

Summit SKILLS



Foundation Degree Framework Specification for the Building Services Engineering Sector

**For providers producing their own
Foundation Degree programme specification**

VERSION 1

October 2008

Department for
**Innovation,
Universities &
Skills**

Foundation Degree Framework Specification for the Building Services Engineering Sector

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Updating

This document will be updated online at www.summitskills.org.uk/fds as needed, including when outstanding Detailed Learning Outcomes and details of a recognition process have been finalised, so please check for the most current version before use.

Foundation Degree Framework Specification for the Building Services Engineering Sector

Introduction

Foundation degrees

A Foundation degree (Fd) is an occupationally focused higher education (HE) qualification that integrates academic and work-based learning (WBL) delivered through close collaboration between employers and programme providers. It is designed with employer involvement and is intended to equip learners with the skills and knowledge relevant to their employment.

A Foundation degree is located at intermediate level in the Framework for Higher Education Qualifications (levels 4 and 5). It is both a stand-alone qualification and it provides a basis for further study which could take a number of different forms, including progression from the Foundation degree to the final year of at least one articulated, relevant honours degree programme.

In the building services engineering sector, employers are increasingly turning to Foundation degrees to provide the higher level knowledge, skills and understanding they need to inform and develop the practice of the existing workforce and trainees/entrants. Employers value the work-based learning element as a means to connect principles and theory to application. Some are finding that the offer of a Foundation degree with further learning to a full degree is giving them a competitive edge in recruitment.

The Foundation degree framework specification for the building services engineering sector

This framework specification has been developed by SummitSkills, the Sector Skills Council for the building services engineering sector, with the support of Foundation Degree Forward. It has been shaped through on-going guidance from a stakeholder [Steering Group](#); research into current provision with existing and prospective providers, both universities and colleges, and Foundation degree students and [consultation](#) with employers, trade associations and professional bodies and education and training providers. The employers consulted represented a mix of contractors and consultancies, with companies in both categories ranging in size from small to large. Previous experience of Foundation degrees amongst employers consulted varied from those who have been involved with design of Foundation degree programmes to those with very limited prior knowledge of the qualifications. All aspects of the industry sector were included.

The purpose of the framework specification is to enable education providers to design and deliver a Foundation degree of optimal relevance to the sector. Use of the framework specification will give providers the advantages of:

- Potential for sector-wide recognition that will reassure employers that the Foundation degree has been benchmarked against the industry standard
- Confidence that their Foundation degree development will be in line with employers' needs
- Documentation that will help accelerate and shape development stages

The framework specification has been designed to mesh with:

- Professional Body recognition requirements that in turn draw on UK-SPEC
- Foundation Degree Forward guidance
- Quality Assurance Agency (QAA) requirements
- HE validation and quality assurance procedures.

Guiding principles for Foundation degree development

The employer consultation emphasised a number of recommendations for a Foundation degree for the sector. Most of these are expressed in this framework; others should be addressed as Foundation degree provision becomes more widespread and providers increase their confidence, capability and capacity for delivery and sharing best practice.

- The qualification should be designed for employees. Currently there is no employer interest in taking on Foundation degree graduates from a course that is not centred in the work place. However, employers *are* interested in expanding their pool of staff with higher level skills. Once the qualification is better known, it may be welcomed as offering knowledgeable and skilled entrants with the advantage of a range of work-based experiences that have formed part of their study.
- Modules should include an introduction to broad construction, engineering and sustainable technology principles, systems and processes and the regulatory environment in order to facilitate contextual understanding.
- There should be a strong emphasis on technical knowledge and skills.
- Mathematics and science should be sufficient for job functions and smooth progression to the final year of an appropriate honours degree.
- Relative consistency across all providers regarding the above is important to employers to help build recognition of the qualification, to give them certainty about prospective employees' qualifications and – over the longer term – to enable transfer of students from one provider to another if needed.
- There should be the opportunity to specialise in particular aspect(s) that would fit with job function/employment focuses. This could be, for example, related to industry sector (heating and ventilation, refrigeration, public health engineering etc), commercial (procurement, contract law, estimating etc), design (CAD etc), and business management. Specific options should be established by providers through consultation with local employers.
- Transferable skills should be explicit and embedded in subject learning, such as communication, ICT, problem-solving, research and report-writing, analysis and evaluation, working with others, managing client relationships managing own learning and performance and career management.
- Work-based learning should be maximised to contextualise theoretical learning, to practise transferable skills in work place settings and to reflect in the course what the students are doing at work. Employers place high value on this course element.
- Providers should design their Foundation degree to meet relevant professional body recognition requirements so that employees can submit Foundation degree qualification achievement as part of a route to membership, where appropriate.
- The delivery format of modules should match the learning requirements of the content and offer some flexibility. Employers are attracted to a 'blended learning' approach.
- Students should be encouraged to share their experiences and the practice of their respective companies with their peers and in learning sessions.
- It is anticipated that in the future, greater emphasis will be needed on technologies and regulations related to sustainability and the global nature of business.

Structure of the framework specification document

The framework specification includes:

- some [generic information about Foundation degrees](#) for providers who are new to this qualification;
- an indication of the [HE validation process](#) showing how different stakeholders can contribute;
- sector-specific contextual data (see sections [1.1](#), [3](#), [4](#) and [5](#)) that will enable providers to begin to construct a case for demand for a Foundation degree in building services engineering;

- details of the key characteristics of Foundation degrees (see sections [6](#), [7](#), [10](#) and [12](#)) and examples of how Foundation degree providers are addressing;
- approaches to [delivery](#) and [assessment](#)
- a [specification of outcomes and indicative content](#).

1. The value and characteristics of Foundation degrees

1.1 The value of Foundation degrees to employers

SummitSkills' interviews conducted as part of [Sector Needs Analysis](#) research (2006) make it clear that employers perceive there is a need for qualifications with characteristics that Foundation degrees can offer, these are:

- designed to meet employer needs
- with a strong work-based element
- flexible delivery to fit the business cycle
- a new qualification route to increase entry to the sector
- supporting progression from trade roles towards supervisory, managerial and professional careers.

SummitSkills' research reveals that current levels of engagement with Foundation degrees by employers in the building services engineering sector are low. This suggests that there is a need to raise awareness of the benefits of Foundation degrees amongst employers. This conclusion was supported by feedback received during consultation on this Framework specification.

Employers already involved make the following points:

- The Foundation degree makes a key contribution to a workforce development and qualifications portfolio. At craft level, there are rafts of qualifications that are well respected and well-used. At a professional level, companies are employing honours degree graduates with a range of degree disciplines and those who already have chartered status to suit their business needs. Companies judged that building services engineering requires substantial numbers of trained staff 'somewhere in the middle' that are technically knowledgeable and operationally proficient. Foundation degrees have the potential to bring more rigour to qualifications at this level.
- Being able to offer the Foundation degree is giving a positive edge to recruitment of better calibre entrants to the industry.
- Smooth transition to the final year of an honours degree must be in place and progression encouraged. This opportunity acts as a motivator to staff who want to achieve to a higher level, for example, those intending to apply for professional membership.
- The work-based learning element promotes transfer and application of knowledge and skills in both directions to the benefit of the business and the course. For example, course projects can be focused on company issues and students on the Foundation degree tend to share their learning with their team and line manager. Evidence from the consultation emphasised the high value that employers place on this aspect of the Foundation degree.
- Students show increasing confidence and knowledge which they can apply to their work tasks. They make stronger contributions to discussions and are stepping forward to take responsibility.

To offer optimal value to companies, employers at the consultation stressed the need for:

- clarity in describing the benefits of the Foundation degree in order to differentiate it from other similar level qualifications so that they can make the best choice;
- consistency across all providers covering a substantial core of the course content with additional options negotiated to meet local needs;
- facility to transfer students from one provider to another, both during the Foundation degree and for further learning, if needed;
- transferable skills development that is tuned to business practice;
- flexible and blended approach to learning delivery.

It is critical that providers can show the business benefits to companies of having employees on the Foundation degree. These might include the facility to tune work-based learning projects to address real company needs, or to offer modules on a CPD basis to a wider group of employees.

1.2 The value of Foundation degrees to providers

Foundation Degrees offer an opportunity to providers to develop and deliver occupationally related higher education programmes with input from employers. Work-based learning (WBL) is a key characteristic of a Foundation degree and it is the feature that is its most distinctive element.

The case for offering this qualification is persuasive. Demographics and social needs (declining birth rates resulting in fewer school leavers, combined with more people working beyond traditional retirement age) mean that education and training must focus increasingly upon the skills of people already within the workforce. This is an issue emphasised within the Leitch Report and is gaining increasing focus within the activities of the Higher Education Funding Council for England (HEFCE.) Providing courses to meet the needs of the existing workforce is especially important in sectors where the pace of change means that employees need to continually develop new knowledge and skills. Regulatory changes, new technologies and the shortage of managerial skills create a demand for education and training to be delivered in a mode and timeframe that suits those in full time employment and is responsive to industry's needs. The consultation confirmed that employers recognise these issues and are seeking strategies to address them.

In summary, engaging in the delivery of Foundation degrees:

- shows to employers a responsiveness to the workforce development agenda
- increases access to students who are already in the workforce
- provides a mechanism to involve employers in consultation on curriculum development and even in delivery
- provides evidence to funders that a provider is pursuing its responsibilities to address 'World Skills', the government's response to the Leitch Report
- potentially provides evidence for accreditation within the new Framework for Excellence.

Further education colleges potentially have awarding powers for Foundation degrees. The consultation with employers suggested that they have high regard for the credibility associated with a HE link and that changing this should be considered as a risk. It is also important for FE that a robust HE partnership ensures that progression to year 3 of an honours degree (level 6) is in place and articulates well with the Foundation degree.

1.3 The characteristics of Foundation degrees

A Foundation degree is an intermediate level HE qualification. For information from QAA about levels, see the [Framework for Higher Education Qualifications](#)

Providers developing a Foundation degree will need to consult relevant components of the [academic infrastructure](#) and address assessment requirements. They may also wish to incorporate [National Occupational Standards](#).

