



HNC Engineering(RQF)
HND Engineering (RQF)

Programme Specification 1.1

*General
Mechanical
Electrical/Electronic
Manufacturing
Operations*

31/01/2018

📍 Semester: Learning & Development, 5 Howells Road, Dunvant, Swansea, SA2 7SX

✉ info@semesterlearning.com

🌐 www.semesterlearning.com

☎ 01792 732001

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Programme Specification

Awarding Organisation:	Pearson Education Ltd
Teaching institution:	Semester: Learning & Development Ltd
Course Accredited By:	n/a
Final Award:	Higher National Certificate Higher National Diploma
Interim Award(s):	n/a
Award Title:	Pearson BTEC Level 4 Higher National Certificate in Engineering 603/0450/9 Pearson BTEC Level 5 Higher National Diploma in Engineering 603/0451/0
Date Prepared or Revised:	07/11/2017

Generic Objectives

The objectives of the BTEC Higher Nationals in Engineering are as follows:

- To provide students with the core knowledge, skills and techniques that all engineers require, irrespective of future specialism, to achieve high performance in the engineering profession.
- To build a body of specialist knowledge, skills and techniques in order to be successful in a range of careers in engineering at the Associate Engineer or Operational Engineer level.
- To develop the skills necessary to fault find and problem solve in a timely, professional manner, reflecting on their work and contributing to the development of the process and environment they operate within.
- To understand the responsibilities of the engineer within society, and work with integrity, regard for cost, sustainability and the rapid rate of change experienced in world class engineering.
- To provide opportunities for students to enter, or progress in, employment within the engineering sector, or progress to higher education qualifications such as degrees and honours degree in engineering or a closely related area, by balancing employability skills with academic attainment.
- To provide opportunities for students to make progress towards achieving internationally recognised registration with a Professional Body regulated by the Engineering Council.

Generic Outcomes

On successful completion of HNC/D awards, students will be able to:

- communicate clearly, concisely and confidently, using an appropriate format;
- collect and use information from a range of sources;
- interpret and manipulate data;
- learn independently and display the skills of professional scholarship required for personal development, career management and lifelong learning;
- use information and communication technology effectively;
- select and apply knowledge and principles to the solution of well-defined problems;

- demonstrate familiarity with, and understanding of, the important facts and principles in a broad field of study and an awareness of the provisional nature of knowledge and theory;
- define criteria and use them to plan and schedule the work of self, individuals and teams;
- display the attributes, skills, behaviour and attitudes required in working life, in the work place;
- demonstrate the ability to establish effective working relationships with others and observe working practices; and
- demonstrate safe working practices and advise others accordingly

General Engineering Outcomes

Students can also benefit from opportunities for deeper learning, where they are able to make connections between units and select areas of interest for detailed study. In this way, BTEC Higher Nationals provide a vocational context in which students can develop the knowledge and academic study skills required for particular degree courses and progression to university, including:

- Active research skills
- Effective writing skills
- Analytical skills
- Critical thinking
- Creative problem-solving
- Decision-making
- Team building
- Exam preparation skills
- Digital literacy
- Practical design and build skills
- Experimental and testing techniques
- Competence in assessment methods used in higher education

Relationship with External Reference Point(s)

The HNC prepares students for progression to HND by addressing key skills and knowledge as identified in the QAA Engineering Subject Benchmark Statement (2006).

The aims and outcomes of this award are clearly in alignment with the Framework for Higher Education Qualifications (January 2001) at level 5.

Course Structure:

The programme is designed to provide a combined study route which is made up of mandatory and specialist units.

Mandatory Core units will provide:

- a broad-based introduction to the qualification
- the essential components of the qualification
- the underpinning learning for the subject area
- the required knowledge for further specialised study

Optional Specialist units will:

- focus on an area of specialisation for a sector-specific field of employment
- build on the fundamentals introduced in the mandatory units
- permit greater depth of learning
- permit greater breadth of learning
- provide a choice for centres, and the potential for choice for learners

HNC Award-Specific Aims

Graduates successfully completing the Higher National Certificate will be able to demonstrate a sound knowledge of the basic concepts of engineering. They will be able to communicate accurately and appropriately, and they will have the qualities of personal responsibility needed for employment. They will have developed a range of transferable skills to ensure effective team working, independent working with growing fault finding and problem-solving strategies, and organisational awareness. They will be adaptable and flexible in their approach to work, showing resilience under pressure and the ability to meet challenging targets within a reasonable, pre-set, timeframe. They will also demonstrate regard for the ethical responsibilities of the engineer, for cost and for the importance of protecting and sustaining the environment.

