Guide for Students in Level 1, Level 2

These pages contain information for students in Mathematics and Statistics in Level 1, 2, including progression rules and study abroad options.

Welcome to Mathematics and Statistics

Welcome to the School of Mathematics and Statistics. The school is home to well in excess of 70 academic staff performing world class research and teaching across the mathematical sciences. The school delivers a wide range of courses to well over 2000 undergraduate students.

This guide is designed to help students at levels 1 and 2 and their advisers choose appropriate courses. It covers the courses in levels 1 and 2, and indicates the range of honours and designated degrees these lead to.

Additional guides cover:
- general school information and policies, including facilities available to students.
- honours and designated degrees in mathematics (including combined courses)
- honours and designated degrees in statistics (including combined courses)
- year by year progression requirements within the school.

Generic Honours Entry Requirements

Most Glasgow undergraduate degrees are split into two components. The non-honours years, normally making up the first 2 years of your studies, and then the honours programme making up years 3-4 in case of a 4 year degree, or years 3-5 in place of an integrated masters.

In order to enter an honours component of your degree programme (usually at the beginning of your third year of studies) you must meet **both** the generic and supplementary requirements of your college, and the subject specific requirements of your chosen degree. The generic regulations can be found in the University Regulations. Students who do not meet the entrance requirements for honours may be able to progress to a designated degree (normally a 3 year programme which requires completing 360 credits).

In particular these college regulations will require a specific performance on 240 credits of non-honours courses. In the college of Science and Engineering this is a GPA of 9 on 240 credits of first and second year courses, including at least 140 from science, and a minimum 200 credits at D3 or better). There are stronger generic requirements for entry into an integrated masters. Similar requirements apply in other college; please check the calendar for full details. In particular, high grades in Mathematics or Statistics courses cannot compensate for failing to meet the college generic requirements to enter honours.

Details of the school requirements for entry into honours, or an integrated masters are detailed below and in the school progression guide.

Definitions

A full list of definitions can be found in the Undergraduate Course Catalogue in the section on Guide to Course Entries.

Pre-requisite

An entry requirement, usually involving courses taken in earlier sessions.

Co-requisite

An entry requirement that requires a course to be taken in the same session.

Not Covered

Although pre- and co-requisites for Honours courses are included in the Progression Pathways, the guide does not cover Honours courses in detail.

Studying Abroad

It is possible for students at Glasgow to apply to study abroad during Level-2 or Level-3 (honours only) of a students degree programme. Students may apply to take part in exchange programmes with universities in various countries including the United States, Canada, Australia, Singapore and across Europe. It is very important to make early contact with the School's exchange programme coordinators; deadlines can occur early in the academic year and it takes time to identify a suitable host institution and programme of study. Information from the university can be found at

https://www.gla.ac.uk/international/abroadexchange/

The School maintains a Moodle page on Studying Abroad with further information.

Mathematics Level 1

Three Mathematics courses are offered at Level 1: Mathematics 1 is a 40 credit course that spans both the Autumn and Spring semester, although there is a 20 credit exit route between semesters for students that are not enjoying the module. Maths 1C is offered In the Autumn semester studying calculus and Maths 1G is offered in the Spring semester studying aspects of pure mathematics. Both these single semester modules are 20 credits.

Maths 1 is open to all students with at least an A grade in Higher Mathematics or a B grade in Advanced Higher Mathematics, or equivalent, or students admitted to a programme in Astronomy, Chemical Physics, or Physics. Maths 1C and 1G are open to all students with a C grade in Higher Mathematics, or equivalent.

The division of routes between Maths 1 and Maths 1C/G is determined by programme plan. All students wishing to progress on a programme involving Maths, Stats, or Physics must pass Maths 1. Maths 1C/G are aimed at students with a passion for Mathematics that are not planning to progress on Maths, Stats, or Physics plan.

Detailed practical information on all matters specific to Level 1, including the contact details of the Level 1 coordinators, can be found on the course Moodle pages, see the Level 1 Moodle page directory.

