



UNIVERSITY OF LINCOLN

Programme Specification

Title:

Forensic Chemistry

Final Award: **Master of Chemistry (MChem)**

With Exit Awards at:

Certificate of Higher Education (CertHE)

Diploma of Higher Education (DipHE)

Bachelor of Science with Honours (BSc (Hons))

Master of Chemistry (MChem)

To be delivered from: 1 Sep 2014

Level	Date
Level 1 or Certificate of Higher Education (CertHE)	2019-20
Level 2 or Diploma of Higher Education (DipHE)	2020-21
Level 3 or Bachelor of Science with Honours (BSc (Hons))	2021-22
Level 4 or Master of Chemistry (MChem)	2022-23

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1. Introduction

This document describes one of the University of Lincoln's programmes using the protocols required by the UK National Qualifications Framework as defined in the publication *QAA guidelines for preparing programme specifications*.

This programme operates under the policy and regulatory frameworks of the University of Lincoln.

2. Basic Programme Data

Final Award:	Master of Chemistry (MChem)
Programme Title:	Forensic Chemistry
Exit Awards and Titles	Certificate of Higher Education (CertHE) Diploma of Higher Education (DipHE) Bachelor of Science with Honours (BSc (Hons)) Master of Chemistry (MChem)
Subject(s)	Chemistry
Mode(s) of delivery	Full Time Part Time
Is there a Placement or Exchange?	
UCAS code	F1F5
Awarding Body	University of Lincoln
Campus(es)	Lincoln Campus
School(s)	School of Chemistry
Programme Leader	Tasnim Munshi (TMunshi)
Relevant Subject Benchmark Statements	
Professional, Statutory or Regulatory Body Accreditation	
Programme Start Date	2019-20

3. Programme Description

3.1 Overview

Chemistry is defined as the science that studies systematically the composition, properties, and reactivity of matter at the atomic and molecular level.

Chemistry has been divided traditionally into three main branches: organic chemistry - the chemistry of (most) substances based on carbon; inorganic chemistry - the chemistry of all other substances; and physical chemistry - the application of concepts and laws to chemical phenomena. Analytical chemistry, addressing the identification and composition of substances is generally described as a fourth branch. However, it is the nature of modern chemistry that there are no distinct boundaries between the branches of the discipline or indeed with other disciplines. Forensic Science is the application of sciences to the law and therefore provides a context for the application of chemistry that can be described as Forensic Chemistry.

The Forensic Chemistry curriculum at Lincoln has been devised to integrate the main sub-disciplines of chemistry effectively, relating physical chemistry concepts to aspects of organic and inorganic chemistry, and to the methods used for analyzing substances. In these programmes, a comprehensive knowledge of chemistry is augmented with subject-specific and generic skills (particularly in practical chemistry) to develop a strong understanding of how to apply chemistry in the context of the forensic and crime scene sciences. In this way, the chemistry education at Lincoln is designed to produce highly employable graduates with a strong background in academic chemistry, a well-developed awareness of specific topics at the cutting-edge of the chemical sciences and, an in-depth experience of the application of chemistry in legal investigation.

3.2 Aims and Objectives

General Aims:

- To provide a stimulating and supportive learning environment that inspires students in the study of chemistry and instills within them an enthusiasm for study of the chemical sciences;
- To enable the development of a broad appreciation of the importance of chemistry in a variety of application contexts: academic, industrial, economic, environmental and social and its role in establishing a sustainable society;
- To develop a range of skills relating to professional practice in chemistry that are relevant both to chemistry and other graduate-level employment

Main aims

- To provide students with a broad appreciation of key chemical concepts and the interrelationship between traditional discipline areas in chemistry;
- To develop a skill set that enables the implementation of sound professional practice in chemistry that ensures safe operation in chemical laboratory environments based on effective risk assessment;
- To provide students with a range of experiences that enable the effective application of defined methodologies to appropriate standards;
- To provide students with knowledge of the application of chemistry in key sectors including an awareness of the importance of regulatory compliance;
- To instill a broad range of knowledge and skills required for graduate-level employment or as a base for advanced level study in chemistry and the chemical sciences.
- To extend understanding of chemical concepts and develop an in-depth appreciation of specialized areas in chemistry through engagement with advanced materials;
- To develop an ability to design scientific investigations, independently execute suitable experimentation and critically evaluate study outcomes;
- To develop capabilities to analyse unfamiliar problems and adapt defined methodologies to devise

effective solutions;

- To develop an awareness of advances at the forefront of chemistry and instill an ability for critical assessment of research in the chemical sciences;
- To prepare students for professional chemistry careers or doctoral research employment through knowledge of advanced practices.

3.3 Variations to Standard Regulations and Guidance

none

4. Programme Outcomes

Programme-level learning outcomes are identified below.

Refer to *Appendix I – Curriculum Map* for details of how outcomes are deployed across the programme.

4.1 Knowledge and Understanding

On successful completion of this programme a student will have knowledge and understanding of:

- 1 Chemical terminology, nomenclature, conventions and units
- 2 Fundamental physicochemical principles
- 3 Molecular and bulk properties of a range of inorganic, organic and bio-molecular materials
- 4 The synthesis of inorganic, organic and bio-molecular compounds including related isolation, purification and characterisation techniques
- 5 Principles and procedures used in chemical analysis for characterisation and quantitation with application to forensic chemistry
- 6 Forensic techniques, principles and practice applied to the crime scene, forensic laboratory and court
- 7 Advanced topics in Forensic Chemistry
- 8 Research methodology and specialist knowledge within the Forensic Chemistry research field

4.2 Subject Specific Intellectual Skills

On successful completion of this programme a student will be able to:

- 9 Demonstrate knowledge and understanding of essential facts, concepts, principles and theories
- 10 Solve qualitative and quantitative problems
- 11 Recognise and analyse problems and plan strategies for their solution
- 12 Evaluate, interpret and synthesise chemical and forensic science information and data from a variety of sources
- 13 Use models, computational chemistry and data-processing relating to chemical information and data
- 14 Communicate scientific material and arguments in a variety of forms
- 15 Adapt and apply methodology to the solution of unfamiliar problems
- 16 Assimilate, evaluate and present research results objectively
- 17 Undertake a research project the outcome of which is of a quality that is potentially publishable

4.3 Subject Specific Practical Skills

On successful completion of this programme a student will be able to:

- 18 Handle chemical materials safely, taking into account their physical and chemical properties including any specific hazards associated with their use and conduct risk assessments for laboratory and field work such as processing a crime scene
- 19 Carry out documented laboratory procedures and standard operating procedures involved in synthetic and analytical work, in relation to both inorganic and organic systems
- 20 Record and document observations and measurements in a logical, comprehensive and contemporaneous manner taking account of the need to demonstrate continuity of evidence and to conform to any quality assurance programme
- 21 Operate standard chemical instrumentation and selected forensic science instrumentation and equipment
- 22 Interpret and explain the limits of accuracy of experimental data in terms of significance and underlying theory
- 23 Plan, design and execute experiments taking into account the results from previous experimental work
- 24 Work independently and be self-critical in the evaluation of risks, experimental procedures and outcomes
- 25 Recognise the professional, moral and ethical standards required for experimental work and forensic casework including the role of the expert witness in criminal investigations

4.4 Transferable Skills and Attributes

On successful completion of this programme a student will be able to:

- 26 Communicate chemistry to a variety of audiences including court reports and presentation at court using a range of formats including written and oral
- 27 Solve qualitative and quantitative problems demonstrating self-direction and originality
- 28 Apply numeracy and mathematics, including error analysis, order-of-magnitude estimations, correct use of units and modes of data presentation
- 29 Use information retrieval, in relation to primary and secondary information sources, including online computer searches
- 30 Use a range of IT hardware and software for a variety of chemistry/forensic science-specific and generic applications
- 31 Interact with other people and work as a member of a team, recognising and respecting the views, opinions and roles of other members of the team
- 32 Demonstrate time management and organisational skills, as evidenced by the ability to plan and implement efficient and effective modes of working
- 33 Communicate and interact with professionals from other disciplines
- 34 Exercise initiative and personal responsibility
- 35 Make decisions in complex and unpredictable situations
- 36 Demonstrate independent learning ability required for continuing professional development

For details of each module contributing to the programme, please consult the module specification document.

