Pearson BTEC Level 5 Higher National Diploma in Engineering (Electrical and Electronic Engineering) - RQF

Code: BHNDE5 Guided Learning Hours: 960 Hours

Programme Structure:

The Higher National Diploma (HND) is a Level 5 qualification made up a minimum of 240 credits of which 120 credits are at Level 5 and 120 credits are at Level 4 and usually attained via the HNC.

- *Pearson would expect that an HND students would have achieved at least 90 credits at Level 4 before progressing to Level 5 units. This allows for the students to submit the remaining 30 credits at Level 4 while undertaking their Level 5 study.*

- *Students undertaking an HND who fail to successfully complete the full qualification may award an HNC, if their credit achievement permits.*

ELITC offers the following units of study for earning a Pearson BTEC Level 5 Higher National Diploma in Engineering (Electrical and Electronic Engineering).

No.	Unit Descriptions	Unit Level	Unit Credit
1	Engineering Design*	4	15
2	Engineering Maths*	4	15
3	Engineering Science*	4	15
4	Managing a Professional Engineering Project (Pearson-set) *	4	15
5	Electrical and Electronic Principles+	4	15
6	Quality and Process Improvement	4	15
7	Digital Principles	4	15
8	Electronic Circuits and Devices	4	15
9	Research Project*	5	30
10	Professional Engineering Management (Pearson-set) *	5	15
11	Further Mathematics+	5	15
12	Industrial Power, Electronics and Storage+	5	15
13	Industrial Systems+	5	15
14	Lean Manufacturing	5	15
15	Further Electrical, Electronic and Digital Principles	5	15
		Total:	**240**

* *Mandatory Core Units*

+ *Mandatory Specialist Units*

Unit Synopsis

Unit 1: Engineering Design (K/615/1475)	Unit Type: Core

Objectives

Introduce students to the methodical steps that engineers use in creating functional products and processes; from a design brief to the work, and the stages involved in identifying and justifying a solution to a given engineering need.

Learning outcomes

Upon completion of this unit, student will be able to:

1. Plan a design solution and prepare an engineering design specification in response to a stakeholder's design brief and requirements.
2. Formulate possible technical solutions to address the student-prepared design specification.
3. Prepare an industry-standard engineering technical design report.
4. Present to an audience a design solution based on the design report and evaluate the solution/presentation.

Unit 2: Engineering Maths (M/615/1476)	Unit Type: Core

Objectives

Develop students' skills in the mathematical principles and theories that underpin the engineering curriculum. Students will be introduced to mathematical methods and statistical techniques in order to analyse and solve problems within an engineering context.

Learning outcomes

Upon completion of this unit, student will be able to:

1. Identify the relevance of mathematical methods to a variety of conceptualized engineering examples.
2. Investigate applications of statistical techniques to interpret, organise and present data by using appropriate computer software packages.
3. Use analytical and computational methods for solving problems by relating sinusoidal wave and vector functions to their respective engineering applications.
4. Examine how differential and integral calculus can be used to solve engineering problems.

Unit 3: Engineering Science (T/615/1477)	Unit Type: Core

Objectives

Introduces students to the fundamental laws and applications of the physical sciences within engineering and how to apply this knowledge to find solutions to a variety of engineering problems.

Learning outcomes

Upon completion of this unit, student will be able to:

1. Examine scientific data using both quantitative and computational methods.
2. Determine parameters within mechanical engineering systems.
3. Explore the characteristics and properties of engineering materials.
4. Analyse applications of A.C./D.C. circuit theorems, electromagnetic principles and properties.

Unit 4: Managing a Professional Engineering Project (A/615/1478)	Unit Type: Core

Objectives

Introduces students to the techniques and best practices required to successfully create and manage an engineering project designed to identify a solution to an engineering need.

This unit is assessed by a Pearson-set assignment. The project brief will be set by the Centre, based on a theme provided by Pearson (this will change annually). The theme and chosen project within the theme will enable students to explore and examine a relevant and current topical aspect of professional engineering.

