

UK Universities' Nuclear Courses

Report compiled by

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1. Introduction

The aim of this report is to provide a comprehensive summary of the current UK provision of Higher Education taught courses and research areas in nuclear fission. The majority of this information can now be found on the Nuclear Liaison website www.nuclearliaison.com Information not included on the website are current and past student numbers and possibilities for an increased future capacity. With the recent publication of the NDA Skills strategy I have included their Current Strategic Interactions with Universities in Appendix 1 and their Identified Needs for University-level teaching and Research-level Activities in Appendix 2. For some courses data are not available as it was not supplied by the host University.

In 2008 there are nuclear courses at foundation, undergraduate and postgraduate level taught at UK universities.

2. Foundation Degrees

Foundation degrees in nuclear are offered at The University of Central Lancashire (UCLan) in the following areas.

Foundation degree in Nuclear Decommissioning

Foundation Degree in Nuclear Project Management and Programme Control

Foundation Degree in Nuclear Related Technology

These courses can be converted into a full degree by taking the following top-up course

BSc / BEng top-up degree in Nuclear Related Technology / Decommissioning

These courses are delivered at Lakes College or Westfield Research Institute and at the sites of other decommissioning experts in West Cumbria, especially GenII Engineering & Technology Training. The Foundation degree in Nuclear Decommissioning course has also been franchised to Bridgwater College in Somerset to support the decommissioning of Hinkley Point. The courses are accredited by the National Skills Academy Nuclear (NSAN) which also offers a bursary scheme.

3. Undergraduate Degrees

Nuclear aspects of science and engineering are taught as part of many undergraduate courses within the UK, such as many Physics courses and the Engineering course at The University of Cambridge but to list all these courses is beyond the scope this report. One indication of the recent trend towards more nuclear energy is the physics course at the University of Salford where 40 students are currently studying a major module on nuclear physics, which has a significant emphasis on nuclear energy. The only dedicated nuclear undergraduate courses are offered by Lancaster University - *M.Eng. In Nuclear Engineering* - and Imperial College London that offers a *M.Eng. in Mechanical Engineering with Nuclear*, *M.Eng. in Chemical Engineering with Nuclear* and *M.Eng. in Materials with Nuclear*. Students take a generic 1st and 2nd year and then take the following nuclear options - 3rd year: Introduction to Nuclear Energy and Nuclear Chemical Engineering, 4th year: Nuclear Thermal Hydraulics, Reactor Physics and Nuclear Materials

The Managing Radioactive Waste Safely (MRWS) programme will need a number of qualified geology and earth science students. There are currently 24 UK universities teaching these subjects -

Aberystwyth	Aberdeen	Birmingham	Bristol
Cambridge	Camborne School of Mines	Cardiff	Durham
Edinburgh	Imperial College London	Keele	Lancaster
Leeds	Leicester	Liverpool	Manchester
Newcastle	Open	Oxford	Portsmouth
Plymouth	Royal Holloway	Sheffield	Southampton
St Andrew's	University College London		

The above departments produce about 1,000 graduates a year. The British Geological Survey report that they are still able to recruit satisfactory numbers of good geosciences graduates but they are becoming increasingly concerned about the shortage of highly numerate recruits who will be needed in areas such as modelling work related to the MRWS programme.

4. Postgraduate Taught Degrees

The following postgraduate taught courses are currently offered by UK Universities. Unless otherwise stated student numbers refer to academic year 08-09.

University of Birmingham

M.Sc. in Physics and Technology of Nuclear Reactors

Postgraduate Certificate and Diploma in Radioactive Waste Management and Decommissioning

38 students on the one-year PTNR course which is a record in the 52 year history of this course.

University of Central Lancashire (UCLan)

M.Sc., Postgraduate Diploma and Certificate in Energy and Environmental Engineering (Nuclear Decommissioning)

University of Dundee

Master of Laws (LLM) and associated Diploma in International and Comparative Nuclear Law and Policy

Lancaster University

M.Sc. in Decommissioning and Clean-Up

M.Sc. in Safety Engineering

Both courses are run part time over two years.

University of Liverpool

M.Sc. in Radiometrics: Instrumentation and Modelling

Postgraduate Certificate in Radioactive Waste Monitoring and Decommissioning

University of Sheffield

M.Sc. in Nuclear Environmental Science and Technology

University of Surrey

M.Sc. in Radiation and Environmental Protection

M.Sc. in Radiation Detection and Measurement

Nuclear Technology Education Consortium (NTEC)

M.Sc, Diploma, Certificate and CPD programme

Twenty-two institutions offer a taught M.Sc. in some aspect of engineering geology (including soil/rock mechanics and mining), no current student numbers are available

Bangor	Durham	Imperial College London	Reading
Birmingham	Glasgow	Manchester	Sheffield
Camborne	Greenwich	Newcastle	South Bank
Cambridge	Heriot-Watt	Nottingham	Southampton
Cardiff	Kingston	Nottingham Trent	
Dundee	Leeds	Portsmouth	

5. Postgraduate Research

Against a backdrop of reduced public funding for UK nuclear research and lab closures within UKAEA and the CEGB from the early eighties to late nineties, BNFL decided to consolidate its University research funding into four core centres of excellence, beginning in 1999 with three further centres opened in the following years -

1999 Centre of Radiochemistry Research (CRR) at The University of Manchester

2000 Institute for Particle Science and Engineering at (IPSE) The University of Leeds

2001 Immobilisation Science Laboratory (ISL) at The University of Sheffield

2002 Materials Performance Centre (MPC) at UMIST (now The University of Manchester)

The contribution these four centres have made to UK nuclear research is summarised below.

