Careers Centre

Options with Mathematics

About this handout

This handout is for students who want ideas about career options linked to maths and information about getting in. It is important to remember that the careers mentioned in this handout are not an exhaustive list of your options and you should conduct your own research to establish your own ideas.

The following links are all good starting points: http://www.prospects.ac.uk/options_mathematics_your_skills.htm provides some suggestions of options with maths

http://www.prospects.ac.uk/links/wdgd - provides information about what recent graduates are doing 6 months after leaving university by subject area.

http://www.mathscareers.org.uk – select 'career profiles' for maths professionals describing their jobs.

http://www.prospects.ac.uk/links/occupations - lists job profiles of the most common graduate occupations according to job category.

www.siam.org/careers/thinking/pdf/brochure.pdf - a brochure by The Institute of Mathematics and its Applications detailing options with maths.

Statistics

To work as a statistician, you would generally need a postgraduate qualification. Employment opportunities are varied and depend on the type of statistician you wish to become. The different types of statistical careers are outlined below and full descriptions, together with entry information and job hunting sources are available on the Royal Statistical Society's careers pages at http://www.rss.org.uk. Information is also available via the occupational profiles at http://www.prospects.ac.uk/links/management

Biometricians use statistics in the biological sciences. For example they may test the performance of new crop varieties, model population changes of animals or analyse the hereditability of a rare disease through genetic pedigrees.

Environmental statisticians tackle problems such as changes in climate patterns or temperatures in ocean currents. They conduct risk assessments to predict how an initiative (for example a new factory) is likely to effect the environment.

Forensic statisticians analyse forensic evidence left at a scene of the crime. For example they may establish the probability of DNA found at the scene belonging to a particular person.

Government statisticians provide underlying data on matters of Government interest (ie inflation figures, gross domestic product figures, school or hospital performance, labour market statistics). They advise on performance indicators and help policy advisers evaluate different options.

Market Research statisticians use statistics in a commercial environment to assess the demand for products and services.

Medical statisticians contribute to medical research through designing, implementing and analysing clinical studies.

Pharmaceutical statisticians design experiments on new drugs, analyse data and interpret results.

Research

Researchers use mathematics to produce something new that will benefit society or the economy. To work in research it is usual to have studied at masters and doctoral level.

The projects that you would work on depend on your area of interest and can be extremely varied. For examples, see Benjamin Dias and Carole Proctor's profiles at www.mathscareers.org.uk. Benjamin's research allowed him to create a computer program that utilized statistical modelling techniques in order to recognise human facial expressions from face

images. Carole's research project however, uses mathematical models to explore the cellular mechanisms of ageing and how these processes are affected by nutrition.

Around 1/5 of post doctoral graduates work in research. Some positions may combine research with teaching, whilst others may be purely research based. Usually, researchers work on fixed term contacts and securing a contract can be extremely competitive.

Research opportunities also exist outside of academia in industries as diverse as finance, IT, manufacturing or healthcare where you could work directly for companies, or for smaller research consultancies.

For more information see
http://www.prospects.ac.uk/links/resscimaths

Other useful sites:

- http://www.vitae.ac.uk/ Contains careers information for researchers. In particular, select 'Careers' > 'What do researchers do' for information about the employment destinations of PhD students by subject area.
- www.jobs.ac.uk Is a very useful job hunt site for people who want to work in academia. It also advertises non-academic research jobs.

Operational Research

Operational Researchers/ Management Scientists look at an organisation's operations and use advanced analytical methods such as mathematical or computer models to improve processes.

For more information see
www.theorsociety.com

For operational research job profiles see
www.mathscareers.org.uk and
http://www.operational-research.gov.uk/recruitment/profiles/

Finance

Financial careers are very varied but can be generally broken down into:

- Financial forecasting
- Accounting
- City jobs (stocks and shares) and banking
- Insurance and pensions

Many maths graduates are attracted to a career in finance because of the need for strong numeracy skills in these roles. However, in many of these roles other skills are even more important than an aptitude for maths (i.e. relationship building skills).

An overview of financial jobs with strong links to maths is below. More information about financial careers can be found at
http://www.prospects.ac.uk/links/finance or
http://www.prospects.ac.uk/links/insurepen

Actuaries apply mathematical modelling to the financial industry. They predict what may happen in the future and help shape business strategies.

See Fayezah Sayed's profile which describes her work as a Trainee Actuary on
www.mathscareers.org.uk

Accountants ensure that the financial accounts of a company or organisation are in order. They may also be involved in financial auditing, forecasting, budget setting and advising on the strategic direction of a company.

See www.mathscareers.org.uk/ for accountancy job profiles.

Economists use mathematical modelling techniques to analyse factors affecting the economy and to provide advice to clients such as government ministers about possible solutions to current or predicted problems.

