Programme Information		
Programme Title	Programme Code	HECoS Code
Chemistry with Molecular Physics	F1F3	For Registry Use Only

Award	Length of Study	Mode of Study	Entry Point(s)	Total Credits	
				ECTS	CATS
MSci Honours degree	4 years	Full time	Annually in October	240	480
BSc degree†	3 years	Full time	N/A	180	360
Diploma of Higher Education*	2 years	Full time	N/A	120	240
Certificate of Higher Education*	1 year	Full time	N/A	60	120

†A BSc exit degree may be awarded to students on an MSci Honours degree, who wish to conclude their studies at the end of their third year. An Honours classification requires the third year meets all requirements for the BSc (Hons).
*The Certificate/Diploma of Higher Education are exit awards and are not available for entry. All students must apply to and join a BSc or MSci programme.

Ownership			
Awarding Institution	Imperial College London	Faculty	Faculty of Natural Sciences
Teaching Institution	Imperial College London	Department	Chemistry
Associateship	Royal College of Science	Main Location(s) of Study	South Kensington Campus, White City Campus
External Reference			
Relevant QAA Benchmark Statement(s) and/or other external reference points		Masters Chemistry degree	
FHEQ Level		MSci – Level 7 - Honours	
EHEA Level		2nd Cycle	
External Accreditor(s) (if applicable)			
External Accreditor 1:	Royal Society of Chemistry		
Accreditation received:	2015	Accreditation renewal:	2027

Collaborative Provision			
Collaborative partner	Collaboration type	Agreement effective date	Agreement expiry date
N/A	N/A	N/A	N/A

Specification Details	
Programme Lead	Prof. Don Craig
Student cohorts covered by specification	2022-23 entry
Date of introduction of programme	October 19
Date of programme specification/revision	October 22

Programme Overview

Studying the MSci Chemistry with Molecular Physics programme you will be an active participant engaging with a rigorous modern student-centred curriculum in a dynamic and world-leading chemistry department. This degree is delivered by the Departments of Chemistry, Mathematics and Physics, and focuses on work at the boundary of these three disciplines, for example nano-engineering. Graduates of this course will gain strengthened knowledge of the physical and mathematical background for mastering physical methods of modern chemistry. Ultimately you will contribute to the department's research and to advancing the discipline, and you will graduate confident in your ability to take on any challenge in chemistry and beyond.

You will develop a thorough and interconnected understanding of core chemistry through studying fundamental chemistry topics across the sub-disciplines of Inorganic, Organic, Physical, Analytical, Synthetic and Computational chemistry. In years 3 and 4 you will select from a range of chemistry options to follow your own interests in advanced topics and frontiers of the discipline. Through an extensive laboratory programme you will learn to synthesise chemicals and to study chemical systems through experimental measurements and computational models, including building instrumentation and programming. You will design your own experiments, and thereby learn a range of broader research and transferrable skills from finding reliable information, to designing an experimental investigation, and analysing and communicating the results. Your third year will include an introduction to emergent 'industry 4.0' approaches and technologies such as rapid prototyping, biohacking and machine learning, and in your final year you will join one of the department's academic research groups at the Molecular Sciences Research Hub to complete a 6 month independent research project.

Your core chemistry studies will be complemented by Maths and Physics modules in years 1 and 2, and the i-Explore module in year 3, in which you undertake multidisciplinary study e.g. Physics, Philosophy, Language. Further, extra-curricular, opportunities include access to the Advanced Hack Space and Invention Rooms at White City, initiatives such as the faculty's Make A Difference competition, and summer research projects through the Undergraduate Research Opportunities Programme.

You will learn from a range of teachers: peers, postgraduate students, teaching- and research- focussed academic staff up to professorial level, including world leaders in their fields. You will build collaborative learning relationships with a range of people, and a personal tutor will oversee your personal and intellectual development. Most teaching will be at South Kensington, but travel to the White City campus will be necessary for some activities.

An MSci degree covers more in-depth chemistry study than a BSc degree, including more advanced research-led modules, making them more suited to students who are considering a career in research or who may wish to progress to further study such as a PhD. The degree programme is professionally accredited by the Royal Society of Chemistry, meaning your degree will be recognised around the world as high quality, having academic rigour and meeting the needs of both students and employers. As well as your main Imperial degree, you will also receive the award of the Associateship of the Royal College of Science (ARCS) on completion of this course. Graduates of the chemistry department go on to a range of employments and further study, including PhD study, technical consultancy, research and development, accountancy, marketing, business activities and medical and law-based graduate training.