5. Learning, Teaching and Assessment Strategies

5.1. Learning and Teaching Strategy

The MChem Forensic Chemistry programme presents an integrated approach to chemistry that retains a clear delineation of traditional sub-disciplines and allies this to specialist topics and advanced practice from Forensic and Crime Scene sciences. The teaching and learning strategy adopted derives from the programme outcomes and is based upon an integration of the curriculum through four main components: Core Chemistry modules, Practical modules, Forensic and Professional Practice modules and Project modules.

1. Core Modules

- The theoretical concepts of the main disciplines of chemistry (inorganic, organic and physical) are taught together in Core Chemistry modules based on a 'spine' of physical chemistry concepts. The physical chemistry key themes of: systems at equilibrium, systems under change, and the structure and bonding of systems are developed at each stage. The themes are contextualized with relevant organic and inorganic conceptual topics and these are exemplified to, respectively, build an organic chemistry reaction toolkit and, assemble a comprehensive survey of the chemistry of the elements. Together these modules provide the depth and breadth of core chemistry required for study of chemistry at this level.
- The 'Core Chemistry' modules use lectures as the primary vehicle to deliver content. Student development is facilitated by interactive enquiry-based tasks and, in this context, emphasis is placed upon application of knowledge to solve problems. Seminars are used to support problem solving activities and provide opportunity for students to experience different learning techniques such as peer tutoring and collaborative learning. On moving from level 1 to 3, a systematic progression is established with both increasing subject depth and in the challenge from problems requiring adaptation of methods and extended strategies for their solution.

2. Practical Chemistry Modules

- Practical skills and associated data interpretation capabilities are developed in Practical Chemistry modules linked to professional practice. Practicals are explicitly linked to core chemistry programmes and the use of brief/debrief session around each laboratory class helps contextualize studies. Key skills in analytical and structural methods (e.g. chromatography, NMR, mass spectrometry, X-Ray crystallography) are developed in parallel using integrated lectures and workshops that focus on the development of skills for robust experimental design and interpretation of experimental data.
- Practical skills are developed at the bench in professional laboratory settings. Strong emphasis on gaining competence in techniques and with appropriate documentation of activities inline with industry practice. Routine and regular use of industry standard equipment and software support characterization of products and generation of reports. There is progression in the nature and demand of tasks and the style of teaching moving through the programme levels. Level 1 is concerned with developing confidence in manipulation of equipment and providing training in basic skills and techniques. Level 2 introduces more complex procedures and more sophisticated interpretation is required. Skills are further developed at level 3 but students are expected to work with increasing independence. There is a transition from fully documented procedures and laboratory exercises to investigative style tasks where students are involved in experimental design, planning, preparation and execution. Extensive use is made of pre- and post-laboratory briefing sessions that link the learning experience to theoretical contexts. Student participation and increasing leadership of

these meetings is expected as student autonomy and expertise increase.

3. Forensic and Professional Practice modules

- Specialist aspects of Forensic Science are introduced through these modules. These integrate theoretical concepts from a broad underpinning of chemical and biological sciences to methodologies and techniques in forensic investigation. Key theoretical aspects are presented in lectures and consolidated in seminars and problem classes. Practical aspects of forensic investigation are integrated into the programme in three contexts: laboratory forensic science where forensic analytical experiments conducted in specialist laboratory environments; crime scene studies utilizing simulated scenes and the University's crime house; and presentation of evidence where simulated court scenes provide an environment for students to practice presentation of evidence and challenge under cross examination. Strong correlation is drawn between theory and practice through laboratory briefings.
- Correlation of evidential types with their physicochemical properties is related to selection of appropriate analytical methods and progressively informs approaches in method development. Progressive use of problem-based and enquiry-based approaches promotes autonomy in student investigations.
- At Stage 4, acquisition of in-depth specialist knowledge is achieved through an array of specialist Forensic Science module. Delivered through a combination of lectures, workshops and practicals, these integrate theoretical concepts with advanced techniques in forensic practice and require students to exercise critical judgment in interpretation and review of evidence and methods for acquiring information.
- At Stage 4, the students will develop and manage their own learning portfolio through experiential learning. Students will direct their own learning process and will control its nature and direction through self-evaluation (reflection). They develop and follow an agreed learning plan (corresponding with directed study) and undergo on-going evaluation of chosen learning activities through a reflective blog and meetings with academic tutor(s). A blog (web log) is maintained as a record the progress of the agreed learning plan and to periodically enable reflection of that progress. Academic tutor(s) review and will add commentary to the student's blog.

4. Extended Projects

- Independent research and professional experience is undertaken through Research Projects. These activities build from group projects undertaken in Practical and Professional Practice but are introduced at an individual level at Stage 3 through the structured Research Project. This encourages students to draw together their experience and plan and execute a significant study with the support of the research teams at the University.
- At Stage 4, the student experience is centred around a placement within a forensic research group at Lincoln. This provides the opportunity for students to develop original and independent research corresponding to the standards required of industrial regulations and/or of publishable standard for the peer-reviewed academic literature.

5. Student as Producer Principles

- The programme fully embraces the principles of Student as Producer. Problem solving is core to the teaching, learning and assessment strategy. Students will encounter a variety of problem types including those of a familiar and unfamiliar nature and open-ended problems. Problem solving is seen as an active method of learning the core chemistry material and all core chemistry modules will have a programme of seminars specifically for problem solving and the development of problem solving skills. These provide opportunity for students to work individually or in groups and for peer collaboration and tutoring. Seminars will include student-led sessions with the tutor taking more of a facilitator role. Core chemistry module examinations will assess problem solving learning outcomes. Professional practice will provide students with open-ended 'industry informed' real life problems. These will be worked upon in small groups and teams with both tutor and industrial support. Outputs will consist of reports and presentations to industrial panels.

- Modules at level 3 are informed by academic staff research. Lectures will include personal research activities and papers will be used as part of the teaching material for modules. Some practicals will be designed to have an investigatory approach to allow students to work as a 'researcher' while carrying out experimental work. Team work on these tasks will be encouraged along with independent work to reflect the variety of environments likely to be encountered by chemistry graduates in employment. Project based learning plays a significant role at level 3. Students will carry out independent research projects within the research groups of academic staff or, if on external placement, within industrial research teams. Students will be involved in the planning and design of the project and will present their findings using a range of formats thus providing a full experience of working as a researcher.

