Studying for a PhD

Professor Clare Austin explains what a PhD is and discusses some of the practical considerations involved

Key words
Qualification
Research
Degree

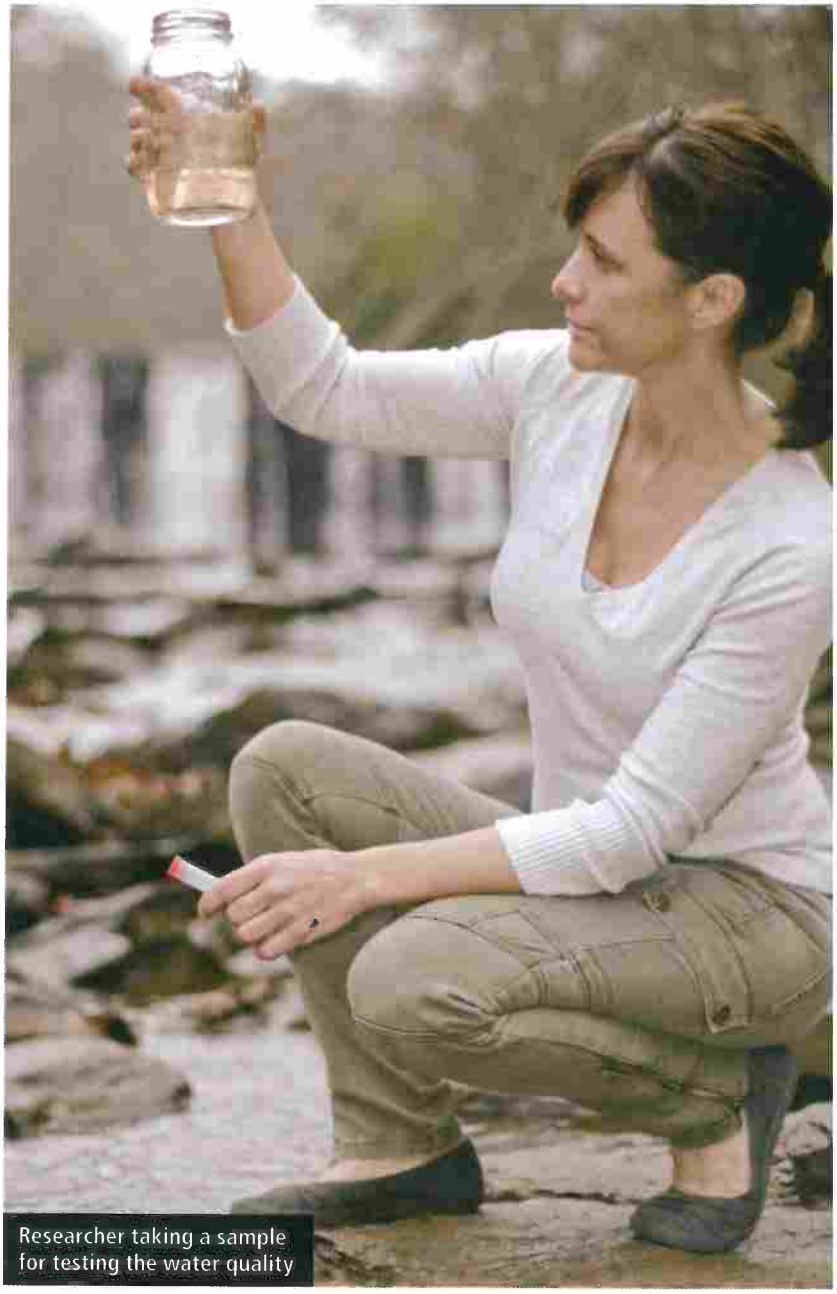
If someone said to you that they were going to be a doctor, you might assume they were working towards becoming a medical practitioner. However, they might just as easily be training for a PhD.

A PhD is one of the highest degrees you can be awarded. PhD stands for Doctor of Philosophy. This is perhaps confusing because PhD degrees are awarded in a wide range of subjects, not only philosophy. A PhD is a postgraduate degree. You cannot study for a PhD unless you have already obtained an undergraduate or first degree. Someone who has a PhD is entitled to use the title doctor. This means that not all doctors are medically qualified. If you see a television broadcast that covers medical research by Dr such and such, the likelihood is that it is a PhD holder, not a medical doctor, although some medical doctors do study for PhDs too.

