

FACULTY OF ENGINEERING SCIENCE & THE BUILT ENVIRONMENT

DEPARTMENT OF ENGINEERING & DESIGN

Programme Specification For HND Electrical & Electronic Engineering

Author: Alan Howson

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HND Electrical and Electronic Engineering

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1. Awarding institution/body London South Bank University

2. Teaching institution London South Bank University

3. Programme accredited by

4. Final award HND

Other award(s) HNC

5. Programme titleHND in Electrical & Electronic Engineering

(EEE)

6. UCAS code 006H HND EEE (Full time)

N/A HND EEE (Part time)

7. Reference points for development of

this programme specification

Internal: LSBU Mission Statement

LSBU Core Skills Policy LSBU Academic Regulations

External UK Standard for Professional

Engineering Competence;

The Accreditation of Higher Education Programmes, Engineering Council

UK, 2008.

Guidance Note on Academic

Accreditation, Engineering Council

UK, July 2008

8. Aims of the programme

This Higher National programme is a specialist vocational courses which delivers outcomes at level 4 or level 5 in the National Qualifications Framework which will partially satisfy the academic requirements for professional accreditation as Incorporated Engineers. The two year full-time HND programme is intended as an accessible route allowing either immediate progression into employment in the EEE sector as a technician or the opportunity to progress with advanced standing to degree level study leading to eventual employment in the sector. There is also a two year part-time HND programme which offers a career progression route for those already in employment as well as the scope for higher level study at degree level. Both programmes will require further learning to meet the full educational requirements for Incorporated Engineers, which could be obtained for example by study on the BSc top-up programmes offered by the department.

The general aims of these courses are to develop the students' technical and application skills in accordance with the requirements of an Incorporated Engineer; the emphasis being on developing skills appropriate to an integrated and multidisciplinary electrical / electronic / computer / communications engineering environment. Students will be expected to develop good organisational and project competence, sound technical judgement and critical self-awareness in applying appropriate design solutions. Students from these Higher National programmes will also require good analytical and communication skills, and be able to participate in design teams, while also being able to work independently.

The HND programme specifically aim to:

- 1. Produce diplomat Electrical/Electronic Engineers at HND level who will, after further study, eventually expect to register as Incorporated Engineers subject to meeting the requirements for professional competence.
- 2. Produce diplomats trained in the core discipline of Electrical / Electronic / Telecommunication / Computer Network Engineering with an emphasis on key concepts and practical applications.
- 3. Provide an intermediate level qualification route for students wishing to transfer to the BSc (or BEng) courses in Electrical / Electronic / Telecommunication / Computer Networks engineering at London South Bank University.
- 4. Develop students' knowledge of mathematics, electrical / electronic / communication theory, engineering methods, safety, economics and finance in support of the central themes of the course.
- 5. Develop students' practical and problem solving skills through the integration of a broad range of subject material. Encourage students to develop an independent and reflective approach to study enabling them to become more self directed learners.
- 6. Teach students to communicate clearly, to argue rationally and to draw conclusions based on a rigorous approach to problems.
- 7. Develop the transferable skills expected of a Higher National diplomat engineer as listed under the QAA benchmark headings in section 9. Diplomats will be expected to work in multi-disciplinary teams with technical, commercial and management staff in industrial and other occupations.
- 8. Develop a professional motivation and attitude to the practice of engineering at IEng (Incorporated) level and generally be able to practise in electrical/electronic engineering and address such issues as safety, energy and environmental concerns.

9. Programme outcomes

The programme provides opportunities for students to develop and demonstrate knowledge and understanding, skills and other attributes in the areas defined by the QAA Engineering Benchmark and listed below. The QAA headings are necessarily generic. Outcomes more subject specific to the particular field of Electrical and Electronic Engineering are summarised in section 8 above and in syllabi for the units of the programme. Units used on these programmes are graded at levels 4 or 5 indicating the scope of students learning, the intellectual demands and the degree of learner autonomy expected.

