CNE: Nuclear Teaching

Dr Ben Britton

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With support from Raj Gill and Emma Warriss

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Teaching Vision

• Imperial College London as **Destination of Choice** for Nuclear Engineering Training, Education and Research

• “Top in class” for UK delivery of skilled nuclear graduates

• Utilise our world class network
  – 30+ Nuclear Academics
  – Internationally leading industrialists & collaborators

• Focus on:
  – Undergraduate delivery
    • MEng ‘with Nuclear’ (Materials, Chemical Engineering, Mechanical Engineering)
  – Postgraduate 1 year – MSc and MRes
    • Coordinated programme covering nuclear life cycle
  – PhD – Centre for Doctoral Training & Sponsored PhDs

• Underpin teaching of Nuclear modules across Faculty of Engineering
  – e.g. Energy Futures MSc, Systems Engineering MSc, etc.

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Marketing & Outreach

- Flyers outlining our provision
- Outreach at the Imperial Festival
- UG and PG open days/evenings
Marketing & Outreach

Centre for Nuclear Engineering

Courses in Nuclear Engineering

For Undergraduates

Nuclear Engineering is a multidisciplinary subject and graduates are highly sought after by employers across the globe. It is predicted that nuclear energy capacity will increase dramatically over the coming decade as part of the strategy to reduce CO₂ emissions whilst meeting the world's growing energy demands.

In the UK alone, it is projected that up to 13 new nuclear reactors will be built. This is further increasing the demand for suitably qualified nuclear engineering graduates, in jobs as diverse as radiation protection, construction, safety case production, chemical engineering plant operation, waste design and materials performance.

Full-time degree courses:

- MEng in Chemical and Nuclear Engineering
- MEng in Materials and Nuclear Engineering
- MEng in Mechanical and Nuclear Engineering

If you are an undergraduate student at Imperial you also have the option to choose some modules in Nuclear Engineering without committing to a full degree.

- Nuclear Engineering courses for current students

For Postgraduates

Nuclear Engineering is challenging and building and maintaining a reactor is a team effort, requiring talented individuals from a wide variety of backgrounds, but with advanced training.

- MSc in Nuclear Engineering (1 year)
- PhD in Nuclear Engineering (3 years)
- MPhil in Nuclear Energy (4 years)

http://www.imperial.ac.uk/nuclear-engineering/courses/
MEng People

<table>
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<tbody>
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<td>Year 1</td>
<td>6</td>
<td>3</td>
<td>NA*</td>
<td>9</td>
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<tr>
<td>Year 2</td>
<td>8</td>
<td>6</td>
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<td>14</td>
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<td>Total</td>
<td>21</td>
<td>21</td>
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* MEng with Nuclear in Mech Eng do not specify optional degrees until the end of year 2
MSc Modules

7/8 Core Modules

- Nuclear Safety Management
- Nuclear Materials
- Nuclear Thermal Hydraulics
- Intro to Nuclear Energy
- Modelling for Nuclear Engineering
- Nuclear Chemical Engineering
- Reactor Physics
- Nuclear Waste Management

3/6 Short Courses

- 3-Month Research Project
- Construct-ionarium
- Nuclear Policy
- Engineer in Industry
- Fusion
- Radiation Protection
- Fast Reactors & Hydrogen production

Skills Development

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MSc People

• 1 year course (Oct start)

• Student numbers:
  – 2013 – 16
  – 2014 – 16 (+10 CDT)
  – 2015 – 10 (+10 MRes CDT)

• 4 British / 8 EU / 4 OS

• Key staff:
  – Director: Ben Britton
  – Administrator: Raj Gill
  – External Examiner: Tom Scott (Bristol)
MSc Projects

• Core to the MSc is a 3 month research project

• Develops new skills, new research, widens horizons & industrial links

• Industry can supply projects
  – Students in industry (e.g. CCFE / RR / ANSTO / EdF)
  – Students in IC with Industry Focus (e.g. AWE-CEMS)

• 2015-2016 Projects:
  – 2x with CCFE
  – 2x at ANSTO
  – 2x with Reactor centre
Student Satisfaction

→ Course met expectations for 92% of students

→ After the MScs
  • 49% to employment
  • 30% PhD or EngD
  • 5% further study

→ Top three industries
  • Manufacturing
  • Business, Management, Consultancy
  • Nuclear
  • R&D
  • Oil and mining

→ 98% of students enjoyed the MSc courses

Source: October 2015 MSc Exit Surveys (Advanced Materials & Nuclear Engineering)
# Getting More Involved - costs

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<tr>
<th>COSTS</th>
<th>£k</th>
<th>per year for</th>
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<tbody>
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<td>4 years =</td>
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<td>Masters student sponsorship</td>
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<tr>
<td>PhD student sponsorship (CDT)</td>
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<td>4 years =</td>
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<td>PhD student sponsorship (100%)</td>
<td>40</td>
<td>3.5 years =</td>
<td>140</td>
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Current masters student sponsorship:

- RR & AWE for prizes
- 3x EdF sponsorship (~£6k each only)
- 3x Department of Materials (£10k each)*
- 5x Department of Materials (£3k each)*
- ANSTO & CCFE for project studentships offsite

*shared with MSc in Advanced Materials
## Getting More Involved - timing

<table>
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<tr>
<th>TIMELINE</th>
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<th>2017</th>
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<tr>
<td>- project runs (lab / offsite)</td>
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For project submissions – email: b.britton@imperial.ac.uk
Teaching Summary

• CNE provides teaching to wide range of students
  – UG as MEng with Nuclear & individual options
  – PGt through MSc in Advanced Nuclear Engineering
  – PGt and PhD with ICO-CDT Programme
  – PGr through direct/indirect research funding

• Activities coordinated across multiple departments to provide wide range of expertise and training

• Growth in the area is promising, support from Industry encouraging

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