Introduction to Skills Training (2017/18)

1. SKILLS-TRAINING COURSES (Research-Specific Skills and Transferable Career Skills)

Graduates need to be skilled not only in the experimental and/or theoretical techniques relevant to their own research, but also in skills for communicating their results to a wider audience and for managing their own research programme and future career development. The handbook of 'Postgraduate Lecture Synopses and Research Colloquia' lists the different skills training courses on offer under the title 'Postgraduate Training'. **You should keep a log-book or portfolio to record the various training that you undertake**, of all kinds, formal and informal, since you may be asked to summarise this by your research sponsor or by a prospective employer and you will be required to summarise it on your applications for transfer of status and confirmation of status. There is an expectation by some sponsors and by the University that you will engage in approximately 100 hours per annum of transferable career skills training during years one to three of your research degree. Included in the 100 hours is skills training and feedback provided by your supervisor, for example on presentation skills, report writing or writing a scientific paper.

Transferable career skills are those in addition to your academic and research skills that employers both inside and outside academia value. The UK Government and funding agencies believe that these skills are essential for maintaining employability in a global economy which is increasingly requiring people to respond to and anticipate change.

If you wish to attend a 'course' external to the Department of Materials for which there is a modest charge and which is important for your research, including a 'summer school', then your supervisor is permitted to cover the costs from the 'baseline research costs' allowance she/he receives for each research student whose project is not funded directly by a sponsor.

MPLS Graduate Training Framework

You might find it helpful to use the framework set out in the table below as a tool for planning and recording your training needs as you progress through your DPhil programme. It has been pre-populated with the small number of courses that are compulsory for Materials research students.

Phase / Category	Foundations Phase (0-12 months)	Intensive Research Phase (12-30 months)	Completion Phase (24+ months)
Transferable Career Skills	Project Management Career Planning Teaching (JD)	Research Talk	
Research Skills	Safety Induction Talk Colloquia		Poster Presentation
Academic Skills	Two assessed lecture courses		

Notes:

1. The phases are for guidance rather than rigid timescales.
2. The skills categories are defined as follows: **Academic skills** are lecture courses/ subjects that form an extension to, and fill gaps in, undergraduate knowledge; **research skills** are those needed to actually carry out research, for example safety, equipment use, programming; **transferable career skills** are those which are core to every student's development and are genuinely transferable, although they may have a subject nuance.
3. Therefore Academic skills and Research skills sit in departments. Transferable career skills sit in both department and Division (and other providers as appropriate)

To browse the full range of courses provided by departments in MPLS, see the Researcher Training Tool (RTT): https://weblearn.ox.ac.uk/portal/hierarchy/grad/ . In the Researcher Training Tool you will see that courses are also categorised using a wider range of categories. These are Oxford wide categories that are designed to align with the Researcher Development Framework (https://www.vitae.ac.uk/researchers-professional-development/about-the-vitae-researcher-development-framework); they drill down from those detailed in the table above.

University College London on their website http://www.ucl.ac.uk/ppd/ present a table of key transferable career skills with links to further information on each topic:

Academic		
Learning Actively	Analysing Data	Thinking Critically
Using Sources	Solving Problems	Managing Projects
Self-Management		
Reflecting on Learning	Managing Time	Being Creative/Innovative
Assessing Oneself	Being Independent	Managing Resources
Communicating		
Writing	Listening	Using Information Technology
Presenting	Communicating Globally	Planning and Making Decisions
Working with Others		
Working in Teams	Negotiating	Leading
Understanding Others	Assessing Self and Peers	Managing Change

The Vitae organisation has compiled a **Researcher Development Framework** (RDF) which you are strongly encouraged to browse:
The Vitae 'Researcher Development Statement' (https://www.vitae.ac.uk/vitae-publications/rdf-related/researcher-development-statement-rds-vitae.pdf).

The RDF provides a framework for planning and supporting the personal, professional and career development of graduate students and research staff. It encourages individual researchers to identify strengths and prioritise their professional development. It helps them consider the skills and experiences that will enhance their career prospects and to articulate their knowledge, behaviours and attributes to employers.

