PRIFYSGOL ABERYSTWYTH UNIVERSITY

Department of Mathematics
Undergraduate Studies

Contents

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Important information
The programme information published in this brochure was correct at time of going to print (July 2019) and may be subject to change. Prospective students are advised to check the definitive programme information, including entry requirements, that is available on our website before making an application, to ensure that the programme meets their needs.

Welcome

Welcome to the Department of Mathematics.

"Mathematics by the Sea" has been part of Aberystwyth University since it first opened its doors in 1872. In fact, Aberystwyth was the first University to teach Mathematics in Wales. Teaching and research methods have certainly changed over the last century, yet our aim remains the same – to provide the highest quality education possible, in a friendly and supportive environment.

We are a close-knit department that focuses on our students' learning, development and satisfaction during their time here in Aberystwyth. We teach using a mixture of lectures, small group tutorials and practicals, with the aim to both explore rich Mathematical structures and to translate Mathematics into practical applications.

Our single honours Mathematics courses, for example the three year (G100) scheme and the four year Integrated Masters (G103) scheme, are accredited by the Institute of Mathematics and its Applications, meaning that you will meet the educational requirements for the status of Chartered Mathematician. These courses are built on a foundation of algebra and calculus, and lead to a wide choice of final year options in subjects such as mathematical analysis, biological statistics, fluid and solid mechanics, and operator algebras. In addition to our single-honours courses, there are a selection of joint-honours courses to choose from, with subjects such as Physics, Computer Science, Business and Languages.

Aberystwyth itself is a beautiful seaside town that combines a vibrant student experience with a naturally stunning environment.

I hope you enjoy reading through our brochure and I look forward to meeting you in Aberystwyth soon.

