Industry insight - Science

In a nutshell

The science sector covers:

- laboratory research and development (R&D);
- biotechnology;
- the pharmaceutical, nuclear, oil and gas, chemicals, petroleum, and polymer industries;
- R&D and manufacture of medical devices;
- publishing, patents, scientific communication;
- the science underpinning the engineering development of other sectors.

There are 5.8 million people working in science-based occupations, which equates to 20% of the UK workforce. Graduates or postgraduates make up almost 60% of the core and related science workforce (The Science Council, 2011).

What kind of work can I do?

Work in the science sector encompasses a huge range of occupations, including:

- product and process development;
- research and development;
- medical and analytical chemistry;
- in vivo sciences;
- clinical research;
- manufacturing;
- teaching;
- writing and editing;
- management and administration;
- consultancy;
- data management;
- IT support;
- HR;
- marketing;
- logistics;
- sales.

As so many different roles exist across the sector, graduates from non-science backgrounds can find many opportunities in science-based organisations. For science-based roles, graduates are recruited from across the academic spectrum, including applied, physical, material and life sciences.

What’s it like working in this industry?

Working conditions vary according to your role. You might work in a laboratory, office, warehouse, on the factory floor, or outdoors. Pay varies widely between roles. See job roles for details of typical salaries.
Women are well represented in pharmaceuticals and bioscience, making up around 40% of the workforce (The Science Council, 2011), although the proportion is smaller at senior levels. **Women into Science, Engineering and Construction (WISE)** and **the UKRC** (for women in science, engineering, technology and the built environment) offer career advice and mentoring to women embarking on a career in science.

**SEMTA: The Sector Skills Council for Science, Engineering and Manufacturing Technologies** is working with organisations such as the Science, Technology, Engineering and Mathematics Network (STEMNET) - for example, through the **STEM Ambassadors programme** - to encourage inclusivity in science.

Ethical issues in the science sector that are subject to debate include:

- animal experimentation;
- drug testing;
- genetic modification of plants;
- human/stem cell research;
- nuclear energy;
- the involvement of global, commercial corporations;
- the environmental impact of scientific work;
- the ethics of work in the defence/military environment.

Go to **Scientists for Global Responsibility (SGR)** to explore these topics in more detail.

**How big is this industry?**

- £7.5million is spent each day on R&D in the life sciences sector (UKTI, 2011), making the UK one of the world’s life sciences leaders.
- The UK’s life sciences sectors employ more than 120,000 people and have a combined annual turnover of £30.4billion (BIS, 2010).
- The UK has the world’s largest aerospace industry outside the USA with almost 20% of the global market (BIS, 2011).
- 45% of biotechnology and healthcare products in the pipeline in Europe are made by UK companies (UKTI, 2011).
- The UK’s medical technology sector is the second largest in Europe, with over 3,000 mainly SME employers employing approximately 55,000 people (BIS, 2010).
- The UK is responsible for 8% of all published scientific papers and has produced 70 Nobel prize winners (UKTI, 2011).

More detailed information is available from the **UK Trade & Investment (UKTI)** and the **Department for Business, Innovation and Skills (BIS)**.

**Where can I work?**

- Opportunities exist in major cities and towns throughout the UK.
- Science-based industries are widely spread throughout Scotland. There is a strong chemical and pharmaceutical cluster in North Ayrshire and Falkirk, biotechnology, polymer and chemical manufacture in the central belt, and clusters of oil and gas employers in Shetland and Orkney.
- In the South of England, work can be found in the ‘golden triangle’ of Oxford, Cambridge and London.
- Clusters of chemical and bioscience employers and nuclear facilities exist in the North West of England.
- There are numerous chemical and polymer companies around Cardiff, Swansea and Newport and in the Yorkshire and Humberside regions.
- There are a significant number of environmental companies in the South West of England.
- Science jobs in Northern Ireland are concentrated in Belfast and areas with ready access to Belfast.
• There is a concentration of pharmaceutical, polymer, chemical and energy companies in the North East.
• The East and West Midlands have large concentrations of polymer employers.
• The East Midlands has significant numbers of pharmaceutical and chemical companies.
• There are lots of opportunities to work overseas - see opportunities abroad for more information.

