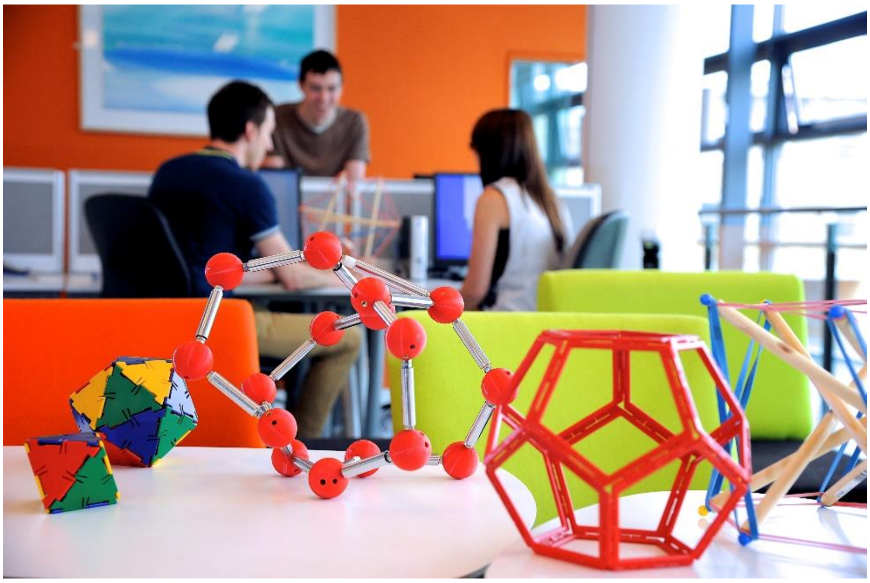
FIRST-YEAR UNDERGRADUATE HANDBOOK 2020-21



Contents

Last updated: 8th September 2020. While every effort has been made to ensure the information contained in this document is accurate, details are subject to change.

1. INTRODUCTION

Welcome to Mathematics and Statistics at Lancaster. This document contains information about the department and our Part I (first-year) subjects MATH100 and MATH110.

The University maintains a collection of Core Information for Students, which is available on [the website.]

You should ensure you are familiar with all the information contained under the Undergraduates heading.

A full-time first-year student is required to enrol in three Part I subjects, totalling 120 credits, consistent with the degree scheme to which they were admitted and for which they are properly qualified. For instance, a student who enters to study for a combined degree in Mathematics and Philosophy would enrol in

- MATH100 (40 credits),
- MATH110 (40 credits) and
- PHIL100 Introduction to Philosophy (40 credits).

We offer the following Part I subjects in Mathematics and Statistics.

MATH100 and MATH110 These subjects are intended for students who have Mathematics at A level or a similar qualification. They are designed to provide the foundation for a degree in Mathematics and Statistics, and to cover the material required to support another subject. MATH100 may be taken as a minor subject by suitably qualified students.

MATH100 and MATH110 consist of the following modules.
Weeks - 1-5, MATH101 Calculus, 8 credits
Weeks - 6-10, MATH102 Further Calculus, 8 credits
Weeks - 11-15, MATH103 Probability, 8 credits
Weeks - 16-20, MATH104 Statistics, 8 credits
Weeks - 21-25, MATH105 Linear Algebra, 8 credits

Weeks - 1-5, MATH111 Numbers and Relations, 8 credits
Weeks - 6-10, MATH112 Discrete Mathematics, 8 credits
Weeks - 11-15, MATH113 Convergence and Continuity, 8 credits
Weeks - 16-20, MATH114 Integration and Differentiation, 8 credits
Weeks - 21-25, MATH115 Geometry and Calculus, 8 credits

Prerequisites MATH102 requires MATH101; MATH104 requires MATH103; MATH112 requires MATH111; MATH114 requires MATH113.

MATH140 This subject, composed of the four modules MATH141 – MATH144, is intended for Engineering students and cannot be taken with MATH100 or MATH110; see the Engineering Part I Handbook for details.

2. CHOICE OF MODULES

In the following, MATH100 refers to the five modules MATH101-105, and MATH110 refers to the five modules MATH111-115.

1. Students intending to major in any of the following degree schemes **must** take a double Part I in Mathematics, consisting of MATH100 and MATH110, together with either the indicated core modules or their choice of minor. (Note that students wishing to minor in Economics should take ECON101, not ECON102.)

- Mathematics, Mathematics with Statistics, the Study Abroad and Placement variants of these
- Financial Mathematics (AC.F100 and AC.F150)
- Computer Science and Mathematics (SCC.110 and SCC.120)
- Mathematics and Philosophy (PHIL100)

2. Theoretical Physics with Mathematics students take PHYS100, MATH100 and MATH110, but **must** substitute PHYS115 Vector Calculus for MATH115 Geometry and Calculus.

3. Accounting, Finance and Mathematics (AccFin & Maths), Economics and Mathematics (Econ & Maths), Mathematics, Operational Research, Statistics and Economics (MORSE) (including Industry variants) students must take MATH100 together with their combined major subject (AC.F100, AC.F150 and ECON101 for AccFin & Maths; ECON101 and ECON105 for Econ & Maths; ECON101, MSCI101 and MSCI103 for MORSE). Econ & Maths students are strongly encouraged to take MATH110 as well.

4. French Studies, German Studies or Spanish Studies and Mathematics students must take DELC100, MATH100 and either the beginners or advanced module for their chosen language (FREN100/101, GERM100/101, SPAN100/101). They are strongly encouraged to take MATH110 as well.

5. Natural Science students taking a theme in Mathematics are required to take either

- MATH100, for the Single Mathematics pathway, or
- MATH100 and MATH110, for the Double Mathematics pathway.

6. Other students with a grade A in A-level Mathematics or equivalent may take MATH100.

Prerequisites for Part II courses

- MATH210 Real Analysis requires MATH113 Convergence and Continuity and MATH114 Integration and Differentiation.
- MATH215 Complex Analysis requires MATH210 Real Analysis.
- MATH220 Linear Algebra II requires MATH105 Linear Algebra.
- MATH225 Abstract Algebra requires MATH220 Linear Algebra II.
- MATH230 Probability II requires MATH103 Probability.
- MATH235 Statistics II requires MATH104 Statistics and MATH230 Probability II.
- MATH240 Project Skills has no prerequisites.
- MATH245 Computational Mathematics requires MATH100.

Change of modules

Students who wish to change from the modules for which they have enrolled should consult the Part I Director of Studies, and they should also inform the Part I Co-ordinator. This is necessary to ensure correct registration for University examinations.