The defining characteristics of a Foundation degree are set out in the Quality Assurance Agency for Higher Education (QAA) [Foundation Degree Qualification Benchmark](#):

- Employer involvement
- Accessibility
- Articulation and progression
- Flexibility
- Partnership
- Work-based Learning

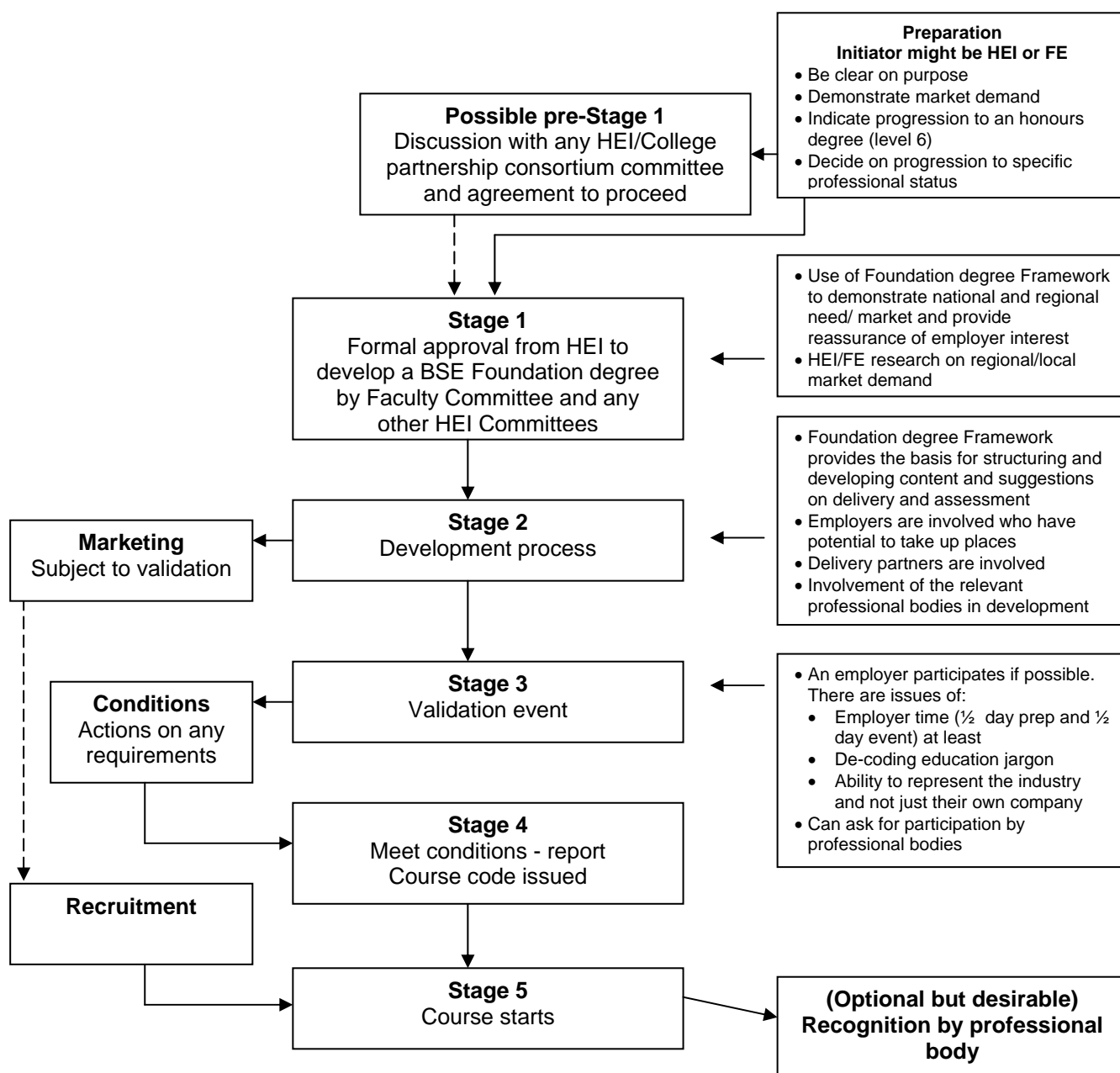
Providers new to Foundation degrees are advised to consult all the information referred to above, guidance from their own institution and, if relevant, their prospective HE partner.

2. Foundation degree validation process

The flowchart presents a common validation process model. It is offered here to enable new Foundation degree providers to better anticipate the needs at each stage. Points to note are:

- effective use of this framework specification can provide background information and evidence for the Foundation degree’s value to the sector and will enable providers to make a ‘quick start’;
- researching local market demand is essential and also helps to build employer-education relationships;
- providers should decide at the outset whether to seek recognition from professional bodies and whether to ask for their participation in the development process. Employers see accreditation as highly desirable;
- employers and education delivery partners should be involved in design and validation;
- liaison with marketing department(s) and timely promotion are critical;
- regular and effective communication should be in place across all contributors;
- determination is required - it is a long process.

Validation of a BSE Foundation Degree



3. The business context

SummitSkills is the Sector Skills Council for the building services engineering sector. The sector represents the following core industries:

- Air conditioning and refrigeration
- Electrotechnical
- Heating and ventilation
- Plumbing
- Building services engineering consultancy (including design).

Building services engineers undertake all types of work downstream of electric, water and gas meters and play a major role in the areas of sustainable development and energy efficiency. The sector requires a wide range of skills providing essential design, installation and maintenance services for industrial, commercial and domestic clients.

There are many jobs available within the sector that require technical expertise including:

- Installation electrician
- Industrial and commercial plumber
- Heating and ventilation engineer
- Computer aided designer
- Project manager
- Refrigeration engineer
- Service and maintenance engineer

In addition to specialist building services engineers there are many people with other areas of expertise employed within the sector in roles such as administration, accounts, personnel and marketing.

Building services engineers work for a wide range of employers including small businesses, large consultancy practices, major contractors, local authorities and big organisations (such as universities, NHS, large retail chains, and the British Airports Authority) with their own property departments. Many building services engineers are self employed. Some building services business specialise in one area, some cover all areas of building services engineering and some building services engineers work within multi-disciplinary construction companies that do a range of work within and outside building services engineering.

The [SummitSkills careers website](#) provides information about many of the careers that exist within the building services engineering sector.

The UK building services engineering sector has an annual turnover of £16.2bn (2005 data quoted in SummitSkills Sector Skills Agreement Gap Analysis 2007), rising to £17bn in 2007, employs over 523,000 individuals in over 58,310 businesses.

There are a large number of small and micro-businesses within the sector with over 90% of businesses employing fewer than 10 people. A further 8% employ between 11 and 49 people with only 2% employing 50 people or more. This means that many working in the sector are not only building services engineers but also business owner-managers.

Building services engineering is a continually evolving sector. Key drivers for change include:

- environmental issues (an area increasingly affected by regulations)
- legislative and regulatory changes
- global competition
- new technologies and products

Those employed in the sector should be regularly updating their knowledge and skills to ensure continued success in a changing industry. However, employers can perceive it as impractical to take people out of the workforce, even for half a day a week, to participate in education and training.

The purpose of developing this Foundation degree framework specification is to help ensure that Foundation degrees in building services engineering provide the skills needed in the sector, and are delivered in a way which best serves the building services engineering industry and ultimately the society it serves.

Further information about the sector context, and the skills needs of the sector, is available in [SummitSkills Sector Skills Agreement](#) research reports (2006 and 2007).

4. The education, training and skills context

4.1 Current skills

Current skills issues must be borne in mind when developing Foundation degrees for the sector. Research for the SummitSkills Sector Skills Agreement indicated:

- The sector has some deficits of basic/core/essential skills of existing staff which revolve around literacy, numeracy and IT deficiencies. Employers believe these skills are increasingly weak amongst new entrants.
- Current skills needs most commonly identified by building services engineering employers are in the broad areas of practical skills, followed by IT and specialist skills.
- Amongst consultancy employers IT and specialist skills are the most frequently identified area of need, followed by practical skills.
- IT skills vary within the building services engineering workforce. Some employers have told us they would welcome use of some e-learning within a Foundation degree delivered using a blend of delivery methods. However providers may want to consider whether some students would benefit from access to an introductory IT course, and ensure any use of e-learning does not pose a barrier to success for some learners.
- Soft skills are only identified as an issue by 2% of all employers interviewed during SSA research, with no consultancy employers identifying soft skills as a current skills requirement. However, the Foundation degree employer consultation painted a very different picture.
- Low levels of engagement in formal management training may mean that many supervisory and management staff lack the skills they need to do a good job, and that productivity may suffer as a consequence
- Many people employed within the building services engineering sector do not have academic qualifications. Employer consultation identified that there is demand for building services engineering Foundation degrees that can support progression of people who do not hold academic qualifications (many of whom do hold NVQs).

Employers whom SummitSkills consulted as part of the process of developing this Foundation Degree framework specification identified a need for Foundation degrees to support **development of knowledge and skills in the following areas:**

- Broad construction, engineering and sustainability processes, principles and regulatory systems to facilitate contextual understanding
- Mathematics – both generic and applied to building services engineering
- Science applied to building services engineering
- Technical knowledge and principles, technologies and systems that inform and govern design and installation etc.
- Technologies and regulations related to sustainability and energy efficiency.
- Transferable skills: communication, ICT, problem-solving, research and report-writing, analysis and evaluation, working with others, managing own learning and performance, career management and managing client relationships
- Management of projects
- People management
- Awareness of the commercial environment and basic understanding of finance

Management training has been identified in consultation as something many employers want Foundation degrees to provide, not just for business managers but also for those whose roles (now or in the future) may involve aspects of supervision or project management.

In addition, employers told us there should be the opportunity to **specialise in particular aspect(s)** that would fit with and enhance job function/ employment focuses, eg related to

subsector (H&V, refrigeration, public health engineering etc), commercial interests (contract law, estimating etc), design (CAD etc), and business management. Learning about these aspects should be connected strongly and explicitly with work based learning. Specific needs should be established through consultation with local employers.

Some candidates may need additional support with English, maths, ICT, or study skills at the start of their Foundation degree studies, which could take the form of short courses prior to or alongside the first year of the Foundation degree.

