School of Mathematical Sciences

BSc in Actuarial Mathematics[1]

Programme Description[2]

Dublin City University

2019/2020

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1. Overview of the Programme

- The BSc in Actuarial Mathematics programme provides students with a firm foundation in mathematics, computing and statistics for careers as actuaries in particular, or in finance in general. It is also suitable for students who may be interested in research, teaching or other non-financial areas. Specifically, the programme provides the opportunity to gain exemptions from some of the professional actuarial examinations of the Institute and Faculty of Actuaries (IFoA), UK. It is a challenging programme both in terms of breadth of application and intellectual depth. Enjoyment of mathematics, problem-solving and an interest in the applications of mathematics are important prerequisites.

- The programme is of four years' duration and may be divided into two parts. In the first four semesters (i.e. the first and second years) students are introduced to a wide range of mathematical subjects to allow them to make informed choices about subjects in the fourth year. In the latter semesters, students may select subjects with varying degrees of emphasis on actuarial or financial mathematics. Details of the subjects are set out in Section 4.

- It is possible for students to be recommended for exemption from some of the professional actuarial examinations of the Institute and Faculty of Actuaries (IFoA), UK. Recommendations for exemptions will be based on student performance in certain modules. Details of the possible exemptions are set out in a separate document – Terms and Conditions for Students Sitting Examinations for Actuarial Exemptions.

- An important feature is INTRA, a programme under which the University attempts to place students in relevant commercial employment, normally in the second semester of year three. This is an opportunity for students to gain valuable employment experience in an appropriate commercial area.

- Modern business and industry need sophisticated mathematical and allied skills. While the programme is specifically designed for an actuarial career or careers in finance, it is also useful for graduates who may wish to progress to research, teaching or employment in business or industry generally.

2. Programme Aims & Objectives

- The educational philosophy underpinning this programme is that there is intrinsic value attached to acquiring a dep knowledge of mathematics; knowledge of the role of applied mathematics in science and society; knowledge and experience of the use of technology in mathematics; the ability to generate and contribute new knowledge to the areas of actuarial science and financial mathematics.

- The aims of the programme are the following: -

  - To provide a strong grounding in basic mathematical principles, with a strong emphasis on the use of computers at every stage;
  - To ensure a knowledge of areas of application of mathematics in actuarial science, risk management and financial engineering;
  - To ensure competence in statistical methods and stochastic processes and their use to model demographic and actuarial concepts;
  - To develop problem-solving skills, analytical reasoning and critical thinking in relation to the assumptions underlying any mathematical models formulated within the course;
  - To give students an opportunity to gain experience of employment in the financial and actuarial services areas during the programme.

- The specific objectives for the programme are:

  - To introduce students to the concepts and applications of actuarial studies as an academic discipline, appropriate to the attainment level of an undergraduate degree in actuarial mathematics.
  - To offer students the opportunity to gain exemptions from a number of the professional examinations of the Institute & Faculty of Actuaries (IFoA), UK;
  - To introduce students to subjects which do not form part of the professional actuarial syllabus currently but which are nevertheless of interest to actuaries.

The nature of a mathematics programme is such that the majority of the time is spent acquiring and honing analytical and problem-solving skills. Apart from problem-solving skills, the programme incorporates, to some extent, learning skills, management skills and information technology skills:

- Analytical & Problem Solving Skills:

  - Virtually all modules will develop abstract thinking and problem-solving skills. This is a feature of mathematics programmes most valued by employers.

- Information Technology:

  - The full-year, first-year Computing module was dedicated to C++ programming from 2008/09 to 2011/12 inclusive, after which time the programming language was Matlab (the second-year Numerical Mathematics module, in which 25% is allocated to computing assignments, switched to Matlab from 2013/14 onwards). In 2018/19 the 1st year Computing module covered R in addition to Matlab.
  - From 2019/20 the first year computing module was split into a 10 credit module covering Phyton and R and a 5 credit module covering Excel (Financial Modelling with Excel).
  - Information technology will be used in the delivery of many modules in the form of 'Loop' (formerly 'Moodle') pages, and it is anticipated that, for most if not all students, the Industrial Placement (INTRA) in third year will involve Excel, VBA programming or the use of some other computer packages.

- Communication Skills:

  ➢ The Industrial Placement in third year will have a large and practical communication element.

- Learning Skills:

  ➢ University-level mathematics requires a different learning method than pre-university mathematics. Part of the difficulty encountered by students in mathematics programmes is making this transition. The first-year module 'Mathematical Concepts & Skills' will address the issue of independent learning to assist students in making this transition, while the modules Sequences and Series in the first year, together with Analysis and Differential Equations in second year, will address the change to abstract thinking, using the method of guided enquiry.

3. Intake and Entry Requirements

- The programme can be accessed exclusively through the Central Applications Office (CAO Code DC126). The entry requirement (in addition to the general conditions set by the University) is a grade H3 or higher in Higher-Level Mathematics in the Irish Leaving Certificate examination. Where a school-leaving examination other than the Leaving Certificate is presented, an equivalent grade in Mathematics will be required.

- There is also an alternative entry mechanism via the common entry route, which has a designated CAO Code (DC127) and is entitled the Common Entry into Actuarial, Financial and Mathematical Sciences (CAFM). The entry requirement (in addition to the general conditions set by the University) is also a grade H3 or higher in Higher-Level Mathematics in the Irish Leaving Certificate examination, in line with the standard required for direct entry into the BSc in Actuarial Mathematics programme.

