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 5 Higher National Diploma in Electrical and Electronic Engineering Pearson BTEC Level 5 Higher National Diploma in Manufacturing Engineering		
5	**FHEQ Level**	5		
6	**Bologna Cycle**	HND: Short cycle (within or linked to the first cycle) qualifications [1]		
7	**JACS Code and JACS Description**	H600		
8	**Mode of Attendance**	Full 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		
12			Typical entry criteria	Minimum entry criteria

[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

	Criteria for Admission to the Programme	**Level 3 qualifications**	48 UCAS tariff points from two A-levels (or equivalent qualifications)	16 UCAS tariff points from one A-level (or an equivalent qualification), in a relevant subject
		Mature applicants	We welcome applications from mature* applicants who may not have met the academic criteria, but who can demonstrate a wealth of experience in their chosen field. Candidates in this category and otherwise are likely to be interviewed to assess their suitability for the course and may be asked to provide a portfolio of evidence to support their application. *21 years and over at the start of the course	
		GCSE English	English Language grade 4 or above. Key Skills Level 2, Functional Skills Level 2 and the Certificate in Adult Literacy are accepted in place of GCSEs.	
		GCSE Maths	Maths grade 4 or above. Key Skills Level 2, Functional Skills Level 2 and the Certificate in Adult Numeracy are accepted in place of GCSEs.	
		IELTS	IELTS 6	
		Reference	A 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 5, which leads the student to the progression pathway to Level 6 relating to individual professions within the manufacturing and electric and electronic engineering sector.
- 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. 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 (Industrial power, electronics and storage, Lean manufacturing, Industrial systems, Manufacturing systems engineering, Advanced manufacturing technologies,	

	Professional engineering management). Case studies, together with group exercises allow students to effectively apply their skills at the workplace, too. A mixture of short lectures, tutor-led seminars and tutorials have been applied in the Professional engineering management and Sustainability modules in order to impart the necessary principles and concepts relevant to professional management, sustainability and, in general, the role of engineering. This was arranged this way in order allow students to solve problems interactively and to facilitate effective team work. This has allowed students to climb Blooms taxonomy from recall to application in a short space of time. Other units, e.g. Industrial systems or Industrial power, electronics and storage have combined lectures and theoretical and practical problems, but also some practical elements such as reviewing the effectiveness of a power grid or applying programming or software simulation to make the programme relevant to the industrial applications. Student-led tutorials consisting of action learning activities, discussion groups and report-back sessions are used in units discussing current topics, such as Lean manufacturing, Sustainability or Industrial power, electronics and storage. This has allowed students to develop their research, communication and teamwork skills. Apart from class based delivery modes, the Level 5 programme employs a modern VLE (Google Classroom) to make teaching material, assignments and further information available on a more flexible basis. The VLE has also been used for revision and preparation purposes so that the students who work in part time employment are able to have access to the same learning experience as those who are not in employment. Apprenticeship is delivered at Level 4 so the Level 5 HND programme is delivered to academic (non-apprentice) students only.
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, and also exam style tasks see also assessment matrix) ● Project work

17 Programme Modules

Level 4 (Year 1)

Code	Title	Credits	Core/ Option	Non-Compensatable	Compensatable
1	Engineering Design	15	Core		X
2	Engineering Maths	15	Core		X
12	Engineering Management	15	Core		X
3	Engineering Science	15	Core		X
4	Managing a Professional Engineering Project	15	Core		X
7	Machining and Processing of Engineering Materials	15	Core		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
14	Production Engineering for Manufacture	15	Option		X

Level 5 (Year 2)

Code	Title	Credits	Core/ Option	Non-Compensatable	Compensatable
34	Research Project	30	Core		X
35	Professional Engineering Management (Pearson-set)	15	Core		X
39	Further Mathematics	15	Core		X
49	Lean Manufacturing	15	Core		X
45	Industrial Systems	15	Option		X
44	Industrial power, electronics and storage	15	Option		X
48	Manufacturing Systems Engineering	15	Option		X
50	Advanced Manufacturing Technology	15	Option		X
51	Sustainability	15	Core		X

18 **Programme Structure**

Full time
Students are enrolled onto the 2-year Level 5 course.
The first year contains Level 4 modules and the second year contains Level 5 modules.

The units are delivered during two full days of teaching. This mode of study is aimed at students in part time employment.

Level 4 – 1st year of programme			
N/A	Full year	Unit 2: Engineering Maths	1st Semester
		Unit 7: Machining and Processing of Engineering Materials	
		Unit 12: Engineering Management	
		Unit 17 Quality and Process Improvement (Man. option)	
		Unit 15: Automation, Robotics and PLCs (EEE option)	
		Unit 1: Engineering Design	2nd Semester
		Unit 3: Engineering Science	
		Unit 4: Managing a Professional Engineering Project	
		Unit 14: Production Engineering for Manufacture (Man. option)	
		Unit 19: Electrical and Electronic Principles (EEE option)	
Level 5 – 2nd year of programme			
Unit 34: Research Project	Full year	Unit 45: Industrial Systems (EEE option)	1st Semester
		Unit 39: Further Mathematics	
		Unit 48: Manufacturing Systems Engineering (Man. option)	
		Unit 51 Sustainability	
		Unit 35: Professional Engineering Management (Pearson-set)	2nd Semester
		Unit 50 Advanced Manufacturing Technology (Man. option)	
		Unit 44 Industrial power, electronics and storage (EEE option)	
		Unit 49: Lean Manufacturing	

