



Programme Specification

BENG-AE-2022: Engineering (Aerospace Engineering)

LU Bachelor of Engineering with Honours awarded by Lancaster University (FHEQ Level 6)

Programme Status: Approved | Version: 1

Introduction

This programme specification provides a summary of the main features of the Engineering (Aerospace Engineering) programme and includes the learning outcomes that you as a student are expected to have achieved on successful completion of the programme.

Further detailed information related to this programme and the College can be found in the following resources:

- Programme Handbook
- B&FC Admissions Policy
- Work based and placement learning handbook (for foundation degrees)
- Student guide to assessment and feedback

Key Programme Information

Programme Code	BENG-AE-2022
Programme Title	Engineering (Aerospace Engineering)
Teaching Institution	Blackpool and The Fylde College
Professional, Statutory and Regulatory Body (PSRB) Accreditation	None
UCAS Code	
Language of Study	English
Version	1
Approval Status	Approved
Approval Date	06 June 2022
JACS Code	Other: Other
Programme Leader	Margarita Georgieva

Programme Awards

Award	Award Type	Level	Awarding Body
LU Bachelor of Engineering with Honours	Honours Degree (360 credits)	Level 6	Lancaster University

Programme Overview

Aerospace Engineering is an exciting, cutting-edge field that offers international prospects. Graduates have a range of options in the research, design and development of manned or unmanned civil and military aircrafts, missiles, weapons systems, satellites, space vehicles. They also work in testing and maintenance of aircrafts and systems and in improving efficiency, speed, weight, and fuel consumption. Aerospace Engineering is increasingly oriented towards sustainability in recent years and many roles in the field also address environmental impacts, health and safety, or more broadly operations management.

As a student in Aerospace Engineering, you will learn about aircrafts, flying and flight systems. By the time you graduate, you will have specialist knowledge in aerodynamics, avionics, materials and structures, propulsion and systems integration. Our BEng (Hons) Engineering (Aerospace) programme will provide you with a balanced knowledge in both core and specialist principles of aerospace engineering. It has a well-proportioned content in both mechanical and systems aspects of aerospace to furnish you with versatile skills to enjoy an exciting career path within this future-oriented sector.

At Level 4 the programme covers common core modules. You will focus on essential skills

in project management, mathematics, computer-aided design (CAD) which will give you a great advantage on the job market. You will also enjoy a specialty field module to gently ease you into concepts and principles of aerospace engineering. At Levels 5 and 6, you will gain more insight into subject specialisms with an option at Level 6 to choose between two optional subject specific modules and customise your programme based on your interests in the field.

We have designed the programme so as to give you the opportunity to explore practical subject areas and to engage in hands-on learning. The programme will allow you to develop your own interests and projects in the field and prepare for the range of responsibilities you can undertake in the future. The UK has a significant shortfall of suitably-skilled and qualified engineers, and a very advanced aerospace industry. At B&FC, we have well-developed working relationships with a wide range of Engineering employers, through which we help and support learners into sustainable employment. Many of our graduates are now employed by major companies (EDF Energy, Westinghouse Springfields, BAE Systems, Airbus, NIC, GCE and Ford Motor Company) as design, production, project or research and development engineers. Successful students may also wish to continue their studies by undertaking a relevant postgraduate degree at another university institution, leading to even greater career opportunities.

Admission Criteria

A minimum of 48 UCAS points (excluding Functional Skills) in an appropriate discipline:

- DD from A levels to include mathematics and a technology, engineering or science-based subject
- PPP from Extended Diploma, MP from Diploma, MM from 90 Credit Diploma in a science or technology-based subject, including passes in mathematics

The entry criteria for direct entry onto Level 5 of the programme are:

- HNC or HND with an overall Merit grade in Mechanical, General or Aeronautical Engineering or another appropriate Engineering discipline
- Applicants for whom English is not their first language are expected to achieve a minimum 6.0 overall with at least 5.5 in each IELTS component.
- Applicants who are able to demonstrate relevant work/life skills or knowledge will also be considered on an individual basis and will be required to attend an interview and provide an up-to-date CV with a professional portfolio, evidencing their capacity to undertake the programme.

Students entering the programme with an HND will need to obtain additional initial advice and guidance on their funding eligibility.

