

Course Specification

A. Course Information				
Final award title(s)	Product Design and Development Engineer (Degree Apprenticeship)			
Intermediate exit award title(s)	none			
UCAS Code	TBA	Course Code(s)	5759	
	London South Bank University			
School	<input type="checkbox"/> ASC <input type="checkbox"/> ACI <input type="checkbox"/> BEA <input type="checkbox"/> BUS <input checked="" type="checkbox"/> ENG <input type="checkbox"/> HSC <input type="checkbox"/> LSS			
Division	Mechanical Engineering and Design			
Course Director	Robin Jones			
Delivery site(s) for course(s)	<input checked="" type="checkbox"/> Southwark <input type="checkbox"/> Havering <input type="checkbox"/> Other: <i>please specify</i>			
Mode(s) of delivery	<input type="checkbox"/> Full time <input checked="" type="checkbox"/> Part time <input type="checkbox"/> other please specify			
Length of course/start and finish dates	Mode	Length years	Start - month	Finish - month
	Full time	N/A		
	Full time with placement	N/A		
	Part time	4 academic years + up to 12 months to complete End Point Assessment (EPA)	September	June
	Part time with Placement	N/A		
Is this course generally suitable for students on a Tier 4 visa?	No			
Approval dates:	Course validation date	March 2021		

	'parent' degree course specification last updated and signed off	March 2020
Professional, Statutory & Regulatory Body accreditation	Apprenticeship will be submitted to the Institute of Engineering Designers for accreditation to Incorporated Engineer (IEng) and Chartered Technological Product Designer (CTPD)	
Reference points:	Internal	Corporate Strategy 2020-2025 Academic Quality and Enhancement Manual School Strategy LSBU Academic Regulations
	External	<ul style="list-style-type: none"> • Apprenticeship Standard (ST0027) • QAA Quality Code for Higher Education 2018 • Framework for Higher Education Qualifications • QAA Subject Benchmark Statement for Art and Design • UK Standard for Professional Engineering Competence: Chartered Engineer and Incorporated Engineer Standard • SEEC Level Descriptors 2021
B. Course Aims and Features		
Distinctive features of course	<p>Our apprentices will blend creative thinking, scientific analysis and insight to create workable and functional product solutions. They will be able to identify consumer needs and design products that meet technical, functional, aesthetic and economic criteria. Academic modules cover the complete design cycle from conceptual design through to engineering science, analysis and optimisation, product development, prototyping, presentation and design for manufacture. All work produced during the degree will go towards a portfolio hosted on ePortfolio that will be used to evidence against the apprenticeship skills, knowledge and behaviours to satisfy the needs for EPA.</p> <p>The final year of the degree course revolves around the delivery of a company sponsored major design project. Students are required to design, develop, prototype and manufacture a product to their sponsoring company's specifications. They will choose the appropriate manufacturing techniques and materials to make and test a working prototype of their product. The result will be showcased at the University's annual design show – Product of South Bank. Post degree completion apprentices will have one further year in which they will undergo preparation for their End Point Assessment with EAL</p>	
Course Aims	<p>There is a fundamental need for appropriate, good quality design if a product is to be successful, and to perform according to its specification, and so there is a continued demand for Product Design and Development Engineering Apprentices who can produce desirable and functional products. This requirement exists for both consumer products and capital products markets, where designers are employed directly or through consultancies. This course is thus intended for companies who wish to train employees to become Product Designers / Engineering Designers. This apprenticeship will develop the appropriate skills, knowledge and competencies required to meet industry's needs and challenges.</p> <p>The general educational aims of this course are to develop students' intellectual and creative abilities, enabling them to enlarge their view of the</p>	

study programme in a broad context beyond the limits of the subject and departmental perspectives. Critical self-awareness and confidence to make judgements will also be developed throughout the course. Graduating Apprentices will be equipped with an understanding of engineering, design, materials, product functions and manufacturing; together with highly developed creative abilities and communication skills. They will be able to make decisions, respond to market demand and successfully manage design activities.

The design of durable consumer products, and all associated issues, form the core of the course. This includes the study of the design process, technology, materials and manufacturing processes, aesthetics, ergonomics, inclusive design and sustainability (environmental, social and economic concerns). As well as a traditional approach to drawing and problem-solving processes, students have access to a wide variety of computer courses and systems. They are expected to develop working prototypes as well as appearance models.

Because Design & Development is a synthesis of art and engineering, the course includes study of both design and technology. A large part of the learning is experiential i.e. 'by doing'. This is supported by more formal lectures, seminars and tutorials. Discussion and debate are important parts of the course and help to develop students' ability to analyse, criticise and assess their own and others' work as part of the design process. As well as facilitating the development of technical expertise and general design knowledge, students' aesthetic sensibilities are refined throughout the course, which also develops their individuality through practice and the recognition of conceptual and practical boundaries.

Graduate apprentices will have the following knowledge, skills, abilities and characteristics:

1. Commitment and ability to follow a career in Product Design & Development Engineering, allowing progression to Incorporated Engineer professional status.
2. Awareness of best current practice within industry, and future trends.
3. Industry-critical skills, including working effectively as part of a team and/or providing leadership for the team.
4. Effective communications skills, enabling the exchange of ideas with specialist professionals and with the public at large.
5. Continual Professional Development (CPD) skills, including critical self-awareness, reflection, independent judgement, responsibility for decisions, original thinking, managing own learning, and making use of scholarly reviews and primary sources.
6. Systematic and broad knowledge of key topics within Engineering Design together with the skills needed to update, extend and deepen, in further study and future career development.
7. Understanding of a cognitive map of topics within the Design subject area, incorporating design methods, creativity, materials, aesthetics, modelling and visualisation, model making and prototyping, ergonomics, and sustainability.
8. Understanding of a cognitive map of topics within the Engineering subject area incorporating well developed skills in Mechanics of Solids and Manufacturing and Materials, and familiarity with other core Engineering topics, like Dynamics and Thermofluids. All of this is underpinned by understanding of relevant science and engineering

