THE CHARTERED INSTITUTION OF BUILDING SERVICES ENGINEERS

GUIDANCE NOTES ON THE SUBMISSION OF DOCUMENTATION FOR ACCREDITATION OF ACADEMIC PROGRAMMES

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1. ACCREDITATION OF ACADEMIC PROGRAMMES

This guidance is provided for Universities intending to submit documentation for accreditation of academic programmes by the Chartered Institution of Building Services Engineers (CIBSE). An accreditation visit by a CIBSE team will be required. Guidance for the accreditation of MSc programmes is published separately.

1.1 Why seek accreditation?

Accreditation of degree programmes by recognised professional and statutory bodies is a mark of assurance that the programmes meet the standards set by a profession. In the UK, the Engineering Council sets and maintains the standards for the engineering profession and the overall requirements for accreditation. The EC licenses professional engineering institutions including CIBSE to undertake the accreditation within these requirements – interpreting them as appropriate for their own sector of the profession – and maintains the registers of accredited programmes. CIBSE uses the accreditation process to assess whether specific educational programmes provide some or all of the underpinning knowledge, understanding and skills for both eventual membership and EC registration in a particular category.

Accreditation is an accepted and rigorous process that commands respect both in the UK and internationally. It helps students, their parents and advisers choose quality degree programmes. It also confers market advantage to graduates from accredited programmes both when they are seeking employment and also when in due course they decide to seek professional qualification. Some employers require graduation from an accredited programme as a minimum qualification.

The accreditation process gives educational institutions a structured mechanism to assess, evaluate, and improve the quality of their programmes. In an important development, the UK Quality Assurance Agency for Higher Education (QAA) has since 2006 adopted the standards in UK-SPEC as the subject benchmark statement for engineering. This alignment was strongly supported by the academic community and further strengthens the case for accreditation as well as assisting in reducing the regulatory burden on the higher education sector.

Increasingly the advantages of professional accreditation are being recognised internationally. The UK engineering profession participates in several major international accords, within and outside Europe, which establish the ‘tradeability’ of engineering and technology degrees. In each case the system of accreditation applied in the UK is fundamental to the acceptance of UK degrees. With increasing globalisation, such accords and frameworks are assuming growing importance with employers as a means by which they can be confident in the skills and professionalism of the engineers involved. An accredited programme also has a market advantage for education providers wishing to attract international students to the UK.

1.2 What is involved?

The accreditation process is essentially one of peer review; it is applied to individual programmes not to the department or institution overall. An educational establishment seeking accreditation for an engineering programme should approach the CIBSE Membership Department for information.

There is currently no charge for the process for visits in the UK but for visits outside the UK there will be a charge to cover expenses incurred by the accreditation team. Further advice is available from CIBSE.

Where relevant joint visits with two or more Licensed Members are an option and can reduce the overall costs of accreditation. These can be organised through the auspices of the Engineering Accreditation Board (EAB) or arranged through CIBSE and further details are available from the CIBSE Membership Department.

Where programmes are offered collaboratively with other educational establishments, or on a franchised basis, the accrediting institution will normally expect to visit all partners involved in delivering the programme, although this requirement may be waived in certain circumstances.

Programmes may be accredited as fully or partially meeting the educational requirement for registration as either Incorporated Engineer (IEng) or Chartered Engineer (CEng). Qualifying phrases such as ‘provisional accreditation’ and ‘partial accreditation’ are not used.

All BEng (Hons) degrees accredited as partially meeting the academic requirements for CEng status will also be accepted as accredited degrees for IEng registration.

1.3 Output Standards

Under the United Kingdom Standard for Professional Engineering Competence (UK-SPEC) published by the Engineering Council, the decision whether to accredit a programme will be made on the basis of the programme delivering the specified learning outcomes. These outcomes are described in the Engineering Council document “The Accreditation of Higher Education Programmes” and can be found on the EC website www.engc.co.uk. They are set out in Appendix 3 of this guidance.

Accredited engineering programmes provide the exemplifying levels of understanding, knowledge and skills for professional competence. The output standards therefore need to be read in the context of the generic statements of competence and commitment for Chartered Engineers and Incorporated Engineers as set out in UK-SPEC.

The output standards for accredited engineering programmes encompass two different categories of learning outcomes that are inter-related. One category is **general** in nature, and will apply to all types of programme. The second category is more **specific**. The general learning outcomes describe the overall nature of the programme; delivery of the specific outcomes should contribute to a greater or lesser extent to the delivery of the general ones.

As the output standards for degrees leading to IEng registration differ from those for degrees leading to CEng registration, and UK-SPEC envisages that degrees will be accredited for one or the other, but not both.

1.4 Exemplifying Qualifications

Accredited engineering programmes provide the exemplifying levels of understanding, knowledge and skills for professional competence. The output standards set out by the Engineering Council for the accreditation of higher education programmes here need therefore to be read in the context of the generic statements of competence and commitment for Chartered

Engineers and Incorporated Engineers as set out in the United Kingdom Standard for Professional Engineering Competence (UK-SPEC) available on www.engc.org.uk.

The exemplifying academic awards are:

Chartered Engineer (CEng):

• **either** an accredited Bachelor's degree with honours in engineering or technology, plus either
  - An appropriate Master's degree accredited by a Licensed Member
  - Or appropriate further learning to Masters level
  - Or appropriate or Engineering Doctorate (EngD) accredited by a Licensed Member

• **or** an accredited integrated MEng degree.

Postgraduate Diplomas are not exemplifying qualifications under UK-SPEC, though they may be accepted on an individual basis as meeting part or all of further learning requirements.

Incorporated Engineer (IEng):

• **either** an accredited Bachelors or honours degree in engineering or technology
• **or** a Higher National Certificate/Diploma or Foundation Degree in engineering or technology, plus appropriate further learning to bachelor's degree level
• **or** an NVQ4 or SVQ4 which has been approved for the purpose by CIBSE or by licensed engineering institution provided this is in a subject relevant to building services engineering.

Appendix A shows the output standards expected from a Bachelors (Honours) degree appropriate for CEng. The modifications to these for an accredited MEng degree and for degrees accredited for IEng are also provided.

It is important to note that the listing of different learning outcomes does not imply a compartmentalised or linear approach to learning and teaching. Throughout each programme, a number of different learning outcomes are likely to be delivered concurrently, through, for example, project work.

The process of accreditation will include an assessment of whether graduates are achieving these outcomes. Accrediting institutions may judge that a certain level of achievement at graduation is necessary to secure the outcomes.

MEng degrees differ from Bachelor's degrees in having a greater range of project work, usually including a group project. They also provide a greater range and depth of specialist knowledge, within a research and industrial environment, as well as a broader and more general educational base, to provide both a foundation for leadership, and a wider appreciation of the economic, social and environmental context of engineering.

IEng Bachelor's degrees, **Foundation degrees** and **Higher National** qualifications will have an emphasis on the application of developed technology and the attainment of know-how, sometimes within a multidisciplinary engineering environment. The breadth and depth of underpinning scientific and mathematical knowledge, understanding and skills is provided in the most appropriate manner to enable the application of engineering principles within existing technology to future engineering problems and processes.

For Masters degrees other than integrated MEng programmes, these standards will be a reference point. However, because of the wide range of such degrees, and the specialist nature of most of them, the principal reference points are likely to be the qualification descriptor for Masters degrees issued by the Quality Assurance Agency (QAA) and the Scottish Credit and Qualifications Framework (SCQF) Partnership. The Institution provides separate guidance for the accreditation of Masters degrees.

Engineering Technician (EngTech)

There is no accreditation procedure for qualifications leading to EngTech. Individuals who hold a qualification which has been approved by a licensed professional engineering institution, such as CIBSE, as providing evidence of part or all of the required competence are regarded as standard route applicants for EngTech registration. Individuals who have successfully completed an approved engineering-based Advanced/Modern Apprenticeship or equivalent programme provide the most obvious example. They will need to provide evidence that their apprenticeship included training integrated with substantial working experience, and to demonstrate commitment to future development of their competence and to the Institution's code of conduct. This may fulfil all of the EngTech competence requirements and so can lead directly to Engineering Technician registration.

Many other qualifications may also be acceptable as evidence that part of the necessary competence has been acquired. These include an EdExcel level 3 BTEC Certificate or Diploma in Engineering or Construction and the Built Environment, and programmes, employer schemes and qualifications set at or above level 3 in the Qualifications and Credit Framework (or level 6 in the Scottish Credit and Qualifications Framework) which have been approved by CIBSE or a licensed professional engineering institution.

Each professional institution has a list of programmes and qualifications which it has approved. The Engineering Council has a searchable database of approved qualifications and programmes. Please check the Engineering Council website: www.engc.org.uk

1.5 Academic Content

The following guidance is not intended to be prescriptive and is essentially indicative in nature. The Chartered Institution of Building Services Engineers seeks to encourage new and imaginative interpretations of Building Services Engineering and does not wish to impose a definitive course structure or curriculum on educational establishments. Course Leaders are encouraged to contact the Institution for further clarification of these notes or to discuss any ideas or possible contentious issues at an early stage of course planning.

