UNIVERSITY OF LINCOLN

Programme Specification

Title:

Food Engineering

Final Award: **Bachelor of Engineering (BEng)**

With Exit Awards at:
Certificate of Higher Education (CertHE)
Diploma of Higher Education (DipHE)
Bachelor of Engineering (BEng)

To be delivered from: 17 Sep 2018

Level	Date
Level 1 or Certificate of Higher Education (CertHE)	2019-20
Level 2 or Diploma of Higher Education (DipHE)	2020-21
Level 3 or Bachelor of Engineering (BEng)	2020-21

Table Of Contents

1. Introduction

This document describes one of the University of Lincoln's programmes using the protocols required by the UK National Qualifications Framework as defined in the publication *QAA guidelines for preparing programme specifications*.

This programme operates under the policy and regulatory frameworks of the University of Lincoln.

2. Basic Programme Data

Final Award:	Bachelor of Engineering (BEng)
Programme Title:	Food Engineering
Exit Awards and Titles	Certificate of Higher Education (CertHE) Diploma of Higher Education (DipHE) Bachelor of Engineering (BEng)
Subject(s)	Engineering Food Science & Technology
Mode(s) of delivery	Part Time
Is there a Placement or Exchange?	
UCAS code	
Awarding Body	University of Lincoln
Campus(es)	Holbeach Campus, Lincoln Campus
School(s)	National Centre for Food Manufacturing
Programme Leader	Andrea Paoli (APaoli)
Relevant Subject Benchmark Statements	
Professional, Statutory or Regulatory Body Accreditation	
Programme Start Date	2019-20

3. Programme Description

3.1 Overview

The Degree Apprenticeship is a key pillar in the Government's strategy to develop a highly skilled and technically capable workforce. Academic knowledge underpins the vocational skills to produce competencies relevant to the workplace. A series of Standards have been developed by Industrial Partnerships to define both the Academic Knowledge and Vocational Skills appropriate for a series of industrial activities. This Programme is designed to meet the Academic Knowledge requirements of the Food and Drink Advanced Engineer standard as well as potentially meeting the requirements of further Standards still under development. It provides knowledge crossing traditional trade boundaries to include mechanical, electrical/electronic, automation, production and food concepts, all considered within the food arena and termed food engineering.

A continuing thread of business organisational practices and needs ensures an emphasis on application theory as befits this highly vocational area of employment, making this degree highly relevant, not only to Degree Apprenticeship Standards, but also to the general industry needs.

Focusing strongly on research-informed teaching, we have brought together an international team of staff from a range of disciplines and industry backgrounds to ensure that our students get the most from their course and the best start in their engineering careers. Its integration with the Vocational Skills of the Apprenticeship Scheme help provide some of the most capable graduates with a clearer focus on work-based responsibilities than has hitherto been possible.

3.2 Aims and Objectives

The overall aim of this programme is to create numerate and highly motivated graduates who will be in demand by a wide spectrum of organizations. The first two years of study lay the common foundations of mechanical engineering principles. The final year provides an opportunity for students to deepen their education in through a broad range of specialist modules that are integrated within the structured learning environment. The overall aims of this programme are:

• To offer an industrially relevant degree programme that places the student’s learning experience at the centre of every activity and provides students with the partial academic requirements for registration as an Incorporated Engineer (IEng).

• To provide a broad knowledge and understanding of mechanical or electrical engineering within a food context at level 5 or, at level 6 to distill this down further to production, automation or mechanical engineering, again within the food context, all of this being informed by the research activities of the academic staff and drawing on the workplace practices and experiences of a actively engaged series of industrial collaborators within the food and drink arena.

• To produce graduates who can apply fundamental scientific principles and mathematical techniques in order to conceive, realise, create and innovate solutions to real-world engineering problems in a food environment.

• To equip students with an awareness of engineering in the wider social, ethical, sustainable and economic context.
• To develop management skills with particular relevance to a food engineering context.

• To give students the opportunity to develop their intellectual curiosity, their powers of creativity and

innovation, and to reach their full potential in all aspects of University life.

• To provide opportunities for access and personal and professional development that will inspire a commitment to life-long learning.

• To produce graduates who are prepared for a career at management level in food engineering.

• To produce graduates with industry-relevant experience, having considered the wider implications of industrial activity (i.e. ethics).

