Apprenticeship Specification

Apprenticeship Summary Information		
1	**Apprenticeship Title**	**Fire Safety Engineer (Degree) Apprenticeship (ST0859)**
2	**BCU Apprenticeship Course Code**	US1380
3	**Awarding Institution**	Apprenticeship Qualification is awarded by the End Point Assessment Organisation chosen by Employers: To be confirmed Birmingham City University, as the training provider, awards the academic qualification.
4	**Teaching Institution(s)** (if different from point 3)	Birmingham City University
5	**Professional Statutory or Regulatory Body (PSRB) accreditation** (if applicable)	Institute for Apprenticeships and Technical Education Standard Reference ST0859

6	**Apprenticeship Description**
	The *Fire Safety Bill* introduced March 2020, identified 1.6 million buildings that require inspection on a regular basis. Significantly, whilst the number of fires decreases, the level of severity of those that occur is increasing. This is of concern and means that deeper understanding of why this is and, of course, how this can be avoided is critical. Ongoing updates from government publications continue to show the need for professionally accredited engineers which the proposed Fire Safety Apprenticeship will address. This degree apprenticeship is fully informed and supported by industry practice and recognised research in design and delivery of modules by experienced staff who have extensive industry experience. The curriculum is practice led and cultivates problem solving skills, improving communication through effective real-life project work, work experience, and cases. Team working on real life scenarios develop professional competence and prepares you for further employment opportunities and career development. This degree apprenticeship has been developed to provide you with a good knowledge of a range of engineering principles. It will prepare you for the rapidly developing field of fire safety engineering and its supporting operational systems. Upon your completion you will have the intellectual, creative and personal qualities necessary for undertaking a leadership role and a depth of knowledge that will enable the application of new and emerging technologies to the solution of fire safety problems. The degree apprenticeship in fire safety engineering will develop you as a skilled engineer capable of undertaking fire safety engineering tasks within and across organisations. The apprenticeship focuses on the importance of sustainable futures and the Government's STEM agenda, in order to give you the knowledge and attributes you will need to thrive in this everchanging industry.

	You'll work on industry-standard analytical tools, develop your design skills, as well as exploring a wide range of facilities, such as our burning house simulation. This apprenticeship focuses on project-based activities, giving you lots of opportunity to work in teams on projects from design to implementation. This will enhance your practical experience of applying engineering science to real world problems, working in multidisciplinary teams to develop your interpersonal skills, and prepare you for a key aspect of modern engineering practice. Problem solving and project management are key skills for an engineer, and our focus on practical experience will help to improve your skills in these highly sought-after areas. During your studies, you will use the latest tools and technologies, developing new skills at an advanced level. The apprenticeship will encourage your creative thinking and develop your engineering leadership skills. Building on a foundation of the generic skills required by tomorrow's engineers, you will also explore the wider context of engineering, as well as the application of advanced engineering principles to solve problems through research and development. You'll engage in independent study and systematic enquiry at an advanced level and take responsibility for the conclusions drawn from it. You will have lots of opportunity to apply industry-standard modelling and simulation techniques to the analysis, specification and design of mechanical engineering systems so that you are able to apply your knowledge and theory to a practical situation. On completion of this apprenticeship, you will be able to analyse, synthesise and evaluate those engineering factors that are required to produce engineering solutions. You will explore the themes of: • Use of general and specialist engineering knowledge and understanding. • Application of appropriate theoretical and practical methods to appropriate application. • Technical and commercial leadership and management at all levels. • Effective interpersonal and communication skills using various media means and resources. • Commitment to professional standards and recognition of obligations to society and environment in accordance with the latest benchmarks. Specifically, this apprenticeship will develop your skills in the key areas of: • Fire safety technology including risk assessment, methods, techniques and current / developing theories and conceptual ideas. • Fire safety engineering science and applied mathematics. • Management, including current management techniques and theories, Risk management, supplier relations and financial controls. • IT which will include developing the student's skills in the areas of CAD, spread sheets, Internet usage and general IT skills. • Transferable communication skills, including written, verbal, and new media presentation skills. • The role of engineers in creating a sustainable and ethical environment. The above scope of skills was identified as being critical for the development of modern high technology organisations, who must have personnel that are skilled in these areas in order to successfully compete in today's global marketplace. Our vision is to develop real world engineers, proudly made in Birmingham, who will change the world, each in their own way. The level of education provided by the courses are appropriate to