	<p>topics such as Mathematics, Electrical and Electronic Engineering, Computing and Control Systems.</p> <ol style="list-style-type: none"> 9. Ability to analyse Mechanical Engineering components and systems from first principles, through to advanced simulation techniques; combined with an understanding of the advantages and disadvantages of different analysis approaches, and be able to select an appropriate method. 10. Competent practical skills including drawing and sketching, prototyping and model making, manufacturing techniques, 2D graphical communications and 2D and 3D digital (CAD) modelling. 11. Awareness of advanced manufacturing techniques, to inform design choices and to design products for cost-effective manufacture. 12. Ability to set up projects and manage them, approach design problems with creativity, and see all tasks to successful completion underpinned by an understanding of innovation and enterprise.
<p>Course Learning Outcomes</p>	<p>a) Graduates must be able to demonstrate their knowledge, and they must have an appreciation of the wider multidisciplinary engineering context and its underlying principles. They must appreciate the social, environmental, ethical, economic and commercial considerations affecting the exercise of their engineering judgement.</p> <p>Students will have knowledge and understanding of:</p> <p><i>Underpinning Science and Mathematics</i></p> <p>A1 – the scientific principles underpinning relevant materials and manufacturing technologies, to enable the modelling of routine engineering systems, processes and products, and collect and interpret data and draw conclusions in the solution of practical engineering design problems. <i>(US1i)</i></p> <p>A2 – the mathematics necessary to support the application of key engineering design principles. <i>(US2i)</i></p> <p>A3 – non-engineering disciplines in engineering design. <i>(US3i)</i></p> <p>A4 – the functionality of common ICT tools and appropriate computer-based engineering design tools to solve problems. <i>(US4i)</i></p> <p><i>Design</i></p> <p>A5 – business, customer and user needs, including considerations such as the wider engineering context, public perception, aesthetics and ergonomics, and how these are synthesised in a Product Design Specification (PDS). <i>(D2i)</i></p> <p><i>Economic, Legal, Social, Ethical and Environmental Contexts</i></p> <p>A6 – the commercial, economic and social context of engineering processes. <i>(S1)</i></p> <p>A7 – management techniques that may be used to achieve engineering design objectives including finance, law, marketing, personnel and quality. <i>(S2)</i></p> <p>A8 – the requirement of engineering activities to promote sustainable development. <i>(S3i)</i></p> <p>A9 – relevant legal requirements governing engineering activities, including personnel, health and safety, contracts, intellectual property rights, product safety and liability issues. <i>(S4)</i></p> <p>A10 – risk issues, including health and safety, environmental and commercial risk.</p> <p><i>Engineering Practice</i></p>

A11 – contexts in which engineering design knowledge can be applied to solve engineering problems. (P3i)

A12 – standard engineering workshop and laboratory practice. (P2i)

A13 – specific engineering design codes of practice and industry standards, with some knowledge of design factors and requirements for safe operation. (P6i)

A14 – quality issues in engineering design. (P7i)

- b) Graduates must be able to demonstrate creative and innovative ability in the synthesis of solutions and in formulating designs. They must be able to apply appropriate quantitative science and engineering tools to the analysis of problems. They must be able to comprehend the broad picture and thus work with an appropriate level of detail.

Students will develop their intellectual skills such that they are able to:

Engineering Analysis

B1 – monitor, interpret and apply the results of analysis and modelling in order to bring about continuous improvement. (E1i)

B2 - use the results of analysis to solve engineering design problems, apply technology and implement engineering processes. (E2i)

B3 – apply quantitative methods and computer software relevant to engineering design technology, within a multidisciplinary approach. (E3i)

B4 – apply a systems approach to engineering design problems through knowledge of the application of relevant technologies. (E4i)

Design

B5 – define engineering problems, identifying any constraints including environmental and sustainability limitations; ethical, health, safety, security and risk issues; intellectual property; codes of practice and standards. (D1i)

B6 – work with information that may be incomplete or uncertain, and be aware that this may affect the engineering design.

B7 – apply problem-solving skills, technical knowledge and understanding to create or adapt engineering design solutions that are fit for purpose, including operation and maintenance. (D4i, D5i)

B8 - manage the engineering design process, including cost drivers, and present report containing analysis, evaluation and discussion of the results/outcomes.

B9 - use engineering design processes, methodologies and tools to adapt engineering design to meet new purposes or applications. (D6i)

B10 – generate ideas to solve problems and design new products, systems, components or processes, synthesising from those already in existence.

Engineering Practice

B11 – use and apply information from a range of technical literature. (P4i)

- c) Graduates must possess practical design and engineering skills acquired through, for example, work carried out in laboratories and workshops; in industry through supervised work experience; in individual and group project work; and in the development and use of computer software in design, analysis and control. Evidence of group working and of participation in a major project is expected.

Students will acquire and develop practical skills such that they are able to:

Design

C1 – communicate their work to technical and non-technical audiences using visualisations such as physical prototypes or models; renderings of a product, system, component or process.

Engineering Practice

C2 – understand and use relevant materials, equipment, tools, processes and products (*P1i*)

C3 – work with intellectual property rights (IPR) including patent search and principles of copyright and design registration. (*P5i*)

- d) Graduates must have developed transferable skills that will be of value in a wide range of situations. These include problem solving, communication and working with others, as well as the effective use of general IT facilities and information retrieval skills. They also include planning self-learning and improving performance, as the foundations for lifelong learning / CPD.

In addition, the following advanced outcomes should be expected of IEng Degree graduates:

- the ability to develop, monitor and update a plan, to reflect a changing operating environment;
- the ability to monitor and adjust a personal programme of work on an ongoing basis, and to learn independently;
- the ability to exercise initiative and personal responsibility, which may be as a team member or leader, and;
- the ability to learn new theories, concepts, methods etc and apply these in unfamiliar situations.