Professor Simon Cox
Head of Department

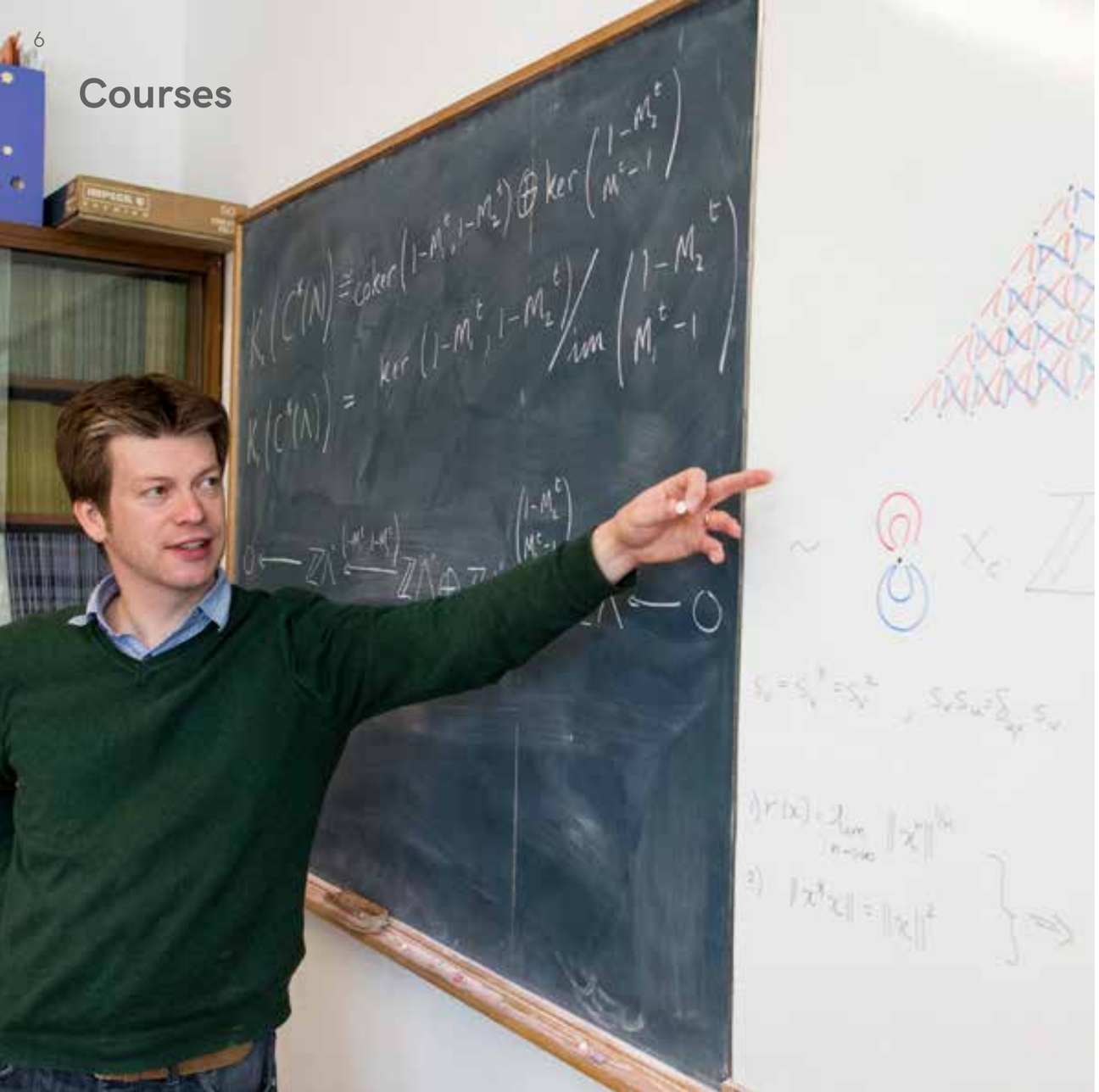
Why study Mathematics

Mathematics is living discipline that has evolved through the ages. It is one of the supreme achievements of the human mind. Not only is it a scientific discipline in its own right, it influences all other scientific subjects. Science without mathematics is unthinkable.

Within the subject of Mathematics there are many subdisciplines, broadly categorised as Pure Mathematics, Applied Mathematics (including Mechanics) and Statistics. You may choose to study modules in all three areas, or develop your interests in a particular branch of Mathematics. You may also choose to focus on the use of Mathematics in cognate areas of study through our bespoke degree schemes in Financial Mathematics, Mathematical and Theoretical Physics, and Data Science, which combines elements of Computer Science with Statistics.

We offer a wide range of possibilities, including combinations with closely-related subjects such as Physics and Economics. For those who foresee a career in teaching, it is possible to study Mathematics and Education, and we also offer joint degrees with a Modern Language, with History and with Drama.

For future employment, a Mathematics degree will equip you with many transferable skills. Mathematics graduates work in diverse environments and are highly sought after by many employers. We encourage all our students to complete a year in employment, as part of their studies, to give them a taste of the career path they may want to pursue.



Mathematics