• To deliver course content embedded with opportunity for workplace engagement through project work and case studies at all levels and across modules (where appropriate), thus facilitating an evolving course content to reflect changing work environments, varied learners backgrounds and emerging technologies.

3.3 Variations to Standard Regulations and Guidance

None

4. Programme Outcomes

Programme-level learning outcomes are identified below.

Refer to *Appendix I – Curriculum Map* for details of how outcomes are deployed across the programme.

4.1 Knowledge and Understanding

On successful completion of this programme a student will have knowledge and understanding of:

1 Legislative, regulatory and ethical requirements, including hygiene and food safety, employee health & safety law and environmental considerations and how these impact future product and process design and commissioning.

2 Reliability optimization strategies, prevention of failures through effective maintenance techniques and development of life cycle plans.

3 Systems approach to equipment design and optimization.

4 Techniques and tools to research, analyse, interpret and evaluate information and concepts; how to utilize ideas from existing systems and new applications to improve or change processes

5 Principles and practices of hygienic design and cleaning systems appropriate to a food and drink environment

6 The role and impact of food and drink engineering within the wider business context, needs of internal and external stakeholders and the wider legal, environmental, technical and economic environment

7 Financial aspects required to justify, develop and commission new process or equipment

8 Strategic leadership, project management techniques, theory and practice required to deliver change processes within a food and drink environment

9 Inter-relationships between food ingredients, product and packaging materials and their effects on food safety, quality and performance of food processing and packaging design and improvement

30 The fundamental concepts, theories, principles, and limitations of engineering science, with knowledge of current practice selected areas of engineering and its relation to the food and drink sector at an advanced level.

31 The mathematical concepts and principles that is relevant to the analysis and solution of food engineering problems.

32 The principles, processes and methods of design, and how to apply them in the creation of new products and processes.

4.2 Subject Specific Practical Skills

On successful completion of this programme a student will be able to:

10 Demonstrate the ability to evaluate new techniques or technologies, and to recognise if these have value within their own food and drink environment.

11 Apply appropriate theoretical and practical methods to design, develop engineering solutions within a food and drink environment.

14 Implement preventative and condition based maintenance procedures using a range of reliability strategies across engineering, use technical risk assessments to improve reliability, maintainability and availability

17 Effectively research a number of different approaches to identify the right solution

18 Identify best practice within the industry through networking across factories and suppliers.

19 Lead, motivate and influence people within a project management matrix to create an inclusive, high performance work culture

20 Exchange food and engineering related information and provide advice to technical and non-technical colleagues.

36 Produce full documentation of the design process and demonstrate compliance with technical, commercial, quality and cost constraints.

4.3 Subject Specific Intellectual Skills

On successful completion of this programme a student will be able to:

12 Align engineering developments with wider business considerations including finance, commercial management, product innovation and sustainability

13 Define, articulate and justify the business case for food and drink engineering investment

15 Use problem solving techniques and Continuous Improvement techniques to deliver change and improvement programmes in a food and drink process designed to advance business performance

16 Consider business environmental objectives through engineering solutions which advance and protect business and industry reputation.

33 Integrate their knowledge and understanding of engineering, food, mathematics, design and business practice to propose solutions to food engineering problems.

34 Acquire, evaluate and understand the context of engineering and/or food information from a range of sources and apply it in the solution of food engineering problems.

35 Use a systematic approach to define and investigate food engineering problems and display creativity and innovation in establishing engineering solutions.

4.4 Transferable Skills and Attributes

On successful completion of this programme a student will be able to:

21 Takes an approach to avoid risk through application of technical skills, exercises management and mitigation strategies.

22 Takes responsibility for recommending the implementation of new practices, ensuring integrity of processes and raising site standards

23 Embraces new ways of thinking and encourages others to do the same, displays a positive mind set demonstrated by willingness to learn, displays proactive approach and ability to act on their own initiative

24 Strives to always give their best, sets themselves challenging targets, confident decision maker, has ambition to continuously improve self

25 Leads by example, acts as a role model and motivates others through actions and behaviour, shows respect for others and provides time and support

26 Committed to lead, manage and coach others effectively; works well with different functions and operations

27 Willingness to take on new problems; maintains quality of thinking and creativity under pressure

28 Flexible to changing working environment and demands; resilient under pressure

29 Demonstrates curiosity to foster new ways of thinking and working; seeks out opportunities to drive forward change and improvements.

