MEng Chemical with Nuclear Engineering

This document provides a definitive record of the main features of the programme and the learning outcomes that a typical student may reasonably be expected to achieve and demonstrate if s/he takes full advantage of the learning opportunities provided. This programme specification is intended as a reference point for prospective students, current students, external examiners and academic and support staff involved in delivering the programme and enabling student development and achievement.

Programme Information				
Award(s)	MEng			
Programme Title	Chemical with Nuclear Engineering			
Programme Code	H890			
Awarding Institution	Imperial College London			
Teaching Institution	Imperial College London			
Faculty	Faculty of Engineering			
Department	Department of Chemical Engineering			
Associateship	City and Guilds of London Institute (ACGI)			
Mode and Period of Study	4 academic years full-time			
Cohort Entry Points	Annually in October			
Relevant QAA Benchmark Statement(s) and/or other external reference points	Honours Degrees in Engineering and Master's Degrees in Engineering			
Total Credits	ECTS:	270	CATS:	540
FHEQ Level	Level 7			
EHEA Level	2nd cycle			
External Accreditor(s)	Institution of Chemical Engineers (IChemE)			
Specification Details				
Student cohorts covered by specification	2016/17 entry			
Person responsible for the specification	Fiona Thomson (Student Office Manager)			
Date of introduction of programme				
Date of programme specification/revision	December 2016			

Description of Programme Contents

Our four-year MEng Chemical with Nuclear Engineering degree is a specialised course offered by the Department for Chemical Engineering, focused on preparing graduates for employment in nuclear or related industries.

This integrated Master's course is strongly rooted in science and mathematics, which is incorporated from the first term onwards alongside practical applications in engineering subjects.

You take advantage of practical teaching and assessment methods, with over half of the course centred around project work as opposed to formal lectures.

You will be practical both within and outside of your studies, with all students expected to take advantage of the opportunity to complete an industry-based project toward the end of the course.

Our MEng courses are always evolving in content while the educational aims are retained, and our intention is to demonstrate how you can apply scientific and technological expertise to achieve material, commercial and environmental benefits.

You have a choice of more specialised subjects in years three and four, relevant to the nuclear engineering component of the course.

You will also be encouraged to carry out project work relevant to nuclear power and every effort will be made to find you a relevant placement in the summer vacation period between the third and fourth year.

Learning Outcomes

The Imperial Graduate Attributes are a set of core competencies which we expect students to achieve through completion of any Imperial College degree programme. The Graduate Attributes are available at: www.imperial.ac.uk/students/academic-support/graduate-attributes

Knowledge and Understanding of:

- Mathematics
- Process Chemistry
- Physical Chemistry
- Transfer Processes
- Separations
- Reaction Engineering
- Safety & Environment
- Systems Engineering
- Process Design
- Management
- Humanities/ Languages (as options)

Intellectual Skills - students will be able to:

- Perform analysis and, thereby, solve problems in specific areas listed above.
- Integrate theory and practice in dealing with problems which involve several of the subject areas listed above.

- Carry out a synthesis/design of a process when faced with a conflicting set of objectives which are, to some extent, mutually exclusive.
- Demonstrate the skills necessary to plan, conduct and report a programme of original research or, alternatively, a project of direct and immediate industrial relevance.

Practical Skills - students will be able to:

- Plan and execute safely a series of experiments.
- Use laboratory methods to generate data.
- Start-up, operate, and shut down safely a pilot scale process plant.
- Analyse experimental results and determine their accuracy, precision, and validity.
- Prepare technical reports.
- Give technical presentations.
- Use effectively a wide range of computational tools and packages of a general nature.
- Use effectively a wide range of computational tools and packages relating specifically to chemical engineering and to determine the range of their validity.
- Make use of knowledge from a number of diverse areas to synthesise a feasible solution to a complex problem of design.

Professional Skills Development - students will be able to:

- Communicate effectively through oral presentations and written reports.
- Use Information and Communications Technology.
- Develop management skills: group coordination, decision processes, objective criteria, problem definition, project design and evaluation needs.
- Work as a team and/or independently, as appropriate.
- Be adequately prepared to enter a chosen sector of industry as a professional.
- Become aware of the environmental, economic and social impact of chemical processes.
- Integrate and evaluate information from a variety of sources.
- Learn effectively for the purpose of continuing professional development.

