

Sample guidance provided to new postgraduate research students by Dame Professor Nancy Rothwell

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Doing a PhD - What you should expect and what is expected of you

A PhD is a training in all aspects of research which will lead you to the stage of reasonable research independence, an ability to consider research problems, design, execute and assess experimental programmes, formulate new hypotheses and ideas, and discuss your research with colleagues including leading scientists in the field. It should also allow you to become highly proficient in verbal and written communication of science, have an understanding of key issues such as supervising junior staff and students, broad aspects of your field, relevant methodologies, seeking funding, publishing scientific data, and some knowledge of intellectual property, public opinion and engagement in science, careers and opportunities in science.

Many of these skills will equip you well for a career in science in academia or industry, but they also transferable to many other professions, and a PhD is excellent training for many jobs/careers, not just academic science!

The key requirements for obtaining a PhD are:

- Discovery of novel findings - which should be of a standard sufficient for publication in peer reviewed scientific journals (your work may not be published by the time you submit your thesis, but it is helpful if it is).
- A broad and in depth understanding of your field including relevant methodologies, an ability to discuss critically research, its implications and limitations.
- Preparation of a well written and presented thesis describing the background to your work, the methods used, observations made and critical discussion in the context of the broader field.

Starting out

Each PhD student will progress at a different rate, largely depending on their training, background knowledge and the nature of the project. Some PhD students may not have worked in a lab before, while others will have considerable experience of research. Each student will need different levels of support and supervision depending on their background, but all should achieve the same or similar levels of achievement quite quickly.

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On arrival

After registration and sorting out personal details, you will meet with your supervisor(s), the rest of the lab, be allocated a desk, be told who you go to with specific problems and start to attend weekly lab meetings (obligatory).

The graduate induction programme is an important part of your early training. All aspects are obligatory.

Within the first month

You will discuss the objectives of your project, identify key reading, meet your advisor and start to learn experimental techniques. You will record everything in a lab book (see below). Lab work will occupy the major part of your time (70-80%) for most of your PhD, apart from specific periods such as the final stages of your transfer report, preparing a major presentation or paper, or writing your thesis. For most other periods, reading and writing will be done outside lab work hours or during short breaks between experiments. During this early period you can expect a high level of direct supervision, often on a day-to-day basis.

By the end of the second month you should:

- Have a reasonable understanding of your project, and the background literature.
- Be conducting experimental procedures, largely unsupervised (backed with regular discussion) and be starting experiments (NB this depends on the nature of the experimental procedures - some such as in vivo surgery take a long time to learn and become proficient).
- Know everyone in the lab, who to go to for help and who to ask about specific problems.
- Be meeting regularly (say weekly) with your direct supervisor and at least monthly with Nancy.
- Have started planning your literature report.
- Be attending relevant seminars.

By Christmas you should

- Be reasonably confident about your experimental approaches.
- Have a draft of significant parts of your literature report.
- Have given a lab talk.

By the end of your first year

- You will be conducting experiments unsupervised and beginning to design your own studies, with general guidance.

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- Be able to analyse and discuss your data critically.
- Be asking questions at lab meetings.
- Have written and processed your transfer report/viva.
- Be starting to think independently about the direction of your project.

Over years 2-3

You will have many ups and downs. Many experiments will fail, for a lot of reasons, but don't despair and stay optimistic - it will work out in the end! This is finding out what research is really about - more failures than successes, but the highs are worth many lows! It is important also to realise that negative results may be as important as "successes" and may give you critical clues about the answers to your primary question(s). You will attend many talks, some national and international meetings, and establish collaborations within and outside the lab. Most importantly you, rather than your supervisor, will be starting to drive your research. You will be coming up with your own solutions to problems, your own ideas, and often you may challenge what your supervisors tell you! You will contribute to lab meetings, to other projects in the lab, and will probably supervise an undergraduate or a new post-grad. You will also have learned to criticise constructively both your own work and that of others, and discuss research ideas (in lab meetings, conferences, with colleagues in the pub!).

Throughout this time you will be writing your thesis, reading the literature and towards the end of year 2 be thinking about your future. You will submit your thesis by December of year 3 - and will pass!

Specific issues

It is essential to keep a detailed lab book for legal as well as scientific reasons.

- Write *everything* down - protocols, ideas, problems, all observations and most importantly anything unusual/unexpected.
- Use a hard back book with numbered pages, date each section. Never tear out a page. Cross through mistakes but leave them legible.
- Get your lab book checked and signed by your supervisor regularly - at least once a month.

Working hours

These are not fixed – some people start early and leave early, some the other way round, some seem to work long hours but take many breaks. The important thing is that you get things done. A PhD is a very demanding workload and you will need to manage your own working hours. You will need to work flexibly around the demands of your experiments and this may involve work in evenings or weekends.

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Seminars/meetings/talks/societies

Some seminars (e.g. Neuroscience and AstraZeneca seminar series) and all lab meetings (unless you have a pressing and unavoidable experiment or are away) are obligatory. You will give regular presentations and journal clubs - first at lab meetings and PG groups, then to the Research Section and eventually to international audiences. Most PhD students should expect to attend at least one international meeting, but will be expected to apply for some external funding. This is available from various sources, including the learned societies (e.g. The Physiological Society, The Pharmacological Society, British Neuroscience Association etc) as well as the conference hosts. You should join one or several of these societies early on in your PhD as to apply for money you will need to be a member. As well as travel grants, they offer many other services e.g. workshops, career advice etc.

Supervision

At first this will be frequent, but as you become more independent you may be meeting weekly with your direct supervisor and monthly with Nancy (for which you should prepare a short formal report). However, whenever you have a serious problem, you will always get support. You must expect to work increasingly independently. Even though Nancy is busy she will always answer an email and is usually in at 7.00 am if you need to meet urgently or have a terribly exciting result! Apart from that it is *up to you* to organise and attend meetings e.g. with your advisor.

If you are unhappy with your supervision or with your project and feel unable to talk to your supervisor, you should ask to meet your advisor - they will talk to you in complete confidence.