

PROGRAMME SPECIFICATION

1. Key Information

Programme Title:	BEng (Hons) Engineering Design BEng (Hons) Engineering Design with Foundation Year BEng (Hons) Engineering Design with Placement Year
Awarding Institution:	Buckinghamshire New University
Teaching Institution(s):	Buckinghamshire New University
Subject Cluster:	3D Design
Award Title (including separate Pathway Award Titles where offered):	BEng (Hons) Engineering Design
FHEQ level of final award:	6
Other award titles available (exit qualifications):	Certificate of Higher Education Diploma of Higher Education BEng Engineering Design
Accreditation details:	<p>Institution of Engineering and Design (IED)</p> <p><i>To note; Almost half of the modules have already been accredited by the IED on the BEng (Hons) Engineering Design Part Time course. Accreditation for the remaining modules will be sought once the first cohort completes learning. Accreditation with IED will lead to Incorporated Engineering (IEng) status.</i></p> <p>The programme will also be seeking for Institution of Engineering and Technology (IET) and iMeche accreditation upon completion of first cohort and potentially be backdated by IET and iMeche (subject to approval/consent) up to five years.</p>
Length of programme:	3 years 4 Years with Foundation Year 4 years with Placement year
Mode(s) of Study:	Full Time
Mode of Delivery:	In person (on-site) delivery
Language of study:	English
QAA Subject Benchmark(s):	QAA Subject Benchmark Statement Engineering (March 2023)
Other external reference points (e.g., AHEP Standard):	
Course Code(s):	BEENGDFD – 3 Years Full Time

	BEENGDFY – 4 Years Full Time with Foundation Year BEENGDSW – 4 Years Full Time with Placement Year
UCAS Code(s):	
Approval date:	November 2023
Date of last update:	August 2024

2. Programme Summary

This programme will provide you with the ability to identify and engineer solutions to complex challenges through innovation and creativity. This programme will enable you to develop and advance your technical knowledge and skills to understand Engineering Design and how to apply it for your future career. You will study a broad range of Engineering disciplines including Computer Aided Design, Simulation, Thermodynamics, Thermofluids, Computational Fluid Dynamics, Sustainable Materials, Science and Advanced Mechanical Principles.

This programme has been designed to meet the current and future needs of industry and has been informed by employers. This means you will gain a valuable insight into current professional engineering practices particularly those practical technologies being used in the workplace. Laboratory sessions and a range of practical activities will also enable you to build upon previous learning, developing, embedding, and advancing your knowledge through lectures, tutorials, workshops, and team working.

Engineering is vitally important for the national economy with a high percentage of all employment in the United Kingdom being aligned to the Engineering and Manufacturing sectors. Demand for trained Engineers both regionally and nationally has never been so great. This programme will prepare you for an exciting career in these high demand sectors.

3. Programme Aims and Learning Outcomes

Programme Aims

This programme aims to:

1. Provide learners with a thorough understanding and knowledge of scientific and engineering principles, analysis, tools, and practices
2. Prepare learners with key knowledge, understanding and skills to employ modern design methodologies, quality management systems and tools to achieve optimum solutions to engineering designs and manufacturing problems
3. Produce graduates who are able to use a sound, evidence-based approach in applying innovative technologies, processes and systems and leadership skills
4. Develop graduates with critical understanding and leadership of professional ethics, social and cultural values in engineering and other business contexts in developing products and services recognising the impacts their decisions could have on the environment and society

Programme Learning Outcomes

Knowledge and Understanding (K)

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

ID	Learning Outcome
K1	Develop detailed and systematic skills, knowledge and understanding of a range of scientific and engineering principles, tools and processes used in solving engineering design and technological problems.
K2	Synthesise scientific knowledge and skills in formulating and analysing engineering design concepts and techniques whilst considering client, financial, environmental, quality, statutory and safety objectives.
K3	Execute knowledge through demonstrating effective planning, implementation, and presentation techniques in carrying out a major individual project.
K4	Demonstrate comprehension of the importance of linking academic knowledge and skills with industry, research and development.