Progression to Part II Mathematics

Students who have taken only MATH100 may be allowed to register for Part II Mathematics if they have performed sufficiently strongly in Part I and undertake extra preparatory work that will be specified by the Department. You should consult the Part I Director of Studies as early as possible if you want to consider this.

3. DEPARTMENTAL CONTACTS

Part I Teaching Co-ordinator George Moran, Room B2, Fylde College
E-mail: mathsteaching@lancaster.ac.uk

Teaching Co-ordinators Callum Forsyth/Katie Park-Walford, Room B2, Fylde College
E-mail: mathsteaching@lancaster.ac.uk

Part I Director of Studies Dr David Pauksztello, Room B4, Science & Technology Building
E-mail: d.pauksztello@lancaster.ac.uk

The Part I Director of Studies is available for consultation on any problems that might arise in connection with Part I Mathematics, such as choice of modules or other Part I subjects, absence, illness and difficulty with work.

Director of Studies for combined degree schemes (FST=Faculty of Science and Technology)**:**

FST Director of Studies Prof Stephen Power, Room B26, Fylde College
E-mail: s.power@lancaster.ac.uk

Non FST Director of Studies Dr Azadeh Khaleghi, Room B37, Fylde College
E-mail: a.khaleghi@lancaster.ac.uk

Director of Undergraduate Teaching Dr Mark MacDonald, Room B12, Fylde College
E-mail: m.macdonald@lancaster.ac.uk

The Director of Undergraduate Teaching is also available for consultation when the Directors of Studies are unavailable.

Head of Department Prof Alexander Belton, Room B55, Fylde College
E-mail: a.belton@lancaster.ac.uk

Study Abroad Director Dr Yemon Choi, Room B60a, Fylde College
E-mail: y.choi1@lancaster.ac.uk

Disability Officer Dr Sean Prendiville, Room B44, Fylde College
E-mail: s.prendiville@lancaster.ac.uk

Departmental Administrator Catherine Winterburn, Room B57, Fylde College
E-mail: c.winterburn@lancaster.ac.uk

The **Department Office** (Room B2, Fylde College) arranges workshop groups, keeps records and so forth. Part I information is made available on the Maths Information Moodle site.

Web pages with information about the Department

4. ONLINE SESSION AND TUTORIAL TIMES

Details of synchronous (live) events that will occur online and in person can be found on your timetable

Times and rooms are **subject to change**. You should regularly check your online timetable and Moodle for any alterations. In case of clashes, please contact the Part I Co-ordinator/Teaching Office as soon as possible (mathsteaching@lancaster.ac.uk)

Term Dates 2020–21

Michaelmas Term	5th October 2020 to 11th December 2020
Lent Term	11th January 2021 to 19th March 2021
Summer Term	19th April 2021 to 25th June 2021

5. TEACHING AND LEARNING

In light of the novel Coronavirus pandemic, there will be changes to the way we teach during this academic year, with many events moving online and teaching taking place in a “blended learning” format. Unfortunately, changes to public health advice and guidance in response to Covid-19 outbreaks either locally or nationally may result in changes to the way we teach at short notice.

We recognise having direct live contact with your lecturers and tutors is very important and the following planned activities have been carefully considered to optimise your learning experience while mitigating the risks of Covid-19 to both students and staff.

None of the mathematics modules assumes knowledge of material from A-level Further Mathematics; much of this material is incorporated in MATH100 and MATH110.

Course notes

Course notes, which are sometimes known as **lecture notes**, for MATH100 and MATH110 modules will be made available in PDF format on the individual module webpages on Moodle.

You should supplement the electronic notes with your own annotations and notes. The test of good course notes is to be able to use them afterwards, to help complete exercises, and to revise for examinations.

Asynchronous (recorded) video content

In the academic year 2020-21, asynchronous video content will be provided by the module lecturers and will be made available on the individual module Moodle pages. This will, hopefully temporarily, replace lectures as the basic method of going through the content of the course. Lecturers will provide information on how to pace viewing and reviewing content; time to do this will not appear on your timetable.

Taught computer lab sessions for the R component of MATH100 will also be replaced by asynchronous recorded video content.

Synchronous (live) events

There will be four kinds of synchronous (live) events for each MATH100 and MATH110 module. These are:

- Online Sessions;
- Tutorials (in person or online);
- Computer Labs/Drop-ins (online); and,
- Problem Solving classes (online, MATH111 – 113 only).

Links to all online events will be provided on the Moodle page of each individual MATH100 and MATH110 module.

Note that you attend only two of these tutorials and three Problem Solving classes for each module, but **attendance is compulsory and monitored closely**. Absences are recorded on your permanent record.

Online Sessions

There will be **two** online sessions per week. Feel free to ask questions even if you are not sure whether your question is 'silly'; almost always it turns out that there are other students who have the same question. Such sessions can become something of a monologue if students are inhibited about asking questions or pointing out mistakes (yes, lecturers do and will make mistakes).

These sessions may appear as "Online Seminars" in your timetable.

You should always work carefully through the relevant parts of the course notes before attending each online session. This is a good use of your time, because you will find out exactly what needs to be done. Course notes generally contain examples or results related to the example/exercise sheets.

Tutorials

In each module there will be two tutorials. Students will have the choice to have at most one tutorial as an "in person" event but may opt to have both tutorials as online events. MATH100 modules will have tutorials in weeks 2 and 4 of the module and MATH110 modules in weeks 3 and 5. For example, MATH101 has tutorials in weeks 2 and 4 and MATH102 in weeks 7 and 9, while MATH111 has tutorials in weeks 3 and 5 and MATH112 in weeks 8 and 10.

These tutorials will be led by a Graduate Teaching Assistant (GTA) and take place in small groups of approximately 6 students. They will provide an opportunity for you to get detailed feedback on your work from a tutor.

Computer Labs/drop-ins (MATH100 only)

Computer Labs are practical laboratory components of MATH100 modules, which introduce students to the power of computers in modern mathematics and statistics, and support the academic aims of MATH100.

A student taking any of the MATH100 modules is required to participate in the Lab component of that module. Computer Labs introduce the software package R, and use it to demonstrate basic mathematical programming techniques, such as producing plots, looping, conditional statements, writing functions and generating random numbers. These techniques are used to carry out actual mathematics and statistics calculations related to Calculus, Further Calculus, Probability, Statistics and Linear Algebra. Teaching materials will be provided on the Moodle page for the relevant MATH100 module, and will be assessed as part of the usual coursework and quiz questions. General overview documents, which cover topics such as how to install R and its basic syntax, can be found on the Maths Information pages.