For details of each module contributing to the programme, please consult the module specification document.

5. Learning, Teaching and Assessment Strategies

5.1. Learning and Teaching Strategy

The achievement of the learning outcomes is promoted through the following teaching and learning methods:

• Distance learning via the University VLE, utilising a blend of short videos, lecture notes, online interactive tools e-books and other downloadable resources as appropriate to the modules.
• Tutorials online via video-conferencing software linking lecturer to student groups for interactive question time or discussion on new material covered in that week.
• Week blocks on campus (half a week per module) to deliver additional lectures, intensive laboratory session or practical work un-deliverable at a distance.
• Lectures on campus to provide problem sheets, worked examples and/or case studies.
• Students will be directed to suitable resources involving a range of ICT to enable then to develop their understanding of the subject matter during self-directed study.
• Students will be expected to explain and defend their researched contentions to peers, to broaden the breadth of cohort understanding beyond normal lecture delivery.
• Tutorials and Example Classes will draw heavily on the students' workplace experiences. These classes provide an opportunity for students to explore and resolve problems under staff guidance and direction.
• Workshops are used to enable students to work on “open-ended” problems related to real engineering situations. They also provide good opportunities for developing team-working and communication skills as well as individual skills.
• Laboratory Classes are used to introduce experimental techniques and practical methods. They provide an excellent opportunity for students to practice team-working and communication skills.
• Coursework Assignments are used in a number of modules where students are required to seek additional information so that they can develop and demonstrate their understanding of the course material. Students may be required to work independently or in small groups.
• Oral and Poster Presentations are often included as part of coursework assignments. These presentations allow students to develop their communication skills.
• Formative Assessments do not contribute to the final marks achieved for each module, but provide an opportunity for students to develop their critical evaluation skills and to monitor their own academic progress. They also provide a useful opportunity for lecturers to give feedback to the students and to monitor and improve the students learning experience. These assessments will take the form of diagnostic tests, in-class tests and on-line tests during lectures, and evaluation and discussions relating to logbooks and equipment during laboratory classes. Students will have opportunities to develop their oral and presentation skills during tutorials and workshops.

Wherever possible, the Programme will make the maximum use of industry-university links so that graduates will gain practical experience in modern commercial and managerial practices appropriate to the engineering industry. In addition to traditional modes of delivery, workplace experience and industrial exposure is embedded within the program through the workplace vocational delivery.

5.2. Assessment Strategy

Assessment Strategy:
Assessment as far as possible will be facilitated digitally. This will not always be possible, hence some assessment will be clustered around campus weeks (i.e. examinations).

Opportunities for the student to demonstrate achievement of the learning outcomes are provided through summative assessment methods, including:

• Written Examinations; typically of 3 hours duration. The content of these exams is previously unseen by the student, and earlier modules may use written exams as the main assessment method. Different modules may use open or closed book, multiple choice, open ended and essay type exams
• Coursework Assignments, Laboratory Reports, Technical Reports, Technical Notes, Dissertations, Portfolios, Oral and Poster Presentations are widely used through out the degree programme to assess higher levels of understanding. They may constitute the only or the major form of assessment in later modules, but most modules will include both coursework and exams as part of the assessment strategy to assess foundation knowledge and deeper understanding within the subject. Coursework assignments increase in size and complexity as student's progress through their degree, and they are designed to give students the opportunity to demonstrate their understanding of the course material (particularly when the student is required to seek additional information). Students are also able to demonstrate their presentation and communication skills. Assignments can be conducted on an individual basis at the beginning of the degree programme, or increasingly as small groups as the student progresses.
• Computer Based Tests and Assessed Simulations are used in modules that involve a substantial computer-based element. These assessments give the students an opportunity to demonstrate their proficiency in a simulated professional situation and levels of analytical and logical problem solving.
• Peer Assessment will be used in modules that involve a substantial team-working element. Normally, students will moderate the final marks for the group project to reflect the contributions of different team members to encourage self assessment and engagement within a team environment.
• Demonstrations of Prototypes and Exhibitions are used to assess practical workshop skills and allow students the opportunity to demonstrate the realisation of a design project.
• Class Tests are conducted during the course of the academic year to assess student's progress. The results from class tests provide a useful opportunity to give developmental feedback to students.