	those students who will eventually hold senior management positions within the fire-related professions or would like to become fire engineers. The course emphasises Fire Engineering in the context of buildings and infrastructure. As a result, you will find that the course is now characterised by parallel themes of management, engineering and project work. The management theme will develop your capabilities as a project manager in the field of fire engineering, whilst the project modules will provide scope for integrative studies on practical engineering and design situations. **Apprenticeship Aims:** The content and structure of the Fire Safety Engineering Apprenticeship are designed to provide you with an academically challenging and vocationally relevant degree, which encompasses all of the issues involved in successfully entering and progressing your career within the Fire Safety Engineering discipline. Furthermore, the apprenticeship has clearly identifiable core themes (with significant elements of work-related based learning), in which capability skills and competencies can be fostered, demonstrated, and further developed. This Apprenticeship aims are to: • Provide you with the appropriate intellectual tools in order to be able to operate effectively as an applications engineer, within the multidisciplinary engineering environment of a fire safety engineering-based company. • Develop your awareness of the relationship between theory and practice and the ability to adapt their approach to solve complex technical problems quickly and competently with known technology and to design creatively a product, process or system to meet a defined need • Provide appropriate practical engineering opportunities, combining theory and experience, to enable you to become applications engineers with awareness, knowledge, skills, and an understanding of a range of experience of engineering practice • Extend your confidence and professionalism in high-level communication tools at and to develop interpersonal and team working skills in order to be able to contribute effectively to business activities. • Develop your ability to reflect on and evaluate their learning and technical achievements and performance in order to clearly identify their proposed professional intent. • Provide an accessible and flexible apprenticeship suitable for you from a wide range of backgrounds to succeed and progress. • Enables you to develop critical evaluation and apply appropriate engineering solutions • Enables you to fulfil the role of a competent applications engineer by being able to tackle engineering needs and problems associated with products systems, processes and components. To do this you have to be able to perform the analysis necessary and to apply results to improve systems and projects. • Supports you in becoming an application engineer who possesses appropriate awareness, knowledge and understanding of the economic, social and environmental context of industrial technology within the mechanical engineering area. • Enable you to accomplish your desire to successfully progress to a level 7 PG Apprenticeship. Furthermore, through the Academic Plan (2015), the University has expressed its commitment to the following aims to enhance your experience as an apprentice: • Pursuing excellence • Practice-led, knowledge-applied education • Interdisciplinary approaches • Employability-driven

	• Internationalisation • In addition, the following apprenticeship aims apply: • Essential knowledge and understanding of management principles. • Extend you intellectually and practically according to your abilities and to provide the opportunity to allow you to reflect on their learning. • An opportunity to acquire skills in response to the market need for competent project managers capable of operating across multinational organisations embracing differing cultural dimensions. • A knowledge and full understanding of the breadth of capability in the latest software tools for facilitating multi-site project communication. • An opportunity to demonstrate their skills as one of a new generation of project managers, with a wider, more creative, flexible skill set, including a good understanding of internal and external customer requirements. • An apprenticeship with an emphasis on active and participative education, including practical learning, problem-based learning and group work which will develop their skills of analysis, synthesis, decision making and the ability to cope with new and unfamiliar problems. • An opportunity to relate practical real-life problem-based learning to industry and commerce, then to apply new technologies and techniques to solve present and future problems, in an international arena. • An ability to handle uncertainty and ambiguity and deal with complex project management. The Standard's Assessment Plan is a key component of an Apprenticeship Standard and identifies the End-Point Assessment (EPA) undertaken by the apprentice. The EPA ensures that the apprentice has taken on all the knowledge, skills and behaviours required to do their job role with confidence and is measured against the Knowledge, Skills and Behaviours set out in the standard. The End Point Assessment for the Standard consists of three discrete assessment methods: Technical Report, Professional Interview (underpinned by a professional review report) and Exam. This Apprenticeship Standard aligns with the UK Standard for Professional Engineering Competence (UK-SPEC) and provides a pathway towards Chartered Engineer (CEng). The experience gained and responsibility held by the apprentice on completion of the apprenticeship will either wholly or partially satisfy the agreed level of professional competence and this will be determined through independent assessment by a Professional Engineering Institution.