Learning Outcomes

Chemistry degree programmes have six broad Intended Learning Outcomes. Students will be able to:

1. **Apply chemistry knowledge and understanding**
2. **Use experimentation to find chemical information and create new chemical knowledge and technologies**
3. **Use reliable sources to find chemical information**
4. **Analyse and interpret data and solve problems creatively in chemistry and wider contexts**
5. **Communicate chemistry**
6. **Demonstrate intellectual and personal development as a university learner and citizen to enable purposeful and responsible engagement with the world**

and employ the transferrable skills and core competencies expressed in the Imperial Graduate Attributes

Graduates of the Chemistry with Molecular Physics programmes will additionally be able to:

Confidently apply tools from mathematics, physics and computing to tackle in interdisciplinary problems in molecular and chemical-physics, nanotechnology and advanced materials

Upon completion of a MSci Chemistry degree you will, in addition to the BSc Chemistry learning outcomes (below), be able to:

- **Apply chemistry knowledge and understanding:**
  demonstrate depth of knowledge and comprehensive understanding of their chosen specialism; describe and explain personal opinions on contested issues
- **Use experimentation to find chemical information and create new chemical knowledge and technologies:**
  plan and carry out a substantial open-ended research project including strategic optimisation
- **Use reliable sources to find chemical information:**
  efficiently find information to explore their own interests; critically analyse journal articles and evaluate their contribution to the literature
- **Analyse and interpret data and solve problems creatively in chemistry and wider contexts:**
  define and solve problems in the context of their chosen specialism; identify gaps in current knowledge or data sets and formulate projects to address these
- **Communicate chemistry:**
  communicate and defend their research; explain views on directions of future research in the area
- **Demonstrate intellectual and personal development as a university learner and citizen to enable purposeful and responsible engagement with the world:**
  employ behaviours of a research-led learner; manage their own learning, time and workload and maintain research group relationships over a substantial project; instigate professional relationships; exercise substantial initiative, perseverance and academic accountability; operate in a professional chemistry environment

Upon completion of a BSc Chemistry degree you will, in addition to the Certificate and Diploma learning outcomes (below), be able to:

- **Apply chemistry knowledge and understanding:**
  describe advanced topics and areas of current research; choose appropriate models to provide explanations and predictions within the context of advanced topics or current research applying core chemistry concepts
- **Use experimentation to find chemical information and create new chemical knowledge and technologies:**
  plan and carry out investigative work and an open-ended research project, demonstrating an integrated understanding of techniques for synthesis, analysis and/or computational modelling
- **Use reliable sources to find chemical information:**
  efficiently find information to explore a specific field of research; summarise information gathered from a range of literature sources

- **Analyse and interpret data and solve problems creatively in chemistry and wider contexts:**
  define and solve problems in real-world and abstract contexts using incomplete or ambiguous data sets, applying critical analysis
- **Communicate chemistry:**
  communicate their research project context, aims and outcomes; communicate synoptic understanding with and without presentation aids
- **Demonstrate intellectual and personal development as a university learner and citizen to enable purposeful and responsible engagement with the world:**
  employ behaviours of a professional learner; manage their own learning, time and workload and build research group relationships over a project; exercise initiative; operate in a professional environment

Upon completion of a Diploma of Higher Education you will, in addition to the Certificate learning outcomes (below), be able to:

- ***Apply chemistry knowledge and understanding:***
  choose appropriate representations to describe familiar and unfamiliar chemical systems and processes; explain concepts and theories and apply synoptic understanding; explain and predict properties, behaviours and trends with an appreciation of the limitations of familiar models and their position in the historical development of the discipline
- ***Use experimentation to find chemical information and create new chemical knowledge and technologies:***
  assess risks and hazards of self-determined lab work; use advanced techniques and basic computational modelling; obtain reliable and accurate and precise data
- ***Use reliable sources to find chemical information:***
  identify appropriate reliable texts to find information and to extend syllabus learning; extract meaning from journal articles; use reference management software
- ***Analyse and interpret data and solve problems creatively in chemistry and wider contexts:***
  use their own synoptic knowledge and understanding of theoretical models and the results of information searches, experimental work and data analyses to solve well-defined problems in real-world contexts
- ***Communicate chemistry:***
  in a mode appropriate to the designated audience
- ***Demonstrate intellectual and personal development as a university learner and citizen to enable purposeful and responsible engagement with the world:***
  apply techniques of independent learning; contribute to the education of others within communities of learning