6. Programme Structure

The total number of credit points required for the achievement of Certificate of Higher Education (CertHE) is 120.
The total number of credit points required for the achievement of Diploma of Higher Education (DipHE) is 360.
The total number of credit points required for the achievement of Bachelor of Engineering (BEng) is 720.

Level 1

Title	Credit Rating	Core / Optional
Mathematics for Engineers 2019-20	15	Core
CAD and Technical Drawing 2019-20	15	Core
Introduction to Robotics 2019-20	15	Core
Electrical and Electronic Technology 2019-20	15	Core
Statics and Dynamics 2019-20	15	Core
Health & Safety, Energy and The Environment 2019-20	15	Core
Food Components and Materials for Food Engineers 2019-20	15	Core
Food Quality Assurance, HACCP and Hygiene 2019-20	15	Core

Level 2

Title	Credit Rating	Core / Optional
Mechatronics Systems 2020-21	15	Core
Applied Dynamics and Vibrations 2020-21	15	Optional
Solid Body Mechanics 2020-21	15	Optional
Analogue Electronics 2020-21	15	Optional
Applied Thermofluids 2020-21	15	Core
Digital Systems and Microprocessors 2020-21	15	Optional
Food Packaging Systems and Machinery 2020-21	15	Core
Food Factory Design 2020-21	15	Core
Food Process Engineering 2020-21	15	Core
Industrial Continuous Improvement 2020-21	15	Core

Level 3

Title	Credit Rating	Core / Optional
Robotics and Automation 2021-22	15	Core
Food Production, Processes and Technologies 2021-22	20	Core
Food Engineering Project 2021-22	40	Core
Advanced Application of Automation to Food Industry 2021-22	30	Optional
Food Production and Operations Management 2021-22	30	Optional
Advanced Mechanical Food Systems 2021-22	30	Optional
Engineering Management and Lean Manufacturing Practices 2021-22	15	Core

Appendix I - Curriculum Map

This table indicates which modules assume responsibility for delivering and ordering particular programme learning outcomes.

Key: ✓ Delivered and Assessed Delivered ✓ Assessed

Level 1

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CAD and Technical Drawing 2019-20			✓	✓							✓	
Electrical and Electronic Technology 2019-20			✓	✓						✓	✓	
Food Components and Materials for Food Engineers 2019-20									✓			
Food Quality Assurance, HACCP and Hygiene 2019-20	✓				✓	✓						
Health & Safety, Energy and The Environment 2019-20	✓					✓						
Introduction to Robotics 2019-20			✓							✓	✓	
Mathematics for Engineers 2019-20				✓							✓	
Statics and Dynamics 2019-20			✓	✓						✓	✓	

	PO13	PO14	PO15	PO16	PO17	PO18	PO19	PO20	PO21	PO22	PO23	PO24
CAD and Technical Drawing 2019-20								✓		✓		✓
Electrical and Electronic Technology 2019-20			✓		✓							
Food Components and Materials for Food Engineers 2019-20											✓	
Food Quality Assurance, HACCP and Hygiene 2019-20								✓	✓		✓	
Health & Safety, Energy and The Environment 2019-20								✓	✓		✓	
Introduction to Robotics 2019-20			✓		✓							
Mathematics for Engineers 2019-20			✓									

Statics and Dynamics 2019-20					✓							

	PO25	PO26	PO27	PO28	PO29	PO30	PO31	PO32	PO33	PO34	PO35	PO36
CAD and Technical Drawing 2019-20	✓	✓	✓	✓		✓		✓				✓
Electrical and Electronic Technology 2019-20		✓					✓					
Food Components and Materials for Food Engineers 2019-20				✓		✓	✓					
Food Quality Assurance, HACCP and Hygiene 2019-20			✓	✓						✓		✓
Health & Safety, Energy and The Environment 2019-20		✓	✓	✓		✓						✓
Introduction to Robotics 2019-20			✓				✓		✓			
Mathematics for Engineers 2019-20							✓					
Statics and Dynamics 2019-20			✓				✓					

Level 2

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
Analogue Electronics 2020-21			✓	✓						✓	✓	
Applied Dynamics and Vibrations 2020-21			✓	✓						✓	✓	
Applied Thermofluids 2020-21				✓							✓	
Digital Systems and Microprocessors 2020-21			✓	✓						✓	✓	
Food Factory Design 2020-21	✓		✓	✓	✓	✓	✓			✓	✓	✓
Food Packaging Systems and Machinery 2020-21	✓		✓		✓	✓	✓		✓	✓		✓
Food Process Engineering 2020-21									✓	✓		
Industrial Continuous Improvement 2020-21	✓											✓
Mechatronics Systems 2020-21			✓	✓						✓	✓	
Solid Body Mechanics 2020-21			✓	✓						✓	✓	