Electronic & Electrical Engineering

Year 1	**Semester1**	**Semester 2**
	Unit 2: Engineering Maths Unit 7: Machining and Processing of Engineering Materials Unit 12: Engineering Management	Unit 1: Engineering Design Unit 3: Engineering Science Unit 4: Managing a Professional Engineering Project

	Unit 15: Automation, Robotics and PLCs	Unit 19: Electrical and Electronic Principles
Year 2	**Semester 1**	**Semester 2**
	Unit 34: Research Project Unit 45: Industrial Systems Unit 39: Further Mathematics Unit 51 Sustainability	Unit 34: Research Project Unit 35: Professional Engineering Management Unit 44 Industrial power, electronics and storage Unit 49: Lean Manufacturing

Manufacturing Engineering

Year 1	**Semester1**	**Semester 2**
	Unit 2: Engineering Maths Unit 7: Machining and Processing of Engineering Materials Unit 12: Engineering Management Unit 17 Quality and Process Improvement	Unit 1: Engineering Design Unit 3: Engineering Science Unit 4: Managing a Professional Engineering Project Unit 14: Production Engineering for Manufacture
Year 2	**Semester 1**	**Semester 2**
	Unit 34: Research Project Unit 39: Further Mathematics Unit 48: Manufacturing Systems Engineering Unit 51 Sustainability	Unit 34: Research Project Unit 35: Professional Engineering Management Unit 50 Advanced Manufacturing Technology Unit 49: Lean Manufacturing

19 Support for Students and Their Learning

- 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.
- 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.
- 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.
- All necessary information about the programme has been provided by means of the student handbook, module handbooks and the VLE.
- The University Centre provides an extensive range of services for students, including support for those with special needs.
- Students have access to Student Services, which provide assistance and guidance e.g. counselling, dyslexia support.
- 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.
- Over the last year guest speakers from the engineering industry have provided a great overview for possible career progress to students.

	● 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. ● 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 full-time 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 full-time programme does not only cover the units detailed above. During the summer break, the students are expected to have a work placement. This should be continued during the second year on a part-time basis (probably 2 days/week). The main area of work-based learning is within the research project module, where students are encouraged to pursue work related projects, which tends to be set by their employer/work experience placement or, in the lack of these, the tutor can mimic the industrial environment via regular consultations and providing facilities to instrumentation. 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 Level 4 modules as the assignment reports require the involvement of work based (or relevant practical) experience via reporting results or a case study. Professional Engineering Management is a Level 5 module where work based project delivery and/or management abilities are assessed in report format.

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	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										
34	x	x	x	x	x	x	x						x																				x		x
35	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
39	x											x						x					x		x			x					x		
14	x						x	x										x								x									
45	x													x								x	x										x		
48	x	x					x																	x									x		x
49	x						x											x						x									x		
44	x	x	x		x	x	x												x		x	x	x	x							x		x		x
50	x	x	x		x	x	x												x		x	x	x	x							x		x		x
51	x	x	x		x	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	*	*	*	*	*		*	*			*

Level 5

	Lectures	Seminars	Tutorials	Experi-ments	Demos	Case studies	Group exercise	Independent Study	Simula-tions	Individual research projects	Design projects
Unit 34: Research Project	*		*				*	*	*	*	*

Unit 35: Professional Engineering Management (Pearson-set)	*	*	*			*		*			
Unit 39: Further Mathematics	*							*			
Unit 44: Industrial power, electronics and storage	*			*	*	*	*	*	*		*
Unit 45: Industrial Systems	*					*	*	*	*		*
Unit 48: Manufacturing Systems Engineering	*		*		*	*		*			
Unit 49: Lean Manufacturing	*					*	*	*			*
Unit 50: Advanced Manufacturing Technology	*			*	*	*		*			
Unit 51: Sustainability	*	*	*	*		*		*	*	*	*

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)		*					

Level 5

	Software simulation	Report\ essay	Assignments (summative)	WRL project	Reflective learning statement	Case study	Self evaluation	Peer assessment	Portfolio	Presentation
Unit 34: Research Project		*	**W15** (practical report and portfolio together with reflective learning statement) **W29** (presentation and Q+A from tutor and peers)		*			*	*	*
Unit 35: Professional Engineering Management (Pearson-set)		*	**W24** (practical report and portfolio together	*			*	*	*	*

			with self evaluation on work based learning) **W30** (presentation and Q+A from tutor and peers)							
Unit 39: Further Mathematics			**W6** (course work) **W14** (course work)							
Unit 44: Industrial power, electronics and storage		*	**W22** (practical report including a case study) **W28** (presentation)			*				*
Unit 45: Industrial Systems		*	**W9**			*				*

			(practical report including a case study) **W13** (presentation)							
Unit 48: Manufacturing Systems Engineering			**W9** (evidence of practical experience in manufacturing - report or case study) **W13** (written evidence of effective group discussion and teamwork)	*				*		
Unit 49: Lean Manufacturing		*	**W23** (practical report with			*				*

			case study) **W29** (presentation with Q+A session)							
Unit 50: Advanced Manufacturing Technology		*	**W24** (case study) **W28** (report and presentation)			*				*
Unit 51: Sustainability	*	*	**W7** (practical report with case study) **W12** (simulation report and presentation)			*				*