7	Apprenticeship Awards		
7a	**Apprenticeship Final Award (awarded by End Point Assessment Organisation)**	**Level**	**Credits Awarded**
	Fire Safety Engineer	6	n/a
7b	**University Awards and Credits Awarded (where applicable)**		
	Bachelor of Engineering with Honours Fire Engineering	6	360
7c	**University Exit Awards and Credits Awarded (where applicable)**		
	Certificate of Higher Education Fire Engineering Diploma of Higher Education Fire Engineering Bachelor of Engineering Fire Engineering	4 5 6	120 240 300

8	Derogation from the University Regulations
	1. For modules with more than one item of assessment, students must achieve a minimum of 30% (undergraduate) or 40% (postgraduate) in each item of assessment in order to pass the module. 2. Compensation of marginal failure in up to 20 credits is permitted at each level. 3. Condonement of failed modules is not permitted. 4. Apprenticeships adhere to University academic regulations for University awards offered within apprenticeship training. Where Educations and Skills Funding Agency (ESFA) regulations specify an alternative requirement for apprenticeship training management, this takes precedence. This is a requirement of the University registration with the ESFA as an apprenticeship-training provider and receipt by the University of individual apprenticeship funding.

9	Delivery Patterns		
Mode(s) of Study	**Location(s) of Study**	**Duration of Study**	**Code(s)**
Apprenticeship	City Centre	4 years plus EPA	US1380

10	**Entry Requirements**	
	Home/UK:	Whilst any entry requirements will be a matter for individual employers, typically an apprentice might be expected to have already achieved academic qualifications of 96* UCAS points or above at A-Level standard or equivalent, to include two STEM based subject such as Maths, Physics, ICT, Computing, Electronics. Apprentices are expected to hold one of the following: BTEC National Diploma (12-units not including early years)/Pearson BTEC Level 3 National Diploma - D*D* or combined with other level 3 qualifications to achieve a minimum total of 112 UCAS points. A Distinction in Mathematics for Technicians unit or a Merit in Further Mathematics for Technicians unit' BTEC Extended Diploma (18-units not including early years)/Pearson BTEC Level 3 National Extended Diploma - DMM - 112 UCAS points. A Distinction in Mathematics for Technicians unit or a Merit in Further Mathematics for Technicians unit; BTEC Subsidiary Diploma/Pearson BTEC Level 3 National Extended Certificate - Combined with other level 3 qualifications to achieve a minimum total of 112 UCAS points. In addition, you will require a grade C in A Level Mathematics or equivalent such as a Distinction in Mathematics for Technicians unit or Merit in Further Mathematics for Technicians unit; Access to Higher Education Diploma - 60 credits overall. Minimum of 45 credits at level 3. Including 12 credits at Merit or Distinction with 9 in Mathematics and 3 in Science. Must already hold GCSE Mathematics and English Language Grade 4 or higher or the equivalent at application point or currently taking; GCE A Level/ AS Level - BBC at A Level - 112 UCAS tariff points from A/AS Level with a minimum of 2 A Levels and including A Level Mathematics at grade C or above. or equivalent qualifications accepted A Maths Diagnostic test has been created for apprentices who do not meet the level 3 entry requirement. Passing the Maths Diagnostic test will therefore meet the level 3 entry requirement. Plus, Five GCSEs at Grade 4 and above** including Mathematics, English and Double Science or equivalent qualification. . For those with an education, health and care plan or a legacy statement the apprenticeships English and maths minimum

		requirement is Entry Level 3 and British Sign Language qualification are an alternative to English qualifications for whom this is their primary language. *Equal to 240 UCAS points prior to 2017, **Equal to Grades C and above.

Apprenticeship Course Learning Outcomes

The following table shows how the UK SPEC Learning Outcomes are mapped against the 5 University's Key Themes. An in depth mapping document for the UK Spec Engineering learning outcomes against course modules can be found at Appendix 1