- At the end of the second year, students on the common entry degree will be ranked based on their second-year results. In order of merit, students will then choose places on the BSc in Actuarial Mathematics or the BSc in Financial Mathematics. At any particular stage, a maximum of 50 students per year on either degree will be permitted. Admission to the BSc in Actuarial Mathematics will also be subject to the approval of the Progression & Awards Board, in consultation with the External and Independent Examiners for that degree.

4. Programme Structure & Assessment

- Within the Bologna Declaration, it is proposed that European Higher Education should be based on courses which are compatible with the European Credit Transfer System (ECTS). ECTS is a tool for conversion between national education systems and is an important instrument in removing barriers to mobility. The two main elements of ECTS are a credit system and a grading scale. In the ECTS credit system, one year of full-time study corresponds to 60 credits. ECTS also offers a grading scale which can be used to convert grades awarded in one national system into the most closely-corresponding grade in another system. The two elements, when used together, enable a student's learning achievement in one institution to be recognised by another.

- Successful completion of each year in the programme has an ECTS credit value of 60.

- The distribution of modules across the programme years is present in Table 1. The following points should be noted.

  - Year 1: Modules 1, 2, 3, 4 and 5 are core in Semester1, modules 6, 7, 8, 9 and 10 are core in Semester 2, and module 11 is a year-long core module.

  - Year 2: Modules 12 to 16 are core in Semester 1 and modules 17 to 21 are core in Semester 2.

  - Year 3: Modules 22 to 26 are core in Semester 1. Students undertake a 32-week industrial placement (INTRA) commencing at the beginning of Semester 2.

  - Year 4: Modules 28 and 29 are core in Semester 1 and students must choose two of the Semester 1 option modules 30 to 33. Modules 34 to 36 are core in Semester 2 and students must choose one of the Semester 2 option modules 37 to 39.

- The core idea underpinning the learning philosophy of this degree is that graduates in applied mathematics must accumulate a combination of knowledge, skills and modes of thinking in order to succeed in bringing their education to bear in their future careers. We see this accumulation as happening on a gradual basis, with students starting at a level where they must review and refine their school-mathematics knowledge and skills and begin the process of reflecting on the nature of mathematics and their engagement with it.

- In subsequent years, students will become more independent in their learning; modules dealing specifically with helping students to make this transition from years one and two. In particular, the flow of modules is designed with a view to helping students make the transition to the stage where they can construct their own formal mathematical arguments.

		ACM 2019/2020			
No.	Code	Module Title	Credits	Terminal Examination	Continuous Assessment

Year 1

No.	Code	Module Title	Credits	Terminal Examination	Continuous Assessment
1	MS103	Linear Mathematics I	5	80%	20%
2	MS111	Mathematical Concepts & Skills	5	70%	30%
3	MS112	Differential Calculus	5	75%	25%
4	EF113	Introduction to Microeconomics	5	80%	20%
5	MS119	Financial Modelling with Excel	5	50%	50%
6	MS104	Linear Mathematics II	5	80%	20%
7	MS113	Integral Calculus	5	80%	20%
8	MS114	Sequences & Series	5	80%	20%
9	MS117	Probability I	5	60%	40%
10	EF114	Introduction to Macroeconomics	5	80%	20%
11	CA167	Computing for Mathematics	10	70%	30%

Year 2

No.	Code	Module Title	Credits	Terminal Examination	Continuous Assessment
12	MS205	Calculus of Several Variables	5	75%	25%
13	MS213	Numerical Methods	7.5	75%	25%
14	MS217	Linear Algebra	5	75%	25%
15	MS231	Analysis	7.5	75%	25%
16	MS255	Statistics I	5	80%	20%
17	AC316	Accounting I	7.5	80%	20%
18	MS232	Probability II	7.5	75%	25%
19	MS211	Differential Equations	5	75%	25%
20	MS216	Mathematics of Finance	5	80%	20%
21	MS258	Statistics II	5	80%	20%

Year 3

No.	Code	Module Title	Credits	Terminal Examination	Continuous Assessment
22	EF316	Accounting II	7.5	80%	20%
23	MS308	Stochastic Modelling	7.5	75%	25%
24	MS318	Financial Mathematics	7.5	75%	25%
25	MS338	Actuarial Modelling	5	100%	-
26	MS324	Financial & Actuarial Data Analysis	7.5	-	100%
27	IN314	INTRA ACM	25	-	100%

Year 4

No.	Code	Module Title	Credits	Terminal Examination	Continuous Assessment
28	MS427	Financial Economics I	7.5	75%	25%
29	MS449	Risk Theory	10	80%	20%
30	MS437	Probability & Finance I	7.5	75%	25%
31	MS408	Probability & Finance II	7.5	75%	25%
32	MS455	Simulation for Finance	7.5	40%	60%
33	MS406	Coding & Cryptography	7.5	75%	25%
34	MS428	Financial Economics II	7.5	75%	25%
35	MS447	Time Series	7.5	75%	25%
36	MS448	Life Contingencies	10	75%	25%
37	MS456	Deep Learning	7.5	0%	100%
38	MS426	Stochastic Finance	7.5	100%	-
39	MS434	Optimisation	7.5	75%	25%

Table 1: 2019/20 Modules by ACM Programme Year

- The guiding philosophy behind the assessments is to develop and test the understanding and mastery of the various skills required of a graduate in applied mathematics. The assessment methods will aim towards the measurement of specific module learning outcomes and the encouragement of creativity, critical thinking and academic writing skills.

- The assessment of the modules will be by continuous assessment, project work and terminal examination or by a combination of these elements. The nature of the assessment and percentage marks allocated to the elements of continuous assessment will vary depending on the module. Table 1 indicates the relative breakdown of the marks between continuous assessment (CA) and terminal examination (TE) for each module.