Pathways

Structure of the Edexcel BTEC level 4 HNC in:

HNC Electrical/Electronic Engineering

Unit number	Mandatory core units – all 5 units must be taken	Unit Level	Unit Credit
1	Design	4	15
2	Maths for Engineers	4	15
3	Engineering Science	4	15
4	Managing a Professional Engineering Project	4	15
19	Electrical & Electronic Principles	4	15
Optional units - choose 3 units with a minimum credit value of 45 credits			
5	Renewable Energy	4	15
8	Mechanical Principles	4	15
13	Fundamentals of Thermodynamics and Heat Engines	4	15
14	Production Engineering for Manufacture	4	15
17	Quality and Process Improvement	4	15
29	Electro, Pneumatic and Hydraulic Systems	4	15
30	Operations & Plant Management	4	15
32	CAD for Maintenance Engineers	4	15

HNC General Engineering

Unit number	Mandatory core units – all 4 units must be taken	Unit Level	Unit Credit
1	Design	4	15
2	Analytical Methods for Engineers	4	15
3	Engineering Science	4	15
4	Managing a Professional Engineering Project	4	15
Optional units - choose 4 units with a minimum credit value of 60 credits			
5	Renewable Energy	4	15
8	Mechanical Principles	4	15
13	Fundamentals of Thermodynamics and Heat Engines	4	15
14	Production Engineering for Manufacture	4	15
17	Quality and Process Improvement	4	15
19	Electrical & Electronic Principles	4	15
29	Electro, Pneumatic and Hydraulic Systems	4	15
30	Operations & Plant Management	4	15
32	CAD for Maintenance Engineers	4	15

HNC Manufacturing Engineering

Unit number	Mandatory core units – all 6 units must be taken	Unit Level	Unit Credit
1	Design	4	15
2	Analytical Methods for Engineers	4	15
3	Engineering Science	4	15
4	Managing a Professional Engineering Project	4	15
14	Production Engineering for Manufacture	4	15
17	Quality and Process Improvement	4	15
Optional units - choose 2 units with a minimum credit value of 30 credits			
5	Renewable Energy	4	15
8	Mechanical Principles	4	15
13	Fundamentals of Thermodynamics and Heat Engines	4	15
19	Electrical & Electronic Principles	4	15
29	Electro, Pneumatic and Hydraulic Systems	4	15
30	Operations & Plant Management	4	15
32	CAD for Maintenance Engineers	4	15

HNC Mechanical Engineering

Unit number	Mandatory core units – all 6 units must be taken	Unit Level	Unit Credit
1	Design	4	15
2	Analytical Methods for Engineers	4	15
3	Engineering Science	4	15
4	Managing a Professional Engineering Project	4	15
8	Mechanical Principles	4	15
13	Fundamentals of Thermodynamics and Heat Engines	4	15
Optional units - choose 2 units with a minimum credit value of 30 credits			
5	Renewable Energy	4	15
14	Production Engineering for Manufacture	4	15
17	Quality and Process Improvement	4	15
19	Electrical & Electronic Principles	4	15
29	Electro, Pneumatic and Hydraulic Systems	4	15
30	Operations & Plant Management	4	15
32	CAD for Maintenance Engineers	4	15

HNC Operations Engineering

Unit number	Mandatory core units – all 4 units must be taken	Unit Level	Unit Credit
1	Design	4	15
2	Analytical Methods for Engineers	4	15
3	Engineering Science	4	15
4	Managing a Professional Engineering Project	4	15
B units – All 3 units must be taken			
29	Electro, Pneumatic and Hydraulic Systems	4	15
30	Operations & Plant Management	4	15
32	CAD for Maintenance Engineers	4	15
Optional Units – 1 Unit to be chosen from those below			
5	Renewable Energy	4	15
8	Mechanical Principles	4	15
13	Fundamentals of Thermodynamics and Heat Engines	4	15
14	Production Engineering for Manufacture	4	15
17	Quality and Process Improvement	4	15
19	Electrical & Electronic Principles	4	15

HND Award-Specific Aims

Holders of the Level 5 Higher National Diploma will have developed a sound understanding of the principles in their field of study, and will have learned to apply those principles more widely. Through this they will have learned to evaluate the appropriateness of different approaches to solving problems. They will be able to perform effectively in their chosen field, and will have the qualities necessary for employment in situations requiring the exercise of personal responsibility and decision-making.