- Technology will be at the forefront of the student experience. Blackboard will be used to provide module information and teaching material and to engage with students through discussion groups and on-line teaching activities. The teaching team has previously utilized funds to work with students to produce videos that support learning across a range of chemical science topics. Similar funding has also been used to develop on-line support for practical activities and JISC funding was used to produce a series of radio programmes and to create open access to level 1 chemistry teaching material. Computational chemistry will use a range of software packages and databases will be extensively used.

- The learning environment for chemistry is excellent. Modern, well equipped teaching laboratories are housed in the science building. A significant proportion of time is spent within the laboratory and students gain hands-on experience of a range of chemical equipment and chemical analysis instruments. Large laboratories have demonstration facilities with A/V systems so that students can be instructed without having to leave their work stations. Organisation of laboratory classes will ensure that demonstrators are available to support small groups of students. Research laboratory and equipment facilities in the new Joseph Banks Laboratories will be available for project work.

- Learning is supported by a core pack of textbooks covering inorganic, organic and physical chemistry. A range of other supporting texts and journals are available through the library. Students have a library induction in induction week provided by the chemistry librarian. The library also provides a range of workshops to support learning skills and these are made available to all students.

- A number of mechanisms are used to obtain student views about their learning. Subject committees are an important forum for obtaining feedback through elected student reps however reps are encouraged to work closely with programme teams throughout the academic year to ensure that

issues are resolved in a timely manner. Other mechanisms for obtaining feedback include meetings with academic tutors, student meetings with external examiners, module evaluation forms and discussion groups.

- Employability is an integral part of the curriculum. Professional practice provides a vehicle for students to engage and experience a variety of chemical science commercial sectors. Professional practice also deals with the practical aspects of skill profiling, personal development and job applications. These sessions will be delivered with the chemistry careers and employability adviser. Summer placements both external and on-campus are encouraged and support is provided to help students obtain suitable placements and to apply for sources of funding.

5.2. Assessment Strategy

A variety of assessment methods are used that enable students to demonstrate attainment of the programme learning outcomes. Methods include:

- Unseen examinations
- Laboratory and professional reports
- Problem-solving exercises
- Presentations (oral, poster, individual, group)
- Project work (individual, group)
- Literature review
- Personal development portfolios (including RSC Skills and Personal and Professional Blogs)

Assessment is a fundamental component of the teaching and learning process and is used to enable the student to confirm their achievement of learning outcomes. It is seen, therefore, as having two functions – formative and summative. Formative assessment is primarily delivered in small group seminars, laboratory or team-based settings relating to continuous assessment of problem-solving activities or practical and project work including proposals and experimental design. Formative feedback forms the basis for routine structured feedback to students. Summative assessment is derived from examinations, and written assignments and dissertations as final module assessments. Summative feedback also provides a vehicle for student feedback, either through discussion of individual pieces or as part of overall performance profiling within personal academic tutoring.

- Knowledge and understanding. Summative assessment of knowledge and understanding is achieved through traditional-style examinations that are used at each Stage of the course and are, almost exclusively, composed from unseen problems. These are taken at the end of each semester and are the main assessment vehicle for the Core and Extension Chemistry modules. At Level 1, confirmation breadth of learning is the main objective and so examinations consist mainly of short structured questions. At Level 2, greater depth of analysis and understanding is expected and so examinations include combination of short and long answer questions and introduce problem-based components. At Levels 3 and 4, the primary aim of formal examination is to assess an individual's depth of specialist knowledge and of an independent ability to adapt methods to unfamiliar problems. Examination tends therefore to focus on analysis and interpretation in problem-based contexts. Where possible, use is made of primary scientific literature, assessing abilities to engage with, and critically evaluate research level material.

- Subject specific intellectual skills. Analysis of information and problem solving is assessed through a range of methods – primarily problem-solving exercises in continuous assessment and unseen examinations. Problem-solving activities on the Core and Extension concepts are assessed continuously through a programme of seminars and tutorials and these comprise a primary vehicle for student feedback and reflection. Group work activities in Professional Practice and in Practical

Chemistry mini-projects also incorporate problem-solving activities – generally focused towards method selection and project design. By their nature, problems in these contexts are open-ended and contribute to the development and assessment of research and transferable skills.

- Subject specific practical skills. The range of skills developed in practical work requires a variety of assessment types. Student portfolios are used to audit the acquisition of manipulative and practical skills including at-bench evaluation and competency tests. These tests are used for on-going in-class feedback and additionally function as qualification training for independent use of instrumentation. Competence in data acquisition, recording and analysis is assessed through inspection of laboratory records and through structured report sheets contributing to student portfolios for final assessment. Familiarity with a range of formal reporting methods is assessed through formally submitted reports and these allow interrogation of abilities to contextualise laboratory studies, interpret and validate experimental results, and draw conclusions from experimental data. Formal reports form the basis for summative assessment in Practical Chemistry modules.
- Research skills are assessed through individual research projects (at Stage 3 and 4) and group work in mini-projects in Practical chemistry and Professional Practice modules. These include project planning through a portfolio of tasks, execution of the planned work that is assessed continuously by the project supervisor and through the written report, analysis and interpretation of results that are assessed by the written report and individual or group presentation.
- Presentation and written communication skills are assessed at all levels. Written skills are assessed using a range of written tasks that include laboratory reports, scientific articles, job application, literature review, dissertation, professional report. Competence is developed through feedback through the programme Levels with the expectation that students will produce written outputs corresponding with recognised professional practice. These are many-fold but include presentation, structure and quality of writing that would satisfy the criteria for publication. Oral presentations are assessed formatively in group-working and seminar contexts. These include both individual and group presentations. Summative assessment of presentation skills is through group and individual presentations. Peer assessment of presentation skills is additionally used for informal feedback.
- Additional forensic skills are assessed through laboratory notebooks, investigative and evidential statements, case studies and reports, court presentation, crime scene group work

6. Programme Structure

The total number of credit points required for the achievement of Certificate of Higher Education (CertHE) is 120.

The total number of credit points required for the achievement of Diploma of Higher Education (DipHE) is 240.

The total number of credit points required for the achievement of Bachelor of Science with Honours (BSc (Hons)) is 360.

The total number of credit points required for the achievement of Master of Chemistry (MChem) is 480.