Further information

Association of British Science Writers (ABSW)
Association of Clinical Scientists (ACS)
Science & Technology Facilities Council (STFC)
The Science Council

Job roles

Key careers

The following profiles are examples of key jobs that exist in the science industry. To find the job roles that best match your skills and interests, login to what jobs would suit me?

• Analytical chemist
• Animal technologist
• Biomedical scientist
• Clinical research associate
• Food technologist
• Medical physicist
• Meteorologist
• Product/process development scientist
• Regulatory affairs officer
• Research scientist (life sciences)
• Secondary school teacher
• Software engineer
• Statistician
• Teaching laboratory technician
• Toxicologist

For even more career ideas, take a look at types of jobs.

Further information

Bright Recruits
Jobs in Science
Knowledge Transfer Partnerships (KTP)
New Scientist Jobs
Science Careers

Entry and progression

How do I find a job?

Many professional bodies and careers services run specialist careers fairs.
Larger scientific recruiters offer a structured graduate training programme, with an application deadline often in the November, December or January of your final year. Non-science graduates can also apply for places on these programmes to work in areas such as human resources, IT and finance.

Smaller companies tend to recruit throughout the year.

Vacancies for PhD and post-Doctoral entrants are usually advertised as they occur.

Many science jobs, particularly at PhD level, are found through networking. You can develop your network by:

- attending talks and insight days;
- attending conferences;
- joining specialist mentoring schemes organised by your university;
- contacting the relevant professional body or university student society.

Places to find job advertisements are:

- your university career service will have recruitment literature;
- employers’ websites;
- professional bodies’ websites;
- specialist recruitment agencies;
- the national and local press;
- trade magazines.

Find out more about job application advice.

**What skills do I need?**

Because of the technical nature of most jobs in the science sector, employers state that applicants for specific posts need particular qualifications and grades. Beyond that, the exact skills employers look for depend on the nature of the job.

The bioscience sector has greater skills shortages and gaps than other sectors and has a high demand for relevantly skilled technicians, graduates and postgraduates. Priorities within the bioscience sector include:

- in vivo sciences - pathology, toxicology, pharmacology and physiology;
- clinical research;
- medical and analytical chemistry;
- engineering and maths and statistics.

Generally, employers in the science sector look for evidence of:

- good organisational and planning skills;
- communication and team working skills;
- IT skills;
- flexibility and adaptability;
- the ability to work quickly, accurately, and independently;
- good numerical skills;
- logical, critical thinking.

You can acquire relevant transferable skills by getting involved in sport, university societies and voluntary organisations. It may also be possible to mentor other students on your course or join a staff/student committee.
Where can I find work experience?

Relevant work experience can be crucial in landing your ideal job. If your course includes a placement, this can be a real advantage. Otherwise, try to arrange a one-year or vacation placement. Larger recruiters run formal work placement schemes. Check their websites to find out how to apply. If no vacancies are advertised, make informal enquiries or apply speculatively.

Experience and insight developed through work shadowing or voluntary work are also useful. Remember that any work you do will be to your credit, especially if you demonstrate that you have developed skills (e.g. IT and team working) that are vital in your chosen career.

There are links for industrial placements available on some professional body websites, such as the Royal Society of Chemistry.

Is postgraduate study useful?

An increasing number of jobs require a postgraduate qualification.

In industry, a PhD is often an advantage for longer-term promotion and professional development. For certain roles it is mandatory for employees to obtain professional accreditation or qualifications.

Employers generally support professional development by encouraging employees to obtain postgraduate qualifications, so they may cover tuition fees and grant study leave.

How can my career develop?

Generally speaking, the science sector offers lots of opportunity for career development. You are more likely to find a structured career path if you work in industry. Advancement is usually made by obtaining further qualifications or professional accreditation, by changing role, and/or by taking on significantly more responsibilities, usually in management.