Centre of Radiochemistry Research

Number of PhDs awarded - 49

Number of Postdoctoral Research Assistants - 29

Destination of students and postdocs after leaving the CRR

AWE Aldermaston (4), BNFL (2), AmecNNC (7), Atkins (1), DSTL (1), Home Office Scientific Development Branch (1), UKAEA (1), DECC (1), Unilever (1), UC Santa Barbara (1), UC Berkeley (4), Institute for Transuranium Elements, Karlsruhe (1), Los Alamos (2), Washington State Univ (4), USDOE (1), AECL (1), UK academic posts (Cardiff, Oxford x 2, Leeds, Birmingham; 5), ANSTO (1), UK postdocs (7), it should be noted that this list is incomplete

Institute for Particle Science and Engineering

Number of PhDs awarded - 15

Number of Postdoctoral Research Assistants - 17

Destination of students and postdocs after leaving the IPSE

PhD Employment into nuclear industry = 4 (Nexia Solutions 2, Aker Solutions, AWE)

PhD Employment into other sectors = 6

URA Postdocs now at Leeds University = 0

Ex-URA Postdocs still at Leeds = 1

Immobilisation Science Laboratory

Number of PhDs awarded - 10

Number of Postdoctoral Research Assistants - 13

Destination of students and postdocs after leaving the ISL

Queen's University, Belfast, Senior Technologist at Lafarge, Unilever R&D, Department of Chemical Engineering at Melbourne University, Nirex, Building Research Establishment, National Nuclear Laboratory (2), AMEC•NNC, Department of Physics at the University of Illinois at Chicago, Department of Civil and Environmental Engineering at University College London

Materials Performance Centre

Number of PhDs awarded - 7

Number of Postdoctoral Research Assistants - 20

Destination of students and postdocs after leaving the MPC

7 joined nuclear industry (Fraser Nash, Serco TAS, NNL), 3 joined academia, 5 became PDRAs, 1 joined British Aerospace

Other universities that have nuclear related research

University of Birmingham, Nuclear Power Technology, Department of Physics

Currently 5 PhD students in total

University of Cambridge, Department of Earth Sciences

No data available

University of Central Lancashire

10 PhD students spread across the Departments of Chemistry and Engineering studying nuclear related or nuclear specific topics

University of Hull, Department of Engineering

2 PhD students per year on average

University of Liverpool, Department of Physics

5-6 PhD Students per year in nuclear physics and nuclear instrumentation

University of Lancaster, Department of Engineering

8 PhD students in total and 4 Masters degrees by research

University of Cardiff, Geoenvironmental Research Centre, Department of Engineering

6 PhD students in total

Loughborough University, Environmental Radiochemistry Research Group, Department of Chemistry

8 PhD students in total

Research Consortia

KNOO

26 PhD students and 20 PDRAs shared between the Universities of Bristol, Cardiff, Leeds, Manchester, Sheffield, The Open University and Imperial College London

DIAMOND

28 PhD's will be funded by DIAMOND. The PhD split between the partner universities is as follows (bracketed figures denote PhD students now, or soon to be, in place).

Leeds - 5 (4)

Manchester - 5 (?)

Sheffield - 1 (1)

Loughborough - 5 (5)

Imperial - 7 (7)

UCL - 5 (2)

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Nuclear Engineering Doctorate Programme

Research Engineers by year

2006 - 2

2007 - 8

2008 - 8

These PhDs are split between the six partner universities - Manchester, Imperial College London, Sheffield, Leeds, Bristol and Strathclyde

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SPRing

No data available

6. Future Capacity

The overwhelming response for possibly increasing the future capacity is that it could be accommodated as long as the required funding is in place. One caveat though is that this funding would need to be secure, as an increase in student numbers beyond a certain level would require an investment in staff. Other comments include

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“The problem is that students are a major commitment, especially if you want to do properly hot work. Laboratories work much better with a postdoc:student ratio > 1. So my concern would be sources of funding at postdoc level, not PhD student. If we had a secure postdoc funding stream, we would be able to support more students.”

“We could increase up about 5 to 10% with the current staff involvement (10FTE). However, the attraction of new staff could lead to a larger increase - say 25% to 50%. This would take our total of students up to over 100.”

“Based on student number of 5-6 per year we could easily expand by 50% with the number of academic positions we have. A 100% increase would just about be OK. Above that would be a challenge or need more academics.”

“It is clear that some start-up funding of some kind is necessary to get new nuclear courses going but given that, there is lots of capacity.”