

PROGRAMME SPECIFICATION WORD TEMPLATE – POSTGRADUATE PROGRAMMES

KEY FACTS

Programme name	MSc in Decision Sciences
Award	MSc
School	Mathematics, Computer Science and Engineering
Department or equivalent	Mathematics
Programme code	
Type of study	Full time
Total UK credits	180
Total ECTS	90

PROGRAMME SUMMARY

The overall aim of the programme is to provide you with a broad and flexible education on the key methodologies in decision making within management across a range of areas within industry, the finance sector, government. A particular strength of the programme is its focus on game-theoretical methods. The emphasis is on equipping you with the insight and ability to adapt to an ever developing field, rather than an in depth knowledge of specific methods and packages.

Aims

The programme aims to:

- 1 Provide you with a core grounding in the methodologies of the Decision Sciences, as well as a critical awareness of current problems
- 2 Develop your understanding and experience so that you can think flexibly when faced with any problem
- 3 Enable you to critically evaluate and analyse complex models using methods appropriate to the particular problem, and also to learn new methods
- 4 Develop your confidence and expertise to adapt current methods and generate new methods to tackle decision sciences problems
- 5a [*Students on the Systems and Control variant*] Provide you with understanding and experience of Systems and Control methodology both in general and in the specific context of the Decision Sciences
- 5b [*Students on the Financial Economics variant*] Provide you with understanding and experience of Financial Economics both in general and in the specific context of the Decision Sciences
- 5c [*Students on the Econometrics variant*] Provide you with understanding and experience of Econometrics both in general and in the specific context of the Decision Sciences

WHAT WILL I BE EXPECTED TO ACHIEVE?

On successful completion of this programme, you will be expected to be able to:

Knowledge and understanding:

1. Demonstrate synthesis of the key concepts and methodologies involved in the decision sciences
2. Assess the correct method or combination of methods to apply to a specific type of problem
3. Differentiate the principles behind the different methodologies used in decision sciences

and know when and how to adapt existing methods to tackle problems

4a [*Students on the Systems and Control variant*] Demonstrate knowledge and understanding of key concepts in Systems Engineering, in particular in systems modelling and optimal control

4b [*Students on the Financial Economics variant*] Demonstrate knowledge and understanding of key concepts in Financial Economics, in particular in financial derivatives and corporate finance

4c [*Students on the Econometrics variant*] Demonstrate knowledge and understanding of key concepts in Econometrics, in particular in relation to the financial markets

Skills:

1. Solve standard problems in decision theory, game theory, statistics and other decision sciences disciplines using mathematics
2. Apply the techniques of optimisation to a range of problems
3. Choose the correct statistical test for a problem, and apply it successfully.
4. Apply the Nash equilibrium concept, and related game theoretical methods
5. Assess a mathematical/ statistical solution in the context of the original problem for weaknesses/ potential errors both qualitatively and quantitatively
6. Solve problems that require allowance for the decisions of other decision makers, including large populations, in making the "best" decision
7. Use standard agent based models and other simulation methodology to analyse decision problems
8. Use appropriate methods to solve problems from your specific programme variant
9. Explain complex mathematical and related methodologies in straightforward terms
10. Adapt existing methods appropriately (in terms of both representation of reality and tractability) to problems that do not properly fit into the standard frameworks

Values and attitudes:

1. Demonstrate an appreciation of the value of simple models in understanding complex reality
2. Demonstrate flexibility in your approach to the solving of a wide range of problems
3. Demonstrate a willingness to apply a mixture of methods to problems

This programme has been developed in accordance with the QAA Subject Benchmark for generic Masters level programmes.

HOW WILL I LEARN?

For the taught component of the MSc, you will study on a number of core modules that will introduce you to the key methodologies of the decision sciences. This will involve a combination of lectures and problem classes, where you will learn about the details of the methodology and then apply it to conventional, and then less conventional, problems. For some modules the problem classes will focus on the analytical solution of problems, including how to correctly formulate problems prior to analysis, whereas others will involve practical computational classes.

For such technical subjects significant use of the lecture model is best, and so the core of all of the modules is a series of lectures in the traditional manner. Typically for each module there will be 20-30 lecture hours. Most modules will be taught continuously over a full term, although there will also be high-intensity modules where much of the teaching is condensed into a week, followed up by support problem classes.

However, in this MSc there will be significant emphasis on you solving problems. The aim of the programme is, as well as to impart a lot of technical expertise, to allow you to think and respond flexibly to a problem. A familiarity in using a range of methods is important, and for this practice is vital. This will be provided by the supporting problem classes, and also a significant amount of extra study based upon problems. Most modules will provide a set of (non-assessed) exercises for you to do, which will be discussed in the associated problem classes. You will also be expected to read and understand your lecture notes in detail, and to read around the subject; a reading list will be provided with each module, and the lecturer will provide appropriate guidance.