UK SPEC Learning Outcomes		Pursuing Excellence	Practice Led Knowledge	Interdisciplinary	Employability Driven	Internationalisation
	A. Knowledge & Understanding					
A1	Maintain and extend a sound theoretical approach in enabling the introduction and exploitation of new and advancing technology in the field of Fire Safety Engineering	☒	☒	☐	☒	☒
A2	Engage in the creative and innovative development of fire safety engineering technology and continuous improvement systems.	☒	☒	☒	☒	☐
	B. Design and Development of processes, systems, services and products					
B1	Identify potential projects and opportunities.	☒	☒	☒	☒	☐
B2	Conduct appropriate research, and undertake design and development of engineering solutions within the design and development field.	☒	☒	☒	☒	☐
B3	Manage implementation of design solutions, and evaluate their effectiveness.	☒	☒	☒	☒	☐
	C. Responsibility, management and leadership					
C1	Plan for effective project implementation.	☒	☒	☒	☒	☒
C2	Plan, budget, organise, direct and control tasks, people and resources.	☒	☒	☒	☒	☒
C3	Lead teams and develop staff to meet changing technical and managerial needs.	☒	☒	☒	☒	☒
C4	Bring about continuous improvement through quality management.	☒	☒	☒	☒	☒

	D. Communication and interpersonal skills					
D1	Communicate in English with others at all levels.	☒	☒	☐	☒	☐
D2	Present and discuss proposals.	☒	☒	☐	☒	☐
D3	Demonstrate personal and social skills.	☒	☒	☐	☒	☐
	E. Professional Commitment					
E1	Comply with relevant codes of conduct.	☒	☒	☒	☒	☒
E2	Manage and apply safe systems of work.	☒	☒	☒	☒	☐
E3	Undertake engineering activities in a way that contributes to sustainable development.	☒	☒	☒	☒	☒
E4	Carry out and record CPD necessary to maintain and enhance competence in own area of practice	☒	☒	☐	☒	☐
E5	Exercise responsibilities in an ethical manner.	☒	☒	☒	☒	☒

Apprenticeship Learning Outcomes

The Apprenticeship Learning Outcomes are articulated in terms of:

- Knowledge and understanding;
- Intellectual Practical and transferable skills;
- Behaviours

At Level 4 the apprentice will illustrate succession from familiarity and working understanding to a wider appreciation, application and deeper understanding at Level 5. At Level 6 the apprentice will illustrate the ability to independently apply knowledge, skills and understanding, with a focus on active and reflective practice and clear evidence of synthesis and integration of the various skills and knowledge acquired throughout the apprenticeship. The Level 6 learning outcomes are designed for apprentices to propose and carry out individual study apprenticeships in design and research that fully explore analytical, creative and innovative problem solving potentials.

The apprenticeship standard allows the aligning of learning outcomes with key knowledge skills and behaviours (KSB's) set out in the standard document which have been implemented to allow advancement in professional standing. A list of which can be found below.

Apprenticeship KSB's

Knowledge and understanding:

K1: The mathematical, scientific and engineering principles, methods and modelling that contribute and help to develop the design and construction to create a fire safe and sustainable built and natural environment. The analysis and understanding of fire growth and smoke movement, determining the behaviour of materials in fire, the behaviour of structure and people's reaction to fire, as well as limitations that come with different analytical approaches.

K2: Understanding of the first principles of fire engineering including: fire dynamics, smoke dynamics, heat transfer, human behaviour, psychological impact of fire on humans, physiological impacts of fire (tenability), combustion process, products of combustion, structural response.

K3: Legal and regulatory frameworks, that govern the life cycle of the built environment such as Building Regulations, Construction (Design and Management) Regulations, Regulatory Reform Fire Safety Order.

K4: The differences between regulation, statutory guidance, British and European Standard guidance, and guidance produced by others, e.g. trade bodies.

K5: The application of the regulatory framework affecting the life cycle of the building i.e. from concept design through to occupation and beyond.

K6: Construction fundamentals including what makes a structure, construction methods and construction types. What designers are involved in the design of a structure (e.g. structures and their component parts), how they fundamentally work together as a system, and key design decision drivers (i.e. sustainability, energy, natural lighting etc.). The different fire hazards that arise from different construction methods (modular, mass timber, timber frame, etc). An understanding of common fire safety defects.

K7: Fire performance and material classifications (including reaction to fire, fire resistance and surface spread of flame), the test procedures associated with these and the certification process. Limitations of the tests and the applicability and suitability of the tests for the proposed purpose or function. This will include the difference between direct field of application and extended field of applications and limitation of such assessments.

K8: Principles of both active and passive groups of fire protection systems and the individual systems within both groups. Understanding of the principles to include function and application, cause and effect matrices, cost benefit analysis, interaction between systems, limitations, design freedoms and compensations, their design and use during and after construction.