- Strict adherence to the University's Marks & Standards will be observed in all matters relating to progression regulations, compensation regulations, accumulation of credits, the attainment levels for award classifications and regulations regarding repeat attempts. With the exception of the actuarial exemption modules (listed in document *Terms and Conditions for Students Sitting Examinations for Actuarial Exemptions*), all the taught modules in the programme are eligible for compensation as defined in the Marks & Standards.

- A brief summary of the main progression regulations and award classifications is given below:

  - The pass mark is 40%.

  - In order to progress from one year of study to the next, students must pass all modules, either unequivocally or by means of compensations (in accordance with such regulations as are in place prescribed for the programme of study).

  - For students graduating from 2017/2018, classification of the final-degree award will be based on a weighted average for the years 2, 3 and 4 precision year scores as follows:

Year	Contribution to Award Classification
2	25%
3	15%
4	60%

First Class Honours	70% - 100%
Second-Class Honours: Grade 1	60% - 69%
Second-Class Honours: Grade 2	50% - 59%
Third-Class Honours	40% - 49%

  - For students graduating prior to 2017/18 the final degree award was based on the 4th year precision mark only.

  - A student who fails a module, or who does not take a full set of examinations in the final year of the programme, is normally eligible for third-class honours only.

5. Programme Changes

- Year 4 of the ACM programme became available for the first time in 2011/12. The full set of module specifications for Year 4 were approved by the Accreditation Panel of the Institute & Faculty of Actuaries (IFoA) and the then Independent and External Examiners.

- From February 2011, the School of Mathematical Sciences assumed responsibility for the teaching of CT3-associated modules CA255 and CA258. With some re-distribution of the CT3 learning objectives across modules, the module codes were amended to MS255 and MS258 respectively.

- On a phased basis (see Tables 3, 4, 5 and 6), the original CT2-associated modules of EF107A and AC334 were replaced by AC316 and EF316 (the latter two were the CT-associated modules in the old Financial & Actuarial Mathematics programme). While all the CT2 learning objectives remained in place, there was some necessary re-organisation of material across modules. AC316 was taken by ACM2 students for the first time in 2011/12 while EF316 was taken by ACM3 students for the first time in 2012/13.

- From 2013/14, two additional option modules (MS339 and MS341) were added to the ACM4 suite of modules from which module MS551 was removed (see Table 7). Additionally, module MS447 moved from Semester 1 to Semester 2. Also, from 2013/14 onwards, the title of module MS306 changed from Treasury Mathematics to Work-Based Skills.

- From 2014/15 (see Table 8), three new optional modules were added (two in Semester 1, namely MS437: Probability & Finance I and MS408: Probability & Finance II, and one in Semester 2, namely MS426: Stochastic Finance.) Module MS455: Simulation for Finance changed from being core to optional in Semester 1. Optional modules MS339: Mechanics and MS341: Algebra were removed from Semester 1.

- A decision was taken at the School Teaching Meeting in March 2014 to the effect that the overall degree-precision score will be based on a weighted average of the years 2, 3 and 4 precision-year scores, with weightings of 25%, 15% and 60% for years 2, 3 and 4 respectively, and that this arrangement would come into operation for the first time for final-year students presenting in 2017/18. Prior to 2017/18 award classification was based on your 4th year grade only.

- From 2015 the three first-year modules MS105, MS108 and MS109 (totalling 20 credits) were replaced by four 5-credit modules (Mathematical Concepts & Skills and Differential Calculus in Semester 1 and Integral Calculus and Sequences & Series in Semester 2). The year-long, 10-credit first-year Economics module EF110 and split into two 5-credit modules (EF113: Introduction to Microeconomics in Semester 1 and EF114: Introduction to Macroeconomics in Semester 2). Also, the 5-credit, second-year module Complex Variable was removed from the academic structures, with the credit ratings for Analysis (formerly Analysis II) and Probability II being correspondingly increased from 5 to 7.5 credits.

- 2016/17: No change to programme structures.

- 2017/18: A new module, MS324: Financial and Actuarial Data Analysis, was added as a core module in Semester 1 of year 3. The optional work-based skills module was removed. The INTRA module in year 3, Semester 2 was reduced to 25 credits and the module code changed to IN314. The code for module Actuarial Modelling was changed to MS338 and the credits reduced to 5.

- 2018/19: No changes to programme structures.

- 2019/20: The first year computing module was split into two modules; CA167 (10 credits) teaching Phyton and R and a new 5-credit module MS119 covering Excel from a financial applications perspective. Module MS117 was updated to require students to pass both the continuous assessment and end of semester exam components separately. The IFoA Curriculum 2019 syllabus was introduced in Year 1 in September 2019/20 and will roll in over a four-year period; Year 2 will incorporate the Curriculum 2019 requirements in 2020/21, Year 3 in 2021/22 and Year 4 in 2022/23. Full details can be

found in the document: *Terms and Conditions for Students Sitting Examinations for Actuarial Exemptions.*

6. Contact Details

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		ACM 2009/2010			
No.	Code	Module Title	Credits	Terminal Examination	Continuous Assessment

Year 1

No.	Code	Module Title	Credits	Terminal Examination	Continuous Assessment
1	MS105	Calculus	10	75%	25%
2	MS108	The Mathematical Experience	2.5	50%	50%
3	EF107A	Corporate Finance	7.5	75%	25%
4	MS117	Probability I	5	75%	25%
5	CA167	Computing for Mathematics	15	70%	30%
6	EF110	Introduction to Economics	10	80%	20%
7	MS106	Linear Mathematics	10	75%	25%