Computer Labs begin in Week 2 and continue until Week 25. You will not have a timetabled slot for Computer Labs: they will be taught using asynchronous recorded lecture content and any assistance that you need can be obtained during weekly drop-in sessions, which appear on your timetable. These will be held as online synchronous (live) events; links to these events will be available on the MATH100 individual module Moodle pages.

Problem Solving (MATH111 – 113 only)

Problem Solving sessions are a practical component of each of the MATH110 modules. They are intended to help you make the transition from A Level to university mathematics, and to improve your creative mathematical-thinking skills and your knowledge of some important topics, such as the concept of infinity.

There will be one Problem Solving class each week for the second, third and fourth weeks of each module. During each class, there will usually be a set of problems to work on, with the last one often being more challenging. These problems will not come with a set method which you can apply to find the answer, so you will have to find a solution yourself. Being able to communicate your thinking clearly will be an important aspect of the activity. Assessment will be based on participation.

Problem Solving classes will be online synchronous (live) events and will take place in small groups of 6 students.

Problem sheets

These are sometimes called "example sheets", "exercise sheets" or even "workshop exercises". These sheets will be provided at regular intervals, electronically (on Moodle), by the module lecturer usually once per week; though some lecturers like to provide (bigger) sets of exercises less frequently, e.g. the full set of exercises for the whole course at the beginning, or have exercises embedded directly in their course notes/lectures/recorded content. Some of these exercises will form the basis of assessment (see the section on Assessment and Examinations below).

It is only by doing mathematics you will learn it: if you are unable to solve a good number of your exercises, it is quite likely you haven't fully understood your course notes, so you should refer back to them for insight and inspiration. For this reason you will benefit from attempting more exercises than those strictly required for assessment and we strongly recommend you do so.

It is worth noting that we do not expect you to be able to immediately solve the exercises, and that you will spend some time going down blind alleys and reaching dead ends. This is a normal process in learning university level mathematics, and even when you feel you are "not getting it" you will be learning. Remember to moderate your expectations: you may be used to getting >90% in your high school homework assignments, but at university a first class mark is >70 %, and a 2.1 is 60-70%.

The problems presuppose acquaintance with the material covered in lectures. At school or college you probably did many exercises of every type to help you understand each new topic; here you will usually see only one or two of each type, so it is especially important to attempt them all. Model solutions are circulated via Moodle; reading these is a good way to learn, but only after you have made your own attempts, and not all solutions will necessarily be provided – you are encouraged to ask the lecturer or your tutor if you would like feedback on a solution that has not been provided.

The online sessions and tutorials in many cases will be based on material from problem sheets, however, they will not restricted to talking about the latest problem sheet; their purpose is to help you along with the course in any way needed. So even if you feel hopelessly behind or thoroughly lost, do not be tempted to skip the online sessions/tutorials; it is there for such as you. You should also bear in mind that, under University regulations, attendance at tutorials is compulsory. A register of attendance is taken at each tutorial, and a permanent record is kept. Repeated defaulters will be contacted and asked to explain themselves; continued absences may lead to disciplinary action.

Office hours

Lecturers have (virtual) office hours during which you can come to discuss questions about the course. Such discussions are more profitable if you have thought about the questions in advance.

How much time should I spend studying?

Lecturers are often asked how long students should spend on their weekly problem sheets and other study. This depends on the topic and an individual's working speed, but the university expects, on average, a 40-hour working week. Thus you should be ready to spend around one-and-a-half times as much time working outside of live and recorded events as you do in them. This will include preparation for live and recorded events, writing up course notes and making sure the material is understood, completing exercises and further reading. Students are expected to work for around 80 hours on an 8-credit module, which includes revision for the end-of-year examination.

Books and other Library resources

Although the lectures are intended to contain all the material for the course and you are not required to purchase any books, you should use textbooks to supplement your understanding and to see alternative presentations of the subject matter. On occasion, you may wish to use books to revise A-level topics. You may find a book which suits your particular way of learning better than the lectures. The University Library contains copies of most of the relevant books; see the recommendations given with the Syllabuses, below. Where a book proves to be popular, multiple copies are kept. Even if you feel that the lectures, exercises and examination papers provide everything you need, books can broaden your horizons.

The Library is open 24/7 during term time and has a range of study space to suit different ways of working. Due to Coronavirus, study space in the library must be booked in advance, and opening times will be subject to change depending on how the Coronavirus situation. Information to help you get started with the Library, Covid-19 mitigations that are in place, and how to book study space

OneSearch can be used to search the Library's book and journal collections

The Library also provides a range of specialised resources for the sciences including MathSciNet, Web of Science and Scopus. The Subject Guide for Maths and Stats has links to these resources and more. The Computing Guide has links to some resources which may be relevant, such as IEEE Xplore and ACM Digital Library.

Lesley English is the Faculty Librarian who works with the Faculty of Science and Technology. You can contact Lesley if you have any questions or need help with library resources for Maths. Contact her via l.h.english@lancaster.ac.uk

The Learning Skills website has information about a wide range of learning opportunities at Lancaster to help you develop your academic and digital skills

6. WEB RESOURCES

In order to access the University computer network and your university email, you will need a university IT account. You should have set up this account before coming to Lancaster; if you haven't, or should you need any help with University computer issues throughout the year, you should contact the ISS Help Centre via the following webpage.

https://helpcentre.lancaster.ac.uk/

It is essential you check your university email account **at least once a day**, to ensure you do not miss important communications from the university and the department.

Many of the key Web Resources you will need to help with your studies can be accessed via the Student Portal or through the iLancaster app for mobile devices. Useful links include those to your individual timetable and the Moodle VLE (Virtual Learning Environment). This includes further links to the following.

- Individual module web pages. These pages are updated regularly as a module progresses and typically contain completed versions of the course notes and specimen solutions to problem sheets.
- Links to submit your solutions to written and online assessments.
- End-of-module questionnaires; these are a good way to provide feedback and let us know what you thought about a module.

The Core Information for Students at contains important details above university procedures and regulations, with which you should be familiar.

The Student Registry web pages can be accessed via the Student Portal. These pages contain information about general University procedures and policies.

7. ASSESSMENT AND EXAMINATIONS

In each of the MATH100 and MATH110 modules, the assessment weighting will be as follows.

MATH100, MATH114 and MATH115: 20% online quizzes, 30% coursework, 50% end-of-year examination.

MATH111, MATH112 and MATH113: 15% online quizzes, 30% coursework, 50% end-of-year examination, 5% participation in Problem Solving classes.

Online (Moodle) quizzes

These will take place weekly beginning in the second week of each module. Links to each quiz will be appear on individual module Moodle pages.

Coursework

There will be two pieces of written coursework for each module. These will be submitted in the third and fifth weeks of the MATH100 modules and the fourth and "sixth" (= the week after the module has finished) week for the MATH110 modules. These pieces of coursework will be timed 48-hour "open book" assessments. When the coursework opens, the exercises will be available to view on the individual module Moodle page.