Students will acquire and develop transferrable skills such that they are able to:

Economic, Legal, Social, Ethical and Environmental Contexts

D1 – understand the need for, and application of, a high level of professional conduct and ethical responsibility, including a knowledge of professional codes of conduct, and the global and social context of engineering design.

Engineering Practice

D2 – work with technical uncertainty, limited or contradictory information, being able to make value judgments in the solution of engineering design problems (*P10i*)

D3 – understand the principles of managing engineering design projects, and be able to work in a team (*P8i*)

General Skills

D4 – apply their skills in problems solving, communication; information retrieval; working with others; writing, structuring and presenting technical reports and specifications; and the effective use of general IT facilities.

D5 – plan self-learning and improve performance, as the foundation for lifelong learning / CPD.

D6 – plan and carry out a personal programme of work.

D7 – exercise personal responsibility, which may be as a team member.

C. Teaching and Learning Strategy

Teaching and learning takes place through design studio practice, lectures, seminars, group and individual tutorials. Student learning is experiential, through design and other project work in the design teaching rooms, workshops and computing laboratories. Students enhance their critical, analytical and visual and oral communication skills through group discussions, group critiques and written assignments. All skills, knowledge and behaviour requirements for the apprenticeship are met within the academic modules (See Appendix E) but will be put to practice and honed within the professional environment.

Knowledge and Understanding

Knowledge and understanding in mathematics and engineering is taught through two level four modules and two level five modules. Teaching is combined with the university's Mechanical Engineering degree for two modules at level 5. This ensures an appropriate level of rigour in engineering analysis. Final year modules include project-based teaching in CFD and FEA. The second year module Machine Drives and Mechatronics covers electronics and control theory.

The common design modules at levels 4 and 5, Design Methods, Design Thinking and Applications, and Design Contexts and Communications introduce students to a wide range of non-engineering disciplines through the design issues addressed in project briefs. The final Engineering Product Design Project, which requiring analytical content to underpin the design work, also requires students to synthesise a coherent product that is appropriate to a specific application, often involving research and knowledge of other disciplines. CAD is taught throughout level 4, and visual communications teaching is embedded throughout the course, in particular as the Visual Communications module at level 4.

Intellectual Skills

The teaching of intellectual skills of engineering and maths is intertwined with the teaching of knowledge and understanding. Modules include the development and use of mathematical models for components and systems for analysis and synthesis, performance evaluation, and understanding practical operation. Standard analytical methods for representation and analysis of systems and components are also studied, for example, Finite Element Analysis, and Computational Fluid Dynamics. Students use industry standard software at Levels 4, 5, and 6 to produce designs and to evaluate scenarios (Level 4) and subsequently for quantitative analysis of performance in the CAD 2 (Level 5) module and the Level 6 Portfolio Engineering Projects module. The 60 credit Level 6 Engineering Product Design Project modules require acquisition of quantitative analysis and software skills to complete and demonstrate understanding of the work undertaken.

A central feature of the teaching on this course is through project-based design briefs. As students progress through L5 (eg Design Thinking and Applications) and L6 (eg Portfolio Engineering Projects) these become more open-ended, requiring students to conduct further investigation to define the problem and demonstrate an awareness of the effects of any uncertainties.

Practical Skills

Students use design projects as a vehicle to cover design methodology, physical prototyping, workshop skills, and an introduction to materials and manufacturing technology. Computer-based workshops include practical investigations, design exercises and CAD simulations to develop more advanced skills.

Transferable skills

The course is largely centred around design project-based coursework, in which a broad range of transferable skills – in particular relating to teamwork, leadership, project management and communication - are required. The L5 module Design Contexts and Communications prepares students for work placements and introduces issues of ethical responsibility, professional codes of conduct, and the global context of their industry. This understanding is developed at L6 through the Innovation and Enterprise module.

Subject-related and Generic Resources:

These include the Perry Library, the metalwork and woodwork workshops, the rapid prototyping laboratories, the thermodynamics laboratory, the solid mechanics laboratory, the advanced vehicle engine test laboratory, and computer labs. All labs and workshops will require completion of relevant health and safety tasks as well as risk assessments. Apprentices will be guided through all these requirements.

The core and optional reading lists are supplied at the end of each module guide produced by the module leader. A copy of the module guide will be made available on the Virtual Learning Environment, VLE (Moodle) as well as MS Teams and the reading lists can also be accessed through LSBU's Library website.

Overview of learning support:

To support students in their learning, academic and support staff are available during the normal operating hours of the University via prior appointment. Academic staff also operate surgery hours where no prior appointments are needed. The University buildings and library are usually open from 8am to 9pm during term time, while the library operates for an extended period during examinations. Some specialist workshops/computing spaces etc. are not accessible outside the normal operating hours of 9am to 5pm, unless timetabled for use in a module.

The LSBU Skills for Learning Centre offers students a range of interactive workshops, one-to-one tutorials and drop-in sessions delivered by experienced learning developers. It also offers Language support for international students. Students who struggle to understand some of the basics, or feel they need additional support in understanding fundamentals of mathematics, are advised to use the drop-in sessions where they can provide comprehensive advice and guidance.

In addition, The School of Engineering also run drop-in sessions for students requiring assistance with any math related struggles the apprentices may have.

Teaching Staff:

Most modules are delivered by full-time academic staff from within the parent division where the course resides and or sometimes by staff from other areas within the School of Engineering or University where expertise lies. The primary aim is that each module is taught by a single member of staff, which most likely is the module leader (support teaching may be needed depending on the nature/size of the module etc. where students are sub-grouped into multiple tutorials or laboratory sessions). Occasionally, PG students or part-time teaching or research staff may support certain sessions, and, in such cases, the relevant tutors are trained, and care is taken to ensure the quality of the provision.

Virtual Learning Environment (VLE):

Each course has a course site on the VLE, where relevant information is posted by the respective Course Director. Each module on the course has a module site on the VLE and all relevant teaching and learning material such as module guides, lecture notes, teaching slides, tutorial and seminar sheets, workshop exercises, past exam papers, assignments, supplement material etc. are made available by the module leader. The VLE can be accessed using the Windows OS login credentials and can be accessed from any Internet connected PC inside or outside of the LSBU campus.