BSc (Hons)

Our Mathematics degree uncovers a fascinating and challenging discipline that combines the identification and analysis of shapes and patterns with data collation and calculation. You will be taught the essential disciplines of algebra, calculus and mathematical analysis with optional modules in your second and third years to broaden your mathematical knowledge.

Core modules:

Year 1

- > Algebra
- > Calculus
- > Classical Dynamics
- > Geometry
- > Differential Equations
- > Further Algebra and Calculus
- > Mathematical Analysis
- > Probability
- > Statistics
- > Career Planning and Skills Development

Year 2

- > Complex Analysis
- > Linear Algebra
- > Applied Statistics
- > Numerical Analysis
- > Mathematical Physics

Year 2 optional modules:

- + Abstract Algebra
- + Real Analysis
- + Hydrodynamics
- + Advanced Dynamics
- + Distributions and Estimation

Year 3

Year 3 mainly optional modules:

- + Group Theory
- + Graphs and Networks
- + Operator Algebras
- + Norms and Differential Equations
- + Partial Differential Equations
- + Mathematical Biology
- + Hydrodynamics
- + Linear Statistical Models
- + Stochastic Models in Finance

Degree type: BSc

UCAS Code: G100

Duration: 3 years

Available with an integrated industrial year.

Available as a four year integrated masters degree.

Available with a foundation year, for students without formal qualifications who have suitable background education, experience and motivation.

Available as Pure Mathematics / Statistics, Applied Mathematics / Statistics, and Applied Mathematics & Pure Mathematics.