Year 2

No.	Code	Module Title	Credits	Terminal Examination	Continuous Assessment
8	CA255	Statistics I	5	100%	-
9	MS205	Calculus of Several Variables	5	75%	25%
10	MS209	Analysis I	7.5	60%	40%
11	MS213	Numerical Methods	7.5	75%	25%
12	MS217	Linear Algebra	5	75%	25%
13	CA258	Statistics II	5	80%	20%
14	MS206	Complex Analysis	5	75%	25%
15	MS208	Probability II	5	75%	25%
16	MS211	Differential Equations	5	75%	25%
17	MS216	Mathematics of Finance	5	80%	20%
18	MS229	Analysis II	5	75%	25%

Year 3 (Operational from 2010/11)

No.	Code	Module Title	Credits	Terminal Examination	Continuous Assessment
19	AC334	Principles of Accounting & Taxation	10	80%	20%
20	MS308	Stochastic Modelling	7.5	75%	25%
21	MS318	Financial Mathematics	7.5	75%	25%
22	MS332	Actuarial Modelling	7.5	100%	-
23	MS306	Treasury Mathematics	-	75%	25%
24	IN306	INTRA	30	-	100%

Year 4 (Operational from 2011/12)

No.	Code	Module Title	Credits	Terminal Examination	Continuous Assessment
25	MS427	Financial Economics I	7.5	75%	25%
26	MS447	Time Series	7.5	75%	25%
27	MS449	Risk Theory	10	100%	-
28	MS551	Monte Carlo Methods in Finance	7.5	50%	50%
29	MS406	Extreme Value	7.5	75%	25%
30	MS428	Financial Economics II	7.5	75%	25%
31	MS448	Life Contingencies	10	100%	-
32	EF520	Financial Engineering	7.5	75%	25%
33	EF583	Fixed Income Markets & Instruments	7.5	75%	25%
34	EFxxx	Advanced Financial Econometrics	7.5	75%	25%

Table 2: 2009/10 Modules by ACM Programme Year

		ACM 2010/2011			
No.	**Code**	**Module Title**	**Credits**	**Terminal Examination**	**Continuous Assessment**

Year 1

No.	Code	Module Title	Credits	Terminal Examination	Continuous Assessment
1	MS105	Calculus	7.5	75%	25%
2	MS108	The Mathematical Experience	5	50%	50%
3	MS109	Analysis I	7.5	60%	40%
4	MS117	Probability I	5	75%	25%
5	CA167	Computing for Mathematics	15	70%	30%
6	EF110	Introduction to Economics	10	80%	20%
7	MS106	Linear Mathematics	10	75%	25%

Year 2

No.	Code	Module Title	Credits	Terminal Examination	Continuous Assessment
8	CA255	Statistics I	5	100%	-
9	MS205	Calculus of Several Variables	5	75%	25%
10	MS209	Analysis I	7.5	60%	40%
11	MS213	Numerical Methods	7.5	75%	25%
12	MS217	Linear Algebra	5	75%	25%
13	CA258	Statistics II	5	80%	20%
14	MS206	Complex Analysis	5	75%	25%
15	MS208	Probability II	5	75%	25%
16	MS211	Differential Equations	5	75%	25%
17	MS216	Mathematics of Finance	5	80%	20%
18	MS229	Analysis II	5	75%	25%

Year 3

No.	Code	Module Title	Credits	Terminal Examination	Continuous Assessment
19	AC334	Principles of Accounting & Taxation	10	80%	20%
20	MS308	Stochastic Modelling	7.5	75%	25%
21	MS318	Financial Mathematics	7.5	75%	25%
22	MS332	Actuarial Modelling	7.5	100%	-
23	MS306	Treasury Mathematics	-	-	P/F
24	IN306	INTRA	30	-	100%

Year 4 (Operational from 2011/12)

No.	Code	Module Title	Credits	Terminal Examination	Continuous Assessment
25	MS427	Financial Economics I	7.5	75%	25%
26	MS447	Time Series	7.5	75%	25%
27	MS449	Risk Theory	10	100%	-
28	MS450	Simulation for Finance	7.5	-	100%
29	MS428	Financial Economics II	7.5	75%	25%
30	MS448	Life Contingencies	10	75%	25%
31	EF520	Financial Engineering	7.5	100%	-
32	MS415	Optimisation	7.5	75%	25%
33	MS505	Coding & Cryptography	7.5	75%	25%
34	MS551	Monto Carlo Methods in Finance	7.5	50%	50%

Table 3: 2010/11 Modules by ACM Programme Year

		ACM 2011/2012			
No.	**Code**	**Module Title**	**Credits**	**Terminal Examination**	**Continuous Assessment**

Year 1

No.	Code	Module Title	Credits	Terminal Examination	Continuous Assessment
1	MS105	Calculus	7.5	75%	25%
2	MS108	The Mathematical Experience	5	50%	50%
3	MS109	Analysis I	7.5	60%	40%
4	MS117	Probability I	5	75%	25%
5	CA167	Computing for Mathematics	15	70%	30%
6	EF110	Introduction to Economics	10	70%	30%
7	MS106	Linear Mathematics	10	80%	20%

Year 2

No.	Code	Module Title	Credits	Terminal Examination	Continuous Assessment
8	MS205	Calculus of Several Variables	5	75%	25%
9	MS213	Numerical Methods	7.5	75%	25%
10	MS217	Linear Algebra	5	75%	25%
11	MS229	Analysis II	5	75%	25%
12	MS255	Statistics I	5	80%	20%
13	AC316	Accounting I	7.5	80%	20%
14	MS206	Complex Analysis	5	75%	25%
15	MS208	Probability II	5	75%	25%
16	MS211	Differential Equations	5	75%	25%
17	MS216	Mathematics of Finance	5	80%	20%
18	MS258	Statistics II	5	80%	20%