Entry Requirements		
Academic Requirement	Grade Requirement	Minimum **A*A*A**
	Subject Requirements	**A*** in Mathematics **A** in Chemistry Relevant subjects for the remaining A-level include: Physics, Biology, Further Mathematics, and Economics.
	Excluded Subjects	See above for relevant subjects
International Baccalaureate (IB)	Grade Requirement	**39** points overall
	Subject Requirements	**7** in Mathematics at higher level **6** in Chemistry at higher level **6** in Physics or Biology at higher level. Economics

		at higher level may also be considered
GCSE Requirements		None
English Language Requirement		Standard requirement OR Higher requirement
Admissions Tests		Candidates may be asked to undertake an admissions test set by the College in order to provide additional information for the Admissions Tutor in support of an application.
Interview		Yes
The programme's competency standards document can be found at: http://www.imperial.ac.uk/engineering/departments/chemical-engineering/courses/undergraduate/admissions/		
Learning & Teaching Strategy		
Scheduled Learning & Teaching Methods		• Lectures • Tutorials • Lab Work • Control/Operation of a Pilot Plant • Design Work
E-learning & Blended Learning Methods		• Lecture recording • Pre-recorded lectures in combination with problem classes
Project and Placement Learning Methods		• Research Project
Assessment Strategy		
Assessment Methods		• Written Exams • Class Tests • Coursework
Academic Feedback Policy		
The department strives to provide timely and rich feedback to students on all coursework. For standard pieces of coursework the department adheres to the college's two-week rule. Larger coursework items have longer turn-around times that are published.		
Re-sit Policy		
The College's Policy on Re-sits is available at: www.imperial.ac.uk/registry/exams/resit		
Mitigating Circumstances Policy		
The College's Policy on Mitigating Circumstances is available at: www.imperial.ac.uk/registry/exams		

Assessment Structure
Marking Scheme

Year One

A student must:

- Achieve a mark of at least 40% in each individual examination
- Achieve an aggregate mark of at least 40% in each module
- Achieve an aggregate mark of at least 40% in the combined coursework assessments

Year Two

A student must:

- Achieve a mark of at least 40% in each individual examination
- Achieve an aggregate mark of at least 40% in each module
- Achieve an aggregate mark of at least 40% in the combined coursework assessments

Year Three

A student must:

- Achieve a mark of at least 40% in each individual examination
- Achieve an aggregate mark of at least 40% in each module
- Achieve an aggregate mark of at least 40% in the combined coursework assessments

Year Four

A student must:

- Achieve a mark of at least 40% in each individual examination
- Achieve an aggregate mark of at least 40% in each module
- Achieve an aggregate mark of at least 40% in the combined coursework assessments

Final Degree Classifications

Third – a student must achieve an aggregate mark of 40%
Lower Second – a student must achieve an aggregate mark of 50%
Upper Second – a student must achieve an aggregate mark of 60%
First - a student must achieve an aggregate mark of 70%

Year	% Year Weighting	Module	% Module Weighting
Year One	11.1%	Business for Engineers 1 – Business Ethics for Chemical Engineers	6%
		Mastery for Engineers 1	0% (P/F)
		Process Analysis	7.2%
		Separation Processes 1	4.8%
		Mathematics 1	15%
		Properties of Matter	8.75%
		Fluid Mechanics 1	6.25%
		Heat & Mass Transfer	6.25%
		Thermodynamics 1	10%
		Chemistry	8.75%
		First Year Design Project	6%
		Spring Test	5%
		Foundation Laboratory	10%
		Introduction to MATLAB	6%

Year	% Year Weighting	Module	% Module Weighting
Year Two	22.2%	Mastery for Engineers	0% (P/F)
		Heat Transfer	3.75%
		Fluid Mechanics 2	3.75%
		Reaction Engineering 1	6%
		Thermodynamics 2	7.5%
		Process Dynamics and Control	9.25%
		Mathematics 2	15%
		Business for Engineers 2 - Economic Evaluation of Projects	6.25%
		Industrial Chemistry	3.75%
		Biochemistry	3.75%
		Separation Processes 2	6%
		Reactor Design and Control Project	15%
		Knowledge Laboratory	12.5%
		Pilot Plant Project	7.5%

