4.3. Programme structure

The programmes, BSc (Hons) Mathematical Sciences and BSc (Hons) Industrial Mathematics, are four-stage, 240 ECTS programmes, with each stage consisting of 60 ECTS. ECTS denotes European Credit Transfer and Accumulation System and is a measurement of the student workload associated with a module. It is used within TU Dublin to denote the learning credits associated with any module. A total of 5 ECTS is equivalent to a student study workload of 100 hours. These hours are a combination of contact with lecturers (through lectures, tutorials, practical sessions, laboratory sessions and group study sessions) and self-study. Contact may include elements of remote learning.

The programme is full-time and is in modular form. Lectures are delivered Mondays – Fridays and the timetable for the delivery of modules is available via the online student timetable system. Some elements of delivery may be online via the University's student learning system, Brightspace.

In Stage 3 of the programme students will normally undertake a six-month work placement from mid/late January to July. If it is not possible to provide a work placement for all students, an alternative will be provided. The student, while on work placement, will be required to maintain weekly logs detailing the nature of their work and their experiences. The student will submit the weekly logs along with a written report summarising their work experience at the end of the placement, which will contribute towards their assessment. In addition, the student will be required to make a formal presentation, which will also contribute towards their assessment. Work placement procedures are described in the appendix of this document.

In Stage 4 students undertake a major project involving independent study and research supervised by an academic member of staff. The project is assessment includes a written report and presentation. Project procedures are described in the appendix of this document.

Below is a summary of the modules, including their learning and assessment requirements, for each stage. The detailed syllabus for all modules are given in the Syllabus section. (CA indicates Continuous Assessment component.)

4.3.1. Stage 1

List of modules for Stage 1 TU874 Mathematical Sciences & TU873 Industrial Mathematics

Module	Title	Semester	ECTS
MATH 1801	Foundation Mathematics	1	10
MATH 1802	Calculus I	2	5
MATH 1803	Discrete Mathematics I	1	5
MATH 1804	Linear Algebra I	2	5
MATH 1805	Statistics I	2	5
MATH 1812	Algorithms	1	5
MATH 1810	Introduction to Scientific Python	1	5
MATH 1811	Introduction to Mechanics with Python	2	5
MATH 1808	Mathematical Modelling I	1&2	5
MATH 1809	Mathematics Laboratory	1&2	5
PROF 1801	Professional Development I	1&2	5
TOTAL			60

Description of module workload and Assessment

Module	Lecture (hrs)	Tutorial/ Lab (hrs)	Self-study (hrs)	Total (hrs)	Assessment
MATH 1801 Foundation Mathematics	52	26	122	200	2 hr Exam (70%) CA(30%)
MATH 1802 Calculus I	39	13	48	100	2 hr Exam (70%) CA(30%)
MATH 1803 Discrete Mathematics I	26	13	61	100	2 hr Exam (70%) CA(30%)
MATH 1804 Linear Algebra I	26	13	61	100	2 hr Exam (70%) CA(30%)
MATH 1805 Statistics I	26	13	61	100	2 hr Exam (70%) CA(30%)
MATH 1812 Algorithms	26	13	61	100	2 hr Exam (70%) CA(30%)
MATH 1810 Introduction to Scientific Python	26	26	48	100	CA(100%)
MATH 1811 Introduction to Mechanics with Python	26	26	48	100	2 hr Exam (70%) CA(30%)
MATH 1808 Mathematical Modelling I		52	48	100	CA(100%)
MATH 1809 Mathematics Laboratory		52	48	100	CA(100%)
PROF 1801 Professional Development I	26	26	48	100	CA(100%)

4.3.2. Stage 2

List of modules for Stage 2 TU874 Mathematical Sciences & TU873 Industrial Mathematics

Module	Title	Semester	ECTS
MATH 2814	Calculus II	2	5
MATH 2816	Introduction to Analysis	1	5
MATH 2802	Linear Algebra II	1	5
MATH 2811	Discrete Mathematics II	2	5
MATH 2804	Operations Research	2	5
MATH 2805	Statistics II	1	5
MATH 2806	Numerical Methods	2	5
MATH 2812	Introduction to Ordinary Differential Equations through Python	2	5
MATH 2813	Practical Computing for Mathematics	1	5
MATH 2809	Mathematical Modelling II	1&2	5
MATH 2810	Geometry	1	5
PROF 2801	Professional Development II	1&2	5
TOTAL			60

Description of module workload and Assessment

Module	Lecture (hrs)	Tutorial/ Lab (hrs)	Self-study (hrs)	Total (hrs)	Assessment
MATH 2814 Calculus II	26	26	48	100	2 hr Exam (70%) CA(30%)
MATH 2816 Introduction to Analysis	26	13	61	100	2 hr Exam (70%) CA(30%)
MATH 2802 Linear Algebra II	26	13	61	100	2 hr Exam (70%) CA(30%)