K9: The principles, techniques and methodologies of risk assessment used to evaluate the impact of fire safety on life, property and environment in the built environment. This includes the importance and limitations of tools used to measure, enhance or protect welfare, health and safety and sustainability.

K10: Management and maintenance requirements for different fire safety strategies, systems and the impact these may have on owners / tenants during the life cycle of the building.

K11: A range of research techniques used to develop acceptable and safe solutions to fire engineering problems and the use of current and emerging technologies, products and fire safety data and

research. Understanding of the use and validation of software, codes and data gathering to model, evaluate, test, build and manage fire safe buildings with an awareness of limitation of software and data.

K12: Building life cycle management, using acquired knowledge to understand the impact of their design from a commercial and practical viability viewpoint and demonstrate an awareness of fire safety beyond design into construction and occupation. This includes how fire safety measures are specified, constructed and maintained by others.

K13: Managing teams and developing staff to meet changing technical and managerial needs including reviewing and appraising performance in relation to delivery of fire engineering projects.

K14: The principles and techniques of effective project management to time cost and quality. Utilising change-management techniques and impacts on project design and delivery. Understanding the design and construction stages RIBA, BIM and other PM tools.

K15: Safe systems of work, their management and application.

K16: UK Engineering Council's and other relevant codes of conduct and ethical principles.

K17: The capabilities and limitations of the fire service and how building design can facilitate safe and effective fire service intervention. Firefighting objectives that may need to be considered during an operational incident include: firefighter safety; life safety of building users; loss control; business continuity; property and environmental protection.

K18: The key topics related to sustainable development and how fire safety design methods can impact on these, and where challenges can arise with competing design requirements. Examples include the significance of carbon and climate change; building energy use; material selection; responsible procurement and efficient use of resources during construction; life cycle costing.

Skills

S1: Use and evaluate modelling software including smoke and evacuation models.

S2: Develop and or review, safe, technical solutions to fire safety engineering problems through the use of research techniques, current and emerging technologies, products and innovations as well as best practice. Examples include: ability to use of range of research methods to collect and analyses data to draw well-founded practical conclusions for implementation, applicable research strategy and methodology, literature searches.

S3: Communicate effectively and provide guidance to others using appropriate language to suit the audience through varying methods: design models, calculations, reports, drawings, specifications, presentations, digital media and discussions with those both inside and outside the industry.

S4: Demonstrate solutions proposed are safe and the level of safety they provide. Critically analyse prescriptive recommendations and alternative solutions, the use of bench-marking, cost/benefit and sensitivity analysis.

S5: Illustrate/present Fire Safety Engineering solutions to the appropriate level of detail for concept design and detailed design.

S6: Coordinate fire safety solutions with technical and non-technical people.

S7: Review and interpret fire related information such as product certification and test reports, cause and effect information and design detail drawings.

S8: Carry out and record the continuing professional development necessary to maintain and enhance knowledge and competence as a fire safety engineer.

S9: Interpret and apply design and quality standards including codes of practice, legal and regulatory frameworks, in the development of fire engineering solutions, Examples include:
planning, designing, construction and maintenance of buildings and infrastructure in compliance with current codes, standards and legislation, industry regulations.

S10: When considering design options, evaluate the impact of fire safety engineering on society and the environment taking account of business, client and end user needs in its construction, management and use.

S11: Contribute to the management of the planning, budgeting and organisation of tasks, people and resources for a project, working to agreed quality standards, project programme and budget, within legal, contractual and statutory requirements.

S12: Contribute to effective team working and developing staff to meet changing technical and managerial needs.

S13: Apply acquired knowledge to develop and or review fire safety solutions and be able to objectively review, identify issues or offer alternative solutions/opinions including, fire engineered analysis, means of escape calculations, smoke ventilation calculations, heat transfer calculations and hazard identification and fire risk assessments.

Behaviours

B1: Adhere to the UK Engineering Council's code of conduct and ethical principles.

B2: Be conscious of the need to create, maintain and enhance productive working relationships.

B3: Shares good practices/best practice and actively promotes their use.

B4: Take responsibility for personal development, demonstrating commitment to learning and self-improvement and be open to feedback.