	PO13	PO14	PO15	PO16	PO17	PO18	PO19	PO20	PO21	PO22	PO23	PO24
Analogue Electronics 2020-21			✓		✓							
Applied Dynamics and Vibrations 2020-21			✓		✓							
Applied Thermofluids 2020-21												
Digital Systems and Microprocessors 2020-21			✓		✓						✓	
Food Factory Design 2020-21	✓			✓	✓			✓	✓			✓
Food Packaging Systems and Machinery 2020-21	✓			✓	✓			✓	✓			✓
Food Process Engineering 2020-21						✓					✓	✓
Industrial Continuous Improvement 2020-21									✓		✓	✓
Mechatronics Systems 2020-21		✓	✓		✓			✓				
Solid Body Mechanics 2020-21			✓									

	PO25	PO26	PO27	PO28	PO29	PO30	PO31	PO32	PO33	PO34	PO35	PO36
Analogue Electronics 2020-21						✓						
Applied Dynamics and Vibrations 2020-21						✓	✓					
Applied Thermofluids 2020-21						✓	✓					
Digital Systems and Microprocessors 2020-21						✓		✓				
Food Factory Design 2020-21	✓		✓	✓	✓			✓	✓	✓		✓
Food Packaging Systems and Machinery 2020-21	✓		✓	✓	✓	✓			✓	✓		✓
Food Process Engineering 2020-21	✓		✓	✓			✓	✓	✓	✓		
Industrial Continuous Improvement 2020-21	✓	✓		✓	✓	✓				✓		
Mechatronics Systems 2020-21						✓	✓	✓				
Solid Body Mechanics 2020-21						✓	✓					

Level 3

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12

Advanced Application of Automation to Food Industry 2021-22			✓							✓	✓	
Advanced Mechanical Food Systems 2021-22	✓		✓						✓	✓	✓	✓
Engineering Management and Lean Manufacturing Practices 2021-22		✓		✓				✓				✓
Food Engineering Project 2021-22	✓	✓	✓	✓		✓	✓	✓		✓	✓	✓
Food Production and Operations Management 2021-22		✓	✓			✓		✓			✓	✓
Food Production, Processes and Technologies 2021-22	✓	✓		✓	✓			✓		✓	✓	✓
Robotics and Automation 2021-22				✓					✓	✓	✓	

	PO13	PO14	PO15	PO16	PO17	PO18	PO19	PO20	PO21	PO22	PO23	PO24
Advanced Application of Automation to Food Industry 2021-22	✓									✓	✓	✓
Advanced Mechanical Food Systems 2021-22	✓							✓		✓	✓	✓
Engineering Management and Lean Manufacturing Practices 2021-22		✓	✓						✓		✓	✓
Food Engineering Project 2021-22	✓		✓		✓	✓	✓		✓	✓	✓	
Food Production and Operations Management 2021-22	✓			✓	✓			✓			✓	✓
Food Production, Processes and Technologies 2021-22	✓			✓	✓			✓			✓	✓
Robotics and Automation 2021-22		✓	✓		✓						✓	

	PO25	PO26	PO27	PO28	PO29	PO30	PO31	PO32	PO33	PO34	PO35	PO36
Advanced Application of Automation to Food Industry 2021-22	✓		✓	✓	✓							
Advanced Mechanical Food Systems 2021-22	✓		✓	✓	✓			✓	✓		✓	✓
Engineering Management and Lean		✓	✓	✓	✓		✓			✓		

Manufacturing Practices 2021-22												
Food Engineering Project 2021-22			✓	✓	✓	✓	✓			✓	✓	
Food Production and Operations Management 2021-22				✓	✓		✓	✓	✓	✓	✓	✓
Food Production, Processes and Technologies 2021-22			✓	✓	✓		✓			✓		
Robotics and Automation 2021-22	✓							✓	✓		✓	✓

Appendix II - Assessment Map

This table indicates the spread of assessment activity across the programme. Percentages indicate assessment weighting.

