University Centre Leeds

Programme Specification

1	**Awarding Institution/Body**	Pearson – Edexcel
2	**Delivery Location(s)**	Leeds City College
3	**Programme Externally Accredited by (e.g. PSRB)**	N/A
4	**Award Title(s)**	Pearson BTEC Level 4 Higher National Certificate in Electrical and Electronic Engineering Pearson BTEC Level 4 Higher National Certificate in Manufacturing Engineering Apprenticeship: EAL Level 4 Diploma in Engineering and Advanced Manufacturing
5	**FHEQ Level**	4
6	**Bologna Cycle**	HNC: Short cycle (within or linked to the first cycle) qualifications [1]
7	**JACS Code and JACS Description**	H600
8	**Mode of Attendance**	Part time
9	**Relevant QAA Subject Benchmarking Group(s)**	Engineering Subject Benchmark Statement (2015)[2]
10	**Relevant Additional External Reference Points**	UK standard for professional engineering competence (Level 3 and 6)
11	**Date of Approval/ Revision**	Oct 2018

[1] See QAA. (2014). *The Frameworks for Higher Education Qualifications of UK Degree-Awarding Bodies*. Available online [http://www.qaa.ac.uk/en/Publications/Documents/qualifications-frameworks.pdf], accessed: 09/08/17

[2] Although QAA subject benchmarking groups do not apply to HNC/D qualifications

12	**Criteria for Admission to the Programme**	● A* to C grade in GCSE Maths, relevant A-levels, relevant BTEC Level 3/National Certificate at MM or above, also industrial experience will also be considered. ● English: Level B2 (CEFR), PTE 51, IELTS 6 or equivalent. ● Suitable reference (e.g. from line manager or tutor)

13 Educational Aims of the Programme

The purpose of the programmes is to develop students as professional, self-reflecting individuals who are able to meet the demands of employers in the rapidly evolving engineering sector and adapt to a constantly changing world. The qualifications also aim to widen access to higher education and enhance the career prospects of those who undertake them.

The overall aims of the programme are to:

- Provide a thorough grounding in engineering principles at Level 4, which leads the student to the progression pathway to Level 5 relating to individual professions within the manufacturing and electric and electronic engineering sectors.
- Equip individuals with the essential qualities of an engineer, including integrity, regard for cost and sustainability, as they apply to a range of roles and responsibilities within the sector.
- Enable progression to a higher level of studies such as a university degree by supporting the development of academic study skills and the selection of appropriate optional units.
- Enable progression to further professional qualifications in specific engineering disciplines by mapping the units studied to the requirements of the Professional Bodies applicable to that discipline.

14 Learning Outcomes

The programme will enable students to develop the knowledge and skills listed below. On successful completion of the programme, the student will be able to (demonstrate):

	Knowledge and Understanding	
	KU1	Knowledge and understanding of the fundamentals principles and practices of the contemporary global engineering industry.
	KU2	Knowledge and understanding of the external engineering environment and its impact upon local, national and global levels of strategy, behaviour, management and sustainability.
	KU3	Understanding and insight into different engineering practices, their diverse nature, purposes, structures and operations and their influence upon the external environment.
	KU4	A critical understanding of the ethical, environmental, legal, regulatory, professional and operational frameworks within which engineering operates.
	KU5	A critical understanding of process, practices and techniques for effective management of products, processes, services and people.
	KU6	A critical understanding of the evolving concepts, theories and models within the study of engineering across the range of operational alternatives.
	KU7	An ability to evaluate and analyse a range of concepts and theories, models and techniques to make appropriate engineering operational and management decisions.

	KU8	An appreciation of the concepts and principles of CPD, staff development, team dynamics, leadership and reflective practice as strategies for personal and people development.
	KU9	Knowledge and understanding of how the key areas of engineering and the environment it operates within influence the development of people and businesses.
	KU10	An understanding of the skills, techniques and methodologies used to resolve problems in the workplace.
	KU11	Knowledge and understanding of the human-machine interaction to inform the development of good design and fitness for purpose.
	Cognitive/Intellectual Skills *(insert additional rows as necessary)*	
	CS1	Apply knowledge and understanding of essential concepts, principles and models within the contemporary global engineering industry
	CS2	Develop different strategies and methods to show how resources (human, financial, environmental and information) are integrated and effectively managed to successfully meet objectives.
	CS3	Critically evaluate current principles and operational practices used within the engineering industry as applied to problem-solving.
	CS4	Apply project management skills and techniques for reporting, planning, control and problem-solving.
	CS5	Recognise and critically evaluate the professional, economic, social, environmental and ethical issues that influence the sustainable exploitation of people, resources and businesses.
	CS6	Critique a range of engineering information technology systems and operations and their application to maximise and successfully meet strategic objectives.
	CS7	Interpret, analyse and evaluate a range of engineering data, sources and information to inform evidence-based decision-making.
	CS8	Synthesise knowledge and critically evaluate strategies and plans to understand the relationship between theory and actual world engineering situations.
	CS9	Evaluate the changing needs of the engineering industry and have the confidence to self-evaluate and undertake additional CPD as necessary.
	Applied Skills	
	AS1	Evidence the ability to show customer relationship management skills and develop appropriate policies and strategies to meet stakeholder expectations.
	AS2	Apply innovative engineering ideas to design and develop new products or services that respond to the changing nature of the engineering industry and the global market.
	AS3	Integrate theory and practice through the investigation, evaluation and development of practices and products in the workplace.
	AS4	Develop outcomes for customers using appropriate practices and data to make justified recommendations.
	Key Transferable Skills	
	TS1	Develop a skill-set to enable the evaluation of appropriate actions taken for problem-solving in specific engineering contexts
	TS2	Develop self-reflection, including self-awareness, to become an effective self-managing student, appreciating the value and importance of the self-reflection process.
	TS3	Undertake independent learning to expand on own skills and delivered content.
	TS4	Competently use digital literacy to access a broad range of research sources, data and information.