Career Options and Progression Opportunities

A continuous need for aerospace engineers means there are excellent career opportunities for talented engineering graduates across the sector. These range from the development of new aircraft components to investigating aircraft accidents. Aerospace professionals also take part in flight testing, supervising aircraft development and manufacturing, satellite and drone research, and developing innovative ideas. You might also want to consider an international career, working with companies in technology innovation for aerospace, or alternatively, postgraduate study and research.

As an aerospace engineer, you will either be based in an office, or a factory environment that includes production or testing hangars and laboratories, where various components are tested, developed and produced. You can expect to work with sophisticated software and tools, which will involve continuous professional development and life-long learning opportunities. Important

skills for aerospace engineers are enthusiasm, dedication, stress management and attention to detail. You will most probably develop a very particular set of soft skills that combine fast decision-making and extreme accuracy, since human error in this field can have serious consequences.

Aerospace engineers have upper-range starting salaries. At senior level, you can expect to earn between £45,000 and £65,000. If you are aiming for the upper end of this range, you would do well to consider further study at Master's or research level (PhD). This course leads perfectly to such courses, which, though challenging, are rewarded through a wealth of personal and professional development opportunities.

Programme Aims

- To provide a robust foundation and framework for aerospace specialists enriched by the development of core, interdisciplinary and specialist knowledge of aerospace systems and technologies, their design, development, manufacture and through-life management and support.
- To enable students to independently gain skills, knowledge and confidence in applying proven principles, technological techniques and methods in aerospace engineering, leading them to explore and utilise new developments in the field, including research and advanced technologies, to acquire new knowledge, analyse and evaluate new developments in the sector and to apply these appropriately.
- To provide students with the opportunity to gain transferrable knowledge and skills that enable them to engage fully in design, research, development, manufacture, testing and maintenance of aerospace systems that have an impact on the advancement of science and technology.
- To provide academic, technical and professional development through a variety of learning experiences, the development of communication skills and capability of critical analysis, problem solving, the presentation and justification of rational argument and alternative courses of action.
- To enable students to critically evaluate concepts and evidence from a range of sources, and to transfer and apply creativity and innovation skills, exercising significant judgement in a range of situations, accepting responsibility and accountability for determining and achieving personal and team outcomes.
- To educate proficient aerospace engineers about responsibility, professional development and lifelong learning, and facilitate opportunities to pursue employment or the level of study which will enable them to continue to excel in their professional lives.
- To graduate professional aerospace engineers who have a critical and informed awareness of contemporary issues, legislation, human factors, ecological, sustainability, obsolescence, maintainability challenges, as well as key opportunities of the sector, recognising the impact of customer voice, market trends and industry demands, and who are able to produce or propose sustainable solutions with lasting, impactful outcomes for the success of the industry.

Programme Learning Outcomes

Level 6

Upon successful completion of this level, students will be able to:

1. Critically analyse and evaluate complex systems and their interdependencies through the application of systems thinking via analysis of the wider engineering context in view of integrated solutions adopting a systems approach.
2. Interrogate and resolve problems using a sound evidence base to contribute to improved effectiveness of aerospace technologies, systems, services, and their management, considering legal and contractual issues.
3. Independently analyse essential facts, concepts, and fundamentals of aerospace engineering, underpinned by scientific and mathematical principles to identify, formulate and solve aerospace problems and to critically evaluate these solutions.