To be accredited as meeting the academic requirements for membership of CIBSE a degree must be first and foremost an engineering degree. It must meet the learning outcome requirements of UK-SPEC and follow the CIBSE Guidelines on accredited courses.

To meet the academic requirements for Chartered Membership of CIBSE either an accredited MEng or an accredited BEng (Hons) plus suitable further learning is required. To meet the academic requirements of CIBSE for Associate membership an IEng degree or equivalent is required (See Section 1.4 on Exemplifying Qualifications).

The content of a Building Services Engineering course should be essentially the same irrespective of the programme but the depth and emphasis will need to reflect the type of degree. The MEng degree will contain additional material to the other degrees. This additional material will either broaden the degree to cover allied fields of relevance, such as management, or provide an in-depth coverage of specialist areas of engineering topics. Further learning, additional to the BEng (Hons), would likewise offer broadening or deepening study which does not repeat content from the undergraduate programme followed.

a) Common Degree Content

1. A common core topic for all engineering courses is Mathematics and broadly 5% to 10% Mathematics will be embedded within the course.

2. There should be a sound base of appropriate engineering principles comprising about 25% of the course and containing the essential elements of:

material science	physics
heat transfer	fluid mechanics
thermodynamics	electrical & electronics principles
engineering mechanics	control theory and instrumentation

The extent and balance would be variable but normally it would be expected that all these core topics would be covered to a reasonable extent.

In addition it would normally be expected that at least some the following topics would be covered:

design methodology	communication skills
experimentation	historical aspects
information technology	

These topics may be covered wholly or in part in common with other engineering degrees.

3. Specialist subjects, specific to the discipline of Building Services Engineering, should comprise about 40% of the course and would be typically:

human physiology	daylighting and artificial lighting
heating	electrical installation
ventilation	electrical power systems
air-conditioning	building thermal performance
fan engineering	utility services
refrigeration	building transportation
acoustics and vibration	individual design project work

management

health and safety

control engineering

dynamic modelling

construction law

It would not be essential for all of these topics to be addressed as there are many possible specialisms that would be acceptable although the grouping in any course or option would be expected to be a coherent group of topics. In addition, studies of other relevant related subjects might be included:

group design project work

research project work

foreign language

the construction industry

project management

statistics

software development

façade engineering

fire engineering

energy engineering

environmental engineering

computer aided engineering

manufacturing technology

quality assurance

financial accounting

4. The engineering subjects should be taught in the context of design (see **Appendix C**-Design in Degree Programmes) with appropriate account of issues of:

- Sustainability (see **Appendix D**- Sustainability Development in Degree Programmes)
- Health and Safety (see **Appendix E**-Health and Safety Risk Management in Degree Programmes, and
- Construction

so that each forms a continuous and integrating thread running through the programme.

5. Multi-disciplinary design should be encouraged in project work. Departments of Schools should consider developing design opportunities with other Departments such as architecture.

6. There should be strong, viable and visible links between the Department/School and the profession. It is essential that local practising engineers should become involved with the education of students by, for example, giving appropriate lectures, internal talks, assisting with design projects, acting as industrial tutors and enabling site visits. Regular site visits should be an important element within the programme. It is strongly recommended that an industrial liaison group is established that meets regularly to advise on the programme content, implement change, and identify local and national needs for graduate employment and how this relates to the programmes. Departments/Schools should also refer to **Appendix F** on Industrial Placements in Degree Programmes

7. CIBSE wishes to encourage career progression and believes that if 'Professionalism' can be embedded into engineering education, this will make degree programmes more attractive and ensure that graduates have the appropriate skills to work effectively in the industry. It therefore requires that degree programmes put forward for accreditation contain elements which provide a good understanding of a broad range of inter-related social, economic and environmental issues. An understanding of how core skills can be utilised to assist with these issues should back up these course elements. Details of how professionalism can be incorporated into the teaching and learning process is referred to in **Appendix G** on Professionalism.

8. Every programme would be required to encompass a major individual investigative project which will be individually assessed. This should provide scope for initiative, creative thinking, understanding the research method involved, and should be intellectually challenging. Where possible students should be exposed to research that is taking place within the Department/School. Projects should ideally be linked to real problems and undertaken towards the end of the programme.

9. The remaining 25% of the programme should be devoted to topics relevant to engineering as, for example, project management, facilities management, legal aspects and so forth.

1.6 Accreditation of Foundation Degrees

Foundation Degrees may be accredited by CIBSE as partially meeting the requirements for ACIBSE IEng registration.

CIBSE will consider requests to accredit Foundation Degrees. In doing so, and before agreeing to undertake accreditation, the Department/School will be expected to provide information on the Degree similar to that for Bachelor's Degrees (see section 3). For educational providers seeking accreditation of Bachelors or Masters Degrees as well as Foundation Degrees additional information is required. This would include information about:

- The degree awarding body and its relationship with any other FD programme provider(s)
- Progression opportunities
- Careers information and guidance given to the FD students
- How the quality of any provision in the workplace is assured by the degree awarding body
- Systems for the accreditation of prior learning/experiential learning

A visit to the education provider will normally be undertaken, including each franchisee. However, mechanisms to reduce the resource required for a visit will be explored.

CIBSE will be free to decide whether to approve Foundation Degrees as exemplifying qualifications towards EngTech registration.

CIBSE may wish to accredit a FD leading to a bachelor's degree even if that bachelor's degree is not accredited.

1.7 Compensation

All university examination boards may decide that a strong performance by a student in one part of the programme may compensate for under-performance elsewhere. UK-SPEC Regulations require universities to have regard to the following guidance on compensation:

- Compensation should be allowed
- Major projects should not be compensated
- Normally only up to 20 out of 120 credits in the final year can be compensated
- Compensation should not undermine the overall learning outcomes of the programmes.

1.8 How to apply

When an educational establishment believes it has a programme that would benefit from accreditation by CIBSE it should contact the Membership and Accreditation Coordinator. Contact information can be found at https://www.cibse.org/membership/contact-membership Joint accreditation visits can be organised by the Engineering Accreditation Board (EAB) which acts as a single point of contact. EAB-organised visits are appropriate when accreditation is sought for either mixed discipline degrees or a range of engineering courses by a number of Engineering Council Licensed Members. EC provides the Secretariat for EAB and further information is available at www.engab.org.uk It is rare that a degree programme that embraces the principles of engineering cannot be accredited.

Although a programme may be accredited by a particular Licensed Member, once accredited it appears in the full list maintained by CIBSE and also EC, available at www.engc.org.uk/registration/acad/search.aspx Additionally, accredited qualifications will normally appear in the UK section of the FEANI Index of recognised European qualifications (www.feani.org). An accredited programme may also provide the basis for professional recognition by other professional engineering institutions.

2. THE ACCREDITATION PROCESS

2.1 General Information

Decisions concerning the accreditation of programmes are made by the CIBSE Accreditation Panel which meets three times a year and, if necessary, will arrange interim meetings. Judgements are made on the basis of the submission document submitted by the University concerned and the report of the accreditation team following the accreditation visit.

A full accreditation visit lasts for 2 days and follows a standard format (see section 3). It is carried out by an accreditation team normally comprised of two academic members and one or two industrialists plus a secretary. Occasionally the accreditation team may be accompanied by one or more observers, such as a trainee moderator, an EC representative or representatives from international professional bodies. Where an MSc programme is being submitted for accreditation with undergraduate programmes then this will be considered on the visit and a full submission in accordance with the guidance on the accreditation of MSc programmes is required.

The accreditation team will not include members that have served (or are currently serving) as external examiners, consultants or advisers to the educational establishment making an accreditation submission in the preceding three years.

Full accreditation visits are usually carried out every 5 years as required in UK-SPEC. Although the principal aim of accreditation visits is to assess compliance with the CIBSE guidelines, the accreditation team will always try to adopt a supportive approach and create a helpful atmosphere throughout each visit. The accreditation team will highlight any examples of good practice as well as identifying any suggestions for improvement or further development.

2.2 Pre-Visit Arrangements

The educational establishment seeking accreditation of its programmes will normally be given 6 months' notice of the visit. Prior to the visit the University will be contacted by the CIBSE Secretary to discuss dates and when confirmed will contact the University with the full names and contact details of the accreditation team. The University has the right to object to one or more of the team members but, in doing so, must provide a written explanation for the objection.

No later than eight weeks before the visit, the University is required to provide a copy of the submission document (see section 5). A copy of the proposed visit programme should be sent to the CIBSE Secretary within four weeks of the accreditation visit. For the recommended programme for accreditation visits for academic programmes please refer to section 3.

