

Working Higher

Piloting 'Sector Bespoke' Foundation Degrees through the Nuclear, Chemical and Bioscience industries

Institutions Involved:

- [University of Hull](#) (Sponsoring/Lead HEI)
- [Cogent Sector Skills Council for Chemicals, Pharmaceuticals, Nuclear, Oil and Gas, Petroleum and Polymers](#)
- [Higher Education Academy \(HEA\) Physical Sciences Centre](#)
- [Semta, Sector Skills Council for Science, Engineering and Manufacturing Technologies \(Semta\)](#)
- Up to a further five HEIs to be identified by invitation to bid to join the Working Higher consortium

Strategic Importance and Sector Need

The Nuclear, Chemicals and Bioscience sectors are amongst the most strategic and value-added manufacturing sectors in the UK. From security of energy supply (Nuclear) to transport infrastructure (Petrochemicals); from materials (Plastics) to chemicals and along the value-added chain to twenty-first century Bioscience, the UK is a world leader in the development and manufacture of high value-added products in these sectors. These knowledge-intensive industries are characterised by the application of higher level skills under regulated conditions (Safety, Health, Environmental, Patent and IPR) and are a major source of employment in the private sector. A competitive future for the industries in a global economy, especially in the current economic downturn, requires the supply of higher level skills to extend beyond the traditional supply drawn from approximately one third of all young people who progress through the full-time higher education system. It requires wider HE participation and flexible employer-facing higher level skills products for workforce development. In this context the proposal is in line with the DIUS Manufacturing Strategy (2008), the IUS Select Committee Report on Reskilling for Recovery (2009) and the Leitch Review of World Class Skills (2007).

Overview of Proposal

The project aims to address the blockages that have resulted in a mismatch of supply versus need. It does so by utilising the specific strengths of a number of partners: Sector Skills Councils (need identification, demand raising and marketing to employers), the HEA (engagement of leading practitioners and best practice) and institutions (programme development and delivery; project management). These partners will engage with employers whose role will be to share the risks and assist in programme development. To attempt to resolve the skills shortages across the whole of the science and manufacturing sectors would be improbably ambitious. The project therefore seeks to prove by means of pilots in some key economic sectors (commencing with the Nuclear industries and rapidly followed by Polymers, Petroleum, Chemicals and Biosciences) that the current blockages can be overcome, in particular by minimising risks for the various stakeholders.

The project will develop a set of generic modules to be used across Foundation Degrees relevant to a wide range of science-based industries. It then seeks, by means of utilising academic and industrial expertise, to develop and deliver specialist modules which together with the generic modules will complete a suite of discrete FDs targeted at the needs of specific sectors. The project aims to share across a consortium of universities the generic modules, with a lead HEI developing the specific modules relevant to a particular sector (for example, one university would lead for the nuclear sector). At the conclusion of the project an assessment will be made as to whether by extension, further sectors of the economy could be addressed by this model. The project therefore aims to bring coherence to an otherwise random and inefficient process of individual universities developing FD programmes in response to a localised or very specific, perhaps temporary, identified need and that expertise not being shared across the sector. It also seeks to address the disincentive to HEIs to engage in costly provision (science provision) by sharing costs across a range of providers and funding development work.

The project seeks further to tackle risks related to market uncertainty and levels of income. It utilises the expertise of the Sector Skills Councils to identify sectors in which there is particular shortage and employers who are willing to engage by sharing costs. The project has an allocation of HEFCE co-funded numbers and Sector Skills Councils are confident of their ability to identify and engage employers willing to co-fund. The Sector Skills Councils will also have a role in stimulating demand. It is recognised that identifying a need is only part of the issue, employers need continually to be persuaded of the relevance of academic delivery (in this case specific FDs) in order to appreciate the subsidy to cost that this project will deliver for the employers. In a time of recession and reduced investment this role of the SSCs will be crucial in persuading employers not to eliminate training budgets, but to invest in their workforce. The project works on the basis that employers respond to tangible benefit. It therefore includes provision for Industry Champions. These posts will be embedded for the life of the project and be tasked with effectively representing industry-customising approaches and delivery. Universities too need to recognise tangible benefit and the project therefore involves working in partnership to share expertise in particular through the work of the HEA.

