



PROGRAMME SPECIFICATION – UNDERGRADUATE PROGRAMMES

KEY FACTS

Programme name	Data Analytics and Actuarial Science Data Analytics and Actuarial Science (with Professional Placement)
Award	BSc (Hons)
School	Bayes Business School
Department or equivalent	UG Programme (Bayes Business School)
UCAS Code	G3G1 Data Analytics and Actuarial Science GG31 Data Analytics and Actuarial Science (with Professional Placement)
Programme code	USDAAS
Type of study	Full Time
Total UK credits	430
Total ECTS	215

PROGRAMME SUMMARY

The BSc (Hons) Data Analytics and Actuarial Science degree gives a sound education in data analytics, programming, probability and statistics, actuarial science, finance and mathematics. The goal of the programme is to ensure that, upon graduation, you are able to contribute to business development and help to generate competitive advantage through the appropriate analysis of business-relevant data. You will also be required to show that you can effectively communicate the insights gained from those data to colleagues and managers.

This is a three year programme (or four years, if a sandwich year is taken or you apply for the programme with an integrated Professional Placement). If you apply for the four year with Professional Placement programme you will need to secure a Professional Placement between years 2 and 3. If you do not secure a Placement you will be transferred to the three year version of the BSc Data Analytics and Actuarial Science programme.

The programme is structured so that the majority of the modules in the first two years are compulsory, while in the final year there are a number of optional modules to choose from, allowing you to tailor your degree to your strengths and career aspirations.

Bayes is one of very few business schools in the City of London. Our close links with international corporations are reflected in all of our degree programmes, which are constantly evolving to meet the needs of an ever-changing business world. Our lecturing

staff contains many experienced data analysts, applied statisticians, qualified actuaries and quantitative finance professionals who have worked in industry and continue to consult for corporations. You will therefore benefit from their first-hand knowledge and business experience. As we place a high value on teaching both theory and application, you will emerge from your degree with a good understanding of how to apply your newly acquired knowledge in the workplace. For example, you could pursue a career in data science or business analytics (such as in a hedge fund, an insurance company, a retail firm or a healthcare company), as an actuary or in an alternative direction that requires strong data handling and coding skills.

Due to its academic rigour, the programme also provides you with many options to further your studies after graduation, through a postgraduate degree such as the MSc Business Analytics or MSc Actuarial Management courses at Bayes.

In line with City, University of London's Employability Development Plan, you are expected to gain practical experience with an employer as part of your undergraduate degree. You can gain this experience through a placement where you work for a period with an employer or through taking one or more modules which are delivered in conjunction with an employer. You should take this requirement into account in choosing which elective modules to take and whether to include a placement within your studies.

Indicative modules and other ways to provide the practical experience would be

BM2104 Micro-Placement
MS2203 Mentoring and Coaching for Leadership
Professional Placement Year

Aims

1. To develop a comprehensive set of skills in data handling, coding and data analytics, plus a detailed knowledge of actuarial science, statistics, mathematics, finance and related disciplines.
2. To develop the ability to communicate your knowledge, the outcomes of your work and your understanding accurately and effectively.
3. To develop your understanding of the respective roles of mathematical and statistical calculation, analysis and judgement in practical scenarios.
4. To develop the ability to make reasoned judgements, frame appropriate questions and draw independent conclusions.
5. To equip you with the technical skills, as well as soft skills such as effective team-working and communication, required to work professionally as a data scientist, a business analyst, an actuary or in alternative fields related to statistics, finance and in business more generally.
6. To equip you with the knowledge and skills that will enable you to begin a career in areas such as data science/analysis, Fintech, Insurtech and other paths that require strength in data handling, coding and statistics.
7. To enable you to enter postgraduate study in data analytics, finance, actuarial science

or related disciplines.

8. To develop responsible and socially aware professionals who exhibit high degrees of professionalism and sensitivity to ethical issues, as many of the decisions that you will make in your career will affect numerous stakeholders - all of whose views and situations must be considered.

On successful completion of Stage 1 of the Programme you will have acquired a foundational knowledge and understanding of the key concepts and principles underlying your area of study, the ability to recognise and explain these, and to identify and apply appropriate solutions when presented with a problem. On successful completion of Stage 1 you will be eligible for the award of Certificate of Higher Education should you choose to leave the Programme.

On successful completion of Stage 2 of the Programme you will have built on the knowledge and understanding gained at Stage 1 and demonstrated an ability to analyse and apply these concepts and principles to complex problems and scenarios. You will also have broadened your chosen field of study through the completion of elective modules. On successful completion of Stage 2 you will be eligible for the award of Diploma of Higher Education should you choose to leave the Programme..

