Course Specification

Course Summary Information		
1	**Course Title**	BEng (Hons) Fire Engineering
2	**Course Code**	US1043
3	**Awarding Institution**	Birmingham City University
4	**Teaching Institution(s)** (if different from point 3)	N/A
5	**Professional Statutory or Regulatory Body (PSRB) accreditation** (if applicable)	

6	**Course Description**
	Interested in a career in the Fire Engineering Industry? Why not study our BEng (Hons) Fire Engineering course. The BEng (Hons) Fire Engineering undergraduate course is designed to meet the requirements of relevant professional bodies and will give your career opportunities in fire engineering. The course will help bring together expertise from the local area in teaching, practice and research to build a team of experts that can provide teaching and learning to the next generation of Fire Engineers. This experience, and our outstanding industry links, will give you a competitive edge, enabling you to progress to a successful career when you graduate. Throughout the course, emphasis will be placed on self-motivation, critical thinking and analytical depth. 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.

7	**Course Awards**		
7a	**Name of Final Award**	**Level**	**Credits Awarded**
	Bachelor of Engineering with Honours Fire Engineering Bachelor of Engineering with Honours Fire Engineering with Professional Placement	6 6	360 480
7b	**Exit Awards and Credits Awarded**		
	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
	• 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. • Compensation of marginal failure in up to 20 credits is permitted at each level. • Condonement of failed modules is not permitted.

9 Delivery Patterns			
Mode(s) of Study	**Location(s) of Study**	**Duration of Study**	**Code(s)**
BEng (Hons) Full-Time	City Centre	3 years	US1043
BEng (Hons) Professional Placement	City Centre	4 years	US1365
BEng (Hons) Part-Time	City Centre	5 years	US1044

10	Entry Requirements	
	Home/UK:	The admissions requirement are similar to the BEng (Hons) Civil Engineering and Construction degree. 112 UCAS tariff points from A Level with a minimum of 2 A Levels. In addition you must attain at least a grade C in A Level Mathematics or equivalent. At the point of application, you must have GCSE at Grade 4 (C) or above in English Language and Mathematics. Equivalent qualifications will be accepted. Plus, you must have achieved or be completing one of the following: **GCE A Level/ AS Level:** BBC at A Level or 112 UCAS tariff points from A Level with a minimum of 2 A Levels and including A Level Maths at grade C or above. **Access to Higher Education Diploma:** In Engineering - Pass overall with 60 credits, 45 at Level 3 and 15 at Level 2, including with a minimum of 12 credits at Merit or Distinction with 9 credits of these credits from Mathematics units and 3 credits in Science units. **BTEC Extended Diploma in a relevant subject/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, or a Merit in Further Mathematics in Construction and the Built Environment. International Baccalaureate Diploma (or equivalent, including internationally accredited Foundation courses). Overall 30 points with at least 15 points Higher level from 3 subjects.

		Students must have grade 5 in Maths (Higher Level) Students must have one subject from Group 4 (excluding Biology) at the Higher Level and English Group A - Grade 4 or above or English Group B and Ab Initio - Grade 5.
	International:	IELTS 6.0 overall with 5.5 minimum in all bands If you do not meet the required IELTS score, you may be eligible for one of our pre-sessional English courses. Please note that you must have a Secure English Language Test (SELT) to study on the pre-sessional English course. *For country specific requirement please visit:* https://www.bcu.ac.uk/international/bcu-in-your-country

11	**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**
	Please find Appendix 1 curriculum mapping Course Learning Outcomes to specific modules.
	Upon completion of Level 4 / the Certificate of Higher Education, students will be able:
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.
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, students will be able:
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, students will be able:
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	**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. The strategy is designed to provide students with a high quality learning experience, which 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 the nature of the module and the learning outcomes that need to be satisfied. Students will use a number of software package 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 course will include a range of industrial software that is constantly updated.