Analysis and Criticality (C)

On successful completion of the programme you will be able to:

ID	Learning Outcome
C1	Evaluate appropriate techniques and methods for solving numerical and scientific problems.
C2	Examine business contexts with respect to strengths and weaknesses, opportunities and threats in order to develop methods to counteract or exploit such aspects in developing sustainable production design and manufacturing solutions.
C3	Critique a range of engineering software and manufacturing processes for the integration of design functions from concept to realisation.
C4	Analyse engineering materials and their processing methods for the design development and implementation of sustainable and practical solutions to engineering problems.
C5	Reflect on your own creativity in problem solving and your application of knowledge across discipline areas.

Application and Practice (P)

On successful completion of the programme you will be able to:

ID	Learning Outcome
P1	Employ efficiently advanced modelling, simulation, and analysis packages in engineering design.
P2	Design with a range of innovative technologies, such as electronic, electro-mechanical, mechatronics, Industry 4.0, instrumentation, control, robotics and automation techniques, in the process of product development and manufacturing.
P3	Implement engineering design projects both individually and in a group utilising a methodical and disciplined approach to satisfy client, financial, environmental, quality, statutory and safety requirements.
P4	Design engineering products and services considering their lifecycle, circular economy principles and sustainability considerations.

P5	Demonstrate efficiently using a range of tools and techniques, including digital approaches, to model, simulate and analyse complex products and assemblies to achieve optimum solutions.
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Transferable skills and other attributes (T)

On successful completion of the programme you will be able to:

ID	Learning Outcome
T1	Work effectively in collaboration with others, by identifying and working towards targets for personal, career, and academic development.
T2	Communicate effectively by oral, written, and visual means including highly specialised manual and computer-based methods for engineering product design and presentation.
T3	Use Electronic and mechanical computer-aided design (ECAD/MCAD) software effectively.
T4	Identify and work towards targets for personal, career, and academic development.
T5	Evaluate business customer and user requirements to apply advanced problem-solving skills in the development of creative systems engineering.

Graduate Attributes

The BNU Graduate Attributes of: Knowledge and its application; Creativity; Social and ethical awareness and responsibility; and Leadership and self-development focus on the development of innovative leaders in professional and creative capacities, who are equipped to operate in the 21st Century labour market and make a positive impact as global citizens.

Graduates will achieve comprehensive knowledge and understanding of engineering design (K1), who will be pragmatic, seek to achieve sustainable solutions (K4, C4, P4). They will be effective problem solvers, able to apply creative, critical, and evidence-based planning and thinking to conceive innovative responses to future challenges (P1) in engineering and convey ideas effectively (T2-T3) to a range of audiences for a variety of purposes (C1-C5). They will be risk, cost and value-conscious, ethical, social, cultural, environmental, health and safety aware (P3), and familiar with the nature of business and enterprise in the creation of economic and social value (K5, P4). They will have the ability to engage with dynamic traditions of thought (K2-K3), the ability to apply their knowledge in real-time practice across multi-disciplinary and multi-professional contexts (P3-P4) in designing engineering products and services. Graduates will appreciate the global dimensions of engineering, commerce, and communication, be able to formulate and operate within appropriate codes of conduct, professional in their outlook, capable of team working and effective communicators (T1-T5). Graduates will engage in professional, intellectual, and ethical behaviour, and have the potential to be entrepreneurial and take leadership roles (K4-K5), well prepared for living, learning, and working in a digital society (P2, T2-T3) within their chosen careers.

4. Entry Requirements

The University's [general entry requirements](#) will apply to admission to this programme with the following additions / exceptions:

- A typical offer will require a UCAS tariff score of between 100-128 points
- A minimum of two full A-levels, preferably in Mathematics and a Science based subject or 120 credits in an Engineering BTEC at level 3 (or equivalent) is required.
- Applications are welcomed from candidates without the formal qualifications outlined above providing 5+ years of relevant industry experience can be provided and discussed at interview.
- Every application is considered on an individual basis.
- Applicants will need to complete an interview and/or demonstrate a portfolio of work, further guidance is given on the interview and portfolio advice pages.
- Applicants with a HNC and/or a Foundation Degree in Engineering (or equivalent) may have the opportunity to join this programme at an advanced entry point in accordance with our [accreditation of prior learning](#) (APL) process.
- For further details of our international English entry requirements, please visit our international pages.