D. Assessment**Assessment Overview:**

The assessment of the apprenticeship degree is twofold; there is an expectation of 20% off the job training that will be assessed via an ePortfolio. This will form part of the evidence needed to complete the end point assessment with EAL (the assessing body). The ePortfolio will be kept up to date

throughout the term of the apprenticeship and will map attainment against the various required skills, knowledge, and behaviours. After the completion of the academic course there will be a period of up to one year in which the apprentice is expected to complete their end point assessment. The academic assessment requirements are outlined in the paragraphs below.

Coursework in modules can be either formative or summative and the details are usually made available in the module guide and explained to students by the module leader at the beginning of the semester. The module guide will also provide details about the weightage of these assessment components and when the relevant brief will be made available, including submission instructions and deadlines.

Formative assessment and feedback is part of the learning process on the course that provides constructive feedback to the learner. This allows students to improve their quality of work. It does not contribute towards a final module grade. All modules will provide students opportunities to receive formative assessment and feedback. Formative assessment typically includes discussions in the classroom, during tutorial exercises, simulation exercises, workshop or computing exercises, questions and answer sessions, peer discussions, observations, reflection on learning, presentation rehearsals.

Each module is summatively assessed by the process that is deemed most appropriate to the subject matter. In many engineering subjects, this may mean that there is a combination of coursework and examination, whilst in design and business-based modules assessment is by 100% coursework. When and where appropriate, assessment is undertaken as group presentations and critiques. During and after critiques, students benefit from oral and written feedback. As and when appropriate, assignments are submitted to the School Office or digitally through the VLE and are assessed by academic staff who provide written feedback and tutorial advice.

Knowledge and understanding is assessed formatively through tutorials and practice tests, and summatively through exams in Engineering Mathematics (IEng), Introduction to Mechanical and Electronic Engineering, Solid Mechanics and FEA, and Machine Drives and Mechatronics. This knowledge and understanding is also assessed indirectly across the project-based modules, where students are expected to incorporate engineering understanding into their project solutions.

Similarly, engineering analysis skills, and the application of the knowledge base, are assessed formatively in tutorials and practice tests, and summatively through exams as above. Modules at levels 5 and 6 see progressively more design based and systems analysis questions in examinations, and through coursework projects in project-based modules. Level 6 modules in Portfolio Engineering Projects, and Engineering Product Design Project offer the best chance for students to demonstrate their ability to apply a systems approach to solving engineering problems. At levels 5 and 6, students have to analyse systems in laboratory workshops and assignments as part of their summative assessment (for example in Machine Drives and Mechatronics).

Design is generally assessed through submission of coursework, the nature of which is dependent on the particular brief. This includes design sketch work and development portfolios or log books, mockups, ergonomic rigs, proof-of-principle prototypes, aesthetic (physical) models, CAD models and renderings, digital simulations, 2D presentation graphics, video or animations, and oral presentations either individually or in groups. Some more technical elements such as product specifications, project management etc are assessed through written reports.

Typically each design project is assessed through a rubric grading structure, with a checklist of marking criteria, against each of which a grade is assigned for each student. Due to the occasionally subjective or non-quantifiable nature of design, all work is marked by at least two assessors, from which a final grade is averaged.

Students are encouraged to make design assumptions in order to demonstrate their understanding of the importance of requirements specification. They are required to submit a PDS document as a

component of the Design and Manufacture Project (L5) and the Engineering Product Design Project (L6), and to justify the claims made within the document.

Communication within engineering and design (B8, C1, D4) is also assessed via engineering reports and presentations in addition to development portfolios, prototypes etc. Some modules specifically employ practical simulation exercises as a major part of the assessment.

Students ability to put their work into its economic, legal, social, ethical and environmental context are assessed through project-based coursework assignments. For example, in Design Contexts and Communications (L5), students conduct a life cycle assessment exercise on a commercial packaging design, and propose design improvements based on the results. At Level 6, consideration of sustainability issues are explicit in the project marking criteria. Evidence is presented through project log books and development portfolios, and summarized in a project report.

Engineering practice is assessed in situ throughout the course, by observation of laboratory and workshop practice, and submission of standard logbooks and reports based on student activity. The skills of engineering practice are formally assessed at Level 4 through simple 'design and make' exercises. Further development of these skills is indirectly assessed through design assignments in specialist modules at Levels 5 and 6. Additionally these are assessed in the Level 6 individual and group projects, both of which include assessment by presentation and viva-voce examinations. A risk assessment is submitted as an assessed component of the Engineering Product Design Project.

The Engineering Product Design Project at Level 6 is assessed by a variety of means, including the public display of work in the annual degree show: Product of South Bank

E. Academic Regulations

The University's Academic Regulations apply for this course.

School specific protocols apply, including compliance with our professional body's (iED) requirements.

F. Entry Requirements

Candidates will be employed by a company operating in relevant fields of engineering or technology or design and be nominated by that company to undertake a PDDE Apprenticeship.

Candidates must have the following entry requirements:

- 5 GCSEs A-C (including Maths and English) or equivalent.

PLUS

- A Level BBB (must include Maths), **or**;
- BTEC National Diploma DDM **or**;
- Access to HE qualifications with 24 Distinctions and 21 Merits (must include a minimum of 3 Merits in Design Technology, Maths and Physics) **or**;
- Entry level 3 qualifications worth 122 UCAS points (must include Maths or Physics)

Candidates are normally interviewed by LSBU before being offered a place and are asked to bring along evidence of their design thinking, this can take the form of a selection of imagery (portfolio) that showcases these skills. There is no such thing as a 'standard' portfolio. In short, we would like to see exciting example sheets of design or other creative work, which collectively illustrate a breadth of skills. This might include (in no particular order):

- Problem-solving
- 2D sketch work
- Creative thinking (mind maps, spider diagrams)
- Colour treatments
- Photography
- 3D collages
- 3D sculpture
- 2D and 3D prototyping/model making
- CAD or other digital work
- Presentation drawings/boards

Accredited Prior Experiential Learning (APEL)

APEL may be considered in determining the entry requirements for candidates with relevant academic qualifications and/or work experience but cannot replace the requirement for formal qualifications in Mathematics.

