

PROGRAMME SPECIFICATION

KEY FACTS

Programme name	Aerospace Engineering Aerospace Engineering with Placement
Award	BEng (Hons)
School	Science & Technology
Department or equivalent	Engineering
UCAS Code	H406; H407
Programme code	USAEEB ENBEAEN01 USAEBP ENBEAEN01
Type of study	Full Time
Total UK credits	360
Total ECTS	180

PROGRAMME SUMMARY

This programme has the objectives of exploring the design, analysis and testing of aeronautical and aerospace vehicles, including unmanned aerial vehicles that require the use of technologies that have not been present in the classical aeronautics field. Students will be equipped with in-demand expertise to progress to a career in the international airline and aircraft industries.

Engineering knowledge is built-up and nurtured, with specific objectives associated with each component Programme Stage. Most of the modules of Stage 1 are common across the engineering degrees offered by City University. This introductory year is intended to give you a thorough grounding in the fundamental and applied science and mathematics appropriate for an engineer, as well as developing personal skills such as time and quality management. You will have the opportunity to undertake preliminary engineering designs through group activity. Common to all stage 1 and 2 and across all Engineering Programmes, you will be offered a core module termed as the “Engineer in Society” which will introduce the engineering discipline with particular emphasis on some key topics such as sustainability and the environment. It will also incorporate personal tutoring and a series of seminars to improve your soft skills (presentations, CV building...) During the second year, the module will focus on an introduction to engineering management and the circular economy. It will also incorporate training in employability and promote multi-skills engineering.. In stage 3 the same module is tailored to the engineering discipline you have chosen. Emphasis will be given to an interdisciplinary approach to engineering, sustainability, societal and moral impact of engineering. Further help in building your curriculum and enhancing your employability potential will also be provided.

At the end of Programme Stage 1 (if you have met the academic requirements described below) you will have the opportunity to decide whether to remain on the BEng (Hons) Aerospace Engineering degree or switch to one of 2 other engineering BEng (Hons) degrees that share all stage 1 modules, namely Mechanical and Design Engineering or

Civil and Infrastructure Engineering.

In addition, you will study aerospace engineering and design topics such as fluid mechanics, thermodynamics, solid mechanics, materials and manufacturing, electronics heat transfer, mechatronics, control, computational fluid and structural mechanics, composite structures, aerospace materials, engineering design, aerodynamics and propulsion, flight dynamics, applied aerospace engineering, aeroelasticity, advanced aerodynamics and aircraft design and optimisation. Design projects will boost real-world engineering skills. Interdisciplinarity in the programme are enhanced by increasing elements of computer science, programming, data analysis, autonomous systems, robotics

If you wish to gain practical experience during your degree, then you have the option of spending 12 months between Programme Stages 2 and 3, on a paid industrial placement or two summer internships for up to 3 months between the years of study. We strongly recommend this (see the subsequent section entitled 'What Placement opportunities are available') as a possibility to improve your employability profile whilst maturing an experience in a real work environment.

Certificate of Higher Education

Upon successful completion of Programme Stage 1 you will be able to: (i) discuss underlying concepts and principles associated with fundamental science and technology, (ii) to develop skills in time and quality management and (iii) present, interpret and evaluate quantitative and qualitative data within your subject of study appropriate to the formation of an engineer. At this stage, having gained all the necessary credits, you will either: (i) automatically progress onto Programme Stage 2 of the BEng (Hons) in Aerospace Engineering or (ii) decide to switch onto one of the other 2 BEng (Hons) engineering degrees that share all stage 1 modules, namely Mechanical and Design Engineering or Civil and Infrastructure Engineering or (iii) leave the University with a Certificate of Higher Education in Engineering.

Diploma of Higher Education

Upon successful completion of Programme Stage 2 you will have: (i) built upon your previous knowledge and experience, (ii) developed critical understanding of the well-established principles, and of the way in which those principles have developed in your area of study and (iii) advanced your skills of enquiry and different approaches to problem-solving as well as identify the limitations of your knowledge in your subject. At this stage, having gained all the necessary credits, you will either: (i) automatically progress onto Programme Stage 3 of the BEng (Hons) in Aerospace Engineering or (ii) leave the University with a Diploma of Higher Education in Aerospace Engineering.