Financial Mathematics

BSc (Hons)

Our Financial Mathematics degree was established in response to the increasing demand from employers in the financial sector for graduates with an understanding of Mathematics. The core of teaching will revolve around algebra, calculus and statistics. This will be within a financial context, for example in stochastic modelling of the stock market, equipping students with a solid understanding of the principles of financial accounting and management.

Core Modules:

Year 1

- Algebra
- Calculus
- Economic Principles
- Probability
- Differential Equations
- Financial Accounting
- Further Algebra and Calculus
- Introduction to Financial Management
- Mathematical Analysis
- Statistics

Year 2

- Numerical Analysis
- Linear Algebra
- Distributions and Estimation
- Applied Statistics
- Corporate Finance and Financial Markets
- Econometrics

Year 2 optional modules:

+ Complex Analysis
+ Abstract Algebra
+ Real Analysis*

Year 3

- Advanced Econometrics
- Stochastic Models in Finance
- Financial Accounting
- Investments and Financial Instruments
- Probability and Stochastic Processes

Year 3 optional modules:

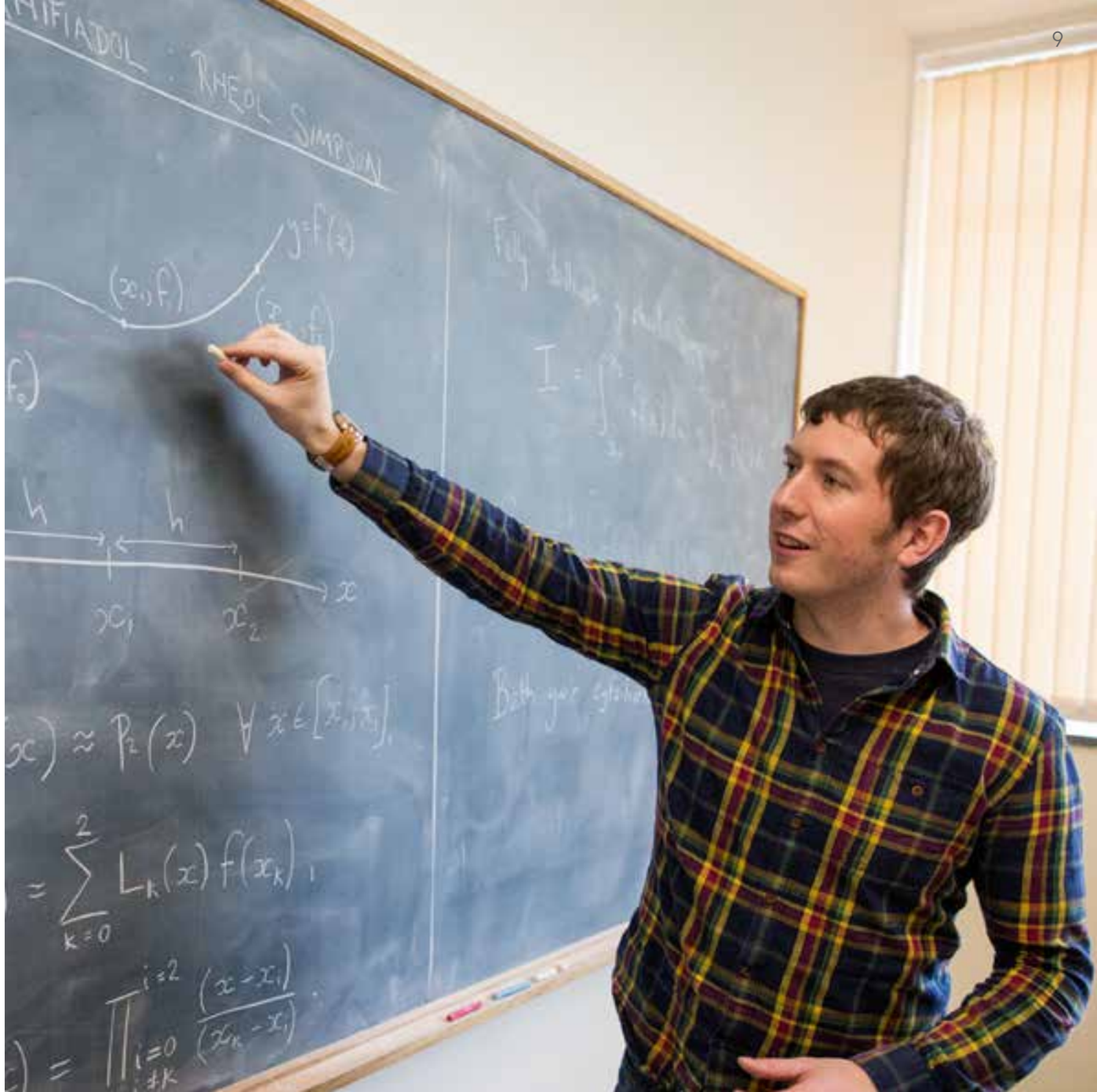
+ Comparative Statistical Inference
+ Graphs and Networks
+ Linear Statistical Models
+ Norms and Differential Equations
+ Partial Differential Equations