	TS5	Communicate confidently and effectively, both orally and in writing both internally and externally with engineering professionals and other stakeholders.
	TS6	Demonstrate strong interpersonal skills, including effective listening and oral communication skills, as well as the associated ability to persuade, present, pitch and negotiate.
	TS7	Identify personal and professional goals for continuing professional development in order to enhance competence to practice within a chosen engineering field.
	TS8	Take advantage of available pathways for continuing professional development through Higher Education and Professional Body Qualifications.
	TS9	Develop a range of skills to ensure effective team working, project and time management, independent initiatives, organisational competence and problem-solving strategies.
	TS10	Reflect adaptability and flexibility in approach to engineering; showing resilience under pressure and meeting challenging targets within given deadlines.
	TS11	Use quantitative skills to manipulate data, evaluate and verify existing theory.
	T12	Apply their subject-related and transferable skills in contexts where the scope of the task and the criteria for decisions are generally well defined but where some personal responsibility and initiative is required.

15 Key Learning & Teaching Strategy Methods

In general, the teaching methods used in the sessions of these study programmes include lectures, tutorials, seminars and laboratory classes, and aim to offer an interactive, high quality learning experience.
Over the last 3 years, for instance, in the Engineering Science module a mixture of short lectures, tutor-led worked examples and tutorials have been used in order to impart the necessary engineering principles and concepts and to solve problems interactively. This has allowed students to climb Blooms taxonomy from recall to application in a short space of time. Realistic and work-related examples have been used to make sure that the theoretical ideas were put into practicality.

Case study is a great teaching and learning method that allows students to apply academic concepts within realistic scenarios and to effectively learn those concepts and potential applications. Therefore, case study is used in several modules (Engineering design, Engineering management, Engineering science, Quality and process improvement). Case studies, together with group exercises allow students to effectively apply their skills at the workplace, too.

Some units, e.g. Automation, Robotics and PLCs or Electrical and Electronic Principles, have used not only lectures and theoretical problems, but also more practical tasks such as programming or software simulation to make the programme relevant to the workplace. This was possible even during lockdown as software like MultiSim are easily accessible from any computer connected to the web.
Student-led tutorials consisting of action learning activities, discussion groups and report-back sessions have been used in modules discussing current topics, such as Engineering management or Engineering design. Another practical unit is the Engineering project which is very important as students need to complete different tasks during the project work. During the last 3 years the tasks have included a mixture of literature research and simulation based projects where teamwork and professional discussion have been very much facilitated. This has allowed students to develop their research, communication and teamwork skills.