2.3 Additional Information Required for the Accreditation Visit

Please be prepared to produce the following during the accreditation visit:

- Marked examination scripts (the examination papers, model answers, and marking schemes will normally be included by the educational establishment as part of the submission document).
- Marked samples of coursework (with feedback given to students).
- Individual projects and dissertations (including the marks and marking schemes used in the assessment).
- Marked design project work (including drawings).
- Marked laboratory reports.
- Marked class tests (or other similar in-class assessments).
- Copies of poster displays.
- Industrial training reports submitted by students and employers (sandwich programmes only).

Any student work that is to be inspected should be set out in a room set aside for the accreditation team with appropriate labels so that the team can identify clearly the module of study, the year of study and the programme associated with each item of work.

2.4 After the Accreditation Visit

The visit Secretary will produce a visit report for consideration by the accreditation Team Leader within four weeks of the visit. The Team Leader then has a further two weeks to consider the report and make amendments, as appropriate, before it is circulated to team members for additional comments.

The University will be sent a copy of the report within eight weeks of the visit for checking for factual accuracy. This will not include the conditions or recommendations made by the accreditation team regarding accreditation or possible changes or improvements to the programme(s). Once the educational establishment has confirmed factual correctness of the visit report then the full visit report, inclusive of the requirements and recommendations, will be considered by the CIBSE Accreditation Panel at its next scheduled meeting.

The decisions of the CIBSE Accreditation Panel for each of the programmes submitted for accreditation will normally be one of the following:

(a) accreditation for five years, with or without recommendations for implementation by the University;

(b) accreditation for less than five years, subject to certain requirements being met immediately following the visit. The remaining period of accreditation will be granted subject to the successful completion of a review visit or a review of a paper submission. The review visit will be carried out to assess the specific concerns identified by the Accreditation Panel in the full visit report;

(c) that a resubmission be made, after recommended remedial action has been taken;

(d) that accreditation is not recommended.

In the event of accreditation being withdrawn, none of the students enrolled on a programme of learning at the time of a full accreditation visit will be adversely affected by any decision taken by the CIBSE Accreditation Panel.

The definition of a '***recommendation***' and a '***requirement'*** is

a ***recommendation*** is intended to assist the awarding institution and is directed to programme enhancement. It does not require implementation in order for accreditation to be conferred. For example, the accreditation team may feel that the educational provider could do something in a more efficient way or there may be practice from elsewhere that the university may benefit from exploring. After consideration by the HEI or FE college, the recommendation may or may not be acted upon. However, whatever the outcome, it should be reported on during the next visit to demonstrate that it has been considered.

a '***requirement***' is something that must be completed in order for CIBSE to consider conferring accreditation. This will normally be reported on by the HEI or FE college in an action plan that is requested by the Accreditation Panel and there will be a deadline for its implementation. The requirement may specify making a change or ask for the development of a plan of action.

2.5 Review Visits

A review visit is normally recommended following an accreditation visit where the accreditation team has identified a number of concerns or requirements for action and a period of accreditation of less than 5 years has been granted. In some cases, a review visit is required to assess the output from a programme of learning that was not available for inspection at the last full accreditation visit.

A review visit normally lasts one day and is carried out by an accreditation team comprised of one academic member, one industrial member and a Visit Secretary. Either the academic member or the industrial member of the review team should normally have been a member of the accreditation team conducting the previous full accreditation visit.

The principal aim of a review visit is to determine if the educational establishment has taken appropriate satisfactory action to address all the concerns identified by the accreditation team following the last full accreditation visit. In some cases, it is also to inspect the output from programmes of learning that was not available for inspection at the last full accreditation visit, to judge if the appropriate output standards have been achieved.

The educational establishment should prepare a submission document explaining how the concerns raised by the CIBSE Accreditation Panel following the last full accreditation visit have been addressed. The document should also describe any significant changes that have occurred since the last full visit. This is to help the accreditation team to gain an up-to-date understanding of the situation in the Faculty, School or Department at the time of the review visit.

Such changes may include new staff appointments, staff departures, increased investment in relevant teaching and research, any changes in the management and organisational structures, etc. An output standards statement is required for each programme submitted for re-accreditation (see Section 5).

The review visit programme should be tailored to suit the specific aims of the review visit identified in the accreditation visit report. This should normally start with a private meeting of the accreditation team (to last 1 hour) followed by a meeting of the team with the senior academic staff. It is usually not necessary to meet with all academic staff, students, the Vice-Chancellor (or Principal or Chief Executive) or with members of the Industrial Advisory Board unless such meetings will help to demonstrate how the educational establishment has addressed the concerns raised by the CIBSE Accreditation Panel. A tour of facilities is not required unless this was included in the reasons for the review visit. Most review visits can normally be completed between 10:00am and 4:00pm.

Following the review visit the procedure as described above for full accreditation visits will apply to review visits.

3. PROGRAMME FOR ACCREDITATION VISITS

The following guidance has been prepared to assist Heads of Departments or Schools in making arrangements for visits by the CIBSE accreditation team. To some extent timings will be dictated by the travel arrangements of the team.

The programme is flexible, to a degree, and detailed timings are left to the Head of Department or School but the following elements should be included:

(1) An inspection of examples of project and dissertations, course work and engineering design work. Those members of the academic staff responsible for setting and supervising the work presented should also be available if required.

(2) A short meeting with a random selection of students from all years with no members of the academic staff being present. It would assist the accreditation team if some Staff-Student Liaison Committee members could be amongst the students chosen to participate.

(3) A meeting with as many members of the academic staff as possible to discuss various aspects of the programme(s). This would best be done towards the end of the visit.

(4) Short meetings of the accreditation team with programme leaders (including the Head of Department or School) at the commencement of the visit and at the end of the visit.

(5) A short period when the accreditation team can meet privately to agree the subjects to be raised with members of the academic staff.

(6) A tour of Departmental facilities such as laboratories, workshops, drawing/design office, lecture theatres, computer facilities and library. This should be done when students are using the facilities where possible. CIBSE wishes to emphasise the importance it places on experimental work.

(7) A meeting with a senior member of the higher educational staff such as the Vice-Chancellor.

It has been found that useful exchange of information can be conducted over meals held in an informal manner. Lunch should be provided by the Department or School and should be as informal as possible. A standing buffet would give the accreditation team the best chance of mingling with members of the staff. It is preferable that students should not be included.

From past experience, it is suggested that the programme for a visit should be along the following lines.

FIRST DAY

11.00 – 11.30	Accreditation team arrives.
11.30 - 12.00	Preliminary meeting of the accreditation Panel.
12.00 - 12.30	Meeting of the visiting Panel with Head of Department or School and programme leaders. 10 minute presentation **outlining changes** to degree courses since the last visit.
12.30 - 13.30	Buffet lunch with Faculty and University Staff.
13.30 - 15.00	Tour of Departmental/School facilities.
15.00 - 17.00	Private inspection by the accreditation team of display showing examples of project reports, course work, from all years and relevant groups.
17.00 - 18.00	Meeting of the accreditation team with representatives of the Industrial Liaison Committee or its equivalent.
19.00 - 21.30	Dinner with senior academic staff.

SECOND DAY

9.00 - 9.30 am	Courtesy call on Principal/Vice Chancellor/Director.
9.30 - 10.30	Meeting with students.
10.30 – 11.00	Private meeting of the accreditation team.
11.00 - 12.15	Meeting with academic staff.
12.15 - 12.45	Private meeting of the accreditation team.
12.45 – 13.00	Final meeting of the accreditation team with Head of Department/School.
13.00	Buffet lunch and depart

The University will be responsible for bearing the cost of accommodation for the visiting members of the accreditation team for the overnight stay. It would be appreciated if the University would arrange appropriate accommodation at a local hotel.

4. PROCEDURE FOR REVIEW OF CIBSE ACCREDITATION DECISIONS

4.1 General Requirements

CIBSE will advise academic institutions of their right to a review of a decision if a request for accreditation of a particular programme is rejected. Any request for a review will be considered in accordance with the following procedures.

4.2 Grounds for Review

The grounds on which a review shall be approved shall be:

- that there is evidence of administrative, procedural or other irregularity in the conduct of the visit or the meetings of the Accreditation Panel at which the decision was taken:
  or
- that information has become available which would influence the decision and which was not and could not have been available at the time of the visit.

4.3 Stages of the Review

1. The applicant educational establishment must submit a written notice of intent to request a review to the Secretary of the Accreditation Panel within 15 days of the receipt of the Institution's decision.

2. A detailed report stating grounds for seeking a review, together with a fee of £100, returnable at the discretion of the Review Panel, shall be submitted to the Secretary of the Accreditation Panel within 30 days of the receipt of the Institution's decision.

3. The Chairman of the CIBSE Professional Practices Committee shall nominate a Review Panel, consisting of three serving CIBSE members drawn from Education, Training and Membership Committee and its executive panels, who have had no involvement in the in the accreditation decision or with the educational establishment concerned.