Level 1

Title	Credit Rating	Core / Optional
Practical Chemistry 1.1: Fundamental laboratory techniques 2019-20	15	Core
Crime Scene Investigation 2019-20	15	Core
Introduction to Professional Practice 2019-20	15	Core
Core Chemistry 1.1: Introduction to Energy, Change and Electronic Structure 2019-20	30	Core
Practical Chemistry 1.2: Introduction to synthetic methodologies and molecular characterisation 2019-20	15	Core
Core Chemistry 1.2: Molecular Structure, Bonding and Mechanism 2019-20	15	Core
Professional Practice 1.2: Forensic Laboratory Analysis 2019-20	15	Core

Level 2

Title	Credit Rating	Core / Optional
Professional Practice for Forensic Science 2020-21	15	Core
Core Chemistry 2.1: Stability, Structure and Mechanism in Molecular Systems 2020-21	30	Core
Trace Evidence 2020-21	15	Core
Advanced Crime Scene Investigation 2020-21	15	Core
Practical Chemistry 2.1: Organic synthesis, purification and advanced characterisation 2020-21	15	Core
Practical Chemistry 2.2: Inorganic synthesis and structural methods 2020-21	15	Core
Core Chemistry 2.2: Chemistry of Activated Systems and Radicals 2020-21	15	Core

Level 3

Title	Credit Rating	Core / Optional
Drugs of Abuse 2021-22	15	Optional
Forensic Toxicology 2021-22	15	Core
Fire and Explosion Investigation 2021-22	15	Optional
Global Security: Nuclear Forensics and Bioterrorism 2021-22	15	Optional
Core Chemistry 3.1: Defining Shape, Symmetry and Stereochemistry 2021-22	30	Core
Structured project 2021-22	30	Core

Core Chemistry 3.2: Heterogeneous Systems, Surfaces and Nanoscience 2021-22	15	Core
Practical Chemistry 3.1: Advanced techniques in IO-chemistry 2021-22	15	Core
Biological Chemistry 2021-22	15	Optional

Level 4

Title	Credit Rating	Core / Optional
Academic Research Project 2022-23	60	Optional
Professional and Personal Development 2022-23	30	Core
Commercial Research Project 2022-23	60	Optional

Masters

Title	Credit Rating	Core / Optional
Advanced Forensic Toxicology 2022-23	15	Optional
Fire and Explosions 2022-23	15	Optional
Sensors in Forensic Science 2022-23	15	Optional
Method Development and Validation 2022-23	15	Optional
Synthetic Chemistry for Forensic Science 2022-23	15	Optional

Appendix I - Curriculum Map

This table indicates which modules assume responsibility for delivering and ordering particular programme learning outcomes.

Key: Delivered and Assessed Delivered Assessed

Level 1

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
Core Chemistry 1.1: Introduction to Energy, Change and Electronic Structure 2019-20	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>				<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Core Chemistry 1.2: Molecular Structure, Bonding and Mechanism 2019-20	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>				<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>		
Crime Scene Investigation 2019-20						<input checked="" type="checkbox"/>						
Introduction to Professional Practice 2019-20	<input checked="" type="checkbox"/>								<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>		
Practical Chemistry 1.1: Fundamental laboratory techniques 2019-20	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>						<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>		
Practical Chemistry 1.2: Introduction to synthetic methodologies and molecular characterisation 2019-20	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>				<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>		
Professional Practice 1.2: Forensic Laboratory Analysis 2019-20												

	PO13	PO14	PO15	PO16	PO17	PO18	PO19	PO20	PO21	PO22	PO23	PO24
Core Chemistry 1.1: Introduction to Energy, Change and Electronic Structure 2019-20	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>										
Core Chemistry 1.2: Molecular Structure, Bonding and Mechanism 2019-20												
Crime Scene Investigation 2019-20		<input checked="" type="checkbox"/>						<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>			
Introduction to Professional Practice 2019-20	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>								<input checked="" type="checkbox"/>		
Practical Chemistry 1.1: Fundamental laboratory techniques 2019-20						<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>			<input checked="" type="checkbox"/>		

Practical Chemistry 1.2: Introduction to synthetic methodologies and molecular characterisation 2019-20		✓				✓	✓		✓	✓		
Professional Practice 1.2: Forensic Laboratory Analysis 2019-20												
	PO25	PO26	PO27	PO28	PO29	PO30	PO31	PO32	PO33	PO34	PO35	PO36
Core Chemistry 1.1: Introduction to Energy, Change and Electronic Structure 2019-20		✓	✓	✓								
Core Chemistry 1.2: Molecular Structure, Bonding and Mechanism 2019-20			✓	✓								
Crime Scene Investigation 2019-20	✓						✓					
Introduction to Professional Practice 2019-20		✓		✓		✓	✓					
Practical Chemistry 1.1: Fundamental laboratory techniques 2019-20			✓	✓								
Practical Chemistry 1.2: Introduction to synthetic methodologies and molecular characterisation 2019-20			✓	✓								
Professional Practice 1.2: Forensic Laboratory Analysis 2019-20												

Level 2

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
Advanced Crime Scene Investigation 2020-21						✓					✓	✓
Core Chemistry 2.1: Stability, Structure and Mechanism in Molecular Systems 2020-21	✓	✓	✓	✓	✓				✓	✓	✓	✓
Core Chemistry 2.2: Chemistry of Activated Systems and Radicals 2020-21	✓	✓	✓	✓					✓	✓	✓	✓
Practical Chemistry 2.1: Organic synthesis, purification and advanced characterisation				✓						✓	✓	✓

2020-21												
Practical Chemistry 2.2: Inorganic synthesis and structural methods 2020-21	✓	✓		✓						✓	✓	✓
Professional Practice for Forensic Science 2020-21									✓	✓		✓
Trace Evidence 2020-21					✓	✓					✓	✓

	PO13	PO14	PO15	PO16	PO17	PO18	PO19	PO20	PO21	PO22	PO23	PO24
Advanced Crime Scene Investigation 2020-21		✓							✓			
Core Chemistry 2.1: Stability, Structure and Mechanism in Molecular Systems 2020-21	✓	✓										
Core Chemistry 2.2: Chemistry of Activated Systems and Radicals 2020-21												
Practical Chemistry 2.1: Organic synthesis, purification and advanced characterisation 2020-21		✓				✓	✓		✓	✓		
Practical Chemistry 2.2: Inorganic synthesis and structural methods 2020-21		✓					✓	✓	✓	✓		
Professional Practice for Forensic Science 2020-21		✓								✓		
Trace Evidence 2020-21		✓										

	PO25	PO26	PO27	PO28	PO29	PO30	PO31	PO32	PO33	PO34	PO35	PO36
Advanced Crime Scene Investigation 2020-21							✓					
Core Chemistry 2.1: Stability, Structure and Mechanism in Molecular Systems 2020-21		✓	✓	✓								
Core Chemistry 2.2: Chemistry of Activated Systems and Radicals 2020-21			✓	✓								
Practical Chemistry 2.1: Organic synthesis, purification and advanced characterisation 2020-21			✓	✓								
Practical Chemistry 2.2: Inorganic synthesis and structural methods 2020-21		✓	✓	✓								

Professional Practice for Forensic Science 2020-21		✓		✓	✓							
Trace Evidence 2020-21												

Level 3

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
Biological Chemistry 2021-22	✓		✓	✓		✓	✓	✓	✓	✓		✓
Core Chemistry 3.1: Defining Shape, Symmetry and Stereochemistry 2021-22	✓	✓	✓	✓	✓				✓	✓	✓	✓
Core Chemistry 3.2: Heterogeneous Systems, Surfaces and Nanoscience 2021-22	✓	✓	✓	✓	✓				✓	✓	✓	✓
Drugs of Abuse 2021-22					✓	✓			✓		✓	✓
Fire and Explosion Investigation 2021-22	✓	✓	✓		✓	✓			✓	✓	✓	✓
Forensic Toxicology 2021-22	✓		✓		✓	✓			✓	✓	✓	✓
Global Security: Nuclear Forensics and Bioterrorism 2021-22	✓	✓			✓		✓	✓	✓	✓	✓	✓
Practical Chemistry 3.1: Advanced techniques in IO-chemistry 2021-22	✓	✓	✓	✓	✓	✓			✓	✓	✓	✓
Structured project 2021-22	✓				✓						✓	✓