At the end of Programme Stage 2, you also can move to Programme Stage 3 of the Meng (Hons) degree if you have achieved an overall aggregate mark of at least 50% at the end of Programme Stage 2.

BEng (Hons) Degree

Upon successful completion of Programme Stage 3 (having gained all the necessary credits), you will: (i) have developed a coherent systematic, detailed knowledge of your discipline and (ii) be able to confidently develop and employ appropriate techniques and methods in mathematical modelling and experimentation for engineering problem-solving, analysis and design. At this stage, having gained all necessary credits, you will be either: i) awarded a BEng (Hons) degree or ii) subject to discretion of the Assessment Board, offered the possibility to continue your studies joining stage 4 MEng (Hons). If you will not have reached enough credits you will leave the University with an ordinary bachelor's degree.

Aims

The overall aim of the BEng (Hons) in Aerospace Engineering is to provide an excellent education in engineering with specialised training for a professional career in the industries underpinned by the aerospace disciplines, including aeronautical, Space, Air-Transport, and associated industries. This will include the research, development, design, production, commissioning, operation, and management aspects of those industries. In addition, students are expected to exercise leadership in project management and initiate independent research and critical analysis into specialized and advanced fields in engineering.

The specific aims (further elaborated below in the section '*What will I be expected to achieve*') are to produce graduates who:

- have a broad knowledge and clear understanding of the key aspect of study to solve a range of complex technical problems in aerospace engineering;
- are able to apply and integrate knowledge and understanding of other engineering disciplines;
- have developed a natural curiosity about the scientific world and are able to tackle and solve engineering problems;
- have a sound understanding of business and management to participate effectively in teamwork;
- are aware of their professional and ethical responsibilities, the global and societal impact of engineering solutions, as well as of economic, sustainability and political issues;
- can communicate to a wide range of audiences, exhibit team loyalty and have the ability and confidence to undertake further training of a professional leadership role in industry.

WHAT WILL I BE EXPECTED TO ACHIEVE?

This Programme has been developed in accordance with the QAA Subject Benchmark

for Engineering. Learning outcomes which must be delivered by BEng Programmes, accredited by Professional Engineering Institutions as meeting the educational requirements for registration as a Chartered Engineer, are defined in general terms in the 4th edition of the Accreditation of Higher Education Programmes, published at www.engc.org.uk. The module learning outcomes listed below are accordingly all cross-referenced to these mandated AHEP4 learning outcomes.

On successful completion of this programme, you will be expected to be able to:

Knowledge and understanding:

- Explain and demonstrate the scientific principles upon which aerospace engineering is based, including those which underpin current technological advances in the sector (C1).
- Apply mathematical and computational approaches to analyse and solve engineering components and systems (C2).
- Assess and discuss the engineering concept/design/build/test process, including customer requirements, dependencies, assumptions, constraints, uncertainties and creative solutions to problems; also, with recent or planned developments in practice (C5, C6, C7, C9, C12, C13).
- Apply practical experience of the concept of fitness for purpose and the separate consideration of production, operation, maintenance, and disposal of an engineering system (C5, C6, C7, C12).
- Apply practical experience of the multi-disciplinary character of engineering and making decisions based upon social, environmental/sustainable development, ethical, legal, economic, and commercial considerations (C7, C8, C15).
- Conform with current technological, manufacturing, and operational practice in the engineering industry and with future trends in relevant areas (C4, C7, C13).
- Discuss concepts from outside engineering which nonetheless drive engineering practice and business development (C5, C13).
- Apply the broad range of management tools and techniques required to run an engineering business (C9, C10, C14, C15).
- Apply your knowledge and understanding, of the type described above, specific to the principles and practice of flight and to aerospace vehicles design, manufacture, operation and maintenance and awareness of developments in the field (C5, C6, C12, C13).
- Assess the aerospace engineering industry as a business enterprise in national and international economies (C5).

Skills:

- Tackle confidently unfamiliar engineering problems (C18).
- Gather, integrate, and evaluate information from various sources including technical literature (C4)
- Break down a problem into a series of engineering tasks to be solved under a set of multi-disciplinary constraints (C5).
- Communicate effectively in technical and non-technical languages, written, oral and graphical forms to individuals and large audiences; be proficient with IT and

communications systems (C17).