Consortium consisting of Five HE Partners and Five Industry Champions

Five HEIs will be contracted from a tendering process led by the SSC/HEA Subject Centre/Hull partnership to develop the FD pathways in the framework - nominally one HEI per subsector (Nuclear, Chemicals, Petroleum, Polymers Bioscience). Five Industry Champions will be seconded to the project and linked to the HEI lead for that sector – nominally one from an industry in each sub-sector.

The Proposed Academic Structure of the FD Framework

While it will remain a major academic objective of the project to develop the framework, module details and work-based learning approach, some examples are set out here for illustrative purposes. The early stages of the programme will involve agreement within the HE consortium as to how this illustration is interpreted and taken forward. The examples draw from consistent employer feedback for flexible work-based provision.

The *Principal Knowledge* is predominantly underpinning academic content. It is expected that modules in this would be delivered through a blended approach of attendance together with distributed work-based learning.

The *Skills* section is envisaged as predominantly employment skills that can be assessed through workplace activities or through existing in-house training. This is akin to a work-based laboratory on the traditional HE model. A common suite of learning outcomes in this section could describe these skills while *employment contextualisation* would provide scope for evidencing accrediting and/or assessing active learning through the workplace. This generic section could then differentiate in context and serve the *named FD pathways*.

The *Specialisation* and *Skills* section is likely to be a mix of academic knowledge top-up with skills enhancement linked to the specific occupation and industry. This would provide *customised* modules for named FD pathways.

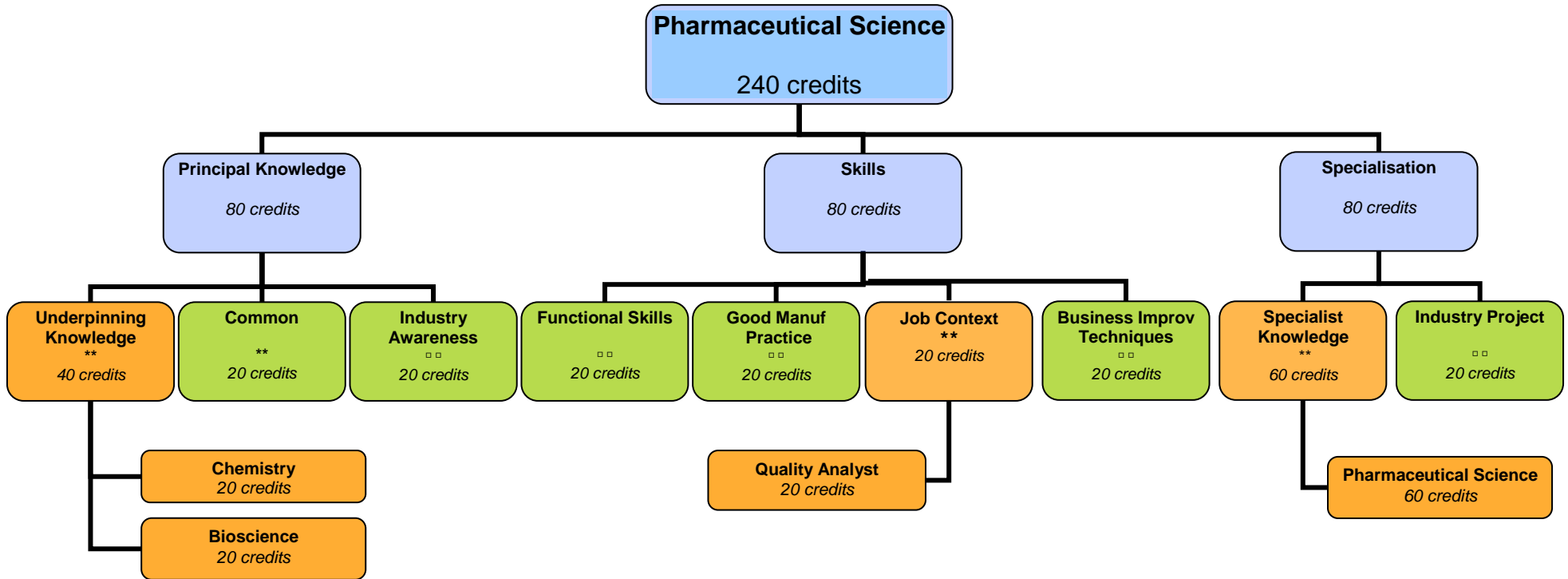
The following schematics illustrate a possible shape the FD framework and a detailed scenario for one of the pathways.