A. Students will acquire knowledge and understanding of:

- A1 Mathematical methods
- A2 Scientific Principles
- A3 Principles of IT and Communications
- A4 General Principles of Design
- A5 Computer Aided Design Techniques
- A6 Characteristics of Engineering Materials
- A7 Management, Business and Professional Ethics, the social context of engineering
- A8 Operational/codes of practice, safety and standards

Teaching and learning strategy

Acquisition of **A1** starts in first year lectures and tutorials concentrating on the basic essentials. To provide assimilation time, the Mathematics teaching is spread over the year, i.e. Maths A and Maths B respectively

Acquisition of **A2**, **A3** and **A6** begins with a combination of lectures, tutorials and workshops in year 1. **A3** is more fully developed in year 2, mainly in workshop based units. The study of electronic materials is not a specific stream within the programme and hence further study of **A6** is within the context of specialist units, as appropriate.

Acquisition of **A4** and **A5** is part of many units. In this programme, 'Design' means that part of the engineering lifecycle where requirements are decomposed into clearly identified subsystems to which known methods can be applied, followed by system integration and testing. These aspects of engineering are learnt by making them explicit in practical work, from short assignments to longer projects in Engineering Applications. Computer Aided Design techniques are used as the tools to support this work.

Acquisition of A7 is through a series of professional/industrial studies units from level 1 to level 2. In these, the learning is by directed self-learning, supported by lectures and case study. Cross reference to management, business and professional ethics is also present in other units, since these are taught in the context of real engineering, where commercial and professional issues interact strongly with technical ones.

Assessment

Assessment of the knowledge base for all programmes is through End of Unit examinations, phase tests and assignments which, frequently demand that the student extend knowledge of a subject by self learning. Engineering and core skills are assessed via assignments and larger scale project work and logbooks.

B. Students will develop their intellectual skills such that they are able to:

- B1 Select and apply appropriate mathematical methods for modelling and analysing engineering problems.
- B2 Use scientific principles in developing engineering solutions to practical problems and for the modelling and analysis of systems, processes and products.
- B3 Select and apply computer based methods for modelling and analysing engineering problems.
- B4 Analyse systems, processes and components requiring engineering solutions.
- B5 Create new processes or products through synthesising ideas from different sources.
- B6 Understand and undertake commercial and technical risk evaluation.

Teaching and learning strategy

All these skills are acquired progressively. Initially, tutorials and lectures show by example how to apply standard methods from the knowledge base to straightforward problems. Later these skills are extended by developing a systems view, where problem decomposition leads to the application of multiple problem solving methods. This is learnt largely by undertaking both small assignments and larger scale projects (particularly the major project in Engineering Applications 2).

B5 is explored in a simple way in the context of year one Industrial Studies and is taken up again in the context of the assigned project work. The programme is more process, than product, oriented.

B6 is not a mainstream element of the programme and is not taught from a theoretical point of view. Nevertheless, the notions are explored in the context of other units, e.g. in relation to specification and testing and in various areas of the curriculum where safety critical issues are considered.

Assessment

Basic skills in applying the knowledge base are assessed in lab work and phase tests. The more extended skills are assessed via assignments and project reports

C. Students will acquire and develop practical skills in Engineering such that they are able to:

- C1 Use mathematical methods for modelling and analysing engineering problems
- C2 Use relevant test and measurement equipment and execute experimental laboratory work.
- C3 Use engineering IT tools, including programming languages and CAD packages.
- C4 Design a system, component or process and research information to further develop ideas.
- C5 Test designs in a laboratory or by simulation, with technical analysis and critical evaluation of results.
- C6 Apply engineering techniques taking account of industrial and commercial constraints.
- C7 Project management.

Teaching and learning strategy

C1. The strategy is as described for B1. The actual ability to use mathematics is developed by practice. In year 1 and to a lesser extent in year 2 this is by standard problems in tutorials or in web based exercises. This is complemented and followed through by either tutorial or laboratory work in specific technical units where the appropriate mathematical methods and tools are applied.

C2 Initial familiarity with basic equipment is in first year electrical/electronic laboratories where students work with standard 'design and test' workstations, each of which has the same standard range of equipment which they must master. After initial closely supervised sessions on the use and safety aspects of the workstations, the students can progress in a more self-paced and self-learning framework of structured experiments.

More complex and expensive, industrial, equipment is used in more specialised laboratories attached to the specialist divisions and research groups.