The RDF and RDS are made up of four top level domains which encompass the knowledge, behaviour and attributes that are needed to be a successful researcher. These are:

A: Knowledge and intellectual abilities
B: Personal effectiveness
C: Research governance and organisation
D: Engagement, influence and impact

Further information on the Researcher Development Statement (RDS) and RDF can be found at
https://www.vitae.ac.uk/researchers-professional-development/about-the-vitae-researcher-development-framework/ and https://www.vitae.ac.uk/researchers-professional-development/why-focus-on-professional-development.

The RDS is put in context by the **EPSRC's Statement of Expectations** for its students at http://www.epsrc.ac.uk/skills/students/help/expectation.

Some of the skills training courses available to you as a Materials graduate student are:

(i) Project management skills (Dr A O Taylor and others, MT Week 4);
(ii) Presentation skills (Staff of IT Services & Dr A O Taylor, HT Week 2);
(iii) Writing skills, lab notebooks, IPR and patents (Prof H E Assender & others, HT Week 3);
(iv) Information skills (Staff of Bodleian, MT Week 2);
(v) Career-planning (Alumni of Dept, OU Careers Service & Dr A O Taylor, MT Weeks 1 and 5);
(vi) Workshop skills (workshop technicians, throughout year);
(vii) Microscopy skills (see Materials Postgraduate Lecture & Training Course Synopses – an optical microscopy course and a very wide range of electron microscopy courses);
(viii) GRAD Challenge, second (or third) year [only if the MPLS Division decide to run this scheme in the relevant year(s)] (https://weblearn.ox.ac.uk/course-signup/rest/course/4D00D40002);
(ix) Institute of Materials – Benefits of student membership (Sarah Boad, MT Week 4);
(x) Poster presentation skills (Dr A O Taylor, MT Week 8));
(xi) Teaching skills (Lecturing, laboratory demonstrating, tutorials, classes, maths classes, [see lecture lists]);
(xii) Managing your References - Bibliographic software (Dr L Ristic, Bodleian, HT);
(xiii) Academic Writing Skills (for non-native English speakers);
(xiv) Foreign Language Skills (register on-line with the OU Language Centre http://www.lang.ox.ac.uk/courses/courses.html by Wednesday of MT Week 1);
(xv) Foundations for a successful DPhil course (see MPLS courses);
(xvi) An introduction to Public Engagement and Science Communication (see MPLS courses)
(xvii) ISIS Innovation Ltd – Knowledge and Technology Transfer (TT Week 2, tbc);
(xviii) Labview Workshop (tbc);
(xix) Patent Literature (Dr L Ristic, Bodleian, Week 7, MT)
(xx) Owning a successful DPhil (run by JCCG, MT date tbc)
(xxi) Research Integrity (on-line course at https://weblearn.ox.ac.uk/portal/hierarchy/skills/ricourses)
(xxii) A suite of 'Enterprise' training courses (see MPLS courses).

The Project Management Workshop in Week 4 of Michaelmas Term is compulsory.
The Career Planning Workshop in Week 5 of Michaelmas Term is compulsory.
The Training Workshop for Junior Demonstrators (MT, tbc) is compulsory.

It is also strongly recommended that you attend some of the workshop sessions in Hilary Term on 'Presentation skills' and on 'Writing skills', since you will need the former to give a good presentation at your first-year interview and second-year talk, and you will need good writing skills for your Literature Review, first-year report and your thesis. These courses assume you know the basics of word processing and use of Powerpoint, but introductory courses to these (and a wide range of other IT courses) are available from the University IT Services (http://www.it.ox.ac.uk/do/training-and-facilities).

Students whose first language is not English, should consider attending the courses on 'Academic Writing' and 'Advanced Communication Skills' that are offered by the Oxford University Language Centre at 12 Woodstock Road (http://www.lang.ox.ac.uk). For some, this attendance will have been set as a compulsory course requirement.

You should also attend the lecture in Week 2 of Michaelmas Term on 'Information Skills' as the latter is critical for accessing the research already done in your chosen field. Information on accessing and searching the materials literature can be found at http://libguides.bodleian.ox.ac.uk/friendly.php?s=oxford.

