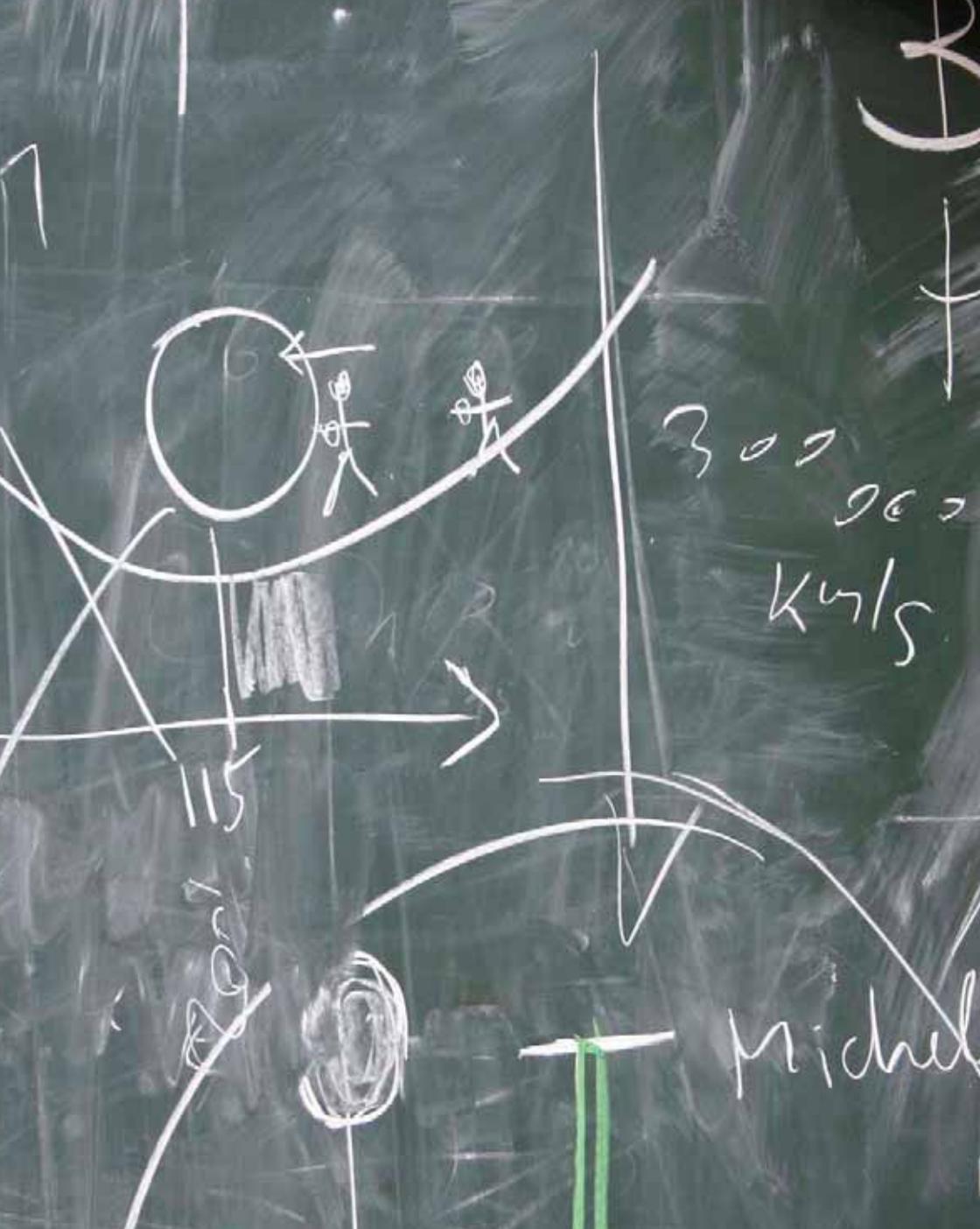




What can I do with my maths degree?

Careers advice for maths undergraduates



300
900
K4/5

Michael



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Where next?

Have you thought about where your maths degree could take you?



You have probably been told countless times that maths graduates are highly sought after by employers and that there will be a wide range of careers that you can choose from. Perhaps that was even one of your main motivations for choosing a maths degree - the prospect of a well paid, interesting and satisfying job. You may also have found yourself scratching your head, wondering what you will do, confused about what maths graduates actually end up doing.

Very few job titles contain the word 'mathematician' but you can be assured that there are hundreds of interesting career paths that a maths graduate can take. You will however probably have to put more effort into researching which career is for you, more so than someone studying a vocational subject, as there is no typical job for a maths graduate.