Direct Entry

Applicants may be considered for advanced entry. Applicants will be interviewed and will be required to have formal prior qualifications to demonstrate preparedness for direct entry.

G. Course structure

Course overview

Level 4

Design methods	40 credits
Visual communications	20 credits
CAD 1	20 credits
Introduction to mechanical and electronic engineering	20 credits
Mathematics (IEng Stream)	20 credits

Level 5

Design thinking and applications	20 credits
Design contexts and communications	20 credits
CAD 2	20 credits
Machine Drives and Mechatronics	20 credits
Solid Mechanics and FEA	20 credits
Design and manufacture project	20 credits

Level 6

Research methods for design projects	20 credits
Portfolio engineering projects	20 credits
Innovation and Enterprise	20 credits
Engineering Product Design project	60 credits

Placements

Apprentices will be working at their sponsoring companies so WILL NOT take a placement year.

H. Course Modules

Module Code	Module Title	Level	Semester	Credit value	Assessment
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MED_4_MAT	Mathematics	4	1+2	20	100% Exam
MED_4_IME	Introduction to Mechanical and Electrical Engineering	4	1+2	20	100% Coursework
MED_4_DME	Design Methods	4	1+2	40	100% Coursework
MED_4_VCO	Visual Communications	4	1+2	20	100% Coursework
MED_4_CA1	CAD 1	4	1+2	20	100% Coursework
MED_5_SMF	Solid Mechanics and FEA	5	1	20	70% Exam, 30% Coursework
MED_5_MDM	Machine Drives and Mechatronics	5	2	20	70% Exam, 30% Coursework
MED_5_DTA	Design Thinking and Applications	5	1	20	100% Coursework
MED_5_DCC	Design Contexts and Communications	5	1+2	20	100% Coursework
MED_5_CA2	CAD 2	5	1+2	20	100% Coursework
MED_5_DMP	Design and Manufacture Project	5	2	20	100% Coursework
MED_6_IAE	Innovation and Enterprise	6	1	20	100% Coursework
MED_6_PEP	Portfolio Engineering Projects	6	1	20	100% Coursework
MED_6_RMD	Research Methods for Design Projects	6	1	20	100% Coursework
MED_6_EPD	Engineering Product Design Project	6	1	60	100% Coursework

I. Timetable information

Apprentices will have timetabled classes & tutorials on one day per week during term time.

Apprentices will be briefed about projects in advance of their contact days and will use the VLE and have tutorial support on their day at University to complete the tasks.

J. Costs and financial support

Course related costs

- **books or other learning materials:** Circa £150 per annum (*all required texts are available from the university library, but many students find it useful to own a copy of some core material*).
- **specialist equipment:** Circa £150 per annum (*for example, sketching equipment and student license for Adobe software*)
- **field trips:** Circa £100 per annum (*usually travel cost/ entry for London based field trips*)

Tuition fees/financial support/accommodation and living costs

- Information on tuition fees/financial support can be found by clicking on the following link - <https://www.lsbu.ac.uk/courses/undergraduate/fees-and-funding#apprentices>

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Appendix A: Curriculum Map

For clarity the Curriculum Maps for both IEng requirements RProdDes requirements are supplied in a separate document: **03b PDDE curriculum map and learning outcomes**.

These maps provides a design aid to help course teams identify where course outcomes are being developed, taught and assessed within the course. It also provides a checklist for quality assurance purposes and may be used in validation, accreditation and external examining processes. Making the learning outcomes explicit will also help students to monitor their own learning and development as the course progresses.

Appendix B: Embedding the Educational Framework for Undergraduate Courses

The Educational Framework at London South Bank University is a set of principles for curriculum design and the wider student experience that articulate our commitment to the highest standards of academic knowledge and understanding applied to the challenges of the wider world.

The Educational Framework reflects our status as University of the Year for Graduate Employment awarded by *The Times and The Sunday Times Good University Guide 2018* and builds on our 125 year history as a civic university committed to fostering social mobility through employability and enterprise, enabling our students to translate academic achievement into career success.

There are four key characteristics of LSBU's distinctive approach to the undergraduate curriculum and student experience:

- Develop students' professional and vocational skills through application in industry-standard facilities
- Develop our students' graduate attributes, self-awareness and behaviours aligned to our EPIIC values
- Integrate opportunities for students to develop their confidence, skills and networks into the curriculum
- Foster close relationships with employers, industry, and Professional, Statutory and Regulatory Bodies that underpin our provision (including the opportunity for placements, internships and professional opportunities)

The dimensions of the Educational Framework for curriculum design are:

- **informed by employer and industry** needs as well as professional, statutory and regulatory body requirements
- **embedded learning development** for all students to scaffold their learning through the curriculum taking into account the specific writing and thinking requirements of the discipline/profession
- **high impact pedagogies** that enable the development of student professional and vocational learning through application in industry-standard or authentic workplace contexts
- **inclusive teaching, learning and assessment** that enables all students to access and engage the course
- **assessment for learning** that provides timely and formative feedback

All courses should be designed to support these five dimensions of the Educational Framework. Successful embedding of the Educational Framework requires a systematic approach to course design and delivery that conceptualises the student experience of the curriculum as a whole rather than at modular level and promotes the progressive development of understanding over the entire course. It also builds on a well-established evidence base across the sector for the pedagogic and assessment experiences that contribute to high quality learning.

This appendix to the course specification document enables course teams to evidence how their courses meet minimum expectations, at what level where appropriate, as the basis for embedding the Educational Framework in all undergraduate provision at LSBU.