The focus of A-levels and an undergraduate degree is learning and applying well-known facts, as well as being able to interpret data and solve problems. A PhD is quite different — it is a research degree during which students aim to find out completely new things. Each student usually has their own research project — no one else will have carried out exactly the same research before. Each project involves a specific research question(s) but the findings produced may have wider implications, for example the treatment of disease or management of an environmental issue. This experience can be very rewarding.

What do PhD students do?

There is no such thing as a typical day in the life of a PhD student (see Box 1 on p. 18). Doing a PhD is varied and what students do will depend on the type of research project being carried out and will change on a day-to-day basis. PhD students spend a lot of their time collecting, processing and interpreting data. In biology-based PhDs this often involves conducting laboratory experiments but it might also involve a wide range of other methods such as environmental sampling and clinical studies (see Figure 1).



Researcher taking a sample for testing the water quality

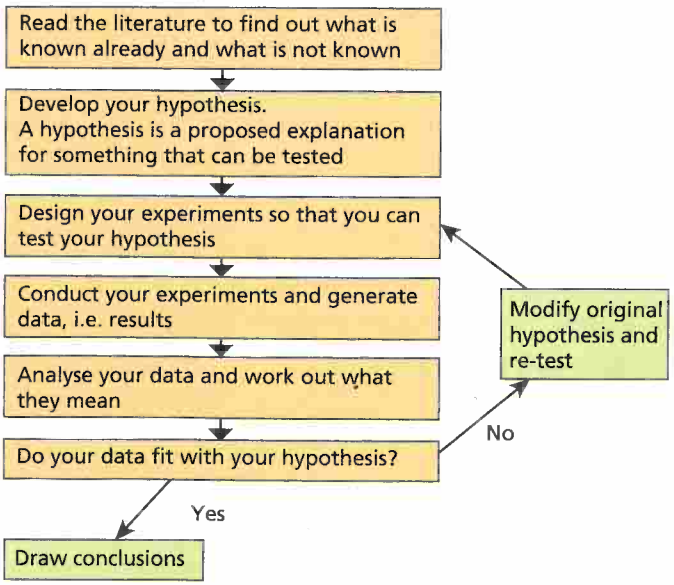


Figure 1 How to design and conduct an experiment

Box 1 My PhD

I was awarded a PhD in pharmacology from the University of Liverpool.

What was it on?

During my PhD I investigated the influence of diabetes on the cardiovascular system — the heart and blood vessels. This is important because cardiovascular disease is the major cause of death and disability in people with diabetes. I found that diabetes is associated with changes in the numbers of a particular cellular receptor, and that this results in changes in the way in which both the heart and the blood vessels work. A receptor is something drugs and chemicals interact with to cause a response (change) in a cell or tissue.

What was a typical day like?

My PhD was varied and there was no such thing as a typical day. I spent a lot of my time in the laboratory conducting many different kinds of experiments. I really loved this and, although it was hard work, and frustrating when things did not work, it was very rewarding when I obtained exciting results. Some days I spent analysing my results, drawing conclusions from them and reading research papers produced by others.

I had the opportunity to present my research at a number of scientific conferences, including a particularly enjoyable one in Portugal where the weather was much nicer than in Liverpool! I was fortunate to have considerable opportunities to teach during my PhD. I helped run large undergraduate laboratory practical classes and supervised final year research projects.

How did a PhD benefit me?

I was bitten by the research bug and wanted to continue to do research in a university and eventually lead a research group myself; a PhD is necessary for this. After my PhD I obtained a short-term research position (a postdoctoral position) in a different laboratory. This was beneficial to me because I learned new experimental techniques and expanded my knowledge. I subsequently obtained a position as lecturer and research group leader. In recent years I have become increasingly involved in helping others study for their PhDs at the University of Manchester.

Students need to spend time analysing their results, that is, working out what they mean. An important part of doing research is telling people about what you have found. Most PhD students publish their findings in scientific journals, or books produced by the organisers of conferences. It is exciting to think that people all over the world can read or hear about what you have done. Most PhD students get the chance to present their data at research conferences — the lucky ones in exotic places!

PhD students are involved in a variety of other things as well. Some may teach, some may mentor (support) other students, some may tell the public about their science. All of these are excellent ways of developing general skills that are important throughout life and for a variety of careers.

How is a PhD examined?

At the end of their PhD, students must present the work they have done as a thesis. This is essentially a large book that explains what the research project was, why it was conducted, what results were obtained, what they mean and why they are important. Each student is examined on their work in an oral exam called a viva voce. This is an exam conducted by an acknowledged expert in the field of the PhD, usually someone in a position of high authority in another university or in industry. It includes an opportunity for the candidate to defend their conclusions, and is often accompanied by a presentation to staff and other postgraduates.