Routes

There are two normal routes through Level 1 mathematics. For those wishing to progress on a programme involving Maths, Stats, or Physics and one for those not wishing to progress on one of these plans.
1. Take Mathematics 1 in both Semesters 1 and 2 if you aim to progress on any plan involving Maths, Stats, or Physics.
2. Take Mathematics 1C in Semester 1 and/or Mathematics 1G in Semester 2 if you are passionate about Mathematics but **do not** want to progress on a plan involving Maths, Stats, or Physics.

It is also possible for students taking Mathematics 1 in semester 1 to take the 20 credit exit route and study Mathematics 1G in semester 2.

Students intending to proceed to Level 2 Mathematics must successfully pass Maths 1. If you're unsure which is the right route through level 1 mathematics for you, please contact your adviser of studies.

Course descriptions

The course catalogue contains detailed descriptions of the level 1 mathematics courses offered.

Mathematics 1

Mathematics 1 aims to transition students to university level mathematics through development of abstract structures and reasoning skills, the interplay between algebra and geometry, the underpinnings of calculus and its vast applications, and ensure students have a strong command of core skills crucial to further study. A strong focus throughout the course will be placed on developing mathematical communication skills.

Mathematics 1C

Mathematics 1C aims to consolidate and build upon calculus and algebra skills from SQA Higher Mathematics with a focus on calculus and modelling; increase students' competence and confidence in abstracting the essentials of problems across subjects such as Computer Science, Biochemistry and Economics, formulating them mathematically and obtaining clearly communicated solutions by appropriate methods.

Mathematics 1G

Mathematics 1G aims to build upon algebra skills from SQA Higher Mathematics with a focus on complex numbers, vector and matrix algebra, counting, and sequences and series; increase students' competence and confidence in abstracting the essentials of problems across subjects such as Computer Science, Biochemistry and Economics, formulating them mathematically and obtaining clearly communicated solutions by appropriate methods.

Mathematics Level 2

For students who enter from Level 1, eight courses are offered at Level 2; four in the first semester and four in the second semester. Each course is worth 10 credits, and they combine in a variety of packages leading to the different options available at Level 3 (Non-Honours and Honours).

Detailed practical information on all matters specific to Level 2, including the contact details of the Level 2 coordinator, can be found on the Level 2 information page. There you can also find information on the induction session for Level 2 students which will be held at the start of Semester 1.

Courses

For students who enter from Level 1, eight courses are offered at Level 2; four in the first semester and four in the second semester. Each course carries 10 credits and they combine in a variety of packages leading to the different options available at Level 3 (Non-Honours and Honours).

In the table below you find the complete list of courses.

First Semester	Second Semester
2A Multivariable Calculus	2D Mathematical Methods and Modelling
2B Linear Algebra	2E Mechanics
2C Introduction to Real Analysis	2F Groups, Transformations and Symmetries
2P Graphs and Networks	2T Topics in Discrete Mathematics

Each course runs for a semester and involves 11 weeks of lectures with two lectures per week on average and one tutorial per fortnight. For each course the degree exam contributes 80% to the final assessment and the remaining 20% comes from combinations of class tests, course work and continuous assessment. **Please note that there is no reassessment/resit of the continuous assessment for any of the Level 2 Maths courses.**

Full details of these courses, including aims and intended learning outcomes, and requirements for credits can be found through the course catalogue.

Some common course groupings are given below. Note, however, that students are free to choose other appropriate combinations if they wish. The only absolute constraints are the timetable and pre-requisites.

- **The honours package consists of the group of six courses 2A, 2B, 2C, 2D, 2E and 2F. This package is required for entry into all honours and designated degrees involving mathematics.**
- **The algebra/calculus package consists of the courses 2A, 2B and 2D. This package is required for entry into honours and designated degrees involving physics and statistics**
- **The supplementary courses consist of 2P and 2T. These are optional courses giving students flexibility to study additional mathematics at level 2 if they wish.**

One common second year curriculum is to take the 80 credits of level 2 mathematics courses combined with the 40 credits of level 2 statistics (or level 2 arts subjects with a 40 credit load). But it is equally normal to combine the core 60 credits of level 2 mathematics with other subjects offering 60 credits at level 2.