11	**Apprenticeship Course Learning Outcomes**
	Knowledge and Understanding
1	To provide a clear understanding of key aspects of fire dynamics including ignition, pyrolysis, flame spread, and smoke movement.
2	To develop safe building designs, taking account of the influences of material reaction to fire and implications of human behaviour in fires.
3	To provide an understanding of the hierarchy of legislation and standards relied upon for ensuring fire safety within the built environment including design, project control and management.
4	To demonstrate a sound knowledge and understating for the fire testing of procedures and certification for construction materials and fire safety systems, to demonstrate compliance with relevant standards.
5	To critically analyse and evaluate the performance of a building in the case of a fire considering fire dynamics, evacuation dynamics, and structural response.
6	To apply appropriate research methodologies and conduct research in the field of fire engineering, applying existing tools and knowledge.
7	To engage in creative and innovative design of fire safety systems as part of a fire strategy including means of escape, detection and warning, lighting, smoke control, firefighting provisions, fire compartmentation, material reaction to fire, external fire spread, structural fire protection, active/passive fire systems, and building management.
	Skills and other attributes
8	To maintain and extend theoretical and practical techniques to enable the introduction and development of new and advancing technology in the field of engineering.
9	To demonstrate the application of industry Codes of Practice, including national and international standards, as well as the relevant Health and Safety regulations.
10	To develop an in-depth understanding and application of management skills, including team working, leadership and organisation to implement strategies to resolve engineering design problems and projects.
11	To conduct appropriate research, and undertake design and development of engineering solutions within the design and development field.

12	**Level Learning Outcomes**
	Upon completion of Level 4 / the Certificate of Higher Education, learners will be able to:
LO1	To provide a clear understanding of key aspects of fire dynamics including ignition, pyrolysis, flame spread, and smoke movement.
LO2	To develop safe building designs, taking account of the influences of material reaction to fire and implications of human behaviour in fires.
LO4	To demonstrate a sound knowledge and understating for the fire testing of procedures and certification for construction materials and fire safety systems, to demonstrate compliance with relevant standards.
LO5	To critically analyse and evaluate the performance of a building in the case of a fire considering fire dynamics, evacuation dynamics, and structural response.

LO8	To maintain and extend theoretical and practical techniques to enable the introduction and development of new and advancing technology in the field of engineering.
LO9	To demonstrate the application of industry Codes of Practice, including national and international standards, as well as the relevant Health and Safety regulations.
LO10	To develop an in-depth understanding and application of management skills, including team working, leadership and organisation to implement strategies to resolve engineering design problems and projects.
	Upon completion of Level 5 / the Diploma of Higher Education, learners will be able to:
LO1	To provide a clear understanding of key aspects of fire dynamics including ignition, pyrolysis, flame spread, and smoke movement.
LO2	To develop safe building designs, taking account of the influences of material reaction to fire and implications of human behaviour in fires.
LO3	To provide an understanding of the hierarchy of legislation and standards relied upon for ensuring fire safety within the built environment including design, project control and management.
LO4	To demonstrate a sound knowledge and understating for the fire testing of procedures and certification for construction materials and fire safety systems, to demonstrate compliance with relevant standards.
LO5	To critically analyse and evaluate the performance of a building in the case of a fire considering fire dynamics, evacuation dynamics, and structural response.
LO7	To engage in creative and innovative design of fire safety systems as part of a fire strategy including means of escape, detection and warning, lighting, smoke control, firefighting provisions, fire compartmentation, material reaction to fire, external fire spread, structural fire protection, active/passive fire systems, and building management.
LO8	To maintain and extend theoretical and practical techniques to enable the introduction and development of new and advancing technology in the field of engineering.
LO9	To demonstrate the application of industry Codes of Practice, including national and international standards, as well as the relevant Health and Safety regulations.
LO10	To develop an in-depth understanding and application of management skills, including team working, leadership and organisation to implement strategies to resolve engineering design problems and projects.
	Upon completion of 60 credits at Level 6 / the Bachelors Degree, learners will be able to:
LO1	To provide a clear understanding of key aspects of fire dynamics including ignition, pyrolysis, flame spread, and smoke movement.
LO2	To develop safe building designs, taking account of the influences of material reaction to fire and implications of human behaviour in fires.
LO3	To provide an understanding of the hierarchy of legislation and standards relied upon for ensuring fire safety within the built environment including design, project control and management.
LO5	To critically analyse and evaluate the performance of a building in the case of a fire considering fire dynamics, evacuation dynamics, and structural response.
LO6	To apply appropriate research methodologies and conduct research in the field of fire engineering, applying existing tools and knowledge.

