UNIVERSITY OF NOTTINGHAM

PROGRAMME SPECIFICATION

SESSION 2012/2013

Section A. Basic Information

1 Title

Doctor of Philosophy IDIC Energy Technologies

2 Course Code

H89D

3 School(s) Responsible For Management Of The Course

Chemical & Environmental Engineering 100%

4 Type of Course

Single Subject

5 Mode of Delivery

Full time

6 Accrediting Body

Not applicable

7 Relevant QAA Subject Benchmark(s)

Section B. General Information

Educational Aims

This multi-disciplinary programme aims to provide students with an intensive four-year postgraduate research programme preparing future research leaders to tackle the major national and international challenges over the next 15 years; implementing new power plant to generate electricity more efficiently using fossil energy with near zero emissions, involving the successful demonstration and deployment of CO_2 capture, together with reducing CO_2 emissions generally from coal utilisation, including iron making.

Additionally, the aims are to provide a doctoral research project portfolio with research training in technical subjects and interdisciplinary skills. This is to address key challenges in efficient fossil energy technologies and transform the latest research results into industrial technologies. The nature of the research will vary from predominantly laboratory-based through to industry-based research.

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Outline Description of Course

The structure of the programme is for all candidates to undertake a research project portfolio together with a curriculum training component. The programme leads to the award of a Doctor of Philosophy (PhD) and complies with the University regulations for research degrees.

http://www.nottingham.ac.uk/academicservices/qualitymanual/studyregulations/index-page-research-degree-regulations.aspx

One of the key features of the programme is that the three partner universities, Nottingham, Loughborough and Birmingham will provide the curriculum training component consisting of Masters level modules. At the same time the students will work on their research projects, some of which are provided by our industrial partners.

Funding from the University and Ningbo Education Bureau has been secured to recruit up to 50 students onto this programme over three intakes. The first intake of approximately 12 students will be in 2012/13 (start of session). A further intake of 18 students is expected in 2013/14 and another 20 in 2014/15.

All students will be initially registered at the UK campus and will transfer to the Ningbo campus after 12 months of study. Whilst in the UK, all students will undertake a similar curriculum training programme to the students (Research Engineers) registered on the Engineering Doctorate in Efficient Fossil Energy Technologies (H89P) which comprises Masters-level taught modules and a postgraduate research project component.

Distinguishing Features

Many of the core (compulsory) modules are delivered in one-week intensive blocks. They have been selected to provide the student with knowledge, application and interdisciplinary skills in two main themes: professional development and advanced technical and include lectures, group activities, problem-based learning and industrial case studies. These provide a continuous thread of industrial and research development leading into the electives and summer research project. A further contextual skills theme is provided in the choice of electives and these modules will enable students to become both professionally and technically competent in their domains to prepare them for effective deployment of technology within industry.

The aim of the programme is to develop a new breed of engineers that will be thoroughly versed in cutting edge energy research and capable of operating in multi-disciplinary teams, covering a range of knowledge transfer, deployment and policy roles and with the skills to analyse the overall economic context of their projects and to be aware of the social and ethical implications.

Students will make their own arrangements for travel to Birmingham and Loughborough for the core compulsory modules (20 credits) that these universities deliver (although The Energy System module is delivered by Birmingham via video conference anyway). They may also travel for their electives but for some of the elective modules video-conferencing facilities may be used where possible to minimise travel between locations.

The programme is delivered by experts drawn from across the three partner universities and the students will gain experience of the type of problems encountered by industrial and academic researchers, both via taught courses and project work on an individual and group basis. Written and oral presentations will also be undertaken at various stages of the course.

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Section C. Supplementary Regulations

1 Admission Requirements

Course Requirements At least 2.1 (Upper 2nd class hons degree or international equivalent)

Including Engineering and Physical Sciences or closely related degrees (Chemical, Mechanical, Environmental or Materials Engineering, Chemistry, Physics, Mathematics or Geology)

Excluding All Arts & Social Sciences

Other Requirements

Applicants with qualifications below the minimum may be considered if they have relevant experience, subject to approval by the Quality and Standards Committee. International applicants are welcome – the scholarships secured are available to applicants of any nationality.

pre-sessional course final assessment of "Pass with Merit"

IELTS Requirements 6.5 (no less than 6.0 in any element)

TOEFL IBT 87 (no less than 21 in listening and writing, 22 in reading and 23 in speaking)

2 Course Structure

Module availability on non-compulsory modules is subject to timetabling and pre-requisite restrictions.