Level 1

	01	02	03	04	05	06	07	08	09	10	11	12
CAD and Technical Drawing 2019-20												
Electrical and Electronic Technology 2019-20												
Food Components and Materials for Food Engineers 2019-20						60					40	
Food Quality Assurance, HACCP and Hygiene 2019-20					50					50		
Health & Safety, Energy and The Environment 2019-20												
Introduction to Robotics 2019-20												
Mathematics for Engineers 2019-20					25							
Statics and Dynamics 2019-20												

	13	14	15	16	17	18	19	20	21	22	23	24
CAD and Technical Drawing 2019-20	100											
Electrical and Electronic Technology 2019-20							100					
Food Components and Materials for Food Engineers 2019-20												
Food Quality Assurance, HACCP and Hygiene 2019-20												
Health & Safety, Energy and The Environment 2019-20										50		
Introduction to Robotics 2019-20												
Mathematics for Engineers 2019-20												
Statics and Dynamics 2019-20												

	25	26	27	28	29	30	31	32	33	34	35	36
CAD and Technical Drawing 2019-20												
Electrical and Electronic Technology 2019-20												
Food Components and Materials for Food Engineers 2019-20												
Food Quality Assurance, HACCP and Hygiene 2019-20												
Health & Safety, Energy and The Environment 2019-20			50									
Introduction to Robotics 2019-20		100										
Mathematics for Engineers 2019-20												
Statics and Dynamics 2019-20			25									

	37	38	39	40	41	42	43	44	45	46	47	48
CAD and Technical Drawing 2019-20												
Electrical and Electronic Technology 2019-20												
Food Components and Materials for Food Engineers 2019-20												
Food Quality Assurance, HACCP and Hygiene 2019-20												
Health & Safety, Energy and The Environment 2019-20												
Introduction to Robotics 2019-20												
Mathematics for Engineers 2019-20												
Statics and Dynamics 2019-20												

	49	50	51	52	EP 1 (Wk 16)	EP 2 (Wks 33, 34, 35)
CAD and Technical Drawing 2019-20						
Electrical and Electronic Technology 2019-20						

Food Components and Materials for Food Engineers 2019-20												
Food Quality Assurance, HACCP and Hygiene 2019-20												
Health & Safety, Energy and The Environment 2019-20												
Introduction to Robotics 2019-20												
Mathematics for Engineers 2019-20												75
Statics and Dynamics 2019-20												75

Level 2

	01	02	03	04	05	06	07	08	09	10	11	12
Analogue Electronics 2020-21												
Applied Dynamics and Vibrations 2020-21												
Applied Thermofluids 2020-21												50
Digital Systems and Microprocessors 2020-21												
Food Factory Design 2020-21												
Food Packaging Systems and Machinery 2020-21												
Food Process Engineering 2020-21												
Industrial Continuous Improvement 2020-21												
Mechatronics Systems 2020-21												
Solid Body Mechanics 2020-21												

	13	14	15	16	17	18	19	20	21	22	23	24
Analogue Electronics 2020-21								25				
Applied Dynamics and Vibrations 2020-21							25					
Applied Thermofluids 2020-21												50
Digital Systems and Microprocessors 2020-21											50	
Food Factory Design 2020-21											50	
Food Packaging Systems and Machinery												

2020-21												
Food Process Engineering 2020-21												
Industrial Continuous Improvement 2020-21												
Mechatronics Systems 2020-21												
Solid Body Mechanics 2020-21												

	25	26	27	28	29	30	31	32	33	34	35	36
Analogue Electronics 2020-21												
Applied Dynamics and Vibrations 2020-21												
Applied Thermofluids 2020-21												
Digital Systems and Microprocessors 2020-21												
Food Factory Design 2020-21				50								
Food Packaging Systems and Machinery 2020-21	50											
Food Process Engineering 2020-21			60									
Industrial Continuous Improvement 2020-21	50										50	
Mechatronics Systems 2020-21				40								
Solid Body Mechanics 2020-21			25									

	37	38	39	40	41	42	43	44	45	46	47	48
Analogue Electronics 2020-21												
Applied Dynamics and Vibrations 2020-21												
Applied Thermofluids 2020-21												
Digital Systems and Microprocessors 2020-21												
Food Factory Design 2020-21												
Food Packaging Systems and Machinery 2020-21												
Food Process Engineering 2020-21												
Industrial Continuous Improvement 2020-21												
Mechatronics Systems 2020-21												
Solid Body Mechanics 2020-21												