The dissertation will give you experience of tackling an open problem which you have to research yourself. This will typically involve a literature search, the formulation of the problem, an assessment and application of appropriate methods and written and oral presentation of results. This is a significant piece of work, comprising a third of the whole MSc.

WHAT TYPES OF ASSESSMENT AND FEEDBACK CAN I EXPECT?

Assessment and Assessment Criteria

Assessment on core modules will be a mixture of coursework and written examinations. The major component of assessment on most modules (typically worth 50-80% of the marks) will be a final written examination which will assess your overall understanding of the module. The smaller coursework assessment will take place during the module and its precise form will vary from module to module (for example written exercises, short tests, computer practicals), as appropriate for the type of material covered. In each case you will have a period to work on the coursework before handing it in for marking. Assessment on optional modules may vary more widely in form (details are available in the corresponding module specifications).

Assessment Criteria are descriptions, based on the intended learning outcomes, of the skills, knowledge or attitudes that you need to demonstrate in order to complete an assessment successfully, providing a mechanism by which the quality of an assessment can be measured. Grade-Related Criteria are descriptions of the level of skills, knowledge or attributes that you need to demonstrate in order to achieve a certain grade or mark in an assessment, providing a mechanism by which the quality of an assessment can be measured and placed within the overall set of marks. Assessment Criteria and Grade-Related Criteria will be made available to you to support you in completing assessments. These may be provided in programme handbooks, module specifications, on the virtual learning environment or attached to a specific assessment task.

Feedback on assessment

Feedback will be provided in line with our Assessment and Feedback Policy. In particular, you will normally be provided with feedback within three weeks of the submission deadline or assessment date. This would normally include a provisional grade or mark. For end of module examinations or an equivalent significant task (e.g. an end of module project), feedback will normally be provided within four weeks. The timescale for feedback on final

year projects or dissertations may be longer. The full policy can be found at:
[https://www.city.ac.uk/ data/assets/pdf file/0008/68921/assessment and feedback policy.pdf](https://www.city.ac.uk/data/assets/pdf_file/0008/68921/assessment_and_feedback_policy.pdf)

Assessment Regulations

In order to pass your Programme, you should complete successfully or be exempted from the relevant modules and assessments and will therefore acquire the required number of credits.

Pass requirements:

To qualify for a Master's degree, a student must acquire a total of 180 credits as specified in the Programme Scheme.

To qualify for a Postgraduate Diploma, a student must acquire a total of 120 credits from the successful completion of all the taught modules except the Research Skills module EPM697.

To qualify for a Postgraduate Certificate, a student must acquire a total of 60 credits, which must be achieved from the successful completion of Modules out of the following list *only*: EPM944, EPM945, EPM951, MAM613 and EPM953.

The Pass mark for each module is 50%, although on some optional modules minimum marks on individual components may also be required.

If you fail an assessment component or a module, the following will apply:

1. Compensation: where you fail up to a total of 20 credits at first or resit attempt, you may be allowed compensation if:
 - Compensation is permitted for the module involved (see the module specification), and
 - It can be demonstrated that you have satisfied all of the Learning Outcomes of the modules in the Part, and
 - A minimum overall mark of 40% has been achieved in the module to be compensated

If you receive a compensated pass in a module you shall be awarded the credit for that module. The original component marks shall be retained in the record of marks and the greater of the original module mark and the minimum pass mark for the module shall be used for the purpose of calculation towards the Award.

2. Resit: you will normally be offered one resit attempt. However, if you did not participate in the first assessment and have no extenuating circumstances, you may not be offered a resit.

If you are successful in the resit, you shall be awarded the credit for that module. The mark used for the purpose of calculation towards your award shall be calculated from the original marks for the component(s) that you passed at first attempt and the minimum pass mark for the component(s) for which you took a resit.

You work on a dissertation on a topic related to the Decision Sciences under the supervision of a lecturer. Most of the work will take place over the summer after the end of the examination period (though you are encouraged to start work before this). Assessment will be based upon the written dissertation (worth 75% of the marks) and a presentation of your work (worth 25%). To pass the dissertation you must pass BOTH assessment components (the pass mark is 50% for both components).

If you would like to know more about the way in which assessment works at City, please see the full version of the Assessment Regulations at:

WHAT AWARD CAN I GET?