Year 1

Compulsory

Students must take all modules in this group

Code	Title	Credits	Compensatable	Taught
N14T15	Innovation and Technology Transfer	10	Y	Autumn
K14CPC	Combustion and Pollution Control	10	Y	Autumn
H84PGC	Power Generation and Carbon Capture	10	Y	Autumn
G54RPS	Research and Professional Skills	10	Y	Full

				Year
H84RP1	Efficient Fossil Energy Technologies: EngD Research Project Portfolio Part 1	20	N	Summer
G54RP2	Research and Professional Skills for DTC students Part II	10	Y	Spring
L34110	Energy, Technology and Society (10)	10	Y	Autumn
	Credit Total	**80**		

Year 4

Additional Module Choice Information for Year 4

Students may choose from any relevant Masters-level module (i.e. level 4 or in exceptional cases level 3) offered by any of the three universities; there are no restrictions but the modules selected need to be relevant to the ethos of the centre and the research project to be carried out. The choice of elective modules must have the approval of the project supervisor(s). There is no restriction on numbers of credits selected from a specific university however there are restrictions should the candidate not complete the PhD programme as outlined in the following paragraph.

Additional Components

The curriculum training programme is entirely based within the first year of registration requires the students to complete a total of 120 credits comprising 100 credits of taught modules and a 20 credit postgraduate research component.

3 Assessment

All Supplementary or course Regulations should be read in the context of the relevant University Study Regulations .

Please refer to this information on http://www.nottingham.ac.uk/regulations/ .

Progression Information:

This programme will comply with the University regulations for research degrees as given in the Quality Manual at http://www.nottingham.ac.uk/academicservices/qualitymanual/studyregulations/phd-and-mphil-regulations.aspx

In line with the University regulations each PhD research project is assessed through examination of a thesis (of no more than 100,000 words) and a formal viva voce examination. Candidates shall be examined by one Internal Examiner, one External academic Examiner and, where relevant (for an industry-based PhD), an External Examiner who is an industrialist.

For the curriculum training component students are assessed in the 100 credits of the taught training modules and the 20 credit research project modules undertaken in the first year. An Examination Board, including an External Examiner and internal examiner, will be convened to consider progress to year 2. Students requiring re-assessment will be offered one chance to be re-assessed.

Degree Information:

Students who have successfully completed part of the entire training component but who subsequently do not complete the requirements for the PhD may be awarded a Postgraduate Diploma (PGDip) or Postgraduate Certificate (PGCert) in IDIC Energy Technologies subject to regulations and provided they have successfully completed requirements as set out below.

A Postgraduate Diploma may be awarded provided the student has successfully completed 120 credits with an overall credit weighted average mark of at least 50%, with at most 40 credits below 50% of which no more than 20 credits can be below 40% and with no marks lower than 30%.

Candidates who fail to reach the required standard for the award of the Diploma may be awarded a Certificate provided they have successfully completed 60 credits with an overall credit weighted average mark of at least 50% with at least 40 taught credits of at least 50% and with no marks lower than 30%.

These awards will be made with Distinction if the credit-weighted average is 70% and above and with Merit if the credit-weighted average is above 60%.

Borderlines will be considered at 49% for Pass; 59% for Merit and 69% for Distinction.

When a candidate's rounded mark is in one of the above borderline zones they will be awarded the higher degree classification if the candidate has half or more credits in favour of the higher degree classification (i.e. 60 credits for PGDip or 30 credits for PGCert). Candidates who fail to meet this threshold will be awarded the lower degree classification.

Course Weightings %

Degree Calculation Model:

4 Other Regulations

Accredited Prior Learning (APL) will be allowed in exceptional circumstances, such as students who have previously studied similar content at MSc level. In cases where students have previously completed a core module and this has been approved by the Training programme manager, they will not be required to take the module again. Instead they will be allowed to take an alternative approved elective module. All cases of APL will be subject to approval by the Efficient Fossil Energy Technologies Engineering Doctorate Centre Management Group and subject to the regulations of the University.