Hopefully this guide will:

Give you some ideas about possible careers, both obvious and unusual!

Suggest places to do further research

Highlight the other skills you will need to make you stand out from the crowd

Show you that there is a career out there for you.



fact: Maths graduates have highly developed numerical skills, are good at logical thinking and have an ability to analyse difficult problems - studies have shown that mathematics and computing graduates earn more over a lifetime than graduates of other degree subjects.

Inside this booklet you will find...

- 6 Where do I begin?
- 8 More than a maths degree

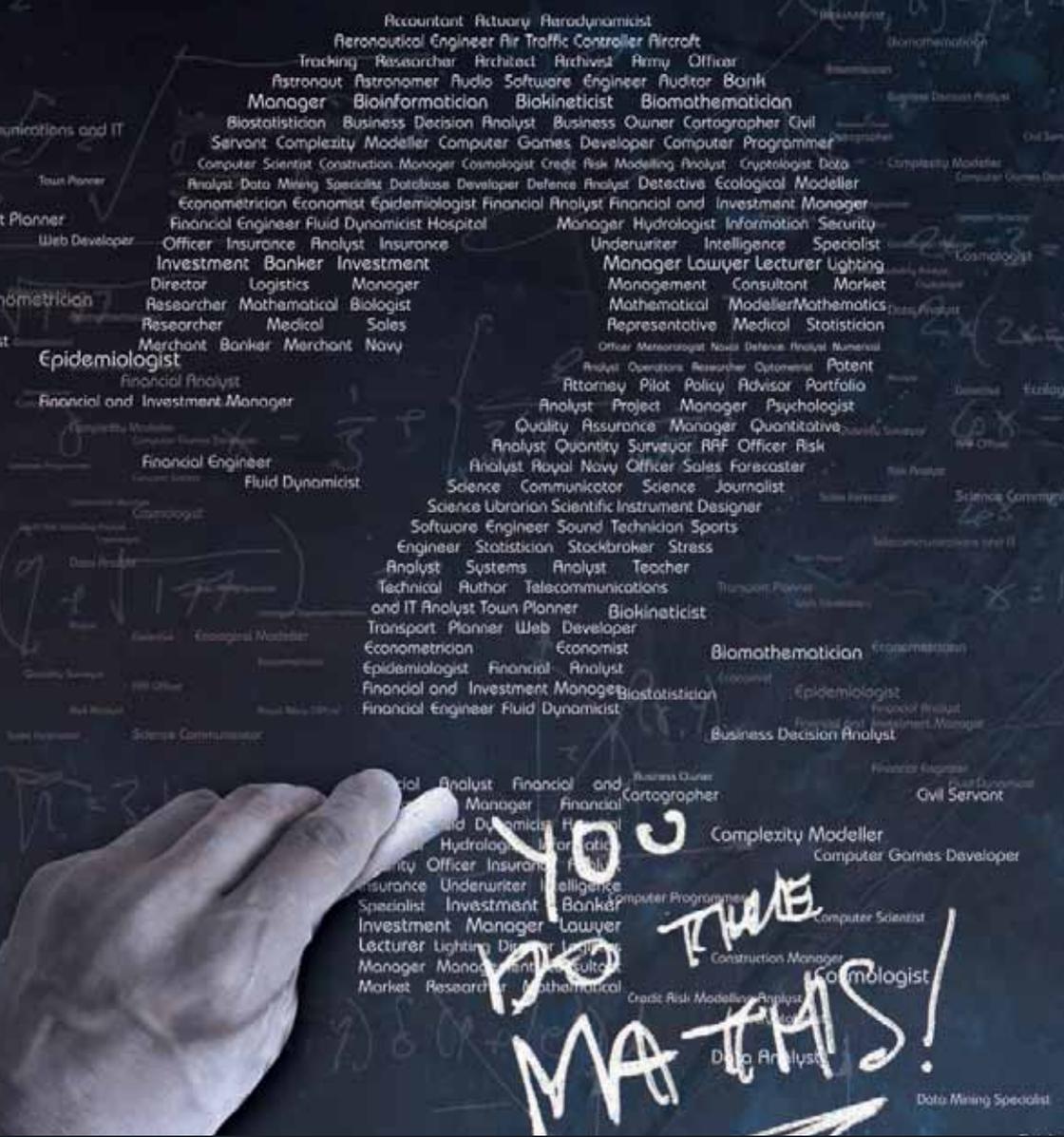
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"there is no typical job for a maths graduate ..."

Which subject at degree level gives you access to a thousand different careers?