- C3 Computer programming skill is developed from year one in dedicated units. It is not primarily taught simply as 'language' acquisition, but rather as exemplifying a part of the lifecycle of an engineering process. This enables it to be linked to other essential skills concerning requirements analysis, system decomposition and assembly, and testing. Skills with more specific CAD tools are developed in the specialised laboratories.
- **C4 C7** These skills are exercised progressively in workshop assignments and mini projects, culminating in a major final year project which brings them together, along with specific lecture and tutorial work to develop the necessary research and (**C7**), project management skills. **C7** is also directly addressed in the Industrial Studies unit and in Engineering Applications 2

Assessment

- **C1** is assessed by phase tests and marked logbooks, primarily.
- C2 is also assessed primarily via logbooks which are kept at all laboratory sessions, along with formal reports on selected experiments or exercises.
- C3 is assessed by a combination of phase tests and assignments (to cover routine aspects of language acquisition), software design projects (which for software subjects also assesses C4 C6) and some formal examinations, covering underlying principles.
- **C4 C7** are assessed via engineering reports and presentations. Some units specifically employ practical simulation exercises as a major part of the assessment.

Project management plays a primary role in assessment of the Engineering Applications 2, both in an interim 'progress' report and in the final report which has to describe the project's process activity.

D. Students will acquire and develop transferable skills such that they are able to:

- D1 Manipulate and sort data
- D2 Present data in suitable form
- D3 Use of science based evidence in solving problems.
- D4 Use of general IT tools.
- D5 Use creativity and innovation in problem solving, and work with limited information.
- D6 Effective communication and life long learning.
- D7 Teamwork, leadership and time management.

Teaching and learning strategy

D1 - D4 are specifically taught, mainly in a workshop setting, in two first year units (Industrial Studies and Engineering Applications 1) where there are either laboratory measurements or statistical exercises to collect and analyse data in practice, after simpler exercises with appropriate tools such as Excel. Many other units extend these skills in later parts of the course. Communication/gathering and particularly sifting of evidence skills are developed by controlled (including Web based) investigations and the preparation of written reports and oral presentations. The School maintains standards for written reports which demand competence in word processing, as well as the engineering role of standards and protocols.

D5 - D7 The *importance* of these is taught in year 1, but the skills themselves result from the aggregated experience of students in most of the areas they study and depend on teachers who re-enforce these aspects in any and every engineering context.

Assessment

D1 - D4 are assessed specifically via standard logbooks and some exercises and phase / mini tests in the early units, and later by forming part of the checklist of elements for which marks are awarded in the assessment of small and larger projects. D5 - D7 are formally assessed in year 1 in simple 'design and make' exercises. Further development of these skills is more indirectly assessed, in that significant achievement in these areas is necessary for the highest marks, particularly in project work, which includes assessment by presentation and viva-voce examinations.

10. Entry requirements

In order to be considered for entry to the various programmes applicants will be required to have the following qualifications:

HND Electrical and Electronic Engineering (Full Time Entry Requirements)

- i) Vocational and GCE A levels: (Maths or Science subject) 1 six-unit award at grade D or 2 three-unit awards (voc/AS level) at grade D.
- ii) Edexcel/BTEC National Certificate/Diploma in Electrical/Electronic Engineering, or similar with at least 3 merits at L3.
- iii) An appropriate Foundation or Access course.

HND Electrical and Electronic Engineering (Part Time Entry Requirements)

- i) Vocational and GCE A levels: (Maths or Science subject) 1 six-unit award at grade D or 2 three-unit awards (voc/AS level) at grade D.
- ii) Edexcel/BTEC National Certificate/Diploma in Electrical/Electronic Engineering, or similar with at least 3 merits at L3.
- iii) An appropriate Foundation or Access course.
- iv) Mature Candidates who are at least 21 years of age with a minimum of two years appropriate experience / qualifications will also be considered.