Section D. Learning Outcomes

Knowledge and Understanding

A student who completes this programme successfully should be expected to demonstrate Knowledge and Understanding of:
- essential facts, concepts, theories and principles of efficient fossil energy technologies, and their underpinning science and mathematics;
- appreciate the wider multidisciplinary engineering context and its underlying principles;
- appreciate the social, environmental, ethical, economic and commercial considerations affecting the exercise of their engineering judgment. Specifically, students will be able to demonstrate:

- A1 (US1m) A comprehensive understanding of the scientific principles of efficient fossil energy technologies;

- A2 (US2m) A comprehensive knowledge and understanding of mathematical and computer models relevant to efficient fossil energy technologies, and an appreciation of their limitations;
- A3 (US3m) An understanding of concepts from a range of areas including some outside engineering, and the ability to apply them effectively in engineering projects;
- A4 (US4m) An awareness of developing technologies related to efficient fossil energy technologies;
- A5 (S1m) An extensive knowledge and understanding of management and business practices, and their limitations, and how these may be applied appropriately;
- A6 (P1m) Extensive knowledge and understanding of a wide range of fossil energy processes and equipment.
- A7 (D1m) A wide knowledge and comprehensive understanding of design processes and methodologies and the ability to apply and adapt them in unfamiliar situations.
- A8 A systematic acquisition and understanding of a substantial body of knowledge which is at the forefront of an academic discipline or area of professional practice.
- A9 A detailed understanding of applicable techniques for research and advanced academic enquiry.

Intellectual Skills

A student who completes this programme successfully should be able to demonstrate the following Intellectual Skills:

- apply appropriate quantitative science and engineering tools to the analysis of problems;
- demonstrate creative and innovative ability in the synthesis of solutions and in formulating designs;
- comprehend the broad picture and thus work with an appropriate level of detail.

Specifically, students will be able to demonstrate:

- B1 (E1m) The ability to use fundamental knowledge to investigate new and emerging technologies;
- B2 (E2m) The ability to apply mathematical and computer-based models for solving problems in engineering, and the ability to assess the limitations of particular cases;
- B3 (E3m) The ability to extract data pertinent to an unfamiliar problem, and apply its solution using computer based engineering tools when appropriate;
- B4 (D2m) The ability to generate an innovative design for products, systems, components or processes to fulfill new needs.
- B5 The creation and interpretation of new knowledge, through original research or other advanced scholarship, of a quality to satisfy peer review, extend the forefront of the discipline, and merit publication.

Professional/Practical Skills

A student who completes this programme successfully should be able to demonstrate the following Professional and/or Practical Skills:

- practical engineering skills acquired through, for example, work carried out in laboratories and workshops, in industry through supervised work experience, in individual and group project work, in design work, and in the development and use of computer software in design, analysis and control;
- evidence of group working and of participation in a major project.
- C1 (S2m) The ability to make general evaluations of commercial risks through some understanding of the basis of such risks;
- C2 (P2m) A thorough understanding of current practice and its limitations, and some appreciation of likely new developments;
- C3 (P3m) The ability to apply engineering techniques taking account of a range of commercial and industrial constraints.

Transferable/Key Skills

A student who completes this programme successfully should be able to demonstrate the following Transferable (key) Skills:

- transferable skills that will be of value in a wide range of situations, as exemplified by the Qualifications and Curriculum Authority Higher Level Key Skills, including problem solving, communication, and working with others, as well as the effective use of general IT facilities and information retrieval skills.
- self-learning and performance improvement, as the foundation for lifelong learning/CPD. Specifically, students will be able to demonstrate:
- D1 The ability to develop, monitor and update a plan, to reflect a changing operating environment;
- D2 The ability to monitor and adjust a personal programme of work on an on-going basis, and to learn independently;
- D3 An understanding of different roles within a team, and the ability to exercise leadership;
- D4 The ability to learn new theories, concepts, methods, etc. in unfamiliar situations;
- D5 The ability to communicate effectively through technical reports and technical presentations;
- D6 The ability to make effective use of general IT tools;
- D7 The ability to develop a scientific approach to solving problems and adopt a critical approach in investigation.
- D8 The general ability to conceptualise, design and implement a project for the generation of new knowledge, applications or understanding at the forefront of the discipline, and to adjust the project design in the light of unforeseen problems.

Teaching and Learning for all sections if summarised

Teaching/learning methods and strategies are matched as appropriate to the material to be delivered. Much of the teaching is done via lectures reinforced via examples, laboratory and computer-based classes. However, teaching and learning will also take place through seminars, tutorials, individual consultations, use of library and web resources, etc. The Faculty is very keen for students to get 'hands on' experience through problem solving and practical work. Many of the outcomes are achieved through guided self-directed learning especially in the research related modules.

Assessment for all sections if summarised

A wide variety of assessment methods are used through the course. The method of assessment is chosen as appropriate to the material and objectives. Widespread use is made of written examinations, laboratory reports, oral presentations and coursework including problem solving. Students are also asked to prepare and submit computer simulations with an explanatory commentary. The research project modules allow the students to undertake wider ranging work and present their results orally as well as preparing written reports and poster presentations.