	Apart from class based delivery modes, the programme employs a modern VLE (Google Classroom) to make teaching material, assignments and further information available on a more flexible basis. The VLE is also used for revision and preparation purposes so that the part time students are able to have a more rounded out learning experience. Apprenticeship has been managed by an independent assessor based at the Printworks campus. The assessor has been carrying out visits and reviews with 8 to 12 weeks intervals with all the learners. During the lockdown periods these visits were carried out remotely. Learners were introduced to OneFile at the beginning of their studies. This is the platform where they are required to submit their weekly timesheets (evidence of off the job learning) and also to provide responses to review questions, together with any evidence for meeting apprenticeship standards. During the last 3 years little overlap was made between the individual learner's learning plans and the Pearson based HNC learning outcomes, however, from the next academic year more overlapping will be generated in toder to ease learner's workload and to make the learning strategy more effective. Tamas is being trained as an assessor and he will be able to carry out visits and assess work based learning.
16	**Key Assessment Strategy/Methods** Assessments relate directly to learning outcomes and one assessment covers one or more than one learning outcome. Students are assessed in taught modules which are specifically designed to enable students to practise and develop their acquired skills and knowledge and students are assessed in accordance with the assessment schedule identified for the programmes. Outcomes are assessed through a variety of assessment mechanisms including: ● Assignments (tasks include maths problems, presentations, essays or reports, see also assessment matrix) ● Project work Apprentices are assessed in their workplace, too. Assessment includes progress check against the Level 4 Engineering Manufacturing Technician Apprenticeship Standards that are listed here: Engineering manufacturing technician / Institute for Apprenticeships and Technical Education Learners have 42 months from enrolment to complete their studies. Over the last 3 years an external assessor has been carrying out the progress reviews, visits and administration related to apprentice learners. In 2021-22 the Programme manager has been involved in the process by shadowing the assessor and carrying out regular visits to two learners who work at the same company. Learners need to submit their responses to assigned tasks on OneFile, together with their regular timesheets.These are being checked by the assessor and the tutors. Work related learning is checked against the above criteria and regular monitoring is taking place via consultation with learners and work based mentors. At the end of their studies apprentices need to pass an End-point assessment (EPA) that tests the knowledge, skills and behaviours that an apprentice has gained during their training. Unique to each standard, EPA demonstrates the competence of an apprentice in their role and they are very valuable for employers.

17 Programme Modules

Level 4 (HNC Level)

Code	Title	Credits	Core/ Option	Non-Compensatable	Compensatable
1	Engineering Design	15	Core		X
2	Engineering Maths	15	Core		X
3	Engineering Science	15	Core		X
12	Engineering Management	14	Core		X
4	Managing a Professional Engineering Project	15	Core		X
7	Machining and Processing of Engineering Materials	15	Core		X
14	Production Engineering for Manufacture	15	Option		X
15	Automation, Robotics and PLCs	15	Option		X
19	Electrical and Electronic Principles	15	Option		X
17	Quality and Process Improvement	15	Option		X

18 **Programme Structure**

Part time
The part time provision can be studied at level 4.

This mode of study is aimed at students in employment (including apprentices), all units will be delivered during one day per week.

Level 4 – 1st year of programme			
N/A	Full year	Unit 2: Engineering Maths	1st Semester
		Unit 12: Engineering Management	
		Unit 1: Engineering Design	2nd Semester
		Unit 3: Engineering Science	
Level 4 – 2nd year of programme			
N/A	Full year	Unit 17 Quality and Process Improvement (Man. option)	1st Semester
		Unit 15: Automation, Robotics and PLCs (EEE option)	
		Unit 7: Machining and Processing of Engineering Materials	
		Unit 4: Managing a Professional Engineering Project	2nd Semester
		Unit 19: Electrical and Electronic Principles (EEE option)	
		Unit 14: Production Engineering for Manufacture (Man. option)	

Electronic & Electrical Engineering Modules

Year 1	**Semester1**	**Semester 2**
	Unit 2: Engineering Maths Unit 12: Engineering Management	Unit 1: Engineering Design Unit 3: Engineering Science
Year 2	**Semester 1**	**Semester 2**
	Unit 15: Automation, Robotics and PLCs Unit 7: Machining and Processing of Engineering Materials	Unit 4: Managing a Professional Engineering Project Unit 19: Electrical and Electronic Principles

Manufacturing Engineering Modules

Year 1	**Semester1**	**Semester 2**
	Unit 2: Engineering Maths Unit 12: Engineering Management	Unit 1: Engineering Design Unit 3: Engineering Science

Year 2	Semester 1	Semester 2
	Unit 17 Quality and Process Improvement Unit 7: Machining and Processing of Engineering Materials	Unit 4: Managing a Professional Engineering Project Unit 14: Production Engineering for Manufacture

19 Support for Students and Their Learning

1. Detailed induction programme is prepared that includes support with enrolment, talks from the student reps, the HE Student Support team and the HE librarian. Over the last 3 years these have always been scheduled into the induction week programme.
2. In 2021 tutorials were started to be timetabled into the delivery in order to provide individualised tailored support and therefore, provide equal opportunities. The tutorial and individualised support is provided during the entire duration of the study.
3. Apprentices are provided with extra in-class and in-work support. This means that the tutor supports them with their weekly timesheets and the work based mentor and college assessor provide extra personalised support via regular consultations and visits.
4. Regular communication with students (email, Google Chat, Google Classroom notice board) has always been a priority over the last few years This has helped to improve attendance and achievement to a high standard. Engineering students have regularly arrived to lessons on time and submitted their assignments on time, too. The lack of resits in 2020-21 and 2021-22 well reflects this.
5. All necessary information about the programme has been provided by means of the student handbook, module handbooks and the VLE.
6. The University Centre provides an extensive range of services for students, including support for those with special needs.
7. Students have access to Student Services, which provide assistance and guidance e.g. counselling, dyslexia support.
8. Industrial visits are an ideal way of technical support but due to lockdown it has not been possible to arrange them over the last 3 years, however, it is planned to be happening in the current and coming years.
9. Over the last year guest speakers from the engineering industry have provided a great overview for possible career progress to students.
10. Small class sizes make it possible to put learners on an accelerated learning path and to make teaching and learning more effective, via individualised in-class support, questioning and teamwork.
11. Since 2020-21 instruments have been purchased to provide appropriate technical support and to help students embed practical skills into their learning.

