

# National Higher Education STEM Programme

Summary of successful projects for engineering activities under second call

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## Developing professional skills through short-term engineering placements

<b>Reference</b>	FP001 MAR2011
<b>Project Leader</b>	Dr Martin Borthwick
<b>Institute</b>	University of Plymouth
<b>Academy Advisor</b>	Hal Igarashi, Employer Coordinator & Acting Project Director, The Royal Academy of Engineering

### Summary of the project:

The project seeks to address the need for engineering undergraduates to develop professional skills. It seeks to meet the demand for the necessary work-based learning opportunities through developing short-term placements. A survey of employers and professional bodies will be used to determine the professional skills that can be developed in a short-term placement, so that the expectations of both employers and students can be matched. The skills developed in a selection of summer placements will be assessed using student, employer and academic reviews. The outcomes will be disseminated via a web site to promote the benefits of placement-led professional development.

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### Enhancement of graduate employability skills through environmental consultancy experience

<b>Reference</b>	FP004 MAR2011
<b>Project Leader</b>	Prof. Peter Excell
<b>Institute</b>	Glyndwr University
<b>Academy Advisor</b>	Hal Igarashi, Employer Coordinator & Acting Project Director, The Royal Academy of Engineering

#### Summary of the project:

In this proposal, the development of a module is proposed, based on previous work on computing technologies. Prediction tools will be reviewed and key lessons drawn out, including the currently hot topic, the 'Kurzweil Singularity'. Visits to Science Museums were valuable, to draw out clear lessons on technological forecasting from the artefacts on display: videos will be used to save costs and increase availability, with a commentary on significant features and historical contexts of key technological heritage artefacts.

One useful outcome is to apprise students about the key mistakes of forecasting made in the past, so they can avoid repeating them.

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### Enhancement of graduate employability skills through environmental consultancy experience

<b>Reference</b>	FP009 MAR2011
<b>Project Leader</b>	Dr Steve Dorney
<b>Institute</b>	University of Southampton
<b>Academy Advisor</b>	Hal Igarashi, Employer Coordinator & Acting Project Director, The Royal Academy of Engineering

#### Summary of the project:

This proposal seeks to embed the local success of a number of consultancy-related initiatives into a Faculty-wide consulting module open to all students following programmes in the Faculty of Engineering and the Environment. The scope of this proposal is 'environmental engineering consultancy' since this builds on proven initiatives in environmental engineering, environmental management and noise consultancy. Since our Faculty brings together a much wider range of engineering disciplines we intend to evolve the module to include these in the medium-term. Longer-term the module will act as a template of best practice for consultancy education across the institution.

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### Enhancing the opportunities derived from large cohorts of engineering students

<b>Reference</b>	FP016 MAR2011
<b>Project Leader</b>	Andrew Fox
<b>Institute</b>	University of Plymouth
<b>Academy Advisor</b>	Hal Igarashi, Employer Coordinator & Acting Project Director, The Royal Academy of Engineering

#### Summary of the project:

This proposal aims to explore an innovative approach for teaching construction law to large classes of engineering students, using a simulation exercise. It will deepen the engagement between the UoP and engineering employer organisations as well as develop new links between the University and two expert bodies, the SCL and SAGSET. The SCL aims to promote interest in the subject of construction law and SAGSET is interested in promoting simulation as a teaching tool within higher education and their combined input will enable this project to produce an output that can offer valuable lessons to the field of engineering education.

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### Cognitive apprenticeship meets industrial apprenticeship

<b>Reference</b>	FP018 MAR2011
<b>Project Leader</b>	Prof. John W Davies
<b>Institute</b>	Coventry University
<b>Academy Advisor</b>	Hal Igarashi, Employer Coordinator & Acting Project Director, The Royal Academy of Engineering

#### Summary of the project:

The overall aim of the project is to contribute to research on the formation of engineers by bringing a new perspective to the development of professional attributes in engineering students. This perspective is made possible by the joint teaching of part-time, sandwich and full-time students of civil engineering at Coventry University, creating situations in which students who already possess some professional attributes developed in industry (part-time students and to some extent sandwich students) encounter project work at university designed to develop those attributes in those who do not yet possess them. The education research project proposed is an investigation of this experience through semi-structured interviews with students, and discussions by a panel of academic staff.

