn

Teaching will be conducted through ten lectorial sessions of 3 hours (total 10*3=30 hours). These will comprise a combination of lecture talks,problem-solving workshops focusing on the practical aspects discussed in the lecture,small group computer lab sessions for further practice,and optional advice and feedback hour sessions for addressing more questions (if any).Additional online quizzes and contemporary case studies willbe provided on Blackboard to support self-directed learning;you will,thus,cover the basic building blocks of the unit and deepen your understanding of the material covered in the main supervised sessions.

How you will be assessed

Tasks which help you learn and prepare you for summative tasks(formative)

- ·There willbe weekly practical exercises and case studies (in workshops and labs)to be completed by students either individually or collectively to improve their analytical skills. Answers and feedback will be available to students for self-assessment.
- ·Students will be offered the opportunity to answer optional online quizzes found on Blackboard,typically at the end of the main lecture,to check their understanding of the respective week?s content.
- ·As part of the group assessment,instructors will offer regular guidance and feedback on your intermediate work products (e.g.,plan,proposal).This will provide you with the chance to improve your group project before submitting it for summative assessment.

Tasks which count towards your unit mark (summative)

Group Assignment (50%of the overall unit mark):

Participants will collaborate in groups to explore a current real-world business challenge using various sources.In their comprehensive report,they are expected to assess and critically analyze prior efforts and propose the application of alternative optimisation techniques/algorithms,as covered in the course,to address the identified problem.This assessment is related to all intended learning outcomes.The student is required to submit a 2,000-word group project report to communicate their findings(ILOs 1-5)

2×60-minute online tests(Multiple Choice or Short Answer)via Blackboard (2×25%of the overall unit mark):

The first online MCQ test will cover the material of weeks 1-4 and the second online MCQ test will cover the material of weeks 5-9.Both tests will be open booked.Both tests are related to all intended learning outcomes (ILOs 1-5).

When assessment does not go to plan

When a student fails the unit and is eligible to resubmit,failed components will be reassessed on a like-for-like basis.

The first component involves a 50%individual reflection,limited to 500 words.This reflection task encourages students to discuss both the opportunities and challenges they encountered while collaborating on the original group assignment,aligning with ILOs 1-5.

There are also 2×60-minute online tests(Multiple Choice or Short Answer)via Blackboard(2 x25%of the overall unit mark).The first online MCQ test will cover the material of weeks 1-4 and the second online MCQ test willcover the material of weeks 5-9.These online tests align with all ILOs)1-5.

Resources

If this unit has a Resource List,you will normally find a link to it in the Blackboard area for the unit.Sometimes there willbe a separate link for each weekly topic.

If you are unable to access a list through Blackboard,you can also find it via the Resource Lists homepage.Search for the list by the unit name or code(e.g.MGRCM0021).

How much time the unit requires

Each credit equates to 10 hours of total student input.For example a 20 credit unit will take you 200 hours of study to complete.Your total learning time is made up of contact time, directed learning tasks,independent learning and assessment activity.

See the University Workload statement relating to this unit for more information.

Assessment

The assessment methods listed in this unit specification are designed to enable students to demonstrate the named learning outcomes (LOs).Where a disability prevents a student from undertaking a specific method of assessment,schools will make reasonable adjustments to support a student to demonstrate the LO by an alternative method or with additional resources.

The Board of Examiners willconsider all cases where students have failed or not completed the assessments required for credit.The Board considers each student's outcomes across all the units which contribute to each year's programme of study.For appropriate assessments,if you have self-certificated your absence,you will normally be required to complete it the next time it runs (for assessments at the end of TB1 and TB2 this is usually in the next re-

assessment period).
The Board of Examiners will take into account any exceptional circumstances and operates within the Regulations and Code of Practice for Taught Programmes.

Related links

Units available in the School of Management -Business School