Upon completion of a Certificate of Higher Education you will be able to:

- ***Apply chemistry knowledge and understanding:***
  use various representations as directed to describe familiar chemical systems and processes; explain concepts; use concepts, theories and models to explain and predict properties, behaviours and trends
- ***Use experimentation to find chemical information and create new chemical knowledge and technologies:***
  assess risks and hazards of lab work; apply basic techniques to work safely and purposefully in the lab to obtain meaningful data; carry out basic computational operations
- ***Use reliable sources to find chemical information:***
  use recommended texts to find information and to reinforce syllabus learning; extract with guidance appropriate data from journal articles; correctly cite sources of information
- ***Analyse and interpret data and solve problems creatively in chemistry and wider contexts:***
  use their own knowledge and understanding of theoretical models, and results of information searches, their own experimental work and data analyses, to solve well-defined problems in familiar contexts
- ***Communicate chemistry:***
  communicate scientific ideas in accurate English clearly through a variety of defined modes using correct terminology and effective presentation of data
- ***Demonstrate intellectual and personal development as a university learner and citizen to enable purposeful and responsible engagement with the world:***

apply techniques of university learning; self-reflect on what has been learned from received teaching; build collaborative learning relationships with peers and tutors and integrate into the university community

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

Entry Requirements	
Academic Requirement	The **minimum** requirements for entry to this degree programme, and *typical offers*, are listed below: **A-Level:** AAA in Chemistry, Mathematics, Physics. *Typical offer:* A*AA-A*A*A. General Studies and Critical Thinking are not accepted. **IB:** 38 points overall, with HL6 in Chemistry, HL6 in Mathematics, HL6 in Physics. *Typical offer:* 39 points, with 7, 6, 6 at Higher Level. For further information on entry requirements, please go to https://www.imperial.ac.uk/study/ug/apply/requirements/ugacademic/
Non-academic Requirements	N/A
English Language Requirement	Higher requirement Please check for other Accepted English Qualifications
Admissions Test/Interview	Academic interviews are conducted in person by two academic staff or *via* Skype by one experienced academic staff member. You will be informed of the interview performance criteria in advance. Detailed written interview feedback and grading from interviewers is used, in conjunction with the application, to make an offer decision. There is no admissions test in use. Please see the following webpage for further information: http://www.imperial.ac.uk/chemistry/undergraduate/admissions/application-and-entry-requirements/

The programme's competency standards documents can be found at: http://www.imperial.ac.uk/chemistry/undergraduate/course-structure-and-content/

Learning & Teaching Approach

Learning and Teaching Delivery Methods

The teaching and learning approach you will experience aims broadly that you gain an integrated understanding of chemistry and are able to apply this to solve real-world problems, and develop into a self-motivated, independent life-long learner. Teaching will include: lectures and other whole-cohort teaching sessions incorporating active learning (opportunities for you to apply your learning); discussions in tutorials in groups of about 8; application and problem-solving in workshops in groups of about 30; laboratory practicals and projects in small groups, pairs or individually; placement in an academic research group for an independent research project. Throughout the degree you will undertake independent study and you may choose to work individually or with peers.

Overall Workload

Your overall workload consists of face-to-face sessions and independent learning. While your actual contact hours may vary according to the optional modules you choose to study, the following gives an indication of how much time you will need to allocate to different activities at each level of the programme. At Imperial, each ECTS credit taken equates to an expected total study time of 25 hours. Therefore, the expected total study time is 1500 hours per year.

Typically, in years 1 and 2 you will spend in the order of 15% of your time on classroom teaching (around 230 hours), 15% in the laboratory, and 70% on independent study. Week-to-week your workload will fluctuate within reasonable limits, i.e. you will be more busy in some weeks than others. In later years the proportion of independent study increases to 80% in year 3, and 90% in year 4 (excluding the research project).

Assessment Strategy

Assessment Methods

Your achievement of the intended learning outcomes of the programme will be supported by formative assessment and measured by a range of summative assessments.

