



College of Health and Science

**School of Engineering and Physical
Science**

MTH2006M / PHY2003M

**Industrial and Financial Mathematics /
Industrial and Econophysics**

2024/2025

The information contained in the handbook is correct at the time of publication. However the University reserves the right to change its regulations and processes from time to time as this becomes necessary. Any changes will be undertaken following the protocols as laid down in the University regulations and interested parties informed accordingly.

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Overview

The main aim of this module is to expose you to some of the many ways in which and physics is used to solve “real world” problems. Throughout this handbook, the word “industry” will be used to refer to work that takes place outside academic departments. This module is intended to showcase some of the industrial applications of mathematics and physics, with a focus on finance.

The module is comprised of two parts. In the first part, you will learn about a range of industrial applications of mathematics and physics from lecturers and guest lecturers who work or have worked in industry and used mathematics and physics as one of their primary tools. You will be expected to prepare a professional-quality poster on the subject matter from one of the guest lectures or your chosen topic. You will be expected to attend the guest lectures, the career sessions and the sustainability workshop.

In the second part of this module you will learn the fundamental principles of modern financial mathematics. Your assessment for this section consists of weekly online tests.

This module has no final examination.

Part 1: Industrial Mathematics and Physics

Expect to be exposed to unfamiliar mathematics and physics

Industry specialists will give the lectures for this part of the module. You should expect to be exposed to some mathematics and physics you have not encountered before. When this happens, you should make a note of it and look it up later in the library or online.

Working as an industrial mathematician or physicist involves jumping into new areas of mathematics or physics without fear and teaching yourself unfamiliar mathematics or physics that you hope will help you solve whatever problem you are currently working on. It is exciting and challenging.

Take detailed notes in each lecture

When listening to the industry specialists’ lectures, you should take notes. You may wish to make your poster based on one of these lectures, and so you should ensure that your notes are sufficiently detailed to allow you to do this. The employers of our guest lecturers may not allow them to circulate their PowerPoint slides and so your notes should be extensive.

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Your poster should look professional

You will be expected to make an A2 poster covering a specific application of mathematics or physics to industry. Due to accreditation physics students must do their poster on industrial application of physics. It can (but does not have to) be based on one of the industrial lectures. If you wish to create a poster on a topic of your choosing, then first run it by the module coordinator. This is to ensure the application and level is suitable. The poster should be of a professional standard, including an appropriate amount of mathematics to demonstrate your industrial application. Be careful not use company logos in your poster without permission from the copyright holder. A blank, correctly-sized poster template will be available to download from Blackboard (the file format is PowerPoint). If you have any references, you should cite works on the poster itself. Here is some advice on fonts:

Title (54pt); Authors (40pt); Body text (24pt); Captions (18pt)

Part 2: Financial Mathematics / Econophysics

The second part of the module is an introduction to financial mathematics / econophysics. In it, you will be given an overview of modern financial markets including a description of how geometric Brownian motion can be used to model market behaviour. There will also be discussions of chaotic behaviour, random walks and Lévy stochastic processes. You will be assessed with weekly online tests on financial mathematics.

Assessment

Assessment of the Industrial Mathematics and Physics aspect of the module will consist of a set of industrially relevant problems based on A2 poster, a poster presentation and an attendance marking (based on 7 days attendance) on career sessions, guest lectures and sustainability workshops.

Assessment of the Financial Mathematics aspect of the module will consist weekly sets of problems based on the content of the Financial Mathematics lectures.

Details on how these components will be assessed are given below.

Assignment	Percentage of assessment	Breakdown
Poster	70%	70%
Poster presentation		30%
Attendance		10%

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Financial mathematics problems	30%	100%
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Financial mathematics problems

These will be comprised of weekly online tests where you will get three attempts to input the correct answer.

Poster (70% of the component mark)

Your poster can be based on one of the Industrial Mathematics or Physics lectures. It does not need to cover the whole lecture; you may focus on some part that interests you. You can also base the poster on your own topic. However, you should check with the module leader to ensure the application and level is appropriate for a second-year mathematics or physics course. Due to accreditation, physics students must do their poster on industrial application of physics.

Your poster should give:

- Background information
- A description of a problem
- An introduction to the mathematics or physics that is used in the solution of the problem
- An overview of the solution

The poster will be assessed as a written assignment. It will be displayed at the poster presentation event, during which you will give your poster presentation to the assessment panel.

A good poster is clear, concise and attractive. Large blocks of text should be avoided and complex information should be displayed in a visual manner wherever possible.

Examples of good posters can be found on Blackboard in the poster guidance folder. Further guidance of how to create a good poster can be found in the introductory lecture.

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Qualitative Grade

	Bad Fail	Marginal Fail	III	Iii	Iii	I	High First
A. Content of the poster							
The poster contains suitable material on industrial mathematics / physics, appropriate for 2nd year level and time available.							
The poster is well balanced: shows balance between breadth and depth of analysis, theory and examples.							
There is a logical structure to the poster.							
B. Clarity and appearance	-	-	-	-	-	-	-
Poster is attractive and professional. It is interesting with a good title. The poster is clear and easy to read.							
Presentation, including figures, style, grammar, spelling and use of IT. Correct use of references in text and acknowledgements in figure captions.							
The poster attracts the attention from several metres.							

Additional Comments:

Name of Assessor:

Mark breakdown: 0.5A + 0.5B

Student Name:

Mark awarded (%):

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Poster Presentation (20% of the component mark)

Your poster will be displayed at a poster presentation event. You should stand by your poster, and make a short poster presentation to people who stop by to look at it. Your poster presentation should be 3 minutes in length. It should be professional, concise and compelling. In industrial settings, you often have very little time in which to pitch your ideas; this poster presentation is your opportunity to practice giving an “elevator pitch”. You should also be prepared to answer questions on your poster. Poster presentations differ from oral presentations in that they are much less formal.

A panel including members of staff and possibly a contingent of the guest lecturers will judge each presentation. The assessment is intended to evaluate your ability to summarise the poster and answer questions from the assessors.

Attendance marking (10%)

To get a full mark on attendance you should attend all the guest lectures, the career sessions and the sustainability workshops.

The mark scheme for the poster and presentation is given below.

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Qualitative Grade

Presentation	Bad Fail	Marginal Fail	III	Iii	Ii	I	High First
A. Presentation Skills <ul style="list-style-type: none"> • Gains audience attention, relaxed, confident • Is easily heard • On time (no longer than 3 minutes) 							
B. Ability to summarise the poster <ul style="list-style-type: none"> • Gives a general introduction • Presentation is understandable to laymen • Poster content is put into context 							
C. Ability to communicate <ul style="list-style-type: none"> • Concise delivery • Manner appropriate for broad audience • Effective handling of any questions 							

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D. Preparation and use of poster during presentation <ul style="list-style-type: none">• Well-prepared• Refers to equations or diagrams on the poster							
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Additional Comments:

Name of Assessor:

Mark breakdown: 0.25A + 0.25B + 0.25C + 0.25D

Student Name:

Mark awarded (%):