Framework Template (*n.b.* for illustration - content is indicative)

Work- based Learning	Blended Learning
50% (120 credits)	50% (120 credits)

Principal Knowledge 33% (80 credits)	Skills 33% (80 credits)	Specialist Knowledge and Skills 33% (80 credits)
<p>Underpinning STEM (40 credits from)</p> <ul style="list-style-type: none"> • Science <ul style="list-style-type: none"> ○ Bioscience ○ Materials Science ○ Physical Science • Engineering/Technology <ul style="list-style-type: none"> ○ Electrical ○ Mechanical ○ Process ○ Design <p>Common Knowledge (20 credits)</p> <ul style="list-style-type: none"> • Measurements • Mathematics in context • Safety, Health, Environment 	<p>Functional Skills (20 credits)</p> <ul style="list-style-type: none"> • Teamwork • Problem Solving • Leadership • Presentation Skills • IT skills • Personal Dev Planning <p>Good Manufacturing Practice (20 credits)</p> <ul style="list-style-type: none"> • QA and QC • Regulatory Affairs <ul style="list-style-type: none"> ▪ Project Management ▪ Process Control ▪ Laboratory Operations <p>Business Improvement Techniques (20 credits)</p> <ul style="list-style-type: none"> • Business Awareness • Management and Leadership <p>Job Context Dissertation (20 credits)</p>	<p>Specialist STEM (60 credits from)</p> <ul style="list-style-type: none"> • Science <ul style="list-style-type: none"> ○ Chemical Science ○ Bioscience ○ Materials Science ○ Nuclear Science • Engineering/Technology <ul style="list-style-type: none"> ○ Chemical ○ Materials ○ Nuclear ○ Petrochemical ○ Biotechnology ○ Polymer
<p>Industry Awareness (20 credits)</p> <ul style="list-style-type: none"> • Dissertation • Value Chain • Upstream and Downstream 		<p>Industry Project (20 credits)</p> <ul style="list-style-type: none"> • Functional skills embedded • Problem-solving emphasis • 'Live' project (for the employer)

Example Pathway for Bioscience (Pharmaceutical Science) FD for a Quality Analyst*



* Credit ratings are notional and designed to illustrate balance within framework rather than limits to credit structure

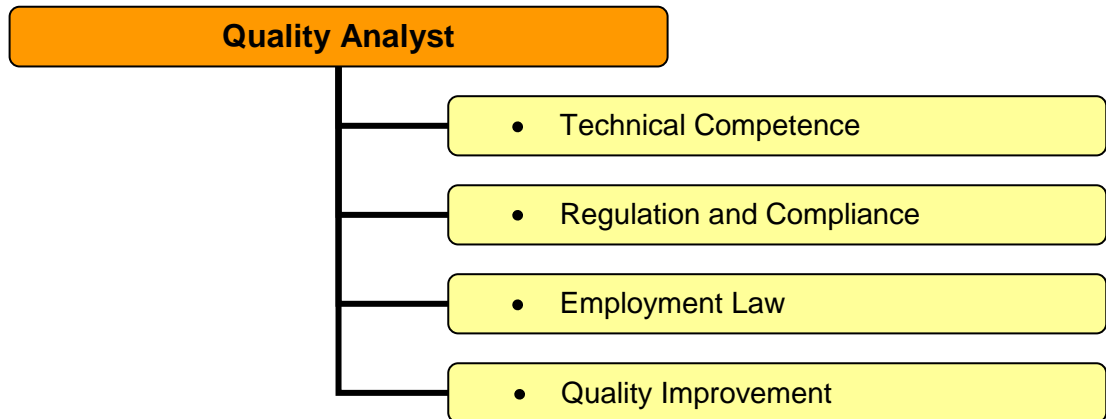
** Module content and learning outcomes change with named pathway and job role -