5. Programme Structure

BEng (Hons) Engineering Design

Level	Modules (Code, Title and Credits)	Exit Awards
Foundation Year	<p>Core modules: ENG0007 Foundation Mathematics ENG0008 Introduction to Engineering Design ENG0009 Introduction to Engineering Science ENG0010 Introduction to Engineering Materials and Structures ENG0011 Project: Engineering Design ENG0012 Engineering in Practice and Professional Development</p> <p>Option modules: No option modules are available at this level.</p> <p>Opportunity modules: No Opportunity modules are available at this level.</p>	<p>N/A. No credit is awarded at this Level.</p>
Level 4	<p>Core modules: CAD4076 Fundamentals of Electrical and Electronic Engineering (20) CAD4079 Science and Materials for Engineers (20) CAD4080 Mathematics for Engineers (20) CAD4083 Computer Aided Design and Simulation (20) CAD4086 Modelling and Analysis of Electromechanical Systems (20) CAD4087 Individual Engineering Project and Management (20)</p>	<p>Certificate of Higher Education, awarded on achievement of 120 credits at Level 4</p>

<p>Level 5</p>	<p>Core modules: CAD5113 Engineering Design, Materials and Processes (20) CAD5114 Strength of Materials and Mechanics (20) CAD5115 Engineering Design and Fabrication lab (20) CAD5116 Virtual engineering and mechanical simulations (20) CAD5039 Thermodynamics, heat engines and Thermofluids (20) CAD5099 Advanced Mechanical Principles, Dynamics and Control (20)</p>	<p>Diploma of Higher Education, awarded on achievement of 240 credits, including a minimum of 120 credits at Level 5</p>
<p>Placement year (optional)</p>	<p>ENG5036 Professional Practice (20)</p>	
<p>Level 6</p>	<p>Core modules: CAD6061 Leadership and Management (20) CAD6063 Emerging and Sustainable technologies for Engineers (20) CAD6066 Design for Manufacture (20) CAD6021 Research Project (40)</p> <p>Option modules: Choose one module to the total of 20 credits:</p> <p>CAD6052 Advanced Engineering Design and Fabrication (20) CAD6067 Advanced Manufacturing Technology and Automation (20)</p>	

Please note: Not all option modules will necessarily be offered in any one year. Other option modules may also be introduced at a later stage enabling the programme to respond to changes in the subject area. Also note that a maximum of 20 credits in a bachelor's degree programme can be compensated. Major projects/Dissertation (group and individual) must not be compensated.

6. Learning, Teaching and Assessment

Learning and teaching

Modules on this programme will be taught in line with the University's Teaching, Learning and Assessment strategy and the Programme Team will strive to ensure that all modules embrace contemporary industrial practice and practice-based, work integrated learning, wherever possible. Where appropriate authentic assessments will be drawn down from real-world examples and workplace simulations and used as part of the practice-based learning approach. A range of active teaching methods and authentic assessment strategies will be used to ensure that the learner is able to learn at their best ability and excel to exceed expectations. Typical learning, teaching and assessment methods will include the following but will not be exclusive to:

- Lectures to transfer the basic and complex theory of the topic
- Seminars will be used for smaller groups to discuss and analyse the subjects
- Tutorials used for one-to-one assistances
- Work based learning simulation skills learned will provide the practical application to the learning process through the practice-based learning modules
- Blackboard for e-learning and transfer of information
- Workshop, Groupwork and Practical sessions development of required skills
- Laboratories will be used for the testing and proving of theory
- Research and industrial visits: to provide depth and context to the learning

Digital technologies and industry standard software will be used in the relevant modules. ECAD and MCAD software including MATLAB Simulink, SolidWorks will be used along with practical and discrete components to model, simulate and evaluate information such as specifications, programme, cost, environment, sustainability, green skills, Net-Zero, health, and safety etc., in the teaching of relevant modules. This will foster deep learning enabling learners to see how the contents delivered in different modules are interrelated to provide holistic concepts of engineering technology, sustainable design, and integration of model-based engineering services and systems for effective design and operation of manufacturing technologies.