In Michaelmas Term of your first year two alumni/ae of the Department, together with a representative from the Oxford University Careers Service, will run a compulsory and very useful workshop on Career Planning - Looking to the Future. Further information about the Careers Service can be found on their website (http://www.careers.ox.ac.uk/).

Towards the end of your degree there is an opportunity to discuss career opportunities for Materials Scientists on a one-to-one basis with several alumni and alumnae of the Department. This complements the many activities available through the OU Careers Service.

Since Materials Science is strongly linked with technology, and therefore wealth creation, you might like to develop your business skills by attending some or all of a set of lectures in a series called 'Building a Business' organised by The Oxford Centre for Entrepreneurship and Innovation', part of the Saïd Business School. The lectures take place at 6.00 pm – 7.00 pm on Tuesdays at the Said Business School.

17 October – This will be a general introduction to starting a business, Kevin Monserrat
24 October – Business Model Canvas, Megan Morys-Carter
31 October – Team Building and Company Culture, William Scott-Jackson
7 November – Marketing, Neri Karra
14 November – Financial Management, Thomas Hellmann
21 November – Investment options and how to access them, Eileen Modral

Further details of the course and registration information can be found at the following web address: http://www.sbs.ox.ac.uk/faculty-research/entrepreneurship/our-programmes/building-business.

The MPLS Division also offers a range of courses on enterprise and entrepreneurship, as outlined to you at Materials Induction by Dr Anne Miller, http://www.mpls.ox.ac.uk/enterprise/mpls-programme-and-courses.

The MPLS Division runs a very useful workshop on 'Foundations for a Successful DPhil' (usually in Hilary Term) which complements the Department's Project Management Scheme, details can be found at http://www.mpls.ox.ac.uk/training/course-programme-for-graduate-students/foundations-for-a-successful-dphil.

As mentioned in Section 3 of the Graduate Course Handbook, in Michaelmas Term the JCCG run a workshop on "Owning a Successful DPhil".

If you wish to attend a transferable, academic or research skills training course that is not offered by the Department of Materials or MPLS Division and for which a fee is charged, you may apply to the Director of Graduate Studies for funding using a copy of the form in the appendix VI of the Graduate Course Handbook.

If you wish to use the supervised mechanical workshop, then it is mandatory that you first attend a Workshop skills course given by one of the technicians.

Similarly, if you wish to use the electron microscopes, then you should first complete an access and training request form (see Section 7 of the Graduate Course Handbook).

You should also attend the lecture in Week 4 of Michaelmas Term by Sarah Boad on the benefits of student membership of the Institute of Materials. The receipt of their monthly magazine 'Materials World' and attendance at their meetings should both increase your general knowledge and improve your networking skills! The first year's membership is paid for you by the Department if you attend this lecture.

Finally, you may wish to develop skills in 'Public Engagement'. The ability to communicate the essence of your work to a non-scientist, to excite them, without hyperbole, about its potential applications and benefits, and to help them understand any associated societal risks is a valuable transferable skill. To find out more see the 'Public Engagement' pages of the MPLSD website (http://www.mpls.ox.ac.uk/support-services).

Further transferable skills training information and courses can be found via the MPLSD Researcher Training information site at http://www.mpls.ox.ac.uk/training/graduate-training-framework**.**

For example in addition to the transferable skills training courses offered by the Materials Department, the MPLS Division's Graduate School and other academic departments, Oxford University IT Services and the Bodleian Library provide a wide range of courses (for these and other courses see http://www.skillstoolkit.ox.ac.uk), and courses in foreign languages are offered by the Oxford University Language Centre (http://www.lang.ox.ac.uk).

2. VITAE and GRADChallenge

Vitae was set up under the sponsorship of the UK's Engineering and Physical Sciences Research Council (EPSRC). The Vitae website contains an excellent section, originally designed by postgraduates, 'Postgraduate Researchers', and you are strongly advised to browse through this at your earliest convenience (https://www.vitae.ac.uk/doing-research/doing-a-doctorate). It contains several interlinked sections some of which we have referred to in the Graduate Course Handbook, including:

- Managing yourself
- Planning your research project
- Developing as a researcher
- Career management
- Completing your doctorate – tips on writing your thesis, submission and viva
- Supervision and key relationships.