WHAT WILL I BE EXPECTED TO ACHIEVE?

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

Knowledge and understanding:

- Describe and apply tools from core mathematical, statistical and actuarial subjects, including calculus, linear algebra, differential equations and computing.
- Compare the different roles of data scientists, business analysts and actuaries in commercial or regulatory organisations.
- Describe, use and analyse key concepts and tools in data analytics, actuarial science, statistics, finance and business.
- Employ a variety of mathematical and statistical modelling techniques, and to be able to evaluate their conditions and limitations.
- Analyse the role and importance of assumptions in statistical modelling, be able to identify them where used and evaluate the consequences of their violation.

Skills:

- Handle and analyse data with care and rigour and in a way that is likely to generate business intelligence.
- Devise and sustain rational arguments, and be able to evaluate others' arguments critically, their rationale and to identify the assumptions made and conclusions drawn.
- Perform calculations and manipulations in the core mathematical, statistical, data analytics and actuarial subjects.

- Design and implement code relevant to programming tasks, such as statistical assignments, using a variety of languages.
- Identify, select and undertake critical analysis of information from a number of sources. (This skill will, in particular, be assessed in the major individual project.)
- Work under guidance on an extended task.
- Communicate results or findings from analysis clearly and accurately, both orally and in writing, and to be able to respond to questions regarding method, results and interpretation.

Values and attitudes:

- Reflect on the importance of an ethical approach to work for a data scientist, business analyst, actuary or other finance professional.
- Articulate the need for and demonstrate the use of careful documentation of your computations, to allow for verification by your peers.
- Work productively as part of a group. Be an effective team player who is tolerant of disagreement, and open and sensitive to diversity in cultures and people.
- Manage your time effectively.

When you undertake a programme of study at Bayes Business School we will expect you not only to learn but also to challenge and look critically at the world in which we live. We will constantly ask you to question the ethical underpinning of the assumptions you have made and the decisions you have reached, and that inquisitive, ethical approach is woven through every element of a Bayes education. In recognition Bayes is one of the few business schools to have been awarded Champion Status by the UN PRME (Principles of Responsible Management Education) initiative at Davos in 2018.

HOW WILL I LEARN?

Teaching and Learning methods are designed to foster your knowledge of, and enthusiasm for, the subject and to stimulate engagement and participation in the learning process. They encourage deep learning and enable you to reflect on, and take responsibility for, your own learning to develop your academic self-confidence.

- Lectures provide knowledge and set the context for your private study. This could, for example, be through question and answer sessions, examples, case studies, discussions and (short) exercises. Most contact hours during the degree programme take the form of lectures.

-Tutorials, computer labs, exercise classes and surgery hours are opportunities to apply the knowledge and to participate in the discussion of the subject area. The computer lab sessions will allow you to develop your computational and analytical

skills and will complement the lectures covering the computer-based modules throughout your degree. The main purpose of exercise classes is to give you practice at solving problems, with tutors on hand to help you if you get stuck. Surgery hours have been scheduled to assist you if you are having difficulties with the module concerned. A number of tutorials, exercise classes and surgery hours are scheduled during the first year; these serve to help scaffold your learning and develop you as an independent learner. The number of tutorials, exercise classes and surgery hours decreases as you progress and you become more able to direct your own learning.

- In several modules, the face-to-face teaching is complemented by online lectures and active use of the Virtual Learning Environment. The type of support will vary by module but may take the form of delivery of learning materials and resources, submission and feedback of coursework assessments, on-line lecture delivery, discussion forums, question-and-answer sessions or sample/mock questions and quizzes to help you prepare for assessments.

- In addition to the taught elements of the programme, there will be the need for private study. This time will be spent working on background reading, revision of lecture notes, work on tutorial problems, coursework and individual or group work on projects including the major project in Stage 3 of the programme.

WHAT TYPES OF ASSESSMENT AND FEEDBACK CAN I EXPECT?

Assessment and Assessment Criteria

Assessment is carried out according to context and purpose and recognises that you may exhibit different aptitudes in different forms of assessment:

- Some assessment is by coursework which you take home and complete with the aid of your notes and individual study.
- There are formal unseen written examinations every year. They take place at the end of each term (or at the end of a year, if a module is taught over two terms).
- Some assessment takes the form of class tests.
- Some assessment takes the form of online quizzes and tests, using the Virtual Learning Environment.
- A number of modules require you to give an assessed presentation.
- A group project forms the basis of assessment in four compulsory modules and some electives.
- An individual project forms an integral part of the Programme Stage 3 assessment.

