



PROGRAMME SPECIFICATION

KEY FACTS

Programme name	Actuarial Science with Business Analytics
Award	MSc
School	Bayes Business School
Department or equivalent	Specialist Masters Programme
Programme code	PSASBA
Type of study	Full Time
Total UK credits	180
Total ECTS	90

PROGRAMME SUMMARY

The MSc in Actuarial Science with Business Analytics programme consists of two stages.

Stage 1: Core Statistics, Core Mathematics, Core Business, Business Analytics modules

Successful completion of Stage 1 requires achieving at least 120 credits from Business Analytics, Core Statistics, Core Mathematics and Core Business modules.

You have to pass the compulsory modules:

- SMM061 Financial Mathematics (CM1(1)) (20 credits)
- SMM065 Contingencies (CM1(2)) (30 credits)
- SMM634 Analytics Methods for Business (15 credits)
- SMM636 Machine Learning (15 credits)

Additionally, you will need to obtain at least 40 more credits from the elective modules:

- SMM062 Finance and Financial Reporting (CB1) (20 credits)
- SMM071 Business Economics (CB2) (20 credits)
- SMM047 Probability and Mathematical Statistics (CS1) (30 credits)

- SMM048 Insurance Risk Modelling (CS2) (30 credits)
- SMM068 Financial Economics (CM2) (30 credits)

Please note that CM1(1) and CM1(2) together make up the professional subject CM1. If you already have an exemption from CM1 corresponding to compulsory modules SMM061 and SMM065 on the programme, either through taking a professional examination or through prior study, you may be allowed to not take these modules. In that case, you will still need to obtain the corresponding credits from different Core Statistics, Core Mathematics and Core Business modules. Please also note that SMM634 and SMM636 do not offer any exemption.

Stage 2: Research Methods for Actuarial Professionals / Short Electives / Core Practice modules / Applied Research Project (optional)

To complete Stage 2 you need to be awarded 60 further credits from:

- SMM540 Research Methods for Actuarial Professionals (10 credits) in Term 1, AND in Term 3

EITHER

- 5 short elective modules (10 credits each)

OR

- 3 short elective modules (10 credits each) and SMM799 Applied Research Project (20 credits),

where at least two elective modules should be from:

- SMM284 Applied Machine Learning
- SMM694 Applied Natural Language Processing
- SMM695 Data Management Systems

OR

- SMM092 Modelling Practice (CP2) (15 credits), SMM091 Professional Communication (CP3) (15 credits) and 2 short elective modules (10 credits each) from:

- o SMM284 Applied Machine Learning
- o SMM694 Applied Natural Language Processing
- o SMM695 Data Management Systems.

Prerequisites: note that in order to be allowed to take this programme route, you need to pass first the modules SMM693 Introduction to R Programming and SMM692 Introduction to Python Programming by a pre-specified deadline.

Successful completion of both Stages 1 and 2 leads to the award of the MSc in Actuarial Science with Business Analytics (180 credits). Please note that, depending on your choice of modules in Stage 1, you may accumulate more than 180 credits overall. However, your final award will be calculated from 180 credits only.

Terms 1, 2 and 3

Modules CM1(1), CS1, CB1 and CB2 are taught in Term 1 and written exams are held in January. Modules CM1(2), CM2, CS2 are taught in Term 2 and written exams are held in late April / early May. Modules SMM634 (Term 1) and SMM636 (Term 2) are assessed only by coursework.

Research Methods for Actuarial Professionals is taught in Term 1.

Short elective modules and Core Practices (CP2 and CP3) are taught in Term 3. The Applied Research Project starts in Term 3 and extends to the end of August.

The MSc in Actuarial Science with Business Analytics is only available for study on a full-time basis.

The aims of the programme are:

1. To give you the opportunity to study the fundamentals of actuarial science, statistics, finance and economics, corresponding to subjects CM1, CM2, CS1, CS2, CB1 and CB2 of the Institute and Faculty of Actuaries' examinations, and to enable you to gain exemption from them.
2. To give you the opportunity to study the modelling and communication practices, corresponding to subjects CP2 and CP3 of the Institute and Faculty of Actuaries' examinations, and gain exemptions from them.
3. To give you the opportunity to additionally study business analytical methods and learn how data analysis is performed in the real world, corresponding to module SMM634.
4. To give you the opportunity to additionally study machine learning techniques and their use in analysing complex data and designing predictive analytics methods, corresponding to module SMM636.
5. To prepare you for employment in actuarial and non-traditional related fields.
6. To provide you with opportunities for additional study beyond the core syllabus, to enable you to be better prepared both for practical actuarial work and also for tackling the later professional examinations.
7. To be a suitable preparation for students wishing to proceed to the MSc in Actuarial Management, and for those students wishing to pursue relevant academic research.
8. To develop your abilities for independent research.
9. To enable you to develop your own interests in the field of actuarial science, and enable you to prepare for further professional education and for employment in actuarial professional practice or research.