Discussions may be around elements of cutting-edge developments in the field/ industry 2030, with exposure for learners of technology in the workplace and what future technology may be available not only in the next 2-3 years but in the next 10-15 years.

The active teaching and authentic assessment strategies employed throughout the programme are those judged to be the most appropriate for each module at each stage and level of the programme with a strong emphasis on practice-based learning and simulated learning, building on prior learning to develop and advance knowledge and skills. They include the following strategies and techniques:

Lectures

This is the most formal teaching strategy used during the programme. It is used for the delivery of a body of theoretical information to a large group of learners, and this is most effective when followed by a seminar, tutorials, or group discussion. The lecture format may also be used to introduce a module or a project to the whole cohort, and in all cases, lectures will be supported by supplementary information in the form of handouts, or links to Blackboard or similar virtual learning environment (VLEs). This supplementary information will reinforce learning and expand upon the information conveyed through the lecture and may well include tutorial or

other exercises to be carried out in the learner's own time. On occasion, guest lecturers (GLs) and Associate Lecturers (ALs) will be used where specific areas of expertise are required, and to launch external competitions and industrial collaboration projects.

Seminars

These are seen as an essential teaching tool, and can vary from large group seminars, which provide formal debate, to impromptu discussion sessions with small groups, which may follow on from a lecture, demonstration, or video. Seminars will be promoted to encourage learners from a range of programmes within the faculty to attend, to allow cross fertilisation of ideas.

Critiques

All learners are required to present their work to the rest of the cohort and to the programme team on a regular basis. All learners, including those from other levels, are welcome to take part, but numbers are kept low, as this is less intimidating for those presenting. The onus is on the learner to take responsibility for presenting their work in the most appropriate manner. This is an extremely effective teaching strategy, encouraging learners to become increasingly articulate and confident in discussing their work as they enter critical debate. It also acts as a communication vehicle to allow dissemination of good practice between all the learners and the staff.

Tutorials

Group and individual tutorials are used throughout all levels of the programme. Each learner also has a personal tutor; someone who follows their progress but is also available to discuss other more personal problems that may occur, and where necessary refer them elsewhere for assistance, help and support. Learners may request a personal tutorial as and when necessary. For the final Level 6 project dissertation, learners are given a regular weekly timetabled tutorial. The role of the tutor is to provide advice, support, guidance and constructive feedback and feedforward on the learner's work as it develops.

Blackboard

Blackboard is the University's choice of computer software for our virtual learning environment (VLE). It supports online teaching and learning and can be accessed by registered learners and staff via the University's intranet system or by the Internet from any location. Blackboard has become a key learning support tool whereby staff and learners can communicate through text and images. Resources available within the `environment` include, programme information, module materials that can comprise of anything from lecture notes to video clips, discussion forums for communication between staff and learners, administrative information such as calendars, and the setting and marking of online assessment. Blackboard facilitates an inordinately flexible and remotely available teaching and learning world.

Workshop and Practical Sessions

Practical sessions will allow the acquisition of specific skills and techniques, and highlight the health and safety requirements of materials, equipment, and processes. Cohorts will be split into small group sizes to ensure that each learner has full access to each process. These will be expressed in their final project when they will have to demonstrate that they are able to coordinate their learning and use the knowledge learnt to apply to project management.

Laboratories

Lab sessions allow learners to practically apply the theoretical aspects of the programme, for example mathematical and physical science that has been introduced in more formal lectures, and therefore gain another perspective on the academic material. The more relaxed atmosphere of the lab environment allows and encourages learner experimentation, practice-based and work-related simulations.

Research/Industrial Visits / Study Tours

These may include visits to factories, service centres, galleries, exhibitions, museums, retail outlets and manufacturers, and are aimed at increasing the learners' awareness of the wider world and possibilities within their area of study. Learners will usually be offered two optional annual study tours, aimed at promoting an international perspective on design, an awareness of other cultural attitudes and creating relationships with other institutions through visits, guided tours, and collaborative projects.