Solutions should be scanned using the Microsoft Lens app or similar and then uploaded to the appropriate Moodle submission point. Take care to make sure that your pages have been scanned in the correct order, all pages are present, and are displayed correctly (that is, not upside down or rotated), and your writing is clearly legible. You may choose to typeset your solutions, if you do so, submit them as a PDF file. Solutions containing pages that are not displayed correctly significantly increase online marking time and therefore may incur a penalty.

Your solutions will be marked by a tutorial tutor. Unfortunately, due to the impact of Covid-19, we cannot ensure that your solutions will be marked by your tutorial tutor. Some part of the tutorials and online sessions may be devoted to giving feedback on assessed work. Make sure to ask your tutor when you feel there is something you have not understood properly. The tutor may emphasize such matters as clarity and accuracy of presentation, which need to be taken much more seriously as you advance in mathematics. You should keep your marked coursework as it is useful when you revise for exams.

Examinations

Examinations for all modules take place in the second half of the Summer Term. Due to the novel Coronavirus pandemic, it is not clear whether classic closed-book examinations will take place. You will be advised in due course, as the situation develops, what format the summer examination will take. They will likely be one of two kinds:

- A timed closed-book examination in supervised examination conditions for each module as you will have experience during your GCSE examinations. In previous years these exams have been one-hour long for each module and paired into twos.
- A timed open-book examination which we expect to be open for 24 hours. The coursework component of each module is designed to help you prepare for this style of examination.

In either case, you should attempt all questions on each exam. The marks available for each question will be indicated on the question paper.

Students are responsible for ensuring that they are registered for the correct examinations, and they should ask the Part I Co-ordinator/Teaching Office in case of doubt. Note that examinations may be scheduled on Saturday, as well as Monday to Friday.

Past examination papers

Papers from previous years are available in the Library and from the University web pages.

As a matter of policy, solutions to past examination papers are not provided by the department.

Return of marks

The department aims to return marks for all assessment as quickly as possible. For written coursework, marks will typically be returned within one or two weeks. In all cases students can expect marks within four weeks of submission or completion.

Penalties for late submission of coursework

The Lecturer will state the deadline before which coursework should be submitted. Work submitted up to three days late without an agreed extension will receive a penalty of 10%, and additionally the mark will be capped at 70%. Saturdays and Sundays are included as days in this regulation. However, when the third day falls on a Saturday or Sunday, students will have until 10.00 a.m. on Monday to hand in work without receiving further penalty. Work submitted more than three days late without an agreed extension will be awarded a zero and will be considered a non-submission.

The lecturer will state when the solutions will be available to students, and due to the desire to provide prompt feedback, that may fall within the three-day period. In this case, late coursework will be awarded a zero if it is submitted after the solutions have been published.

Where exceptional circumstances may have led a student to miss a stipulated deadline (which may be an already extended deadline), the student should make those circumstances known to the department. They should inform the department within 48 hours of the missed deadline unless prevented from doing so by acceptable circumstances in which case students should inform the department as soon as possible. Students should provide the department with evidence of the exceptional circumstances as soon as they are able.

In this context, exceptional circumstances are defined by University regulations as actions or events outside the control of the student which result in any circumstances which are thought reasonably to have caused an individual student to fail to complete all the required assessment for a programme or contributing module by a stipulated deadline (e.g. missed exam or coursework deadline). Further details on exceptional circumstances and procedures concerning them can be found on page 18.

Fairness is one of the main principles that justifies our policy on late coursework.

Plagiarism

What is plagiarism?

Plagiarism involves the unacknowledged use of someone else's work and passing it off as if it were one's own. This includes the following examples.

- Copying or paraphrasing from a source text without acknowledgement. This includes quoting text from a referenced source without distinguishing it with quotation marks or similar. It does not include the statement of standard results, definitions and so forth, which is permissible without attribution.
    - One single line or a few words. This will not usually be considered an issue.
    - A whole paragraph or more. This is in general a major offence.
    - Somewhat less, but several lines. This is poor academic practice and a minor offence.
- Submission of another student's work or a part thereof.
    - In the case of weekly coursework students are allowed to work together, but each student should write up separately and not submit the same work.
    - For a project or a dissertation it is a major offence.
- Directly copying from model solutions made available in previous years. This is taken very seriously as a major offence.
- Reproduction of the same or almost identical work for more than one assessment is, in general, a major offence.
- Submission of purchased work is a major offence.
- Copying computer code from the internet for project work is a major offence.

How major or minor offences are classified.

The level of intent will be taken into consideration; unintentional plagiarism is a minor offence. If there is no intent to gain an unfair advantage, then it is likely due to poor study skills, but the matter will usually still be raised with the student concerned.

Preventing plagiarism.

All members of the department involved in teaching are expected to raise awareness and give advice on good study practice, while being clear about expected standards, including referencing and the use of quotations. All markers are required to act if plagiarism is suspected. Graduate Teaching Assistants will consult the course lecturer on what action to take. The Academic Officer and the Directors of Undergraduate and Postgraduate Teaching can provide guidance if desired.

How suspected plagiarism is handled.

In the case of a minor offence, marks will be deducted for poor academic practice and feedback will identify the problem. A meeting with the student will usually be offered, to discuss the matter. The Academic Practice and Support (APS) section of the student's LUSI record will be updated by a member of admin staff, to note that marks have been lost through poor academic practice. A copy of the relevant material will be passed to the Academic Officer. Students may appeal the judgement to the Academic Officer. Persistent offenders will be referred to their Director of Studies.

Any suspected major offence must be referred to the Academic Officer, and no mark will be recorded until the case is resolved; copies will be made of the material which is under suspicion. The student will be informed that their mark is withheld and that they may appeal to the Academic Officer. An entry will be made in the APS section of the student's LUSI record to the effect that the case has been referred to the Academic Officer.

This advice is provided to give a better understanding of the university's Plagiarism Framework

Qualification for Part II

Aggregation scores

In the department, marks are first calculated as percentages, and then converted into the university's *aggregation scores*. For each module, aggregation scores are computed for coursework, for the examination and for the module overall. Aggregation scores for component modules are then averaged to obtain the aggregation scores for the subject.

The below information converts ranges of percentage marks into ranges of aggregation scores.

Percentage	Aggregation score	Grade
45 to 100	10.3 to 24	Majorable Pass
40 to 44	9.0 to 10.2	Pass
0 to 39	0.0 to 8.9	Fail

Part I progression

To proceed to Part II, each student must pass all three Part I subjects and also obtain Majorable Passes in those subjects that the student intends to study in Part II.