MATH 2811 Discrete Mathematics II	26	13	61	100	2 hr Exam (70%) CA(30%)
MATH 2804 Operations Research	26	13	61	100	2 hr Exam (70%) CA(30%)
MATH 2805 Statistics II	26	13	61	100	2 hr Exam (70%) CA(30%)
MATH 2806 Numerical Methods	26	13	61	100	2 hr Exam (70%) CA(30%)
MATH 2812 Introduction to ODE's through Python	26	13	61	100	2 hr Exam (30%) CA(70%)
MATH 2813 Practical Computing for Mathematics	26	13	61	100	CA(100%)
MATH 2809 Mathematical Modelling		52	48	100	CA(100%)
MATH 2810 Geometry	26	13	61	100	2 hr Exam (70%) CA(30%)
PROF 2801 Professional Development II	26	26	48	100	CA(100%)

4.3.3. Stage 3

List of modules for Stage 3 TU874 Mathematical Sciences

Module	Title	Semester	ECTS
MATH 3801	Numerical Analysis & Applications	1	5
MATH 3802	Ordinary Differential Equations	1	5
MATH 3803	Statistics III	1	5
MATH 3811	Mathematics Practical	1	5
MATH xxxx	Option 1	1	5
MATH xxxx	Option 2	1	5
MATH xxxx	Option 3	1	5
MATH 3812	Work Placement	2	25
TOTAL			60

List of modules for Stage 3 TU873 Industrial Mathematics

Module	Title	Semester	ECTS
MATH 3801	Numerical Analysis & Applications	1	5
MATH 3802	Ordinary Differential Equations	1	5
MATH 3803	Statistics III	1	5
MATH 3811	Mathematics Practical	1	5
MATH 3808	Introduction to Financial Mathematics	1	5
MATH 3810	Stochastic Modelling	1	5
MATH xxxx	Option	1	5
MATH 3812	Work Placement	2	25
TOTAL			60

Full list of module options in Stage 3

(NB not all modules may be offered in any given year)

Module	
MATH 3807 Algebraic Structures: Groups	*(not available every year)*
MATH 3806 Classical Mechanics	
MATH 3808 Introduction to Financial Mathematics	*(not optional for TU873)*
MATH 3813 Network Analysis & Transportation	
MATH 3810 Stochastic Modelling	*(not optional for TU873)*
MATH 3804 Real Analysis	

MATH 3805 Complex Analysis	
MATH 4805 Algebraic Structures: Rings & Fields	*(not available every year)*

Description of module workload and Assessment

Module	Lecture (hrs)	Tutorial/ Lab (hrs)	Self-study (hrs)	Total (hrs)	Assessment
MATH 3801 Numerical Analysis & Applications	26	13	61	100	2 hr Exam (70%) CA (30%)
MATH 3802 Ordinary Differential Equations	26	13	61	100	2 hr Exam (70%) CA (30%)
MATH 3803 Statistics III	26	13	61	100	2 hr Exam (70%) CA (30%)
MATH 3811 Mathematics Practical	13	13	74	100	CA (100%)
MATH 3807 Algebraic Structures: Groups	26	13	61	100	2 hr Exam (70%) CA (30%)
MATH 3806 Classical Mechanics	26	13	61	100	2 hr Exam (70%) CA (30%)
MATH 3808 Introduction to Financial Mathematics	26	13	61	100	2 hr Exam (70%) CA (30%)
MATH 3813 Network Analysis & Transportation	26	13	61	100	2 hr Exam (70%) CA (30%)
MATH 3810 Stochastic Modelling	26	13	61	100	2 hr Exam (70%) CA (30%)
MATH 3804 Real Analysis	26	13	61	100	2 hr Exam (70%) CA (30%)
MATH 3805 Complex Analysis	26	13	61	100	2 hr Exam (70%) CA (30%)
MATH 4805 Algebraic Structures: Rings & Fields	26	13	61	100	2 hr Exam (70%) CA (30%)
MATH 3812 Work Placement					CA (100%)

4.3.4. Stage 4

List of modules for Stage 4 TU874 Mathematical Sciences

Module	Title	Semester	ECTS
MATH 4801	Partial Differential Equations	1	5
MATH xxxx	Option 1 from Group A modules	1	5
MATH xxxx	Option 2 from Group A modules	1	5
MATH xxxx	Option 3 from Group A modules	1	5
MATH xxxx	Option 4 from Group A modules	1	5
MATH xxxx	Option 5 from Group B modules	2	5
MATH xxxx	Option 6 from Group B modules	2	5
MATH xxxx	Option 7 from Group B modules	2	5
MATH xxxx	Option 8 from Group B modules	2	5
MATH 4824	Project	1&2	15
TOTAL			60

List of modules for Stage 4 TU873 Industrial Mathematics

Module	Title	Semester	ECTS
MATH 4801	Partial Differential Equations	1	5
MATH 4807	Financial Mathematics I	1	5
MATH 4808	Regression Models I	1	5
MATH 4825	Queuing Theory & Markov Processes	1	5