Learning outcomes

Upon completion of this unit, student will be able to:

1. Formulate and plan a project that will provide a solution to an identified engineering problem.
2. Conduct planned project activities to generate outcomes which provide a solution to the identified engineering problem.
3. Produce a project report analysing the outcomes of each of the project processes and stages.
4. Present the project report drawing conclusions on the outcomes of the project.

Unit 19: Electrical and Electronic Principles (M/615/1493)	Unit Type: Specialist

Objectives

Develop students' knowledge and skills in the principles of electrical and electronic circuits and devices.

Learning outcomes

Upon completion of this unit, student will be able to:

1. Apply an understanding of fundamental electrical quantities to evaluate simple circuits with constant voltages and currents.
2. Evaluate simple circuits with sinusoidal voltages and currents.
3. Describe the basis of semiconductor action, and its application to simple electronic devices.
4. Explain the difference between digital and analogue electronics, describing simple applications of each.

Unit 17: Quality and Process Improvement (H/615/1491)	Unit Type: Optional

Objectives

Introduces students to the importance of quality assurance processes in a manufacturing or service environment and the principles and theories that underpin them.

Learning outcomes

Upon completion of this unit, student will be able to:

1. Illustrate the applications of statistical process control when applied in an industrial environment to improve efficiency.
2. Analyse cost effective quality control tools.
3. Determine the role of standards in improving efficiency, meeting customer requirements and opening up new opportunities for trade.
4. Analyse the importance of Total Quality Management and continuous improvement in manufacturing environments.

Unit 20: Digital Principles (T/615/1494)	Unit Type: Optional

Objectives
Develop students' knowledge and skills in the principles of digital electronic circuits.

Learning outcomes
Upon completion of this unit, student will be able to:
1. Explain and analyse simple combinational logic circuits.
2. Explain and analyse simple sequential logic circuits.
3. Describe and evaluate the technologies used to implement digital electronic circuits.
4. Describe and analyse a range of digital subsystems, hence establishing the building blocks for larger systems.

Unit 22: Electronic Circuits and Devices (F/615/1496)	Unit Type: Optional

Objectives
Introduces students to the use of electronics manufacturers' data to analyse the performance of circuits and devices, the operational characteristics of amplifier circuits, the types and effects of feedback on a circuit performance, and the operation and application of oscillators. They will also be introduced to the application of testing procedures to electronic devices and circuits, and use the findings of the tests to evaluate their operation.

Learning outcomes
Upon completion of this unit, student will be able to:
1. Determine the operational characteristics of amplifier circuits.
2. Investigate the types and effects of feedback on an amplifier's performance.
3. Examine the operation and application of oscillators.
4. Apply testing procedures to electronic devices and circuits.

Unit 34: Research Project (J/615/1502)	Unit Type: Core

Objectives
Introduces students to the skills necessary to deliver a complex, independently conducted research project that fits within an engineering context.

Learning outcomes
Upon completion of this unit, student will be able to:
1. Conduct the preliminary stages involved in the creation of an engineering research project.
2. Examine the analytical techniques used to work on all stages of the project and strategies required to overcome the challenges involved in a research project.
3. Reflect on the impact the research experience could have in enhancing personal or group performance within an engineering context.
4. Explore the communication approach used for the preparation and presentation of the research project's outcomes.

Unit 35: Professional Engineering Management (L/615/1503)	Unit Type: Core

Objectives

Continue building up on the knowledge gained in Unit 4: Managing a Professional Engineering Project, to provide students with the professional standards for engineers and to guide them on how to develop the range of employability skills needed by professional engineers.

This unit is assessed by a Pearson-set assignment. The project brief will be set by the Centre, based on a theme provided by Pearson (this will change annually). The theme and chosen project within the theme will enable students to explore and examine a relevant and current topical aspect of professional engineering.