50% content customised

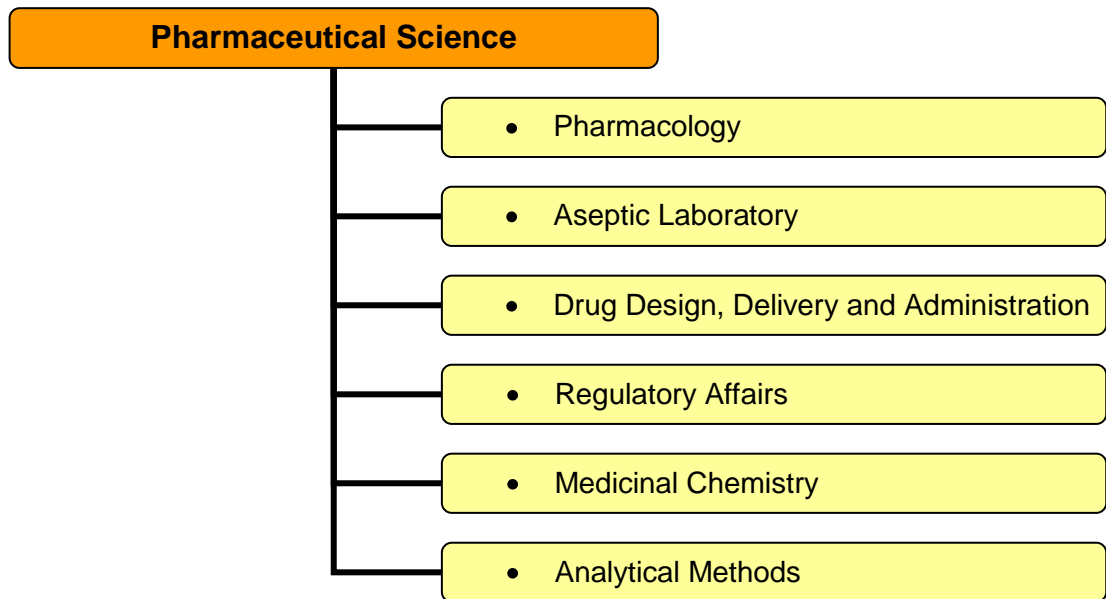
□□ Module context only changes with named pathway; learning outcomes remain unaltered -

50% content contextualised

Example Modular 'Gold Standard' Quality Analyst Role



Example Modular Specialist Pharmaceutical Science



Flexible Learning

The model is premised on reconciling the position that employers would prefer flexible modular qualifications yet a piece-meal modular approach would present neither an economic nor a coherent opportunity to HE. In response it is suggested that short-cycles of 60-credit bundles (professional certificates), corresponding to the stage points, can be banked *en route* to FD or

consolidated into a sub-award for those deciding to exit at an earlier stage. The development of the certificate of achievement and e-portfolios of evidence are particularly important for this aspect of the provision.

Deep-Thin 60-credit 'Professional Certificates' route to FD

Level 5	↑ 20c	↑ 20c	↑ 20c	↑ 20c
Level 4/5	↑ 20c	↑ 20c	↑ 20c	↑ 20c
Level 3/4	↑ 20c	↑ 20c	↑ 20c	↑ 20c