Course Specification

A. Course Information			
Final award title(s)	MSc Process Safety		
Intermediate exit award title(s)	PG Dip in Process Safety PG Cert in Process Safety		
UCAS Code	**n/a**	**Course Code(s)**	5586 (Full Time) 5729 (Part Time)
	London South Bank University		
School	☐ ASC ☐ ACI ☐ BEA ☐ BUS ☒ ENG ☐ HSC ☐ LSS		
Division	Division of Chemical and Energy Engineering		
Course Director			
Delivery site(s) for course(s)	☒ Southwark ☐ Havering ☐ Other: please specify		
Mode(s) of delivery	☒Full time ☒Part time ☐other please specify		
Length of course/start and finish dates	see table below		

Mode	Length years	Start - month	Finish - mor
Full time	1 year +summer	Sep 2021	Sep 2022
Full time with placement/ sandwich year			
Part time	2years+summer	Sep 2021	Sep 2023
Part time with Placement/ sandwich year			

Is this course generally suitable for students on a Tier 4 visa?	Please complete the International Office questionnaire Yes Students are advised that the structure/nature of the course is suitable for those on a Tier 4 visa but other factors will be taken into account before a CAS number is allocated.	
Approval dates:	Course(s) validated / Subject to validation	July 2019
	Course specification last updated and signed off	

Professional, Statutory & Regulatory Body accreditation	Institute of Chemical Engineers (IChemE) Will seek from IoM^3	
Reference points:	Internal	Corporate Strategy 2015-2020 Academic Quality and Enhancement Manual School Strategy LSBU Academic Regulations
	External	QAA Quality Code for Higher Education 2013 Framework for Higher Education Qualifications Subject Benchmark Statements (Dated) PSRB Competitions and Markets Authority SEEC Level Descriptors 2016

B. Course Aims and Features

Distinctive features of course	MSc Process Safety explores topics which cover a wide range of disciplines in relation to process safety, such as; process control, process reliability, human factors in system design and control, engineering ethics, occupational health, environmental impacts as well as toxicology, fires and explosions, safety procedures and design, and relief systems. The students will also study process management and how it can support the implementation and management of safety procedures/systems in chemical processes. The course has been developed in response to the importance of/growing interest in process safety, strongly-supportive feedback from our UG/PG graduates, and it reflects our strength in research and teaching within this area including the expertise in Fire and Explosion Research Group.
Course Aims	The MSc Process Safety aims to: • Produce graduates trained in the core discipline of Process Control and Safety that have a strong focus and interest in developing a career in the Chemical Engineering and relevant sectors. • To produce MSc graduates who are equipped with the relevant understanding, skills and knowledge required to operate effectively and promote safety in the Chemical Engineering sector. • Produce graduates capable of contributing to process control and safety and reliability and the profession of Chemical Engineering in the context of modern industrial practice. • To enable students to develop an understanding of relevant disciplines associated with process control and safety in order to operate in multidisciplinary teams. • Develop students’ knowledge of mathematics, applied sciences, engineering methods and safety awareness, in support of the central themes of the course.

	• Develop students' intellectual and reasoning powers, their ability to perceive the broader perspective, and their problem-solving skills through the integration of a broad range of subject material. • Teach students to communicate clearly, to argue rationally and to draw conclusions based on an analytical and critical approach to data and systems. • To encourage the development of personal qualities and professional competences of process safety engineers.
Course Learning Outcomes	A. Students will have knowledge and understanding of: A1. Mathematics, science and engineering underlying the practice of process control and process safety. A2. Principles and techniques of computer models used in the design and analysis of control and safety of processes, and an appreciation of their benefits and limitations. A3. The scope of process control and safety systems. The professional and ethical responsibilities in the global and social context of engineering. A thorough understanding of current practice in chemical engineering process safety and its limitations and some appreciation of likely new developments. A4. The economic, management and statutory requirements involved in the practice of process control and safety. B. Students will develop their intellectual skills such that they are able to: B1. Use mathematics, science and engineering to support theoretical and practical analysis of complex control and safety systems. B2. Employ concepts from the applied and engineering sciences to design and evaluate control and safety processes and systems, and to simulate these processes. B3. Show awareness of the significance of safety in design work. Critically analyse commercial risks through understanding the basis of such risks. B4. Use fundamental knowledge to investigate new and emerging technologies in the area of process control and safety. B5. Extract data pertinent to an unfamiliar problem and apply them in its solution using computer-based tools when appropriate. B6. Integrate engineering principles of a multi-disciplinary nature in order to propose solution to problems. B7. Apply management and business practices appropriately. B8. Produce engineering solutions, which are consistent with ethical and social responsibilities. C. Students will acquire and develop practical skills such that they are able to:

	C1. Use computers and current software in quantitative and analytical work, as well as general information technology for communication and data handling. Use software commercially available in the simulation of control and safety processes/systems. C2. Plan and manage work both individually and in teams. Communicate effectively using appropriate media. C3. Evaluate designs and systems to identify areas of potential hazard and environmental threats and propose improvements. C4. Use laboratory, engineering and measuring equipment to provide data in support of theoretical understanding. C5. Analyse and solve engineering problems, often based on limited and imperfect data. Critically apply scientific evidence-based methods in the solution of problems. C6. Apply principles of project management. D. Students will acquire and develop transferrable skills such that they are able to: D1. Demonstrate literacy and numeracy skills. Manipulate, sort and present data in forms useful for understanding. Select, interpret and validate data, identifying possible errors and inconsistencies. D2. Communicate clearly the findings of experiments, projects and other assignments using written reports, oral and visual presentations. D3. Work effectively in a team, recognising the roles played by different team members. D4. Manage own responsibilities, including time and task management. D5. Undertake self-development and independent learning. D6. Identify and solve problems in familiar and unfamiliar situations. D. D7. Adapt to change in the working environment.

C. Teaching and Learning Strategy

A. Teaching and learning strategy for knowledge outcomes

All the course lectures, tutorials and simulation assignments will deliver knowledge and understanding described in A1. The knowledge and understandings of A2 are strongly delivered in the modules: Reliability Engineering and Human Factors and Process Control and Instrumentation.

These are further developed and delivered as an important outcome of the Dissertation Project. The students will gain knowledge described in A3 in the modules Process Safety and Hazards and Emerging Energy and Sustainability. This learning outcome is also an important feature in the Dissertation Project.

Much of the understanding described in A4 will be gained in Process Management and Safety, Health and Environment where various engineering management tools will be taught. An understanding of health & safety practice permeates throughout the whole course and strongly features in the practical work undertaken.

The MSc students will be encouraged to attend seminars/events such as those organised externally by IChemE, industry or internally by LSBU. Invited guest lectures from industry will deliver presentations at LSBU on relevant and current topics. The students will also be required to attend the annual Process Safety Workshop organised by IChemE Safety and Loss Prevention Special Interest Group and held at LSBU.

B. Teaching and learning strategies for intellectual skills

Most of the curriculum of the MSc course will support the intellectual learning skills outcomes described in B1-B8. The intellectual skills are developed through lectures, individual and group problem-based work, including the Dissertation Project. In private study, students will develop their intellectual skills in the area of process safety by report writing, and addressing problems set by the tutor or through solving past examinations, case studies, and projects.
The learning outcomes described in B5 are developed in computer laboratory sessions embedded in modules and projects covered in Process Safety and Hazards and Process Control and Instrumentation.

C. Teaching and learning outcomes for developed practical skills

Computing skills for engineering and science, C1, are addressed in the course where students will learn the principles and study the application of specialist engineering packages such as Aspen HYSYS, Aspen Energy Analyzer, MatLab and specific process safety programs. C2 and C3 will be covered by small projects embedded in the modules. C4 will be acquired from case studies using data from industrial projects for the execution of risk, hazard and operability studies with reference to the principles and knowledge gained from the Process Safety and Hazards module. Coursework across the programme and the Dissertation project will be open-ended thus covering the outcomes in C5 and C6.

D. Teaching and learning outcomes for developed transferable skills

The outcomes described in D1 are developed in practical work and design tasks where students for example obtain data from industrial projects and textbook case studies and use them in studies, assessments and investigations with the help of relevant software tools and standard analytical procedures.
The transferable skills outcomes described in D2 and D3 are developed by report-writing, team-working exercises and in simulation and project-oriented modules. The outcomes of D4-D6 are achieved by the comprehensive nature of the course but in particular in the Dissertation module, which is research based.