Assessment takes an overall view of your achievements. A level of success in each individual module that is commensurate with the overall performance is not necessarily required.

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 standard reached in 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 standard reached in 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 on all assessed work (either formative or summative) and on other relevant aspects of your performance and progress in a module. In accordance with the University policy, you will normally be provided with feedback within three weeks of the submission deadline or assessment date. This will 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 when results are released following the Assessment Board.

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. You also need to pass each Programme Stage of your Programme in order to progress to the following Programme Stage.

To qualify for the Honours Degree, you must acquire the total credits indicated in the Student Handbook. Calculation of results and classification of the final award is based on a weighted average of module marks. The contribution of each module is proportional to its credit value.

BSc degrees are awarded with First Class Honours, Second Class Honours (Upper and Lower) or Third Class Honours.

The overall class of honours awarded is based on the overall weighted average mark achieved throughout the Programme Stages of your degree. The weights given to each Programme Stage are shown below:

Programme Stage	Weight
One	10%
Two	30%
Three	60%

Progression from Programme Stage 1 to Programme Stage 2

To be admitted to Programme Stage 2 it is necessary to achieve:

- A module mark of at least 40% in each module, and
- 145 credits at Programme Stage 1.

Progression from Programme Stage 2 to Programme Stage 3

To be admitted to Programme Stage 3 it is necessary to achieve:

- A module mark of at least 40% in each module*, and
- 140 credits at Programme Stage 2.

*for module AS2205 Contingencies, you are required to pass the coursework and examination assessment components separately with a mark of 40%.

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

1. Compensation

Compensation at Programme Stages 1 & 2

Where you fail up to a total of one sixth of the total credits of Programme Stages 1 or 2 at first or resit attempt, you may be allowed 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 Stage, and
- A minimum overall mark of 30% has been achieved in the module to be compensated, including a minimum of 30% in the exam and 30% in the coursework, and
- An aggregate mark of 40% has been achieved for the Programme Stage.

Compensation at Programme Stage 3

Once 90 credits have been earned, the remaining credits for Programme Stage 3 can be earned either by passing modules or through compensation provided that:

- 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 Stage, and
- A minimum overall mark of 30% has been achieved in each module to be compensated, and
- An aggregate mark of 40% has been achieved for Programme Stage 3.

Where you are eligible for compensation at the first attempt, this will be applied in the first instance rather than offering a resit opportunity.

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 module mark will be used for the purpose of your Award calculation.

2. Resit

Where you are not eligible for compensation at the first attempt, you will be offered one resit attempt.

If you are successful in the resit, you will be awarded the credit for that module. The mark for each assessment component that is subject to a resit 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 components that you passed at first attempt.

If you do not meet the pass requirements for a module and do not complete your resit by the date specified you will not progress to the next Programme Stage and the Assessment Board will require you to be withdrawn from the Programme.

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

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?

Bachelor's Degree with Honours:

To qualify for the award of BSc (Hons) Data Analytics and Actuarial Science you will be required to complete 150 credits at Level 4, 140 credits at Level 5 and 140 credits at Level 6 (totalling 425 credits).

Programme Stage	HE Level	Credits	Weighting (%)
1	4	150	10
2	5	140	30
3	6	140*	60

Class	% required
I	70
II upper division	60
II lower division	50
III	40

Ordinary Degree:

To exit with the award of BSc (Ordinary) Data Analytics and Actuarial Science you will be required to complete 150 credits at Level 4, 140 credits at Level 5 and 60 credits at Level 6 (totalling 345 credits).

Programme Stage	HE Level	Credits	Weighting (%)
1	4	150	10
2	5	140	30
3	6	60	60

Class	% required
With Distinction	70
With Merit	60
Without classification	40

Diploma of Higher Education:

To exit with the award of Diploma of Higher Education in Data Analytics and Actuarial Science you will be required to complete 150 credits at Level 4 and 140 credits at Level 5 (totalling 285 credits).

Programme Stage	HE Level	Credits	Weighting (%)
1	4	150	35
2	5	140	65

Class	% required
With Distinction	70
With Merit	60
Without classification	40

Certificate of Higher Education:

To exit with the award of Certificate of Higher Education in Data Analytics and Actuarial Science you will be required to complete 150 credits at Level 4.

Programme Stage	HE Level	Credits	Weighting (%)
1	4	150	100

Class	% required
With Distinction	70
With Merit	60
Without classification	40

* Note that if you take the elective Survival Models (AS3204) at Stage 3 you will earn 145 credits rather than 140.