4. Critically analyse, test and evaluate aerospace systems and processes to identify possible problems, inefficiencies or other issues that may impact users or service providers, evaluating engineering decisions for a more socially inclusive, ethical, economically stable, environmentally sustainable and commercially viable world.
5. Use advanced aerospace-specific IT facilities, applying information retrieval, mathematical and statistical methods to plan, develop and work on projects which support extended enquiries into innovative and creative problem solving in the sphere of aerospace engineering.
6. Evaluate business, customer and user needs, to independently plan, manage and execute a technically and theoretically informed project, which extensively analyses all aspects of a problem and proposes adequate solutions, broadly deepens knowledge and skills base and critically evaluates expected outcomes.
7. Work in teams, managing tasks and resources to meet changing technical and managerial needs, to support design and development processes through cost evaluation, risk management, and to lead continuous quality improvement utilising robust communication strategies.
8. Use interpersonal and collaboration skills to communicate to varied audiences technical and non-technical information on solutions that develop innovative ideas and new ways of thinking to support the advancement of aerospace engineering practices and knowledge.
9. Formulate innovative solutions, designs, products and services by utilising and applying industry-standard engineering skills through laboratory and workshop activities for designing, analysing, implementing, testing and controlling.
10. Creatively apply, utilise and adapt engineering principles and tools, quantitative science and knowledge towards interdisciplinary projects or to deal with uncertainty and extend technological capability and knowledge base through new applications and techniques.
11. Use general IT facilities and information retrieval skills to plan, develop and execute projects, working as a team on projects that involve technical uncertainty, strive for continuous improvement, and develop the ability to work in different roles.
12. Engage in lifelong learning and continuous professional development while supporting others in their endeavours by developing mentorship and people management skills.
13. Apply health and safety, ethical and sustainability principles, legal frameworks and technical standards to professional practices in an engineering context which recognises obligations to society, the profession and the environment.
14. Apply aerospace principles, knowledge and skills in an engineering context in view of creating adaptive, sustainable and efficient solutions that correspond to given specifications.

Programme Structure

Module	Level	Credits	%	Category	Description	Length/Word Count	Grading Method
Stage 1							
B4SCBENG: Introduction to Academic Study (Mandatory)	4	20	60%	Coursework: Other	Written piece and reflection	2000	Letter Grade
			40%	Practical: Other	Case study, analysis, interpretation (1500 words) and poster presentation (15 minutes)	15	Letter Grade
BENG401: Engineering Mathematics (Mandatory)	4	15	60%	Coursework: Assignment	n/a	1200	Percentage Grade
			40%	Written Exam: Formal Written Examination	Formal Written Examination	120	Percentage Grade
BENG402: Engineering Science (Mandatory)	4	15	60%	Coursework: Report	Technical / Laboratory Report	1500	Letter Grade
			40%	Written Exam: Formal Written Examination	n/a	120	Percentage Grade
BENG403: Engineering Design (Mandatory)	4	15	70%	Coursework: Portfolio / e-Portfolio	Portfolio of product design specification, design work and accompanying analytical studies.	2000	Letter Grade
			30%	Practical: Presentation	Presentation and demonstration of a design solution.	15	Letter Grade
BENG404: Managing Professional Engineering Project (Mandatory)	4	15	90%	Coursework: Project	The project will contain a portfolio of project management documents and a project closure report.	3000	Letter Grade
			10%	Practical: Presentation	n/a	10	Letter Grade
BENG405: Computer Aided Design (Mandatory)	4	15	50%	Coursework: Evaluative/ Reflective Report	Evaluative report with a set of CAD drawings	1500	Letter Grade
			50%	Coursework: Evaluative/ Reflective Report	CAD project with Evaluative Report	1500	Letter Grade
BENG406: Workshop (Mandatory)	4	10	50%	Practical: Artefact	Prototype / Manufactured Product Presentation and Demonstration	10	Letter Grade

BENG406: Workshop (Mandatory)	4	10	50%	Practical: Practical Skills Assessment	n/a	20	Letter Grade
BENG407: Aircraft Aerodynamics (Mandatory)	4	15	50%	Coursework: Report	A written report presenting theoretical work, investigating and analysing principles and applications of aerodynamics	1500	Letter Grade
			50%	Practical: Presentation	Presentation of practical work based on a lab report and experiments.	20	Letter Grade
Stage 2							
BENG501: Research Project (Mandatory)	5	20	90%	Coursework: Literature Review	n/a	3000	Letter Grade
			10%	Practical: Presentation	n/a	20	Letter Grade
BENG502: Professional Engineering Management (Mandatory)	5	20	100%	Coursework: Portfolio / e-Portfolio	n/a	4000	Letter Grade
BENG503: Further Engineering Mathematics (Mandatory)	5	20	50%	Coursework: Assignment	Applied Mathematical Study	1600	Percentage Grade
			50%	Written Exam: Formal Written Examination	n/a	120	Percentage Grade
BENG505: Aircraft Flight Control Systems (Mandatory)	5	20	50%	Coursework: Evaluative/ Reflective Report	A study of mechanical systems and evaluation of simulation test data.	1500	Letter Grade
			50%	Coursework: Evaluative/ Reflective Report	A study of electrical and electronic systems and evaluation of simulation test data.	1500	Letter Grade
BENG506: Aircraft Propulsion (Mandatory)	5	20	70%	Coursework: Research Portfolio	A research portfolio that demonstrates your understanding and reflection on principles and operations of propulsion systems.	3000	Letter Grade
			30%	Written Exam: Formal Written Examination	An exam to demonstrate knowledge of the application of mechanical and thermodynamic principles to propulsion systems.	120	Percentage Grade