Accountant Actuary Aerodynamicist
Aeronautical Engineer Air Traffic Controller Aircraft
Tracking Researcher Architect Archivist Army Officer
Astronaut Astronomer Audio Software Engineer Auditor Bank
Manager Bioinformatician Biokineticist Biomathematician
Biostatistician Business Decision Analyst Business Owner Cartographer Civil
Servant Complexity Modeller Computer Games Developer Computer Programmer
Computer Scientist Construction Manager Cosmologist Credit Risk Modelling Analyst Cryptologist Data
Analyst Data Mining Specialist Database Developer Defence Analyst Detective Ecological Modeller
Econometrician Economist Epidemiologist Financial Analyst Financial and Investment Manager
Financial Engineer Fluid Dynamicist Hospital Manager Hydrologist Information Security
Officer Insurance Analyst Insurance Underwriter Intelligence Specialist
Investment Banker Investment Manager Lawyer Lecturer Lighting
Director Logistics Manager Management Consultant Market
Researcher Mathematical Biologist Mathematical Modeller Mathematics
Merchant Banker Merchant Navy Representative Medical Statistician
Epidemiologist
Financial Analyst
Financial and Investment Manager
Financial Engineer
Fluid Dynamicist
Science Librarian Scientific Instrument Designer
Software Engineer Sound Technician Sports
Engineer Statistician Stockbroker Stress
Analyst Systems Analyst Teacher
Technical Author Telecommunications
and IT Analyst Town Planner Biokineticist
Transport Planner Web Developer
Econometrician Economist
Epidemiologist Financial Analyst
Financial and Investment Manager Biostatistician
Financial Engineer Fluid Dynamicist
Business Decision Analyst
Complexity Modeller
Computer Games Developer
Computer Programmer
Computer Scientist
Construction Manager
Cosmologist
Credit Risk Modelling Analyst
Data Analyst
Data Mining Specialist

To find out more about maths careers, visit www.mathscareers.org.uk

Where do I begin?

What type of career would you like to have?

The best place to start is with you! You need to figure out what you enjoy doing, what you want out of a job and what skills you have to offer employers.

Mathematicians go on to work in a huge variety of areas - so it is worth taking a step back and thinking about what kind of thing you would be interested in doing before you start applying for jobs at random.

Why not ask yourself these questions?

1. Do you want a career which requires a high level of maths?

In many careers you won't be required to use university level mathematics, and the career may well be open to people from other disciplines. Lots of employers like maths graduates for their transferable skills - problem solving, logical thinking and ability to understand technical information. So ask yourself - do I want to use a high level of mathematics or do I want to be stretched in other ways?

An example of a job using a high level of maths would be someone using applied mathematics to model wind flow around a building, as opposed to someone who is a project manager rolling out the use of a new software system in an IT firm. Both challenging and stretching jobs, but in different ways.

If you do want a career which requires a high level of maths, think about what areas might interest you, and whether you might need to specialise by undertaking further study such as a PhD. Consider contacting people who already work in that area.

top tip: browse through the career profile section of www.mathscareers.org.uk

you might be surprised and inspired by where maths graduates end up.

2. What type of employer would you like to work for?

Would you like to work for a big organisation or a smaller company? Would you like to join a graduate recruitment scheme? If you want to join a graduate recruitment scheme then think about the implications - you will potentially move job areas several times as well as geographical location. Is this something which appeals to you? Make sure you look carefully into what the scheme will involve.

You may think graduates only join large companies, but plenty also join the public sector or jobs not part of a graduate scheme - if you go down this route you may need to make more effort in looking for vacancies on-line.

3. How do you feel about further study?

Choosing to undertake further study after your degree can help you with your future career, but it can also be expensive and more demanding than an undergraduate degree. You need to be absolutely sure that this is the path for you. So if you were planning on further study because you are unsure of what career is for you, then you might want to reconsider.

How do you feel about a job which requires further study for a professional qualification - e.g. Accountancy. Make sure you have thought this through as you may need to study at evenings and weekends.

4. What type of skills do you have and which would you like to develop?

Do you thrive off being with people? Do you enjoy managing and leading others? Do you enjoy working on detailed or technical problems? Do you enjoy applying maths to real life problems? Do you like to work in a fast paced environment or prefer to work on something where it takes time to see the result?

These are just some of the questions you could ask yourself to help you decide what kind of job you would like to do. Do however be wary of stereotyping - the word "manager" may suggest working with people, but you will also have to sit down and prepare finance reports. Similarly accountants don't just sit at their desk crunching numbers, most will also give presentations, interact with clients and have to be good team players and ambassadors for their company.