Year 3

No.	Code	Module Title	Credits	Terminal Examination	Continuous Assessment
19	AC334	Principles of Accounting & Taxation	10	80%	20%
20	MS308	Stochastic Modelling	7.5	75%	25%
21	MS318	Financial Mathematics	7.5	75%	25%
22	MS332	Actuarial Modelling	7.5	100%	-
23	MS306	Treasury Mathematics	-	-	P/F
24	IN306	INTRA	30	-	100%

Year 4

No.	Code	Module Title	Credits	Terminal Examination	Continuous Assessment
25	MS427	Financial Economics I	7.5	75%	25%
26	MS447	Time Series	7.5	75%	25%
27	MS449	Risk Theory	10	100%	-
28	MS450	Simulation for Finance	7.5	-	100%
29	MS428	Financial Economics II	7.5	75%	25%
30	MS448	Life Contingencies	10	75%	25%
31	EF520	Financial Engineering	7.5	75%	25%
32	MS415	Optimisation	7.5	75%	25%
33	MS505	Coding & Cryptography	7.5	75%	25%
34	MS551	Monto Carlo Methods in Finance	7.5	50%	50%

Table 4: 2011/12 Modules by ACM Programme Year

ACM 2012/2013

No.	Code	Module Title	Credits	Terminal Examination	Continuous Assessment
Year 1					
1	MS103	Linear Mathematics I	5	80%	20%
2	MS105	Calculus	7.5	75%	25%
3	MS108	The Mathematical Experience	5	50%	50%
4	MS104	Linear Mathematics II	5	80%	20%
5	MS109	Analysis I	7.5	60%	40%
6	MS117	Probability I	5	75%	25%
7	CA167	Computing for Mathematics	15	70%	30%
8	EF110	Introduction to Economics	10	70%	30%
Year 2					
9	MS205	Calculus of Several Variables	5	75%	25%
10	MS213	Numerical Methods	7.5	75%	25%
11	MS217	Linear Algebra	5	75%	25%
12	MS229	Analysis II	5	75%	25%
13	MS255	Statistics I	5	80%	20%
14	AC316	Accounting I	7.5	80%	20%
15	MS206	Complex Analysis	5	75%	25%
16	MS208	Probability II	5	75%	25%
17	MS211	Differential Equations	5	75%	25%
18	MS216	Mathematics of Finance	5	80%	20%
19	MS258	Statistics II	5	80%	20%
Year 3					
20	EF316	Accounting II	7.5	80%	20%
21	MS308	Stochastic Modelling	7.5	75%	25%
22	MS318	Financial Mathematics	7.5	75%	25%
23	MS332	Actuarial Modelling	7.5	80%	20%
24	MS306	Treasury Mathematics	-	-	P/F
25	IN306	INTRA	30	-	100%
Year 4					
26	MS427	Financial Economics I	7.5	75%	25%
27	MS447	Time Series	7.5	75%	25%
28	MS449	Risk Theory	10	80%	20%
29	MS450	Simulation for Finance	7.5	-	100%
30	MS428	Financial Economics II	7.5	75%	25%
31	MS448	Life Contingencies	10	75%	25%
32	EF520	Financial Engineering	7.5	75%	25%
33	MS415	Optimisation	7.5	75%	25%
34	MS505	Coding & Cryptography	7.5	75%	25%
35	MS551	Monto Carlo Methods in Finance	7.5	50%	50%

Table 5: 2012/13 Modules by ACM Programme Year

		ACM 2013/2014			
No.	**Code**	**Module Title**	**Credits**	**Terminal Examination**	**Continuous Assessment**

Year 1

1	MS103	Linear Mathematics I	5	80%	20%
2	MS105	Calculus	7.5	75%	25%
3	MS108	The Mathematical Experience	5	50%	50%
4	MS104	Linear Mathematics II	5	80%	20%
5	MS109	Analysis I	7.5	85%	15%
6	MS117	Probability I	5	75%	25%
7	CA167	Computing for Mathematics	15	70%	30%
8	EF110	Introduction to Economics	10	70%	30%

Year 2

9	MS205	Calculus of Several Variables	5	75%	25%
10	MS213	Numerical Methods	7.5	75%	25%
11	MS217	Linear Algebra	5	75%	25%
12	MS229	Analysis II	5	75%	25%
13	MS255	Statistics I	5	80%	20%
14	AC316	Accounting I	7.5	80%	20%
15	MS206	Complex Analysis	5	75%	25%
16	MS208	Probability II	5	75%	25%
17	MS211	Differential Equations	5	75%	25%
18	MS216	Mathematics of Finance	5	80%	20%
19	MS258	Statistics II	5	80%	20%

Year 3

20	EF316	Accounting II	7.5	80%	20%
21	MS308	Stochastic Modelling	7.5	75%	25%
22	MS318	Financial Mathematics	7.5	75%	25%
23	MS332	Actuarial Modelling	7.5	100%	-
24	MS306	Work-Based Skills	-	-	P/F
25	IN306	INTRA	30	-	100%

Year 4

26	MS427	Financial Economics I	7.5	75%	25%
27	MS449	Risk Theory	10	80%	20%
28	MS450	Simulation for Finance	7.5	-	100%
29	MS339	Mechanics	7.5	75%	25%
30	MS341	Algebra	7.5	75%	25%
31	MS505	Coding& Cryptography	7.5	75%	25%
32	MS428	Financial Economics II	7.5	75%	25%
33	MS447	Time Series	7.5	75%	25%
34	MS448	Life Contingencies	10	75%	25%
35	EF520	Financial Engineering	7.5	75%	25%
36	MS415	Optimisation	7.5	75%	25%