MATH xxxx	Option 1 from Group A modules	1	5
MATH 4818	Financial Mathematics II	2	5
MATH 4821	Industrial Statistics: Survival Analysis	2	5
MATH 4827	Case Studies in Industrial Modelling	2	5
MATH xxxx	Option 2 from Group B modules	2	5
MATH 4824	Project	1&2	15
TOTAL			60

Full list of module options in Stage 4

(NB not all modules may be offered in any given year)

Module	Prerequisites
Group A Modules	
MATH 3807 Algebraic Structures: Groups	*(not available every year)*
MATH 4802 Applied Functional Analysis I	
MATH 4803 Fluid Mechanics	
MATH 4804 Coding Theory I	
MATH 4805 Algebraic Structures: Rings & Fields	*(not available every year)*
MATH 4806 Numerical Analysis	
MATH 4807 Financial Mathematics I	*(not optional for TU873)*
MATH 4808 Regression Models I	*(not optional for TU873)*
MATH 4809 Linear Programming	
MATH 4825 Queuing Theory & Markov Processes	*(not optional for TU873)*
MATH 4811 Dynamical Systems and Chaos	
MATH 4812 Fourier Analysis and Wavelets	MATH 3804 Real Analysis
MATH 4813 Quantum Mechanics I	MATH 3806 Classical Mechanics
MATH 4814 Decision Theory and Games	
Group B Modules	
MATH 4815 Differential & Integral Equations	
MATH 4816 Applied Functional Analysis II	MATH 4802 Applied Functional Analysis I
MATH 4817 Cryptology	
MATH 4818 Financial Mathematics II	*(not optional for TU873)*
MATH 4819 Regression Models II	MATH 4808 Regression Models I
MATH 4820 Integer Programming	MATH 4809 Linear Programming
MATH 4821 Industrial Statistics: Survival Analysis	*(not optional for TU873)*
MATH 4822 Coding Theory II	MATH 4804 Coding Theory I
MATH 4823 Non-Linear Programming	MATH 4809 Linear Programming
MATH 4826 Quantum Mechanics II	MATH 4813 Quantum Mechanics I
MATH 4827 Case Studies in Industrial Modelling	*(not optional for TU873)*

Description of module workload and Assessment

Module	Lecture (hrs)	Tutorial/ Lab (hrs)	Self-study (hrs)	Total (hrs)	Assessment
MATH 3807 Algebraic Structures: Groups	26	13	61	100	2 hr Exam (70%) CA (30%)
MATH 4801 Partial Differential Equations	26	13	61	100	2 hr Exam (75%) CA (25%)
MATH 4802 Applied Functional Analysis I	26	13	61	100	2 hr Exam (100%)
MATH 4803 Fluid Mechanics	26	13	61	100	2 hr Exam (100%)
MATH 4804 Coding Theory I	26	13	61	100	2 hr Exam (100%)
MATH 4805 Algebraic Structures: Rings & Fields	26	13	61	100	2 hr Exam (70%) CA (30%)
MATH 4806 Numerical Analysis	26	13	61	100	2 hr Exam (75%) CA (25%)

MATH 4807 Financial Mathematics I	26	13	61	100	2 hr Exam (100%)
MATH 4808 Regression Models I	26	13	61	100	2 hr Exam (75%) CA (25%)
MATH 4809 Linear Programming	26	13	61	100	2 hr Exam (100%)
MATH 4825 Queuing Theory & Markov Processes	26	13	61	100	2 hr Exam (75%) CA (25%)
MATH 4811 Dynamical Systems and Chaos	26	13	61	100	2 hr Exam (100%)
MATH 4812 Fourier Analysis and Wavelets	26	13	61	100	2 hr Exam (100%)
MATH 4813 Quantum Mechanics I	26	13	61	100	2 hr Exam (100%)
MATH 4814 Decision Theory and Games	26	13	61	100	2 hr Exam (100%)
MATH 4815 Differential & Integral Equations	26	13	61	100	2 hr Exam (75%) CA (25%)
MATH 4816 Applied Functional Analysis II	26	13	61	100	2 hr Exam (100%)
MATH 4817 Cryptology	26	13	61	100	2 hr Exam (75%) CA (25%)
MATH 4818 Financial Mathematics II	26	13	61	100	2 hr Exam (100%)
MATH 4819 Regression Models II	26	13	61	100	2 hr Exam (75%) CA (25%)
MATH 4820 Integer Programming	26	13	61	100	2 hr Exam (100%)
MATH 4821 Industrial Statistics: Survival Analysis	26	13	61	100	2 hr Exam (75%) CA (25%)
MATH 4822 Coding Theory II	26	13	61	100	2 hr Exam (100%)
MATH 4823 Non-Linear Programming	26	13	61	100	2 hr Exam (100%)
MATH 4824 Project		20	280	300	CA (100%)
MATH 4826 Quantum Mechanics II	26	13	61	100	2 hr Exam (100%)
MATH 4827 Case Studies in Industrial Modelling	13	26	61	100	CA (100%)