Placement Year

The programme offers an optional placement year, providing an opportunity for students to complete a year-long industry placement. An academic from the school will act as a placement tutor, who will advise and support students on placements. The placement will be administered and monitored through a 20 credit year-long 'professional placement' module.

Assessment

A variety of authentic assessment methods are used as appropriate to each module and to meet all learning styles. The forms of assessment have been chosen to motivate you to achieve and to create positive learning opportunities. The assessments are predominantly coursework, which include:

- Written assignment
- Report (individual and group)
- Portfolio
- Computer-based tests
- Set exercises - worksheets, to be completed as required usually in the learner's own time
- Presentations (such as poster and oral, individual and group)
- Laboratory exercises and report
- Practical Skills assessment
- Proposal
- Dissertation
- Examination

Portfolio:

The Portfolio provides learners with the opportunity to explore and demonstrate work-based examples to design and create live products. Within engineering, a typical portfolio consists of problems and case studies for real-world applications. Learners will solve problems through analysis and application of theory, engineering laws/theorem and report their findings. For case studies, learners will use mathematical models, algorithms and scientific methods with a range of simulation and practical evidence using simulation, electromechanical, 3D design

and practical laboratories and comment on the results/outcomes. Commentary must evaluate the outcomes and recommend the further action(s) as appropriate. The length of portfolio for:

- Level 4: 15-20 pages with 1000 words commentary [for 100% weighting]
- Level 5: 18-25 pages with 1000 words commentary [for 100% weighting]
- Level 6: 25-35 pages with 1000 words commentary [for 100% weighting]

Project output:

Learner to interpret company specific, customer and stakeholder requirements into technical specifications. For example, customer requirements for a product are to ensure safety in all-electric vehicles while the learners use relevant technical terms such as response time of a protection circuit/system. The assessment will be designed to set up response time such as 2 seconds and learners have to simulate the system to achieve “repose time to 2 seconds prior to developing the live product/circuit”.

Formative verbal/written feedback and feedforward are shared on progress for project work, directed study activities, class exercises and progress on summative assessments will be provided using constructive verbal/written feedback during individual tutorials, group critiques or seminar sessions and peer feedback. Constructive formative feedback and feedforward opportunities will be provided to monitor and reflect on progress, identifying areas of achievement as well as focusing on objectives for future development.

Authentic assessment criteria reflect the progressively independent learning expected as learners progress through the programme. This supports the practical nature of the programme, supported by theoretical research and critical writing.

Contact Hours

You can expect to receive approximately 12 hours of scheduled learning activities per week. These may include lectures, seminars, workshops, practical sessions, or placement hours. A full breakdown of contact hours can be found in individual module descriptors.

7. Programme Regulations

Regulations for Taught Degree Programmes (2023)

The following exceptions will apply to all modules on this programme:

- The module pass mark will be 40% overall, but in accordance with Engineering Council regulations each assessment element must achieve a minimum threshold of 30% for the module to be passed.
- No more than 20 credits may be compensated across the programme. Where compensation is applied, the student may instead request reassessment.
- For the placement year option, the degree algorithm will instead be calculated on the best 100 credits out of 140 Level 5 credits. Other aspects will remain the same. The student will achieve an overall total of 380 credits.

8. Support for learners

The following systems are in place to support you to be successful with your studies:

- The appointment of a personal tutor to support you through your programme
- A programme handbook and induction at the beginning of your studies
- Library resources, include access to books, journals, and databases - many of which are available in electronic format – and support from trained library staff
- Access to Blackboard, our Virtual Learning Environment (VLE), which is accessible via PC, laptop, tablet, or mobile device
- Access to the MyBNU portal where you can access all University systems, information, and news, record your attendance at sessions, and access your personalised timetable
- Academic Registry staff providing general guidance on University regulations, exams, and other aspects of students and course administration
- Central student services, including teams supporting academic skills development, career success, student finance, accommodation, chaplaincy, disability, and counselling
- Support from the Bucks Students' Union, including the Students' Union Advice Centre which offers free and confidential advice on University processes.