4. The educational establishment will be notified of the composition of the Review Panel and may object to particular members' inclusion in writing. The CIBSE President shall determine whether or not to change the membership of the Review Panel.

5. The Review Panel shall convene to consider the original submission for the visit, the visit report and decision, and the educational establishment's appeal report. The Review Panel may at their discretion meet with members of the original accreditation team and/or the Head of Department or School (or his/her nominee) of the educational establishment. They may also arrange to visit the educational establishment for further investigation. Such discussions and the meeting of the Review Panel shall be conducted in confidence. The Review Panel will prepare a written report of its decision within 100 days of receipt of the report from the educational establishment setting out the case for review.

6. The Review Panel report will be submitted to the Chairman of the Education Training and Membership Committee, who shall report it to the University and to the next meeting of ETM.

7. During the period of the review, the outcome of the accreditation process will be suspended.

4.4 The Decision

The Review Panel may decide that:

1. The original Accreditation Panel decision should stand;

2. The report should be amended in accordance with the Review Panel's recommendations, and any such amendments be reported to Accreditation Panel and the Education, Training and Membership Committee.

5. THE SUBMISSION DOCUMENT

The submission should be made in the form of a report which gives all the information requested in this document. For easy reference this should be done under the numbered sections and subsection headings (see below). Additional information may be submitted at the discretion of the University.

Please send both an electronic and a hard-copy of the submission document, at least eight weeks in advance of the visit:

- Electronic copies should be sent either by email or Dropbox to the Membership and Accreditation Coordinator
- A hard copy of the submission should also be posted to:

  Membership and Accreditation Coordinator
  CIBSE
  222 Balham High Road
  London SW12 9BS
  UK

When completing the document please ensure that:

1. All core information is supplied in the relevant sections, on the submission document (unless indicated otherwise).
2. Information is not duplicated.
3. All statistics are double-checked.
4. Every page is numbered.
5. All documentation submitted is printed on both sides of the paper.
6. All documents are bound or stapled**.**
7. Each section or table may be expanded as required. However, the information supplied should be concise and the response should be restricted to 1xA4 page maximum (unless indicated otherwise).

The report should normally be in accordance with the section headings outlined below:

SECTION 1. GENERAL

1.1 Accreditation Contact

Give the name and full contact details of the staff member responsible for the accreditation process and visit administration.

1.2 Head of Department or School

Give the name, qualifications and date of appointment.

1.3 Programme Leaders

Give the name, qualifications and dates of appointment of programme leaders for all programmes to be considered

1.4 Title of Department or School

Give the full title of the Department or School offering the programmes to be accredited.

1.5 Title of Programme

Give the full title of the programme(s) to be accredited and relevant UCAS codes. State whether they are full-time, part-time, sandwich or distance learning. Give the duration of the programme and the commencement date of the programme in its present form.

1.6 Aims of the Programme(s)

State the aims and objectives of programme(s) and describe how their content and the quality of learning environment are intended to contribute to attainment of these. Include reference to the relevance of the programme(s) to the future needs of the construction industry. If MEng programmes are being submitted information must be included showing how these are enhanced beyond BEng (Hons) level. A statement should be included explaining how the proposals meet current EC output standards.

1.7 Programme Changes

Describe any changes made to the programme(s) since the date of the previous accreditation, if applicable.

Describe how the Department has addressed any issues raised by the Institution when previously considering the programme(s).

1.8 Foundation Degrees

See also section 1 above on the accreditation of Foundation Degrees. Where a Degree is franchised it will be necessary for the accreditation team to visit each facility and meet relevant teaching staff

A separate document is required for Foundation Degrees. This should include:

- Title of Degree
- Mode of study
- Degree content and syllabus, and the proportion of the programme studied at a franchised institution
- Details of franchised arrangements
- Quality assurance arrangements, including assessment and involvement of external examiner
- Staff teaching on the Degree
- Teaching facilities

- Degree completion rates and numbers that have progressed to an accredited Bachelor's degree.

SECTION 2. PROGRAMME CONTENT

2.1 Programme Structure

Provide a diagram for each programme(s) structure and mode of delivery clearly showing core and optional subjects and all routes through the overall programme(s) or indicate where this information is provided elsewhere in the document.

2.2 Syllabuses/Module Descriptors

Module descriptors including the recommended reading material for each year of the degree(s) should be provided as a separate appendix. The descriptors should show the pre-requisites and co-requisites. Please identify which modules are shared with other degree programmes.

2.3 Time-Tabled Teaching Hours

The information required under this heading will best be given in tabular form along the lines suggested below and should give the time-tabled hours in typical weeks for each year against the various meetings.

	YEAR 1	YEAR 2	YEAR 3	YEAR 4
Lectures				
Tutorials				
Classes/Seminars				
Laboratories				
Drawing/Design Office				
Project				
Fieldwork				
	_______	_______	_______	_______
Total Hours Per Week	_______	_______	_____	_______
Private Study Expected	_______	_______	_______	_______
Total Weeks Per Year	_______	_______	_______	_______

2.4 UK-SPEC

Undergraduate engineering programmes must demonstrate through their teaching and assessment methods that graduates have reached the desired threshold level of each of the Output Criteria specified in the UK-SPEC document “The Accreditation of Higher Education Programmes.

For each year of the programme(s) please complete the matrix included in Appendix B indicating how the programme modules satisfy 1) the General Learning Outcomes and 2) the Specific Learning Outcomes. A separate form should be completed for each programme to be accredited.

Please provide a statement not exceeding 200 words explaining how the programme(s) has been designed to meet the General Learning Outcomes from UK-SPEC.

2.5 Projects

Provide details of the arrangements for individual and group projects: how the topics are arrived at, tutorial support provided, teaching of research methods, and assessment. Please include a list of recent project topics. The accreditation team will wish to see project work, including marks, during the accreditation visit. Include, where available, in a separate appendix, the *Student Project Handbook.*

2.6 Design

State how the concepts of engineering design are introduced and the degree to which it is an intrinsic part of the programme (refer to Appendix C).

Provide a **threads diagram** for each programme showing where design is incorporated.

2.7 Health, Safety and Risk Management

Risk Assessment: State how the Guidelines have been incorporated into the programmes (refer to Appendix E).

Provide a **threads diagram** for each programme showing where health, safety and risk assessment are incorporated.

2.8 Sustainability Issues

State how the Guidelines have been incorporated into the programmes (refer to Appendix D).

Provide a **threads diagram** for each programme showing where sustainability issues are incorporated.

2.9 Communication Skills

Describe:

(a) What steps are taken to assess and improve the standard of the English used in written work?

(b) How oral communication skills are developed?

(c) How draughtsmanship and sketching ability are developed including use of computer-aided drawing.

(d) How IT skills are developed

2.10 Field Courses

Give details of field courses.

2.11 Engineering Applications

Give details of exposure to engineering applications in the course.

2.12 Period of Study Overseas

Give brief details of any period of time spent overseas, indicate the length of time spent abroad and in which university it takes place. Outline the arrangements to ensure that the study is compatible with that in the home university, show how it is assessed. Does this period contribute to the degree result?.

2.13 Further Learning

The content and approach to Further Learning should be provided where applicable and how this meets the requirements of CEng and IEng.

2.14 Sandwich students

Describe the arrangements made to find suitable experience during periods in industry for sandwich students and how this is supervised and assessed (see Appendix F on Industrial Placements).

4.12 QA Procedures

Include a statement of procedures operating in the Department/School. The appropriate QA documents should be available during the visit.

SECTION 3. ENTRY STANDARDS

3.1 Published Entry Requirements

Give the published minimum entry requirements.

Please provide a copy as an annex of the undergraduate prospectus.

3.2 Student Entry Standards

Please provide an anonymous list of each cohort's entry profile.

3.3 Special Cases

Give details of student intake through current schemes.

3.4 Direct Entry

Give the qualifications required for direct entry to the later years of the programmes.

3.5 Selection Procedures

Please provide details of your procedures concerning selection for admission to programmes, including a statement on the use made of interviews. State whether all students are interviewed and give the policy adopted for overseas applicants. Overseas students are defined as being students whose normal county of domicile is outside the European Union.

3.6 Student Numbers

Give detailed information of the student intakes for the last three academic years in the (where applicable) and overall numbers on each year of the programme(s). This will best be done in the form of a table. Please provide information on procedures for transfer between programmes.

SECTION 4. TEACHING STAFF AND TEACHING METHODS

4.1 Academic Staff

A list of the Department or School staff involved in the teaching of the programme(s) is required. This should give dates of their academic and professional qualifications, with details of their employment and experience. The list should also include members of other Departments who make significant contributions to the course.

Please provide details of your staff development policy.

4.2 Summary of Professional Qualifications

The information required should be given in the following way. Numbers only are required.