- Pass: a student passes in a subject if the aggregation score is greater than or equal to 9.
- Majorable Pass: A student has a Majorable Pass in a subject if the aggregation scores satisfy all of the following conditions:

  i. The overall score is greater than or equal to 10.3;
  ii. the coursework score is greater than or equal to 9;
  iii. the examination score is greater than or equal to 9.

The precise Mathematics and Statistics requirements to qualify for Part II are as follows. Combined Majors will also have requirements from their other contributing departments.

- Students intending to major in Mathematics, Mathematics with Statistics, Financial Mathematics, Computer Science and Mathematics or Mathematics and Philosophy must obtain Majorable Passes in *both* MATH100 and MATH110.

- Theoretical Physics with Mathematics students must obtain Majorable Passes in *both* MATH100 and MATH111-114 and PHYS115.

- Combined majors not already mentioned must obtain a Majorable Pass in MATH100. For combined majors taking MATH110 as an optional third subject, then a Pass in MATH110 is acceptable, together with a Majorable Pass in MATH100.

- Natural Science students intending to take a theme in Mathematics and Statistics must obtain a Majorable Pass in MATH100 if on the Single Mathematics pathway, or a Majorable Pass in *both* MATH100 and MATH110 if on the Double Mathematics pathway.

- For the Study Abroad and Placement degree schemes, the following extra rules apply. To proceed to Part II of the scheme, the student must achieve all of the following *at the first sitting*.

i. the overall aggregation score in MATH100 is greater than or equal to 15;
ii. the overall aggregation score in MATH110 is greater than or equal to 15;
iii. the overall aggregation score in the third subject is greater than or equal to 12.

Students who do not meet these conditions may qualify to proceed to another degree scheme according to the previous rules above.

When processing coursework and examination results, the Department may moderate results and interpret raw marks in accordance with University Regulations and academic principles. The results are usually communicated to candidates in mid July.

Resits

Students who do not obtain the required grade will be offered the opportunity to take resits in the appropriate modules. A resit normally consists of a new examination paper taken in late August. Resit papers are in the same style as those for the June examinations. Students who miss a June examination for good reasons, such as illness, are sometimes able to take the August examination as a first sitting.

8. ILLNESS AND EXCEPTIONAL CIRCUMSTANCES

If you are absent from any part of your studies due to illness or otherwise you should let the Part I Co-ordinator know and complete the online self-certification form as soon as possible. Medical evidence, such as a doctor's medical certificate, will normally be required for an absence of more than one week, or any absence during a test or examination.

To certify absence, click the Absence Notification link in the Online Student Services section of your Student Portal page

If you believe your assessment has been adversely affected by any personal circumstances that should be taken into account, the department will require appropriate evidence to be presented. The Part I Director of Studies and Part I Co-ordinator can provide advice about what is appropriate. Any case for exceptional circumstances, together with supporting evidence, should be presented as soon as practicable, and before the end of the Summer Term at the latest.

If the Exceptional Circumstances Committee determines that good cause has been demonstrated as to why a student’s performance has been adversely affected, that student may be allowed to take a resit examination as their first sitting, with no fees applied. Such cases may include, for example, illness or family issues. The Exceptional Circumstances Committee has no power to change the results of examinations or the marks given to assessed coursework.

9. ACADEMIC ADVISER SYSTEM

The goal of the academic adviser system is to provide each student with a single adviser for the duration of their degree, who

- holds a meeting at the beginning of their first term, and termly thereafter;
- provides help with module choices;
- monitors the student's progress;
- supports the student's career planning;
- signposts the student to services available elsewhere in the university.

Once a term, your academic adviser will invite you for a brief meeting, usually no more than 10 minutes in length. This will give you the chance to discuss any issues that may have arisen, and to ask questions about your studies.

Your adviser will be able to advise you on various matters, and point you in the right direction for others. They are a good person to ask to provide a reference for a potential employer or internship opportunity.

It is intended you will build a positive and lasting relationship with your academic adviser. However, it's always possible that difficulties may arise, and the Part I Director of Studies is available to help in this event.

10. SYLLABUSES

MATH101 Calculus – Dr B Schulze

Syllabus

- Functions of real variable polynomials; rational functions; partial fractions; induction; application to sums of squares and cubes; sequences; series as a limit of partial sums; geometric series, and the sum of telescoping series
- Continuity and limits of a function of a real variable; exponential and hyperbolic functions defined via series; compositions and inverses; the natural logarithm function
- Differentiation: definition of the derivative as limit of tangent; differentiable functions are continuous; product and chain rules
- Taylor series; maxima and minima of stationary points; complex numbers; Argand diagram; complex exponentials; De Moivre's Theorem; roots of unity; homogeneous linear second-order differential equations with constant coefficients; general solutions via the auxiliary equation.
- Integration: indefinite integration; definite integration; Fundamental Theorem of Calculus; integration by parts; integration by substitution; integration of rational functions

Aims

To provide the student with an understanding of functions, limits, and series, and a knowledge of the basic techniques of differentiation and integration.

Description

The purpose of this module is to study functions of a single real variable. Some (but not all) of the topics will be familiar from A level, but will be studied at a more formal/rigorous level. The module begins with a discussion of polynomials the principle of induction, and a treatment of sequences and series. The module then considers functions of a real variable. We consider the notion of the limit of a function and introduce the concept of continuity for a function. We then consider key examples of functions such as the exponential function, the logarithm function or the hyperbolic functions. We also consider techniques for building new functions from old. Finally, we introduce the main tools of calculus. The derivative measures the rate of change of a function and the integral measures the area under the graph of a function. The rules for calculating derivatives are obtained from the definition of the derivative as a rate of change. Taylor series are calculated for functions such as sin, cos and the hyperbolic functions. We then introduce the integral and review techniques for calculating integrals, particularly integration by substitution and integration by parts.

The exponential function is defined by its power series which is subsequently extended to the complex exponential function of an imaginary variable, so that students understand the connection between analysis, trigonometry and geometry. The trigonometric and hyperbolic functions are introduced in parallel with analogous power series, giving functional identities. Such functional identities are later used to simplify integrals and to parametrise geometrical curves. The trigonometric and hyperbolic functions are used to solve linear differential equations of the second order with constant coefficients.

Bibliography

GILBERT, J. and JORDAN, C. (2002) *Guide to mathematical methods*, second edition. Palgrave Macmillan.
EDWARDS, C.H. and PENNEY, D.E. (2002) *Calculus*, sixth edition. Prentice Hall.