	PO13	PO14	PO15	PO16	PO17	PO18	PO19	PO20	PO21	PO22	PO23	PO24
Biological Chemistry 2021-22								✓		✓		
Core Chemistry 3.1: Defining Shape, Symmetry and Stereochemistry 2021-22	✓	✓										
Core Chemistry 3.2: Heterogeneous Systems, Surfaces and Nanoscience 2021-22	✓	✓										
Drugs of Abuse 2021-22		✓						✓		✓		
Fire and Explosion Investigation 2021-22		✓					✓	✓		✓		
Forensic Toxicology 2021-22		✓					✓	✓	✓	✓		
Global Security: Nuclear Forensics and		✓	✓									

Bioterrorism 2021-22													
Practical Chemistry 3.1: Advanced techniques in IO-chemistry 2021-22		✓					✓	✓	✓	✓			
Structured project 2021-22	✓	✓						✓	✓	✓			
	PO25	PO26	PO27	PO28	PO29	PO30	PO31	PO32	PO33	PO34	PO35	PO36	
Biological Chemistry 2021-22													
Core Chemistry 3.1: Defining Shape, Symmetry and Stereochemistry 2021-22		✓	✓	✓									
Core Chemistry 3.2: Heterogeneous Systems, Surfaces and Nanoscience 2021-22			✓	✓	✓	✓							
Drugs of Abuse 2021-22		✓	✓										
Fire and Explosion Investigation 2021-22		✓	✓	✓	✓	✓							
Forensic Toxicology 2021-22		✓	✓	✓	✓	✓							
Global Security: Nuclear Forensics and Bioterrorism 2021-22			✓	✓									
Practical Chemistry 3.1: Advanced techniques in IO-chemistry 2021-22		✓		✓		✓	✓						
Structured project 2021-22	✓	✓		✓	✓			✓					

Level 4

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	
Academic Research Project 2022-23	✓	✓			✓	✓	✓	✓	✓	✓	✓	✓	✓
Commercial Research Project 2022-23													
Professional and Personal Development 2022-23					✓	✓		✓			✓		
	PO13	PO14	PO15	PO16	PO17	PO18	PO19	PO20	PO21	PO22	PO23	PO24	
Academic Research Project 2022-23	✓	✓	✓	✓	✓					✓	✓	✓	
Commercial Research Project 2022-23													

Professional and Personal Development 2022-23		✓											✓
	PO25	PO26	PO27	PO28	PO29	PO30	PO31	PO32	PO33	PO34	PO35	PO36	
Academic Research Project 2022-23		✓	✓	✓	✓	✓		✓		✓	✓	✓	
Commercial Research Project 2022-23													
Professional and Personal Development 2022-23		✓				✓		✓	✓	✓	✓	✓	

Masters

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
Advanced Forensic Toxicology 2022-23	✓		✓		✓	✓	✓	✓	✓	✓	✓	✓
Fire and Explosions 2022-23	✓	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓
Method Development and Validation 2022-23							✓		✓		✓	✓
Sensors in Forensic Science 2022-23	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Synthetic Chemistry for Forensic Science 2022-23	✓	✓	✓	✓	✓		✓		✓	✓	✓	✓

	PO13	PO14	PO15	PO16	PO17	PO18	PO19	PO20	PO21	PO22	PO23	PO24
Advanced Forensic Toxicology 2022-23	✓	✓	✓	✓				✓	✓	✓		
Fire and Explosions 2022-23	✓	✓	✓	✓				✓	✓	✓		
Method Development and Validation 2022-23			✓	✓						✓		
Sensors in Forensic Science 2022-23	✓	✓	✓	✓		✓	✓	✓	✓	✓	✓	✓
Synthetic Chemistry for Forensic Science 2022-23	✓	✓	✓				✓	✓	✓		✓	✓

	PO25	PO26	PO27	PO28	PO29	PO30	PO31	PO32	PO33	PO34	PO35	PO36
Advanced Forensic Toxicology 2022-23		✓	✓	✓	✓	✓						
Fire and Explosions 2022-23		✓	✓	✓	✓	✓						
Method Development and Validation 2022-23	✓		✓	✓								

Sensors in Forensic Science 2022-23	✓	✓	✓	✓	✓	✓	✓	✓		✓	✓	✓
Synthetic Chemistry for Forensic Science 2022-23		✓	✓	✓	✓	✓						

Appendix II - Assessment Map

This table indicates the spread of assessment activity across the programme. Percentages indicate assessment weighting.

Level 1

	01	02	03	04	05	06	07	08	09	10	11	12
Core Chemistry 1.1: Introduction to Energy, Change and Electronic Structure 2019-20												30
Core Chemistry 1.2: Molecular Structure, Bonding and Mechanism 2019-20												
Crime Scene Investigation 2019-20												
Introduction to Professional Practice 2019-20												
Practical Chemistry 1.1: Fundamental laboratory techniques 2019-20												
Practical Chemistry 1.2: Introduction to synthetic methodologies and molecular characterisation 2019-20												
Professional Practice 1.2: Forensic Laboratory Analysis 2019-20												
	13	14	15	16	17	18	19	20	21	22	23	24
Core Chemistry 1.1: Introduction to Energy, Change and Electronic Structure 2019-20				70								
Core Chemistry 1.2: Molecular Structure, Bonding and Mechanism 2019-20												
Crime Scene Investigation 2019-20												50
Introduction to Professional Practice 2019-20	25			75								
Practical Chemistry 1.1: Fundamental laboratory techniques 2019-20	100											
Practical Chemistry 1.2: Introduction to synthetic methodologies and molecular												

characterisation 2019-20												
Professional Practice 1.2: Forensic Laboratory Analysis 2019-20												
	25	26	27	28	29	30	31	32	33	34	35	36
Core Chemistry 1.1: Introduction to Energy, Change and Electronic Structure 2019-20												
Core Chemistry 1.2: Molecular Structure, Bonding and Mechanism 2019-20							30					
Crime Scene Investigation 2019-20		50										
Introduction to Professional Practice 2019-20												
Practical Chemistry 1.1: Fundamental laboratory techniques 2019-20												
Practical Chemistry 1.2: Introduction to synthetic methodologies and molecular characterisation 2019-20				30		70						
Professional Practice 1.2: Forensic Laboratory Analysis 2019-20						50						
	37	38	39	40	41	42	43	44	45	46	47	48
Core Chemistry 1.1: Introduction to Energy, Change and Electronic Structure 2019-20												
Core Chemistry 1.2: Molecular Structure, Bonding and Mechanism 2019-20												
Crime Scene Investigation 2019-20												
Introduction to Professional Practice 2019-20												
Practical Chemistry 1.1: Fundamental laboratory techniques 2019-20												
Practical Chemistry 1.2: Introduction to synthetic methodologies and molecular characterisation 2019-20												
Professional Practice 1.2: Forensic Laboratory Analysis 2019-20												

	49	50	51	52	EP 1 (Wk 16)	EP 2 (Wks 33, 34, 35)
Core Chemistry 1.1: Introduction to Energy, Change and Electronic Structure 2019-20						
Core Chemistry 1.2: Molecular Structure, Bonding and Mechanism 2019-20						70
Crime Scene Investigation 2019-20						
Introduction to Professional Practice 2019-20						
Practical Chemistry 1.1: Fundamental laboratory techniques 2019-20						
Practical Chemistry 1.2: Introduction to synthetic methodologies and molecular characterisation 2019-20						
Professional Practice 1.2: Forensic Laboratory Analysis 2019-20						50