- Use laboratory equipment for data measurement, processing, interpreting and analysis; be proficient in the application of analytical, computational and CAD techniques specifically to the analysis and design of aircrafts, aerospace vehicles and systems (C3, C13).
- Use workshop equipment to produce or modify an engineering component (C12).
- Be proficient with analytical, computational, and experimental techniques (including assessing the limitations of the results obtained), coupled with experience and decision-making, to solve engineering problems (C2, C3).
- Apply initiative, creativity and innovation to design, construct and test a system, component, or process to meet specifications (C5).
- Evaluate designs, processes or products and make improvements, taking into consideration associated commercial risks, societal and environmental impact (C7, C9, C10).
- Work with technical uncertainty (C13).
- Work with levels of detail appropriate to the criticality of the task while adding innovation to address societal, user and customer needs (C5).
- Plan for and manage time/cost/quality of an engineering project, including adjusting plans to changing circumstances and controlling such adjustments (C7, C9, C10).
- Exercise leadership both as an individual and as a member of a team (C14, C15).

Values and attitudes:

- Put the needs of the team ahead of one's own needs and willingly take the lead in difficult situations (C16).
- Willingly take on the professional and ethical responsibilities of engineers in society (C8); commit to continuous improvement to enhance professional skills and benefit society (C18).
- Comprehend the value of the aerospace engineering and of aviation to society and to the global economy (C7) while recognising the need for the aerospace engineering industry to contribute in a sustainable way (C7).
- Recognise that there is only one type of engineer, a person that tackles and solves problems, independently of gender, religion, or race and that promotes inclusion (C11).

HOW WILL I LEARN?

Most of the learning in Higher Education is typically conducted through a combination of supervised and private study. Engineering is a practical discipline which benefits from significant supervised study, but it cannot be learnt through lectures alone.

Teaching involves a combination of theoretical, experimental, and computational study. Our approach is to encourage critical thinking and foster your curiosity. By the time that you reach Programme Stage 3, the tutorial and practical elements are managed more by you, especially in relation to your individual project work.

Contact hours are made up of: lectures, which direct you towards the most important

topics in the field and which allow discussion and clarification of areas of uncertainty with expert staff; tutorials where staff are on hand to help with problem-solving exercises; laboratory and workshop classes where practical situations and methods are encountered; and research or design/build projects, both individually and in groups, where personal skills, teamwork, creativity and critical thinking are developed and where knowledge built up elsewhere in the Programme is integrated and developed. Site visits are used to place taught sessions in the context of real-world industries or products.

Private study is essential to the achievement of the learning outcomes and are guided using both formative and summative coursework tasks set during the academic year. Your private study is also supported using Moodle, City's Online Learning Environment. This provides online access to module content, feedback, guidance on completing coursework, audio-visual resources etc.

In Programme Stages 1 and 2 there is a higher proportion of supervised study (compared with Programme Stage 3), with typically 20-24 hours of contact timetabled each week. These supervised contact hours are designed to assist and to focus your private study.

This Aerospace Engineering Programme benefits from a flight test course in Programme stage 2.

WHAT TYPES OF ASSESSMENT AND FEEDBACK CAN I EXPECT?

Assessment and Assessment Criteria

The Programme is subdivided into Programme Stages (years of study) and each Programme Stage into modules (coherent groupings of syllabus topics addressing Learning Outcome types). Each module in the Programme may have one or more assessment components of differing types. Assessment components may involve more than one assessment task (e.g., they may be an aggregate of different coursework marks or multiple examination papers). Modules that contain multiple assessment components (either coursework or exam) for which individual minimum pass marks are required are specified in the relevant module specifications.

Some modules will have an examination component in addition to a coursework (continuous assessment) component. Many skills need to be honed by practice: to this end formative assessments, may be organised within each module with appropriate and timely feedback mechanisms.