Formative assessment opportunities will include digital resources for self-assessment, discussions in tutorials, in workshops and in the laboratory, formative assignment submissions, and, during your final year project, formative literature / interim reports and discussions with your supervisor. Discussions with your personal tutor will address your intellectual and personal development and engagement.

Open- and closed- book examinations and tests will summatively assess your ability to apply chemistry knowledge and understanding, and to analyse and interpret data and solve problems (ILOs 1 and 4). Your performance in the lab will be an assessment also of your ability to use experimentation (ILOs 1,2,4). Oral exams (known as 'vivas') will additionally assess your ability to communicate chemistry (ILOs 1,4,5), and written reports, poster and oral presentations also your ability to find reliable chemical information (ILOs 1,3,4,5). Formal and informal groupwork, reflection on your learning from labs through the research skills passport, and structured self-reflective statements will assess your intellectual and personal development and engagement with the world (ILO 6).

Assessment mode	Year 1	Year 2	Year 3	Year 4
Examination	75%	65%	40%*	25%*
Coursework / Practical	25%	35%	60%*	75%*

* Variable with choice of options

Academic Feedback Policy

You will receive verbal feedback on your understanding and performance through informal discussions with peers, GTAs and staff in labs, workshops and tutorials. You will generally receive immediate verbal feedback on your performance in oral exams and presentations. The department manages submission of written work electronically, and you will receive feedback comments on your work similarly, within 10 working days of submission. Following exams, general feedback on the performance of the cohort is made available, and in early years you will receive individual feedback on your understanding through a scheduled discussion with a tutor, while in later years you can request feedback via your personal tutor.

The College's Policy on Academic Feedback and guidance on issuing provisional marks to students is available at:
www.imperial.ac.uk/about/governance/academic-governance/academic-policy/exams-and-assessment/

Re-sit Policy

The College's Policy on Re-sits is available at: www.imperial.ac.uk/student-records-and-data/for-current-students/undergraduate-and-taught-postgraduate/exams-assessments-and-regulations/

Mitigating Circumstances Policy

The College's Policy on Mitigating Circumstances is available at: www.imperial.ac.uk/student-records-and-data/for-current-students/undergraduate-and-taught-postgraduate/exams-assessments-and-regulations/

Additional Programme Costs		
This section should outline any additional costs relevant to this programme which are not included in students' tuition fees.		
Description	Mandatory/Optional	Approximate cost
Laboratory Personal Protective Equipment (PPE)	Mandatory	PPE is provided at no cost by the department, and replaced as appropriate

Important notice: The Programme Specifications are the result of a large curriculum and pedagogy reform implemented by the Department and supported by the Learning and Teaching Strategy of Imperial College London. The modules, structure and assessments presented in this Programme Specification are correct at the time of publication but might change as a result of student and staff feedback and the introduction of new or innovative approaches to teaching and learning. You will be consulted and notified in a timely manner of any changes to this document.

Programme Structure[1]

Year 1 – FHEQ Level 4
Students study all core modules.

Code	Module Title	Core/ Elective	Group	Term	Credits
CHEM40001	i-Engage	Core		1-3	0
CHEM40002	Language of Chemistry	Core		1	7.5
CHEM40004	Structure and Bonding: Atomic Structure to Molecular Orbitals	Core		1	10
CHEM40003	Introduction to Spectroscopy	Core		1	5
CHEM40006	Reactivity at Carbon Centres	Core		2	7.5
CHEM40007	The Reactions Toolkit: Thermodynamics and Kinetics	Core		2	5
CHEM40005	Chemistry of the Elements: Hydrogen to Uranium	Core		2	5
CHEM40008	Practical Chemistry 1	Core		1-3	15
CHEM40010	Mathematics and Physics 1	Core		1-2	5
				Credit Total	60

Year 2 - FHEQ Level 5
Students study all core modules.