Year	% Year Weighting	Module	% Module Weighting
Year Three	33.3%	Mastery for Engineers 3	0% (P/F)
		Reaction Engineering 2	7.5%
		Fluid Mechanics 3 & Particle Engineering	6.7%
		Strategy of Design	5%
		Safety and Loss Prevention	10.8%
		Environmental Engineering	7.5%
		Project Management	5%
		Process Model Solution and Optimisation	4.1%
		Techno-Economic Project	10%
		Introduction to Nuclear Engineering	6.7%
		Nuclear Chemical Engineering	6.7%
		Flow Sheeting Project	10%
		Mechanical Design Project	10%
		Discovery Laboratory	10%

Year	% Year Weighting	Module	% Module Weighting
Year Four	33.3%	Advanced Chemical Engineering Practice: Research Project	20%
		Advanced Chemical Engineering Design Practice: Final Year Design	40%
		Nuclear Thermal Hydraulics	6.66%
		Nuclear Reactor Physics	6.66%
		Nuclear Materials 1	6.66%
		*3 x Modules from Elective (A/B)**	6.66% each

*Elective modules to include no more than 1 x Horizons module, and 1 x Business for Professional Engineers & Scientists module.

Indicative Module List												
Code	Title	Core/ Elective	Year	L&T Hours	Ind. Study Hours	Place-ment Hours	Total Hours	% Written Exam	% Course-work	% Practical	FHEQ Level	ECTS
CE1-08	Business for Engineers 1 – Business Ethics for Chemical Engineers	CORE	1	16	84	0	100	70%	30%	0%	4	4.00
CE1-01	Mastery for Engineers 1	CORE	1	27	73	0	100	100%	0%	0%	4	4.00
CE1-02	Process Analysis	CORE	1	37	63	0	100	100%	0%	0%	4	4.00
CE1-03-1	First Year Design Project	CORE	1	24	51	0	75	0%	67%	33%	4	3.00
CE1-03-2	Foundation Laboratory	CORE	1	33	92	0	125	0%	70%	30%	4	5.00
CE1-03-4	Introduction to MATLAB	CORE	1	24	51	0	75	0%	100%	0%	4	3.00
CE1-04-1	Fluid Mechanics 1	CORE	1	28	59.5	0	87.5	100%	0%	0%	4	3.50
CE1-04-2	Heat & Mass Transfer	CORE	1	30	57.5	0	87.5	100%	0%	0%	4	3.50
CE1-05	Thermodynamics 1	CORE	1	43	107	0	150	90%	10%	0%	4	6.00
CE1-06	Chemistry	CORE	1	53	97	0	150	90%	10%	0%	4	6.00
CE1-07	Mathematics 1	CORE	1	69	181	0	250	100%	0%	0%	4	10.00
CE1-09	Properties of Matter	CORE	1	44	106	0	150	90%	10%	0%	4	6.00
CE1-10	Separation Processes 1	CORE	1	28	47	0	75	100%	0%	0%	4	3.00

Indicative Module List												
Code	Title	Core/ Elective	Year	L&T Hours	Ind. Study Hours	Place-ment Hours	Total Hours	% Written Exam	% Course-work	% Practical	FHEQ Level	ECTS
N/A	Spring Test	CORE	1	0	50	0	50	100%	0%	0%	4	2.00
CE2-01	Mastery for Engineers	CORE	2	2	98	0	100	100%	0%	0%	5	4.00
CE2-02-1	Heat Transfer	CORE	2	33	67	0	100	100%	0%	0%	5	4.00
CE2-02-3	Fluid Mechanics 2	CORE	2	17	58	0	75	100%	0%	0%	5	3.00
CE2-03-2	Reactor Design and Control Project	CORE	2	52	98	0	150	0%	100%	0%	5	6.00
CE2-03-3	Knowledge Laboratory	CORE	2	40	85	0	125	0%	70%	30%	5	5.00
CE2-03-4	Pilot Plant Project	CORE	2	25	50	0	75	0%	100%	0%	5	3.00
CE2-04	Reaction Engineering 1	CORE	2	26	74	0	100	100%	0%	0%	5	4.00
CE2-05	Thermodynamics 2	CORE	2	37	113	0	150	92.5%	7.5%	0%	5	6.00
CE2-06	Process Dynamics and Control	CORE	2	40	110	0	150	100%	0%	0%	5	6.00
CE2-07	Mathematics 2	CORE	2	53	197	0	250	100%	0%	0%	5	10.00
CE2-09	Business for Engineers 2 - Economic Evaluation of Projects	CORE	2	18	82	0	100	0%	100%	0%	5	4.00
CE2-10-1	Industrial Chemistry	CORE	2	28	72	0	100	70%	30%	0%	5	4.00