More than a maths degree

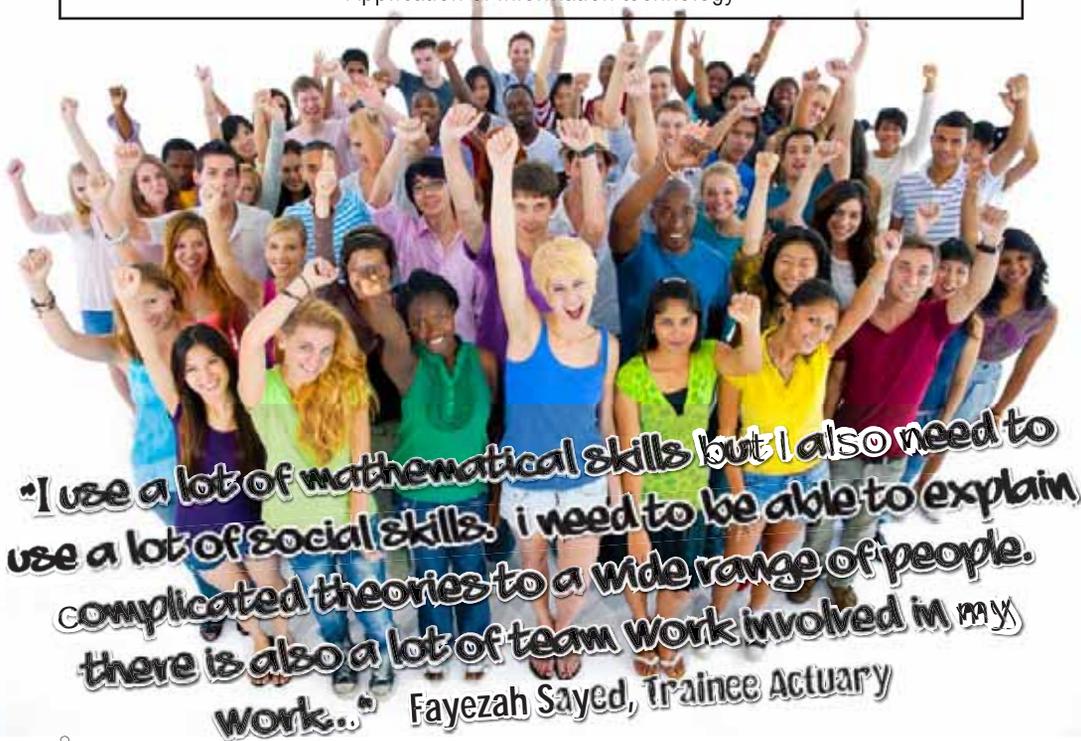
Making *yourself* stand out from the crowd

It is true that many employers love maths graduates for their many transferable skills such as problem solving, logical thinking and the ability to learn quickly.

Employers are also very clear that they want people who can communicate, who can deliver a good presentation and who can write a report in coherent English. Very few jobs require you to sit in an isolated box churning out maths formulae - even if you become an academic research mathematician it will help you a great deal if you can communicate with your colleagues, write successful grant applications and deliver an interesting lecture.

Skills which employers highly value include... (as defined in the education and skills survey 2010)

Self-management \ Teamworking \ Business and customer awareness
Problem solving \ Communication and literacy \ Application of numeracy
Application of information technology



Ideas for increasing your employability skills

Make the most of every opportunity at University - get involved in student societies, volunteering projects, take on responsibility. Do things which you enjoy and will challenge you in new ways.

you will have fun too!

Don't shy away from maths modules which are assessed differently, e.g. Through a presentation, essay or group project.

Do work experience if you can - this is particularly favoured by employers.

Look out for skills events put on by the careers service or your department - you will be surprised at what you might learn.

Sell yourself!

You might have amazing employability skills but you need to be able to say why and give examples to back your claims up.

E.g. "I have excellent communication skills, for example I regularly give tennis coaching sessions to both adults and children."

Why not take the list of employability skills on the opposite page and write down three examples where you demonstrate each of them.

All too often job applicants will be unaware of where they have developed the skills needed and one of the most common interview questions will require you to give examples of where you have demonstrated a particular competency.

Business, IT and Operational Research

How do you best organise your workforce to maximise productivity? What's the best design for a factory to run as efficiently as possible? Is the market ready for new ideas? Businesses need people who can solve complex problems, assess risk, predict the behaviour of markets, and make sense of vast amounts of data.

Many big organisations employ mathematicians and statisticians to help them with these tasks. If you are particularly interested in using your maths in a business context, then you may want to consider Operational Research, a discipline which is concerned with using analytical techniques to make business decisions. Have a look at www.learnaboutor.co.uk. You may not know for example that there is even a Government OR service in the UK.