Choice at Level 3

Students have to finalise their choice of degree programme at the end of their second year, and then work towards that degree in later years. They may aim towards three different types of award involving mathematics, all of which require the core honours package Maths 2ABCDEF as pre-requisites.

Details of school entry requirements for all these degrees can be found in the mathematics and statistics progression guide. These must be read in conjunction with the generic college requirements found in the University Regulations. Please contact your adviser, or check your requirements on MyCampus if you are unsure.

Single honours or MSci in Mathematics.

These require 2 or 3 further years of study respectively. Please note that the MSci in Mathematics is only available in the College of Science and Engineering. Students registered in another College (Arts or Social Sciences) who are interested in an MSci will have to ensure that they are qualified to transfer into Science.

Combined honours or MSci in Mathematics and another subject.

These require 2 or 3 further years of study respectively. Please note that the MSci degrees are only available in the College of Science and Engineering. Students registered in another College (Arts or Social Sciences) who are interested in an MSci will have to ensure that they are qualified to transfer into Science.

Level 3 non honours

At Level-3, there are two routes through the Designated Degree in Mathematics. The Designated Degree-80 is the standard route in which you take 80 credits of mathematics courses from the designated degree programme, together with 40 other credits to meet the generic requirements for award of the designated degree.

In the Designated Degree-120 route you will take 120 credits of level-3 honours mathematics courses. Provided your performance on these courses is a GPA of at least 9 you will be given the option of rejoining honours at level-4, otherwise (provided you meet the award requirements) you will graduate with a Designated Degree in

Mathematics. It is possible to take a designated 120 credit degree in Mathematics and Statistics, but not presently with other subjects.

Statistics Level 1

Two courses are offered at Level-1: S1Y in the first semester and S1Z in the second semester. The courses S1Y and S1Z carry 20 credits each. Entry into S1Y and S1Z requires a pass in Higher Mathematics, or equivalent. The course S1Z builds on S1Y, and these two courses make a 40 points first year Statistics curriculum.

Students taking Statistics 1Y and 1Z who want to continue with Statistics should also take Mathematics 1. The courses S1Y and S1Z are not prerequisites for progression to Level-2 Statistics, but are strongly recommended for any students planning to study Statistics further.

Detailed practical information on all matters specific to Level 1, including the contact details of the Statistics Level 1 coordinators, can be found on the course pages for S1Y and S1Z see the Level 1 page.

Course Descriptions

S1Y Introduction to Statistics: Learning from Data

This course will introduce basic concepts in probability and statistical inference, and demonstrate their importance and practical usefulness in real life including via a case study. It will equip students to apply basic probability theory to solve problems from a wide range of disciplines, and show how to present data informatively and clearly. It will introduce students to fundamental ideas in Statistics including confidence intervals and hypothesis tests, and give students an appreciation of the limitations of these standard techniques. The course develops students' skills in using a statistical programming language for data analysis. The course aims to promote an interest in probability and statistics and hence encourage students to study the subject further.

S1Z Data Modelling in Action

This course will introduce students to summarising patterns and relationships in data, and to using these simple statistical methods to answer real-world questions of interest in a case study. The course aims to enable students to apply correlation coefficients and regression models to quantify relationships in data and to enable students to use bivariate probability models to assess the dependence between two random variables. The course further develops students' skills in using a statistical programming language for data analysis. It demonstrates the importance and usefulness of statistical methods in real life, and promotes an interest in probability and statistics to encourage students to study the subject further.

More information about these courses, including aims, intended learning outcomes, and assessment can be found via the course catalogue. Full course details, coordinator information and timetables for Level 1 Statistics can be found at the Statistics Level 1 pages: S1Y and S1Z.

Statistics Level 2

For students who enter from Level-1, four courses are offered at Level-2; two in the first semester (S2R and S2S) and two in the second semester (S2X and S2Y). Each course carries 10 credits. Entry into honours Statistics requires the courses S2R, S2S, S2X and S2Y, plus the mathematics courses 2A, 2B and 2D.