4.2 Future skills needs

Areas where employers who contributed to SummitSkills Sector Skills Agreement research most frequently identify future skills needs are:

- IT - as new technologies and software are created the workforce need the skills to use them to full advantage
- specialised skills - including environmental technologies; research and development, and legislation
- practical skills - associated with a particular trade or profession

They also identify a need for skills and knowledge addressing:

- new legislation and regulations
- health and safety
- business skills

Other future skills needs may emerge that are not foreseen at present.

Sustainability is a key driver for change within the building services engineering sector. When asked how the sector might change in the short to medium term, twice as many employers identified sustainability as a factor than any other that might affect the sector. Many recent regulatory changes are intended to ensure buildings use less non-renewable energy and consequently demand that building services engineers have the skills to pay greater regard for sustainability in their work. It is recommended that sustainability be addressed within all building services engineering-related Foundation degrees, *not* in specialist 'Sustainability' Foundation degrees.

The building services engineering sector is one that is characterised by change. Regulations, products, technologies and procurement methods are all subject to on-going development. **Content of Foundation degrees should be reviewed regularly to ensure that the qualifications remain appropriate to the evolving needs of the sector.**

In a sector where change is a common occurrence it is important to have knowledgeable and highly skilled managers who can effectively manage responses to change. Foundation degrees can play a valuable role in helping students to develop both the skills and motivation to keep up to date their knowledge and skills up to once they have completed their qualification.

4.3 Attitudes and behaviours relating to training and education

Key statistics about building services engineers' attitude and behaviours relating to education and training include:

- Around 69% of employers within SummitSkills footprint engage in some form of training.
- 62% percent of employers across the building services engineering sector see a need for technician training.

- Training is seen by 73% of employers across the building services engineering sector to improve staff loyalty to some degree. This figure is highest for consultancy practices where 85% see training as improving staff loyalty.
- Participation in formal training for supervisory and management staff is reported by 41% of employers across the whole sector, and just 39% at consultancy level.

Employers who already support staff training may be more ready to engage with Foundation degrees than employers who do not currently participate in staff development. The employer consultation demonstrated that there is potential for Foundation degrees to engage employers who might consider existing qualifications or their modes of delivery to be inappropriate to their needs, if delivering the right content using the right mode of delivery.

Activities to promote Foundation degrees should bear in mind that different messages may be needed for employers who currently engage in training, compared to those who do not engage in training, with tailored messages also needed for employees within the sector, career changers and school leavers. Please visit www.summitskills.org.uk/fds for access to the latest SummitSkills employer guides to Foundation degrees.

A number of employer wants may be addressed by Foundation degrees:

- Work-related qualifications that are university accredited;
- Designed to meet employer needs and workforce development;
- Offer a mixture of delivery modes, including work-based elements;
- Can be completed part time to serve individual and employer needs;
- A recognised qualification in its own right, that gives the option to progress towards an honours degree and/or professional body recognition as an Engineering Technician and potentially to progress towards Incorporated Engineer status;
- Develop technical as well as wider employment skills, management and other specific skills;
- Support progression from trades or technician level to managerial and/or professional roles;
- Can be customised to meet the needs of individual employers or groups of employers
- Opportunity to improve staff loyalty;
- Minimise staff turnover and recruitment costs by ensuring existing staff have the skills to progress successfully within their role;
- Provide a powerful combination of learning about the underpinning principles and systems relating to all building services engineering disciplines within the context of the wider built environment, alongside the practical application of these within work;
- Employees' contribution to the business will be enhanced while they are on-course as well as on completion. This will be due to the growth of their technical knowledge, competence and professional, people and personal skills;
- Employers and individuals can use the work-based learning elements flexibly to their advantage to meet identified business needs;
- Deliver management training modules within a building services engineering context.

Further information about the skills needs of the sector, and participation in and access to sector related education and training, is available in [SummitSkills Sector Skills Agreement](#) research reports (2006 and 2007).

Key point for a Foundation degree programme specification

- Evidence of potential demand from local employers and some definition of the focuses for knowledge, skills and understanding that they request.

5. The learner

Recruitment of adequately skilled and knowledgeable staff is reported as a continuing difficulty by employers. Some companies therefore are starting to see the Foundation degree as an appropriate and potentially valuable qualification within their workforce development strategy to bring on both trainee entrants and more mature employees. This 'grow your own' approach enables companies to both upskill staff and develop employees to fit the company.

Employers currently nominating staff to complete Foundation degrees include national/regional building services contractors, small local contractors, some consultancies and large companies with estate or facilities management divisions, such as NHS and large retailers. Job areas held by their Foundation degree students include design engineers, those commissioning services, those in sales, first time supervisors, and engineers in maintenance and installation.

The employer consultation confirmed existing practice that the Foundation degree should currently be solely targeted at employees.

Students for whom building services engineering related Foundation degrees could be a useful qualification are likely to come from a range of different starting points in terms of qualifications and experience. Foundation degree students may have experience without qualifications, qualifications (academic or vocational) without much experience or a mixture of experience and qualifications. Some learners may benefit from access to pre-Foundation degree courses to address any gaps e.g. in mathematics before they embark upon a Foundation degree, or at least access to a catch-up module alongside their Foundation degree. Offering catch-up programmes is likely to both increase the pool of potential Foundation degree students and maximise Foundation degree successful completion rates. There may be potential for use of select modules from Higher National qualifications for the purpose of a pre-Foundation degree catch-up.

With the **two categories of learner** identified through research for the framework specification all Foundation degree students were both studying part-time and employed:

1. Those who were generally working through managed **traineeship-type schemes** and who were generally in their twenties. These individuals had generally been employed in another field after leaving school and had later become aware of attractive opportunities in building services engineering.

One key point, particularly for younger employees, was the attractiveness of working towards a degree while being paid and trained. Some employers believe that the clearer and stronger progression route provided by Foundation degrees is acting as a positive incentive to help recruitment of a better calibre of trainee. Some younger students confirmed that they had considered doing a full-time degree but that the employed option looked '*more interesting*' and avoided fees.

2. More **experienced students** who by their own and others' reports had come into the industry later from related careers elsewhere or who were experienced within the industry and had recently decided to work towards a higher level qualification. Reasons given by students and their employers for selecting the Foundation degree were, in the main, that they needed to be better informed and qualified on all technical aspects of building services and/or facilities management to improve their confidence and capability. Some providers also reported students coming through the craft route and wanting to work towards promotion and/or membership of a professional body. Some of these individuals had taken on management roles.

Some of the more mature students are also thinking ahead to an honours degree. One provider commented:

'We are getting people in who can work to a higher level and want a higher level qualification. They may have been a plumber or an electrician but now they are that bit older. They have more responsibilities. We've seen here how people's whole lives are affected by becoming qualified.'

Individual learners will have different motivations, or in some cases a complex mix of motivations, when studying towards a Foundation degree. Possible motivations to complete an Foundation degree include:

- Wanting greater knowledge, skills and confidence in an existing area of work
- Ambitions to progress with an existing employer
- Skills and a qualification to support a change of employer
- Development of knowledge and skills in a new area – such as a technical specialism, management or commercial skills – possibly but not necessarily to enable a career change
- Wanting to work towards an honours degree and/or Professional Institution recognition
- Wanting knowledge and skills to better manage an existing or new business
- Meeting employer and/or peer and/or family expectations

The decision to complete a programme may be an individual choice, an employer's suggestion or agreed between an individual and their employer.

Some students and employers will be attracted to a Foundation degree as a worthwhile qualification in its own right, some will favour a Foundation degree as a route towards achievement of full honours degree, many will make up their minds about whether they want a 'top up' to a honours degree after they have started a Foundation degree. Those who want to progress to achieve an honours degree will often require the same accessibility and delivery mode(s) as were offered for their Foundation degree. In addition, some people may need to access honours degree provision in a different location from where they completed their Foundation degree. This means that a Foundation degree gained with one provider must be recognised as giving access towards an honours degree with another provider.

Key point for a Foundation degree programme specification

- Evidence related to the categories and characteristics of the learners that are determining the course content and delivery approaches

6. Employer engagement

Foundation degrees integrate academic and work-based learning through close collaboration between employers and course providers. It is a defining characteristic of Foundation degrees that programmes are designed to satisfy the needs of both employers and individual learners. Employer involvement in design of the Foundation degree ensures that the content of the award meets the needs of the industry and that there is an appropriate balance between work-related understanding and skills and academic learning. Experience from a range of sectors also indicates that where employers have been involved from the outset they are most likely to fund or support employees through a Foundation degree. Highlighting the clear business benefits of Foundation degrees will help to engage employers and ensure their continued commitment.

This framework specification was constructed through employer consultation and provides a clear steer on their interests and needs. However, it is critical that providers still **consult fully with employers locally** to ascertain demand and needs. The evidence base and employer contact can be used for a number of purposes:

- to provide a rationale for the focus of course options and for delivery formats;
- to demonstrate to local employers that a provider's dialogue with them is taken seriously and has meaning;
- to begin to ascertain demand;
- to supply quotations and other insights to be incorporated into promotional materials;
- to begin the process of employer engagement and open the door to request more extensive involvement.

An obvious start point for consultation is the employers with whom engineering and built environment departments already have links. Lists might be expanded though, for example, checking with any 14-19 Diploma delivery colleagues for employer contacts, and with any internal manager of Employer Forums. Many education institutions use alumni to good effect.

Providers should also seek input from regional branches of relevant trade associations and professional bodies that represent employers.

Questions you might want to ask employers and employer representatives may include:

- Which of the possible optional units and/or pathways would you want to access? (A list should be provided)
- At best, when would you prefer learning and assessment that is delivered at college or university to occur? i.e. day release, evening, weekend, one-week block, other – or a mix of these?
- Ideally, how much work-based learning and assessment would you want in the Foundation degree, i.e. learning that is individual to your student and based within your own business?
- What are your views on incorporating e-learning? Is this something you would welcome?
- How important to you is it that learners can use their Foundation degree towards Professional Body membership?
- What level are the people you expect to complete a Foundation degree currently working at and what qualifications do they typically hold?
- Are any of your employees likely to need to develop additional skills maths, study skills or other areas before or alongside their Foundation degree?
- What, if any, involvement in the design, delivery and assessment of the Foundation degree would you want to have?