Indicative Module List												
Code	Title	Core/ Elective	Year	L&T Hours	Ind. Study Hours	Place-ment Hours	Total Hours	% Written Exam	% Course-work	% Practical	FHEQ Level	ECTS
CE2-10-2	Biochemistry	CORE	2	23	52	0	75	100%	0%	0%	5	3.00
CE2-11	Separation Processes 2	CORE	2	22	78	0	100	100%	0%	0%	5	4.00
CE3-01	Mastery for Engineers 3	CORE	3	2	98	0	100	100%	0%	0%	6	4.00
CE3-02	Reaction Engineering 2	CORE	3	46	104	0	150	100%	0%	0%	6	6.00
CE3-03-2	Fluid Mechanics 3	CORE	3	25	50	0	75	100%	0%	0%	6	3.00
CE3-03-3	Particle Engineering	CORE	3	26	49	0	75	100%	0%	0%	6	3.00
CE3-04	Strategy of Design	CORE	3	27	123	0	150	100%	0%	0%	6	6.00
CE3-05	Safety and Loss Prevention	CORE	3	44	106	0	150	100%	0%	0%	6	6.00
CE3-06	Environmental Engineering	CORE	3	36	114	0	150	100%	0%	0%	6	6.00
CE3-07-1	Techno-Economic Project	CORE	3	26	49	0	75	0%	65%	35%	6	3.00
ME3-HNUCN	Introduction to Nuclear Engineering	CORE	3	30	120	0	150	100%	0%	0%	7	6.00
CE3-07-2	Flowsheeting Project	CORE	3	48	27	0	75	0%	100%	0%	6	3.00
CE3-07-3	Mechanical Design Project	CORE	3	24	51	0	75	0%	100%	0%	6	3.00
CE3-07-5	Discovery Laboratory	CORE	3	26	49	0	75	0%	67%	33%	6	3.00

Indicative Module List												
Code	Title	Core/ Elective	Year	L&T Hours	Ind. Study Hours	Place-ment Hours	Total Hours	% Written Exam	% Course-work	% Practical	FHEQ Level	ECTS
CE4-30	Nuclear Chemical Engineering	CORE	3	30	120	0	150	100%	0%	0%	7	6.00
CE3-08	Process Model Solution and Optimisation	CORE	3	22	78	0	100	100%	0%	0%	6	4.00
BS0821	Project Management	CORE	3	3	22	128	0	150	50%	50%	0%	6.00
CE4-01-1	Advanced Chemical Engineering Practice: Research Project	CORE	4	182	193	0	375	0%	80%	20%	7	15.00
CE4-01-2	Advanced Chemical Engineering Design Practice: Final Year Design	CORE	4	310	240	0	550	0%	80%	20%	7	22.00
CE4-29	Nuclear Thermal Hydraulics	CORE	4	30	120	0	150	100%	0%	0%	7	6.00
MSE 414	Nuclear Materials I	CORE	4	24	126	0	150	100%	0%	0%	7	6.00
ME4-MNURP	Nuclear Reactor Physics	CORE	4	32	143	0	175	100%	0%	0%	7	7.00
CE4-05	Advanced Process Operations	ELECTIVE (A)	4	30	120	0	150	100%	0%	0%	7	6.00
CE4-06A	Advanced Process Optimisation 1	ELECTIVE (A)	4	30	120	0	150	100%	0%	0%	7	6.00
CE4-08	Dynamic Behaviour of Process Systems	ELECTIVE (A)	4	30	120	0	150	100%	0%	0%	7	6.00
CE4-09	Dynamical Systems in Chemical Engineering	ELECTIVE (A)	4	30	120	0	150	100%	0%	0%	7	6.00