Learning outcomes

Upon completion of this unit, student will be able to:

1. Evaluate the risk evaluation theories and practices associated with the management of projects for the production of current and developing technology.
2. Produce an engineering services delivery plan that meets the requirements of a sector-specific organisation.
3. Develop effective leadership, individual and group communication skills.
4. Develop personal commitment to professional standards and obligations to society, the engineering profession and the environment.

Unit 39: Further Mathematics (H/615/1507)	Unit Type: Specialist

Objectives

Prepare students to analyse and model engineering situations using mathematical techniques. Students will expand their knowledge of calculus to discover how to model and solve engineering problems using first and second order differential equations.

Learning outcomes

Upon completion of this unit, student will be able to:

1. Use applications of number theory in practical engineering situations.
2. Solve systems of linear equations relevant to engineering applications using matrix methods.
3. Approximate solutions of contextualised examples with graphical and numerical methods.
4. Review models of engineering systems using ordinary differential equations.

Unit 44: Industrial Power, Electronics and Storage (M/615/1512)	Unit Type: Specialist

Objectives

Introduces students to the field of existing and renewable energy systems. There are many alternative sources of energy (some 'green') which can be converted to an electrical form, providing energy for transport, heat/cooling and lighting, as well as energy for various industrial processes and applications. It will also explore the potential impacts of climate change and why more, and different forms of, sustainable energy sources are required together with the need for energy efficiency measures.

Learning outcomes

Upon completion of this unit, student will be able to:

1. Evaluate energy demand to determine the technology and methods of energy production.
2. Discuss current energy efficiency measures, technologies and policies specific to the building and transportation sectors.
3. Analyse the control techniques of power electronics for renewable energy systems.
4. Investigate the impacts of renewable resources to the grid and the various issues associated with integrating such resources to the grid.

Unit 45: Industrial Systems (T/615/1513)	Unit Type: Specialist

Objectives

Develop students' knowledge and skills in the development of advanced electronic solutions in a range of industrial situations.

Learning outcomes

Upon completion of this unit, student will be able to:

1. Describe the main elements of an electronically controlled industrial system.
2. Identify and specify the interface requirements between electronic, electrical and mechanical transducers and controllers.
3. Apply practical and computer-based methods to design and test a measurement system.
4. Apply appropriate analytical techniques to predict the performance of a given system.

Unit 49: Lean Manufacturing (L/615/1517)	Unit Type: Optional

Objectives

Introduce students to the principles and processes of lean manufacturing, so that they can become an effective and committed practitioner of lean in whatever industry sector they are employed in.

Learning outcomes

Upon completion of this unit, student will be able to:

1. Examine the common principles of lean manufacturing and how the implementation of a lean production system contributes to business success.
2. Evaluate the Toyota Production System against the now more widely adopted generic approaches to lean manufacturing.
3. Specify a range of the process improvement tools used within lean manufacturing.
4. Demonstrate effective communication skills in order to lead the process of continuous improvement across an organisation.

Unit 52: Further Electrical, Electronic and Digital Principles (L/615/1520)	Unit Type: Optional

Objectives

Develops student with structured approach to the analysis of AC single-phase and three-phase powered circuitry and help students to arrive at the solution in the most efficient way, with the greatest probability of it being correct. This will allow students to develop the necessary confidence and competence in the four key areas of mathematical techniques, circuit analysis, circuit simulation and laboratory practice.

Learning outcomes

Upon completion of this unit, student will be able to:

1. Use appropriate mathematical techniques to solve a range of electrical and electronic problems.
2. Apply appropriate circuit theorems to solve problems in electrical networks.
3. Use appropriate laboratory and computer simulation techniques to investigate both analogue and digital circuits and interpret the results.
4. Explain the characteristics of non-linear circuits to predict their behavior under a variety of conditions.