9. Programme monitoring and review

BNU has a number of ways for monitoring and reviewing the quality of learning and teaching on your programme. You will be able to comment on the content of their programme via the following feedback mechanisms:

- Formal feedback questionnaires and anonymous module 'check-ins'
- Participation in external surveys
- Programme Committees, via appointed student representatives
- Informal feedback to your programme leader

Quality and standards on each programme are assured via the following mechanisms:

- An initial event to approve the programme for delivery
- An annual report submitted by the External Examiner following a process of external moderation of work submitted for assessment
- The Annual Monitoring process, which is overseen by the University's Education Committee
- Review by the relevant PSRB(s)
- Periodic Subject Review events held every five years
- Other sector compliance and review mechanisms

10. Internal and external reference points

Design and development of this programme has been informed by the following internal and external reference points:

- The Framework for Higher Education Qualifications (FHEQ)
- The QAA Subject Benchmark Statement – see detailed mapping below
- The BNU Qualifications and Credit Framework
- The BNU Grading Descriptors
- The University Strategy

Mapping of Subject Benchmark (e.g.: QAA2023) Statement Standard to Programme Learning Outcomes

Subject Benchmark Statement	Knowledge and understanding (K)					Analysis and Criticality (C)					Application and Practice (P)					Transferable skills and other attributes (T)				
	K1	K2	K3	K4	K5	C1	C2	C3	C4	C5	P1	P2	P3	P4	P5	T1	T2	T3	T4	T5
Engineering																				
Science, mathematics and engineering principles	x		x		x	x					x			x	x					
Engineering analysis, including use of computational tools and techniques			x		x				x		x	x		x	x		x	x		
design, creativity and innovation, including applying an integrated or systems approach			x			x			x				x						x	
Engineering and society, incorporating sustainability, ethics, risk, security and equity, diversity and inclusion	x		x			x		x	x				x							
Engineering practice, including teamwork, project management and use of practical equipment.		x	x		x	x	x	x	x				x		x					

Mapping of Programme Learning Outcomes to Modules

Programme Learning Outcome	Knowledge and understanding (K)					Analysis and Criticality (C)					Application and Practice (P)					Transferable skills and other attributes (T)				
	K1	K2	K3	K4	K5	C1	C2	C3	C4	C5	P1	P2	P3	P4	P5	T1	T2	T3	T4	T5
Level 4																				
Mathematics for Engineers			X			X								X				X		X
Science and Materials for Engineers	X	X				X	X			X	X		X			X		X		X
Fundamentals of Electrical and Electronics Engineering	X		X				X	X	X				X	X				X		X
Individual Engineering Project and Management	X		X		X	X			X					X		X		X		
Computer Aided Design and Simulation			X	X				X	X	X	X		X	X				X		
Modelling and Analysis of Electromechanical Systems	X				X	X				X	X					X		X		
Level 5																				
Engineering Design, Materials and Processes			X					X			X		X			X	X		X	X
Strength of Materials and Mechanics	X			X	X	X			X	X	X	X						X	X	

Programme Learning Outcome	Knowledge and understanding (K)					Analysis and Criticality (C)					Application and Practice (P)					Transferable skills and other attributes (T)				
	K1	K2	K3	K4	K5	C1	C2	C3	C4	C5	P1	P2	P3	P4	P5	T1	T2	T3	T4	T5
Advanced Mechanical Principles, Dynamics and Control		X	X	X	X		X				X	X						X	X	
Engineering Design and Fabrication Lab	X	X	X		X	X	X	X		X	X		X				X	X		X
Thermodynamics, Heat Engines and Thermofluids	X	X	X		X		X		X		X	X				X		X		
Virtual Engineering and Mechanical Simulation	X		X	X	X	X	X				X		X	X			X	X		
Level 6																				
Leadership and Management				X			X	X	X			X	X					X	X	
Design for Manufacturing			X		X			X	X	X	X	X						X		X
Research Project	X	X	X	X	X	X	X	X	X	X	X	X	X			X	X			
Emerging and Sustainable Technologies for Engineers	X	X	X	X	X	X	X	X	X	X	X	X		X				X		
Advanced Manufacturing Technology and Automation	X	X	X	X	X	X	X	X	X	X	X			X				X		
Advanced Engineering Design and Fabrication	X	X	X	X	X	X	X	X	X	X	X			X				X		