Degree type: BSc

UCAS Code: G1N3

Duration: 3 years

Also available with a foundation year, for students without formal qualifications who have suitable background education, experience and motivation.



Mathematical and Theoretical Physics

BSc (Hons)

Our Mathematical and Theoretical Physics degree will develop your understanding of the more theoretical parts of Physics, replacing an experimental approach to Physics with a solid grounding in Mathematics. This combination of Mathematics and Physics links to many spheres of interest, and students studying this diverse subject are very much in demand with employers.

Core Modules:

Year 1

- Algebra
- Calculus
- Classical Dynamics
- Classical Physics
- Geometry
- Differential Equations
- Further Algebra and Calculus
- Mathematical Analysis
- Modern Physics
- Probability
- Statistics

Year 1 optional modules:

+ Career Planning and Skills Development
+ Energy and the Environment
+ Laboratory Techniques for Experimental Physics

Year 2

- Complex Analysis
- Distributions and Estimation
- Electricity and Magnetism
- Introduction to Abstract Algebra
- Linear Algebra
- Mathematical Physics
- Principles of Quantum Mechanics
- Real Analysis
- Thermodynamics

Year 2 optional modules:

+ Advanced Dynamics
+ Hydrodynamics

Year 3

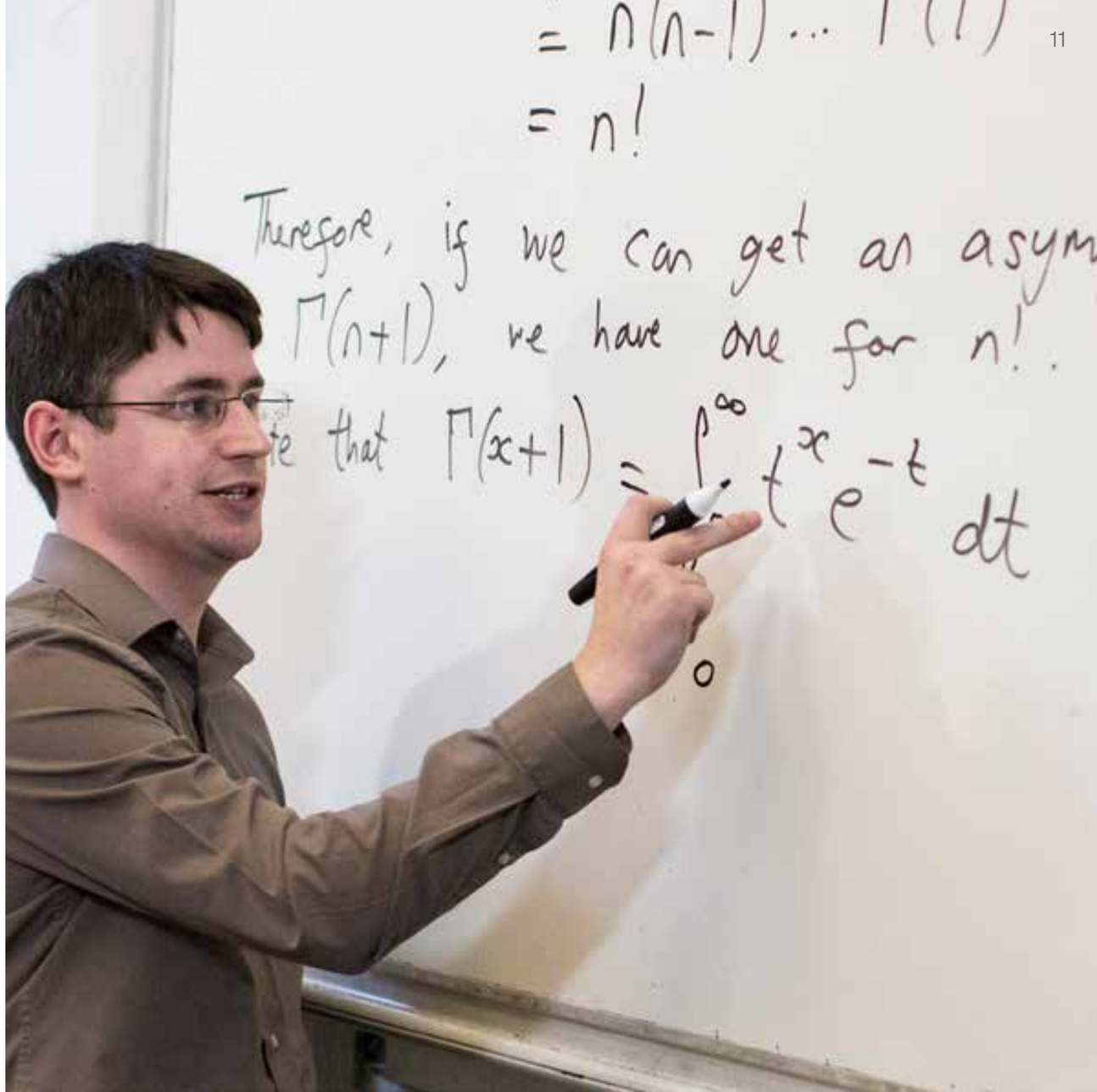
- Group Theory
- Norms and Differential Equations
- Partial Differential Equations
- Particles
- Quanta and Fields
- Probability and Stochastic Processes