Students must meet the requirements of the HNC plus for:

HND Electrical/Electronic Engineering

Unit number	Mandatory core units – all 5 units must be taken	Unit Level	Unit Credit
34	Research Project	5	30
35	Professional Engineering Management (Pearson Set Assignment)	5	15
39	Further Mathematics	5	15
44	Industrial Power, Electronics and Storage	5	15
45	Industrial Systems	5	15
Optional Units – 2 units to be chosen from those below			
36	Advanced Mechanical Principles	5	15
37	Virtual Engineering	5	15
49	Lean Manufacturing	5	15
50	Advanced Manufacturing Technology	5	15
63	Industrial Services	5	15
64	Thermofluids	5	15

HND General Engineering

Unit number	Mandatory core units – all 4 units must be taken	Unit Level	Unit Credit
34	Research Project	5	30
35	Professional Engineering Management (Pearson Set Assignment)	5	15
39	Further Mathematics	5	15
49	Lean Manufacturing	5	15
Optional Units – 3 Units to be chosen from those below			
36	Advanced Mechanical Principles	5	15
37	Virtual Engineering	5	15
44	Industrial Power, Electronics and Storage	5	15
45	Industrial Systems	5	15
50	Advanced Manufacturing Technology	5	15
63	Industrial Services	5	15
64	Thermofluids	5	15

HND Manufacturing Engineering

Unit number	Mandatory core units – all 5 units must be taken	Unit Level	Unit Credit
34	Research Project	5	30
35	Professional Engineering Management (Pearson Set Assignment)	5	15
39	Further Mathematics	5	15
49	Lean Manufacturing	5	15
50	Advanced Manufacturing Technology	5	15
Optional Units – 2 Units to be chosen from those below			
36	Advanced Mechanical Principles	5	15
37	Virtual Engineering	5	15
44	Industrial Power, Electronics and Storage	5	15
45	Industrial Systems	5	15
63	Industrial Services	5	15
64	Thermofluids	5	15

HND Mechanical Engineering

Unit number	Mandatory core units – all 5 units must be taken	Unit Level	Unit Credit
34	Research Project	5	30
35	Professional Engineering Management (Pearson Set Assignment)	5	15
36	Advanced Mechanical Principles	5	15
37	Virtual Engineering	5	15
39	Further Mathematics	5	15
Optional Units – 2 Units to be chosen from those below			
44	Industrial Power, Electronics and Storage	5	15
45	Industrial Systems	5	15
49	Lean Manufacturing	5	15
50	Advanced Manufacturing Technology	5	15
63	Industrial Services	5	15
64	Thermofluids	5	15
38	Further Thermo	5	15
51	Sustainability	5	15

HND Operations Engineering

Unit number	Mandatory core units – all 5 units must be taken	Unit Level	Unit Credit
34	Research Project	5	30
35	Professional Engineering Management (Pearson Set Assignment)	5	15
39	Further Mathematics	5	15
62	Heating, Ventilation, Air Conditioning (HVAC)	5	15
63	Industrial Services	5	15
64	Thermofluids	5	15
Optional Units – 2 Units to be chosen from those below			
36	Advanced Mechanical Principles	5	15
37	Virtual Engineering	5	15
44	Industrial Power, Electronics and Storage	5	15
45	Industrial Systems	5	15
49	Lean Manufacturing	5	15
50	Advanced Manufacturing Technology	5	15

Grades

Learner performance in all BTEC Higher National units, irrespective of their credit value or level, will be graded Pass, Merit or Distinction. Pass level will be the threshold grade meaning that all the learning outcomes have been achieved at the level of the unit and the credit value of the unit can be awarded. Merit or Distinction grades will be used to recognise a qualitative improvement, according to the published grading domains and will be determined by the module tutor.