Why so many credits?

Most degree programmes require students to achieve 120 credits per year, or the equivalent. It would be possible to deliver a degree which focuses on data analytics and offers the opportunity to earn exemption from a couple of the professional subjects of the Institute and Faculty of Actuaries. However, this degree is designed for people who want to apply data analysis in the financial area and are considering an actuarial career. By having a higher number of credits, this degree offers the flexibility of allowing students to take additional modules which can offer more actuarial professional exemptions or enable further study of the wider financial world. For those who choose the actuarial route, the Programme will allow you to gain a maximum five exemptions from the IFoA professional examinations; and for those who wish to pursue a different career, the non-actuarial electives will equip you with the skills to do so.

WHAT WILL I STUDY?

Programme Stage 1

Programme Stage 1, which is worth 150 credits, provides a grounding in mathematics, statistics, computing, financial mathematics and economics. All modules are compulsory.

Module Title	SITS Code	Module Credits	Core/ Elective	Can be compensated?	Level
Introduction to Actuarial Methods and Career Planning	AS1003	15	C	Y	4
Mathematics for Actuarial Science	AS1056	25	C	Y	4
Introduction to Economics (Actuarial Science) [CB2]	AS1057	30	C	N	4
Probability and Statistics I [CS1a]	AS1101	25	C	Y	4
Financial and Investment Mathematics [CM1a]	AS1201	30	C	N	4
Introduction to Excel and Statistical Packages	AS1104	10	C	Y	4
Introduction to VBA for Excel	AS1202	15	C	Y	4

Programme Stage 2

At Programme Stage 2, which is worth 140 credits, the statistical subjects are further developed along with the mathematical skills required to master the applications-oriented material at Stages 2 & 3. Core modules in Python and R will develop your coding skills to broaden your data analysis abilities. Students choose two elective modules. If you are seeking exemptions from the maximum number of the actuarial profession's examinations then you should choose your two elective choices from Contingencies, Financial Economics and Financial Reporting.

Module Title	SITS Code	Module Credits	Core/ Elective	Can be compensated?	Level
Calculus & Linear Algebra (Maths 2)	AS2052	15	C	Y	5
Probability & Statistics 2 [CS1b]	AS2110	30	C	N	5
Stochastic Models [CS2a]	AS2111	20	C	Y	5
Fundamentals of Finance [CB1a]	AS2114	15	C	Y	5
Python, R and data structures	AS2113	15	C	Y	5
Python, R and databases	AS2208	15	C	Y	5
Contingencies [CM1b]	AS2205	15	E	Y	5
Decision Analysis	AS2021	15	E	Y	5
Financial Economics [CM2a]	AS2109	15	E	Y	5
Financial Reporting [CB1b]	AS2207	15	E	Y	5
Risk Analysis & Modelling	FR2208	15	E	Y	5
Derivatives, Trading & Hedging	FR2211	15	E	Y	5
Micro-Placements	BM2104	15	E	Y	5

Programme Stage 3

At Programme Stage 3, which is worth 140 credits, the core data analytics and statistical subjects are compulsory, as is the Final Year Project. Students choose three electives from a wide range of modules to make up the remainder of Programme Stage 3.

Module Title	SITS Code	Module Credits	Core/ Elective	Can be compensated?	Level
AI and Machine Learning	AS3026	15	C	Y	6
Data Visualisation	AS3027	15	C	Y	6
Final Year Project (Data Analytics)	AS3028	30	C	N	6
Statistical Modelling [CS1c]	AS3110	15	C	Y	6
Probabilistic Modelling [CS2c]	AS3209	20	C	Y	6
Extreme Event Statistics	AS3015	15	E	Y	6
Operational Research	AS3021	15	E	Y	6
Advanced Financial Economics [CM2b]	AS3109	15	E	Y	6
Survival Models [CS2b]	AS3204	20	E	Y	6
Statistical Reasoning, Communication and Ethics	AS3208	15	E	Y	6
Advanced Contingencies [CM1c]	AS3210	15	E	Y	6
Investment	AS3301	15	E	Y	6
General Insurance	AS3303	15	E	Y	6
Fixed Income Portfolio	FR3100	15	E	Y	6

Management					
Technical Analysis	FR3110	15	E	Y	6
Advanced Econometrics & Forecasting	IF3103	15	E	Y	6
Asset-Liability Management	FR3102	15	E	Y	6
Financial Technology	AS3025	15	E	Y	6
Game Theory	MA3662	15	E	Y	6

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; a 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.