Further information

Institute of Physics (IOP)
The Physiological Society
The Royal Society
Vitae
Wellcome Trust

Typical employers

The health and education sectors employ 60% of the science workforce, with the remainder of scientists working across a range of sectors (The Science Council, 2011), including:

- agrochemical companies;
- breweries;
- biotechnology research organisations;
- charities;
- environmental organisations;
- food and drink manufacturers;
- government departments and agencies;
• laboratory suppliers and support companies;
• multidisciplinary consultancy or testing companies;
• museums;
• petrochemical companies;
• pharmaceutical companies;
• professional bodies;
• publishing organisations.

Big players

• **Chemical industry** - Akzo Nobel, AstraZeneca, BASF, Dow Chemical, ExxonMobil, Ineos, Johnson Matthey, Shell Chemicals, Unilever.
• **Electronics and communications** - BAE Systems, BT, IBM, E.ON, Rolls-Royce, Siemens, Vodafone.
• **Food and drink** - Kraft Foods, Dairy Crest, the Kerry Group, Mars.
• **Pharmaceuticals** - AstraZeneca, Bristol-Myers Squibb, Roche, Aveceia, Eisai, Eli Lilly and Company Limited, GlaxoSmithKline, Merck Sharp & Dohme (MSD), McFarlan Smith (Edinburgh), Novartis, Pfizer, Sanofi-Aventis, United Therapeutics Corporation (Chertsey, Surrey), Almirall (Stockley Park near Heathrow).
• **Biotechnology** - Syngenta, Monsanto, Boehringer Ingelheim, Vectura.
• **Defence** - BAE Systems, Dstl, QinetiQ, Rolls-Royce, Serco.

The following government departments and agencies are also among the main recruiters:

• Centre for the Protection of National Infrastructure (CPNI)
• Defence Equipment and Support (DE&S)
• Defence Science & Technology Laboratory (Dstl)
• Department for Environment, Food & Rural Affairs (DEFRA)
• Environment Agency (EA)
• Food and Environment Research Agency (FERA)
• Food Standards Agency
• Forensic Science Service (FSS)
• Health Protection Agency (HPA)
• Intellectual Property Office (IPO)
• Medicines and Healthcare products Regulatory Agency (MHRA)
• Met Office
• National Health Service - see NHS Careers
• National Physical Laboratory (NPL)
• Research councils and their related centres, including the UK Astronomy Technology Centre (UKATC)
• UK Atomic Energy Authority (UKAEA)
• United Kingdom Science Park Association (UKSPA)

Small to medium-sized enterprises (SMEs)

SMEs are organisations with fewer than 250 employees and an annual turnover of no more than £44 million. Working for a smaller company can be rewarding because you are more likely to forge a path for yourself within the company, although opportunities to try other departments may be limited.

SMEs are unlikely to use the testing and assessment techniques of larger companies, or follow lengthy recruitment procedures. SMEs are more likely to advertise their vacancies through the local press, university careers service bulletins, local graduate vacancy listings, jobcentres, and word of mouth, rather than rely on their reputation and a presence at graduate recruitment fairs.

Your university careers service should have listings of jobs with small firms. See also the Department for Business, Innovation and Skills (BIS).
Self-employment

It is possible to become self-employed or work freelance within certain sectors once you have built up experience. Opportunities mainly exist within consultancy, science writing and editing, and sales.

Find out more about self-employment.

Opportunities abroad

What are my chances of getting a job overseas?

- With the growth of global development and investment in science, there are increasing opportunities to work abroad, both short and long term. The WorldWideScience Alliance is working to achieve a global science gateway.
- Globalisation and the internet mean that the world is getting smaller and it is now commonplace for employees to work in actual or virtual multinational teams. There are large international projects such as the Human Genome Project, the Large Hadron Collider (LHC) and the Intergovernmental Panel on Climate Change (IPCC).
- The European Research Area aims to create free movement of researchers, technology and knowledge.
- The UK has an excellent international base that can support overseas job progression. Over half of expenditure on research and development (R&D) in the UK is by foreign-owned companies.

Will my qualifications be recognised?