BENG516: Materials, Properties and Testing (Mandatory)	5	20	50%	Coursework: Assignment	Laboratory Report	1500	Letter Grade
			50%	Coursework: Other	Presentation of CFD Simulations and FEA	20	Letter Grade
Stage 3							
BENG601: Major Project (Mandatory)	6	40	5%	Coursework: Other	Proposal	1500	Letter Grade
			80%	Coursework: Report	n/a	10000	Letter Grade
			15%	Practical: Presentation	n/a	20	Letter Grade
BENG602: Professional Engineer (Mandatory)	6	20	60%	Coursework: Report	A case study evaluation of an engineering organisation or team.	2000	Letter Grade
			40%	Coursework: Portfolio / e-Portfolio	A portfolio of professional engagement and a professional discussion demonstrating readiness for undertaking a role as an engineering professional.	20	Letter Grade
BENG603: Control and Simulation (Mandatory)	6	20	40%	Coursework: Report	Technical / Laboratory Report	1600	Letter Grade
			60%	Written Exam: Formal Written Examination	Formal Written Examination	120	Percentage Grade
BENG604: Composite Materials (Mandatory)	6	20	40%	Coursework: Report	A report, reviewing data and findings, and reflecting on lab experiments on materials, including identification and analysis of defects, testing outcomes and materials performance.	1500	Letter Grade
			60%	Practical: Practical Skills Assessment	A practical demonstration on materials development and materials testing in lab settings.	40	Letter Grade

BENG608: Manufacturing Systems Engineering (Elective)	6	20	40%	Coursework: Project	Personal written technical report, incorporating a reflective account, literature research and theoretical applications in practice.	1500	Letter Grade
			60%	Practical: Practical Skills Assessment	Manufacturing simulation project with Digital Components and/or another manufacturing simulation software of your choice.	2500	Letter Grade
BENG612: Virtual Engineering (Elective)	6	20	50%	Practical: Other	Presentation of CFD Simulations and FEA	20	Letter Grade
			50%	Coursework: Research Portfolio	n/a	1500	Letter Grade

Study Workload

This degree is equivalent to 360 credits and the award you will obtain is a Lancaster University Bachelor of Engineering with Honours. This programme requires commitment to attend lectures and workshops at Bispham Campus in line with your study timetable. It is a requirement of the programme that you also undertake appropriate independent study and further reading and assessment. The programme is offered on a full time basis which will typically require attendance on campus for two full days per week over three years. A part time pathway can be followed from Level 5 onwards, which would typically require attendance on campus one full (long) day per week over 3 years. As well as attendance to lectures, you are expected to undertake sufficient self-directed study. For each hour of class contact, you can typically expect to undertake an additional 2-3 hours of work, however this is dependent upon individual progress. You will need to find the right number of hours based on your own needs. Our tutors can help you with advice and support. On the full-time programme of study, at Level 4, you should expect to be in College between two and three days weekly. At Levels 5 and 6, the time spent at College is two days weekly. Your time will be divided between practical workshops, labs and lectures. You should plan for a minimum of one additional hour of independent study for each module you have in any semester. It is commonly accepted that 1/3 of your studies is tutored in classes, laboratories and workshops, while 2/3 of your studies should be based on independent, self-guided work. On the part-time programme of study, at Levels 5 and 6, you should expect to be in College on a day release. While you may be at work during the rest of the week, it is important to allocate some time for independent study.

Teaching Methods

The course will be delivered using a range of methods, which may include informal lectures, tutor-led whole group discussions, student presentations, technical workshops, computer laboratory activities, group work, group and individual research and seminars. Some lecturers will use flipped classroom techniques to encourage your intellectual independence. There are laboratory sessions and practicals for this programme, which will enable you to work with a wind tunnel, to perform materials design and materials testing, and to perform experiments relevant to the Aerospace field. The labs will be enriched with the relevant industry-standard software.