There are also many businesses who are looking to recruit graduates from any discipline, but where the logical thinking, technical abilities and analytical skills of a maths graduate will be welcome. There are also more maths focused roles within a company such as a data or business analyst.

IT and Computing

IT covers a large number of different jobs. Candidates who have work experience or proficiency with a programming language may well have an advantage, but there are some companies that will assess your aptitude and then teach you on the job. If however you think that this sector is for you then it could be worth investing some time and teaching yourself the basics of a language. Not all jobs will require you to program on a daily basis, however knowing some programming will usually be useful.

Working in IT and computing could lead you to working in almost any sector, as most large companies will now need a host of different people working in lots of different functions. You could end up working for a major retailer, in the automotive sector, or even in the film industry, developing graphics for film and television.

Job titles in the IT and computing sector are changing all the time, so it is worth looking carefully at the job description before you apply for a job.

For more in depth information look at www.insidecareers.co.uk/it

For some more advanced applications of computing in industry, it could be useful to do a masters in a topic such as scientific computing.

Some examples of jobs in Business, IT or Operational Research:

Applications Developer
Business Analyst
Computer Games Programmer
Computer Programmer
Database Administrator
IT Consultant
Logistics Consultant
Management Consultant
Market Researcher
Operational Researcher
Project Manager
Software Developer
Software Engineer
Systems Analyst
Systems Developer

"maths is used in all customer based industries to formulate trends and review how effective policies are"
Heather Wright, Hartley McMaster



Case Study

Georgie Mellor - Operational Research Consultant
British Airways

BSc in Maths (University of Southampton), MSc in Operational Research, PhD in Operational Research.

My ability to think about things logically really helps when dealing with clients who have vague and complex problems. I am able to break it down into a set of clear issues and objectives and then set about addressing each of them. Having a good analytical ability also enables me to identify what information is needed and draw this out from large amounts of data.

We use optimisation (e.g. to improve ground staff rosters), linear programming (e.g. to make optimal fleet purchase and configuration decisions), simulation (e.g. to model the flow of passengers through the terminal to make decisions about manpower and equipment) and forecasting (e.g. passenger cancellations). Personally, I use a lot of problem structuring and complex data analysis.

Education

There are lots of opportunities in the teaching profession ranging from teaching maths itself to primary and special needs. Maths teachers are in great demand in schools so their employment prospects are excellent. If you are interested in becoming a teacher then it is well worth doing work experience. Your university may offer a scheme bringing undergraduates into contact with school students. Doing work experience could help you avoid starting a teaching course and then dropping out because it isn't for you. There have also been people who have done the work experience for the pay it involves and have then ended up finding out that teaching is their passion.

There are also now a variety of other routes into teaching rather than doing a PGCE, such as the Graduate Teaching Programme (GTP) scheme and Teach First Programme. At the time of writing there are still bursaries for those studying a maths PGCE, but look on line for the most up to date information.

Becoming an Academic

Most permanent academics combine teaching and research as part of their role. There are a much smaller number of academics who concentrate on just teaching or just research. The most common pathway to becoming a permanent academic is Masters then PhD followed by one or two fixed term post doctoral research positions, then a research fellowship before becoming a permanent lecturer.

It is important to make sure that you choose a PhD supervisor who will give you the support you need, as well as being based in an area you are interested in researching. It is also possible to move into an academic career outside of maths, into another science or technology subject such as physics or computing. There are some fully funded Masters and PhD programmes, look at individual course pages or websites such as www.postgraduatestudentships.co.uk. Don't forget to speak to your lecturers who will also be able to advise you.



Some examples of jobs in the Education sector:

Teacher - Primary / Secondary / Further Education Lecturer
Publisher / Editor - Scientific Journals / Educational Publishing
Science Librarian

Case Study



Ian Hollis - Head of Maths
Alcester High School Technology College

BSc in Mathematics, PGCE Maths

I always wanted to have a job that would give me variety, and would not just be the same every day, and also wanted to share the techniques that I had learnt with others.

Be absolutely sure that you are FULLY committed before deciding on teaching, it can be the most rewarding job in the world, but it can also be the most demanding...

Case Study



Vanessa Styles - Applied Mathematics Lecturer
The University of Sussex

BSc in Mathematics, DPhil in Applied Mathematics

I have always enjoyed studying mathematics and have found that the more I learn the more interesting it becomes. After completing my DPhil, I wanted to continue doing research, so I took post doctoral research positions at Oxford Brookes University and the University of Sussex. Then I spent some time doing research at the University of Regensburg in Germany before returning to Sussex to take up a position as a lecturer.