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

Certain electives may be pre-requisites for other electives you may wish to take later in the programme. Full details can be found in the individual Module Specifications and will be updated annually in your Course Handbook.

In view of the importance of foreign language skills and employability, you also have the opportunity to study extra-curricular (non-credit bearing) language courses in Arabic, French, German, Mandarin, Russian and Spanish.

TO WHAT KIND OF CAREER MIGHT I GO ON?

When you graduate from this programme, you will be well suited for work as a data scientist or business analyst, particularly in the financial services sector, but also in areas including manufacturing, telecoms and retail. You will also be well suited for work in InsurTech or as an actuary. Within finance, you will be well set up for careers in FinTech and related fields such as quantitative and algorithmic trading and portfolio management, risk management and financial engineering. Finally, if you wish to choose a different direction, you will be well prepared for a career in management consultancy, computing or teaching. You will also have the option of progressing to postgraduate study.

If you would like more information on the Careers support available at City, please go to: <http://www.city.ac.uk/careers/for-students-and-recent-graduates>.

WHAT STUDY ABROAD OPTIONS ARE AVAILABLE?

If you opt to apply for a sandwich year abroad and are accepted you will study at one of our overseas partner universities in between Stages 2 & 3. You will be required to pass all Programme Stage 2 assessments at the first attempt.

Studying abroad enables you to improve your language skills, develop future business contacts and provides you with an international outlook on business.

At least 50% of the modules that you choose during your sandwich year must be directly related to your programme of study, while the other 50% can be chosen from a wide range of disciplines.

There is pass/fail assessment of the sandwich year abroad, where a student is deemed to have passed the year if the modules at the partner institution being visited are passed. No credit is awarded for modules taken on the sandwich year.

WHAT PLACEMENT OPPORTUNITIES ARE AVAILABLE?

Professional Work Placement Option

Programme Details: The Professional Work Placement programme is a recognised part of your degree, which is endorsed on your final degree certificate. It is undertaken during your 3rd year, giving you the opportunity to add a valuable additional year to your degree working for a professional organisation, either in the UK or abroad. You will then return to Bayes, after your Placement, to complete your final year.

The aims of the Professional Work Placement go beyond simply work experience. You will spend a period of 9 – 12 months within a professional working environment taking on real responsibilities whilst receiving a salary. This option is intended to give you practical experience which can be related to the knowledge gained at University and is greatly valued by graduate employers. You also get the opportunity to explore the industry you would like to enter after graduation. You will develop key personal, transferable and professional skills, along with the added possibility of securing a graduate position on completing your placement.

Eligibility: You are required to pass all of your Programme Stage 2 assessments at the first attempt. However, students not meeting this requirement will be considered on a case-by-case basis.

Summer Internships:

Taken at the end of Programme Stage 2 for a period of 4 – 12 weeks, this is a great opportunity to gain vocationally relevant work experience within a professional organisation. On completion of your internship you will receive a 'Certificate of Professional Experience'

Eligibility: No requirements

WILL I GET ANY PROFESSIONAL RECOGNITION?

Accrediting Body: Institute and Faculty of Actuaries

Nature of Accreditation

Satisfactory performance in specific modules in all 3 Stages will earn Honours graduates exemptions from up to 5 of the 13 professional subjects required by the Institute and Faculty of Actuaries to become a qualified actuary.

The following subjects from the Institute and Faculty of Actuaries' examinations are covered within the Programme:

Subject CS1: Actuarial Statistics 1

Subject CS2: Actuarial Statistics 2
Subject CM1: Actuarial Mathematics 1
Subject CM2: Actuarial Mathematics 2
Subject CB1: Business 1 (Business Finance)
Subject CB2: Business 2 (Business Economics)

Note that while six of the professional subjects are covered within the degree programme, students are only able to gain a maximum of five due to elective restrictions at Stage 2.

HOW DO I ENTER THE PROGRAMME?

For A-level students our standard offer is A (Maths) AA.

For International Baccalaureate students our standard offer is 36 points overall, including 7 in HL Maths and minimum 5 in all subjects.

We also make offers on other international qualifications that are recognised by British Universities.

Students who have successfully completed Programme Stage 1 of the BSc in Actuarial Science will be admitted to Programme Stage 2 of this programme on request. Students who have completed Programme Stage 1 of the BSc in Finance with Actuarial Science may also be admitted to Programme Stage 2 of this programme.

For students whose first language is not English, evidence of English language proficiency is required.

IELTS: 6.5 with a minimum of 6 in any unit.

Pearson Academic English: 58 overall with a minimum of 50 in any component

Version: 3.1

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For use from: 2022-23