Table 6: 2013/14 Modules by ACM Programme Year

		ACM 2014/2015			
No.	**Code**	**Module Title**	**Credits**	**Terminal Examination**	**Continuous Assessment**

Year 1

No.	Code	Module Title	Credits	Terminal Examination	Continuous Assessment
1	MS103	Linear Mathematics I	5	80%	20%
2	MS105	Calculus	7.5	75%	25%
3	MS108	The Mathematical Experience	5	50%	50%
4	MS104	Linear Mathematics II	5	80%	20%
5	MS109	Analysis I	7.5	85%	15%
6	MS117	Probability I	5	75%	25%
7	CA167	Computing for Mathematics	15	70%	30%
8	EF110	Introduction to Economics	10	70%	30%

Year 2

No.	Code	Module Title	Credits	Terminal Examination	Continuous Assessment
9	MS205	Calculus of Several Variables	5	75%	25%
10	MS213	Numerical Methods	7.5	75%	25%
11	MS217	Linear Algebra	5	75%	25%
12	MS229	Analysis II	5	75%	25%
13	MS255	Statistics I	5	80%	20%
14	AC316	Accounting I	7.5	80%	20%
15	MS206	Complex Analysis	5	75%	25%
16	MS208	Probability II	5	75%	25%
17	MS211	Differential Equations	5	75%	25%
18	MS216	Mathematics of Finance	5	80%	20%
19	MS258	Statistics II	5	80%	20%

Year 3

No.	Code	Module Title	Credits	Terminal Examination	Continuous Assessment
20	EF316	Accounting II	7.5	80%	20%
21	MS308	Stochastic Modelling	7.5	75%	25%
22	MS318	Financial Mathematics	7.5	75%	25%
23	MS332	Actuarial Modelling	7.5	100%	-
24	MS306	Work-Based Skills	-	-	P/F
25	IN306	INTRA	30	-	100%

Year 4

No.	Code	Module Title	Credits	Terminal Examination	Continuous Assessment
26	MS427	Financial Economics I	7.5	75%	25%
27	MS449	Risk Theory	10	80%	20%
28	MS437	Probability & Finance I	7.5	75%	25%
29	MS408	Probability & Finance II	7.5	75%	25%
30	MS455	Simulation for Finance	7.5	40%	60%
31	MS406	Coding & Cryptography	7.5	75%	25%
32	MS428	Financial Economics II	7.5	75%	25%
33	MS447	Time Series	7.5	75%	25%
34	MS448	Life Contingencies	10	75%	25%
35	EF4143	Financial Engineering	7.5	75%	25%
36	MS426	Stochastic Finance	7.5	100%	-
37	MS434	Optimisation	7.5	75%	25%

Table 7: 2014/15 Modules by ACM Programme Year

No.	Code	Module Title	Credits	Terminal Examination	Continuous Assessment

Year 1

No.	Code	Module Title	Credits	Terminal Examination	Continuous Assessment
1	MS103	Linear Mathematics I	5	80%	20%
2	MS111	Mathematical Concepts & Skills	5	70%	30%
3	MS112	Differential Calculus	5	75%	25%
4	EF113	Introduction to Microeconomics	5	80%	20%
5	MS104	Linear Mathematics II	5	80%	20%
6	MS113	Integral Calculus	5	75%	25%
7	MS114	Sequences & Series	5	75%	25%
8	MS117	Probability I	5	75%	25%
9	EF114	Introduction to Macroeconomics	5	80%	20%
10	CA167	Computing for Mathematics	15	70%	30%

Year 2

No.	Code	Module Title	Credits	Terminal Examination	Continuous Assessment
11	MS205	Calculus of Several Variables	5	75%	25%
12	MS213	Numerical Methods	7.5	75%	25%
13	MS217	Linear Algebra	5	75%	25%
14	MS231	Analysis	7.5	75%	25%
15	MS255	Statistics I	5	80%	20%
16	AC316	Accounting I	7.5	80%	20%
17	MS232	Probability II	7.5	75%	25%
18	MS211	Differential Equations	5	75%	25%
19	MS216	Mathematics of Finance	5	80%	20%
20	MS258	Statistics II	5	80%	20%

Year 3

No.	Code	Module Title	Credits	Terminal Examination	Continuous Assessment
21	EF316	Accounting II	7.5	80%	20%
22	MS308	Stochastic Modelling	7.5	75%	25%
23	MS318	Financial Mathematics	7.5	75%	25%
24	MS332	Actuarial Modelling	7.5	100%	-
25	MS306	Work-Based Skills	-	-	P/F
26	IN306	INTRA	30	-	100%

Year 4

No.	Code	Module Title	Credits	Terminal Examination	Continuous Assessment
27	MS427	Financial Economics I	7.5	75%	25%
28	MS449	Risk Theory	10	80%	20%
29	MS437	Probability & Finance I	7.5	75%	25%
30	MS408	Probability & Finance II	7.5	75%	25%
31	MS455	Simulation for Finance	7.5	40%	60%
32	MS406	Coding & Cryptography	7.5	75%	25%
33	MS428	Financial Economics II	7.5	75%	25%
34	MS447	Time Series	7.5	75%	25%
35	MS448	Life Contingencies	10	75%	25%
36	EF4143	Financial Engineering	7.5	75%	25%
38	MS426	Stochastic Finance	7.5	100%	-
38	MS434	Optimisation	7.5	75%	25%