- Graduate scientists’ skills are highly transferable worldwide.
- Individuals with at least five years’ postgraduate training and/or biochemistry, biology, bioinformatics or chemistry skills are especially sought after in emerging Asian job markets.
- English is often used as the main language of communication within the scientific community and may be sufficient for mid-level R&D recruits. However, additional language skills are useful and host country language skills are recommended for supervisory, research floor or high level positions.
- UK scientists wishing to work abroad are generally more employable if they hold Masters or PhD qualifications. UK qualifications ‘travel well’ and non-UK companies look favourably on applications from UK graduates.
- Increased access to learning on the internet means that study and continuing professional development (CPD) can be sourced anywhere in the world.

Where are the opportunities?

- There are more chances of gaining employment in countries with strong economies and good levels of investment in R&D, such as Denmark, Sweden and Switzerland.
- Scientific industries within emerging economies, such as the chemical industries in Brazil and the Middle East, are developing rapidly and struggling to fill scientific positions.
- Opportunities for scientists have opened up in Asia with governments and the private sector eager to expand in scientific areas. Japan, India and China have been eager to attract international talent. Many top pharmaceutical firms, for example, have developed sites in Singapore.
- Research in Australia has identified a shortfall in home-grown scientists and an increased demand for highly qualified overseas workers in areas such as food, pharmaceuticals, agriculture, and protein and peptide chemistry.
• Ireland has invested heavily in science and has developed its company base but has had a difficult time attracting candidates.
• US President Barack Obama has pledged $66.8billion for federal science spending in 2012 (Scientific American, 2011). Areas of research key to the US include climate change and the development of alternatives to oil.

For further information, see country profiles, working abroad and graduate job search.

Further information

European Organization for Nuclear Research (CERN)

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Future trends

Spin-off companies

Spin-off companies from universities and industry are expected to continue to increase in number over the coming years. In its investment framework (see Science and Innovation Investment Framework 2004-2014, 2008 Report), the government sets out its commitment to supporting these companies, particularly those in the SME category.

Trends in research

• The UK Stem Cell Foundation (UKSCF) has increased stem cell research collaborations with US institutions and in 2011 announced £300,000 of funding for a Scottish Stem Cell Research Fund. By 2014, the UKSCF is seeking to raise an additional £5million towards stem cell research projects.
• Up and coming areas include renewable energy, alternative fuels, eco-manufacturing using green technology, plastic, electronics, food and crops for the future. Other areas of development include neurosciences, tissue engineering, monoclonal antibodies, immunology, oncology and infectious disease research.
• Spending on climate change research will continue to increase and research and development (R&D) into alternative forms of fuel is a priority. It is forecast that there will be around 30,000 new jobs in the UK nuclear industry by 2025 (Department of Energy and Climate Change, 2011).
• The rapid evolution of drug discovery will create demands in areas such as cheminformatics and bioinformatics, automated synthesis and combinatorial chemistry, high-throughput screening, proteomics, neuroscience, molecular histology and chiral chemistry.
• There will be increased demand for scientists with genomics knowledge who want to apply it to the business side in marketing, product management or sales.
• The UK government has invested £42million into the Marine Renewables Deployment Fund which will fund R&D into marine energy (UKTI, 2011).

Science parks

There are more than 100 science parks across the UK, with over 3,100 companies (including approximately 300 overseas-owned companies) occupying over 1.6 million square metres of property. Employment in companies located on UK science parks has risen from 31,000 to 70,100 over the last ten years (UKSPA, 2011).

Skills

Scientists will need to be adaptable and multi-skilled, with the ability to work in a multidisciplinary environment with collaborators from different nations, backgrounds and functions. The ability to
speak several languages is expected to become increasingly important and will, in many cases, improve employment prospects.

**Globalisation**

Financial incentives and benefits to companies locating their premises in countries with lower labour costs and increased tax breaks are concerns for the UK science sector.