MATH102 Further Calculus – Prof A Lazarev

Prerequisite: MATH101 Calculus

Syllabus

- Improper integrals
- Integration over infinite ranges
- Functions of two or more variables
- Partial derivatives
- Curves in the plane
- Implicit functions
- The chain rule for differentiating along a curve
- Stationary points for functions of two real variables
- Double and repeated integrals
- First-order differential equations: integrable, separable, linear
- Inhomogeneous second-order linear differential equations with constant coefficients
- Laplace transforms
- Recurrence relations and their applications

Aims

Students should gain an understanding of a range of methods for integrating functions of one variable; knowledge of partial derivatives and their use in classifying stationary points of functions of two variables; an ability to calculate double integrals over simple regions in the plane; and knowledge of methods for solving certain types of differential equation.

Description

This course extends ideas of MATH101 from functions of a single real variable to functions of two real variables. The notions of differentiation and integration are extended from functions defined on a line to functions defined on the plane. Partial derivatives help us to understand surfaces, while repeated integrals enable us to calculate volumes.

In mathematical models, it is common to use functions of several variables. For example, the speed of an airliner can depend upon the air pressure and temperature, and the direction of the wind. To study functions of several variables, we introduce rates of change with respect to several quantities. We learn how to find maxima and minima. Applications include the method of least squares. Finally, we investigate various methods for solving differential equations of one variable.

Bibliography

EDWARDS, C.H. and PENNEY, P.E. (2002) *Calculus*, sixth edition. Prentice Hall.
GILBERT, J. and JORDAN, C. (2002) *Guide to mathematical methods*, second edition. Palgrave Macmillan.
SIMMONS, G.F. (1991) *Differential equations with applications and historical notes*, second edition. McGraw–Hill.

MATH103 Probability – Dr R Hillier

Syllabus

- Axiomatic probability theory
- Discrete and continuous random variables, including probability mass functions, probability density functions and cumulative distribution functions, expectation, variance, skewness and kurtosis
- The Chebychev inequality, independence of random variables and the weak law of large numbers.

Aims

- To provide an introduction to probability theory.
- To introduce students to the axiomatic approach to probability.
- To make students aware of the different probability models used to model varied practical situations.

Description

Probability theory is the study of chance phenomena; the concepts of probability are fundamental to the study of statistics. The course will emphasise the role of probability models which characterise the outcomes of different types of experiment that involve a chance or random component. The course will cover the ideas associated with the axioms of probability, conditional probability, independence, random variables and their distributions, expectation, variance and probabilistic modelling.

No previous exposure to the subject will be assumed.

Bibliography

There are many good elementary books on probability theory. In particular, look at the following.

ROSS, S. (1988*) A first course in probability*, fifth edition. Macmillan.
GRIMMETT, G. and WELSH, D. (1986) *Probability: an introduction*. Oxford University Press.
DURRETT, R.T. (1994) *Essentials of probability*. Duxbury Press.

MATH104 Statistics – Dr A Sykulski

Prerequisite: MATH103 Probability

Syllabus

- Data collection and summary
- The normal distribution
- Foundations for inference
- Confidence intervals
- Hypothesis testing

Aims

The module aims to enable students to achieve a solid understanding of the broad role that statistical thinking plays in addressing scientific problems in which the recorded information is subject to systematic and random variations. Specifically, by the end of the module, students should be able to select and formulate appropriate probability models, to implement the associated statistical techniques, and to draw clear and informative statistical conclusions for a range of simple scientific problems.

Description

The module starts with the description of examples of scientific investigations in which specific questions are of interest, but they are not straightforward to answer, as the available data are subject to systematic and random variations. A range of exploratory data analysis methods for gaining insight into the sources of variations will be introduced. Then a general strategy for the statistical treatment of such problems will be developed, involving aspects of modelling, investigation, and conclusions.

Students will learn how to

- select appropriate probability models which have variations which are consistent with the mechanisms that generated the data;
- fit the probability model to the data by estimating unknown features of the probability model;
- assess whether the fitted probability model agrees with the data;
- provide answers to scientific questions reflecting the uncertainty in the data.

Students will obtain experience in implementing this general strategy for statistical investigation by application to real data sets. The module will be supported by statistical software, which students will learn about through lectures and workshops. The strategic understanding and software experience developed in this module are skills used in all the subsequent statistical modules of the degree.

Bibliography

CLARKE, G.M. and COOKE, D. (1998) *A basic course in statistics*, fourth edition. Arnold.
DALY, F., HAND, D.J., JONES, M.C., LUNN, A.D. and McCONWAY, K.J. (1995) *Elements of statistics*. Addison Wesley.
LINDSEY, J.K. (1995) *Introductory systems, a modelling approach*. Oxford Science Publications.

MATH105 Linear Algebra – Dr J D Evans

Syllabus

- Matrices: addition and multiplication, transpose and inverse
- Simultaneous linear equations
- Reduction to echelon form by elementary row operations
- Elementary matrices
- Determinants: expansions about a row or column
- Elementary row and column operations on determinants
- Properties of determinants
- Linear transformations of Euclidean space
- The matrix of a linear transformation
- Non-singular linear transformations
- Eigenvectors and eigenvalues
- The characteristic equation

Aims

The aim of this module is to give an introduction to the theory of matrices together with some basic applications. These are needed for later courses, such as linear algebra, and they are also of practical use for applications to geometry.

Description

This module consists of two main parts. In the first part we introduce the basic concepts from matrix theory. In particular, we learn the essential techniques that are needed for the applications, such as arithmetic rules, row operations and computation of determinants by expansion about a row or a column. The second part of the module covers a notable range of applications of matrices, such as solving systems of simultaneous linear equations, linear transformations, characteristic equation, eigenvectors and eigenvalues.

Bibliography

GILBERT, J. and JORDAN, C. (2002) *Guide to mathematical methods*, second edition. Palgrave Macmillan.
TOWERS, D.A. (1990) *Guide to linear algebra*. CRC Mathematical Guides.

MATH111 Numbers and Relations – Dr N J Laustsen

Syllabus

- Logic: truth tables, methods of proof (direct, contraposition, contradiction), simple examples of mathematical proofs
- Number theory: division with remainder; highest common factors and the Euclidean algorithm; lowest common multiples; prime numbers; the Fundamental Theorem of Arithmetic and the existence of infinitely many prime numbers; applications of prime factorization
- Congruences: definition; solving congruences; the Chinese Remainder Theorem
- Relations: equivalence relations; the sum and product of two congruence classes; constructions of number systems
- Polynomials: the division algorithm; highest common factors and the Euclidean algorithm

Aims

To introduce students to logic and mathematical proofs; to state and prove fundamental results in number theory; to generalise the notion of congruence to that of an equivalence relation and explain its usefulness; to generalise the notion of a highest common factor from pairs of integers to pairs of real polynomials.