11. HND EEE Programme Structure

Year 1

Semester 1	Semester 2									
Mathematics (30 Credit)										
Electrical Princ	iples (30 Credit)									
Industrial Studies (15 Credit)	Digital Techniques (15 Credit)									

Engineering Applications (30 Credit) Full time covered in house, Part time Covered by Company

Year 2

Semester 1	Semester 2								
Option A (30 Credit)									
Analogue Electronics (15 Credit)	Option B (15 Credit)								
Software Engineering (15 Credit)	Option B (15 Credit)								

Engineering Applications 2 (30 Credit) Full time covered in house, Part time Covered by Company

Option A: Electrical Technology or Computer Systems & Networks.

Option B: Building Services, Microprocessor Systems, Control Engineering or Communications.

Year	Common	Title	Credit	Level	Sem	Co-ordinator
1	FDEng	Mathematics A	30	4	1&2	Howson
1	FDEng	Electrical Principles	30	4	1&2	Howson
1	FDEng	Industrial Studies	15	4	1	Viscardi
1		Digital Techniques	15	4	2	Howson
1		Engineering Applications 1 (FT)	30	4	1&2	Dudley-Mcevoy
1		Engineering Applications 1 (PT)	30	4	1&2	Viscardi
		Covered by company				
2	FDEng	Option A	30	5	1&2	Shirkhooi/Zhan
						Fang
2		Analogue Electronics	15	5	1	Howson
2		Software Engineering	15	5	1	Chen
	FDEng	Option B	15	5	2	Shirkhooi/Klimo
	(Control)					/Chen/Webster
2		Engineering Applications 2 (FT)	30	5	1&2	Reehal
2		Engineering Applications 2 (PT)	30	5	1&2	Viscardi
		Covered by company				
		Total	240			

12 Assessment regulations

HND in Electrical Electronic Engineering: (Two year Full/Part time):

The HND requires students to study units which carry a total credit value of 240 points; no more than 120 points may be at Level 4, and at least 120 points must be at Level 5. In this programme the points are made up of units of 15 or 30 points. Each unit is separately assessed on the basis of defined learning outcomes, either by an examination, by coursework, or by a mixture of the two.

In order to pass a unit a student is required to achieve a mark of at least 40%. Where there is more than one element of assessment (e.g. course work and examination), the student must at least achieve the minimum threshold mark for each element (normally 30%) and the weighted average mark for all the elements must be at least 40%. All units are individually graded as Pass (\geq 40%), Merit (\geq 55%) and Distinction (\geq 70%).

Stage 1:

The programme includes a progression point after Year 1. A student who passes all units in Stage 1 will be permitted to progress to Stage 2. A student who passes 6 or 7 units may, at the discretion of the Board of Examiners, still be allowed to progress provided his/her performance in the failed unit(s) meets the criteria laid down in an approved protocol. A student who fails no more than 3 units in Stage 1 may, at the discretion of the Board of Examiners, attempt to make good the failures before the start of the next academic year and, if successful, progress to Stage 2. A student who fails more than 3 units will normally be permitted to make good the failures in the following year; in such a case the student will be required to attend the failed units and to complete all the assessments associated with these units. Where a student successfully makes good a failure the mark recorded for the unit will be 40%.

The Board of Examiners does reserve the right to require a student who has failed more than 3 units in Stage 1 to withdraw from the course.

Stage 2:

A student who passes all units in Stages 1 and 2 will receive the award of HND. A student who fails no more than 3 units in Stage 2 may, at the discretion of the Board of Examiners, attempt to make good the failures before the start of the next academic year and, if successful, receive the award of HND. A student who fails more than 3 units will normally be permitted to make good the failures in the following year; in such a case the student will be required to attend the failed units and to complete all the assessments associated with these units. Where a student successfully makes good a failure the mark recorded for the unit will be 40%.

A student who does not complete their HND, may be awarded a HNC in Engineering, provided they have passed 120 credits at Level 4.

Students who complete their HND will normally be considered for admission to the one year top-up BSc programme in EEE where they study 4 level 2 and 4 level 3 units to be awarded an unclassified degree. Alternatively, successful HND students can join the BEng programmes, normally at level 2.

13. Support for students:

The University places a high priority on providing support for students. This support is provided by a combination of services, both centrally in the University and locally at the programme level. Much of the support focuses on developing students' skills to enhance their performance on the programme and to facilitate their transition to employment.