I consider good communication/teaching skills and a high dedication to mathematics to be main requirements for my job. I would advise anybody considering my career path to think very carefully when they choose their PhD topic and supervisor as they play a large part in determining the direction that your research takes.

Science and Engineering

Science

Try describing the world around you in an accurate and coherent way, and you'll soon find that the language of maths is indispensable. The skills of a mathematician are vital across the whole of science and technology. Even in areas such as biology, the role of mathematics has grown over recent years and there has been an increase in funding for this area.

A common way of accessing careers in this area is by doing a Masters course in a more specialised area such as mathematical medicine, bioinformatics, meteorology or oceanography. Taking such courses can lead to jobs in industry or can lead to further study before a career in research. Mathematicians are in a lucky position that they have the option of moving into a field different from the one they studied in.

If you are thinking of using your mathematics in a subject area which you haven't studied before such as geophysics or meteorology, it may be worth demonstrating an interest in the area by completing some work experience or voluntary work.

Engineering

The term "engineering" covers an incredibly diverse range of areas varying from medical engineering to construction and the defence sector.

As a mathematician you are unlikely to find many jobs labelled 'mathematician' within an engineering company and are much more likely to be known as an engineer once you work there. Some engineering companies do recruit maths graduates directly, and it is worth visiting a careers fair and asking the engineering companies about the openings which they have. Have a look at www.mathscareers.org.uk -> undergraduates -> who employs maths graduates for a list of engineering companies who employ maths graduates. There are of course many other roles within engineering companies, such as in management, finance and statistics which would also be open to maths graduates.

The other route to becoming an engineer apart from direct entry into a company would be to take a specialist engineering Masters degree. Some of the more common areas for a maths graduate to take a Masters degree in are computational fluid dynamics, digital signal processing or acoustics. Some such Masters courses are accredited by a relevant professional body and can give access to becoming a chartered engineer.

Some examples of jobs in Science and Engineering:

Aerodynamicist
Aeronautical Engineer
Bioinformatician
Biomathematician
Cartographer
Communications Engineer
Geophysicist
Hydrographic surveyor
Meteorologist
Oceanographer
Quantity Surveyor
Thermal/Structural Analyst

Case Study



**Martin Rittman - Post-doctoral research assistant
Chemistry Department, University of Reading**

MPhys (maths and physics), MSc (mathematical biology and biophysical chemistry), PhD (linear dichroism spectroscopy of DNA)

I have a lot of freedom to determine what I do. Most days I run experiments in the lab, which I plan with the guidance of my supervisor. I also assist in supervising PhD and MChem students. Other activities include running labs for undergraduates and there are often seminars where people present their recent research.

Research, particularly biochemistry, is becoming much more interdisciplinary so there is a need for mathematicians. Don't let a lack of lab know-how or scientific knowledge hinder you. Concentrate on your strengths and show a willingness to learn new things.

Finance and Related Professions

Finance is one of the most obvious uses for mathematics and is usually one of the first careers that people think of when they consider what you could do with maths.

The financial sector is large and varied and therefore it is important to investigate carefully the different roles on offer.

You may wish to be in a job which uses advanced mathematics or statistics - examples of such jobs are quantitative analyst and actuary. A quantitative analyst is someone who designs and implements mathematical models for the pricing of derivatives, assessment of risk, or predicting market movements. To become a quantitative analyst, a Masters or PhD is often an advantage.

Actuaries use financial and statistical theories to solve real business problems, using their maths and statistics skills to create theoretical models which can predict risk and uncertainty. To become an actuary you will usually need a 2.1 degree or better and will have to pass exams while you study, typically taking between three and six years.

If accountancy interests you then it is important to know that there are lots of different routes in this profession. For example chartered accountants are often concerned with looking backwards, in terms of auditing, preparing financial records and so on. Whereas management accountants are more likely to be looking forwards, analysing business performance, and providing key financial information which will help a business make its decisions. Accountancy exams will take around three years.

A close-up photograph of a hand dropping a coin into a white piggy bank. The piggy bank is sitting on a patch of green grass under a blue sky with light clouds. The hand is positioned at the top left, and the coin is falling towards the piggy bank's slot.

Accountants also work in a huge variety of settings, they could be inside a large or small firm of accountants, in the finance section of any business or self employed.

If finance interests you then it is well worth doing some investigation - look at the websites of different professional organisations and take a visit to your careers fair.

In modern finance maths is of paramount importance. The financial world relies heavily on accurate forecasts of the future and these are based on rigorous mathematical models. Finding the optimal way for a company or individual to organise assets requires a keen analytical mind and very good problem solving skills - something that maths graduates have in abundance.