Description

University mathematics has a rather different feel from that encountered at school; the emphasis is placed far more on proving general theorems than on performing calculations. This is because a result which can be applied to many different cases is clearly more powerful than a calculation that deals only with a single specific case.

For this reason we begin by taking a look at the language and structure of mathematical proofs in general, emphasizing how logic can be used to express mathematical arguments in a concise and rigorous manner.

We then apply these ideas to the study of number theory, establishing several fundamental results such as Bezout's Theorem on highest common factors and the Fundamental Theorem of Arithmetic on prime factorizations.

Next, we introduce the concept of congruence of integers. This, on the one hand, gives us a simplified form of integer arithmetic that enables us to answer with ease certain questions which would otherwise seem impossibly difficult; and on the other it leads naturally to the abstract idea of an equivalence relation which has applications in many areas of mathematics.

Finally, we show how the idea of a highest common factor can be generalised from the integers to polynomials.

Bibliography

ALCOCK, L. (2013) *How to study for a mathematics degree*. Oxford.
DURBIN, J.R. (2000) *Modern algebra: an introduction*. Wiley.
LIEBECK, M. (2011) *A concise introduction to pure mathematics*. Chapman and Hall.
WALLACE, D.A.R. (2001) *Groups, rings and fields*. Springer
WHITEHEAD, C. (1988) *Guide to abstract algebra*. Macmillan

MATH112 Discrete Mathematics – Dr D Pauksztello

Prerequisite: MATH111 Numbers and Relations

Syllabus

- Introduction to set notation.
- Manipulation of sets: inclusion, intersection, union, complements
- Inclusion-exclusion
- Functions and composition. Injectivity, surjectivity and bijectivity
- Invertibility of functions
- The Schröder-Bernstein theorem
- Cardinality and countability
- Selecting and counting elements from finite sets
- The pigeonhole principle
- Disjoint cycle notation for permutations
- Graphs and trees
- Isomorphism, planarity, traversing and colouring of graphs

Aims

- To develop the notion of a definition and the use of definitions in mathematical proof.
- To introduce the basic ideas and notations involved in describing sets and functions between them.
- To formalise the idea of the size of a set and what it means for a set to be finite, countably infinite or uncountably infinite.
- To provide tools to carry out counting arguments from first principles.
- To introduce the notion of a graph and demonstrate how one can tell graphs apart.

Description

Many mathematical questions involve counting. For example, if you dine with four friends around a circular table, how many meals can you have before you must repeat the seating arrangement? For finite sets, we can say that one is bigger than another if it contains more elements. What about infinite sets: are some infinite sets bigger than others? This module provides the tools to answer these questions and other counting problems, such as the number of permutations of elements of a finite set, and the number of ways to choose a fixed number of elements from a set if replacement is allowed or not.

As well as counting objects, we might be interested in connections between them, which leads to the study of graphs and networks – collections of nodes joined by edges. There are many applications of this theory to designing or understanding properties of systems such as the infrastructure powering the Internet, social networks such as Facebook, the London Tube network, and the whole world ecosystem, one massive biological network.

In the course of studying the above topics, this module illustrates the nature and use of definitions in pure mathematics, as part of the processes of formalisation, generalisation and proof.

Bibliography

ALCOCK, L. (2013) *How to study for a mathematics degree*. Oxford.
CHETWYND, A. and DIGGLE, P. (1995) *Discrete mathematics.* Arnold.
MARTIN, G.E. (2001) *Counting: the art of enumerative combinatorics.* Springer–Verlag.
WILSON, R.J. (2010) *Introduction to graph theory*. Prentice Hall.

MATH113 Convergence and Continuity – Prof G Elek

Syllabus

- Real numbers
- Maximum, minimum, infimum, supremum, lim sup
- Sequences and convergence; Cauchy sequences
- Limit points
- The world of closed sets
- The Bolzano–Weierstrass Theorem
- Real functions
- Sequential continuity
- The epsilon-delta definition
- The intermediate value theorem and applications

Aims

- To have a rigorous, but understandable, introduction to the real numbers
- To get familiar with the basic definitions of real analysis
- To understand the key notion of continuity
- To see and understand various examples and counter-examples related to the above topics
- To learn how to read and write simple proofs regarding the above topics

Description

Analysis is one of the pillars of mathematics, with manifold applications to science, engineering, and economics. It deals with the abstract mathematics behind limits, continuity, differentiation and similar concepts. In this module, students will gain further familiarity with the language of definitions, theorems and proofs. They will also improve their skills at mathematical writing, here in the context of analysis. The key ideas of limit and continuity will be explored. Students will study many examples that are intended to help to develop further their abilities to imagine and "see" complicated mathematical objects.

Bibliography

BARTLE, R.G. and SHERBERT, D.R. (2011) *Introduction to real analysis*, fourth edition. John Wiley and Sons.

HART, F.M. (2001) *Guide to analysis*, second edition, Palgrave Macmillan.

LIEBECK, M. (2015) *A concise introduction to pure mathematics,* fourth edition. Taylor and Francis.

MATH114 Integration and Differentiation – Prof G Elek

Prerequisite: MATH113 Convergence and Continuity

Syllabus

- Uniform continuity of continuous functions
- Integration of continuous functions
- Series versus sequences
- Convergence tests for series: comparison, ratio, integral and alternating series
- Examples such as geometric series and the harmonic series
- Difference quotients, limits, derivatives
- Continuity of differentiable functions
- Algebra of differentiation: product rule, chain rule, differentiating inverse functions
- Mean-value theorem and applications
- Fundamental theorem of calculus

Aims

- To understand the concept of integration of continuous functions.
- To understand the notion of series and convergence of series.
- To understand the concept of differentiability of functions, and its relation to continuity and integration.
- To understand how to read and write proofs related to the above topics.
- To understand how to provide examples and counter-examples to mathematical definitions and statements regarding the above topics.

Description

Building on MATH113, this module is considered the second part of your Analysis studies and deals with three topics: integration, series and differentiation. These topics might sound familiar from A level or MATH101, but here we take a different perspective. Typical question that we aim to answer could include: can you "sum up infinitely many numbers" and get a finite number; under which conditions does this work; can you differentiate every continuous function, and how can we prove it or develop a strategy to prove it? You will also acquire further familiarity with the language of definitions, theorems, proofs and examples, and with mathematical writing, in the context of analysis.