Throughout the course, where possible, lecturers will emphasise the many ethical issues that arise in the context of actuarial practice. In so doing, you will be encouraged to

share your views with your lecturers and with your classmates, where a diversity of opinion is to be expected and encouraged.

Please note that the postgraduate certificate and postgraduate diploma are Exit Awards only and are awarded to students who do not meet the standard for the award of an MSc, but do meet the standard for the award of credit required for the lesser award.

Postgraduate Certificate

Following the award of a Postgraduate Certificate in Actuarial Science with Business Analytics you will be able to examine the theories related to all aspects of actuarial science including non-traditional fields, such as business analytics, and apply your learning in the appropriate context. You will possess the skills and knowledge required to develop a career in actuarial science and you will have mastered essential skills and knowledge and developed an appreciation of what it takes to undertake professional actuarial roles. The assessments you undertake to achieve this qualification will focus on the skills, knowledge and attributes that you will need to facilitate your career development and will support you in developing your practical abilities. The postgraduate certificate will enable you to gain confidence in your role and skills.

Postgraduate Diploma

Following the award of a Postgraduate Diploma Actuarial Science with Business Analytics in addition to the above you will gain a more advanced knowledge and in-depth understanding of these subject areas, from a variety of different perspectives and in order for you to broaden your expertise and skills. You will have developed a sophisticated appreciation of current requirements in the actuarial field, together with the ability to evaluate a range of different approaches to them.

MSc

Following successful completion of the MSc in Actuarial Science with Business Analytics you will have the ability to plan and evaluate all aspects of actuarial science including non-traditional fields, such as business analytics, and apply your learning in the appropriate context. You will also have demonstrated the capacity to expand your knowledge and build on the core of your degree through engagement with specialist elective topics or your own independently researched project.

WHAT WILL I BE EXPECTED TO ACHIEVE?

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

Knowledge and understanding

- Summarise and critically assess fundamental concepts in statistics, economics, finance, investment and business.
- Recognise and apply actuarial theory used in investment, insurance and probability

modelling.

- Evaluate a specific area of actuarial theory or practice and apply this in a detailed and systematic way.

Skills

- Manage time effectively to cope with intensive study.
- Demonstrate proficiency in the use of actuarial and statistical methods to solve insurance, investment and analytics problems.
- Demonstrate advanced mathematical and analytical problem-solving skills.
- Use software as an effective tool for data analysis and financial modelling.
- Evaluate and apply alternative approaches in the analysis of financial reports.
- Present reasoned arguments demonstrating specialised knowledge.
- Communicate effectively with academic and professional tutors in written reports.
- Develop reasoned arguments on current issues relating to actuarial theory and practice.
- Evaluate research papers and professional texts to produce an independent synthesis of knowledge and ideas.
- Demonstrate the ability to evaluate and synthesise information and ideas from articles in actuarial journals.

Values and attitudes

- Reflect on the professional and public service values of the Actuarial Profession.

This programme has been developed in accordance with the QAA Subject Benchmark for Mathematics, Statistics and Operational Research.

HOW WILL I LEARN?

The teaching and learning methods used on the programme consist of:

1. An intensive schedule of lectures
2. Additional online lectures in certain modules
3. Additional tutorial classes in certain modules
4. Extensive private study based on approved reading, question sheets and other lecture handouts
5. Class discussion, tests and other interactive teaching methods during lectures
6. Computer-based work on software
7. Private study of professional and academic literature
8. Training in research methods.

The MSc in Actuarial Science with Business Analytics is designed and structured to allow for intellectual progression through core modules taught in Terms 1 and 2. Modules taught in Term 2 normally build on the knowledge and skill acquired in Term 1. Term 3 allows for further progression by choosing specialist elective modules, or by building on Core Principles to develop core modelling and communication practices, or by choosing or a project, where students can apply knowledge and skills acquired earlier in the programme.

A minimum of 10 teaching and learning hours (both contact and non-contact) are required for each credit awarded. The precise weighting of different types of teaching and learning depends on the modules you take and the breakdown is therefore provided within the appropriate module specifications.

Non-contact hours are for self-directed study and account for the minimum amount of time you should spend studying independently, including subject research, reading, working in groups and completing assignments and other homework.

Overall teaching and learning hours: approx. 1800 hours

Contact hours: approx. 258 hours (depending on module choices)

WHAT TYPES OF ASSESSMENT AND FEEDBACK CAN I EXPECT?

Assessment and Assessment Criteria

The assessment methods used on the programme consist of:

1. Closed-book examinations
2. Coursework with and without computer-based components
3. Tests (both in class and online)
4. Online quizzes
5. Presentations
6. Writing research project reports.