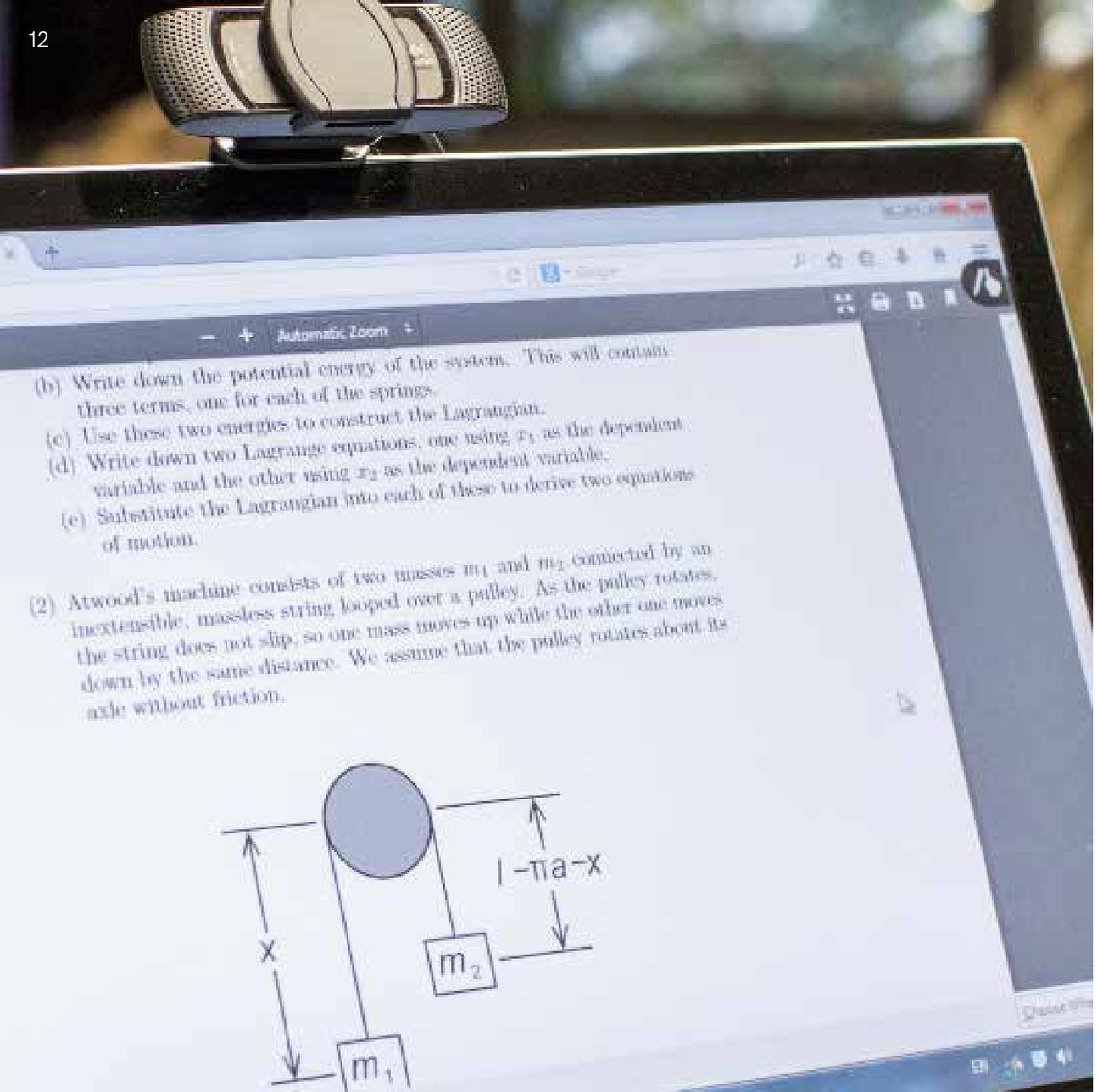
Degree type: BSc

UCAS Code: F340

Duration: 3 years

Also available as a four year integrated masters degree (MMath).





Data Science

BSc (Hons)

There is a rapidly growing demand for people who can analyse and make sense of "big data". Our degree in Data Science is an ideal starting point to work in this area. You will enjoy research-led teaching in a nurturing environment that promotes ingenuity and "out-of-the-box" thinking to address the ever-growing demand for extracting information from data.

Core Modules:

Year 1

- > Algebra
- > Calculus
- > Introduction to Computer Infrastructure
- > Introduction to Programming
- > Probability
- > Further Algebra and Calculus
- > Mathematical Analysis
- > Programming Using an Object-oriented Language
- > Statistics

Year 2

- > Numerical Analysis
- > Linear Algebra
- > Distributions and Estimation
- > Modelling Persistant Data
- > Program Design
- > Data Structures and Algorithms
- > Applied Statistics
- > Software Engineering

Year 3

- > Agile Development and Testing
- > Linear Statistical Models
- > Data Science Project

Year 3 optional modules:

- + Comparative Statistical Inference
- + Graphs and Networks
- + Probability and Stochastic Processes
- + Stochastic Models in Finance

Degree type: BSc

UCAS Code: 7G73

Duration: 3 years

Also available with an integrated industrial year.

Scholarships

Alongside Aberystwyth University scholarships such as Entrance Scholarships, Merit Awards, Academic Excellence Scholarships and Welsh-Medium Study Scholarships, we also offer our own Departmental Scholarships.

These are designed to encourage high-calibre and enthusiastic students to pursue a degree in Mathematics.

To qualify, an applicant must be either in receipt of a university Entrance Scholarship in Mathematics, or achieve grade A* in A Level Mathematics.

Successful applicants receive £500 per year for single honours courses and £250 per year for joint honours courses. Retention of the award requires that students achieve an average of at least 70% in Mathematics modules each year.