14	Course Requirements

14a

Level 4:

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

Module Code	Module Name	Credit Value
ENG4091	Engineering Principles 1	20
ENG4094	Engineering Principles 2	20
ENG4124	Mathematical Modelling 1	20
ENG4125	Mathematical Modelling 2	20
BNV4123	Introduction to Fire Safety and Accidents	20
BNV4124	Fire Science and Risk Management	20

Level 5:

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

Module Code	Module Name	Credit Value
BNV5141	Fire Dynamics	20
BNV5140	Structures and Materials	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 course a student 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	40
BNV6200	Individual Honours Project	20

14b	Structure Diagram

Full-Time

Year 1 Level 4

SEMESTER ONE	SEMESTER TWO
Engineering Principles 1 (20 credits) Mathematical Modelling 1 (20 credits) Introduction to Fire Safety and Accidents (20 credits)	Engineering Principles 2 (20 credits) Mathematical Modelling 2 (20 credits) Fire Science and Risk Management (20 credits)

Year 2 Level 5

SEMESTER ONE	SEMESTER TWO
Structures and Materials (20 credits) Fire and the Built Environment (20 credits) Fire Dynamics (20 credits)	CFD/Finite Element Method (20 credits) Project Management (20 credits) Health and Safety/Fire Law (20 credits)

Professional Placement Year 3 (optional) Professional Placement Module 120 Credits

Year 3 Level 6

SEMESTER ONE	SEMESTER TWO
Structural Fire Engineering (20 credits) Fire Safety Management (20 credits)	Fire Design Project (20 credits) Fire Thermodynamics (20 credits)
Individual Honours Project (40 credits) – **All Year Round**	

Part-Time

Level 4 (year 1)

SEMESTER ONE	SEMESTER TWO
Engineering Principles 1 (20 credits) Mathematical Modelling 1 (20 credits)	Fire Science and Risk Management (20 credits)

Level 4 (year 2)

SEMESTER ONE	SEMESTER TWO
Introduction to Fire Safety and Accidents (20 credits)	Mathematical Modelling 2 (20 credits) Engineering Principles 2 (20 credits)

Level 5 (year 3)

SEMESTER ONE	SEMESTER TWO
Structures and Materials (20 credits) Fire and the Built Environment (20 credits)	CFD/Finite Element Method (20 credits) Health and Safety/Fire Law (20 credits)

Level 5 and 6 (year 4)

SEMESTER ONE	SEMESTER TWO
Fire Dynamics (20 credits) Structural Fire Engineering (20 credits)	Project Management (20 credits) Fire Thermodynamics (20 credits)

Level 6 (year 5)

SEMESTER ONE	SEMESTER TWO
Fire Safety Management (20 credits)	Fire Design Project (20 credits)
Individual Honours Project (40 credits) – **All Year Round**	

15	Overall Student Workload and Balance of Assessment

Overall student *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 students will need to allocate to different activities at each level of the course.

- *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 students. The approximate percentage of the course assessed by coursework, exam and in-person is shown below.

Level 3

Workload

40% time spent in timetabled teaching and learning activity

Activity	Number of Hours
Scheduled Learning	480
Directed Learning	336
Private Study	720
Total Hours	1200

Balance of Assessment

Assessment Mode	Percentage
Coursework	30%
Exam	47%
In-Person	23%

Level 4

Workload

36% time spent in timetabled teaching and learning activity

Activity	Number of Hours
Scheduled Learning	384
Directed Learning	368
Private Study	448
Total Hours	1200

Balance of Assessment

Assessment Mode	Percentage
Coursework	30%
Exam	47%

In-Person	23%

Level 5

Workload

24% time spent in timetabled teaching and learning activity

Activity	Number of Hours
Scheduled Learning	288
Directed Learning	214
Private Study	698
Total Hours	1200

Balance of Assessment

Assessment Mode	Percentage
Coursework	52%
Exam	45%
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%