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### Development of a Small Scale Teaching Centrifuge

<b>Reference</b>	FP021 MAR2011
<b>Project Leader</b>	Dr Jonathan Black & Dr Sam Clarke
<b>Institute</b>	University of Sheffield
<b>Academy Advisor</b>	Hal Igarashi, Employer Coordinator & Acting Project Director, The Royal Academy of Engineering

#### Summary of the project:

Geotechnical centrifuge modelling is a well established research technique that enables simulation of full scale engineering problems using small scale physical experiments in the controlled laboratory environment. The aim of this proposal is to develop a cost effective small scale teaching centrifuge to enhance delivery of key geotechnical engineering principles linking theory and design. The state of the art system will be constructed from off-the-shelf components, feature a 'how-to' development guide and incorporate learning/design resources. Free distribution of the resource pack will maximise transferability and integration of HEI's. A complementary web repository will facilitate advanced HEI collaboration ensuring long-term sustainability.

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### Engineering Thresholds: an approach to curriculum renewal

<b>Reference</b>	FP010 MAR2011
<b>Project Leader</b>	Dr Kathleen M. Quinlan
<b>Institute</b>	University of Oxford
<b>Academy Advisor</b>	Ivan Moore, HE Curriculum Advisor, HEA Engineering Subject Centre, Loughborough University

#### Summary of the project:

Experts in education will partner with experts in engineering to identify thresholds to learning in first year engineering and materials classes at Oxford. Tutors and their students will be interviewed to identify thresholds and their experience of teaching and learning in these areas. Results will be compared to findings from parallel projects at two other universities, thus contributing to and being enriched by a national and international partnership focused on exploring engineering thresholds in foundational engineering subjects. Oxford's unique tutorial setting will illuminate how individual factors such as student background and motivation and teacher approaches affect the learning of thresholds.

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### Engineering Thresholds: an approach to curriculum renewal

<b>Reference</b>	FP017 MAR2011
<b>Project Leader</b>	Ms Sarah Olsen / Dr Matthew Armstrong
<b>Institute</b>	Newcastle University
<b>Academy Advisor</b>	Ivan Moore, HE Curriculum Advisor, HEA Engineering Subject Centre, Loughborough University

#### Summary of the project:

This project aims to improve the progression, performance and student experience of 1<sup>st</sup> year Electrical, Electronic and Computer Engineering undergraduates. We seek to increase student appreciation for the interdisciplinary nature of engineering and to highlight the relevance of taught material within industry. The project will also increase employer participation at an earlier stage of undergraduate programs than is currently practiced. The aims will be achieved through delivery of industrial lectures and incorporation of site visits directly linked to each 1<sup>st</sup> year module. A successful outcome will be increased student engagement and higher progression rates than experienced in previous years.

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### Understanding student perspectives on the transition from university to work

<b>Reference</b>	FP019 MAR2011
<b>Project Leader</b>	Dr Anthea Connolly & Dr Martyn Clark
<b>Institute</b>	University of Leeds
<b>Academy Advisor</b>	Ivan Moore, HE Curriculum Advisor, HEA Engineering Subject Centre, Loughborough University

#### Summary of the project:

This research will contribute to understanding the transition from university study to graduate employment by investigating the experiences of recent graduates. A cohort of engineering graduates with either one or two years work experience at a single employer will be recruited. In one-to-one semi-structured interviews, the cohort will be asked in detail about a range of issues relating their perceptions of the relationship between their university experiences and the roles they now undertake. Analysis will employ Bourdieu's 'thinking tools' – habitus, field and capital – to construct an understanding of each individual's experience of transition. Findings will inform employability enhancement opportunities for current and future undergraduates.

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### Assessing Learning Outcomes in Professional Engineering: What can we learn from other disciplines?

<b>Reference</b>	FP020 MAR2011
<b>Project Leader</b>	Robin Clark
<b>Institute</b>	Aston University
<b>Academy Advisor</b>	Ivan Moore, HE Curriculum Advisor, HEA Engineering Subject Centre, Loughborough University

#### Summary of the project:

This research aims to investigate effective practices in assessing professional education. In order to achieve this aim a comparative study will be undertaken of the assessment practices in two distinctive disciplines; engineering and the medical profession.

Starting with the hypothesis “Assessment of professional competencies in Engineering could be enhanced by adopting similar approaches to assessment used in the Medical Professions”, this exploratory study will compare and contrast approaches to assessment in both disciplines utilizing a mixed methodological approach. Following the analysis, guidelines for Engineering Educators in respect of assessing Professional Competencies will be developed and widely disseminated.