Level 2

	01	02	03	04	05	06	07	08	09	10	11	12
Advanced Crime Scene Investigation 2020-21												
Core Chemistry 2.1: Stability, Structure and Mechanism in Molecular Systems 2020-21												30
Core Chemistry 2.2: Chemistry of Activated Systems and Radicals 2020-21												
Practical Chemistry 2.1: Organic synthesis, purification and advanced characterisation 2020-21										70		
Practical Chemistry 2.2: Inorganic synthesis and structural methods 2020-21												
Professional Practice for Forensic Science 2020-21												
Trace Evidence 2020-21										50		

	13	14	15	16	17	18	19	20	21	22	23	24
Advanced Crime Scene Investigation 2020-21											50	50
Core Chemistry 2.1: Stability, Structure and Mechanism in Molecular Systems 2020-21				70								
Core Chemistry 2.2: Chemistry of Activated Systems and Radicals 2020-21												
Practical Chemistry 2.1: Organic synthesis, purification and advanced characterisation 2020-21	30											
Practical Chemistry 2.2: Inorganic synthesis and structural methods 2020-21												
Professional Practice for Forensic Science 2020-21	50			50								
Trace Evidence 2020-21		50										
	25	26	27	28	29	30	31	32	33	34	35	36
Advanced Crime Scene Investigation 2020-21												
Core Chemistry 2.1: Stability, Structure and Mechanism in Molecular Systems 2020-21												
Core Chemistry 2.2: Chemistry of Activated Systems and Radicals 2020-21							30					
Practical Chemistry 2.1: Organic synthesis, purification and advanced characterisation 2020-21												
Practical Chemistry 2.2: Inorganic synthesis and structural methods 2020-21							70	30				
Professional Practice for Forensic Science 2020-21												
Trace Evidence 2020-21												
	37	38	39	40	41	42	43	44	45	46	47	48
Advanced Crime Scene Investigation 2020-21												

Core Chemistry 3.1: Defining Shape, Symmetry and Stereochemistry 2021-22													30
Core Chemistry 3.2: Heterogeneous Systems, Surfaces and Nanoscience 2021-22													
Drugs of Abuse 2021-22													
Fire and Explosion Investigation 2021-22												50	
Forensic Toxicology 2021-22					50								
Global Security: Nuclear Forensics and Bioterrorism 2021-22													
Practical Chemistry 3.1: Advanced techniques in IO-chemistry 2021-22													
Structured project 2021-22													

	13	14	15	16	17	18	19	20	21	22	23	24
Biological Chemistry 2021-22												
Core Chemistry 3.1: Defining Shape, Symmetry and Stereochemistry 2021-22				70								
Core Chemistry 3.2: Heterogeneous Systems, Surfaces and Nanoscience 2021-22												
Drugs of Abuse 2021-22											50	50
Fire and Explosion Investigation 2021-22												
Forensic Toxicology 2021-22												
Global Security: Nuclear Forensics and Bioterrorism 2021-22												100
Practical Chemistry 3.1: Advanced techniques in IO-chemistry 2021-22	70			30								
Structured project 2021-22												

	25	26	27	28	29	30	31	32	33	34	35	36
Biological Chemistry 2021-22	50											
Core Chemistry 3.1: Defining Shape, Symmetry and Stereochemistry 2021-22												
Core Chemistry 3.2: Heterogeneous							30					

Systems, Surfaces and Nanoscience 2021-22													
Drugs of Abuse 2021-22													
Fire and Explosion Investigation 2021-22													
Forensic Toxicology 2021-22													
Global Security: Nuclear Forensics and Bioterrorism 2021-22													
Practical Chemistry 3.1: Advanced techniques in IO-chemistry 2021-22													
Structured project 2021-22				75		25							
	37	38	39	40	41	42	43	44	45	46	47	48	
Biological Chemistry 2021-22													
Core Chemistry 3.1: Defining Shape, Symmetry and Stereochemistry 2021-22													
Core Chemistry 3.2: Heterogeneous Systems, Surfaces and Nanoscience 2021-22													
Drugs of Abuse 2021-22													
Fire and Explosion Investigation 2021-22													
Forensic Toxicology 2021-22													
Global Security: Nuclear Forensics and Bioterrorism 2021-22													
Practical Chemistry 3.1: Advanced techniques in IO-chemistry 2021-22													
Structured project 2021-22													
							49	50	51	52	EP 1 (Wk 16)	EP 2 (Wks 33, 34, 35)	
Biological Chemistry 2021-22												50	
Core Chemistry 3.1: Defining Shape, Symmetry and Stereochemistry 2021-22													
Core Chemistry 3.2: Heterogeneous Systems, Surfaces and Nanoscience 2021-22												70	

Drugs of Abuse 2021-22												
Fire and Explosion Investigation 2021-22											50	
Forensic Toxicology 2021-22											50	
Global Security: Nuclear Forensics and Bioterrorism 2021-22												
Practical Chemistry 3.1: Advanced techniques in IO-chemistry 2021-22												
Structured project 2021-22												

Level 4

	01	02	03	04	05	06	07	08	09	10	11	12
Academic Research Project 2022-23												20
Commercial Research Project 2022-23												20
Professional and Personal Development 2022-23					30							
	13	14	15	16	17	18	19	20	21	22	23	24
Academic Research Project 2022-23												
Commercial Research Project 2022-23											60	20
Professional and Personal Development 2022-23												
	25	26	27	28	29	30	31	32	33	34	35	36
Academic Research Project 2022-23							60	20				
Commercial Research Project 2022-23												
Professional and Personal Development 2022-23							70					
	37	38	39	40	41	42	43	44	45	46	47	48
Academic Research Project 2022-23												
Commercial Research Project 2022-23												
Professional and Personal Development												

2022-23													
							49	50	51	52	EP 1 (Wk 16)	EP 2 (Wks 33, 34, 35)	
Academic Research Project 2022-23													
Commercial Research Project 2022-23													
Professional and Personal Development 2022-23													

Masters

	01	02	03	04	05	06	07	08	09	10	11	12
Advanced Forensic Toxicology 2022-23												
Fire and Explosions 2022-23								50				
Method Development and Validation 2022-23											50	
Sensors in Forensic Science 2022-23												
Synthetic Chemistry for Forensic Science 2022-23												
	13	14	15	16	17	18	19	20	21	22	23	24
Advanced Forensic Toxicology 2022-23												50
Fire and Explosions 2022-23												
Method Development and Validation 2022-23					50							
Sensors in Forensic Science 2022-23												50
Synthetic Chemistry for Forensic Science 2022-23												
	25	26	27	28	29	30	31	32	33	34	35	36
Advanced Forensic Toxicology 2022-23												

Fire and Explosions 2022-23													
Method Development and Validation 2022-23													
Sensors in Forensic Science 2022-23								50					
Synthetic Chemistry for Forensic Science 2022-23					50			50					
	37	38	39	40	41	42	43	44	45	46	47	48	
Advanced Forensic Toxicology 2022-23													
Fire and Explosions 2022-23													
Method Development and Validation 2022-23													
Sensors in Forensic Science 2022-23													
Synthetic Chemistry for Forensic Science 2022-23													
							49	50	51	52	EP 1 (Wk 16)	EP 2 (Wks 33, 34, 35)	
Advanced Forensic Toxicology 2022-23												50	
Fire and Explosions 2022-23											50		
Method Development and Validation 2022-23													
Sensors in Forensic Science 2022-23													
Synthetic Chemistry for Forensic Science 2022-23													

Appendix III - Benchmark Analysis

This table maps programme learning outcomes to relevant QAA subject benchmark statements or PSRB guidelines.