Appendix 1

Curriculum Mapping

Course Learning Outcomes Vs Specific Modules

LEVEL 4 General Learning Outcome	Engineering Principles 1	Engineering Principles 2	Mathematical Modelling 1	Mathematical Modelling 2	Introduction to Fire Safety and Accidents	Fire Science and Risk Management
Knowledge and Understanding						
Maintain and extend a sound theoretical approach in enabling the introduction of new and advanced technology and other relevant developments.	✓	✓				
Apply and use appropriate mathematical techniques, including algebra, trigonometry, calculus and probability.			✓	✓		
Engage in the creative and innovative development of engineering technology and continuous improvement systems.	✓	✓				
Understand, apply and evaluate engineering science and engineering analysis procedure to solve the engineering problems.	✓	✓	✓	✓		
Safe working practices, risk assessment.					✓	✓
Theoretical and Practical Methods						
Apply appropriate quantitative science and engineering tools to the analysis of problems.	✓	✓	✓	✓		✓
Identify potential projects and opportunities.					✓	✓
Demonstrate creative and innovative ability in the synthesis of solutions and in formulating designs.	✓	✓		✓		

Conduct appropriate research, and undertake design and development of engineering solutions.	✓	✓				✓
Comprehend the broad picture and thus work with an appropriate level of detail.					✓	✓
Implement design solutions, and evaluate their effectiveness.	✓	✓			✓	✓
Investigate simple mechanical problem with appropriate mathematical methods.			✓	✓		
Technical and Commercial Leadership						
Plan for effective project implementation.					✓	✓
Provide evidence of group working and of participation in a major project is expected.	✓					✓
Plan, budget, organise, direct and control tasks, people and resources.					✓	✓
Apply safe working procedures, health and safety legislation, risk assessment and risk management techniques.	✓	✓				✓
Bring about continuous improvement through quality management.					✓	✓

LEVEL 4 General Learning Outcome	Engineering Principles 1	Engineering Principles 2	Mathematical Modelling 1	Mathematical Modelling 2	Introduction to Fire Safety and Accidents	Fire Science and Risk Management
Effective Interpersonal Skills						
Communicate in English with others at all levels.	✓	✓	✓	✓	✓	✓
Present and discuss proposals.					✓	
Demonstrate personal and social skills.					✓	✓
Show initiative, work independently and able to work as member of a team to develop collaborative skills.	✓	✓	✓		✓	✓
Display resourceful solutions including use of advanced engineering tools to the limitations of current Engineering practice and discuss them in a major technical report.	✓	✓				
Personal Commitment to Professional Standard						
Comply with relevant Codes of Conduct.	✓	✓	✓	✓	✓	✓
Manage and apply safe systems of work.	✓	✓			✓	
Undertake engineering activities in a way that contributes to sustainable development.						✓

LEVEL 5 General Learning Outcome	Fire Dynamics	Structures and Materials	CFD/Finite Element Method	Project Management	Fire and the Built Environment	Health and Safety/Fire Law
Knowledge and Understanding						
In-depth Knowledge and understanding of essential facts, concepts, theories and principles of fire engineering and its underpinning science and mathematics.	✓	✓			✓	
Engage in the creative and innovative development of engineering technology and continuous improvement systems.	✓		✓		✓	
In-depth knowledge of the social, environmental, ethical, economic and commercial considerations affecting the exercise of fire engineering judgement.				✓	✓	✓
Computer-Based Design and modelling include its applications.			✓			
Theoretical and Practical Methods						
Analyse and use appropriate advanced fire engineering principles to solve wide range of problems	✓	✓	✓			
Conduct appropriate research, and undertake design and development of fire engineering solutions.	✓			✓	✓	
Identify, evaluate and apply relevant practices within an appropriate professional and ethical framework.				✓	✓	✓
Implement design solutions, and evaluate their effectiveness.	✓	✓	✓			

Evaluate and apply fire problem solving that can assist in the engineering process.	✓	✓	✓			