D. Assessment

A Assessment for knowledge and understanding outcomes

Content, knowledge and understanding of the taught material are assessed either by 100% coursework, or combined coursework and examination (typical 40% CW - 60% exam)
Summative assessment will apply to the practical or theoretical content of the module, or essays, reports, group work, oral presentations, production of posters, and in-class tests. Examinations normally take the form of a 2 to 3-hour unseen end-of-semester paper pre examined by external exam board.

Formative assessments will include tutorial exercises, computer simulation exercises, discussions in classroom, questions and answer sessions, peer discussions, observations, reflection on learning, presentation rehearsals

B Assessment for intellectual skills outcomes

Intellectual skills are normally assessed through formal examinations and student presentations. Preparation of laboratory and project reports are also considered as assessment of the developed intellectual skills.

C Assessment of practical skills

C1 will be assessed through computing assignments, C2-C6 as parts of coursework assessment, and C4 in the marking of laboratory reports. The outcomes described in C5-C6 are assessed in project based coursework and will be marked for the critical approach to problem-solving.

D Assessment for developed transferable skills

A variety of methods will be used to assess transferable skills. These assessments include computer laboratory exercises and simulations, oral presentations, written reports, and management in the Dissertation.

D1 is assessed in many of the written examination papers, and reports, and further as constructive feedback on the quality of written reports, D2. The effectiveness of teamwork, D3, is assessed as an element in several coursework tasks throughout the course. D4-D6 are heavily assess in the research based Dissertation module.

E. Academic Regulations

The course will be subject to the latest regulations:
http://www.lsbu.ac.uk/__data/assets/pdf_file/0008/84347/academic-regulations.pdf

For course specific protocols please refer to the School/Divisional protocol document.

F. Entry Requirements

The MSc Process Safety offers a specialization route for chemical engineering graduates, or a conversion route for non-chemical engineering graduates to upskill in the area of Chemical Engineering based on advanced Chemical Engineering principles and skills. The standard requirement for admission will be a 2.2 or higher first degree in engineering or a physical science from a UK university, or equivalent degree from overseas. Entrants from a science route must, by their degree or otherwise, be sufficiently prepared for the mathematical content of the course. Applicants must also meet the University's standard requirement for English, i.e. IELTS 6.5, TOEFL 580 or equivalent.

G. Course structure(s)

Course overview MSc Process Safety

Full time students (FT) are offered Process Safety if they are previous engineering graduate or not. Dissertation CPE_DISS stretches over the full academic year.

Part time (PT) students, will follow a similar programme over 2 years.

MSc Process Safety xxxx (Full Time)

	Semester 1		Semester 2	
	Emerging Energy and Sustainability CEE_7_XXX	20	Reliability Engineering and Human Factors CEE_7_XXX	20
	Process Management CEE_7_XXX	20	Process Safety and Hazards CEE_7_XXX	20
	Safety, Health and Environment CEE_7_XXX	20	Process Control and Instrumentation CEE_7_XXX	20
			Dissertation (S1 /S2 +summer) CEE_7_XXX	60

MSc Process Safety xxxx (Part Time)

	Semester 1		Semester 2	
Year 1	Safety Health and Environment CEE_7_XXX	20	Process Control and Instrumentation CEE_7_XXX	20
	Process Management CEE_7_XXX	20	Process Safety and Hazards CEE_7_XXX	20
Year 2	Emerging Energy and Sustainability CEE_7_XXX	20	Reliability Engineering and Human Factors CEE_7_XXX	20
			Dissertation (S1/S2 +summer) CEE_7_XXX	60

Course Module Assessment Plan					
Module Code	**Module Title**	**Level**	**Semester**	**Credit value**	**Assessment**
CEE_7_XXX	Emerging Energy and Sustainability	7	S1	20	Exam CW
CEE_7_XXX	Process Management	7	S1	20	Exam CW
CEE_7_XXX	Safety, Health and Environment	7	S1	20	Exam CW
CEE_7_XXX	Reliability Engineering and Human Factors	7	S2	20	Exam CW
CEE_7_XXX	Process Control and Instrumentation	7	S2	20	Exam CW
CEE_7_XXX	Process Safety and Hazards	7	S2	20	Exam CW
CEE_7_XXX	Dissertation	7	S1/S2/S	60	CW: 100% 75% Thesis 25% Viva