Table 8: 2015/16 Modules by ACM Programme Year

No.	Code	Module Title	Credits	Terminal Examination	Continuous Assessment

ACM 2016/2017

Year 1

No.	Code	Module Title	Credits	Terminal Examination	Continuous Assessment
1	MS103	Linear Mathematics I	5	80%	20%
2	MS111	Mathematical Concepts & Skills	5	70%	30%
3	MS112	Differential Calculus	5	75%	25%
4	EF113	Introduction to Microeconomics	5	80%	20%
5	MS104	Linear Mathematics II	5	80%	20%
6	MS113	Integral Calculus	5	80%	20%
7	MS114	Sequences & Series	5	80%	20%
8	MS117	Probability I	5	75%	25%
9	EF114	Introduction to Macroeconomics	5	80%	20%
10	CA167	Computing for Mathematics	15	70%	30%

Year 2

No.	Code	Module Title	Credits	Terminal Examination	Continuous Assessment
11	MS205	Calculus of Several Variables	5	75%	25%
12	MS213	Numerical Methods	7.5	75%	25%
13	MS217	Linear Algebra	5	75%	25%
14	MS231	Analysis	7.5	75%	25%
15	MS255	Statistics I	5	80%	20%
16	AC316	Accounting I	7.5	80%	20%
17	MS232	Probability II	7.5	75%	25%
18	MS211	Differential Equations	5	75%	25%
19	MS216	Mathematics of Finance	5	80%	20%
20	MS258	Statistics II	5	80%	20%

Year 3

No.	Code	Module Title	Credits	Terminal Examination	Continuous Assessment
21	EF316	Accounting II	7.5	80%	20%
22	MS308	Stochastic Modelling	7.5	75%	25%
23	MS318	Financial Mathematics	7.5	75%	25%
24	MS332	Actuarial Modelling	7.5	100%	-
25	MS306	Work-Based Skills	-	-	P/F
26	IN306	INTRA	30	-	100%

Year 4

No.	Code	Module Title	Credits	Terminal Examination	Continuous Assessment
27	MS427	Financial Economics I	7.5	75%	25%
28	MS449	Risk Theory	10	80%	20%
29	MS437	Probability & Finance I	7.5	75%	25%
30	MS408	Probability & Finance II	7.5	75%	25%
31	MS455	Simulation for Finance	7.5	40%	60%
32	MS406	Coding & Cryptography	7.5	75%	25%
33	MS428	Financial Economics II	7.5	75%	25%
34	MS447	Time Series	7.5	75%	25%
35	MS448	Life Contingencies	10	75%	25%
36	EF4143	Financial Engineering	7.5	75%	25%
38	MS426	Stochastic Finance	7.5	100%	-
38	MS434	Optimisation	7.5	75%	25%

Table 9: 2016/16 Modules by ACM Programme Year

		ACM 2017/2018			
No.	**Code**	**Module Title**	**Credits**	**Terminal Examination**	**Continuous Assessment**

Year 1

No.	Code	Module Title	Credits	Terminal Examination	Continuous Assessment
1	MS103	Linear Mathematics I	5	80%	20%
2	MS111	Mathematical Concepts & Skills	5	70%	30%
3	MS112	Differential Calculus	5	75%	25%
4	EF113	Introduction to Microeconomics	5	80%	20%
5	MS104	Linear Mathematics II	5	80%	20%
6	MS113	Integral Calculus	5	80%	20%
7	MS114	Sequences & Series	5	80%	20%
8	MS117	Probability I	5	75%	25%
9	EF114	Introduction to Macroeconomics	5	80%	20%
10	CA167	Computing for Mathematics	15	70%	30%

Year 2

No.	Code	Module Title	Credits	Terminal Examination	Continuous Assessment
11	MS205	Calculus of Several Variables	5	75%	25%
12	MS213	Numerical Methods	7.5	75%	25%
13	MS217	Linear Algebra	5	75%	25%
14	MS231	Analysis	7.5	75%	25%
15	MS255	Statistics I	5	80%	20%
16	AC316	Accounting I	7.5	80%	20%
17	MS232	Probability II	7.5	75%	25%
18	MS211	Differential Equations	5	75%	25%
19	MS216	Mathematics of Finance	5	80%	20%
20	MS258	Statistics II	5	80%	20%

Year 3

No.	Code	Module Title	Credits	Terminal Examination	Continuous Assessment
21	EF316	Accounting II	7.5	80%	20%
22	MS308	Stochastic Modelling	7.5	75%	25%
23	MS318	Financial Mathematics	7.5	75%	25%
24	MS338	Actuarial Modelling	5	100%	-
25	MS324	Financial & Actuarial Data Analysis	7.5	-	100%
26	IN314	INTRA ACM	25	-	100%

Year 4

No.	Code	Module Title	Credits	Terminal Examination	Continuous Assessment
27	MS427	Financial Economics I	7.5	75%	25%
28	MS449	Risk Theory	10	80%	20%
29	MS437	Probability & Finance I	7.5	75%	25%
30	MS408	Probability & Finance II	7.5	75%	25%
31	MS455	Simulation for Finance	7.5	40%	60%
32	MS406	Coding & Cryptography	7.5	75%	25%
33	MS428	Financial Economics II	7.5	75%	25%
34	MS447	Time Series	7.5	75%	25%
35	MS448	Life Contingencies	10	75%	25%
36	EF4143	Financial Engineering	7.5	75%	25%
38	MS426	Stochastic Finance	7.5	100%	-
38	MS434	Optimisation	7.5	75%	25%