Entry Requirements:

- Applicants who are at least 18 years of age must satisfy at least one of the following requirements:
  - Pearson BTEC Level 4 Higher National Certificate and Minimum 1 GCE 'A' Level passes; or
  - Diploma in any field; or equivalent.
- Mature applicants (at least 30 years of age) with minimum 8 years of relevant working experience but do not possess the required qualifications will be considered on a case by case basis.
- Applicants should be free from colour appreciation deficiency.

Language Proficiency:

- Applicants must have English Language Proficiency with IELTS (International English Language Testing System) score of at least 5.50; or a level of competence equivalent to a TOEFL (Test of English as a Foreign Language) score of 500; or who have successfully completed at least 2 years of schooling in English medium and had the required English Language competency.
- Applicants who do not meet the above English Language requirements are required to pass in ELITC English Proficiency Entrance Test and/or an interview to be conducted by ELITC.

Duration:

The total Guided Learning Hours (GLH) for 15 Units is 960 hrs. This programme is offered either as:

- **Full-time** over 18 months which comprises a total of 6 trimesters. All classes will be conducted from 9.00 am to 5.30 pm on weekdays.
- **Part-time** over 24 months which comprises a total of 8 trimesters. All classes will be conducted 2 sessions per week from 9.00 am to 4.00 pm or 2 evening sessions during weekdays from 6.30 pm to 9.30 pm and 1 weekend session from 9.00 am to 4.00 pm.

Training Medium:

This programme is conducted in English.

Training Methodology:

This programme is delivered through lectures, tutorials, lab, hands-on activities, role-plays, case studies, work assignments, group discussions.

Essential Requirements:

- Scientific Calculator: CASIO FX-570MS / CASIO FX-991MS / SHARP EL-506W / SHARP EL-520W
- Laptop

Assessment:

There is a range of assessment methods that can be utilised, such as:

- individual work assignment with/without presentation
- group work assignment with/without presentation
- written report with/without presentation
- practical assessment and/or written assessment

BTEC Higher Nationals in Engineering are assessed using a combination of internally assessed centre-devised internal assignments (which are set and marked by the Centre) and internally assessed Pearson-set assignments (which are set by Pearson and marked by the Centre). Pearson-set assignments are mandatory and target particular industry-specific skills. For the Level 5 HND, two core units: one core, 15 credit, unit at Level 4 and one core, 15 credit, unit at Level 5, will be assessed by a mandatory Pearson-set assignment targeted at particular skills; all other units are assessed by centre-devised assignments.

Grading System:

Each successfully completed unit will be graded a **Pass, Merit or Distinction**.

Unit Grade	Generic Grade Descriptors
Pass	• All learning outcomes and associated assessment criteria have been met
Merit	• Pass requirements achieved • All merit grade descriptors achieved through high performance in each learning outcome
Distinction	• Pass and merit requirements achieved • All distinction grade descriptors achieved through outstanding performance across the unit as a whole

Certification:

To achieve a Pearson BTEC Level 5 Higher National Diploma (HND) qualification within 4 years (from the registration date), student must have:

- completed units which is equivalent to 120 credits at Level 4;
- achieved at least a pass in 105 credits at Level 4;
- completed units which is equivalent to 120 credits at Level 5; and
- achieved at least a pass in 105 credits at Level 5

Student must satisfy the minimum attendance requirements in all the units for the award of Statement of Attendance. Full-time Students, both local and international, must attain a minimum of 90% of scheduled unit hours or not be absent from the unit for consecutive 7 days. As for Part-time Students, the minimum attendance requirement is 80%.

Progression Pathway:

Successful students with Pearson BTEC Level 5 Higher National Diploma in Engineering (Electrical and Electronic Engineering) – RQF can progress into the final year of the Bachelor degree programme recommended by Pearson Education Ltd.

For more information, please visit the degree course finder from Pearson website: https://degreecoursefinder.pearson.com.

Career Prospects:

This programme helps students to gain employment opportunities in the manufacturing as well as the electrical or electronic engineering sector where students may move towards supervisory or managerial positions. This programme also serves as a good training route for students to switch into electrical or electronic engineering sector.