Programme and course level support:

The course follows the University guidelines in Personal tutoring provision.

All new students are allocated a personal tutor at enrolment. Students meet their tutors for the first time during the induction sessions in week 1 of the academic year and are encouraged to make contact with their tutors thereafter at least once per semester. There is a well-established system for students to book 'surgery time' via notices kept on staff office doors. Staff offer time slots when they are available for consultation via this system. Email contacts are also maintained between tutors and tutees.

The course has a Senior Personal Tutor (SPT) to whom problems can be referred and who is responsible for maintaining staff awareness and training about student support issues. Before each new induction session, staff are updated about issues relevant to their role as personal tutor, particularly in encouraging confidence building, the development of learning skills and other non-knowledge specific academic attributes. The Senior Personal Tutor may also re-allocate tutors if necessary.

The Senior Personal Tutor is also responsible for ensuring that students with any special needs (e.g. dyslexia) are identified early in their course and that a proper evaluation is made. The Faculty Office keeps a database of students with special needs and makes appropriate examination arrangements for these students.

Students are actively encouraged to join the Institution of Engineering and Technology (former IEE) as student members and benefit from what it has to offer. There is an IET Student Counsellor for the University and an active Blackboard IET site accessible to all students in electrical and related fields.

Tutorial support

Over three-quarters of the units on the course involve workshop or laboratory based activity. These sessions allow individual or group consultation with staff about problems and are a key source of academic tutorial support for the course.

Blackboard is used extensively to deliver teaching material to students.

Skills development

Workshop and laboratory sessions also require students to follow proper engineering standards and procedures and to communicate and report the work done in a professional manner. A large part of assessment is via logbooks, engineering reports and individual or group presentations. Hence most of the development of both 'core' skills and more specific engineering skills is supported in this way.

There is also in the course a specific thread of Engineering Applications units, to integrate and set the engineering skills experienced in other units in context and to supply an appropriate knowledge base.

Central support

The University's Learning and Development Centre (LDC) aims to support students' learning and personal development. It provides a wide range of personal and academic services to students and works with other departments and faculties in the University to ensure that the services offered meet the needs of students. All services are based on the

main campus in Southwark. In addition some services also operate at the Essex campus. Some services are provided in the evening. Information about all services is included on the University's website.

The services available include:

Blackboard - is used extensively to deliver teaching material to students.

Core skills provision – classes, workshops and drop-in sessions to help students develop and enhance their academic reading and writing skills, study skills, basic maths, English language (for students whose first language is not English)

Careers guidance – drop-in sessions and interviews to discuss any aspect of career planning and taking career decisions, discuss CVs or prepare for a job interview.

Personal development and advice – advisory service to discuss personal concerns or difficulties during their programme which might affect their personal development and academic performance; support for students with disabilities including dedicated dyslexia support; chaplaincy to provide confidential pastoral care.

Institution of Engineering & Technology – advisory service and Blackboard site to help students and provide exposure to the Institution and Industry.

14. Links with employers

Industrial advisors have both informal input to the course planning process via tutors industrial contacts and formal input via participating in course validation and subject reviews. An industrial advisory panel assembles twice per year to discuss strategic issues in course planning, design and marketing. Many staff are engaged in industrial based research, teaching company programmes or consultancy.

Additionally research groups provide opportunity for students to carry out project work in an environment similar to industry, under the guidance of research active staff and professors.

15. Quality Indicators

A course board, made up of staff and student representatives from each year of the course, meets at least once per term to discuss issues to do with learning and teaching and course developments. The course board is convened and chaired by the Director of UG Programmes.

Unit Coordinators produce an End of Unit Report for each unit. The End of Unit Report is made available to the External Examiners before the Subject Area Examination Boards. The report also incorporates a summary of the End of Unit Questionnaires for the unit, filled out by students.

The course is reviewed at an annual meeting of teaching staff. The review takes into account the progression statistics for individual units, student end of unit questionnaires, end of unit reports and external examiners' comments. On the basis of these, modifications to units and the course are proposed and, where necessary, submitted to the Faculty Academic Standards Committee (FASC) for approval.

The course is monitored by FASC through the annual report for the ECCE undergraduate course cluster.