Chartered Engineers

MCIBSE
FCIBSE
Mechanical/Electrical
Other

Incorporated Engineers

ACIBSE
Other
(Include against the appropriate heading those who are members of more than one Institution).

Details of other professionals

4.3 Representation of Chartered and Incorporated Engineers

Please give information on the proportion of differently qualified staff. Numbers only are required.

Chartered Engineers
Non Chartered Engineers
Other academic staff
Total Academic Staff

4.4 Student: Staff Ratio

Give the Departmental student: staff ratio based on full-time equivalent students and staff. Mention should also be made of the effect of postgraduate and diploma courses on the ratio. Some Departments/Schools may wish to give more than one figure. Please give a statement on how this is calculated e.g. post-graduates weighted or un-weighted, categories of staff counted etc.

4.5 Supporting Staff

Give details of laboratory demonstrators (e.g.-postgraduate students) and funded technicians, administrative and secretarial staff. Numbers only are required.

4.6 Classes to Support Student Learning

Give details of Departmental tutorial and similar arrangements including student/staff contact hours and size of groups.

4.7 Inter-Departmental Teaching

Give details of the arrangement made for teaching subjects not based within the Department or School.

4.8 Staff-Student Liaison Committee

Please describe the role of the Staff-Student Liaison Committee, whether there is a mechanism to enable student feedback and how it is included in any regular course reviews.

4.9 Research and Consultancy Activities

Comment on the influence which the Departmental research and consultancy work has on the teaching and project work of the students.

SECTION 5. PROFESSIONAL CONTACT

5.1 Input by Practising Engineers

Give details of any input to the programme(s) review and development by practising engineers, and their involvement on the programmes. Include details of input on project work and list recent lectures given by practicing engineers and contact with the CIBSE Region.

Please include information on the industrial liaison committee, including recent minutes of meetings, in the programme documentation.

Please provide details of any industrial mentoring schemes.

5.2 Site Visits

Give details of arrangements for site visits by the Department/School. Please give a statement on how students are encouraged to benefit from these in their ongoing studies.

5.3 Vacation Work

Give details of the arrangements made for students to obtain practical engineering experience during vacations. Indicate what percentage of students is able to find suitable experience.

5.5 Student Membership

Estimate the percentage of students who are members of CIBSE for each year of the programme(s). Please provide the name of the Student and Staff Liaison Officers for CIBSE.

SECTION 6. EXAMINATION PROCEDURES

6.1 Examination Papers and Solutions

Members of the accreditation team will require copies of all end of session examination papers set for each year of the programme, together with model solutions for the most recent year only. Please supply this information in a separate annex.

For new programmes, typical assignments and examination details are required.

6.2 Weighting of Assessments

Give details of the contributions made by examinations, coursework and projects/dissertations for each year of the programme.

6.3 Classification Procedures

Give details of the contribution made to final assessments by examinations in the final year, examination results from earlier years if applicable, and by projects. Give the percentage marks for the award of Honours degrees at class I, II/1, II/2 and III levels. In unclassified awards, state the criteria for determining 'pass', 'merit' or 'distinction' grades.

6.4 Referral Procedures

Give details of procedures for referring students who have not fully satisfied the examiners at the first attempt, including the condoning of failed elements of the course. Please refer to section 1 of the guidance on compensation rules.

6.5 Selection for Honours

Where applicable, describe the procedures for selection for MEng streams and streaming candidates for Honours degrees.

6.6 Pass

State whether a candidate for Honours who fails to meet the requirements for Class III may be awarded a Pass degree on a full Honours programme. If so state what overall Pass mark is required, and any other conditions are to be satisfied.

6.7 Degrees Awarded

Give details of the degrees awarded for the past five years. Please use a table as follows

YEAR	**Bachelor's Degrees**					**MENG**	**CLASSIFICA-TION (IF USED)**	**FAIL**	**TOTAL**
	I	II/I	II/2	III	Pass on Honours Course				
TOTAL									

Note: Under 'Pass' show only those graduates who followed the whole Honours course but were awarded a Pass degree. Under 'Fail' show only those who failed the final year examinations. For IEng degrees that are no-Honours pass/fail data should be provided.

6.8 Course Completion Rate

Give details of the overall dropout rate from all sources such as examination failure, transfer to other courses, withdrawal etc. for the past three years. This should be expressed as a percentage of student entry.

Where the information exists, a cohort analysis of the performance of students completing the programme during the last three years should be given.

6.9 External Examiners

Give the names and tenures of office of your External Examiners for the past five years. Provide copies of the External Examiners' Reports for the last three years, as appropriate.

SECTION 7. FACILITIES

7.1 Teaching Facilities

Give details of the available facilities under the following headings, indicating changes since the last approval exercise:

(a) Laboratories and workshops/lecture rooms

(b) Drawing/design offices

(c) Library

(d) Computers

(e) Software packages

(f) Accommodation for private study.

7.2 Student Facilities

Give details of the facilities available to students under the following headings. Indicate any changes since the last visit.

(a) Sport and Recreation

(b) Welfare

(c) Personal tutorial arrangements.

SECTION 8. RESEARCH, CONSULTANCY AND POSTGRADUATE COURSES

8.1 Research and Consultancy

Give details of the research and consultancy work being carried out in the Department or School.

The estimated value of research grants and consultancy work awarded to the Department or School should also be given, as described below. State current numbers of research students and research staff.

The value of research commenced in the last three years should be given, and the assessed annual value of completed research contracts over the same period (£ per annum).

8.2 Research Assessment Exercise

Please give the last ranking achieved.

8.3 Papers Published

Provide a list of papers published during the last two years.

SECTION 9. RESOURCES

Give details as to how financial or other considerations have affected the course in recent years.

SECTION 10. GRADUATE EMPLOYMENT

Provide a statement on the current situation relating to the employment of graduates, indicating numbers who find employment in other professions.

SECTION 11. FUTURE PLANS AND INTENTIONS

Give details of any major changes planned or intended in course structure, course content, student numbers, staff or facilities, and recruitment of a broader based cohort of students. CIBSE should be informed at the time when any of these changes are put into effect.

APPENDIX A. OUTPUT STANDARDS. EXTRACT FROM: 'UK Standard for Professional Engineer Competence: The Accreditation of Higher Education Programmes'

General Learning Outcomes

Graduates with the exemplifying qualifications, irrespective of registration category or qualification level, must satisfy the following criteria:

Knowledge and Understanding: they must be able to demonstrate their knowledge and understanding of essential facts, concepts, theories and principles of their engineering discipline, and its underpinning science and mathematics. They must have an appreciation of the wider multidisciplinary engineering context and its underlying principles. They must appreciate the social, environmental, ethical, economic and commercial considerations affecting the exercise of their engineering judgement.

Intellectual Abilities: they must be able to apply appropriate quantitative science and engineering tools to the analysis of problems. They must be able to demonstrate creative and innovative ability in the synthesis of solutions and in formulating designs. They must be able to comprehend the broad picture and thus work with an appropriate level of detail.

Practical skills: they must possess practical engineering skills acquired through, for example, work carried out in laboratories and workshops; in industry through supervised work experience; in individual and group project work; in design work; and in the development and use of computer software in design, analysis and control. Evidence of group working and of participation in a major project is expected. However, individual professional bodies may require particular approaches to this requirement.

General transferable skills: they must have developed transferable skills that will be of value in a wide range of situations. These are exemplified by the Qualifications and Curriculum Authority Higher Level Key Skills and include problem solving, communication, and working with others, as well as the effective use of general IT facilities and information retrieval skills. They also include planning self-learning and improving performance, as the foundation for lifelong learning/CPD.

Specific Learning Outcomes in Engineering

Graduates from accredited programmes must achieve the following five learning outcomes, defined by broad areas of learning. As set out here, the outcomes apply to accredited programmes at Bachelor (Honours) level leading to CEng registration. See pages 21 and 22 for an explanation of how they might be applied to accredited MEng degrees and to accredited Bachelor's degrees leading to IEng registration, respectively.

The weighting given to these different broad areas of learning will vary according to the nature and aims of each programme.

Underpinning science and mathematics, and associated engineering disciplines, as defined by the relevant engineering institution

- Knowledge and understanding of scientific principles and methodology necessary to underpin their education in their engineering discipline, to enable appreciation of its scientific and engineering context, and to support their understanding of historical, current, and future developments and technologies;
- Knowledge and understanding of mathematical principles necessary to underpin their education in their engineering discipline and to enable them to apply mathematical methods, tools and notations proficiently in the analysis and solution of engineering problems;
- Ability to apply and integrate knowledge and understanding of other engineering disciplines to support study of their own engineering discipline.

Engineering Analysis

- Understanding of engineering principles and the ability to apply them to analyse key engineering processes;
- Ability to identify, classify and describe the performance of systems and components through the use of analytical methods and modelling techniques;
- Ability to apply quantitative methods and computer software relevant to their engineering discipline, in order to solve engineering problems;
- Understanding of and ability to apply a systems approach to engineering problems.