Balanced Theory and Practice

Modules are designed to integrate practical and theoretical application. Software and laboratory equipment will be regularly introduced by tutors and applied at relevant points within your studies.

One-on-one Support

Tutors are very accessible and supportive and eager to enhance your learning experience through one-on-one assistance when needed. You will also have a dedicated progress tutor along with support from the College higher education learning mentors. You will significantly benefit from relatively small class sizes and a warm and friendly learning environment which encourages effective group interaction.

You will be shown various tools and techniques and will be able to practice with them where appropriate to reinforce the taught portion of some sessions. Independent research will allow development of additional practical and theoretical knowledge as appropriate to your chosen specialism. This becomes more important as you progress through the programme. You will have access to outstanding specialist facilities and equipment including our Advanced Technology Centre. This will allow you to work with industry-standard equipment and software relevant to your future engineering career.

Programme Delivery: Assessment

Various modes of assessment will be used in different modules to ensure all aspects of learning are assessed and that you are competent in different forms of demonstrating your knowledge. These will range from real world case studies, live presentations and briefing sessions, written assessments, computer aided design projects and written examinations. You will be supported in the preparation for assessments via readily available tutorial sessions and tutor support. Some assessments may already be very familiar, such as essays, exams, and reports. However, in higher education there are a great many varieties of assessment depending on the subject, the level and the type of course. Our higher education courses often integrate academic and work-based learning so assessment may include aspects of personal reflection, portfolio building and case studies.

The assessments for this programme are based on a combination of coursework, exams and practical assignments.

Coursework

Coursework might range from written tasks (essays, reports, reflective research) and assignments to the collation of portfolio of evidence based around a work placement or a set of laboratory tasks. Coursework differs from exams in that it will usually have a submission deadline within several weeks, and will be carried out independently.

Exam

Exams are formal, timed assessments, carried out in a controlled environment and overseen by one or more invigilators. They assess your grasp of the theory and underpinning knowledge related to your chosen career area. The opposite of practicals, they require you to present your practical understanding within an academic context. Some modules have no exams, but most modules incorporating elements of mathematical analysis will have an exam.

Practical

Practical assessments test your technical ability, and assess the level of application to real or contextualised tasks in your chosen career area. They can be timed or non-timed and involve observation of your practical skills and competencies, either in a work-based environment or a dedicated laboratory setting that closely resembles the workplace. Practical work-based assessments are supported and carried out by trained assessors. Practical assignments may include presentations or demonstrations of prototypes you have developed.

Programme Delivery: Work Based and Placement Learning

The programme has been designed to align carefully with the needs of industry.

Although an industry placement is not an integral part of the course, you are strongly encouraged to gain industry experience via summer internships, short courses in industry and industrial visits. We regularly invite guest speakers, employers and alumni at relevant points throughout your studies to integrate your academic and work-based experience.

Case studies from industry will be embedded within specific modules and will feature throughout the course, as will the development of those attitudes and behaviours expected of a professional engineer. Students who are in work placement or in employment with industry will be encouraged to contextualise their coursework to their engineering activities to strengthen their understanding of theory within a practical context.

Throughout your study with us you may be invited or encouraged to participate in field trips, activities and events or professional development opportunities, research events and webinars supported by the IET or the IMechE. These opportunities will help you to develop a well-rounded employability profile within engineering.

Programme Delivery: Graduate Skill Development

The BEng Aerospace programme offers you the opportunity to experience and develop a range of skills related to the discipline. These include accessing and evaluating information from a range of technical sources and communicating findings in a range of ways suitable to engineering. Modules are designed to develop your existing skills to enable you to become independent engineers and will provide the basis for a successful career in engineering, developed through industry and academic research and enquiry. Further skills in technical information analysis and application will be developed during the delivery of the programme content through lectures, guest speakers and research into engineering systems, sub-systems and approaches.