Some of these questions should prompt further discussion to help in both your understanding of employer and student needs and your planning, to help ensure your Foundation degree offer meets the needs of local employers and learners.

Employers contacted during Foundation degree research knew very little about Foundation degrees, even those who had employees on HNCs/Ds. Once they had more information, all expressed interest. Most have intentions to either maintain or expand their training at this level to meet business demand and were open to the idea of a Foundation degree. They recognised the issue of course viability and were willing to make a commitment of a number of employees annually or biannually, albeit one or two individuals for small companies.

Promotion methods suggested were:

- Editorial and articles in trade journals and magazines;
- Direct promotion by providers to employers on their mailing lists;
- Targeted, proactive outreach, eg to those with current or past students on HNC courses.
- Up-to-date website entries.

All employers consulted were enthusiastic about making a contribution to design and/or delivery. Employers of different sizes will be able to contribute differently and providers should recognise this. A key request was that the time commitment, timing and expectations should be specified at the outset. Aspects that could figure on an **employer participation 'menu'** are:

- input to help shape the design of the course
- being on the course validation panel
- providing a mentor for own students
- conducting three-way reviews (student, tutor and employer)
- supporting work-based learning projects for own student(s)
- validating the assessment of own student's work-based learning
- providing materials for a case study
- being a member of an assessment panel
- supporting provider staff development and updating
- participation in module evaluation and course review
- being a member of a provider's employer network.

A powerful approach for providers is to view employers as being in a real partnership with them and to shift to a process of relationship management. This might be based around a negotiated three-way learning contract.

Research with current Foundation degree providers indicated that employer engagement was variable. The colleges and HEIs who already have strong company involvement, for example through positive experiences of HNC/HND or degrees, secured **contributions to Foundation degree design** and expect to have on-going participation. One university specifically mentioned using employers as **external examiners**; one college included an employer on the **validation panel** and several on **assessment panels**. Some colleges have relied on their partner universities' existing relationships. Others have found engagement difficult, partly because of lack of employer familiarity with the qualification. More needs to be done by providers to increase their own capacity to engage and to raise employer awareness of these opportunities to help shape provision.

Employer engagement in design

The course leader contacted a small group of employers. They were asked to provide written or verbal feedback on the proposed design and structure and to specify in some detail what they are looking for in an employee.

Employer engagement in design

The college is a COVE for Construction and employs a number of Employer Engagement Managers. OfSTED recently awarded a 1 for their practice. The Managers have a role to identify likely employer interest and pursue engagement activities.

Employer engagement in design

The college has a long-standing relationship with a specific employer. The company contributed particularly to the commercial pathway of the Foundation degree. Based on past experience of the HNC/D, it will be involved in student reviews and presentations and the Training manager will visit regularly.

Employer engagement in design

One large and a number of small local employers sit on an Employer Forum and this was involved in consultation on content. They requested two changes: focus should be on procurement rather than estimating and tendering and they wanted the management element to be focused on construction rather than the generic management proposed for delivery by the university.

Employer involvement in validation and assessment

The college invited an employer to participate in the validation panel with a brief to focus on the relevance of content. He is also involved with CIBSE and has a strong overall knowledge of the industry. It required time to review the extensive documentation as well as attendance. As it is a new qualification, one issue was agreement on what exactly it should be judged against – clarity about where the Foundation degree fits was important. Currently, the employer is a member of the year-end assessment panel.

Employer engagement in design

The university has delivered the HND for one specific employer over a long period and moved to a Foundation degree about 4 years ago. The employer contributed ideas about design and structure and their premises are used for some of the block modules. The course leader is presently restructuring to build more employer delivery into the Foundation degree – both teaching and provision of materials.

One aspect that seemed eminently feasible was integration of **employer case study materials** such as contract specifications and bids, technical investigations and reports, site photographs, design solutions, implementation analysis and plans etc. Employers were happy to supply information like this, provided it was properly rendered anonymous if requested.

Employer involvement in materials development and training of college staff

One college is using an employer to support the development of one of the construction department staff to lead delivery of the commercial pathway on their Foundation degree. She has commercial experience herself and works very closely with the employer to come up with case studies. She's met with the commercial managers and talked through their approach to tendering and has been given additional training by a project consultant working in the industry.

To date, employer involvement in **course delivery** is limited. Issues are:

- employer availability – not just time but ensuring that appointments can be adhered to;
- consistency of delivery to meet assessment requirements where different employers might be participating each year;
- identifying appropriate opportunities within modules.

Some modules, such as Health and Safety, lend themselves to employer involvement in delivery. One example researched was with a university provider of a company-dedicated

course. The course leader is planning a module focused on team building to be employer delivered. Students will be expected to organise visits to their own business sites within the company.

Some providers were also drawing on the expert knowledge of their employed students, to advantage. One student, for example, had offered his fellow students a visit to his employer to study the installation of a unique piece of equipment. The research indicated that this is a relatively untapped area.

The research for this framework specification showed that employers felt their greatest contribution was to **interest themselves in and fully support their Foundation degree students**. Using mentors is a structured way for employers to achieve this (see [section 10.5](#), sub-heading 'Mentors'). Providers might consider whether offering a dedicated CPD module for employers on mentoring might be an attractive enhancement of the Foundation degree.

Employers will wish to be provided with appropriate initial information about the Foundation degree and institutions may consider the production of an employer handbook for this purpose. One key strategy for providers is to find how employers wish to be communicated with while students are on the course, and consistently and reliably feed them information to enable them to successfully play their support role. At the least, they wish to receive feedback that their student is on-track. Communication like this will open channels that in time may offer a start to additional involvement.

[A briefing for learning providers](#) is published by Foundation degree Forward.

Key points to be included in a Foundation degree programme specification

- Definition of a mechanism to engage employers in design and consultation on the programme specification
- Process for effective use of this mechanism – and plans to build on the relationships
- Consideration of on-going employer involvement where it can add value
- Employer communication strategy to include promotion and feedback
- Employer participation in an annual Foundation degree review

7. Access

Foundation degrees are intended to provide routes in to higher education for a wide range of learners.

Providers should operate and communicate **flexible admissions procedures** which cater for candidates with different combinations of prior formal, informal and experiential learning. Admissions policies and regulations should not be limited to traditional entry qualifications, but designed to be applicable and attractive to students from different backgrounds, with diverse experiences and qualifications, including vocational and occupational. Arrangements should include Accreditation of Prior (Experiential) Learning (AP(E)L).

The research provided examples of entry qualifications such as A levels, HNC, part-way through HND, Edexcel BTEC National Certificate or Diploma, and those achieved through Craft or Technical Apprenticeships (NVQs and Technical Certificates).

Research for this framework specification highlighted the importance of the following:

1. **Accurate web-based promotion**

All of the mature students had been asked by employers to research options themselves and then present these for discussion with their line manager. All used the internet to as a search tool. This indicates the prime importance of correct and comprehensive materials on the web. Most potential students had initially started to investigate by looking for HNCs and then discovered the existence of Foundation degrees.

Employers made very careful comparisons on a module content basis: *'It had to be the right kind of course – I wanted to be sure that technical knowledge and skills were covered – both BS and Construction.'* The Work-based learning element also had strong appeal for employers.

2. **Options offered by providers**

Several of the Foundation degree providers believed it is important to offer choice to students and employers and so are seeking to retain HNCs and well as offering Foundation degrees. This means that distinctions between qualifications must be clear.

3. **Building awareness of the value of the Foundation degree**

Providers believe that Foundation degrees have the potential to generate demand: awareness is growing but there is still much more to be done. Conversations with employers during consultation supported this. A longer-term game plan might include writing up success case studies based on the experiences of a first cohort and get them placed in the local press, in trade association newsletters, on provider websites etc.

Those consulted on this framework specification recommended:

- using a diagnostic tool prior to the start of the course to assess a student's capability to complete the Foundation degree programme. Discussion at the interview to explore the level at which the student feels able to work should also contribute to decisions on what will be needed as a bridge;
- an individual learning plan and provision to address gaps. Provision might be a bridge completed prior to or in parallel to the start of the course. Study on subjects, such as mathematics, should be contextualised for building services engineering.
- providers should consider how to access funding to minimise the additional costs of running pre-entry or parallel bridging courses.

Use of the BTEC National Certificate as a funded pre-entry 'bridge'

One example from our research was to use units selected from the BTEC National Certificate in Building Services Engineering as a main route in for everyone. AP(E)L can be used so that students with good previous qualifications will not need to study all units in the NC i.e. students with good building services technology experience/ qualifications eg NVQ3 in plumbing, heating and ventilation, electrical installations or refrigeration and air conditioning etc, can be credited with the corresponding National Certificate units, whilst students with A level qualification in Maths and Physics can be credited with appropriate units. Students with GCSE qualifications only are likely to be required to complete the NC in its entirety and then progress to the FD. This means that students gain an additional certificate;

Providers should also make clear to employers the level that the students will be working at so that they understand fully and can take responsibility for support.

Key points to include in a Foundation degree programme specification

- Transparent and flexible entry routes, including AP(E)L arrangements
- Arrangements to support students to make a successful start and achieve at an appropriate level
- Marketing strategy that includes web-based promotion and longer-term awareness-raising of employers aimed at securing a regular flow of entrants

8. Content

8.1 Overview

This content specification takes into account:

- Employers' needs as expressed through SummitSkills research and consultation;
- Good provider practice identified through research and consultation;
- Requirements of QAA and relevant professional bodies and the guidance produced by Foundation Degree Forward.

The **Higher Level Learning Outcomes (HLLOs)** (see 8.2) are structured to correspond with the requirements of UK-SPEC for IEng (Incorporated Engineer) and reflect the [UK-SPEC descriptors](#) for this level. UK-SPEC mirrors the QAA subject benchmark for engineering. In addition, the HLLOs relate to the [QAA FHEQ](#) (Framework for Higher Education Qualifications) descriptors for a qualification at Intermediate level (levels 4 and 5).