I. Timetable information

- Students can expect to receive a confirmed timetable for study commitments; during welcome week of Semester 1
- Enrolled students will be announced via Moodle and in class if Timetable changes are planned

J. Costs and financial support

Course related costs

- Access to labs and consumables for projects will be applied from School of Engineering
- Field trips may be self-funded
- The tuition fee do not cover any literature (downloads or books) nor stationaries

Tuition fees/financial support/accommodation and living costs

- Information on tuition fees/financial support can be found by clicking on the following link - http://www.lsbu.ac.uk/courses/undergraduate/fees-and-funding or
- http://www.lsbu.ac.uk/courses/postgraduate/fees-and-funding
- Information on living costs and accommodation can be found by clicking the following link- https://my.lsbu.ac.uk/my/portal/Student-Life-Centre/International-Students/Starting-at-LSBU/#expenses

List of Appendices

Appendix A: Curriculum Map
Appendix B: Personal Development Planning (postgraduate courses)
Appendix C: Terminology

Appendix A: Curriculum Map

This map provides a design aid to help course teams identify where course outcomes (A1-A4, B1-B8, C1-C6 and D1 to D7) 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. The table will help students monitor their own learning and development outcomes for their Personal Developing Plan (PDP) as the course progresses. Approach to PDP is found in Appendix C

MSc Process Safety outcome mapping

Modules		**Outcomes**																								
Title	Code	A1	A2	A3	A4	B1	B2	B3	B4	B5	B6	B7	B8	C1	C2	C3	C4	C5	C6	D1	D2	D3	D4	D5	D6	D7
Safety Health and Environment	CEE_7_XXX				TA							DA	DA		TA			TA D	TA D			TA D	D	D	D	D
Emerging Energy and Sustainability	CEE_7_XXX				TA							DA	DA		TA			TA D	TA D			TA D	D	D	D	D
Reliability and Human Factors	CEE_7_XXX	TA	TA D	TA		TA	TA	TA						TD A						DA						
Process Management	CEE_7_XXX	TA	TA D	TA		TA	TA							TD A						DA						
Process Control and Instrumentation	CEE_7_XXX	TA	TA D		TA	TA		TA						TD A						DA						
Process Safety and Hazards	CEE_7_XXX	TA	TA D		TA	TA		TA						TD A						DA						
Dissertation	CEE_7_XXX	DA	DA	DA	DA	DA	TD A	DA		D	DA	DA	D		TD A		DA			DA	DA	DA	D	D	D	

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T: Taught; D: Developed; A: Assessed

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, 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.

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. The MSc course team will Indicate where/how in the course/across the modules this is supported.

Approach to PDP	Level M
1. Supporting the development and recognition of skills through scheduled one-to-one meeting	Module coordinator and course director interaction
2. Supporting the development and recognition of skills in academic modules/units.	Across modules, presentations and CW feedback
3. Supporting the development and recognition of skills through purpose designed modules/units.	Dissertations, simulation projects, presentations, and report writing
4. Supporting the development and recognition of skills through research projects and dissertations work.	Dissertation
5. Supporting the development and recognition of career management skills.	In Dissertation, Engineering Management, Chemical Engineering Management, Energy Management & Sustainability
6. Supporting the development and recognition of career management skills through taught materials and invited guest lecturers	In Dissertation, Engineering Management, Chemical Engineering Management, Advanced Materials
7. Supporting the development of skills by recognising that they can be developed through extra curricula activities.	IChemE seminars/events attendance. Visit at other universities
8. Supporting the development of the skills and attitudes as a basis for continuing professional development.	Dissertation, Engineering Management, IChemE seminars/events attendance
9. Other approaches to personal development planning.	
10. The means by which self-reflection, evaluation and planned development is supported e.g. electronic or paper-based learning log or diary.	In Dissertation, Engineering Management, , Chemical Engineering Management, Energy Management & Sustainability

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'
compulsory module	a module that students are required to take. (opposite to Optional)
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
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 earning
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
optional module	a module or course unit that students choose to take (opposite to Compulsory)
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
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