Is a PhD right for me?

A PhD is hard work and is full of highs and lows. High points, such as obtaining exciting results, are coupled with low points, for example, when your experiments do not work. Research is not for everyone so it is important that you find out whether it is something you enjoy before starting a PhD.

You can get research experience in many ways. At school you may be able to get work experience in laboratories or universities (talk to your biology teacher about this) and at university some undergraduate degree programmes include a year of research in a university or professional setting as part of the programme. Most university undergraduate degrees include a research project in the final year. This additional research experience is something you may consider when choosing your undergraduate degree.

If you are thinking about studying for a PhD, it is important that you choose a subject that really interests you. Do your homework, read as much as you can (scientific books, journals and websites) and find a subject that excites you.

What qualifications will I need to study for a PhD?

Usually students need to have an undergraduate degree of the top two classifications or grades, that is, a degree with first class honours (1st) or upper second class honours (2:1), before they can be considered for a PhD (see Figure 2). Some students with lower grades go on to study for a PhD when they have obtained a Masters degree. Most Masters degrees are postgraduate degrees, but at a lower academic level than a PhD, and most include both taught and research components. Some students who have a good undergraduate degree but who have not done a year of research as part of it study for a Masters degree to increase their chance of getting a position on a PhD programme and to ensure that research is right for them.

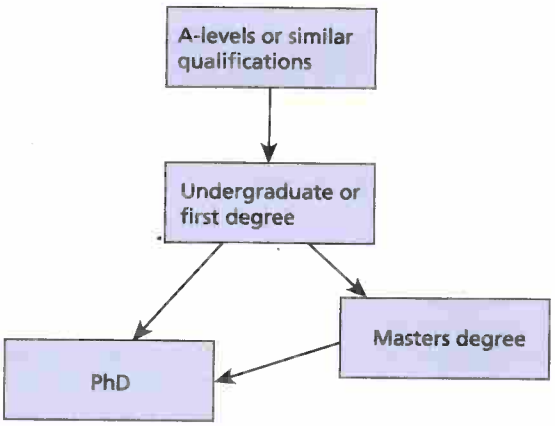


Figure 2 Qualifications for studying for a PhD

How long does it take to get a PhD?

Until recently most students in the UK studied for a PhD over a 3 year, full-time period. There are now, however, many 4 year PhD programmes. These programmes vary in structure but usually include some taught parts and more opportunities for development of general skills. Part-time study may be possible and usually doubles the length of the programme. All PhD students spend the vast majority of their time on their PhD research project but may also contribute to teaching undergraduates, and follow a training programme that covers generic skills.

How do I get funding for a PhD?

Unlike undergraduate students, most UK students studying for a PhD do not pay fees. The money comes either from the government or charities that pay not only the tuition fees but also fees for items that are necessary for the research project to be carried out. These items might include chemicals, equipment and computers. Most students studying for a PhD in biological science are awarded a scholarship or studentship that pays all, or at least some, of the costs associated with fees and living expenses. This means that students can actually get paid (tax free) for studying for a PhD. Scholarships for PhD study are, not surprisingly, highly competitive.

Studentships are advertised on university websites and on general websites such as FindAPhD (**www.findaphd.com**). If a student knows what they want to research for their PhD and who they want to work with, they may apply directly to funding bodies or ask their potential supervisor to do so for them.

What benefit will a PhD be?

Obtaining a PhD is an enormous achievement for anyone and demonstrates commitment, motivation and knowledge to potential employers. A PhD is essential if you want, one day, to run your own research group and supervise PhD students of your own in a university. Many research leaders working in industry also have a PhD. Doing a PhD develops many transferable skills in students, that is, general skills and abilities that will help you in a variety of careers.

Doing a PhD is not easy but can be extremely rewarding. You will meet lots of different people, often visit different places and experience many new things, all of which make you a more well-rounded person. You cannot describe how proud you feel when someone calls you 'doctor' for the first time, even if you do have to explain to them that you are not a medical professional or a time lord.

Useful websites

FindAPhD has information on what a PhD is, how to find one, how to write a research proposal, and much more:
http://tinyurl.com/ofm67zu

Further careers advice on studentships is available from jobs.ac.uk:
http://tinyurl.com/oaza6z4

Professor Clare Austin has recently taken up a position as associate dean for research and innovation in the Faculty of Health and Social Care at Edge Hill University.