A clear message came through from the consultation that employers would appreciate consistency across the Foundation degrees on offer. If Foundation degrees are too diverse this will act as a barrier to generating understanding and acceptance. Consistency will:

- help build recognition of the qualification. Employers want to know what they are buying;
- give them certainty about the level and coverage of knowledge and skills represented by the qualifications of job applicants;
- enable transfer of students from one provider to another if needed, both mid-course and to level 6 further learning/degree .

To address this requirement, **60-70% of the framework specification is 'core', ie of the 240 credits that make up a foundation degree, 144 – 168 credits are to be achieved through mandatory modules covering specified learning outcomes.**

This means that **30-40% (72 - 96 credits) can be developed to match the needs of local employers and the resources of the provider.** It is critical that **employers are consulted** in order to make relevant decisions on what should be covered. Large employers may have interests that are different from those of small employers, so providers may be need to propose and negotiate with interested companies.

Influences on decisions might include the needs to:

- address the requirements of IEng accreditation;
- ensure smooth articulation with level 6 of the full honours degree.

The framework specification provides a number of optional modules and suggested option pathways, including detailed learning outcomes. It is important that whatever modules are selected they form a coherent and relevant whole, in combination with the mandatory modules. Modules must be selected from those listed, although providers are free to change the titling.

It is not possible to be precise about the number of modules that should be taken because different universities have different credit-per-module requirements. The foundation degree is **a total of 240 credit points**. As an example, a module or unit of 15 credits should have a study period of about 150 hours with 50 of those hours (in a college- or university-based unit) in a class-based setting. Generally 120 credits will be at level 4 and 120 at level 5.

There are **five 'components' that form the structure of the Foundation degree** (see 8.3):

- Engineering Knowledge and Skills Base (15% minimum)
- Built Environment Knowledge and Skills Base (15% minimum)
- Technical Building Services Engineering Knowledge and Skills Base (30% minimum.)

- Applied Building Services Engineering (15% minimum)
- Transferable Skills (15% minimum.)

Components, modules and detailed learning outcomes (see 8.4) are described for the mandatory 'core', including the transferable skills and the outcomes for 'Sustainable and Renewable Technologies' that are all to be embedded. There are also example option modules grouped into coherent learning pathways to form the Technical Building Services Engineering Knowledge and Skills Base component. **Detailed learning outcomes** for modules in each component can be accessed by clicking on the web link.

Research indicated that, because of the likely range of students coming through flexible entry arrangements, many will need some '**bridging**' elements to enable them to achieve at an appropriate level. Provision for subjects like mathematics and science and skills like ICT and research may be required. Some students may need help to make a successful transition to the final year of an honours degree. These 'bridging' elements have *not* been developed in this framework.

Pre-Foundation degree level modules might be offered prior to entry if funding can be identified. Units from qualifications such as the BTEC [National Certificate](#) may offer a start point for a subject such as mathematics. If sufficient numbers of students with these gaps are with the same employer, an employer-funded course might be provided on company premises. Alternatively, a catch-up course might run alongside early year 1 modules provided that learning on the Foundation degree is not limited by students' existing levels of knowledge and skill. However, this would not be ideal because of the increase of pressure on students and the possible effect on their ability to fully participate.

There will be a regular process of review led by SummitSkills and modules will be changed and added as needed.

8.2 Higher level learning outcomes

The **Higher Level Learning Outcomes** (HLLOs), listed below, are structured to correspond with the requirements of UK-SPEC for IEng (Incorporated Engineer) and reflect the [UK-SPEC descriptors](#) for this level. This is to facilitate accreditation with a professional body for those education institutions that decide this is important. Employers saw accreditation as highly desirable and specifically requested that the Foundation degree should pitch itself as contributing towards IEng membership. UK-SPEC provides the QAA subject benchmark for engineering. The HLLOs also relate to the [QAA FHEQ](#) (Framework for Higher Education Qualifications) descriptors for a qualification at Intermediate level.

A: Knowledge and understanding

On completion of the qualification, graduates will know and understand:

- A1 mathematics that underpins the various disciplines within building services engineering
- A2 science/applied science that underpins the various disciplines within building services engineering
- A3 essential facts, principles and theories of building services engineering
- A4 the main methods of enquiry used in building services engineering
- A5 characteristics of engineering/ building materials and components
- A6 legal, economic, design, environmental considerations and techniques that govern the sector
- A7 commercial/business practice and management approaches used in the sector
- A8 professional and ethical responsibilities including the global and social context of engineering

B: Intellectual abilities

Graduates will have developed the intellectual ability to:

- B1 identify and analyse real needs and problems
- B2 analyse and evaluate concepts and theories and apply them appropriately and creatively
- B3 evaluate critically the appropriateness of different methods and tools and apply them as relevant
- B4 select, analyse and integrate information from a range of data sources
- B5 generate, propose and apply effective designs and solutions
- B6 make judgements based on proper professional and ethical considerations and awareness of own limitations

C: Practical skills

Graduates will be able to:

- C1 use standard and specialised computer-based tools and packages effectively, including for analysis and design
- C2 research information to help develop ideas, including accurate analysis of surveys, reports, data, information and experimental results
- C3 prepare technical reports/drawing for a range of purposes and make presentations to a range of audiences
- C4 work as an effective member of a team

D: General transferable skills

Graduates will be able to utilise the following skills flexibly and appropriately:

- D1 Communication skills – verbal and written - using the range of media commonly in use and for specialist and non-specialist audiences
- D2 Use information technology effectively, including data retrieval, manipulation and presentation
- D3 Manage resources, including time
- D4 Manage tasks and projects
- D5 Manage and improve own learning and performance
- D6 Work effectively with others and take a leadership role when needed

8.3 The structure of the Foundation degree in Building Services Engineering

There are five 'components' of the **structure of the Foundation degree** as shown on the diagram following:

- Engineering Knowledge and Skills Base (15% minimum) – provides both relevant underpinning elements and facilitates transition to any further learning at level 6 of the full degree. There are three mandatory modules and three optional modules;
- Built Environment Knowledge and Skills Base (15% min.) – enables Foundation degree graduates to understand how building services engineering fits with other aspects of construction, how the regulatory environment works and to communicate effectively with fellow professionals. There are three mandatory modules;
- Technical Building Services Engineering Knowledge and Skills Base (30% min.) – offers option pathways designed to match employer and individual needs and interests. Each pathway must also integrate the learning outcomes related to 'Sustainable and

renewable technologies'. Modules selected must form a coherent set and attention should be paid to the effect of choice on eligibility for IEng and on progression to a full degree;

- Applied Building Services Engineering (15% min.) – provides opportunities to integrate and apply principles, knowledge and skills drawing on earlier modules. There are two mandatory modules and two optional modules;
- Transferable Skills (15% min.) – addresses needs for a range of generic skills that contribute to individual employability and to improvement in business practice. These are intended to be primarily achieved through work-based learning. There are four optional modules and transferable skills should also be embedded in other modules, as appropriate. Coverage should be shown through mapping at Foundation degree validation.

Foundation degrees with the right engineering content sit slightly above the academic requirements for EngTech, and provide a good route towards **Engineering Technician professional recognition**. Some employers will want their students to use the Foundation degree with a minimum amount of 'bridging' to progress on to the final year of a recognised BEng degree and then on to **IEng professional recognition**. To give eligibility for EngTech or contribute towards IEng, some components will require a greater emphasis and number of credits, for example inclusion of more underpinning mathematics, science and design engineering analysis. It is strongly recommended that providers check these requirements with their validating universities and a professional body during course development.

The table presents **three option pathways**. It is not proposed that every provider should offer all modules listed, nor that the pathways would operate in a rigid way that prevents a 'multi-skilling' route. Modules must be selected from the lists provided. The mechanical and/or electrical option pathway would be an appropriate choice for those wishing to achieve EngTech or progress to a BEng as part of a route to IEng. The commercial pathway might be part of a 'destination qualification' or provide access to the final year of an honours degree such as contract management or project management. Small businesses might find a multi-skilled pathway of more value. For this, a module set might be made up from across all the options, including some of the commercial modules that will contribute to business success. Employers and employees will need to know the progression opportunities that the combination selected will provide.

To expand options a single provider can offer, providers should consider whether a provider consortium would be feasible and attractive to individuals and employers. Where an option module can be delivered as a 'block' (see section 9), it may be possible to combine students from a number of providers in order to have a sufficient number.

Four [examples](#) are provided that illustrate how modules can be combined to meet different employer needs:

1. A Foundation degree that meets the needs of EngTech and would enable smooth transfer to the 3rd year of a degree accredited by a professional body such as CIBSE;
2. A Foundation degree that meets the needs of small – medium sized consultancies for qualified employees who are multi-skilled;
3. A Foundation degree that meets the needs of large contractors specialising in electrotechnologies;
4. A Foundation degree that meets the needs of small contractors.

These examples are based on suggestions by employers on the Steering Group. In discussion with employers, guidance lists like this might form the basis for a discussion that considers an assessment of delivery requirements inclusive of employer expertise that can support the approach chosen.