Some examples of jobs in the Finance sector and related professions:

Actuary
Auditor
Chartered Accountant
Credit Analyst
Financial Advisor
Insurance Analyst

Investment Analyst
Investment Banker
Management Accountant
Pensions Advisor
Quantitative Analyst
Tax Advisor

Case Study

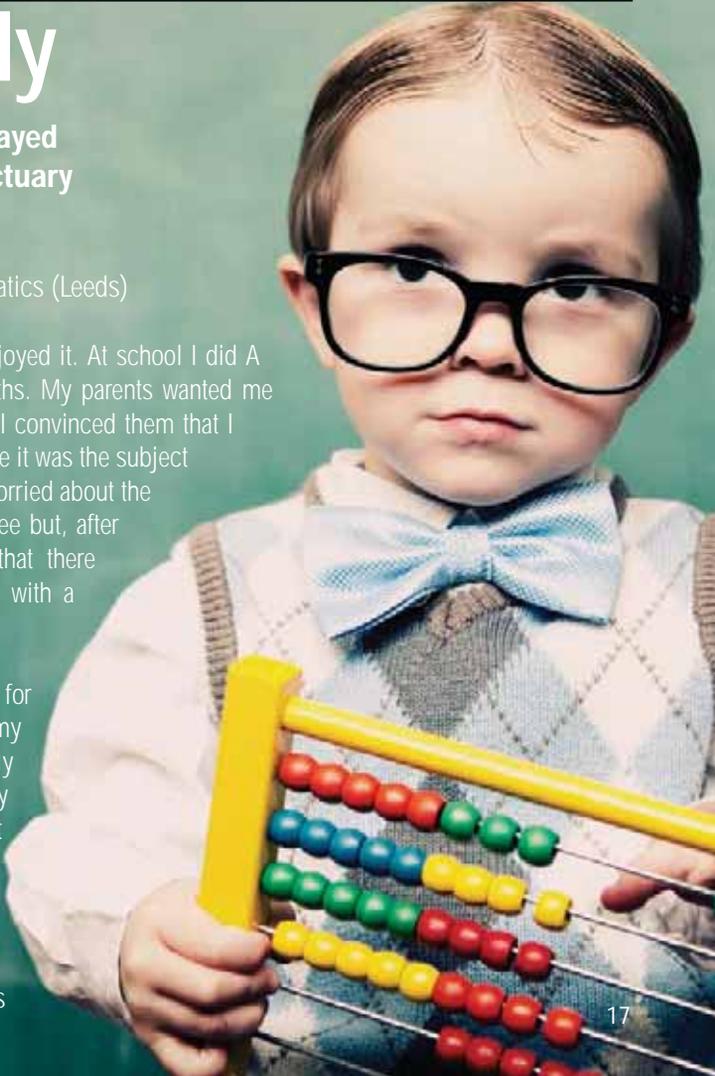


Faye Zah Sayed
Trainee Actuary
KPMG

BSc Mathematics (Leeds)

I always did Maths because I enjoyed it. At school I did A Levels in Maths and Further Maths. My parents wanted me to do Medicine at university but I convinced them that I really wanted to do maths because it was the subject which I loved. My parents were worried about the job prospects with a Maths degree but, after doing some research, I found that there were a huge number of options with a background in Maths.

I worked part time in admin for Topshop while I was doing my degree. My duties were mainly to do with the finances. I got my current job as a trainee actuary at KPMG after I graduated. Actuaries basically look at the profits and losses of a company and use Maths to predict the financial future of the company using lots of calculations and graphs.



Statistics

There is a high demand for suitably qualified statisticians and being a maths graduate you will be well placed to enter this career. The most commonly required entry requirement is that you have completed a Masters course in a statistical subject, such as statistics, applied statistics or medical statistics. There are however some posts, especially those which will require some kind of research where you will need to have completed a PhD. Some jobs won't require a Masters, however they are in the minority. There are also some jobs where the company will pay for you to complete your Masters while you work. A Masters is often required even if your undergraduate course contained a large amount of statistics.

Statisticians work in a large variety of areas, ranging from government, the environmental sector to the NHS and the pharmaceutical industry. There is detailed information on working in each of these sectors at the Royal Statistical Society's careers section at: www.rss.org.uk/careers

Job prospects are good in statistics and it is likely that the demand for statisticians will only grow over time, as decisions in business and government become more and more evidence based.