Dimension of the Educational Framework	Minimum expectations and rationale	How this is achieved in the course
Curricula informed by employer and industry need	<p><u>Outcomes focus and professional/employer links</u></p> <p>All LSBU courses will evidence the involvement of external stakeholders in the curriculum design process as well as plan for the participation of employers and/or alumni through guest lectures or Q&A sessions, employer panels, employer-generated case studies or other input of expertise into the delivery of the course provide students with access to current workplace examples and role models. Students should have access to employers and/or alumni in at least one module at level 4.</p>	<p>Students are introduced to external stakeholders and potential employers in modules at all levels (e.g. L4 Introduction to Mechanical and Electrical Engineering coursework; L5 Design and Manufacture Project; L6 Portfolio Engineering Projects all have an external brief and engagement with external stakeholders). We regularly invite visiting speakers. Field trips (e.g. to the Design Museum) also give students an external focus for their work.</p>
Embedded learning development	<p><u>Support for transition and academic preparedness</u></p> <p>At least two modules at level 4 should include embedded learning development in the curriculum to support student understanding of, and familiarity with, disciplinary ways of thinking and practising (e.g. analytical thinking, academic writing, critical reading, reflection). Where possible, learning development will be normally integrated into content modules rather than as standalone modules. Other level 4 modules should reference and reinforce the learning development to aid in the transfer of learning.</p>	<p>In L4 Design Methods, students are taught design thinking within the context of their transition to higher education.</p> <p>In L4 Introduction to Mechanical and Electrical Engineering, students are taught about the structure of engineering analyses.</p> <p>Other modules at L4 and beyond develop this support, and include support in e.g. critical reading and reflection.</p>

<p>High impact pedagogies</p>	<p><u>Group-based learning experiences</u> The capacity to work effectively in teams enhances learning through working with peers and develops student outcomes, including communication, networking and respect for diversity of perspectives relevant to professionalism and inclusivity. At least one module at level 4 should include an opportunity for group working. Group-based learning can also be linked to assessment at level 4 if appropriate. Consideration should be given to how students are allocated to groups to foster experience of diverse perspectives and values.</p>	<p>Students work in groups regularly throughout the course, including in the L4 modules Design Methods and Introduction to Mechanical and Electrical Engineering. Students are assessed on group work. We balance student-selected groups and randomly allocated groups to give a range of experiences.</p>
<p>Inclusive teaching, learning and assessment</p>	<p><u>Accessible materials, resources and activities</u> All course materials and resources, including course guides, PowerPoint presentations, handouts and Moodle should be provided in an accessible format. For example, font type and size, layout and colour as well as captioning or transcripts for audio-visual materials. Consideration should also be given to accessibility and the availability of alternative formats for reading lists.</p>	<p>All course materials are provided in an accessible format, through the VLE and in hard copies.</p>
<p>Assessment for learning</p>	<p><u>Assessment and feedback to support attainment, progression and retention</u> Assessment is recognised as a critical point for at risk students as well as integral to the learning of all students. Formative feedback is essential during transition into university. All first semester modules at level 4 should include a formative or low-stakes summative assessment (e.g. low weighted in final outcome for the module) to provide an early opportunity for students to check progress and receive prompt and useable feedback that can feed-forward into future learning and assessment. Assessment and feedback communicates high expectations and develops a commitment to excellence.</p>	<p>All L4 modules contain formative assessment.</p>
<p>High impact pedagogies</p>	<p><u>Research and enquiry experiences</u> Opportunities for students to undertake small-scale independent enquiry enable students to understand how knowledge is generated and tested in the discipline as well as prepare them to engage in enquiry</p>	<p>Students are given small and well-defined projects in L4 (for example in Design Methods). At L5 the project briefs are more open-ended,</p>

	<p>as a highly sought after outcome of university study. In preparation for an undergraduate dissertation at level 6, courses should provide opportunities for students to develop research skills at level 4 and 5 and should engage with open-ended problems with appropriate support. Research opportunities should build student autonomy and are likely to encourage creativity and problem-solving. Dissemination of student research outcomes, for example via posters, presentations and reports with peer review, should also be considered.</p>	<p>in preparation for the final project at L6.</p> <p>Posters, presentations and reports are all assessed during the course, and are subject to peer review and discussion.</p>
<p>Curricula informed by employer and industry need / Assessment for learning</p>	<p><u>Authentic learning and assessment tasks</u> Live briefs, projects or equivalent authentic workplace learning experiences and/or assessments enable students, for example, to engage with external clients, develop their understanding through situated and experiential learning in real or simulated workplace contexts and deliver outputs to an agreed specification and deadline. Engagement with live briefs creates the opportunity for the development of student outcomes including excellence, professionalism, integrity and creativity. A live brief is likely to develop research and enquiry skills and can be linked to assessment if appropriate.</p>	<p>The design courses at LSBU use live briefs and projects at all levels.</p>
<p>Inclusive teaching, learning and assessment</p>	<p><u>Course content and teaching methods acknowledge the diversity of the student cohort</u> An inclusive curriculum incorporates images, examples, case studies and other resources from a broad range of cultural and social views reflecting diversity of the student cohort in terms of, for example, gender, ethnicity, sexuality, religious belief, socio-economic background etc. This commitment to inclusivity enables students to recognise themselves and their experiences in the curriculum as well as foster understanding of other viewpoints and identities.</p>	<p>We are committed to this inclusivity.</p>
<p>Curricula informed by employer and industry need</p>	<p><u>Work-based learning</u> Opportunities for learning that is relevant to future employment or undertaken in a workplace setting are fundamental to developing student applied knowledge as</p>	<p>Apprentices are working in industry so will be able to apply their academic</p>