UK-SPEC Mapping	Engineering Knowledge & Skills Base			Transferable Skills	
Underpinning Mathematics and Science	<ul style="list-style-type: none"> • Building Services Engineering Mathematics (Levels 4 & 5) - mandatory • Building Services Engineering Science (Level 4) – mandatory • Thermofluids/Heat Transfer (Level 5) - optional • Electrical/ Electronic Principles (Level 5) – optional • Control Theory (Level 5) – optional <p>15% minimum. 20% or more for EngTech/ progression towards IEng.</p>			<p>(explicit and embedded)</p> <p>Communication</p> <p>ICT</p> <p>Problem solving</p> <p>Research</p> <p>Analysis & evaluation</p> <p>Working with others</p> <p>Managing own learning & CPD</p> <p>Managing client relationships</p> <p>Career management</p>	
Built Environment Knowledge & Skill Base					
Economic, social and environmental context Engineering Practice	<ul style="list-style-type: none"> • Health & Safety Management (Level 4) - mandatory • Construction management and procedures (Level 4) - mandatory • Project Management (Level 5) - mandatory <p>Typically 15%</p>				
Technical Building Services Engineering Knowledge & Skills Base					
Choice of option pathway or modules to form a 'multi-skill' or combination route					
Engineering Practice Economic, social and environmental context"	<p style="text-align: center;">Mechanical</p> <p>Modules to be chosen from:</p> <ul style="list-style-type: none"> • Heating, Ventilation and Air Conditioning (Levels 4 & 5) • Refrigeration (Levels 4 & 5) • Public Health Engineering • Utility Services • Fire Engineering (levels 4 & 5) • Controls & Building Management Systems 	<p style="text-align: center;">Electrical</p> <p>Modules to be chosen from:</p> <ul style="list-style-type: none"> • Electrical Installations (Levels 4 & 5) • Electrical Power Supplies Lighting Designs • Fire detection & Security Installations • Transportation Systems in Buildings. 	<p style="text-align: center;">Commercial</p> <p>Modules to be chosen from:</p> <ul style="list-style-type: none"> • Building Services Engineering Systems • Tendering & Estimating • Measurement • Contractual procedures • Law and Contract • Procurement • Supply Chain Management • Specification and documentation • Cost & Financial Control 		
	'Sustainable and renewable technologies' to be embedded in the option pathway selected				
	Typically 30% credits				
Applied Building Services Engineering					
Design Engineering Analysis	<ul style="list-style-type: none"> • Group Integrative Project (Level 4) -mandatory • Individual Integrative Project (Level 5) - mandatory • Design Methodology for Building Services Applications – optional • Computer Applications in Building Services Engineering - optional <p>15% minimum, Typically 20% or more for EngTech/ progression towards IEng.</p>				
Specific Transferable Skills					
Economic, social and environmental context	<ul style="list-style-type: none"> • Communication and Report Writing – optional • Managing own Learning & CPD – optional • Managing Client Relationships – optional • Career Management – optional <p>Typically 15%credits</p>				

8.4 Components, modules and detailed learning outcomes

Detailed learning outcomes for modules can be accessed by clicking on the web link for each component.

For any of the modules, providers may wish to change the actual title, but should ensure that the outcomes specified are covered.

- Mandatory modules/learning outcome sets are in bold and labelled M.
- **Note that some learning outcomes are labelled M but are to be embedded** eg Sustainable and renewable technologies and Transferable skills. This means that they should be integrated and assessed in modules where they have best fit
- Option modules are labelled O

I. [Engineering Knowledge and Skills Base](#)

This component might typically be expected to represent a minimum of **15 %** for all programmes but is likely to need to represent a greater percentage for those programmes seeking contribution towards IEng.

Mandatory modules

- M1 Building Services Engineering Mathematics (Level 4)**
- M2 Building Services Engineering Mathematics (Level 5)**
- M3 Building Services Engineering Science (Level 4)**

Optional modules

- O1 Thermofluids/Heat Transfer (Level 5)
- O2 Electrical/ Electronic Principles (Level 5)
- O3 Control Theory (Level 5)

Note

1. For programmes seeking professional body recognition as contributing towards the UK-SPEC EngTech or IEng standard, this section should map well against UK-SPEC Broad Area of Learning: “***Underpinning Mathematics and Science***”.
2. Providers should check UK-SPEC for any variations or changes.

II. [Built Environment Knowledge and Skills Base](#)

This component might be expected to represent approximately **15%** of all programmes.

Mandatory modules

- M4 Health & Safety Management (Level 4)**
- M5 Construction management and procedures (Level 5)**
- M6 Project Management (Level 5)**

Notes

- For programmes seeking professional body recognition as contributing towards the UK-SPEC IEng standard, this section should map well against elements of UK-SPEC Broad Areas of Learning: “***Economic, social and environmental context***” and also against elements of “***Engineering Practice***”.

- There is an explicit expectation that Health & Safety should be embedded within all appropriate modules. Employers can best advise on this. The above H&S module deals with specific content over and above the embedded content.

III. Technical Building Services Engineering Knowledge and Skills Base (Option pathways)

It is important that programmes have option pathways that include the appropriate knowledge and skills to support that option pathway. Options offered should be negotiated with local employers and potential students and, at best, match employment and job function needs. This component is likely to represent a **minimum of 30%** of all programmes.

Example module ‘sets’ from which providers can make a selection are as follows. Equally, providers might decide to offer modules to provide a multi-skills route to cover the fundamentals of all sectors.

Option pathway	Taken from the following
<u>Mechanical</u>	O4 & O5 Heating, Ventilation and Air Conditioning (Levels 4 & 5) O6 & O7 Refrigeration (Levels 4 and 5) O8 Public Health engineering (Level 4) O9 Utility Services (Level 4) O10 and O11 Fire engineering (Levels 4 & 5) O12 Controls & building management systems
<u>Electrical</u>	O13 and O14 Electrical installations (Levels 4 & 5) O15 Electrical power supplies O16 Lighting designs O17 Fire detection & security installations O18 Transportation systems in buildings. O19 Controls & building management systems
<u>Commercial</u>	O20 Building Services Engineering systems O21 Tendering & estimating O22 Measurement O23 Contractual procedures O24 Law and contract O25 Procurement O26 Supply chain management O27 Specification and documentation O28 Cost & financial Control

In addition, each pathway should integrate the detailed learning outcomes listed under M: Sustainable and Renewable Technologies.

Note:

- For programmes seeking professional body recognition as contributing towards the UK-SPEC IEng standard, the mechanical and electrical modules of this section should map well against UK-SPEC Area of Learning: “**Engineering Practice**”. The commercial modules will map against elements of UK-SPEC Broad Area of Learning: “**Economic, social and environmental context**” but are unlikely to satisfy the requirements of “**Engineering Practice**”.

IV. Applied Building Services Engineering

In order to integrate and apply the above principles, knowledge and skills base, it is important the Foundation degree should include modules that provide for this integration. This component is likely to represent a **minimum of 15%** of all programmes and 20% of programmes contributing to IEng accreditation.

Mandatory modules

- M7 Group Integrative Project (level 4)
- M8 Individual Integrative Project (level 5)

Optional modules

- O31 Design Methodology for Building Services Applications
- O32 Computer Applications in Building Services Engineering

Notes:

1. For programmes seeking professional body recognition as contributing towards the UK-SPEC IEng standard, this section should map well against UK-SPEC Broad Area of Learning: “**Design**” and also against Broad Area of Learning “**Engineering Analysis**”.
2. This component also helps meet the higher level learning outcomes for **Practical Skills** and helps satisfy the expectation within UK-SPEC General Learning Outcomes “**Practical Skills**” that there will be both individual and group work and that participation in a major project is expected.
3. Providers should review UK-SPEC for any variations and changes.

V. Transferable Skills (core)

Transferable skills pitched at an appropriate level are to be explicit and embedded within modules. This should be shown at validation through mapping:

- M Communication
- M ICT
- M Problem solving
- M Research
- M Analysis and evaluation
- M Working with others
- M Managing own Learning & CPD
- M Managing Client Relationships
- M Career Management

Alternatively, there is scope for some transferable skills to be incorporated as identified modules if required. Some of these might lend themselves particularly to Work-based learning opportunities.

Optional modules:

- O33 Communication and Report Writing
- O34 Managing own Learning & CPD
- O35 Managing Client Relationships
- O36 Career Management

Note:

1. For programmes seeking professional body recognition as contributing towards the UK-SPEC IEng standard, this section should map well against elements of UK-SPEC Broad Areas of Learning: “**Economic, social and environmental context**”. This component might typically represent **15%** of all programmes.

Key points to be included in a Foundation degree programme specification

- Coverage of the Higher Level Learning Outcomes and mapping of these against individual modules
- The incorporation of the five components in a provider's Fd structure
- The selection of modules and the coverage of the detailed learning outcomes specified in the framework
- Mapping of required transferable skills against individual modules
- Evidence from employers that has influenced the selection of modules.

9. Delivery

Foundation degrees are designed to reach people in a range of learning and work settings. Flexible delivery modes are crucial to respond to work patterns of the sector and ensure appeal to both students and employers. Foundation degrees should therefore be delivered in such a way that learners can access appropriate learning and support according to their own and their employers' needs. This implies that delivery modes should make use of premises close to the learners themselves, and offer provision through evening, day, weekend and block attendance and e-learning in combinations which allow maximum access. Level 6 of the honours degree that forms the progression route should also offer similar flexibility.

The cost to employers comprises course fees, travel and primarily the employee loss to the business for the time they are absent. Employers felt that the latter is under-recognised by providers and that delivery modes should be designed to be effective and time efficient. Employers might be consulted on preferred delivery format at the same time as on content focus.

Programme providers need to be conscious of the fact that students who join the programme are likely to come from a variety of educational backgrounds so the early stages of programme delivery may place greater emphasis on tutor support and traditional teaching and learning methods. Some students may need 'bridging' into the course where their English, mathematics skills – or study skills – are not to the level required. Learning needs assessment can help structure this process. Some institutions have a central, dedicated 'study centre' with staff skilled in advising on this approach and with the capacity to offer sessions.

Some students wishing to progress to further learning at Honours level may benefit from support to make a successful transition, through additional tutorials and/or units to cover any shortfalls in knowledge or skills.

There are a number of modes of Foundation degree delivery which should be considered including:

- Blended learning combining some or all of the elements below
- Day release
- Block release, generally a week.
- Evening/weekend only
- Work place delivery
- Components of e-learning with or without tutor/mentor support
- Delivery on a provider consortium basis, making use of block and e-learning formats, of options that because of low numbers are not viable for single providers to run.

The delivery format that had the most appeal for employers consulted was 'blended learning': combining a range of approaches. Discussion on this subject prompted many providers to begin to question their assumptions and think outside their customary offer. Both employers and providers were of the opinion that the current prevailing model of day release was generally less effective in achieving learning outcomes than more intensive sessions such as week or weekend blocks. Additionally block release is found by some employers to be less disruptive to their businesses than releasing staff for a day every week. Some employers had experience of the improved impact of the block format.

An approach was proposed with the first stage being a rigorous examination of module content and objectives, with the aim of establishing the best mode of delivery to achieve each set of outcomes. It was felt that analysis like this would point to the desirability of a blended style of learning, with some modules delivered, for example, through tightly focused one-week blocks or residential weekends, some phased over a few months through a series

of evenings or a single day per week, and some through predominantly work-based learning. Some knowledge elements might be offered online.