In their February 2001 review of the original site, Science magazine wrote: ‘The great strength of this site is that it has been put together for a very specific target group (doctoral students) and has clearly been written by people who know what they are talking about.

In some years the MPLS Division arranges an Oxford Graduate School known as GRADChallenge which normally takes place towards the end of the Long Vacation or early in Michaelmas Term. You may attend this at no charge even if you are not sponsored by the EPSRC. If a GRADChallenge is run we recommend that you attend a Graduate School during the summer of your **second or third year** (2018/19 or 2019/20). The purpose of these schools is to help graduates develop their awareness of key transferable skills and enhance their career development. In the Materials Department we encourage all students to consider attending the GRADChallenge, but you should seek permission from your supervisor and note that it is a voluntary transferable skills activity. Further information about the most recent GRADChallenge graduate school can be found at http://www.mpls.ox.ac.uk/training/course-programme-for-graduate-students/grad-challenge. At the time of going to print we understand that a GRADChallenge will not run in 2017 and that no decision has been taken in respect of 2018.

3. TRAINING IN ELECTRON MICROSCOPY

The Electron Microscopy (EM) Facility offers an extensive range of research instrumentation, and training courses that run throughout the year. The EM Facility allocates researchers to training courses that are suitable and timely for their research projects. A provisional plan for EM access and training is drawn up between EM research support and project supervisors prior to the arrival of new graduate students in order to get teaching and training off to an efficient start. Researchers normally master one technique or instrument before embarking on the next, and training is tailored to match instrument capability with the scientific objectives of user projects. There are three research support scientists, each specialising in one of the three main technique areas of scanning electron microscopy (SEM), transmission electron microscopy (TEM) and focused ion beam (FIB).

EM training courses are designed to teach new users how to obtain the required data for their research project and also use the instrumentation safely. Following successful completion of a training programme, "approved users" may book equipment themselves, operating within the booking rules detailed on the website and on-line booking form.

These are designed to give a fair share of instrument time to all. Requests for additional instrument access outside the booking rules should be directed to the relevant support scientist. EM support scientists are here to make sure you get the most out of EM for your research project so do not be afraid to ask questions about EM or data analysis.

The Postgraduate Synopses booklet contains the EM training course synopses and details of associated post-graduate level lecture courses. More information can be found at http://www-em.materials.ox.ac.uk/. Applications for training and access normally will be made by your supervisor using the form provided in consultation with the relevant research support scientist. For further information please contact EM Facility staff at emaccess@materials.ox.ac.uk, or Dr Neil Young directly at neil.young@materials.ox.ac.uk.

4. SCIENCE, TECHNOLOGY, ENGINEERING AND MATHEMATICS (STEM) AMBASSADORS

What is the STEM Ambassador scheme?

This important scheme aims to put "real" scientists and engineers in school classrooms with the intention of motivating schoolchildren towards further study and careers in science and engineering. This is a serious concern for the Government, since falling numbers of scientists and engineers involves not only the closure of university departments and lost research, but also the eventual loss of jobs as industries move abroad to countries where sufficient able graduates can be recruited. Of equal concern is the lost talent that results from various groups in society that remain under-represented in STEM subjects.

What does a STEM Ambassador do?

STEM Ambassadors co-operate with teachers in a variety of ways depending on the needs of the school and the skills of the Ambassador. Examples include careers advice and helping with projects or school clubs.

What do I gain?

Apart from it being good for the Department as a whole if some of our research students are involved with such schemes, it is a good thing to have on a CV for jobs in industry or education: for anyone even remotely thinking of a career in teaching it can be very helpful indeed as it provides useful contacts in teaching and a good insight into what is involved.

Anyone who is already involved with schools through their children, as governors etc., may also find it useful. Finally, developing communication skills with the general public, as well as communicating with other scientists and engineers, is a valuable personal skill in itself.

Where can I find out more?

Information on https://www.stem.org.uk/stem-ambassadors/ambassadors will be helpful and you can apply online directly from this website. Further information is available from Jayne Shaw, the Access & Outreach Manager in the Department. (Email: jayne.shaw@materials.ox.ac.uk, Tel: 73710).