Detailed assessment criteria are available in your handbook and from your individual module leaders.

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 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 and will be provided in a variety of ways throughout your course, both formally and informally, in order to support your learning.

You will normally be provided with coursework feedback within three weeks of the submission deadline or assessment date. This would normally include a provisional grade or mark. The timescale for feedback on final projects may be longer. Examination grades will be provided once they have been agreed by an Assessment Board.

More details about the feedback you can expect from individual modules and assessments will be provided by your lecturers.

The full policy can be found at:

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, therefore, acquire the required number of credits. The programme is weighted according to the number of credits awarded for each module. Pass / Fail modules are excluded from this calculation.

The pass mark for each module is 50% and there are no minimum qualifying marks for individual components.

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

1. Re-Sit:

You will normally be offered one re-sit attempt.

If you are successful in the re-sit, you will be awarded the credit for that module. The mark for each assessment component that is subject to a re-sit will be capped at the pass mark for the module. This capped mark will be used in the calculation of the final module mark together with the original marks for the component(s) that you passed at first attempt.

2. Compensation:

Compensation can only be awarded by the Final Assessment Board and must be applied within the following limits and conditions:

Where you fail up to a total of 20 credits (15 for a postgraduate certificate), you may be eligible for compensation if:

- Compensation is permitted for the module involved (see the “What will I Study” section of the programme specification), and
- It can be demonstrated that you have satisfied all the Learning Outcomes of the modules in the Programme, and
- A minimum overall mark of no more than 10% below the module pass mark has been achieved in the module to be compensated, and
- An aggregate mark of 50% has been achieved overall.

If you receive a compensated pass in a module, you will be awarded the credit for that module. The original component marks will be retained in the record of marks and your original mark shall be used for the purpose of your award calculation.

If, at the point where you have results for all taught modules:

- You have no more than 20 credits outstanding (15 for a PG Certificate), and
- The grade for this module(s) is 40% or above, and
- Your overall degree average is at least 50%, and
- If the module(s) is eligible for compensation.

Then you will **not** be required to undertake the re-sit for that module, as this will be eligible for compensation.

Please note:

- **If you fail more than 20 credits (excluding project modules), then you must retake all outstanding assessments with no exceptions.**

If you do not meet the pass requirements for a module and do not complete your re-sit by the date specified, you will not progress and the Assessment Board will require that you be withdrawn from the programme.

If you fail to meet the requirements for the Programme, the Assessment Board will consider whether you are eligible for an Exit Award as per the table below.

To be awarded a Postgraduate Diploma you need to achieve at least 120 credits from

modules in Terms 1, 2 and 3.

To be awarded a Postgraduate Certificate you need to achieve at least 60 credits from modules in Terms 1, 2 and 3.

If you fail to meet the requirements for the programme and are not eligible for the award of a lower qualification, the Assessment Board shall require that you withdraw from the programme.

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:

http://www.city.ac.uk/_data/assets/word_doc/0003/69249/s19.doc

WHAT AWARD CAN I GET?

Master's Degree

	HE Level	Credits	Weighting (%)
Degree	7	180	100

Class **% required**

With Distinction 70
With Merit 65
Without classification 50

Postgraduate Diploma

Students must achieve 120 credits, with a minimum mark of 50%.

	HE Level	Credits	Weighting (%)
Degree	7	120	100

Class **% required**

With Distinction 70
With Merit 65
With Pass 50

Postgraduate Certificate

Students must achieve 60 credits (25% of which must come from Business Analytics modules), with a minimum mark of 50%.

	HE Level	Credits	Weighting (%)	Class	% required
Degree	7	60	100	With Distinction	70
				With Merit	65
				Without classification	50

WHAT WILL I STUDY?

The modules forming part of the MSc in Actuarial Science with Business Analytics are the following.

Module Title	SITS Code	Module Credits	Core/ Elective	Can be Compensated?	Level
Financial Mathematics (Subject CM1(1))	SMM061	20	C	Y	7
Contingencies (Subject CM1(2))	SMM065	30	C	N	7
Analytics Methods for Business	SMM634	15	C	Y	7
Machine Learning	SMM636	15	C	Y	7
Research Methods for Actuarial Professionals	SMM540	10	C	Y	7
Finance and Financial Reporting (Subject CB1)	SMM062	20	E	Y	7
Probability and Mathematical Statistics (CS1)	SMM047	30	E	N	7
Business Economics (Subject CB2)	SMM071	20	E	Y	7
Insurance Risk Modelling (Subject CS2)	SMM048	30	E	N	7
Financial Economics (Subject CM2)	SMM068	30	E	N	7
Applied Research Project	SMM799	20	E	N	7
Modelling Practice (CP2)	SMM092	15	E	Y	7
Professional Communication (CP3)	SMM091	15	E	Y	7
Modelling and Data Analysis	SMM069	10	E	Y	7