Providers acknowledged that this would be a challenge, but felt that it could be feasible and act as a motivator and invigorate staff interest. Employers would need to know about specific dates and times well ahead to be able to plan. In employers' view, these flexible modes would be easier to schedule in relation to maintaining their capacity to address business demands. It would feel more like a genuinely reciprocal endeavour.

An entire e-learning course – even with tutorial support – had little appeal. Employers believed it would not work because of the type of 'hands-on' individual employed in the industry. Because of work pressures, most employers consulted thought that individuals and employers would find it difficult to allocate proper work time to study. Lastly, it would sacrifice the benefits of being part of a learning group: motivation, sharing company practice and peer support. However, it was proposed that e-learning could be used effectively for communicating areas of knowledge. This might also be tested online. This would allow contact time to focus more on the application of knowledge.

Large employers with a customised Foundation degree course would appreciate providers reviewing relevant in-house courses for validation and integration. The [Employer Based Training Accreditation](#) (EBTA) project, coordinated by Foundation Degree Forward can help with this.

There are concerns that the knowledge and skills of some teaching staff are not sufficiently current and providers seem to have too few explicit strategies to address this. The difficulties of recruitment are recognised. At best, staff should have recent industrial experience. Employers may be able to offer occasional inputs to the course on particular aspects of their practice, specific innovations they are trialling or offer access to cutting edge equipment. One student interviewed was arranging a visit for his classmates to his workplace for the latter purpose.

The present CPD requirement for teaching staff should offer the leverage and opportunity for upskilling. Employers may also be willing to contribute to the professional development of provider staff. Some of the providers consulted felt that most powerful would be an 'immersion' approach with staff on short company placements or even simply attending business meetings as interested observers. Sessions might be integrated with staff visits to students linked to work-based learning assessments.

Key points to be included in a Foundation degree programme specification

- Varied delivery formats, demonstrating fit with module content, and engaging students with different learning preferences
- Additional units and/or support to help students make a successful start on the course and manage transition into further learning at a higher level, plus an indication of how these might be funded
- Staff with current knowledge and recent experience of industry practice, plus a staff development strategy to help them remain up-to-date with new technologies, products and changes in the regulatory environment
- Access to up-to-date resources – equipment and materials – that reflect business operations

10 Work-based learning

Work-based learning (WBL) is a key characteristic of a Foundation degree and it is the feature that is its most distinctive element. WBL recognises the value of work as a source of knowledge and experience; it makes work the subject of study. The workplace is an important learning environment and WBL brings the methods and academic rigour of higher education to the curriculum of working life. WBL develops critical thinking and reflection through learning activity designed and tailored for the individual, involving elements of blended learning, accreditation and support. It puts the learner's development first, creating a flexible learning experience that is delivered through work, in work, by work.

Work-based learning may involve learners engaging in consultancy or project work for employers and it may use the learner's own workplace as a source of learning. Whatever the case, the WBL element of the programme must be of sufficient duration and suitably structured to enable the learner to demonstrate all the agreed WBL outcomes.

10.1 Specification and delivery of work-based learning

Employers did not recommend that a specific percentage of time is allocated to Work-based learning. Rather, that it should permeate the whole programme with some work-based assessment criteria integrated in all modules where possible. A mixed approach is envisaged with some entire modules being assessed through work-based projects and others with a varied degree of work-based activity generally focusing on the application in the work place of the theoretical and/or case study elements studied in the classroom. This enables theoretical aspects to be contextualised and provides the impetus and a structure for employees to learn more about their company or organisation.

Research for the framework specification illustrated that learning does happen in both directions: most students were applying their learning to the work situation and were also drawing on work for examples and projects:

'When we'd learned about the design of an installation, then I went back to the site and looked at it. I organised it myself – it's my own initiative – but it is expected. Then at work we were doing containment for cables - I was looking at this on site and I noticed different approaches. I analysed this at college and used it in my report.'

Work-based learning should ideally be designed so that it contributes to the business objectives of the employer, for example, a project might be specified to research and generate solutions to address a specific employer issue. The brief determined by the provider would clearly need to be sufficiently flexible to be capable of interpretation and action in a range of employment environments. Employers can also contribute by offering clear opportunities for personal development and by helping the student to relate the outcomes stated in his/her learning plan to desired organisation operational outcomes. These might be derived from targets or objectives in a personal appraisal.

The role of the academic tutor is to help the learner think about the knowledge they require (or indeed already have) in order to do their job and also about the criteria which will describe their learning. The tutor also needs to provide appropriate frameworks and support for such activities. These two activities produce the curriculum and the learning outcomes for a negotiated learning plan or contract. The academic tutor needs to introduce the concept of level here and make sure that outcomes reflect the level and volume appropriate to the credit being sought in the negotiated part of the programme.

Students also should be heavily involved in the design of work-based learning. WBL should enable learners to take on appropriate roles within the workplace, giving them an opportunity to apply the skills and knowledge they are acquiring. The role of the learner is to consider their own needs and aspirations in embarking upon the programme, to consider and articulate the actions and opportunities which are available to them in their work role or workplace which will allow them to test theories and reflect on their actions and to take an active part in both the planning and execution of their programme.

10.2 Work-based learning outcomes

Work-based learning should be fully integrated into the whole Foundation degree programme, with defined and assessable learning outcomes, and should not be seen as a 'bolt-on' to academic study. It is certainly *not* another name for structured work experience. Experience at work is not in itself sufficient to qualify for credit within a Foundation degree. It is the *learning* that derives from work that will be assessed as part of the Foundation degree programme.

Work-based learning aims and learning outcomes should be set at the intermediate level on the Framework for Higher Education qualifications. Learning outcomes for WBL should relate to technical skills, occupationally relevant knowledge, professional, personal and interpersonal skills. The detailed learning outcomes of modules within the Foundation degree component 'Applied Building Services Engineering' (min 36 credits) particularly lend themselves to a WBL approach, as do Transferable skills. There are also specified outcomes in most modules that might be addressed through investigations into applications in the student's own business environment.

10.3 Assessment

Providers should ensure that their work-based learning arrangements and assessment will satisfy their partner university's QA requirements. Institutions must be prepared to be flexible with regard to traditional conventions that may restrict assessment of WBL, such as:

- "A 20 credit L2 module must have 15 contact hours, 6 learning outcomes and a reading list of at least 6 texts."
- "All modules must have 20 credits and this equals 200 learning hours."
- "A 20 credit module must be assessed with a written assignment of 2,000 words."

The organisation of assessment must ultimately relate to the learning outcomes. A sensible approach for work-based learning would be to attempt to exploit the circumstances of the work environment. The plan would be to use the evidence and demonstration arising from work tasks *and the reflection they inspire* as the backbone of the assessment strategy. Many work-based programmes contain multiple learning experiences – some of which will occur in non-work environments. Even in these cases it is possible to conceive of an assessment approach which would look for use of the work environment to test or in some way gain a perspective on a theory or model. So the overall ambition for assessment in a work based programme must be, as far as is possible, to use *work* to provide the opportunity to demonstrate learning.

By basing assessment around the tasks of work - it would be all too easy to create far too many items of assessment and so overburden a learner. A solution is to specify a small number of fairly large items of assessment each spanning a number of learning outcomes. A large item of assessment might for instance include a working task, the project management of that task, appropriate research and presentation elements as well as a reflective piece (e.g. a diary or blog) giving a critical perspective. In this way several learning outcomes can be addressed in an integrated fashion.

Assessment strategy should specify the evidence required from all candidates to ensure consistency of standards.

10.4 Employer involvement and support

Employers are expected to support learners as they learn in the workplace. To achieve this, employers would appreciate the following. These might be covered in an Employer Handbook and/or could be the subject of direct briefing, perhaps offered at a breakfast session. These aspects should be taken into account during the design phase of the Foundation degree.

- Information on how the Foundation degree can support business objectives
- Agreement with the education institutions on the breadth and timescales of their involvement in Work-based learning and mentoring
- Induction into the provision of opportunities for and management of workplace learning or mentoring
- Mentor/supervisor training
- Help in managing learning activity in the workplace
- Monitoring student learning and progress, for example through three-way reviews between the student, employer and tutor
- Assistance in understanding assessment procedures, and contributing to assessment if possible.

Students interviewed for the research talked about employers in a range of support roles. Some had mentors – not their own manager - and these were appreciated. *'He has the voice of authority – he produced a time plan. He helps keep me on track – to meet targets, encourage me and signpost others'*. Most had line-managers who took time to discuss progress with them, for example at fortnightly one-to-ones or at annual appraisals, or to read projects. The national boss of one student contacted him monthly by phone for a conversation and he experienced this as very motivating. Some had colleagues who helped – *'there is always someone (else) who has done it'*.

Employer mentors who were interviewed chose to undertake the role and gain satisfaction from it. They were trained for the task and have a mentor pack, plus access to a training group and contact to provide on-going support. They saw their value as helping students to draw up and keep to a schedule, responding to requests about *'angles'* for work projects and advice on the quality and sufficiency of the work produced, and making suggestions about managing competing work pressures. Key qualities are to be *'approachable and inspire trust'*. Mentors felt it was important to be fully informed about the course and they appreciated sessions at the college where they were briefed and given feedback from the course leader about their mentees. They also participated in college project assessment panels in which their own student is involved and in work-based student reviews.

Foundation Degree Forward guidance suggests that employers sign up to a tripartite [learning agreement](#) between themselves, the learner and the university or college. This should outline the work which will be undertaken and the learning outcomes which will be assessed. Research showed some HEIs and FECs operating this approach. The most successful had integrated the agreement with the process of on-going student development reviews that might be education-based or employer-based.

A mechanism to encourage students and employers to comment on their work-based learning experiences would be of value, and feedback should be part of the annual evaluation processes.

The most recent QAA recommendations related to Work-based learning can be found at: www.qaa.org.uk/academicinfrastructure/codeOfPractice/section9/PlacementLearning.pdf

10.5 Summary of roles and responsibilities

The contributions to be made in managing work-based learning within the Foundation degree programme will require that the roles and responsibilities of learner, programme leader, tutor, mentor and supervisor are clearly defined and that appropriate systems and schedules are in place. This section is presented to offer some introductory guidance and is not meant to supersede currently effective collaborative activity.