Examinations are used because they provide a comprehensive tool to assess the acquired knowledge and understanding and problem-solving skills. The time pressure and lack of warning about specific issues to be tackled is representative of real-world situations faced by practising engineers. Coursework assessments vary from paper assignments

(which may be like examinations but with longer time scales and with access permitted to information sources) to the assessment of practical skills which cannot be done in the exam hall. For example, communication skills (e.g., presentations, drawings, and written reports), personal skills (such as teamwork or leadership), planning and design (both software and hardware), data analysis, critical review of information and the use of workbench and CAE tools are usually assessed by means of coursework tasks.

Often coursework tasks may be set which are not to be assessed but which are valuable as a learning experience. This is known as formative coursework and is often the key to improving grades on assessed or summative coursework. You will receive feedback from all coursework assessments, both formative and summative to enable you to develop and enhance your assessment performance.

Assessment Criteria are descriptions, based on the intended learning outcomes, of the skills, knowledge, or attitudes that you need to demonstrate to complete an assessment successfully, providing a mechanism by which the quality of an assessment can be measured. Grade-Related Criteria are descriptions of the level of skills, knowledge, or attributes that you need to demonstrate in order to achieve a certain grade or mark in an assessment, providing a mechanism by which the quality of an assessment can be measured and placed within the overall set of marks. Assessment Criteria and Grade-Related Criteria will be made available to you to support you in completing assessments. These may be provided in Programme handbooks, module specifications, on the virtual learning environment or attached to a specific assessment task.

Feedback on assessment

Feedback will be provided in line with our Assessment and Feedback Policy. You will normally be provided with feedback within three weeks of the submission deadline or assessment date. This may be written (on the hard copies and online) or oral (in class), specific to you or generally applicable, and would normally include a provisional grade or mark. If the coursework submitted is a laboratory report, then your work will not be returned until three weeks after the last report has been submitted. Laboratories are undertaken by groups of you in rotation over periods of many weeks and consequently the last group of you may complete the laboratory and submit the report many weeks after the first group.

For end-of-module examinations or an equivalent significant task (e.g., an end-of-module project), generic feedback will normally be provided within four weeks of the last day of exam period. The timescale for feedback on final year projects or dissertations may be longer and starts from the date of the final presentation of the project. The full policy can be found at:

https://www.city.ac.uk/_data/assets/pdf_file/0009/452565/Assessment-and-Feedback-Policy...pdf

Assessment Regulations

To pass your Programme, you should complete successfully (or be exempted from) the relevant modules and assessments and will therefore acquire the required number of credits. You also need to pass each preceding Programme Stage of your Programme to progress to the following Programme Stage.

Your overall aggregate mark will be calculated by combining the aggregate marks from Programme Stages 1, 2 and 3 in the ratio 1:3:6. The pass mark for each module is 40%. In some modules there will be a written exam that has the individual pass mark of 40%. Details of which assessment components need to be passed individually is provided in the Module Specification.

If you fail an assessment component or a module, the following will apply.

Compensation: where, if you fail up to 30 credits at first or resit attempt, you may be allowed compensation if compensation is permitted for the module involved (see the What will I study section of the Programme Specification), and it can be demonstrated that you have satisfied the Learning Outcomes of the modules in the Programme Stage, and a minimum overall mark of at least 30% has been achieved in the module to be compensated, and an aggregate mark of at least 40% has been achieved for the Programme Stage under consideration.

Where you are eligible for compensation at the first attempt, this will be applied in the first instance rather than offering a resit opportunity.

If you receive a compensated pass in a module then you will be awarded the full credits for that module. The original component marks will be retained in the record of marks and your original module mark will be used for the purpose your award calculation.

Note that the total amount of compensated credits cannot exceed 30 during your whole study degree.

Resit: Where you are not eligible for compensation at the first attempt, you will normally be offered one resit attempt. If you are successful in the resit, you will be awarded the full credit for that module. The mark for each assessment component that is subject to a resit will be capped at the pass mark for the module. This capped mark will be used in the calculation of the final module mark together with the original marks for the components that you passed at first attempt.

If you do not meet the pass requirements for a module and do not complete your resit by the date specified, you will not progress to the next Programme Stage and the Assessment Board will require you to be withdrawn from the Programme.

If you fail to meet the requirements for a particular Programme Stage, the Assessment Board will consider whether you are eligible for an Exit Award as per the tables shown below.