Knowledge and Understanding

	ChemHons 01	ChemHons 02	ChemHons 03	ChemHons 04	ChemHons 05	ChemHons 06	ChemHons 07	ChemHons 08	ChemMstr0 1
PO1	✓				✓				✓
PO2	✓				✓				✓
PO3	✓				✓				✓
PO4	✓				✓				✓
PO5	✓				✓				✓
PO6	✓				✓				✓
PO7	✓				✓				✓
PO8	✓				✓				✓

	ChemMstr0 2	ChemMstr0 3	ChemMstr0 4	ChemMstr0 5	FSci01	FSci02	FSci03	FSci04	FSci05
PO1					✓				
PO2					✓				
PO3					✓				
PO4					✓				
PO5					✓	✓			
PO6					✓	✓			✓
PO7					✓	✓			✓
PO8					✓				

	FSci06	FSci07	FSci08	FSci09	FSci10	FSci11	FSci12	FSci13	FSci14
PO1									
PO2									
PO3									

PO4									
PO5									
PO6		✓							
PO7		✓		✓					
PO8				✓					

	FSci15	FSci16	FSci17	FSci18	FSci19	FSci20	FSci21	FSci22	FSci23
PO1	✓								
PO2	✓								
PO3	✓								
PO4	✓								
PO5	✓								
PO6	✓	✓			✓		✓		
PO7	✓	✓			✓		✓		✓
PO8	✓	✓							✓

	FSci24	FSci25	FSci26	FSci27	FSci28	FSci29	FSci30	FSci31	FSci32
PO1									
PO2									
PO3									
PO4									
PO5									
PO6						✓	✓		
PO7									
PO8									

	FSci33	FSci34	FSci35	FSci36	FSci37	FSci38	FSci39	FSci40	FSci41
PO1									
PO2									
PO3									
PO4									
PO5					✓				✓
PO6	✓	✓							

PO7									
PO8									
	FSci42	FSci43	FSci44	FSci45	FSci46	FSci47	FSci48	FSci49	FSci50
PO1									
PO2									
PO3									
PO4									
PO5					✓				✓
PO6							✓		
PO7							✓		
PO8									
	FSci51	FSci52	FSci53	FSci54	FSci55	FSci56	FSci57	FSci58	FSci59
PO1									
PO2									
PO3									
PO4									
PO5			✓						
PO6		✓	✓						
PO7		✓	✓	✓		✓			
PO8			✓	✓		✓			
							FSci60	FSci61	FSci62
PO1									
PO2									
PO3									
PO4									
PO5									
PO6									
PO7									
PO8									

Subject Specific Intellectual Skills

	ChemHons 01	ChemHons 02	ChemHons 03	ChemHons 04	ChemHons 05	ChemHons 06	ChemHons 07	ChemHons 08	ChemMstr0 1
PO9	✓				✓				✓
PO10	✓	✓			✓	✓			
PO11		✓				✓			
PO12		✓			✓	✓			✓
PO13					✓	✓			
PO14	✓			✓	✓			✓	✓
PO15									
PO16									
PO17									

	ChemMstr0 2	ChemMstr0 3	ChemMstr0 4	ChemMstr0 5	FSci01	FSci02	FSci03	FSci04	FSci05
PO9					✓				
PO10	✓								
PO11	✓							✓	
PO12	✓								
PO13									
PO14				✓					
PO15	✓								
PO16			✓						
PO17			✓						

	FSci06	FSci07	FSci08	FSci09	FSci10	FSci11	FSci12	FSci13	FSci14
PO9									
PO10									
PO11									
PO12	✓								
PO13									

PO14			✓						
PO15									
PO16									
PO17									

	FSci15	FSci16	FSci17	FSci18	FSci19	FSci20	FSci21	FSci22	FSci23
PO9	✓								
PO10									
PO11				✓					
PO12						✓			
PO13									
PO14								✓	
PO15									
PO16									
PO17									

	FSci24	FSci25	FSci26	FSci27	FSci28	FSci29	FSci30	FSci31	FSci32
PO9									
PO10									
PO11								✓	
PO12									
PO13									
PO14									✓
PO15									
PO16									
PO17									

	FSci33	FSci34	FSci35	FSci36	FSci37	FSci38	FSci39	FSci40	FSci41
PO9									
PO10									
PO11			✓			✓			
PO12									
PO13									

PO14				✓				✓	
PO15									
PO16									
PO17									

	FSci42	FSci43	FSci44	FSci45	FSci46	FSci47	FSci48	FSci49	FSci50
PO9									
PO10									
PO11									
PO12				✓				✓	
PO13									
PO14			✓			✓			
PO15									
PO16									
PO17									

	FSci51	FSci52	FSci53	FSci54	FSci55	FSci56	FSci57	FSci58	FSci59
PO9									
PO10									
PO11								✓	
PO12									
PO13									
PO14	✓								
PO15								✓	
PO16			✓						
PO17				✓					

	FSci60	FSci61	FSci62
PO9			
PO10			
PO11			
PO12		✓	
PO13			

PO14			
PO15			
PO16		✓	
PO17			

Subject Specific Practical Skills

	ChemHons 01	ChemHons 02	ChemHons 03	ChemHons 04	ChemHons 05	ChemHons 06	ChemHons 07	ChemHons 08	ChemMstr0 1
PO18			✓				✓		
PO19			✓				✓		
PO20			✓				✓		
PO21			✓				✓		
PO22									
PO23									
PO24									
PO25									

	ChemMstr0 2	ChemMstr0 3	ChemMstr0 4	ChemMstr0 5	FSci01	FSci02	FSci03	FSci04	FSci05
PO18		✓	✓				✓	✓	
PO19		✓					✓	✓	
PO20		✓	✓				✓	✓	
PO21		✓	✓						
PO22		✓	✓						
PO23		✓	✓						
PO24		✓	✓						
PO25			✓						

	FSci06	FSci07	FSci08	FSci09	FSci10	FSci11	FSci12	FSci13	FSci14
PO18							✓	✓	

PO19									
PO20			✓						✓
PO21									
PO22	✓								
PO23									
PO24									
PO25						✓			

	FSci15	FSci16	FSci17	FSci18	FSci19	FSci20	FSci21	FSci22	FSci23
PO18			✓						
PO19			✓	✓					
PO20			✓	✓				✓	
PO21			✓	✓					
PO22						✓			
PO23									
PO24									
PO25									

	FSci24	FSci25	FSci26	FSci27	FSci28	FSci29	FSci30	FSci31	FSci32
PO18			✓	✓			✓		
PO19									
PO20					✓				✓
PO21									
PO22									
PO23									
PO24									
PO25									

	FSci33	FSci34	FSci35	FSci36	FSci37	FSci38	FSci39	FSci40	FSci41
PO18		✓							
PO19						✓	✓		
PO20				✓				✓	
PO21									