	<p>well as developing work-relevant student outcomes such as networking, professionalism and integrity. Work-based learning can take the form of work experience, internships or placements as well as, for example, case studies, simulations and role-play in industry-standards settings as relevant to the course. Work-based learning can be linked to assessment if appropriate.</p>	<p>learning immediately to their industry projects.</p>
<p>Embedded learning development</p>	<p><u>Writing in the disciplines: Alternative formats</u> The development of student awareness, understanding and mastery of the specific thinking and communication practices in the discipline is fundamental to applied subject knowledge. This involves explicitly defining the features of disciplinary thinking and practices, finding opportunities to scaffold student attempts to adopt these ways of thinking and practising and providing opportunities to receive formative feedback on this. A writing in the disciplines approach recognises that writing is not a discrete representation of knowledge but integral to the process of knowing and understanding in the discipline. It is expected that assessment utilises formats that are recognisable and applicable to those working in the profession. For example, project report, presentation, poster, lab or field report, journal or professional article, position paper, case report, handbook, exhibition guide.</p>	<p>Within their course, students are asked to communicate in the languages of engineering and design. To this end, they produce, and are assessed on, reports, posters, presentations, logbooks, physical models (both prototypes and production models), and short videos, as well as essays and exam answers. Scaffolding, including formative feedback, is provided to help students master each of these features of disciplinary communication.</p>
<p>High impact pedagogies</p>	<p><u>Multi-disciplinary, interdisciplinary or interprofessional group-based learning experiences</u> Building on experience of group working at level 4, at level 5 students should be provided with the opportunity to work and manage more complex tasks in groups that work across traditional disciplinary and professional boundaries and reflecting interprofessional work-place settings. Learning in multi- or interdisciplinary groups creates the opportunity for the development of student outcomes including inclusivity, communication and networking.</p>	<p>This is embedded within the course. The apprentices will be taught alongside the full-time Engineering Product Design and Product Design students at all levels, and so gain from interdisciplinarity. At level 6, the apprentices will also work with Mechanical Engineering students, including masters students.</p>
<p>Assessment for learning</p>	<p><u>Variation of assessment</u></p>	

	<p>An inclusive approach to curriculum recognises diversity and seeks to create a learning environment that enables equal opportunities for learning for all students and does not give those with a particular prior qualification (e.g. A-level or BTEC) an advantage or disadvantage. An holistic assessment strategy should provide opportunities for all students to be able to demonstrate achievement of learning outcomes in different ways throughout the course. This may be by offering alternate assessment tasks at the same assessment point, for example either a written or oral assessment, or by offering a range of different assessment tasks across the curriculum.</p>	<p>Each module in the course is assessed in a variety of ways. This adds up to a range of assessment tasks across the curriculum.</p>
<p>Curricula informed by employer and industry need</p>	<p><u>Career management skills</u> Courses should provide support for the development of career management skills that enable student to be familiar with and understand relevant industries or professions, be able to build on work-related learning opportunities, understand the role of self-appraisal and planning for lifelong learning in career development, develop resilience and manage the career building process. This should be designed to inform the development of excellence and professionalism.</p>	<p>This is built into our learning outcomes for the course: see above.</p>
<p>Curricula informed by employer and industry need / Assessment for learning / High impact pedagogies</p>	<p><u>Capstone project/dissertation</u> The level 6 project or dissertation is a critical point for the integration and synthesis of knowledge and skills from across the course. It also provides an important transition into employment if the assessment is authentic, industry-facing or client-driven. It is recommended that this is a capstone experience, bringing together all learning across the course and creates the opportunity for the development of student outcomes including professionalism, integrity and creativity.</p>	<p>Our level 6 project is a capstone project for the course. The annual degree show highlights the importance of the L6 project, and allows students at earlier levels to understand the full possibilities of the course.</p>

Appendix C: Personal Development Planning

Personal Development Planning (PDP) is a structured process by which an individual reflects upon their own learning, performance and/or achievement and identifies ways in which they might improve themselves academically and more broadly.

Approach to PDP	
<p>1 Supporting the development and recognition of skills through the personal tutor system.</p>	<p>PDP is developed via individual tutorials / portfolio review sessions for Level 4 and 5 students at the end of every semester. This is intended to cater for students' pastoral care as well as their academic concerns, which may or may not relate to tutors' subject specialist areas. Skills shortfalls are identified by academic staff, and appropriate strategies implemented where necessary.</p> <p>At Level 6, each student is assigned two project tutors for their final year project. In addition to guiding the academic content of the project, this allows staff to direct the students on the PDP issues that arise from their Major Project.</p>
<p>2 Supporting the development and recognition of skills in academic modules/modules.</p>	<p>The nature of the subject and the appropriate teaching methodologies require that students continually develop their own plans for learning throughout the course, from the beginning of the first year to the end of the final year. Most design teaching is tutorial based so PDP occurs throughout the course by default; students also present and discuss their design project work at the end of each assignment.</p> <p>Most modules are designed to develop student skills and professional attitudes: Student output from the parent degree is considered to be of a professional, industry-based, practical standard, as evidenced by the course's accreditation from the Institution of Engineering Designers. One of the hallmarks of London South Bank courses is the way that students carry out practical assignments in an industrial setting and this course develops this in a hands-on manner.</p> <p>In order to progress on the course it is necessary to demonstrate that students are developing professionalism and management skills, and that PDP is addressed. Each module is intended to assist in inculcating habits of working and ways of thinking which lead to the development of professionalism.</p>
<p>3 Supporting the development and recognition of skills through purpose designed modules/modules.</p>	<p>In addition to general PDP students engage in specific PDP activities. Students learn about aspects of PDP from a variety of individuals during specific careers tutorials, seminars and workshops (with alumni, practicing designers, placement students and members of the LSBU employability team) which take place mostly in the Design Contexts and Communications module (Level 5). Students attend guest lectures as part of and in addition to modules; these sessions are both subject related and related to professional practice.</p>
<p>4 Supporting the development and recognition of skills through research projects and dissertations work.</p>	<p>The Design Contexts and Communications module (Level 5) introduces research habits with the production of a referenced contextual report. This includes learning how to research, using research material, time planning, personal organisation and project management. There is also a significant research requirement in the</p>