FIRST SEMESTER	SECOND SEMESTER
S2R Probability	S2X Probability II
S2S Statistical Methods	S2Y Regression Modelling

Detailed practical information on all matters specific to Level 2, including the contact details of the Level 2 coordinator, can be found on the **Statistics Level 2 information page**.

Course Descriptions

Full aims, learning objectives and assessment information for these courses can be found through the **course catalogue**.

S2R - Probability

This course introduces students to fundamental concepts in univariate probability. The course focuses on stating and deriving results formally, but also aims to equip students to apply probability to solve problems from a wide range of disciplines. Its contents include: axioms of probability; basic propositions from probability theory; probability distributions and random variables; moments such as the expected value and the variance; moment-generating function; transformations of random variables; special discrete and continuous random variables.

S2X - Probability II

This course follows from S2R and is intended to introduce students to the probability theory required to model two or more random variables simultaneously. Its contents include: joint, marginal and conditional distributions and their moments; independent random variables; covariance and correlation; functions of more than one random variable; sums of random variables; links between different discrete and continuous distributions; multivariate normal distribution; laws or large numbers and central limit theorem.

S2S - Statistical Methods

This course introduces students to two key concepts in Statistics: likelihood inference and testing in parametric statistical models. It also aims to equip students to apply statistical ideas to solve problems from a wide range of disciplines and to communicate the results of their analyses in clear, non-technical language. Its contents include: Summary statistics and plots; point estimates and their properties such as bias and variance; maximum likelihood estimation; hypothesis testing (theory and common hypothesis tests); tests of goodness-of-fit, association and independence.

S2Y - Regression Modelling

This course follows from S2S and aims to introduce students to statistical modelling, in particular linear models through the general vector-matrix approach. There is an emphasis on carrying out standard procedures and reporting the results appropriately. Its contents include: fitting equations to data (least-squares solutions by calculus and completing the square, maximum likelihood estimation); the vector-matrix formulation and algebraic derivation of general forms of estimators in the general linear model; model checking; calculation and interpretation of $R2$; checking model assumptions from residual plots; interval estimation & hypothesis testing within the linear model; model building & variable selection extending the linear model.

Full course details, coordinator information and timetables for Level 2 Statistics can be found at the **Statistics Level 2 page**.

Choices for Level 3

Here we list various possible choices for Level-3, Level-4 and Level-5 degree programmes involving statistics and in each case give the corresponding Level-2 pre-requisites and recommended courses.

Details of school entry requirements for all these degrees can be found in the **mathematics and statistics progression guide**. These must be read in conjunction with the generic college requirements found in the **University Regulations**. Please contact your adviser, or check your requirements on MyCampus if you are unsure.

Single Honours or M.Sci. in Statistics

The Statistics courses S2R, S2S, S2X and S2Y and the Mathematics courses 2A, 2B and 2D are pre-requisites. It is strongly recommended that students take Mathematics 2C for entry to Honours Statistics. Single Honours students have the opportunity to spend their third year studying in Bologna as part of a double degree programme. Those eligible for the MSci also have the opportunity to do a one-year work placement in employment as part of an MSci in Statistics with work placement degree.

Combined Honours with Statistics

The Statistics courses S2R, S2S, S2X and S2Y and the Mathematics courses 2A, 2B and 2D are prerequisities. It is strongly recommended that students take Mathematics 2E for entry to Honours Statistics. Conditions in the other subject must also be met.

For programme and course details for the Single and Combined Honours programmes, see the **Level 3-5 Handbook in Statistics**.

Level-3 Non-Honours

At Level-3, there are two routes through the Designated Degree in Statistics. The Designated Degree-80 is the standard route in which you take 80 credits of statistics courses from the designated degree programme, together with 40 other credits to meet the generic requirements for award of the designated degree.

In the Designated Degree-120 route you will take 120 credits of level-3 honours statistics courses. Provided your performance on these courses is a GPA of at least 9 you will be given the option of rejoining honours at level-4, otherwise (provided you meet the award requirements) you will graduate with a Designated Degree in Statistics. The DD-120 can be combined with mathematics, but not with other subjects.

For course and programme details, see the **DD80 handbook in Statistics**.

Timetable

A complete list of times can be found by using the browse course catalogue feature on MyCampus.