Level 4

- Collaborative work and leadership skills: delivered within the literacy, project and specialist modules. You will work in groups or pairs and will be expected to develop teamwork and leadership skills by successfully managing your time, resources and deliverables.
- Communication, information and digital literacies: delivered across most modules at this level with special attention paid to them in the Academic and Digital Literacy module. You will learn to find, process and analyse information, as well as communicate it effectively.
- Ethical, social and professional understanding: ethical and social topics will be discussed in engineering-specific modules where we will use examples that affect your local community and well as society at large. Analytical methods for engineers will help you take a different look at ethical and social issues and propose Engineering solutions.
- We will provide a foundation for your professional understanding throughout Level 4 study. You will experience a wide-range of general engineering curriculum modules with 6 core modules, including managing professional engineering projects, applied mathematics, engineering design and computer aided design. These modules are supported by group projects and laboratory work, and the development of literacy skills. This broader approach, allows you to sample engineering disciplines so you can switch to an alternative engineering discipline if you choose to do so at the end of this stage. It also ensures that you have a solid grounding in digital literacy, ethical considerations and develop an appetite for lifelong learning which you will carry through into subsequent years and hopefully further study.

Level 5

- Collaborative work and leadership skills: You will build on the skills acquired with Professional Engineering Management and Research Project modules which will enable you to improve the skills you developed at Level 4.
- Communication, information and digital literacies: You will put to practice what you learned at Level 4 in order to research, gather information and use it for your engineering projects.
- Ethical, social and professional understanding: You will develop these skills further with professional modules such as Aircraft Flight Control Systems and Aircraft Aerodynamics, as well as Aircraft Propulsion.
- Global citizenship: You will explore topics of importance for global development, sustainability within your future profession and other topics that you will need a global awareness for. These topics are integrated within each of the modules at Level 5.
- Enterprise and entrepreneurial awareness and capabilities: You may also be asked to consider how your future profession fits within an entrepreneurial mindset and how you can function as an independent professional. To develop these skills, modules such as Professional Engineering Management and the specific Aerospace Engineering modules will be useful to you.
- At Level 5, subject specialist modules will be introduced. Collaborative work will be an inherent part of the programme within your engineering project, allowing peer and self-assessment approaches to be introduced, developing essential communication, ethical awareness and management characteristics. You will continue to apply the principles studied at Level 4 and develop your knowledge and skills in more specialized areas such as aircraft aerodynamics, aircraft propulsion and aircraft flight control systems.

Level 6

- Research, scholarship and enquiry skills: You will develop those skills with the Major Project module which will play a significant part in making you an independent, self-sufficient engineer. Skills gained in communication and digital literacy will be extremely useful to you at this stage.
- Personal and intellectual autonomy: You will be expected to display a great deal of independent thinking and autonomy at Level 6, especially within modules such as Professional Engineering and the 3 specialist modules at this level which include Control and Simulation, Avionics and Advanced Engineering Techniques and Materials.
- A commitment to lifelong learning and career development: It is expected that you identify at this stage further development opportunities and have a vision for your professional career in Aerospace Engineering. You will be given support and ideas by our staff.
- During Level 6 of the programme, you will experience several modules in highly focused areas such as avionics, advanced engineering techniques and materials, systems integration and systems thinking. You will explore and critically analyse the engineering environment within the 'Professional Engineer' module. You will also undertake a major project based on a significant specific engineering project aligned to your interests that will shape and further define your specialized route into your chosen career.

There is a strong emphasis on employability and enhancement of graduate skills in all years of the programme. From Level 4 study onwards, personal development plans (PDP's) will be driven through a tutorial system and will focus on identifying the skills and attributes of graduate engineers as employees, with the formulation and setting of action plans to achieve them. Teaching, learning and assessment methods allow development of key transferable skills such as problem solving, ethics and globalization through communication and digital literacy. The production of assessment work in varied formats such as engineering reports, essays, oral presentations and discussions will contextualize the communication and cognitive requirements of modern employable engineers.

Study Costs: Equipment Requirements

At College, you will have access to all the necessary software and hardware, library and scholarly works that you will need to complete your assignments. However, it is a good idea to invest in a computer or laptop for your studies as well as in a scientific calculator.

Study Costs: Additional Costs

You may encounter some additional costs during your studies, which could include non-mandatory field trips. It is recommended to obtain a student membership with the IET (non-mandatory), which is £20.00 for a year and £50.00 for the duration of the entire course, and which will give you access to a number of events and opportunities for your continuous professional development.

Related Courses

BEng (Hons) Engineering (Electrical and Electronic Engineering)
BEng (Hons) Engineering (Mechanical Engineering)
BEng (Hons) Engineering (Robotics and Automation)
BEng (Hons) Engineering (Industrial Engineering)