Some examples of jobs in the Statistics sector:

Biometrician
Environmental Statistician
Forensic Statistician
Government Statistician
Health Service Statistician
Market Research Statistician
Medical Statistician
Pharmaceutical Statistician

Case Study

Adrian Roberts - Statistician Biomathematics and Statistics Scotland

MSc Statistics

After obtaining an MSc in Statistics, I have been applying statistics at the forefront of research. First I worked at Shell research, investigating new advanced techniques for finding improved agrochemicals. Then I moved to Zeneca seeds, helping develop better crops using genetic fingerprinting. A highlight was a three-year stint in Argentina, working at a sunflower breeding station. Now I have moved on again and work for Biomathematics and Statistics Scotland, which is a major research institute applying mathematics and statistics in the agricultural, biological and environmental sciences.



Multiple Career Paths!

One of the great strengths of having studied maths is that there is such a wide range of career paths on offer. Consequently not every job has fitted into the different categories we have had so far.

Did you know that the largest group of research mathematicians in the country is found at GCHQ (Government Communications Headquarters.) Each year they recruit graduate mathematicians, but there are also other roles on offer such as intelligence analyst or roles in computing.

Do you have a flair for writing or a passion for the promotion of maths and science? Science communication roles can include working in museums, writing for tv, radio or magazines, as well as freelancers who visit schools to promote maths. Possible routes into this area include building up experience on a voluntary basis, or completing a Masters in science communication (a newer route into this area.)

Did you know that the largest group of research mathematicians in the country is found at GCHQ (Government Communications Headquarters).



Do you have a passion for sport as well as maths? Some people combine both their interests by working in roles such as a sports analyst, using mathematical and statistical models to set odds. There are also maths graduates who have entered the field of sports engineering, having taken a specialist Masters or PhD after having completed their maths degree.

If you are interested in a more unusual career such as sports engineer, where only a handful of maths graduates take the route each year then don't be put off. Do some research, check the entry requirements, get any necessary work experience and then apply. If you have seen a more unusual job, perhaps while browsing through the career profiles on mathscareers.org.uk then don't be afraid to make enquiries, e-mailing a relevant company, course admissions tutor or professional body.

Some examples of other jobs which didn't fit neatly into the previous sections:

Air Traffic Controller / Researcher
Defence and Intelligence - e.g. Mathematicians at GCHQ
Lawyer
Quantity Surveyor
Science Writer, Science Communicator
Sports Analyst
Transport Planner

Case Study

**Simon Kilby - Transport
Planner/ Consultant
AECOM**

MMath (University of York)

I am primarily based in an office, where I work in a small team of transport planners. My work concentrates on developing traffic models which can assess the impact of future traffic patterns. Though each model is based on a similar methodology this needs to be tailored to each project based on the needs of the clients and the types of things we will be testing.

I also attend meetings with clients, which includes preparing reports and presentations about my work. More recently I have been responsible for delegating work to colleagues, providing advice and maintaining quality of output.

I like the challenge of meeting the (changing) demands of the client. I enjoy the flexibility offered to me as an employee, with only the task goal specified. After an initial training period how you get there is often left up to the individual. The industry attracts a wide range of people, which provides an engaging environment.

Websites with Further Info

Website

Association of Corporate Treasurers

British Computer Society

Careers in Math

FastStream

(Recruitment to the Government Statistical Fast Stream)

FindaMasters.com

FindaPhd.com

Future Morph

Government Operational Research Service

(GORS)

Inside Careers

Institute of Mathematics and its Applications

Hydrographic Society

London Mathematical Society

Math-jobs.com

MathsCareers

Milkround.com

Operational Research Society – careers site

Plus Career Interview Library

Prospects

Royal Statistical Society Careers Info

Society for Industrial and Applied Mathematics

Statisticians in the Pharmaceutical Industry

The Actuarial Profession

The British Cartographic Society

The Chartered Institute of Logistics & Transport

The OR Society

The Institute of Chartered Accountants

in England and Wales

The Market Research Society

Web Address

www.treasurers.org

www.bcs.org

www.siam.org/careers/thinking/pdf/brochure.pdf

www.faststream.gov.uk

www.findamasters.com

www.findaphd.com

www.futuremorph.org

www.operational-research.gov.uk/recruitment

www.insidecareers.co.uk

www.ima.org.uk

www.hydrographicsociety.org

www.lms.ac.uk

www.math-jobs.com

www.mathscareers.org.uk

www.milkround.com

www.learnaboutor.co.uk

www.plus.maths.org/content/Career

www.prospects.ac.uk

www.rss.org.uk/careers

www.siam.org

www.psiweb.org/newcareers

www.actuaries.org.uk

www.cartography.org.uk

www.ciltuk.org.uk

www.orsoc.org.uk

www.icaew.co.uk

www.mrs.org.uk





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