Table 10: 2017/18 Modules by ACM Programme Year

		ACM 2018/2019			
No.	**Code**	**Module Title**	**Credits**	**Terminal Examination**	**Continuous Assessment**

Year 1

No.	Code	Module Title	Credits	Terminal Examination	Continuous Assessment
1	MS103	Linear Mathematics I	5	80%	20%
2	MS111	Mathematical Concepts & Skills	5	70%	30%
3	MS112	Differential Calculus	5	75%	25%
4	EF113	Introduction to Microeconomics	5	80%	20%
5	MS104	Linear Mathematics II	5	80%	20%
6	MS113	Integral Calculus	5	80%	20%
7	MS114	Sequences & Series	5	80%	20%
8	MS117	Probability I	5	75%	25%
9	EF114	Introduction to Macroeconomics	5	80%	20%
10	CA167	Computing for Mathematics	15	70%	30%

Year 2

No.	Code	Module Title	Credits	Terminal Examination	Continuous Assessment
11	MS205	Calculus of Several Variables	5	75%	25%
12	MS213	Numerical Methods	7.5	75%	25%
13	MS217	Linear Algebra	5	75%	25%
14	MS231	Analysis	7.5	75%	25%
15	MS255	Statistics I	5	80%	20%
16	AC316	Accounting I	7.5	80%	20%
17	MS232	Probability II	7.5	75%	25%
18	MS211	Differential Equations	5	75%	25%
19	MS216	Mathematics of Finance	5	80%	20%
20	MS258	Statistics II	5	80%	20%

Year 3

No.	Code	Module Title	Credits	Terminal Examination	Continuous Assessment
21	EF316	Accounting II	7.5	80%	20%
22	MS308	Stochastic Modelling	7.5	75%	25%
23	MS318	Financial Mathematics	7.5	75%	25%
24	MS338	Actuarial Modelling	5	100%	-
25	MS324	Financial & Actuarial Data Analysis	7.5	-	100%
26	IN314	INTRA ACM	25	-	100%

Year 4

No.	Code	Module Title	Credits	Terminal Examination	Continuous Assessment
27	MS427	Financial Economics I	7.5	75%	25%
28	MS449	Risk Theory	10	80%	20%
29	MS437	Probability & Finance I	7.5	75%	25%
30	MS408	Probability & Finance II	7.5	75%	25%
31	MS455	Simulation for Finance	7.5	40%	60%
32	MS406	Coding & Cryptography	7.5	75%	25%
33	MS428	Financial Economics II	7.5	75%	25%
34	MS447	Time Series	7.5	75%	25%
35	MS448	Life Contingencies	10	75%	25%
36	EF4143	Financial Engineering	7.5	75%	25%
38	MS426	Stochastic Finance	7.5	100%	-
38	MS434	Optimisation	7.5	75%	25%

Table 11: 2018/19 Modules by ACM Programme Year

		ACM 2019/2020			
No.	**Code**	**Module Title**	**Credits**	**Terminal Examination**	**Continuous Assessment**

Year 1

No.	Code	Module Title	Credits	Terminal Examination	Continuous Assessment
1	MS103	Linear Mathematics I	5	80%	20%
2	MS111	Mathematical Concepts & Skills	5	70%	30%
3	MS112	Differential Calculus	5	75%	25%
4	EF113	Introduction to Microeconomics	5	80%	20%
5	MS119	Financial Modelling with Excel	5	50%	50%
6	MS104	Linear Mathematics II	5	80%	20%
7	MS113	Integral Calculus	5	80%	20%
8	MS114	Sequences & Series	5	80%	20%
9	MS117	Probability I	5	60%	40%
10	EF114	Introduction to Macroeconomics	5	80%	20%
11	CA167	Computing for Mathematics	10	70%	30%

Year 2

No.	Code	Module Title	Credits	Terminal Examination	Continuous Assessment
12	MS205	Calculus of Several Variables	5	75%	25%
13	MS213	Numerical Methods	7.5	75%	25%
14	MS217	Linear Algebra	5	75%	25%
15	MS231	Analysis	7.5	75%	25%
16	MS255	Statistics I	5	80%	20%
17	AC316	Accounting I	7.5	80%	20%
18	MS232	Probability II	7.5	75%	25%
19	MS211	Differential Equations	5	75%	25%
20	MS216	Mathematics of Finance	5	80%	20%
21	MS258	Statistics II	5	80%	20%

Year 3

No.	Code	Module Title	Credits	Terminal Examination	Continuous Assessment
22	EF316	Accounting II	7.5	80%	20%
23	MS308	Stochastic Modelling	7.5	75%	25%
24	MS318	Financial Mathematics	7.5	75%	25%
25	MS338	Actuarial Modelling	5	100%	-
26	MS324	Financial & Actuarial Data Analysis	7.5	-	100%
27	IN314	INTRA ACM	25	-	100%

Year 4

No.	Code	Module Title	Credits	Terminal Examination	Continuous Assessment
28	MS427	Financial Economics I	7.5	75%	25%
29	MS449	Risk Theory	10	80%	20%
30	MS437	Probability & Finance I	7.5	75%	25%
31	MS408	Probability & Finance II	7.5	75%	25%
32	MS455	Simulation for Finance	7.5	40%	60%
33	MS406	Coding & Cryptography	7.5	75%	25%
34	MS428	Financial Economics II	7.5	75%	25%
35	MS447	Time Series	7.5	75%	25%
36	MS448	Life Contingencies	10	75%	25%
37	MS456	Deep Learning	7.5	0%	100%
38	MS426	Stochastic Finance	7.5	100%	-
39	MS434	Optimisation	7.5	75%	25%

Table 1: 2019/20 Modules by ACM Programme Year