Code	Module Title	Core/ Elective	Group	Term	Credits
CHEM50002	i-Engage 2	Core		1-3	0
CHEM50003	Electronic States and Bonding	Core		1	7.5
CHEM50001	Analysis of Molecules, Materials and Mixtures	Core		1-2	7.5
CHEM50006	Solids, Liquids and Interfaces	Core		2-3	5
CHEM50005	Chemistry of Molecular Systems	Core		2-3	5
CHEM50011	Macromolecules and Materials	Core		2-3	5
CHEM50007	Control and Selectivity in Molecular Synthesis	Core		1	5
CHEM50004	Practical Chemistry 2	Core		1-3	20
CHEM50008	Maths and Physics 2	Core		1-2	5

[1] **Core** modules are those which serve a fundamental role within the curriculum, and for which achievement of the credits for that module is essential for the achievement of the target award. Core modules must therefore be taken and passed in order to achieve that named award. **Compulsory** modules are those which are designated as necessary to be taken as part of the programme syllabus. Compulsory modules can be compensated. **Elective** modules are those which are in the same subject area as the field of study and are offered to students in order to offer an element of choice in the curriculum and from which students are able to select. Elective modules can be compensated.

				Credit Total	60
Year 3 - FHEQ Level 6 **Students study all core and compulsory modules (there is choice within modules).**					
Code	Module Title	Core/ Compulsory/ Elective	Group	Term	Credits
CHEM60002	Advanced Chemistry Topics 1 for Molecular Physics	Core		1	15
CHEM60005	Advanced Chemistry Topics 2 for Molecular Physics	Core		2	15
CHEM60013	Practical Chemistry 3 for Molecular Physics	Core		1-3	25
	I-Explore	Compulsory		1-2	5
CHEM60015	MSci Chemistry Research Proposal and Literature Review	Compulsory		3	0
				Credit Total	60
Year 4 - FHEQ Level 7 **Students study all core modules. Students choose two electives from group A.**					
Code	Module Title	Core/ Elective	Group	Term	Credits
CHEM70001	Advanced Catalysis	Elective	A	1	5
CHEM70005	Advanced Stereochemistry, Synthesis and Biosynthesis	Elective	A	1	5
CHEM70006	Molecular Imaging	Elective	A	1	5
CHEM70007	From Molecules to Medicine	Elective	A	1	5
CHEM70010	Sustainable Chemistry	Elective	A	1	5
CHEM70004	Advanced Interfacial Science	Core		1	5
CHEM70048	Chemistry of Nanomaterials	Elective	A	1	5
CHEM70049	Membrane Biophysics	Elective	A	1	5
CHEM70050	Plastic Electronics from Materials Chemistry to Device Applications	Elective	A	1	5
CHEM70051	Renewable Energy from Solar Cells to Fuel Cells	Elective	A	1	5
CHEM70009	Research Project	Core		1-3	45
				Credit Total	60

Progression and Classification

Progression

In order to progress to the next level of study, you must have passed all modules (equivalent to 60 ECTS) in the current level of study at first attempt, at resit or by a compensated pass.

The overall weighted average for each year must be 40.00%, including where a module(s) has been compensated, in order for you to progress to the next year of the programme.

Classification

The marks from modules in each year contribute towards the final degree classification.

In order to be considered for an award, you must have achieved the minimum number of credits at the required levels prescribed for that award and met any programme specific requirements as set out in the Programme Specification.

Your classification will be determined through:

i) Aggregate Module marks for all modules
ii) Year Weightings

For this award, Year 1 is weighted at 7.50%, Year 2 at 20.00%, Year 3 at 36.25% and Year 4 at 36.25%.

The College sets the class of undergraduate degree that may be awarded as follows:

i)	First	70.00% or above for the average weighted module results
ii)	Upper Second	60.00% or above for the average weighted module results
iii)	Lower Second	50.00% or above for the average weighted module results
iv)	Third	40.00% or above for the average weighted module results

Please find the full Academic Regulations at https://www.imperial.ac.uk/about/governance/academic-governance/regulations/. Please follow the prompts to find the set of regulations relevant to your programme of study.

Programme Specific Regulations

N/A

Supporting Information
The Programme Handbook is available at: N/A
The Module Handbook is available at: N/A
The College's entry requirements for postgraduate programmes can be found at: www.imperial.ac.uk/study/pg/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: www.imperial.ac.uk/about/governance/academic-governance/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". www.imperial.ac.uk/admin-services/secretariat/college-governance/charters/
Imperial College London is regulated by the Office for Students (OfS) www.officeforstudents.org.uk/advice-and-guidance/the-register/
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 primarily intended as a reference point for prospective and current students, academic and support staff involved in delivering the programme and enabling student development and achievement, for its assessment by internal and external examiners, and in subsequent monitoring and review.

Modifications			
Description	**Approved**	**Date**	**Paper Reference**
N/A	N/A	N/A	N/A