Learners

Learners will engage as defined in the learning and assessment strategy which will accompany a programme specification. Various delivery and accreditation processes may be involved. The learner is likely to be best served if a *learning contract* is negotiated; the provider and employer providing the input needed to create the contract with the active involvement of the learner. Learning through the various methods will ensue and it is likely that the learner will both collect evidence which demonstrates the tasks achieved *and* will create reflective statements demonstrating what learning has been achieved as a result of the tasks.

Programme Leaders

Programme leaders will be responsible for the 'unpacking' of the programme specification into an operational plan. There will be general oversight of the allocation of tutors, supervisors and mentors for each learner. This will include ensuring that adequate staff development takes place in each case; that scheduled activities are taking place on time and achievements are to the standard required.

Tutors

Tutors have a key role in the management and operation of the *learning contract* for each of the learners assigned. Responsibilities will be many and varied – but will include;

- accreditation of prior learning (whether through experience or formal education)
- accreditation of an employer's staff development provision
- identification of the working opportunity which will facilitate achievement of a Detailed Learning Outcome (DLO),
- identification of the remits required to demonstrate the achievement of a DLO and definition of the standards to be achieved within a remit,
- the actual assessment of the standard achieved in each remit,
- pastoral responsibility for the learner
- negotiation with supervisors and mentors as the circumstances of the work environment evolve

Mentor

The mentor in the work place is charged with a number of roles which are supportive in nature and not in any way judgemental. A mentor would typically be someone working at a more senior level than the learner with greater experience of most of the tasks of the job role. The mentor would provide a sounding board for the learner as the challenges of the job become more demanding – providing informal guidance as the learner develops the improved capability needed to handle these greater challenges. The mentor would advise on the use of resources and give informal feedback on the standards being achieved. Micro-businesses or owner managers may be limited in their scope to resource this role. As an alternative, a learner's mentor might be someone in another business with whom he or she is engaged in a project, rather than someone in her/his own business.

Supervisor

The supervisor in the work place must negotiate with the programme leader and tutor in order to identify work which will provide the opportunity needed for a learner to achieve and evidence the learning outcomes of the qualification. The supervisor also has the key responsibility to ensure that this identified work is allocated to a learner with an adequate time allocation. The supervisor must review the progress and attainments of each learner with the tutor concerned and undertake management actions in order to redress any problems or obstacles.

Key points to be included in a Foundation degree programme specification

- An indication of the proportion of work-based learning within the qualification and the approach taken
- Identification of the learning outcomes that will be demonstrated in this way
- Indication of the delivery and assessment methods to be used to match the range of learner types anticipated and to address the learning needs of the selected modules
- Indication of the employers' work-based learning roles and how they will be informed, and supported as needed

11. Assessment

The purpose of assessment is to determine students' performance in relation to the learning outcomes of the award, level and modules. Assessment criteria should be clearly defined and relate to the learning outcomes as specified for the modules selected. The awarding institution is responsible for ensuring that assessment is consistent and appropriate to the level of the award. Cross-moderation processes involving the awarding body and all delivery partners are crucial in ensuring consistent assessment practices across all sites of delivery. Research has highlighted that this is critical for generating the high level of trust in standards across partners that is necessary to underpin successful student progression to achieve a full honours degree. Institutions must also provide clear guidance to external examiners about the distinctive characteristics of Foundation degrees.

Assessment strategies, including those relating to Work-based learning, should be specified at the time of validation. In order to design appropriate strategies, it is important that providers differentiate between learning outcomes that might best be achieved in the workplace, those that are best achieved in the classroom and those where a combination of both environments is desirable.

Assessment methods can embrace a variety of formal and informal, summative and formative techniques provided that they are rigorous and can withstand independent verification. It is important that students are exposed to different assessment methods. The programme of assessment should be varied and 'fit for purpose' providing a good mix of competency based assessments, assignments and employer feedback that may include:

- Case studies
- Presentations
- Project work
- Examinations
- Reports
- Practicals or simulations
- Observations and viva examinations
- Peer and self assessment
- Personal development plans
- Portfolios

Universities will have their own requirements for the percentage of AP(E)L that can be permitted and further education providers are advised to check this. Where an FE college has its own Foundation degree awarding powers, care is still recommended, otherwise there may be barriers to progression for those students wishing to complete the honours degree.

During consultation, employers proposed that transferable skills should be partly assessed through work-based learning assignments to ensure skills meet the needs of the business environment. The engagement of employers in the assessment process should be considered at the design stage of a Foundation degree, for example, inclusion on assessment panels and the validation of assessment related to work-based learning. All this is complex and employers would benefit from some succinct guidance about standards and academic processes.

Where a course is customised for one employer, it may be possible to accredit relevant in-house provision through [Employer Based Training Accreditation](#) (EBTA). This would require a close partnership between the employer and provider to ensure assessment is rigorous and appropriate for academic requirements.

Students are encouraged to understand the relationship between learning outcomes and assessment. A procedure for providing feedback to students that clearly relates to assessment criteria and learning outcomes is essential. Developing student confidence in tackling different forms of assessment will support students in the progression to further professional qualifications and to honours degree-level study.

Key points to be included in a Foundation degree programme specification

- Varied assessment methods that are fit for purpose and enable students with different learning preferences to shine.
- Fit with a university partner’s requirements, particularly over AP(E)L.
- Involvement of employers – trained to contribute - in assessment processes

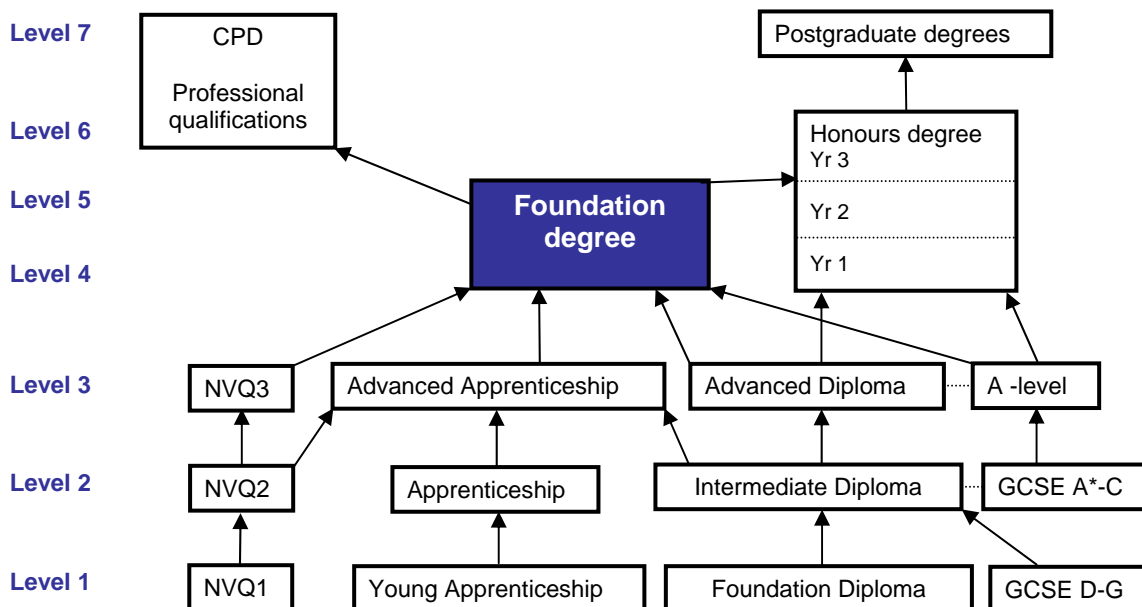
12. Progression

Progression should be seen as a matter of personal choice, and not pinned to a notion of moving through the hierarchy of higher education qualifications. A Foundation degree is a qualification in its own right.

A Foundation degree is validated in the context of an identified progression route for learners who wish to continue their academic study. For building services engineering, this will generally be a course of study to enable a learner to achieve a BSc(Hons) or a BEng (Hons) towards which their Foundation degree will contribute, but it might be to construction or project management qualifications. The awarding institution should make clear where specified progression routes lie. Level 6 degree requirements must be considered when taking decisions on Foundation degree content and learning outcomes, for example, ensuring mathematics is at an appropriate level.

Where delivery is shared between FE and HE, dialogue and partnership are key. This might be expressed through a formal ‘Accord’.

How do Foundation degrees fit with other qualifications?



Research and consultation stressed the importance of making progression routes work smoothly. Routes must be flexible and include AP(E)L arrangements. Employers who were consulted saw Foundation degrees as an excellent next step for employees who had completed a craft Apprenticeship. It broadens knowledge and skills and provides the basis for focusing on more complex technical areas or moving into business management roles.

Progression from Apprenticeships to Foundation degrees

Individual Foundation degree providers set their own requirements for entry and AP(E)L. Individuals who have completed apprenticeships in one of the building services engineering industry may be interested in completing a Foundation degree to support their progression within the sector. The NVQ and Technical Certificate that would normally be achieved during an apprenticeship may be recognised as entry requirements at the discretion of the recruiting institution.

At best, credit accumulation and transfer mechanisms between providers should enable students who move location, either because they change employer or because their employer relocates them, to continue with their studies, part way through the Foundation degree or at the point of transition to level 6 of an honours degree.

Remaining in HE is only one form of progression. Learners may use their success on a Foundation degree to proceed to professional or occupational qualifications, for example employees could progress 'laterally' to an NVQ 4 in Building Services Engineering Technology and Project Management. Graduates might want to move to a new job, seek promotion within their place of work, or stay in their current post in the knowledge that they are better equipped to do their job well.

Employers were keen that access to professional membership should be possible for those students who wish to pursue this option. This means that providers should ensure that content coverage is adequate to meet professional body requirements and seek to secure accreditation for their Foundation degree as part of the route towards Incorporated Engineer.

Key points to be included in a Foundation degree programme specification

- Articulation of progression routes in and out
- Access to at least one honours degree at level 6 with bridging arrangements if necessary
- Accreditation by a professional body, if at all possible