Bibliography

LIEBECK, M. (2015) *A concise introduction to pure mathematics,* fourth edition. Taylor and Francis. [A good introduction to general university mathematics, its language and structure, covering some parts of this module.]
BINMORE, K.G. (1982) *Mathematical analysis*, second edition. Cambridge University Press. [A thorough real-analysis textbook that goes beyond the aim of this module and that will be useful throughout the whole of your undergraduate studies.]
BARTLE, R.G. and SHERBERT, D.R. (2011) *Introduction to real analysis*, fourth edition. John Wiley and Sons. [A thorough and very modern real-analysis textbook that goes beyond the aim of this module and that will be useful throughout your undergraduate studies; sadly very expensive.]
HART, F.M. (2001) *Guide to analysis*, second edition, Palgrave Macmillan. [A gentle, example-focused introduction to real analysis, covering most of this module.]

MATH115 Geometry and Calculus – Prof G Blower

Syllabus

- Geometric vectors
- Parameters for curves
- Curve length
- Gradient vectors and geometrical applications
- Chain rule II for partial derivatives
- Constrained minima and maxima
- Double integrals over triangular and more general regions
- Change of variable for double integrals
- Areas of surfaces and volumes of solids

Aims

The course aims to introduce the key concepts of the theory of vectors, with a focus on two, three or *n*-dimensional real space. The main philosophy is to unite the algebraic machinery with the geometric concepts that vectors can be used to represent.

The course also aims to provide a framework for students to develop facility with various important mathematical tools and techniques, especially optimization of functions in several variables, partial differentiation, scalar products, calculation of angles, and integration.

Description

The main focus of this course is vectors in two- and three-dimensional space. We start off with the definition of vectors and we see some applications to finding equations of lines and planes. We then consider some different ways of describing curves and surfaces via equations or parameters, and we use partial differentiation to determine tangent lines and planes, as well as using integration to calculate the length of a curve.

In the second half of the course, we study functions of several variables. When attempting to calculate an integral over one variable, we often substitute one variable for another more convenient one; here we will see the equivalent technique for a double integral, where we have to substitute two variables simultaneously. We also investigate some methods for finding maxima and minima of a function subject to certain conditions.

Finally, we discuss how to calculate the areas of various surfaces and the volumes of various solids.

Bibliography

GILBERT, J. and JORDAN, C. (2002) *Guide to mathematical methods*, second edition. Palgrave Macmillan.

STEPHENSON, G. (1961) *Mathematical methods for science students*. Longmans.

11. SINGLE-MAJOR AND COMBINED-MAJOR DEGREE SCHEMES

The following is a list of degree schemes to which the department contributes.

Single-major schemes

G100	BSc	Mathematics
G102	BSc	Mathematics (Placement Year)
G101	MSci	Mathematics
G103	MSci	Mathematics (Study Abroad)
G1G3	BSc	Mathematics with Statistics
GCG3	BSc	Mathematics with Statistics (Placement Year)
G1GJ	MSci	Mathematics with Statistics
G1GH	MSci	Mathematics with Statistics (Study Abroad)

Combined-major schemes in the Faculty of Science and Technology

GG14	BSc	Computer Science and Mathematics
GG1K	MSci	Computer Science and Mathematics
GG1L	BSc	Computer Science and Mathematics (Placement Year)
F3GC	BSc	Theoretical Physics with Mathematics
F3G1	MSci	Theoretical Physics with Mathematics
F3G5	MSci	Theoretical Physics with Mathematics (Study Abroad)
GFC0	BSc	Natural Sciences
CFG0	BSc	Natural Sciences (Study Abroad)
FCF3	MSci	Natural Sciences
CFG1	MSci	Natural Sciences (Study Abroad)

Combined-major schemes with the Management School

NG41	BSc	Accounting, Finance and Mathematics
NG42	BSc	Accounting, Finance and Mathematics (Industry)
GL11	BSc	Economics and Mathematics
GL12	BSc	Economics and Mathematics (Industry)
GN13	BSc	Financial Mathematics
GN1J	BSc	Financial Mathematics (Industry)
GN1H	MSci	Financial Mathematics
GLN0	BSc	Mathematics, Operational Research, Statistics & Economics (MORSE)
GLN1	BSc	Mathematics, Operational Research, Statistics & Economics (MORSE) (Industry)

Combined-major schemes with the Faculty of Arts and Social Sciences

GR11	BA	French Studies and Mathematics
GR12	BA	German Studies and Mathematics
GR14	BA	Spanish Studies and Mathematics
GV15	BA	Mathematics and Philosophy

12. GENERAL INFORMATION

End-of-module questionnaires

In order to monitor the response to courses, the department asks students to complete an online questionnaire at the conclusion of each module. A link to the questionnaire will appear on Moodle at the appropriate time. Your feedback is considered carefully by the module lecturer and the department's Undergraduate Teaching Committee.

Year Representatives and the Staff-Student Consultative Committee

A number of students are elected from each year to act as representatives of Mathematics and Statistics students. The representatives have the right and responsibility to attend department meetings, and generally to advise the department of any student concerns. If you are interested in becoming a Year Representative, please contact the Part I Director of Studies.

The Staff-Student Consultative Committee comprises the Year Representatives, the Directors of Studies and the Director of Undergraduate Teaching. The committee considers any teaching issues raised by either by students, lecturers or tutors. Meetings are chaired by a postgraduate student, and are usually held in the third week of each module.

Lancaster University Maths & Stats Society (LUMASS)

LUMASS is a friendly, student-run society which organises social events, talks on interesting mathematical topics and the weekly Maths Café (subject to confirmation due to Covid-19), where you can get extra help with your weekly assignments and discuss areas of interest. Further information about the society is available at Freshers Fair and will be posted on the department notice boards.

Computing facilities

Several computer laboratories on campus are available for student use. The ISS Service Desk in the Learning Zone can provide information about opening times and rules for using the laboratories. See the section on Web Resources, p.14, for details on computer registration.

Alan Talbot memorial prize

This prize commemorates one of the founding professors of the department, and is awarded to the student who is deemed to have performed best in Part I Mathematics. It may be shared. The prize takes the form of a book token.

Student Based Services

If you experience any difficulties during your time at Lancaster University, Student Based Services can often help. They offer a range of services including counselling and advice on financial support, health and general welfare.

The first point of contact for Student Based Services is at The Base helpdesk, which may be found next to reception in University House. They may also be contacted by telephone on 01524 5-92525, via the web or by email to thebase@lancaster.ac.uk.

Part-time work

Lancaster University has its very own Employment and Recruitment Service (ERS) located in The Base, Alexandra Square, which offers casual and flexible work opportunities. After registering online here: temps.lancaster-university.co.uk you just need to take your right to work documents (e.g. passport) and apply for vacancies online. We recommend that students work no more than 20 hours per week during term time - if you are an international student your visa may restrict the number of hours you can work.