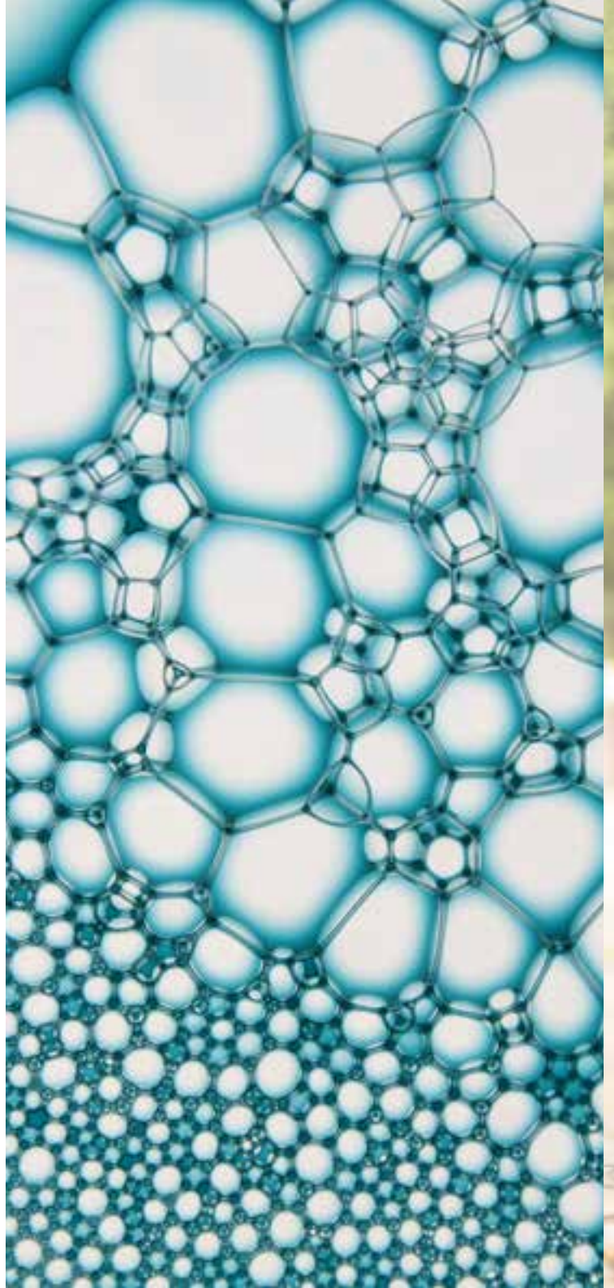
Information on all other University Scholarships can be found online at
www.aber.ac.uk/scholarships

Research

Our Mathematics lecturers are research-active in their respective fields and enjoy helping students develop their knowledge and understanding of Mathematics. The Department's research was rated as Internationally Excellent in the last UK-wide assessment, so you are guaranteed to be taught by experts.

We work in the following areas of Mathematics research:

- **Mathematical Modelling of Structures, Solids and Fluids** – covering diverse problems in solid and fluid mechanics and mathematical analysis. Examples of applications include weather forecast error, hydraulic fracture, and foam treatments for varicose veins. Our approaches include modelling, analysis, numerical simulation and experimentation.
- **Quantum Structures, Information and Control** – using functional analysis, statistics, and operator theory to study (for example) how quantum systems interact with their environment. As well as contributing to the link between algebra and topology, the group studies the emergent field of quantum control engineering.
- **Statistics** – interests include the application of statistical shape analysis to biological data sets and the statistical analysis of high-dimensional biological data sets. This is interdisciplinary work with colleagues in Computer Science and Biology, for example on nitrogen uptake by wheat seedlings and on a plants' internal clock.



What our students say

Alex Kendal

BA Mathematics / Drama and Theatre Studies (GW14) Graduate

"All of the staff in the Maths department are fantastic. The lecturers are all research active too, so they are teaching you about topics they are really interested in. There is an open-door policy so if you ever have a problem with an assignment or exam revision question you just have to ask. Aberystwyth is a place of natural beauty where you can leave your lecture at 6pm, walk a mile into town and see some of the most beautiful sunsets."

AberMathsSoc – Student Society

We also encourage our students to join the Aberystwyth Mathematics Society, with which the lecturers have close links. This is a great society through which to meet your peers, make friends for life, have fun on socials and benefit from academic and revision support in and around exams. You can find out more by searching "aber maths soc" on Facebook.

How to apply

Once you have decided what course you want to study and where, you'll be able to start the university application process. Here's a brief overview of the process and our procedures here at Aberystwyth.

1 Apply through UCAS.com

Deadline 15 January. Aberystwyth University institution code: A40.

TOP TIP: You'll be given a 10 digit UCAS ID number. Keep this to hand as you'll be asked for it many times.

2 The university will consider your offer

TOP TIP: Use UCAS Track to keep an eye on your application. At Aberystwyth we aim to make a decision within 4 weeks.

3 The offer will show on UCAS track

4 Decide where to go

Once you've received all your offers, you'll need to decide which university you want to go to, within a set time. This is when you'll need to note which universities will be your firm and insurance choices.