16 HND/HNC Electrical and Electronic Engineering: Curriculum Map

The curriculum map below reflects the way in which Learning Outcomes of the units fulfil the criteria identified for the BTEC HND EEE programmes.

Level		A Knowledge &							B Intellectual							C Practical Skills							D Transferable							
		Understanding								Skills													Skills							
		1 2 3 4 5 6 7 8 1 2					2	3	4	5	6	1	2	3	4	5	6	7	1	2	3	4	5	6	7					
4	Mathematics	A	C			\mathbf{C}			C	A	В	C	C			A		C		C			C	C	В	В	C	В		
4	Electrical Principles	C	В		A	C			C	\mathbf{C}	В	C	В			C	A	A	C	A			C	C	A	В	C	C		
4	Industrial Studies	C	C	A	A	В	C	A	В		В	C	C	A	В		В	A	A	A	A	A	A	A	В	A	Α	A	A	
4	Digital Techniques	C	В	C	A	A	C		\mathbf{C}	C	В	Α	Α	В		\mathbf{C}	Α	Α	В	Α	C				В	Α	В		\mathbf{C}	
4	Engineering Applications 1	В	В		C	C				A	A	C	В			A	В			C			С	С	В		C	C		
5	Software Design		C	A	A	В	C	C				Α		C	В			A	В	В	В	С	С	С		A	В	A	С	
5	Analogue Electronics	С	C		A	A			C	C	В	Α	В	C		C	A	Α	C	Α					В	A		В		
5	Electrical Technology	С	В	С	A	A	C		C	C	В	Α	Α	В		C	A	A	В	Α	C				В	A	В		С	
5	Electrical Building Services	С	A	С	Α	C				В	В	C	Α		C	В		В	Α		A	C	С	A	В	В	В	В	В	
5	Computer Systems & Networks		C	A	Α	В	C	C				Α		C	В			A	В	В	В	C	С	С		A	В	A	С	
5	Microprocessor Systems	С	В	В	A		C	C		В			C	C	C	C	C	A	C	C	В	В	В	В	В	В	Α	A	С	
5	Communication Engineering	С	В	A	В			C	В	C	В		Α		C	C	A		В		A		С	A	В		C	A	С	
5	Control Engineering		A		C	C				A	A	C	Α			Ā	A	В	A	В	С					C		В	C	
5	Engineering Applications 2	В	В	A	Α	В	В	A	В	В	A	В	Α	В	В	В	A	A	Α	В	A	В	A	A	A	A	Α	A	A	

A Knowledge and understanding of:

- A1 Mathematical methods
- A2 Scientific principles
- A3 Principles of IT and Communications
- A4 General Principles of Design
- A5 Computer Aided Design Techniques
- A6 Characteristics of Engineering Materials
- A7 Management, Business and Professional Ethics, the social context of engineering.
- A8 Operational/codes of practice, safety and standards

C Practical skills - able to:

- C1 Use mathematical methods for modelling and analysing engineering problems
- C2 Use relevant test and measurement equipment and execute experimental laboratory work.
- C3 Use engineering IT tools, including programming languages and CAD packages
- C4 Design a system, component or process and research information to further develop ideas.
- C5 Test designs in a laboratory or by simulation, with technical analysis and critical evaluation of results.
- C6 Apply engineering techniques taking account of industrial and commercial constraints.
- C7 Project management

B Intellectual skills - able to:

- B1 Select and apply appropriate mathematical models for modelling and analysing engineering problems.
- B2 Use scientific principles in developing engineering solutions to practical problems and for the modelling and analysis of systems, processes and products.
- B3 Select and apply computer based methods for modelling and analysing engineering problems
- B4 Analyse systems, processes and components requiring engineering solutions
- B5 Create new products or processes through synthesising ideas from different sources
- B6 Understand and undertake commercial and technical risk evaluation.

D Transferable skills - able to:

- D1 Manipulate and sort data
- D2 Present data in suitable form
- D3 Use science based methods to solve problems
- D4 Use IT tools
- D5 Use creativity and innovation in problem solving, and work with limited information
- D6 Effective Communication, & ability to learn
- D7 Teamwork, leadership & time management