Applied Machine Learning	SMM284	10	E	Y	7
Applied Natural Language Processing	SMM694	10	E	Y	7
Data Management Systems	SMM695	10	E	Y	7
Introduction to Copula Modelling	SMM027	10	E	Y	7
Introduction to Model Office Building in Life Insurance	SMM019	10	E	Y	7
Emerging Global Risks	SMM925	10	E	Y	7
Stochastic Claims Reserving in General Insurance	SMM025	10	E	Y	7
Topics in Quantitative Risk Management	SMM070	10	E	Y	7
Ethics, Society and the Financial Sector	SMM500	10	E	Y	7
Pension Finance	SMM859	10	E	Y	7
VBA with Application for Finance	SMM238	10	E	Y	7
Technical Analysis and Trading Systems	SMM529	10	E	Y	7

During Term 3 you will be able to choose from a range of electives to personalise your experience.

Please note that to be entered to this award you must choose at least two from the following three modules in Term 3:

- SMM284 – Applied Machine Learning
- SMM694 – Applied Natural Language Processing
- SMM695 – Data Management Systems

This list of electives is an indication of the range of modules that can be on offer and is subject to change due to circumstances such as: enhancing or updating the quality and content of educational provision; responding to student feedback; academic staffing changes; the number of students in each programme; lack of student demand for certain modules; or factors beyond the institution's reasonable control, such as meeting the latest requirements of a commissioning or accrediting body. For these reasons, not all the electives listed will be offered every year. New (additional or replacement) modules may also be added for these reasons.

There may also be prerequisites for joining a module, and space and timetable availability restrictions may also apply.

The list of electives offered in a given year will be confirmed by February 1st.

TO WHAT KIND OF CAREER MIGHT I GO ON?

There is a growth in the number of companies that are now looking for actuarial students to have a knowledge of business analytics due to the changing nature of some actuarial roles with more technology and analytics brought into actuarial processes (in some sectors). Therefore, this programme route will allow students to be competitive for these roles as they will gain an understanding of actuarial principles, practices and the analytics. Equally students will also be able to follow a more traditional actuarial route. Students will be able to work in fields such as insurance companies (life/non-life), consulting firms, government departments, banks and investment firms, teaching and research. Additionally, with the increasing number of companies investing in analytics across most industry sectors, students will also be able to follow a more purely analytics route as across almost any sector with the quantitative skills learned from their actuarial modules.

<http://www.cass.city.ac.uk/more-about-cass/careers-services> - Careers Service

<https://community.city.ac.uk/cass/home> - Alumni Service

WHAT PLACEMENT OPPORTUNITIES ARE AVAILABLE?

Placements are not part of the programme.

WILL I GET ANY PROFESSIONAL RECOGNITION?

Accrediting Body: Institute and Faculty of Actuaries

Nature of Accreditation

This programme is accredited by the Institute and Faculty of Actuaries in the United Kingdom. The Profession appoints an Independent Examiner, who recommends students on this programme for exemptions from professional examinations, provided that they have achieved the necessary standard.

Exemptions may be awarded in relation to professional subjects CM1, CM2, CS1, CS2, CB1, CB2 (as well as CP2 and CP3).

HOW DO I ENTER THE PROGRAMME?

There is no direct entry to this degree, MSc in Actuarial Science students can move on to the MSc in Actuarial Science with Business Analytics in Term 2 of the programme. In order to do so, you will need to choose SMM634 (Term 1) and

SMM636 (Term 2) and take at least two out of the three Business Analytics elective modules listed above in Term 3.

All students on this route are also required to take two preparatory programming modules:

- SMM692 Introduction to Python Programming
- SMM693 Introduction to R Programming

Students must previously have met the entry requirements for the MSc in Actuarial Science, below:

To be accepted on to a Bayes MSc degree you will need a good Bachelor's degree. This usually means a UK 2.1 or above, or the equivalent from an overseas institution. Some level of previous study in the specific subject area may be required.

Applicants will need to submit two references, one of which must be an academic reference if the candidate does not have previous work experience. Previous work experience is not a requirement of our full-time MSc courses.

We require all students who have not previously studied in English to take an IELTS exam. The IELTS requirement is 7.0 with a minimum of 6.5 in writing.

The MSc in Actuarial Science with Business Analytics is only available for study on a full-time basis.

RPL/RP(E)L Requirements

Applicants with a prior exemption in CM1, corresponding to compulsory modules on the programme, may be allowed to not take these modules. However, the corresponding number of credits needs to be obtained through passing other elective Core Statistics, Core Mathematics and Core Business modules.

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