Design

Design is the creation and development of an economically viable product, process or system to meet a defined need. It involves significant technical and intellectual challenges and can be used to integrate all engineering understanding, knowledge and skills to the solution of real problems. Graduates will therefore need the knowledge, understanding and skills to:

- Investigate and define a problem and identify constraints including environmental and sustainability limitations, health and safety and risk assessment issues;
- Understand customer and user needs and the importance of considerations such as aesthetics;
- Identify and manage cost drivers;
- Use creativity to establish innovative solutions;
- Ensure fitness for purpose for all aspects of the problem including production, operation, maintenance and disposal;
- Manage the design process and evaluate outcomes.

Economic, social, and environmental context

- Knowledge and understanding of commercial and economic context of engineering

processes;
- Knowledge of management techniques which may be used to achieve engineering objectives within that context;
- Understanding of the requirement for engineering activities to promote sustainable development;
- Awareness of the framework of relevant legal requirements governing engineering activities, including personnel, health, safety, and risk (including environmental risk) issues;
- Understanding of the need for a high level of professional and ethical conduct in engineering.

Engineering Practice

Practical application of engineering skills, combining theory and experience, and use of other relevant knowledge and skills. This can include:

- Knowledge of characteristics of particular materials, equipment, processes, or products;
- Workshop and laboratory skills;
- Understanding of contexts in which engineering knowledge can be applied (e.g. operations and management, technology development, etc.);
- Understanding use of technical literature and other information sources;
- Awareness of nature of intellectual property and contractual issues;
- Understanding of appropriate codes of practice and industry standards;
- Awareness of quality issues;
- Ability to work with technical uncertainty.

Applicability of Output Standards to MEng degrees

Graduates from an accredited integrated MEng degree will have the general and specific learning outcomes described here and will have some of these to enhanced and extended levels. Crucially, they will have the ability to integrate their knowledge and understanding of mathematics, science, computer-based methods, design, the economic, social and environmental context, and engineering practice to solve a substantial range of engineering problems, some of a complex nature. They will have acquired much of this ability through involvement in individual and group design projects, which have had a greater degree of industrial involvement than those in Bachelor's degree programmes.

General Learning Outcomes

The range of general learning outcomes described for graduates from Bachelors programmes will also apply to graduates from MEng programmes. In respect of general transferable skills, the following enhanced outcomes should be expected of MEng graduates:

- The ability to develop, monitor and update a plan, to reflect a changing operating environment;

- The ability to monitor and adjust a personal programme of work on an on-going basis, and to learn independently;
- An understanding of different roles within a team, and the ability to exercise leadership;
- The ability to learn new theories, concepts, methods etc. in unfamiliar situations.

Specific Learning Outcomes

In respect of the specific learning outcomes, MEng graduates will also be characterized by some or all of the following (the balance will vary according to the nature and aims of each programme):

Underpinning science and mathematics, etc.

- a comprehensive understanding of the scientific principles of own specialisation and related disciplines;
- an awareness of developing technologies related to own specialisation;
- a comprehensive knowledge and understanding of mathematical and computer models;
- relevant to the engineering discipline, and an appreciation of their limitations;
- an understanding of concepts from a range of areas including some outside engineering, and the ability to apply them effectively in engineering projects.

Engineering Analysis

- Ability to use fundamental knowledge to investigate new and emerging technologies;
- Ability to apply mathematical and computer-based models for solving problems in engineering, and the ability to assess the limitations of particular cases;
- Ability to extract data pertinent to an unfamiliar problem, and apply in its solution using computer based engineering tools when appropriate.

Design

- Wide knowledge and comprehensive understanding of design processes and methodologies and the ability to apply and adapt them in unfamiliar situations;
- Ability to generate an innovative design for products, systems, components or processes to fulfil new needs.

Economic, social and environmental context

- Extensive knowledge and understanding of management and business practices, and their limitations, and how these may be applied appropriately;
- The ability to make general evaluations of commercial risks through some understanding of the basis of such risks.

Engineering Practice

- A thorough understanding of current practice and its limitations, and some appreciation of likely new developments;
- Extensive knowledge and understanding of a wide range of engineering materials and components;
- Ability to apply engineering techniques taking account of a range of commercial and industrial constraints.

Applicability of Output Standards to IEng Programmes

IEng programmes will have an emphasis on developing and supporting the know-how necessary to apply technology to engineering problems and processes, and to maintain and manage current technology at peak efficiency.

A programme accredited for IEng will have the general learning outcomes described earlier in this document.

Specific Learning Outcomes

In relation to the specific learning outcomes, this focus on the application of developed technology and the attainment of know-how means that accredited IEng Bachelor's degree programmes will have a different emphasis from those for intending Chartered Engineers. In particular, they are likely to give a greater weighting to developing a knowledge and understanding of engineering practice and processes, and to have less focus on analysis. Design will still be a significant component, especially in integrating a range of knowledge and understanding, but the emphasis will be on designing products, systems and processes to meet defined needs.

Similar learning outcomes will apply to accredited Higher National and Foundation Degree programmes, with particular strengths emphasised in any Further Learning undertaken to satisfy the academic requirements for IEng registration.

Underpinning science and mathematics, etc.

- Knowledge and understanding of the scientific principles underpinning relevant current technologies, and their evolution;
- Knowledge and understanding of mathematics necessary to support application of key engineering principles.

Engineering Analysis

- Ability to monitor, interpret and apply the results of analysis and modelling in order to bring about continuous improvement;
- Ability to apply quantitative methods and computer software relevant to their engineering technology discipline(s), frequently within a multidisciplinary context;
- Ability to use the results of analysis to solve engineering problems, apply technology and implement engineering processes;

- Ability to apply a systems approach to engineering problems through know-how of the application of the relevant technologies.

Design

Graduates will need the knowledge, understanding and skills to:

- Define a problem and identify constraints;
- Design solutions according to customer and user needs;
- Use creativity and innovation in a practical context;
- Ensure fitness for purpose (including operation, maintenance, reliability etc.);
- Adapt designs to meet their new purposes or applications.

Economic, social and environmental context

- Knowledge and understanding of commercial and economic context of engineering processes;
- Knowledge of management techniques which may be used to achieve engineering objectives within that context;
- Understanding of the requirement for engineering activities to promote sustainable development;
- Awareness of the framework of relevant legal requirements governing engineering activities, including personnel, health, safety, and risk (including environmental risk) issues;
- Understanding of the need for a high level of professional and ethical conduct in engineering.

Engineering Practice

- Understanding of and ability to use relevant materials, equipment, tools, processes, or products;
- Knowledge and understanding of workshop and laboratory practice;
- Knowledge of contexts in which engineering knowledge can be applied (e.g. operations and management, application and development of technology etc.);
- Ability to use and apply information from technical literature;
- Ability to use appropriate codes of practice and industry standards;
- Understanding of the principles of managing engineering processes;
- Awareness of quality issues and their application to continuous improvement.

Appendix B Matrix of Output Standards

Learning outcome descriptions	**Year 1**					**Year 2**					**Year 3**				
	Module numbers														
Underpinning Science & Mathematics															
US1															
US2															
US3															
US4															
Engineering Analysis															
E1															
E2															
E3															
E4															
Design															
D1															
D2															

D3															
D4															
D5															
D6															
Economic, social & environmental context															
S1															
S2															
S3															
S4															
S5															
Engineering Practice															
P1															
P2															
P3															
P4															
P5															
P6															
P7															
P8															

APPENDIX C – DESIGN IN DEGREE PROGRAMMES

Context

CIBSE requires that design is integrated into existing teaching and learning, and must be pervasive throughout the engineering education programme; a design thread will therefore run though the programme.

In engineering a central activity is design, and the interpretation and execution of design. This may be as an individual or as part of a team involved in creative activities for which imagination, intuition, intellectual rigour, and choice are orchestrated to arrive at a particular solution; or as part of the engineer's role in developing new products, markets or strategic ideas; or on site, seeking to interpret and translate into reality someone else's design. Whatever the role, the engineer will normally be involved in the design process requiring the exercise of continuous judgement, adaptation, modification, ingenuity and nearly always a need for imagination and flair. In proposing solutions, deciding how they can be built and managing parts or all of the process from conception to production, the intellectual activities that are often referred to as "engineering design" play a central role. It is vital, therefore, that engineers receive in their early education a thorough grounding in those activities that are central to the design process.

The environment in which design projects are undertaken is extremely important. The design studio is the designers equivalent of the building site, and in much the same way it needs to contain the materials, tools, information and other resources for student design teams to perform effectively. Universities should endeavour to provide an environment and resources for students to undertake design work that reflects the best to be found in engineering practice. Such design studios should thus include facilities to allow and encourage the students to draw, make physical models, relax, reflect and obtain stimulation and inspiration.