LO7	To engage in creative and innovative design of fire safety systems as part of a fire strategy including means of escape, detection and warning, lighting, smoke control, firefighting provisions, fire compartmentation, material reaction to fire, external fire spread, structural fire protection, active/passive fire systems, and building management.
LO8	To maintain and extend theoretical and practical techniques to enable the introduction and development of new and advancing technology in the field of engineering.
LO9	To demonstrate the application of industry Codes of Practice, including national and international standards, as well as the relevant Health and Safety regulations.
LO10	To develop an in-depth understanding and application of management skills, including team working, leadership and organisation to implement strategies to resolve engineering design problems and projects.
LO11	To conduct appropriate research, and undertake design and development of engineering solutions within the design and development field.

13 Apprenticeship Course Requirements

Level 4:

In order to complete this apprenticeship a learner must successfully complete all the following CORE modules (totalling 120 credits):

Module Code	Module Name	Credit Value
ENG4091	Engineering Principles 1	20
ENG4093	Engineering Practice	20
ENG4124	Mathematical Modelling 1	20
BNV4104	Integrated Digital Design – Residential	20
BNV4123	Introduction to Fire Safety and Accidents	20
BNV4124	Fire Science and Risk Management	20

Level 5:

In order to complete this apprenticeship a learner must successfully complete all the following CORE modules (totalling 120 credits):

Module Code	Module Name	Credit Value
BNV5141	Fire Dynamics	20
BNV5118	Civil Engineering	20
BNV5145	Computational Fluid Dynamics and Finite Element Method	20
BNV5144	Project Management	20
BNV5142	Fire and the Built Environment	20
BNV5143	Health and Safety/Fire Law	20

Level 6:

In order to complete this apprenticeship a learner must successfully complete all the following CORE modules (totalling 120 credits):

Module Code	Module Name	Credit Value
BNV6206	Structural Fire Engineering	20
BNV6207	Fire Safety Management	20
BNV6208	Fire Design Project	20
BNV6209	Fire Thermodynamics	20
BNV6200	Individual Honours Project	40

14 Structure Diagram

Part-Time

Calendar Year 1 (Level 4)

1st SEMESTER (Jan – Apr)
ENG4091 Engineering Principles 1 (20 credits) ENG4124 Mathematical Modelling 1 (20 credits)
2nd SEMESTER (May – Aug)
BNV4124 Fire Science and Risk Management (20 credits)
3rd SEMESTER (Sep – Dec)
BNV4123 Introduction to Fire Safety and Accidents (20 credits)

Calendar Year 2 (Level 4/Level 5)

1st SEMESTER (Jan – Apr)
ENG4093 Engineering Practice (20 credits) BNV4104 Integrated Digital Design – Residential (20 credits)
2nd SEMESTER (May – Aug)
BNV5118 Civil Engineering (20 credits)
3rd SEMESTER (Sep – Dec)
BNV5144 Project Management (20 credits) BNV5141 Fire Dynamics (20 credits)

Calendar Year 3 (Level 5)

1st SEMESTER (Jan – Apr)
BNV5142 Fire and the Built Environment (20 credits)
2nd SEMESTER (May – Aug)
BNV5145 Computational Fluid Dynamics (CFD)/Finite Element Method (20 credits)
3rd SEMESTER (Sep – Dec)
BNV5143 Health and Safety Fire Law (20 credits)

Calendar Year 4 (Level 6)

1st SEMESTER (Jan – Apr)
BNV6206 Structural Fire Engineering (20 credits) BNV6200 Individual Honours Project (40 credits in total)
2nd SEMESTER (May – Aug)
BNV6209 Fire Thermodynamics (20 credits) BNV6200 Individual Honours Project (40 credits in total)
3rd SEMESTER (Sep – Dec)
BNV6207 Fire Safety Management (20 credits) BNV6200 Individual Honours Project (40 credits in total)

Calendar Year 5 (Level 6)

1st SEMESTER (Jan – Apr)
BNV6208 Fire Design Project (20 credits) BNV6200 Individual Honours Project (40 credits in total)

Apprentices with appropriate Level 4 equivalent qualification such as fire technician level 4 modules will be able to join this degree apprenticeship at Year 3 of its delivery.
Apprentices with appropriate Level 5 equivalent qualifications will be able to join this degree apprenticeship at Year 4 of its delivery.