If you would like further information about the way in which assessment works at City, please see the full version of the Assessment Regulations at:

https://www.city.ac.uk/_data/assets/pdf_file/0007/453652/s19.pdf

WHAT AWARD CAN I GET?

Bachelor's degree with honours in Aerospace Engineering

Programme Stage	HE Level	Credits	Weighting %
1	4	120	10
2	5	120	30
3	6	120	60

Class	% Required
I	70
II upper division	60
II lower division	50
III	40

Ordinary degree in Aerospace Engineering

Programme Stage	HE Level	Credits	Weighting %
1	4	120	10
2	5	120	30
3	6	60	60

Class	% Required
With Distinction	70
With Merit	60
Without Classification	40

Diploma of Higher Education in Aerospace Engineering

Programme Stage	HE Level	Credits	Weighting %
1	4	120	25
2	5	120	75

Class	% Required
With Distinction	70
With Merit	60
Without Classification	40

Certificate of Higher Education in Engineering

Programme Stage	HE Level	Credits	Weighting %
1	4	120	100

Class	% Required
With Distinction	70
With Merit	60
Without Classification	40

WHAT WILL I STUDY?

Programme Stage 1

Programme Stage 1 comprises eight core Level-4 modules, totalling 120 credits. To pass Stage 1 you must obtain all 120 credits, as specified in the Programme Scheme.

Module Title	SITS Code	Module Credits	Core or Elective	Can module be compensated?	Level
The Engineer in Society - Social responsibility	EG1000	15	Core	No	4
Engineering Design I	EG1002	15	Core	No	4
Introduction to Mechanics of materials and manufacturing	EG1004	15	Core	No	4
Electronics I	EG1005	15	Core	No	4
Introduction to Programming	EG1007	15	Core	No	4
Engineering Science	EG1003	15	Core	No	4
Mathematics - I	EG1001	15	Core	No	4
Introduction to Thermodynamics and Fluid Mechanics	EG1008	15	Core	No	4

Programme Stage 2

Programme Stage 2 comprises eight core Level-5 modules, totalling 120 credits. To pass Programme Stage 2 you must obtain all 120 credits, as specified in the Programme Scheme.

If you wish to gain practical experience you have the option of spending a year on paid industrial placement between Programme Stages 2 and 3. You also have the option to split the placement over two periods in the summer between the years of study.

Module Title	SITS Code	Module Credits	Core or Elective	Can module be compensated?	Level
The Engineer in Society: Sustainability and Circular Economy	EG2000	15	Core	No	5
Mathematics - II	EG2001	15	Core	No	5
Engineering Design II – Aerospace	EG2100	15	Core	No	5
Fluid Mechanics	EG2101	15	Core	No	5

Structures and Materials	EG2102	15	Core	No	5
Thermodynamics	EG2201	15	Core	No	5
Mechatronics and Systems	EG2202	15	Core	No	5
Data Analysis for Engineers	EG2002	15	Core	No	5

Upon obtaining all 120 credits, you may progress to Programme Stage 3 of the BEng Programme or request to be transferred to Programme Stage 3 of the MEng programme. To do so, you must have achieved a module average of at least 50% at the end of Programme Stage 2.

Programme Stage 3

Programme Stage 3 comprises seven core Level-6 modules, totalling 120 credits. To pass Programme Stage 3 you must obtain all 120 credits, as specified in the Programme Scheme.

A student who has successfully completed Programme Stage 3 of a BEng Programme may, with the approval of the Assessment Board, transfer to Programme Stage 4 of the related MEng programme if they have obtained an overall aggregate mark of at least 50% at Programme Stage 3.

Module Title	SITS Code	Module Credits	Core or Elective	Can module be compensated?	Level
Individual project	EG3000	30	Core	No	6
The Engineer in Society – Zero Emissions	EG3100	15	Core	Yes	6
Composite Analysis and Manufacturing	EG3103	15	Core	Yes	6
Aerospace Propulsion	EG3102	15	Core	Yes	6
Gas Dynamics	EG3106	15	Core	Yes	6
Flight Mechanics and	EG3105	15	Core	Yes	6
Structural Analysis and Finite Element	EG3101	15	Core	Yes	6

TO WHAT KIND OF CAREER MIGHT I GO ON?