Aims

The aim of undergraduate design teaching is to provide students with the basic design skills to allow them to progress smoothly into engineering practice.

Knowledge and understanding

The art of engineering design is probably best explored by examining some of the activities in which the design engineer is involved. While not exhaustive, the following represent some of the more important design attributes of a competent engineer:

- An understanding that design is a creative process in which experience and a thorough knowledge of historical precedent can inform both intuition and conscious choice.
- An ability to cope with the uncertainties associated with the multitude of factors making up the design brief. It is rare for a unique solution to emerge, and more commonly there will be any number of possible solutions for which the "best" solutions will represent an intelligent compromise.

- An ability to ‘think outside the box’. Could a better design be achieved if unnecessary constraints (explicit or implicit) in the brief were renegotiated?
- An ability to interact with clients to help both client and other team members develop a better understanding and definition of the brief and the functional, social and economic objectives.
- A knowledge of how to gather relevant information on environmental and planning issues, site conditions, material suppliers, collaborators, specialists and other contractors. All this information is needed to inform the design process.
- An ability to sort and synthesise all information so that proposed solutions can be tested against the criteria identified in the brief and the overall functional, social and economic objectives.
- Be comfortable working in a system which enables people to work together, and which allows them to plan and track progress towards a developing solution. This applies to both the subcomponents of design and the overall design process.
- An ability to justify the chosen solution to stakeholders.

Although the above suggests a sequential pattern of inception through conception to production, it is rare that the art of design can be performed in such a linear set of steps. There is almost always a need for backtracking. Design can be thought of as a "highly iterative process" involving "necessary compromises between conflicting needs, possibly with flashes of brilliant intuition, but also much hard work, self-criticism and discussion" in which "both visual and engineering understanding need to be combined from start to finish" of the design process (James Sutherland in "Bridge Design" The Royal Fine Art Commission, Seminar, 29 October 1992, HMSO).

Students will undertake a variety of different design tasks over the course of their studies and design teaching should form a thread running through the programme. Design should be based on realistic projects. In practice design is almost always a team activity and as such students should work in groups for a substantial part of their design learning.

Creativity is a mental process involving the generation of new ideas or concepts, or new associations between existing ideas or concepts. Real engineering projects are all unique and hence their design requires creativity. It is important that students develop their creative skills through design projects and other activities within their studies.

Intellectual ability

Design activity is capable of achieving a wide range of learning objectives. The emphasis in a particular degree programme will be expected to be varied, but should seek to cover an appropriate range of the following objectives:

- Develop a stimulating environment for creative, clear and logical thinking.
- Stimulate and encourage student interest and appreciation of engineering as an intellectual and professional activity.
- Make students more responsible for their own learning and intellectual development.

- Develop the habit of and ability for effective independent learning.
- Provide a platform for the improvement of oral and written presentation skills, both individually and as part of a team.
- Encourage clear communication through sketching and drawing.
- Develop an appreciation of the importance of the study of engineering history, the forces that have shaped that history and equally, how engineering developments have affected our material culture.
- Appreciate the relationships between art history, architecture and engineering, as part of the development of greater visual awareness.
- Through the study of past failures, develop an appreciation of the causes of failure and the need to "think failure to avoid it".
- Raise awareness of the complexity of engineering systems, and the need to listen to and interpret client needs, so as to be able to develop clear briefs.
- Provide a context in which the principles of engineering science, and other parallel taught
- courses, may be applied in the creative design process.
- Develop an appreciation that everything we do in design can be seen as a process that can be harnessed to encourage creativity.
- Increase awareness of and develop the skills for planning, tracking and evaluating the processes in design.
- Understand how the construction method, issues of safety and legislation, and the concepts of buildability can drive design.
- Understand how economy, sustainability, ethics, politics, and the impact on society can affect design.
- Understand how to identify and assess risks throughout the design process and decide on methods of elimination and/or control.
- Contextualise their theoretical studies.

Design teaching helps to motivate students generally and after entering practice graduates also routinely report that design projects are the most useful and exciting part of their undergraduate studies.

Practical skills

The student should be able to:

- Demonstrate through design work, project, coursework and/or examinations a strong awareness of and commitment to the principles of sustainable development.
- Demonstrate that they can evaluate the process in design.

General transferable skills

The student should be able to:

- Demonstrate team working skills.

- Demonstrate clear communication skills through their sketching and drawing.
- Develop their creative skills through design projects and other activities within their studies.
- Communicate knowledgeably about design issues especially to those with a non-technical background.

Method of teaching, learning and assessment

Design is best taught by giving students the opportunity to practise, albeit within an education environment and utilising case studies, reflective learning and other techniques as appropriate. It is recognised that high level design skills and experience are often hard to find in universities. As such, it is encouraged that practising engineers have an involvement both in the development and delivery of design teaching. Typically, this can be achieved through advice on setting projects and partial supervision of group design projects. In addition, any connections to clients and contractors would be beneficial.

A proper understanding and relevant skills in relation to Sustainability as well as Health & Safety are fundamental to the teaching and practice of design. Moreover, design projects provide a natural place for students to demonstrate their knowledge and practise their skills in relation to sustainability and Health & Safety. It is recommended that the three sets of guidelines in Appendices C, D and E are considered together, especially in relation to teaching and learning methodology and assessment.

APPENDIX D– SUSTAINABILITY IN DEGREE PROGRAMMES

Context

CIBSE requires that sustainable development be integrated into existing teaching and learning, and must be pervasive throughout the engineering education programme; a thread of sustainability will therefore run though the programme.

Engineers should be able to respond to societies' concerns about the impact of human activity on the environment. There is an increasing demand from governments and the public that this environmental concern is placed in the context of achieving the correct balance between environmental, social and economic outcomes within the overarching concept of sustainable development.

Aims

Students will become tuned to the need to design and engineer projects which minimise our impact on the environment, and which enhance humankind's endeavours in a sustainable manner.

Knowledge and understanding

The thread of sustainability running through the programme should enable a student to:

- Be aware of the implications of climate change, international protocols associated with climate change, and the low-carbon agenda and how it impacts on engineering design, construction and operation.
- Ensure that they take account of the context of environmental, economic, political, interdisciplinary, global and social issues, and other dimensions including ethics and environmental justice in dealing with engineering problems.
- Develop an awareness of the use of environmental management systems, environmental impact assessment and social impact assessment and how they are used on engineering projects.
- Be aware of resource scarcity, and the need to limit energy dependence.
- Be aware of sources of environmental, social, political and economic information and their application to the above.

Intellectual ability

The student should be able to

- Provide an interdisciplinary perspective on the practical problems associated with sustainability.
- Appraise build options in the context of the sustainability agenda.
- Look beyond technical design solutions to impacts on local stakeholders.

- Assess and mitigate environmental risk in given examples [1]
- Demonstrate knowledge of energy supply, and waste & water management.
- Demonstrate knowledge of life-cycle assessment, sustainable communities and related infrastructure.
- Develop a holistic approach to design.
- Develop the ability to critically evaluate assumptions built in to industry practices in order to be able to recognise where these are appropriate and where alternative approaches are needed to address sustainability requirements.

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Practical skills

The student should be able to:

- Demonstrate through design work, project, coursework and/or examinations a strong awareness of and commitment to the principles of sustainable development as outlined above.

General transferable skills

The student should be able to:

- Produce solutions to problems which are profoundly interdisciplinary in nature.
- Appreciate the importance to society in general of the impact of human activity on the environment.
- Communicate knowledgeably about sustainability issues especially to those with a non-technical background.

Method of teaching, learning and assessment

Teaching of sustainability should be embedded throughout many aspects of the taught curriculum, including design projects, dissertation projects, coursework and examinations. Where the subject forms the focus of a particular unit, case studies of (and site visits to) particularly good examples of projects where the ethos of sustainability has been embraced profoundly should be considered.

CIBSE recommends that the three sets of guidelines in appendices C, D and E are considered together, especially in relation to teaching and learning methodology and assessment.

[1] For example flood risk including vulnerability of schools, hospitals etc.; slope stability and risk.

APPENDIX E – HEALTH AND SAFETY RISK MANAGEMENT

Context

The decisions individuals make in the execution of building services engineering projects have an impact on health and safety of those who are directly or indirectly involved with the project, throughout its life from design to demolition. Legislation puts duties onto all people involved in realizing projects, and students must both understand the seriousness of these duties, and develop a mind-set that enables them to fully discharge their responsibilities.

Aims

A thread of health and safety risk management running through the programme will enable students to become tuned to the need to manage health and safety risks and have a basic grasp of the practical application of risk management.