	49	50	51	52	EP 1 (Wk 16)	EP 2 (Wks 33, 34, 35)
Analogue Electronics 2020-21						75
Applied Dynamics and Vibrations 2020-21						75
Applied Thermofluids 2020-21						
Digital Systems and Microprocessors 2020-21						50
Food Factory Design 2020-21						
Food Packaging Systems and Machinery 2020-21						50
Food Process Engineering 2020-21						40
Industrial Continuous Improvement 2020-21						
Mechatronics Systems 2020-21						60
Solid Body Mechanics 2020-21						75

Level 3

	01	02	03	04	05	06	07	08	09	10	11	12
Advanced Application of Automation to Food Industry 2021-22												
Advanced Mechanical Food Systems 2021-22												
Engineering Management and Lean Manufacturing Practices 2021-22						50					50	
Food Engineering Project 2021-22												
Food Production and Operations Management 2021-22												
Food Production, Processes and Technologies 2021-22					50					50		

Robotics and Automation 2021-22												

	13	14	15	16	17	18	19	20	21	22	23	24
Advanced Application of Automation to Food Industry 2021-22												
Advanced Mechanical Food Systems 2021-22												
Engineering Management and Lean Manufacturing Practices 2021-22												
Food Engineering Project 2021-22												
Food Production and Operations Management 2021-22												
Food Production, Processes and Technologies 2021-22												
Robotics and Automation 2021-22												

	25	26	27	28	29	30	31	32	33	34	35	36
Advanced Application of Automation to Food Industry 2021-22												
Advanced Mechanical Food Systems 2021-22												
Engineering Management and Lean Manufacturing Practices 2021-22												
Food Engineering Project 2021-22												
Food Production and Operations Management 2021-22								40				
Food Production, Processes and Technologies 2021-22												
Robotics and Automation 2021-22			100									

	37	38	39	40	41	42	43	44	45	46	47	48
Advanced Application of Automation to Food Industry 2021-22	100											

Advanced Mechanical Food Systems 2021-22	100											
Engineering Management and Lean Manufacturing Practices 2021-22												
Food Engineering Project 2021-22												
Food Production and Operations Management 2021-22	60											
Food Production, Processes and Technologies 2021-22												
Robotics and Automation 2021-22												

	49	50	51	52	EP 1 (Wk 16)	EP 2 (Wks 33, 34, 35)
Advanced Application of Automation to Food Industry 2021-22						
Advanced Mechanical Food Systems 2021-22						
Engineering Management and Lean Manufacturing Practices 2021-22						
Food Engineering Project 2021-22		100				
Food Production and Operations Management 2021-22						
Food Production, Processes and Technologies 2021-22						
Robotics and Automation 2021-22						

Appendix III - Benchmark Analysis

This table maps programme learning outcomes to relevant QAA subject benchmark statements or PSRB guidelines.

Knowledge and Understanding

	Engin01	Engin02	Engin03	Engin04	Engin05	Engin06	Engin07	Engin08	Engin09
PO1								✓	
PO2									
PO3							✓		
PO4	✓			✓		✓			
PO5									
PO6			✓						✓
PO7									
PO8									
PO9			✓		✓				
PO30	✓		✓		✓				
PO31		✓							
PO32	✓			✓					

	Engin10	Engin11	Engin12	Engin13	Engin14	Engin15	Engin16	Engin17	Engin18
PO1								✓	
PO2			✓						
PO3									
PO4				✓					
PO5									
PO6					✓				
PO7	✓								
PO8						✓			
PO9									
PO30									
PO31									

PO32								

	Engin19	Engin20	Engin21	Engin22	Engin23	Engin24	Engin25	Engin26
PO1						✓		
PO2								
PO3								
PO4		✓						
PO5		✓						
PO6			✓					
PO7								
PO8								
PO9	✓		✓				✓	
PO30								
PO31								
PO32		✓						

Subject Specific Intellectual Skills

	Engin01	Engin02	Engin03	Engin04	Engin05	Engin06	Engin07	Engin08	Engin09
PO12									✓
PO13									✓
PO15									
PO16									
PO33			✓						
PO34					✓			✓	
PO35							✓		

	Engin10	Engin11	Engin12	Engin13	Engin14	Engin15	Engin16	Engin17	Engin18
PO12	✓				✓		✓		
PO13	✓				✓				
PO15									

