

# IB207-12 Mathematical Programming II

**20/21**

**Department**

Warwick Business School

**Level**

Undergraduate Level 2

**Module leader**

Bo Chen

**Credit value**

12

**Module duration**

10 weeks

**Assessment**

30% coursework, 70% exam

**Study location**

University of Warwick main campus, Coventry

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## Description

### Introductory description

N/A

[Module web page](#)

### Module aims

This module addresses further theoretical and practical problems of mathematical programming, based on the prerequisite knowledge of linear programming and the duality theory. It provides an introduction to the world of discrete and non-linear optimization with coverage of application context, theoretical basis and methodological skills.

### Outline syllabus

This is an indicative module outline only to give an indication of the sort of topics that may be covered. Actual sessions held may differ.

This module includes coverage of theoretical and practical aspects of mathematical programming. In particular it covers:

linear programming problems with integer variables; the branch-and-bound algorithm; dynamic programming; network

optimisation; approximation algorithms; convex sets and functions and their role in optimisation; simple optimality conditions for non-linear programming problems; use of spreadsheets for the solution of optimisation problems

## **Learning outcomes**

By the end of the module, students should be able to:

- Apply optimisation techniques to the solution of the problems using spreadsheets and other appropriate software;
- Identify the business problems that can be modelled using optimisation techniques and formulate them in a suitable mathematical form;
- Report on the meaning of the optimal solution in a manner suited to a business context.
- List and challenge the assumptions underpinning each of the key models studied.
- Reflect critically on the limitations of each of the models studied.
- Report on the meaning of the optimal solutions in a manner suited to a business context.

## **Indicative reading list**

Recommended references:

- Winston, Operations Research: Applications and Algorithms, 4th Ed., 2004 (or later)
- Hillier and G. Lieberman, Introduction to Operations Research, 9th Ed., 2010 (or later)
- H. Papadimitriou and K. Steiglitz, Combinatorial Optimization: Algorithms and Complexity, Dover Publications, 1998.

Basic terminology and techniques can also be found in the textbooks below:

- Anderson, Sweeney and Williams, An Introduction to Management Science, (any edition), West
- Taylor, Introduction to Management Science, (any edition), Prentice Hall
- Taha, Operations Research: An introduction. (Any addition)

## **Subject specific skills**

Spreadsheet modelling skills.

## **Transferable skills**

Model a business optimisation problem and construct spreadsheets to solve an optimisation problem.

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## **Study**

## **Study time**

<b>Type</b>	<b>Required</b>
Lectures	10 sessions of 2 hours (17%)
Tutorials	9 sessions of 1 hour (8%)
Private study	36 hours (30%)
Assessment	55 hours (46%)
Total	120 hours

### **Private study description**

Private Study.

### **Costs**

No further costs have been identified for this module.

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### **Assessment**

You do not need to pass all assessment components to pass the module.

### **Assessment group D3**

	<b>Weighting</b>	<b>Study time</b>
Individual Assignment	30%	17 hours
Online Examination	70%	46 hours
Exam		

~Platforms - AEP

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- Online examination: No Answerbook required

### **Feedback on assessment**

Feedback via my.wbs.

[Past exam papers for IB207](#)

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### **Availability**

### **Pre-requisites**

## IB104-12 Mathematical Programming I

To take this module, you must have passed:

- All of
  - [IB104-12 Mathematical Programming I](#)

## Post-requisite modules

If you pass this module, you can take:

- IB3J2-15 Decision Making under Uncertainty
- IB9BS-15 Supply Chain Analytics
- IB411-15 Decision Making under Uncertainty
- IB352-15 Applied Optimization Methods
- IB3K2-15 Financial Optimisation

## Courses

This module is Core for:

- Year 2 of USTA-G300 Undergraduate Master of Mathematics, Operational Research, Statistics and Economics
- USTA-Y602 Undergraduate Mathematics, Operational Research, Statistics and Economics
  - Year 2 of Y602 Mathematics, Operational Research, Stats, Economics
  - Year 2 of Y602 Mathematics, Operational Research, Stats, Economics

This module is Core optional for:

- Year 2 of UMAA-G1NC Undergraduate Mathematics and Business Studies
- Year 2 of UMAA-G1N2 Undergraduate Mathematics and Business Studies (with Intercalated Year)

This module is Optional for:

- Year 2 of UCSA-I1N1 Undergraduate Computer Science with Business Studies
- USTA-G302 Undergraduate Data Science
  - Year 2 of G302 Data Science
  - Year 2 of G302 Data Science
- Year 2 of USTA-G304 Undergraduate Data Science (MSci)
- Year 2 of USTA-G1G3 Undergraduate Mathematics and Statistics (BSc MMathStat)
- USTA-GG14 Undergraduate Mathematics and Statistics (BSc)
  - Year 2 of GG14 Mathematics and Statistics
  - Year 2 of GG14 Mathematics and Statistics

This module is Option list B for:

- UCSA-G500 Undergraduate Computer Science
  - Year 2 of G500 Computer Science

- Year 2 of G500 Computer Science
- UCSA-G503 Undergraduate Computer Science MEng
  - Year 2 of G500 Computer Science
  - Year 2 of G503 Computer Science MEng
  - Year 2 of G503 Computer Science MEng
- Year 2 of UMAA-G105 Undergraduate Master of Mathematics (with Intercalated Year)
- UMAA-G100 Undergraduate Mathematics (BSc)
  - Year 2 of G100 Mathematics
  - Year 2 of G100 Mathematics
  - Year 2 of G100 Mathematics
- UMAA-G103 Undergraduate Mathematics (MMath)
  - Year 2 of G100 Mathematics
  - Year 2 of G103 Mathematics (MMath)
  - Year 2 of G103 Mathematics (MMath)
- Year 2 of UMAA-G106 Undergraduate Mathematics (MMath) with Study in Europe
- Year 2 of UMAA-G1NC Undergraduate Mathematics and Business Studies
- Year 2 of UMAA-G1N2 Undergraduate Mathematics and Business Studies (with Intercalated Year)
- Year 2 of UMAA-GL11 Undergraduate Mathematics and Economics
- Year 2 of UECA-GL12 Undergraduate Mathematics and Economics (with Intercalated Year)
- Year 2 of UMAA-G101 Undergraduate Mathematics with Intercalated Year