Indicative Module List												
Code	Title	Core/ Elective	Year	L&T Hours	Ind. Study Hours	Place-ment Hours	Total Hours	% Written Exam	% Course-work	% Practical	FHEQ Level	ECTS
CE4-15	Membrane Science & Membrane Separation Processes	ELECTIVE (A)	4	30	120	0	150	100%	0%	0%	7	6.00
CE4-16	Process Heat Transfer	ELECTIVE (A)	4	30	120	0	150	100%	0%	0%	7	6.00
CE4-17	Colloid & Interface Science	ELECTIVE (A)	4	30	120	0	150	100%	0%	0%	7	6.00
CE4-20	Pharmaceutical Process Development	ELECTIVE (A)	4	30	120	0	150	100%	0%	0%	7	6.00
CE4-21	Modelling of Biological Systems	ELECTIVE (A)	4	30	120	0	150	100%	0%	0%	7	6.00
CE4-22	Downstream Separation in Biotechnology	ELECTIVE (A)	4	30	120	0	150	100%	0%	0%	7	6.00
CE4-23	Product Characterisation	ELECTIVE (A)	4	30	120	0	150	100%	0%	0%	7	6.00
CE4-27	Advanced Bioprocess Engineering	ELECTIVE (A)	4	30	120	0	150	100%	0%	0%	7	6.00
CE4-28	Carbon Capture & Clean Fossil Fuels	ELECTIVE (A)	4	30	120	0	150	100%	0%	0%	7	6.00
CE4-31	Transport Processes in Biological Systems	ELECTIVE (A)	4	30	120	0	150	100%	0%	0%	7	6.00
CE4-32	Biochemical Engineering	ELECTIVE (A)	4	30	120	0	150	100%	0%	0%	7	6.00
CE4-33	Molecular Modelling of Fluids	ELECTIVE (A)	4	30	120	0	150	100%	0%	0%	7	6.00
CE4-34	Long Research Project	ELECTIVE (A)	4	182	118	0	300	0%	80%	20%	7	12.00

Indicative Module List												
Code	Title	Core/ Elective	Year	L&T Hours	Ind. Study Hours	Place-ment Hours	Total Hours	% Written Exam	% Course-work	% Practical	FHEQ Level	ECTS
N/A	Interdepartmental Exchange (IDX)	ELECTIVE (B)	4	Various							6	6.00
N/A	Business for Professional Engineers & Scientists	ELECTIVE (B)	4	Various							6	6.00
N/A	Horizons	ELECTIVE (B)	4	Various							6	6.00

Supporting Information
The Programme Handbook is available at: http://www.imperial.ac.uk/engineering/departments/chemical-engineering/courses/undergraduate/course-details/
The Module Handbook is available at: http://www.imperial.ac.uk/engineering/departments/chemical-engineering/courses/undergraduate/course-details/
The College's entry requirements for undergraduate programmes can be found at: www.imperial.ac.uk/study/ug/apply/requirements/
The College's Quality & Enhancement Framework is available at: www.imperial.ac.uk/registry/proceduresandregulations/qualityassurance
The College's Academic and Examination Regulations can be found at: http://www3.imperial.ac.uk/registry/proceduresandregulations/regulations
Imperial College is an independent corporation whose legal status derives from a Royal Charter granted under Letters Patent in 1907. In 2007 a Supplemental Charter and Statutes was granted by HM Queen Elizabeth II. This Supplemental Charter, which came into force on the date of the College's Centenary, 8th July 2007, established the College as a University with the name and style of "The Imperial College of Science, Technology and Medicine". http://www.imperial.ac.uk/admin-services/secretariat/college-governance/charters-statutes-ordinances-and-regulations/
Imperial College London is regulated by the Higher Education Funding Council for England (HEFCE) http://www.hefce.ac.uk/reg/of/