5. GAINING TEACHING EXPERIENCE

Some experience of teaching, whether as a demonstrator in the laboratory, as a tutor, or assisting with activities provided for school pupils, is a very useful transferable skill. Also, such teaching is paid work. As part of your skills training you are encouraged to volunteer for teaching and/or outreach duties. Unless your sponsor forbids it, the Department expects its graduate research students to participate in a minimum of 30 hours per annum teaching if so requested by the Department. This teaching is paid at the standard University rates.

UK students: please note that earnings from sources such as teaching and demonstrating may be taxable and should be aggregated with income from any other employment when assessing income tax liability for a given tax year (your EPSRC maintenance grant is counted as a training award and not normally regarded as income for UK income tax purposes, a small number of exceptions include certain European Commission-funded studentships, where you are paid a salary).

Overseas students: please note that whether or not we are able to pay you will depend on the terms of your visa. In some cases your visa may still permit you to take a teaching role but unpaid.

5.1. JUNIOR DEMONSTRATING IN THE TEACHING LABORATORY

An essential part of the undergraduate courses is practical work which is undertaken in the Teaching Laboratories. This provides an opportunity for graduate students to gain experience of teaching by acting as junior demonstrators and at the same time earn a useful supplement to their subsistence grant. The Department promotes this by way of Teaching Assistantships (TA).

Each year the Department requires about 15 TAs to help with the Undergraduate Practical Classes. The TA appointments are for one year, with the expectation of renewal for a second and perhaps a third year subject to satisfactory performance, and provided the Department continues with the scheme. Students will be remunerated at the appropriate rate **for work done**.

Normally all new research students are required to attend our JD Training Workshop (usually held in MT). This means that you all become eligible to apply for a JD role.

Each Teaching Assistant on Practical Class duty will be in the teaching laboratory for, typically, 4-6 afternoons (2.00 - 5.00 pm) for each of two terms. Second year students should ensure that any commitments they agree to do not clash with the 2nd Year Talks in Hilary Term. There will also be some training time, including a requirement to assist with setting up equipment and a requirement to attend experiment specific training, and to carry out the full experiment and to produce a set of model results. Each TA will be expert in one particular undergraduate practical being done during the term. The contract is for up to 120 hours per year, but in most years for most TA's the actual requirement is much less. As ever, good verbal communication skills and a reasonable amount of practical expertise will be essential requirements. You should also have the agreement of your supervisor from whom we will seek a reference. Further details on junior demonstrating can be obtained from the Practical Class Organiser.

5.2. TUTORING

A special feature of undergraduate courses at Oxford is the college tutorial. Every week students prepare work for 1-2 tutorials, which they then discuss (usually in pairs) with a college tutor. Tutoring undergraduates is valuable experience and an excellent way of consolidating your knowledge. It also provides extra income. If opportunities arise, in an area where you feel confident, you are encouraged to take on a moderate amount of teaching (discuss it with your supervisor). You should be aware though that the ratio of staff and postdoctoral researchers to undergraduates is high in the Materials Department and relatively few postgraduate students actually have this opportunity. Some demonstrators are needed for crystallography classes and tutors for mathematics classes. Further details on tutoring can be obtained from the Chair of the Tutors' Committee, Professor Jonathan Yates or from Professor Susie Speller and for Maths Classes from Professor Marina Galano (in MT 2017 from Dr Jenny Barnes).

5.3. TRAINING TO TEACH

A number of training workshops are organized for those new to teaching. Details are announced by e-mail and appear in the termly lecture lists, http://www.materials.ox.ac.uk/teaching/lecturelists.html and/or in the on-line Researcher Training Tool.

5.4. SCHOOLS OUTREACH WORK

There are a wide range of opportunities to help with the Department's substantial outreach work to schools: giving short talks, assisting with laboratory-based workshops for school pupils, helping with open days, visiting schools, acting as a host for residential courses held at Oxford and acting as a STEM Ambassador (see Section 8 of the Graduate Course Handbook). We offer training and support to those interested in developing and delivering outreach activities and we are always looking for enthusiastic volunteers. For more details, please contact our Access & Outreach Manager, jayne.shaw@materials.ox.ac.uk.