From Excellence in Education to Excellence in Practice: the skills base for effective applied research

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The Stats….

Physical Sciences	Total	UK	Other EU	Other overseas
Total FT PGs*	11435	7760 68%	1695 15%	1980 17%
Chemistry	Total	UK	Other EU	Other overseas
Total FT PGs*	4160	2825 68%	735 18%	600 14%

36% of all physical science ft postgraduates are studying chemistry – chemistry has the largest share of all the physical sciences

*Data Source: HESA Full-time Postgraduates in the UK by subject of study, domicile and gender 2001/02

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What do employers want?

- Excellent scientific practice
- Excellent scientific reasoning
- Excellent:
  - communication
  - organisation, management
  - effective team work
  - potential leadership qualities
  - self discipline, confidence
  - and more…….

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What do employers want?

much more……

leadership

drive

data handling

logical thinking

reflection

negotiating

project management

team player

motivational skills

planning

influencing

enthusiasm

single-mindedness

personal development

report writing

diplomacy

health & safety

literacy

feedback

initiative

Self awareness

confidence

prioritisation

problem solving

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Where are PhD chemists employed?

Of those chemistry PhD graduates in home (UK) employment:

	1997	1998	1999	2000	2001	2002
Industry	40%	40%	45%	40%	39%	35%
Education	27%	28%	21%	27%	28%	32%
Commerce	21%	22%	24%	24%	24%	19%
Public Service	7%	7%	5%	7%	7%	8%

*Data Source: LearnNet Employer categories of Higher Degree University Chemistry Graduates

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Where are PhD chemists employed?

- Industry is the main employment sector
- However, over 50% of higher degree graduates not employed in industry
- Versatility of Chemistry undergraduate and postgraduate degrees

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Chemistry pg students, best trained scientists?

- What are the UK policy makers, major funding bodies and RSC doing to make chemistry pg students the best trained scientists?

Sir Gareth Roberts Review ' SET for Success' recommends (4.2, Chapter 4):

...major funders of PhD students should make all funding related to PhD students conditional on students' training meeting stringent ***minimum standards*** *and should include the provision of at least* ***two weeks' dedicated training*** *a year, principally in transferable skills.*

www.hm-treasury.gov.uk/roberts/

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Post Graduate Minimum Standards

Improving Standards in Postgraduate Research Degree Programmes

- Postgraduate training framework introduced by the UK funding Councils www.hefce.ac.uk/pubs/hefce/2003/03_23/03_23.doc
- Introduces minimum threshold standards designed to maintain and increase the value of the UK PhD
- Threshold standards ensure that UK postgraduate students complete a high-quality doctoral thesis and develop a range of knowledge, understanding and skills necessary for their future employment
- Threshold standards are built on existing good practice, and represent an essential minimum for the provision of high quality Research Degree Programmes across all disciplines

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Post Graduate Minimum Standards

- Minimum Threshold standards for:

  - Institutional arrangements
  - Research Environment
  - Selection, admission, enrolment & induction
  - Supervisory arrangements
  - Review & Progress
  - Skills development
  - Feedback mechanisms
  - Appeals and Complaints

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Skills development threshold standards

There is a growing awareness of the research degree as a two-fold process

1. a scholarly piece of work that will make a significant contribution to knowledge and understanding
2. development of **research and other skills** that will in many cases go far wider than the original research

Skills training requirements: joint statement by the UK Research Councils/AHRB includes:

- Research Skills and techniques
- Research Environment
- Research Management
- Personal Effectiveness
- Communication Skills
- Networking and Team working
- Career Management

http://www.grad.ac.uk/3_2_1.jsp

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UK Grad programme – dedicated skills training

'The challenges of doing a PhD are such that it is not easy to find the time to stand back and assess where you are and what you want to do next. GRAD courses offer you the chance to do just that. They are courses that allow you to identify ways to develop yourself, see the relevance of your skills in different environments and feel more able to promote yourself and your abilities'

- Funded by UK Research Councils, AHRB, Wellcome Trust. The RSC funds non-research council funded students to go
- GRAD courses are designed for postgraduate research students to assess their personal skills, develop team building skills and career management skills
- High intensity skills development and awareness relevant to research environment
- Attending a course helps the student:
  - complete their PhD successfully
  - make a successful transition to their next position
- Detailed information on the courses is purposefully not given prior to attendance

www.grad.ac.uk

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UK grad programme

- GRAD courses are exceptionally highly rated by attendees:
  - 95% become more aware of their skills and attributes
  - 93% feel they are more able to negotiate with and influence others
  - 72% say they manage their research better
  - 94% believe they are more employable after attending a GRAD course

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RSC Postgraduate Skills Record

- Valuable framework for skills assessment and development
- First discipline specific framework for skills development published by a professional body
- Formally launched in April 2000
- Available to all postgraduate students in the chemical sciences
- Over 5000 copies have been requested and distributed so far
- Widely acknowledged that chemistry pg students have the opportunity to develop essential skills throughout the PhD
- a formal framework helps develop awareness, encouraging reflection, assessment and planning.

www.rsc.org/pgskills

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Postgraduate Skills Record

- Record for self reflection, assessment and planning in essential skills areas:
  - Handling Information
  - Communication Skills
  - Improving Learning and Performance
  - Planning and Organisation
  - Working with Others
  - Scientific Skills
- Placing the emphasis of responsibility onto the student
- Helps identify skills gaps and encourages the individual to seek development opportunities to fill those gaps
- Such was the success of this document it has been adapted to meet the requirements of the UK profiles for undergraduate students.

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What do employers want?

excellent scientific practise

Scientific reasoning

drive

data handling

logical thinking

leadership

reflection

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Self awareness

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Professional Competence

- Chartered Scientist (CSci) – a mark of excellence
- Requirements for CSci:

Masters level qualification

+

4 years postgraduation level experience at an appropriate level

- Professional competencies based on employer skills requirements
- CSci indicates current professional competence, requiring revalidation of the award every 5 years

www.sciencecouncil.org

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Useful links

- **SET for Success**
  - www.hm-treasury.gov.uk/roberts/
- **UK Grad programme**
  - www.grad.ac.uk
  - www.grad.ac.uk/3_2_1.jsp
- **Science Council**
  - www.sciencecouncil.org
- **RSC**
  - www.rsc.org
  - www.rsc.org/pgskills
  - www.rsc.org/industry

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