LEVEL 5 General Learning Outcome	Fire Dynamics	Structures and Materials	CFD/Finite Element Method	Project Management	Fire and the Built Environment	Health and Safety/Fire Law
Technical and Commercial Leadership						
Plan for effective project implementation.				✓	✓	
Plan, budget, organise, direct and control tasks, people and resources.				✓	✓	
Interpret written and design information for areas of more complex work.	✓				✓	✓
Bring about continuous improvement through quality management.				✓		
Effective Interpersonal Skills						
Have developed transferable skills that will be of value in a wide range of situations. These are exemplified by the Qualifications and Curriculum Authority Higher Level Key Skills and include problem solving, communication, and working with others, as well as the effective use of general IT facilities and information retrieval skills.	✓	✓	✓	✓	✓	✓
Demonstrate evidence of planning, self-learning and improving performance, as the foundation for lifelong learning/CPD [continuing professional development].				✓		✓
Communicate effectively with other people using oral, written and graphic means.	✓	✓	✓	✓	✓	✓
Apply safe working procedures, health and safety legislation, risk assessment and risk management techniques.	✓	✓		✓	✓	✓
Ability to use competent in a range of skills on the current CAD and IT equipment in an effective and productive manner.	✓	✓	✓			

Show initiative, work independently and able to work as a member of a team to develop collaborative skills.	✓	✓	✓	✓	✓	✓
Personal Commitment to Professional Standard						
Display resourceful solutions including use of advanced engineering tools to the limitations of current fire Engineering practice and discuss them in a major technical report.	✓	✓	✓			
Manage and apply safe systems of work.	✓		✓			✓
Undertake engineering activities in a way that contributes to sustainable development.		✓				✓

LEVEL 6 General Learning Outcome	Structural Fire Engineering	Fire Safety Management	Fire Design Project	Fire Thermodynamics	Individual Honours Project
Knowledge and Understanding					
Project management, environmental issue and ethics as applied to professional fire engineering.		✓	✓		✓
Selection, critical evaluation, implementation and presentation of a fire engineering project.		✓	✓		✓
Design methodology appropriate to fire engineering.					✓
Critical analysis and problem solving of a fire engineering based project.	✓		✓	✓	✓
Theoretical and Practical Methods					
Critical analysis of working practices to ensure safety, carry out risk assessment and apply appropriate safety management techniques.		✓	✓		✓
Implement design solutions, and evaluate their effectiveness.	✓			✓	
Ability to critically analyse, evaluate and recommend design solutions to meet client's requirements.	✓	✓	✓		
Identify and critically evaluate the constraint of an fire engineering project.	✓		✓	✓	

LEVEL 6 General Learning Outcome	Structural Fire Engineering	Fire Safety Management	Fire Design Project	Fire Thermodynamics	Individual Honours Project
Technical and Commercial Leadership					
Apply safe test to the fire engineering based laboratory task.	✓				
Plan, budget, organise, direct and control tasks, people and resources.		✓	✓		
Lead teams and develop staff to meet changing technical and managerial needs.		✓	✓		
Effective Interpersonal Skills					
Communicate in English with others at all levels.	✓	✓	✓	✓	✓
Present and discuss proposals.			✓		✓
Communicate effectively with other people using oral, written and graphic means.	✓	✓	✓	✓	✓
Apply safe working procedures, health and safety legislation, risk assessment and risk management techniques.	✓	✓	✓	✓	✓
Ability to use competent in a range of skills on the current CAD and IT equipment in an effective and productive manner.	✓		✓	✓	✓
Show initiative, work independently and able to work as member of a team to develop collaborative skills.	✓	✓	✓	✓	✓

Personal Commitment to Professional Standard					
Comply with relevant Codes of Conduct.	✓	✓	✓	✓	✓
Undertake engineering activities in a way that contributes to sustainable development.	✓		✓		✓