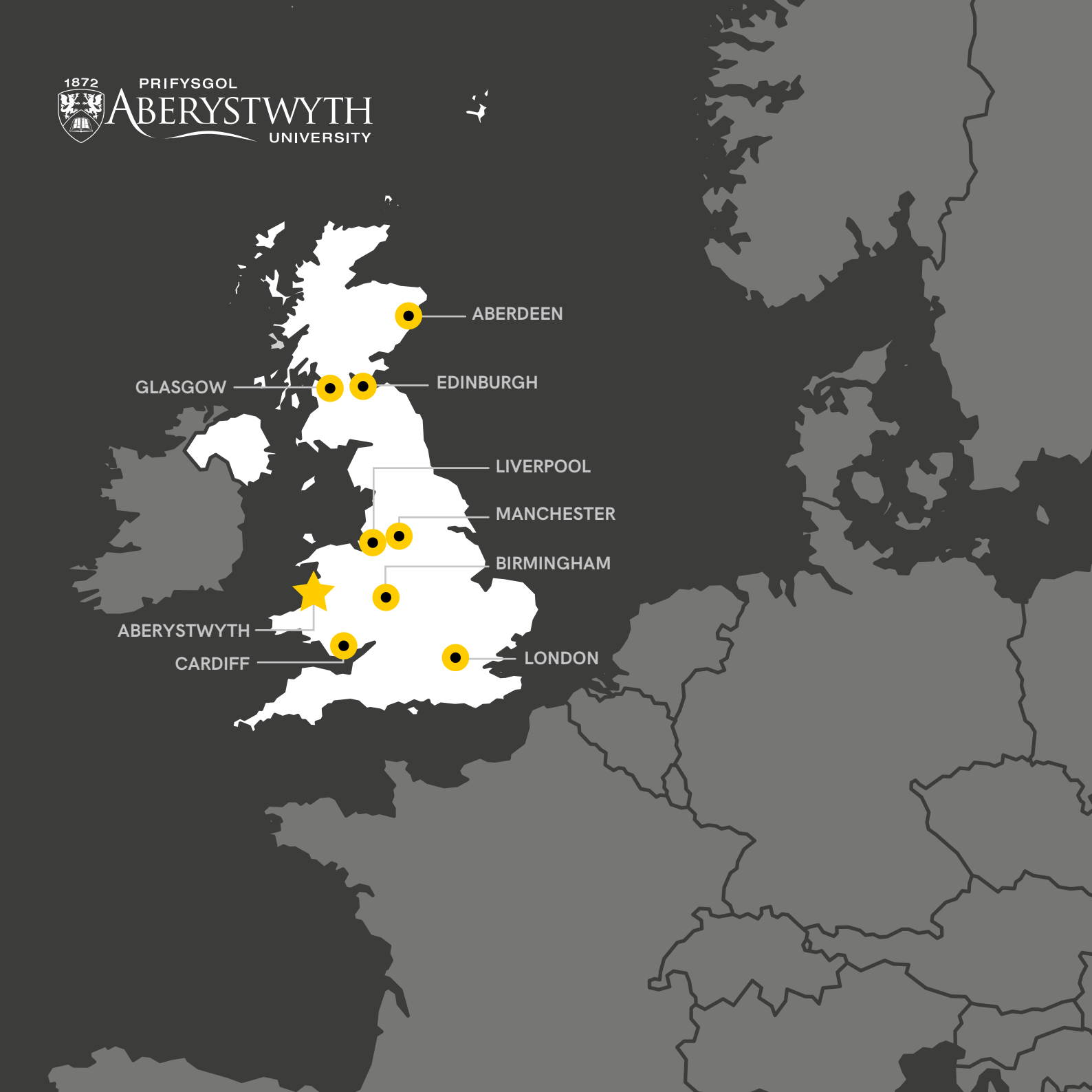
5 Accommodation

Once you've chosen your firm/insurance choice you'll be able to apply for your accommodation (April 1st onwards).

6 Results day

UCAS Track will confirm your offer of a place. If you're not clear what the offer is, contact the university directly. Make sure you're not on holiday on results day. If you don't get the grades you've hoped for, you may want to consider entering Clearing.

7 Start packing!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CARDIFF
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