Many Aerospace Engineering graduates enter the aeronautical/space engineering profession via one of the major international aircraft or aerospace engineering

companies such as Airbus, BAE Systems and Leonardo Helicopters. Other graduates take positions in one of the high-tech design companies (for example, QinetiQ) and manufacture supply chain companies (including aero engine designers and manufacturers, Rolls Royce). Several graduates move to a career in flying. However, beyond the aerospace sector, this degree equips you with the required technical expertise, initiative and management skills to be able to face modern challenges in any number of branches of the engineering industry (from F1 aerodynamics to tall building design). Your creativity and innovation in design will serve you well in the broad profession.

The Centre for Career & Skills Development provides a service to current undergraduates and postgraduates, as well as recent graduates of the University. Their aim is to provide you with advice, information, and skills that you need to make a smooth transition into the world of professional engineering. If you would like further information on the careers support available at City, please go to: <http://www.city.ac.uk/careers>

WHAT STUDY ABROAD OPTIONS ARE AVAILABLE?

At present these options are not available; they remain under development.

WHAT PLACEMENT OPPORTUNITIES ARE AVAILABLE?

If you wish to take a professional placement between Programme Stages 2 and 3 of your degree, then you will need to register accordingly at the beginning of Programme Stage 2. We strongly encourage you to undertake a 12-month placement or 2 Summer Internships of up to 3 months, as you will benefit greatly from the experience; providing you with a distinct advantage when you seek employment upon graduation. The corporate Relations & Employability Unit (CREU) collaborates with Careers Employability Team to deliver a series of Professional Development workshops to prepare you for searching for and applying for a work placement. The CREU is in regular contact with companies and other organisations concerning the availability of training opportunities and will advise you on making applications.

You are welcome to make your own applications, but you will be asked to discuss these with CREU Advisors. Support is provided through the Engineer in Society module on Moodle.

WILL I GET ANY PROFESSIONAL RECOGNITION?

Accrediting Body: The Royal Aeronautical Society and The Institution of Mechanical

Engineers

Nature of Accreditation

Our current Aeronautical Engineering degrees are accredited by the above institutions, providing a path for students on those programmes to gain Chartered Engineering status. This programme has been designed to satisfy the above institutions' accreditation criteria and an application for accreditation will be made in due course. We have every expectation that these degrees will similarly receive full accreditation.

HOW DO I ENTER THE PROGRAMME?

The following entrance requirements typically apply.

UCAS tariff points

120

A-levels

BBB; including A-Level Mathematics. You are also required to have passed GCSE English Language at grade 4 (C) and Mathematics, or higher.

IB

30 points with 'Higher Level Mathematics at grade 5' OR 'Standard Level Mathematics at grade 7 AND Higher-Level Physics/Biology/Chemistry at grade 5'.

BTEC

BTEC (Level 3 Nationals only).

D*DD in Engineering (RQF) (First teaching Sept 2016) with minimum grade D in units 1 - Engineering Principles, 7 - Calculus to Solve Engineering Problems and 8 - Further Engineering Mathematics. Candidates must also have a minimum of grade 6 in GCSE Mathematics and Science/Physics.

English language requirements

For overseas candidates, an IELTS score of 6.0 (with a minimum of 5.5 in all components) is required. TOEFL is not accepted as evidence of English language ability for students that require a Confirmation of Acceptance for Studies.

Entry via Foundation Course

You will be offered a place on the BEng (Hons) degree in Aerospace Engineering should you both (i) successfully satisfy the City University of London interview panel and (ii) obtain an overall grade of at least 65% on an Engineering Foundation programme at: Westminster-Kingsway College, INTO City University of London International or Kaplan International College.

RPL/RPEL Requirement

Direct entry into Programme Stage 2 may be considered for candidates who have successfully completed the first year of a similar accredited MEng or BEng degree.

Scholarships

Undergraduate students are considered for a wide range of awards (scholarships, bursaries, and prizes) throughout their studies in the school. These (internally and externally funded) awards range from £500-£9000 and they are based on a combination of academic merit and hardship. A number of these awards are also available to international students. Further information can be found at: <http://www.city.ac.uk/study/undergraduate/funding-and-financial-support/scholarships-and-bursaries>

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