20	**Distinctive Features** The part-time HNC programme has been designed to enable students to develop a variety of skills and techniques essential for a range of technical and management careers in the engineering industry. In particular, this award focuses on the needs identified in the Leeds City Region Skills Audit that highlights a requirement for engineering graduates. The part-time provision is designed for students on a day release basis. Thus, they are likely to have worked in the industry in some capacity before, as well as during the programme. In some of the units students are expected to draw heavily on their industrial experience. The main area of work-based learning is within the project/research modules, where students are encouraged to pursue work related projects, which tends to be set by their employer/work experience placement. The College is able to provide additional support to students on Higher Education programmes through its robust links with industry, and through approaches to learning such as collaborative group work. Work related learning is also embedded into the assessment strategies of the Managing a Professional Engineering Project and Quality and Process Improvements modules as the assignment reports require the involvement of work based (or relevant practical) experience via reporting results or a case study.

Map of Outcomes to Modules

Unit No	Knowledge and Understanding											Cognitive skills									Applied skills				Transferable skills											
	1	2	3	4	5	6	7	8	9	10	11	1	2	3	4	5	6	7	8	9	1	2	3	4	1	2	3	4	5	6	7	8	9	10	11	12
1	x			x	x	x	x		x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x		x	x	x	x	x	x	x	x	x
2	x											x						x					x		x			x							
12	x			x	x						x	x											x		x	x						x	x	x	x
3	x											x						x					x		x			x							
4	x	x	x	x	x	x	x	x	x	x													x	x	x		x				x	x	x	x	x
7	x	x	x								x	x	x					x							x										
15	x						x	x										x								x									
19	x	x	x		x	x	x		x	x															x							x		x		x
17	x									x													x		x										
14	x						x	x										x								x									

Map of Teaching and Learning Methods

Level 4

	Lectures	Seminars	Tutorials	Experi-ments	Demos	Case studies	Group exercise	Independent Study	Simula-tions	Individual research projects	Design projects
Unit 1 Engineering Design	*		*	*		*	*	*	*	*	*
Unit 2 Engineering Maths	*		*		*	*		*			
Unit 12 Engineering Management	*		*			*	*	*			
Unit 3 Engineering Science	*		*	*	*	*	*	*	*		*
Unit 7 Machining and Processing of Engineering Materials	*		*	*	*	*		*			
Unit 4 Managing a Professional Engineering Project	*		*			*		*		*	
Unit 15 Automation, Robotics and PLCs	*		*	*	*		*	*	*		*
Unit 19 Electrical and Electronic Principles	*	*	*	*	*		*	*	*		*
Unit 17 Quality and Process Improvement	*	*	*			*	*	*			
Unit 14 Production Engineering for Manufacture	*	*	*	*	*		*	*			*

Map of Assessment Methods

Level 4

	Software simulation	Report\essay	Assignments (summative)	WRL project	Experiments	Case study	Self evaluation	Peer assessment	Portfolio	Presentation
Unit 1: Engineering Design		*	**W22** (proposal with case study and portfolio) **W30** (report and presentation)			*			*	*
Unit 2: Engineering Maths			**W6** (course work) **W15** (course work)							
Unit 3: Engineering Science	*		**W20** (experi		*					

			mental report) **W28** (simulation study and coursework)							
Unit 12: Engineering Management		*	**W7** (case study and report) **W14** (presentation)			*				*
Unit 4: Managing a Professional Engineering Project		*	**W23** (report that includes simulation results, and portfolio, together with work based learning)	*			*	*		*

			W30 (presentation with self-reflection and work based learning included),							
Unit 7: Machining and Processing of Engineering Materials		*	**W9** (report that includes a case study) **W15** (presentation)			*				*
Unit 15: Automation, Robotics and PLCs	*	*	**W8** (report that contains experimental and some simulation results)		*					

			W13 (report that contains simulation results)							
Unit 19: Electrical and Electronic Principles	*		**W22** (practical report containing some simulation results) **W29** (practical report containing some simulation results and health and safety considerations)		*					
Unit 17: Quality and Process Improvement		*	**W8** (report that	*		*				

			includes a work based case study) **W13** (report that includes a work based findings)							
Unit 14: Production Engineering for Manufacture	*		**W22** (experimental report) **W29** (practical report that contains simulations)		*					