Knowledge and understanding

The thread of health and safety risk management running through the programme, should enable a student to:

- Understand the concepts of hazard & risk.
- Identify hazards.
- Estimate risks by attributing severity and likelihood to the identified hazards and be able to sort these risks in priority order.
- Understand how risks can be mitigated and the importance of communicating residual risks to others.
- Understand that all decisions, whether in design or construction, potentially have an impact on how safe a project is to build, operate, maintain and demolish.
- Be aware of key legislation relating to health & safety including:
    - The Health and Safety at Work etc. Act 1974
    - The Workplace (Health, Safety and Welfare) Regulations 1992.
    - The Management of Health & Safety at Work Regulations 1999.
    - The Construction (Design & Management Regulations 2007).
- Understand the meaning of competency of individuals.
- Understand how changes on a project require a reassessment of risks.

Intellectual Abilities

The student should be able to:

- Demonstrate the process of identifying hazards, estimating and prioritizing risks, mitigating risk, and managing residual risks and reviewing the risks in the light of the progress of the project. This should be in the context of a design project or laboratory experiment.
- Use a famous failure case study to explain how things go wrong.
- Explain current industry initiatives in respect of health and safety risk.

- Explain project-specific risks and why it matters to distinguish these from common risks.

Practical Skills

The student should be able to:

- Prepare a risk assessment from scratch for an aspect of project work (laboratory or field work) which documents the risks which are specific to the work.
- Conduct themselves appropriately when undertaking field or laboratory work.

General Transferable Skills

- Ability to think out of the box and challenge assumptions.
- Teamwork.
- Communication skills.

Method of Teaching, Learning and Assessment

Teaching would be both through specific modules and by raising awareness of the behaviours and attitudes required throughout the degree programme. Case studies of failures, site visits and practical laboratory work are all important vehicles for teaching this subject. Input from industrialist would be particularly valuable for giving students an appreciation of how health and safety risks are managed on projects.

A proper understanding and relevant skills in relation to Health & Safety as well as Sustainability are fundamental to the teaching and practice of design. Moreover, design projects provide a natural place for students to demonstrate their knowledge and practise their skills in relation to Sustainability and Health & Safety. CIBSE recommends that the three sets of guidelines in Appendices C, D and E be considered together, especially in relation to teaching and learning methodology and assessment.

APPENDIX F– INDUSTRIAL PLACEMENTS IN DEGREE PROGRAMMES

1. Introduction

1.1 An industrial placement which is a necessary and integral part of the university degree programme should be prepared for and monitored in the same way as all other parts of the programme.

1.2 These Guidelines are to be used when students spend a period of time on Industrial Placement(s) as part of a university degree programme. The placement should be of such a length as to allow the student to participate in an appropriate depth and breadth of experience, generally accepted to be in the order of twelve months or two six-month periods.

1.3 The relevant parts of the Guidelines should be used when students spend vacations working in the construction industry and for formal site visits as part of the degree programme.

2. Preparation

2.1 The University should ensure that all students are formally made aware, in good time, of the responsibility (student or university) for finding industrial placements and this, along with the arrangements for preparing for and monitoring industrial placements, should be made clear in the programme handbook.

2.2 A briefing meeting should be held, normally within the three months before the start of the placement, at which an explanation should be given as to what should be achieved from the placement. The following items should be introduced and discussed:

- The acceptance of responsibility for one's actions.
- The acceptance of responsibility for personal safety and the safety of others.
- How to make the most of opportunities for learning.
- The understanding of the relationship between theory and practice.
- The appreciation of management skills.
- The gaining of experience in oral and written communication and other
- transferable/common/core skills at many levels.
- The development of a professional attitude.
- Understand how changes on a project require a reassessment of risks.

2.3 The briefing should particularly include a safety presentation explaining safety legislation and its effect in particular work locations. Reference should be made to the document 'Health & Safety Guidance for the Placement of HE students' ASET/USA: March 1997 (published by CVCP & obtainable from UCEA).

2.4 As soon as practicable after the start of the placement, the university should ascertain the name of a suitable senior person, within the employer's organisation, who will act as a 'mentor' to the student.

2.5 The briefing should also inform the students of the need for an enquiring mind throughout the placement.

2.6 Details of the Initial Professional Development (IPD) requirements for progression to professional registration as Incorporated or Chartered Engineers should be outlined to students.

3. Mentoring

The arrangements for monitoring visits to the place of work by university staff should be explained to students. Visits should be made at least twice in an academic year. The member of staff should always have a meeting with the ‘mentor’ and possibly with the student’s line manager if that is a different person. A written report on the visit should be prepared and its contents discussed with the student at the time.

4. Completion

4.1 The whole period of placement should be recorded in a Training Report which should be submitted to the university. It should be used as a basis for a debriefing session at which individual students should assess and be assessed on their achievements. Health and safety training should form an important part of this assessment.

4.2 The student should be required to make a formal presentation, preferably to a peer group and staff, lasting approximately 15-20 minutes on his/her placement. This should form part of the assessment.

4.3 The student should keep all of their reports for future use.

4.4 The students should be encouraged by university staff, to use their experience and their reports as a basis for a presentation to the local Institution Branch or Region.

APPENDIX G – PROFESSIONALISM

1. Importance of Professionalism

CIBSE recognises that from the first day that students enrol on an accredited programme of study they have commenced on their career as a professional engineer. CIBSE hopes that with the right encouragement these students will progress to work in the industry and go on to achieve a professional qualification.

2. Professionalism and the Teaching and Learning Process

2.1 To encourage this career progression, the Institution believes that if the area of 'Professionalism' can be embedded into engineering education, this will make degree programmes more attractive and ensure that graduates have the appropriate skills to work effectively in the industry. It therefore requires that degree programmes put forward for accreditation contain elements which provide a good understanding of a broad range of inter-related social, economic and environmental issues. An understanding of how core skills can be utilised to assist with these issues should back up these course elements. This will be best achieved by a teaching and learning process that:

- Provides an interdisciplinary perspective on the problems that engineers will tackle in practice.
- Develops an understanding of the interaction between engineering, the environment and society.
- Develops an ability to use engineering knowledge to help solve complex problems as outlined above.
- Universities should encourage students to take up membership of CIBSE, have an understanding of the rules of conduct and play an active role in membership through extracurricular activities such as CPD events, committee involvement, visits to the HQ, etc. The Institution will look for evidence in terms of demonstrable outcomes that these guidelines are being implemented.

2.3 It is acknowledged that where students are taught 'ethics' they will:

- **Understand** the nature of professional responsibility;
- Be able to **identify** the ethical elements in decisions;
- Be able to **address** and **resolve** problems arising from questionable practice;
- Develop critical thinking skills and professional **judgement;**
- **Understand** practical difficulties of bring about change;
- **Develop** a professional ethical identity to carry forward in their working life.

3. How the Professionalism theme can be demonstrated

Professionalism should be integrated into existing teaching and learning and ideally should be pervasive throughout the engineering education programme. The key aim should be to ensure that engineers have appropriate Attitudes, Skills and Knowledge including:

- **Attitudes/Awareness**
    - An over-arching approach to engineering problems in the context of environmental, economic and social issues, and other dimensions including ethics and environmental justice.
- **Skills**
    - Ability to work with complex/ill-defined problems;
    - Team work and communications skills;
    - Ability to evaluate the merits and demerits of options/feasibility assessment.
- **Knowledge – Broad and Deep**
    - Environmental,
    - Social processes,
    - Legal.

4. Link to Guidelines for Design Learning (Annex C)

Section 4 asks Departments to take the following area into account when they are designing a degree programme – *"Learning to work as part of a team. In professional practice, much design work is carried out in teams, and therefore, while some design learning should be on an individual basis, group working should be included. Although this causes greater complexity in terms of grading the performance of individuals, it is important that the short term needs of individual assessment should not impede the development of appropriate team working skills for professional practice."*

5. Link to Guidelines for Sustainability (Annex D)

There is a professional obligation for building services engineers to act sustainably in everything they do. This is why the thread of sustainability must be integrated in any degree programme submitted to CIBSE for accreditation.

6. Link to Guidelines for Health, Safety and Risk Management (Annex E)

This document states that 'the engineering profession has lacked an emphasis on feedback and learning; it is imperative that we get our young engineers to understand the importance of learning from failure". Also, 'Engineers must be aware of safety legislation and appreciate that they will be judged by the repercussions of their acts and their omissions, because as professional engineers they will have a higher duty of care than members of the general public'.

7. Evidence that could be provided by Departments to visiting teams to show how this is being embedded in the degree programmes

- Staff who are professionally qualified through CIBSE;
- A list of lectures given to students by professional engineers;
- The Departments links with the local engineering community including CIBSE Regions;
- Consultancy work undertaken by lecturers;
- A statement showing how the recommendations from the Leitch Report have been incorporated into programme planning and design;
- A list of site visits undertaken by the students;
- Confirmation that presentations concerned with engineering professionalism have been made by CIBSE;
- Evidence from students work;
- A statement on Plagiarism;
- Ethical solutions to problems;
- Appropriate use of key skills;
- A statement on the impact of codes of conduct on the teaching of sustainability, health and safety, and ethics.