Financial Managers or Business Analysts develop strategic business plans for companies in a similar way to a management accountant.

Investment analysts analyse the stock market to provide information to investors (ie fund managers of investment companies) to help them make decisions about buying or selling stock.

Stock brokers or traders buy stock based on their own research and research from investment analysts. They may work on behalf of investment companies, corporate companies and private clients.

Investment bankers work on behalf of companies to manage mergers, acquisitions, privatisation and deals with issues arising from lending and borrowing.

Tax advisers work out the best strategy for companies to pay the least amount of tax.

Bank Managers meet the needs of customers through promoting new products to them and leading teams to do the same.

Risk Analysts calculate potential risk to assets (ie customers not paying back loans, system breakdown, fraud, new legislation).

Engineering

Work in engineering could involve anything from product and process development, consultancy, research and development, data management, IT support or logistics.

There are a range of engineering sectors including: aeronautical, automotive, nautical, civil, electrical, mechanical and chemical.

Many engineers use maths extensively in their work. Engineering companies may also require mathematicians for research and development of processes or products.

Job profiles can be found at http://www.prospects.ac.uk/links/engineering and an overview of the sector is at http://www.prospects.ac.uk/links/engineeringsb

Also see www.mathscareers.org.uk for more engineering job profiles.

IT

Careers in IT are not clearly defined but can be broadly broken into 4 main areas:

- Highly **technical** roles where you would use computer languages such as C++, Java or PHP to develop new applications or databases
- **Support** roles where you would maintain the IT infrastructure of a particular company (or companies), sometimes providing a customer help desk service.
- **Creative** roles where you would design websites, games or multi media products or interactive features
- **Management** roles where you would develop and implement IT policies and procedures to deal with issues such as security or storage, as well as managing relationships with clients and procuring services from other providers.

In some companies, particularly smaller companies, IT professionals may be expected to undertake some duties that fall into all four of these categories.

People who enjoy maths are often attracted to the technical programming aspects of the computer industry as the work involves logic, analysis and testing.

As a maths graduate, you could consider completing a masters in IT. Alternatively, some employers train promising candidates without IT qualifications in the necessary computer technicalities.

See www.prospects.ac.uk/links/infotechmanserv for IT job profiles.

Also see www.mathscareers.org.uk for IT job profiles.

Teaching

You could teach maths in a secondary school, at a college, adult education centre or at a university. Different qualifications are needed for the different settings described. For more information see http://www.prospects.ac.uk/links/education

See www.mathscareers.org.uk for education careers linked to maths.

Other useful links for teaching are at:
http://www.lluk.org/ Lifelong Learning UK
http://www.gttr.ac.uk/ GTTR
http://www.tda.gov.uk/ Teaching Development Agency

Science

For an overview of careers and employers in science visit http://www.prospects.ac.uk/links/sciencesb or http://www.prospects.ac.uk/links/sciservices

Also see the following profiles on www.mathscareers.org.uk which describe ways in which some professionals use maths in their scientific careers:

To predict the weather

- Brian O'Connell – Geophysicist
- Brian Golding – Head of Forecasting Research (Met Office)
- Clare Nasir – Meteorologist

Nanotechnology
Gail Iles – PhD student

Astrophysics
Hayley Gomez

Other useful links

Useful websites

- http://www.math-jobs.com/
- http://www.maa.org/careers/profiles.html The Mathematical Association of America – lists a variety of career case studies
- http://www.mathscareers.org.uk
- http://www.wisecampaign.org.uk/ contains information about grants and scholarships.
- http://fssc.org.uk/ Financial Services Skills Council
- Also see the facebook group http://www.facebook.com/group.php?gid=7633226353 which is run by the Institute of Mathematics and its Applications. IMA members check this page from time to time and answer queries about careers in mathematics.

Travels in a Mathematical World is an audio podcast featuring mathematicians speaking about their work, maths history and maths news. There are now over 50 podcast episodes on a variety of topics such as maths biology, coding, cryptography, engineering, fluid dynamics, wave dispersion, transport modelling, network optimisation, Bayesian stats, stochastic calculus, architecture, art, education, maths communication, finance, category theory, astrophysics, crowd modelling and invisibility cloaks!
See www.travelsinamathematicalworld.co.uk

Professional bodies for Mathematicians and Statisticians

www.rss.org.uk Royal Statistical Authority
www.theorsociety.com Operational research society
www.lms.ac.uk London Mathematics Society
www.ima.org.uk Institute of Maths and its Applications

Professional bodies for accountants

http://www.accaglobal.com ACCA,
http://www.icaew.com ICAEW
http://www.cimaglobal.com CIMA
http://www.cipfa.org.uk CIPFA