The course aims and learning outcomes fully reflect the educational requirements of UK-SPEC (UK Standard for Professional Engineering Competence) as outlined in AHEP3 – Accreditation of Higher Education Programmes, third edition, which means you'll be equipped with the academic, practical and professional skills that employers are keen to find. It encompasses the philosophy which promotes creative project-based learning in teams that can help address global problems. It is intended that an application for accreditation of this course by the appropriate professional institution at the Partial Incorporated Engineer (Partial IEng) level will be made the Course Team within the first two years of delivery for this course.

15	**Apprenticeship Course Learning, Teaching and Assessment Strategy**
	The learning strategy includes a range of lectures, tutorials, seminars, labs, workshops problem-based scenarios, backed up by guest speakers when appropriate that are designed to provide students with high quality learning experience that prepares them for a successful career following graduation. The course includes a variety of assessments including exams, lab reports, real-life scenario assessments, presentations and practical-based assessments. The assessments can also take the form of an individual or group work depending on nature of the module and the learning outcomes that need to be satisfied. Students will use a number of software packages that will allow them to test construction materials under elevated temperature, human evacuation modelling, smoke management, heat transfer, fire spread, finite element simulation, and structural fire design. The software includes but is not limited to Pathfinder, PyroSim, Massmotion, Ansys, FDS, AutoCAD and Revit.

16 Overall Workload and Balance of Assessment

Overall an apprentice *workload* consists of class contact hours, independent learning and assessment activity, with each credit taken equating to a total study time of around 10 hours. While actual contact hours may depend on the optional modules selected, the following information gives an indication of how much time apprentices will need to allocate to different activities at each level of the apprenticeship.

- *Scheduled Learning* includes lectures, practical classes and workshops, contact time specified in timetable
- *Directed Learning* includes placements, work-based learning, external visits, on-line activity, Graduate+, peer learning
- *Private Study* includes preparation for exams

The *balance of assessment* by mode of assessment (e.g. coursework, exam and in-person) depends to some extent on the optional modules chosen by the apprentices. The approximate percentage of the course assessed by coursework, exam and in-person is shown below.

Level 4

Workload

34% time spent in timetabled teaching and learning activity

Activity	**Number of Hours**
Scheduled Learning	408
Directed Learning	404
Private Study	388
Total Hours	1200

Balance of Assessment

Assessment Mode	**Percentage**
Coursework	42%
Examination	24%
In-Person	34%

Level 5

Workload

24% time spent in timetabled teaching and learning activity

Activity	**Number of Hours**
Scheduled Learning	288
Directed Learning	194
Private Study	718
Total Hours	1200

Balance of Assessment

Assessment Mode	**Percentage**

Coursework	60 %
Exam	37%
In-Person	3%

Level 6

Workload

27% time spent in timetabled teaching and learning activity

Activity	Number of Hours
Scheduled Learning	324
Directed Learning	212
Private Study	664
Total Hours	1200

Balance of Assessment

Assessment Mode	Percentage
Coursework	50%
Exam	50%
In-Person	0%

End Point Assessment

As an apprentice, the following provides you with the overall structure of your end point assessment as well as a summary of the end point assessment organisation requirement.

On-programme (typically 60 months)	Training to develop the occupation standard's knowledge, skills and behaviours (KSBs). Training towards English and mathematics Level 2, if required Compiling a professional review report (PRR)

End-point assessment gateway	Employer is satisfied the apprentice is consistently working at, or above, the level of the occupational standard. Apprentices must achieve the following approved qualifications mandated in the occupational standard: • Fire Safety Engineering degree (Bachelor of Engineering accredited by the Engineering Council) Apprentices must: • Submit a professional review report (PRR) to underpin the professional interview The employer must agree the brief of the technical report with the EPAO
End-point assessment (which will typically take 6 months)	Assessment method 1: Technical Report With the following grades: · Pass · Fail Assessment method 2: Professional Interview With the following grades: · Pass · Fail Assessment method 3: Exam With the following grades: · Pass · Fail
Professional recognition	Aligns with recognition by: • Associate/Member of Institution of Fire Engineers