**Government policy**

- Government legislation and funding policy will continue to play a major role in shaping the direction of the science industry.
- The Office for Life Sciences (OLS) has been created by the government to build, sustain and coordinate the UK’s life sciences industry.
- The UK government’s investment in scientific R&D was around £4.6 billion for 2011 and the Department of Health will provide £220 million of capital over the next 4 years (BIS, 2010).

**Further information**

- New Scientist
- Technology Strategy Board

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**Jargon buster**

- **Bioinformatics** - uses mathematical and computational methods to analyse biological, biochemical and biophysical data generated from projects such as the human genome project.
- **Cheminformatics** - the combination of chemical synthesis, biological screening and data-mining approaches used to guide drug discovery and development.
- **Combinatorial chemistry** - a chemistry-based technology. Sets of reactions for solution or solid-phase synthesis are used to create molecular libraries for analysis of compounds on a large scale.
- **FDA** - Food and Drug Administration. US government agency that oversees the safety of most foods and medical products worldwide.
- **Gene therapy** - the process of introducing new genes into the DNA of a person’s cells to correct a genetic disease or flaw.
- **GLP** - good laboratory practice.
- **GMP** - good manufacturing practice.
- **HPLC** - high performance liquid chromatography.
- **Metabolomics** - the global analysis of metabolites - molecules generated from the whole range of biochemical processes in a living organism.
- **Nanotechnology** - an emerging interdisciplinary technology related to features of nanometre scale, e.g. thin films, fine particles, chemical synthesis and advanced microlithography. A nanometre is one billionth of a metre.
- **Neuroinformatics** - invents new computing paradigms (e.g. artificial neural networks) by studying information processing in the brain in order to understand the dynamics of the conscious mind.
- **Photonics** - the technology of generating and harnessing light radiant energy, whose quantum unit is the photon.
- **Proteomics** - the identification and quantification of proteins and the determination of their localisation, activities and, ultimately, their function.

**Case study**
Lindsay is a Graduate Trainee in the Education Department of the Royal Society of Chemistry. She has a PhD in Environmental Geochemistry.

After finishing my PhD I continued down the academic career route and completed a post-Doctoral fellowship. Although I enjoyed research enormously, I realised that it was the teaching and the interaction with students that particularly appealed to me. I taught environmental science at the University of Nagasaki in Japan for a year and from there I applied for my current position at the Royal Society of Chemistry (RSC). I wanted a job where I had the opportunity to combine my academic background and my teaching experience.

Initially, the job was very different to anything I was used to and I had to learn quickly how a professional body worked. It was important to be adaptable, open-minded, and to ask for advice and feedback when I needed clarification. It was also vital to understand the main aims of the RSC, the focus of their education department, and how my skills and knowledge could be incorporated.

I studied physical geography for my first degree. My chemistry-specific knowledge was largely self-taught during my research. Although a good science background is very useful, it is not the subject that is the most important thing, but the ability to learn quickly and to actively seek information. Presentation skills and communication skills are also essential.

My degree provided me with a strong academic background that I have used in every aspect of my current position. Most importantly, my degree provided me with many of the transferable skills required for the job, including the ability to research and critically analyse a task before making an informed decision on how to proceed.

My current job involves a range of educational activities, including the development of education resources, as well as the undertaking of outreach activities. The education team at the RSC caters for chemical scientists of all ages, producing a wide range of resources for teachers, lecturers and students, and delivers training and continuing professional development courses. My role involves assisting with all the different aspects within the education team.

I enjoy the variety of the job. One day I am organising educational resources for the RSC website, the next I can be taking part in outreach activities - most recently the Big Bang Fair at the Imperial War Museum Duxford. No two days are the same and I often get to be hands-on, helping to inspire future generations about chemistry.

I would like to become a full-time Outreach Officer and produce activities and resources focused on engaging with all members of the community. I think it is important to challenge stereotypes and prove that science doesn't need to be boring. People should be made aware of the many exciting career paths that are available to scientists.

Although I enjoy most parts of my job, there are always going to be challenges; for example, the logistics of organising an outreach event. However, these difficulties are quickly forgotten when the event is a huge success. Just one adult or child expressing their enthusiasm and interest can make it all worthwhile.