Qualification Grades

Higher National qualifications will continue to have the achievement of learners expressed in a full qualification profile which will include the units achieved, their credit, level and grade. In addition, achievement for each qualification will have an overall grade. The overall grades will be determined, by Edexcel, through a points system that determines the grade boundaries at Pass, Merit and Distinction.

Curriculum Design

The vocational nature of the courses offered means that the curriculum is broadly based on the sequence *Practice – Principles – Application*. The early stages of each course involve study of current Engineering *principles* which provide the tools for understanding and the application of existing *practice*. It also ensures that students have an appropriate background for their current or future employment in a related industry sector. The purpose being to apply theories and concepts within the vocational subject area, develop practical, work related skills and of course develop the wider transferable interpersonal skills essential for employment.

The HNC has been developed to embed aspects of the National Occupational Standards at level 4. HNC units will relate theory to practice and where possible assessments encourage students to apply practice in the development of assessed work. Employers will be encouraged to support employed students to apply theory and practice where appropriate in assessments.

Learning & Teaching Methods

Teaching and learning methods used to deliver this curriculum are designed to provide experience, analytical skills, and develop concepts which can then be explored through testing and experimentation. The methods used in practice vary according to the nature of the subject matter but include self-managed research, e-learning, student centred activities including assignments and case studies. All students carry out and evaluate a design project which for employed students should be a company based project. The curriculum is delivered in such a way that there is a reducing reliance on tutor directed study as students' progress through their level 4 programme.

Transferable Skills

Mandatory core units include Analytical Methods for Engineers, Engineering Science and Project Design, Implementation and Evaluation. For employed students studying HNC the design project is work-based. The mandatory and specialist units are designed to develop the skills required to succeed on higher education courses, to obtain employment, to manage careers and to develop core skills of communication, numeracy, IT and personal development planning; to develop the skills and attributes required in the world of work; and level 5 modules included in the HNC are designed to develop teamwork, independent learning, problem solving and research.

Assessment

A wide range of assessment methods and equipment appropriate to the learning outcomes and assessment criteria will be used, and will consider the practices used within the engineering sector. Whilst credit is awarded at a threshold level of achievement only, grading arrangements will apply to individual units which will allow for the reward of merit and distinction achievement according to

Edexcel's published grading domains and criteria. Provision will be made for all engineering Higher National students to be eligible for grades beyond a pass level.

Assessment is considered an important part of the learning process. In formulating the forms of assessment for this award, care was taken to ensure that all assessments test the skills and knowledge needed in the Engineering working environment. Formative assessment methods are diverse and include problem based assignments, work-based projects requiring oral and written reports, individual exercises experimental work and work-based assignments and phase tests.

Entrance Requirements

The programme is designed for students working, or intending to work, within the Engineering sector. All applicants will be assessed on individual experience and will be expected to demonstrate to ability to study at higher education level.

For students who have recently been in education, the entry profile is likely to include one of the following:

- A* to C grade in GCSE Maths – strongly recommended.
- A BTEC Level 3 qualification in Engineering
- A GCE Advanced Level profile that demonstrates strong performance in a relevant subject or adequate performance in more than one GCE subject. This profile is likely to be supported by GCSE grades at A* to C (or equivalent)
- Other related Level 3 qualifications
- An Access to Higher Education Certificate awarded by an approved further education institution
- Related work experience
- An international equivalent of the above.

Accreditation for Prior (Experiential) Learning will be considered.

English Language Requirements

Students who have not undertaken their final two years of schooling in English, must demonstrate capability in English at a standard equivalent to the levels identified below, before being recruited to the programme:

- Common European Framework of Reference (CEFR) level B2
- PTE 51
- IELTS 5.5; Reading and Writing must be at 5.5
- or equivalent.

Progression

Students who successfully achieve HNC Electrical/Electronic Engineering will be able to progress to a relevant HND Engineering course or an equivalent level 5 course.

Students who successfully achieve the HND in Electrical and Electronic Engineering will be able to progress on to a Bachelor's Degree course at a University and start at year 3 (each University is different so you will need to check eligibility)

Semester: Learning & Development will support students in making applications to suitable programmes.