	early stages of, and to some extent throughout, the Major Design Project, taught in the Research Methods for Design Projects module.
5 Supporting the development and recognition of career management skills.	<p>The Design Contexts and Communications module (Level 5) lays specific emphasis on careers management skills, with student exercises in identification of potential employment opportunities, developing professional portfolios, and writing targeted covering letters and CVs.</p> <p>Students develop enterprise and entrepreneurial skills through the Level 6 module in Innovation and Enterprise, in such a way that they have a solid foundation to underpin a successful career as an entrepreneur or in carrying out further collaborative enterprise projects.</p>
6 Supporting the development and recognition of career management skills through work placements or work experience.	<p>All apprentices will be working in industry. They will be expected to share their industrial experience with the full-time students</p> <p>Practical hands-on experience developed through taking the Engineering Product Design Project (level 6) . This is designed to provide overall design and project management skills that are of a recognised industry and business standard.</p> <p>The Design Degree Show and New Designers exhibitions are also part of PDP – the students stage the public events (with support from academic staff) and liaise with visitors, many of whom are potential employers.</p>
7 Supporting the development of skills by recognising that they can be developed through extra curricula activities.	<p>Apprentices are encouraged to develop their professional standard through membership of appropriate bodies at the correct professional level. This may include professional bodies, venture capital groups, other enterprise, technology transfer groups, research organisation, local business groupings, etc.</p> <p>Students are encouraged to participate in recruitment by presenting their work to prospective applicants at open days, and may make presentations to other groups as appropriate.</p>
8 Supporting the development of the skills and attitudes as a basis for continuing professional development.	The teaching of the full-time Design courses, combined with an open access policy in the engineering workshops, is intended to foster a strong “studio culture” amongst the student body. Day release apprentices will be able to experience this on their day at university
9 Other approaches to personal development planning.	Skills audit and group skills evaluation are recognised and developed through most of the modules that students undertake, particularly at Levels 5 and 6.
10 The means by which self-reflection, evaluation and planned development is supported e.g. electronic or paper-	Students maintain both a physical and a digital portfolio throughout their degrees, and this is reviewed with staff members at the end of each semester.

based learning log or diary.	
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Appendix D: Terminology

awarding body	a UK higher education provider (typically a university) with the power to award higher education qualifications such as degrees
bursary	a financial award made to students to support their studies; sometimes used interchangeably with 'scholarship'
collaborative provision	a formal arrangement between a degree-awarding body and a partner organisation, allowing for the latter to provide higher education on behalf of the former
compulsory module	a module that students are required to take
contact hours	the time allocated to direct contact between a student and a member of staff through, for example, timetabled lectures, seminars and tutorials
coursework	student work that contributes towards the final result but is not assessed by written examination
current students	students enrolled on a course who have not yet completed their studies or been awarded their qualification
delivery organisation	an organisation that delivers learning opportunities on behalf of a degree-awarding body
distance-learning course	a course of study that does not involve face-to-face contact between students and tutors
extracurricular	activities undertaken by students outside their studies
feedback (on assessment)	advice to students following their completion of a piece of assessed or examined work
formative assessment	a type of assessment designed to help students learn more effectively, to progress in their studies and to prepare for summative assessment; formative assessment does not contribute to the final mark, grade or class of degree awarded to students

higher education provider	organisations that deliver higher education
independent learning	learning that occurs outside the classroom that might include preparation for scheduled sessions, follow-up work, wider reading or practice, completion of assessment tasks, or revision
intensity of study	the time taken to complete a part-time course compared to the equivalent full-time version: for example, half-time study would equate to 0.5 intensity of study
lecture	a presentation or talk on a particular topic; in general lectures involve larger groups of students than seminars and tutorials
learning zone	a flexible student space that supports independent and social learning
material information	information students need to make an informed decision, such as about what and where to study
mode of study	different ways of studying, such as full-time, part-time, e-learning or work-based learning
modular course	a course delivered using modules
module	a self-contained, formally structured unit of study, with a coherent and explicit set of learning outcomes and assessment criteria; some providers use the word 'course' or 'course unit' to refer to individual modules
national teaching fellowship	a national award for individuals who have made an outstanding impact on student learning and the teaching profession
navigability (of websites)	the ease with which users can obtain the information they require from a website
optional module	a module or course unit that students choose to take
performance (examinations)	a type of examination used in performance-based subjects such as drama and music
professional body	an organisation that oversees the activities of a particular profession and represents the interests of its members
prospective student	those applying or considering applying for any programme, at any level and employing any mode of study, with a higher education provider

regulated course	a course that is regulated by a regulatory body
regulatory body	an organisation recognised by government as being responsible for the regulation or approval of a particular range of issues and activities
scholarship	a type of bursary that recognises academic achievement and potential, and which is sometimes used interchangeably with 'bursary'
semester	either of the parts of an academic year that is divided into two for purposes of teaching and assessment (in contrast to division into terms)
seminar	seminars generally involve smaller numbers than lectures and enable students to engage in discussion of a particular topic and/or to explore it in more detail than might be covered in a lecture
summative assessment	formal assessment of students' work, contributing to the final result
term	any of the parts of an academic year that is divided into three or more for purposes of teaching and assessment (in contrast to division into semesters)
total study time	the total time required to study a module, unit or course, including all class contact, independent learning, revision and assessment
tutorial	one-to-one or small group supervision, feedback or detailed discussion on a particular topic or project
work/study placement	a planned period of experience outside the institution (for example, in a workplace or at another higher education institution) to help students develop particular skills, knowledge or understanding as part of their course
workload	see 'total study time'
written examination	a question or set of questions relating to a particular area of study to which candidates write answers usually (but not always) under timed conditions

Appendix E: Skills, Knowledge and Behaviours Map

For clarity the Skills, Knowledge and Behaviours Map for apprenticeship standards requirements are supplied in a separate document: Skills, Knowledge and Behaviours Map

This map provides a design aid to help course teams identify where the required skills, knowledge and behaviours are being developed, taught and assessed within the course.