Master's Degree:

Part	HE Level	Credits	Weighting (%)
Taught	7	135	75%
Dissertation	7	45	25%

Class	% required
With Distinction	70
With Merit	60
With Pass	50

Postgraduate Diploma:

Part	HE Level	Credits	Weighting (%)
Taught	7	120	100

Class	% required
With Distinction	70
With Merit	60
With Pass	50

Postgraduate Certificate:

Part	HE Level	Credits	Weighting (%)
Taught	7	60	100

Class	% required
With Distinction	70
With Merit	60
With Pass	50

PG Cert

For all of you completing the Postgraduate Certificate you will be able to demonstrate synthesis of the key decision sciences concepts, assess the correct method(s) to apply to a particular problem and know when and how to adapt existing methods to tackle problems.

You will be able to solve standard problems in decision theory, game theory, statistics and other decision sciences disciplines using mathematics. This includes applying the core techniques of optimisation to a range of problems, being able to choose and apply the correct statistical test for a problem, applying the Nash equilibrium and other game-theoretical concepts and using standard agent based models and other simulation methodology to analyse decision problems.

You will be able to assess a mathematical/ statistical solution for weaknesses/ potential errors both qualitatively and quantitatively and explain complex mathematical and related methodologies in straightforward terms.

PG Dip

For all of you completing the Postgraduate Diploma, in addition to the above you will be able to demonstrate knowledge and use appropriate methods to solve problems from your specific programme variant.

You will also be able to show a competence across the range of decision making methodologies, and adapt existing methods appropriately to problems that do not properly fit into the standard frameworks.

MSc

For all of you completing the MSc in Decision Sciences, in addition to the above you will spend the project module working on an open problem in the Decision Sciences. This gives you the opportunity to explore an aspect of the Decision Sciences in depth, and to develop an expertise in one area under the supervision of one of our expert academics.

It will also provide you with the confidence to undertake further studies related to the Decision Sciences.

WHAT WILL I STUDY?

Taught component

You will study the six core modules listed below, plus a single stream of two elective modules chosen from the elective list. Elective modules can only be studied in streams; for instance, if you choose the Systems Engineering stream, you will study Systems Modelling in the Autumn, Optimization and Optimal Control in the Spring and Game Theory B in the Spring. The elective streams available may vary from year to year.

Module Title	SITS Code	Module Credits	Core/ Elective	Compensation Yes/No	Level
All students take the following modules					
Managing Project Risk and Uncertainty	EPM944	20	Core	Yes	7
Optimisation and Decision Making	EPM945	20	Core	Yes	7
Game Theory	EPM951	10	Core	Yes	7
Evolutionary Game Theory	MAM613	15	Core	Yes	7
Agent-based Modelling and Network Science	EPM953	15	Core	Yes	7
Research Skills	EPM697	15	Core	No	7
Students in the Systems and Control stream take the following modules					
Further Game Theory	EPM952	10	Elective	Yes	7
Systems Modelling+	EPM744	15	Elective	Yes	7
Optimal Control+	EPM751	15	Elective	Yes	7
Students in the Financial Economics stream take the following modules					
Economics of Financial Markets	ECM016	20	Elective	Yes	7
Topics in Corporate Finance	ECM015	20	Elective	Yes	7
Students in the Econometrics stream take the following modules					
Further Game Theory	EPM952	10	Elective	Yes	7
Foundations of Econometrics	SMM270	15	Elective	Yes	7
Econometrics of Financial Markets	SMM271	15	Elective	Yes	7

+students may also take an alternative Systems and Control option if available

Dissertation component

There is one module which is core for the dissertation component.

Module Title	SITS Code	Module Credits	Core/ Elective	Compensation Yes/No	Level
Dissertation	EPM698	45	Core	No	7

TO WHAT KIND OF CAREER MIGHT I GO ON?

The decision making process is central to modern management, and the programme will equip graduates to work in a variety of areas which require significant quantitative and computational expertise such as Credit Risk, Project Management, Information Systems and Supply Chain and Operations Management, as well as being of more generic value in such areas as understanding and managing risk and organisational behaviour. "Decision Science Analyst" is a common job title in a large range of organisations.

HOW DO I ENTER THE PROGRAMME?

You will have a good (first or second class, or equivalent) first degree in a subject with a sound basis in Mathematics, such as Mathematics, Physics, Engineering and Economics. This is sufficient to take the core material, although it is possible that some options on the programme would require more specific knowledge.

Students who have previously studied a degree taught in a language other than English will be required to have one of the following qualifications:

- IELTS: 6.5
- TOEFL (internet based): 90

Please note that TOEFL is not accepted as evidence of English language ability for students that require a Confirmation of Acceptance for Studies.

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