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### Engaging the disengaged...indefinitely. Making Student Library Ambassadors posts sustainable

<b>Reference</b>	FP002 MAR2011
<b>Project Leader</b>	Ms Elizabeth Gadd
<b>Institute</b>	Loughborough University
<b>Academy Advisor</b>	Jenny Young, Project Manager, The Royal Academy of Engineering

#### Summary of the project:

A successful internally funded project at Loughborough University employed student Ambassadors to promote better engagement with the library and its resources. In the absence of continued project funding, the challenge is how to make such initiatives sustainable - and transferrable. The research proposed would investigate how Library Ambassadors could operate into the future on a low-cost, sponsored or voluntary basis at two institutions: the Universities of Loughborough and Nottingham. A Research Assistant would investigate models of incentivising volunteers and run focus groups with students at both HEIs, in order to develop a model for recruiting and retaining Ambassadors. The model would then be tested at both institutions, and evaluated.

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### Safety Engineering Programme – A Partnership Curriculum Development between Academics, Engineering Practitioners and Professional Institutions

<b>Reference</b>	FP003 MAR2011
<b>Project Leader</b>	Prof. Amir Alani
<b>Institute</b>	University of Greenwich
<b>Academy Advisor</b>	Jenny Young, Project Manager, The Royal Academy of Engineering

#### Summary of the project:

Safety training is a key element of industrial training provided by engineering employers to employees at all stages in their careers. Safety engineering is also an integrated part of the curriculum of courses recognised by the Engineering Council and its affiliated professional bodies.

Evidence shows that high quality teaching and training is essential to maintain high standards of safety within industry and employers who have invested in safety training have demonstrated much reduced levels of injury, accidents, damage to property and 'near misses'.

Safety is already a key element of many if not most engineering courses, and this project will seek to research and investigate current safety provisions available within undergraduate courses and bring together best practice to focus on inter-disciplinary safety delivery across engineering departments and specialism.

Results and findings of this investigation will be applicable to developing an undergraduate safety engineering course as well as a suite of CPD programmes within the University of Greenwich and potentially other HE institutions in the longer term. Funding for the full development of these courses / programmes will be sought from other sources.

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### Development of the online interactive software “Push Me-Pull Me”

<b>Reference</b>	FP006 MAR2011
<b>Project Leader</b>	Dr Stylianos Yiatros
<b>Institute</b>	Brunel University
<b>Academy Advisor</b>	Jenny Young, Project Manager, The Royal Academy of Engineering

#### Summary of the project:

The project aims to develop online interactive software structural analysis “Push me-Pull me” (PmPm), in [www.expeditionworkshed.org](http://www.expeditionworkshed.org), a website created and maintained by Expedition Engineering, dedicated to civil and structural engineering students. Guidelines for the use of PmPm within the Workshed will be developed to enable its use as a free tool in virtual learning environments (VLEs) by the academics in their respective HEIs, including tutorial exercises purposefully created to engage students and enhance their intuitive understanding of structural behaviour. Finally, through visits and workshops, the use of PmPm will be promoted in order to be used in parallel with formal lectures.

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### Development of a sustainable model for engaging women within the BME populations into higher education engineering programmes in East Lancashire

<b>Reference</b>	FP011 MAR2011
<b>Project Leader</b>	Melissa Conlon & Roshani Swift
<b>Institute</b>	University Centre Blackburn College
<b>Academy Advisor</b>	Jenny Young, Project Manager, The Royal Academy of Engineering

#### Summary of the project:

The aim of the project is to encourage and support women from the BEM population in East Lancashire to undertake HE programmes in Engineering disciplines and be aware of the career opportunities which may be open to them within this sector. The project will create a sustainable model for engaging with and enrolling these students. The projects aims to develop an innovative outreach programme as well as making long-term changes to the teaching practices and the learning environment within the engineering department, which currently could be barriers to encouraging female students from BEM population.

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### Re-engineering Assessment for Engineering Education

<b>Reference</b>	FP012 MAR2011
<b>Project Leader</b>	Scarlett Xiao
<b>Institute</b>	University of Hertfordshire
<b>Academy Advisor</b>	Jenny Young, Project Manager, The Royal Academy of Engineering

#### Summary of the project:

This project seeks to enhance students' learning experience and engagement through re-engineering assessment. It starts with identification of specific issues of assessment in engineering disciplines. Then the project will explore possible solutions by building fit-for-purpose assessments to engage students' learning especially supporting first year students' transition into their degree course. Timely and effective feedback mechanisms will also be developed to enhance students' learning experience.

The project will be evaluated with 3 main stakeholders; students, employer partners / professional bodies and academic staff; and will present a set of models and a case study for other institutions wishing to introduce this initiative into their engineering curriculum.