PO16								✓	
PO33									
PO34									
PO35		✓							

	Engin19	Engin20	Engin21	Engin22	Engin23	Engin24	Engin25	Engin26
PO12								
PO13								
PO15	✓							
PO16								
PO33								
PO34								
PO35								

Subject Specific Practical Skills

	Engin01	Engin02	Engin03	Engin04	Engin05	Engin06	Engin07	Engin08	Engin09
PO10	✓								
PO11			✓						
PO14					✓				
PO17									
PO18									
PO19									
PO20									
PO36									

	Engin10	Engin11	Engin12	Engin13	Engin14	Engin15	Engin16	Engin17	Engin18
PO10									
PO11				✓					
PO14									
PO17		✓							

PO18					✓				
PO19						✓			
PO20									
PO36	✓								

	Engin19	Engin20	Engin21	Engin22	Engin23	Engin24	Engin25	Engin26
PO10								
PO11								
PO14								
PO17								
PO18								
PO19								
PO20				✓				
PO36				✓	✓		✓	

Transferable Skills and Attributes

	Engin01	Engin02	Engin03	Engin04	Engin05	Engin06	Engin07	Engin08	Engin09
PO21								✓	
PO22									
PO23									
PO24									
PO25									
PO26									
PO27									
PO28									
PO29									

	Engin10	Engin11	Engin12	Engin13	Engin14	Engin15	Engin16	Engin17	Engin18
PO21									
PO22									✓

PO23		✓							
PO24									✓
PO25						✓			✓
PO26						✓			
PO27									
PO28									
PO29		✓							

	Engin19	Engin20	Engin21	Engin22	Engin23	Engin24	Engin25	Engin26
PO21								
PO22							✓	
PO23								
PO24								
PO25								
PO26								
PO27								✓
PO28								✓
PO29								

Appendix IV:
Benchmark Benchmark Statement(s)

Engin01 - *Knowledge and understanding of scientific principles and methodology necessary to underpin their education in mechanical and related engineering disciplines, to enable appreciation of its scientific and engineering context and to support their...*

Engin02 - *Knowledge and understanding of mathematical principles necessary to underpin their education in mechanical and related engineering disciplines and to enable them to apply mathematical methods, tools and notations proficiently in the analysis and...*

Engin03 - *Ability to apply and integrate knowledge and understanding of other engineering disciplines to support the study of mechanical and related engineering disciplines.*

Engin04 - *Understanding of engineering principles and the ability to apply them to analyse key engineering processes.*

Engin05 - *Ability to identify, classify and describe the performance of systems and components through the use of analytical methods and modelling techniques.*

Engin06 - *Ability to apply quantitative methods and computer software relevant to mechanical and related engineering disciplines, to solve engineering problems.*

Engin07 - *Understanding of and ability to apply a systems approach to engineering problems.*

Engin08 - *Investigate and define a problem and identify constrains including environmental and sustainability limitations, health and safety and risk assessment issues.*

Engin09 - *Understand customer and user needs and the importance of considerations such as aesthetics.*

Engin10 - *Identify and manage cost drivers.*

Engin11 - *Use creativity to establish innovative solutions.*

Engin12 - *Ensure fitness for purpose for all aspects of the problem including production, operation, maintenance and disposal.*

Engin13 - *Manage the design process and evaluate outcomes.*

Engin14 - *Knowledge and understanding of commercial and economic context of engineering processes.*

Engin15 - *Knowledge of management techniques which may be used to achieve engineering objectives within that context.*

Engin16 - *Understanding of the requirement for engineering activities to promote sustainable development.*

Engin17 - *Awareness of the framework of relevant legal requirements governing engineering activities, including personnel, health, safety, and risk (including environmental risk) issues.*

Engin18 - *Understanding of the need for a high level of professional and ethical conduct in engineering.*

Engin19 - *Knowledge of characteristics of particular equipment, processes or products.*

Engin20 - *Engineering workshop and laboratory skills.*

Engin21 - *Understanding of contexts in which engineering knowledge can be applied (e.g. operations and management, technology, development, etc)*

Engin22 - *Understanding use of technical literature and other information sources.*

Engin23 - *Awareness of nature of intellectual property and contractual issues.*

Engin24 - *Understanding of appropriate codes of practice and industry standards.*

Engin25 - *Awareness of quality issues.*

Engin26 - *Ability to work with technical uncertainty.*