PO22									
PO23									
PO24									
PO25									

	FSci42	FSci43	FSci44	FSci45	FSci46	FSci47	FSci48	FSci49	FSci50
PO18									
PO19	✓	✓							
PO20			✓	✓				✓	
PO21									
PO22				✓	✓			✓	✓
PO23									
PO24									
PO25									

	FSci51	FSci52	FSci53	FSci54	FSci55	FSci56	FSci57	FSci58	FSci59
PO18									
PO19									
PO20									
PO21									
PO22									
PO23					✓	✓			✓
PO24					✓			✓	
PO25									

	FSci60	FSci61	FSci62
PO18			
PO19			
PO20			
PO21			
PO22			
PO23			
PO24	✓		

PO25

Transferable Skills and Attributes

	ChemHons 01	ChemHons 02	ChemHons 03	ChemHons 04	ChemHons 05	ChemHons 06	ChemHons 07	ChemHons 08	ChemMstr0 1
PO26				✓				✓	
PO27		✓		✓		✓		✓	
PO28				✓				✓	
PO29				✓				✓	
PO30				✓				✓	
PO31				✓				✓	
PO32				✓				✓	
PO33				✓				✓	
PO34				✓				✓	
PO35				✓				✓	
PO36				✓				✓	

	ChemMstr0 2	ChemMstr0 3	ChemMstr0 4	ChemMstr0 5	FSci01	FSci02	FSci03	FSci04	FSci05
PO26				✓					
PO27	✓			✓					
PO28				✓	✓				
PO29				✓					
PO30				✓					
PO31				✓					
PO32				✓					
PO33				✓					
PO34				✓					
PO35				✓					
PO36				✓					

	FSci06	FSci07	FSci08	FSci09	FSci10	FSci11	FSci12	FSci13	FSci14
PO26									
PO27									
PO28									
PO29									
PO30									
PO31									
PO32									
PO33									
PO34									
PO35									
PO36					✓				

	FSci15	FSci16	FSci17	FSci18	FSci19	FSci20	FSci21	FSci22	FSci23
PO26									
PO27									
PO28	✓								
PO29									
PO30									
PO31									
PO32									
PO33									
PO34									
PO35									
PO36									

	FSci24	FSci25	FSci26	FSci27	FSci28	FSci29	FSci30	FSci31	FSci32
PO26									
PO27									
PO28									
PO29									
PO30									

PO31							✓		
PO32							✓		
PO33									
PO34									
PO35									
PO36	✓								

	FSci33	FSci34	FSci35	FSci36	FSci37	FSci38	FSci39	FSci40	FSci41
PO26								✓	
PO27									
PO28									
PO29									
PO30									
PO31		✓							
PO32		✓							
PO33									
PO34									
PO35									
PO36									

	FSci42	FSci43	FSci44	FSci45	FSci46	FSci47	FSci48	FSci49	FSci50
PO26				✓		✓			
PO27									
PO28					✓				✓
PO29									
PO30									
PO31									
PO32									
PO33									
PO34									
PO35									
PO36									

	FSci51	FSci52	FSci53	FSci54	FSci55	FSci56	FSci57	FSci58	FSci59
PO26	✓								
PO27					✓			✓	
PO28									
PO29						✓			
PO30						✓			
PO31									
PO32						✓			
PO33									
PO34					✓	✓		✓	
PO35					✓	✓			
PO36									

	FSci60	FSci61	FSci62
PO26			
PO27		✓	
PO28			
PO29			
PO30			
PO31			
PO32			
PO33		✓	
PO34		✓	
PO35		✓	
PO36			✓

Appendix IV: Benchmark Benchmark Statement(s)

ChemHons01 - *A basic knowledge and understanding of the content covered in the course is evident.*

ChemHons02 - *Problems of a routine nature are generally adequately solved.*

ChemHons03 - *Standard laboratory experiments can be carried out safely and with reasonable success though the significance and limitations of experimental data and/or observations may not be fully recognised.*

ChemHons04 - *Generic skills have been developed to a basic level.*

ChemHons05 - *Knowledge base covers essential aspects of subject matter dealt with in the programme and shows some evidence of enquiry beyond this. Conceptual understanding is good.*

ChemHons06 - *Problems of a familiar nature are solved in a logical manner, and solutions are generally correct or acceptable.*

ChemHons07 - *Experimental work is carried out in a reliable and efficient manner.*

ChemHons08 - *Performance in generic skills is sound and shows no significant deficiencies.*

ChemMstr01 - *Knowledge base extends to a systematic understanding and critical awareness of topics which are informed by the forefront of the discipline.*

ChemMstr02 - *Problems of an unfamiliar nature are tackled with appropriate methodology and taking into account the possible absence of complete data.*

ChemMstr03 - *Experimental work is carried out independently and with some originality.*

ChemMstr04 - *Substantial research project at the forefront of the discipline is completed effectively.*

ChemMstr05 - *Generic skills are developed appropriately for professional practice.*

FSci01 - *Generic: Demonstrate a basic knowledge of the relevant sciences, including mathematics and statistics (including the Bayesian approach), involved in forensic investigation*

FSci02 - *Generic: Demonstrate a basic knowledge of forensic techniques*

FSci03 - *Generic: Demonstrate competence in basic laboratory skills and procedures*

FSci04 - *Generic: Demonstrate an ability to select and carry out practical laboratory experiments in forensic investigations, including the use of relevant standard equipment*

FSci05 - *Generic: Demonstrate an awareness of the general issues and techniques involved in crime scene investigation*

FSci06 - *Generic: Demonstrate an ability to interpret laboratory and other investigations, with a satisfactory awareness of the limitations of the methods used*

FSci07 - Generic: *Demonstrate an awareness of the various legal and law enforcement environments within which forensic science is practiced*

FSci08 - Generic: *Demonstrate an ability to record accurately, organise data, make rational deductions and present the results of an investigation both in written and oral forms*

FSci09 - Generic: *Demonstrate an awareness of how scientific and technical progress is made within the discipline*

FSci10 - Generic: *Demonstrate an ability to develop appropriate strategies to enable continuing professional development*

FSci11 - Generic: *Demonstrate an awareness of, and commitment to, the ethical and legal obligations of science and particularly forensic science*

FSci12 - Generic: *Demonstrate an awareness of, and respect for, issues and practices involved with the handling, storage and investigation of human tissues, DNA and other trace evidential materials*

FSci13 - Generic: *Demonstrate an ability to comply with safe working practices, both for self and others*

FSci14 - Generic: *Demonstrate an awareness of quality assurance procedures within a forensic science context*

FSci15 - Generic: *Demonstrate a good knowledge of those sciences, including mathematics and statistics (including the Bayesian approach), involved in forensic investigation*

FSci16 - Generic: *Demonstrate a good knowledge of forensic techniques*

FSci17 - Generic: *Demonstrate confidence in laboratory skills and procedures*

FSci18 - Generic: *Demonstrate an ability to select, carry out and develop practical laboratory experiments in forensic investigations, including the use of relevant laboratory equipment*

FSci19 - Generic: *Demonstrate a good knowledge of the general issues and techniques involved in crime scene investigations*

FSci20 - Generic: *Demonstrate an ability to interpret the results of laboratory and other investigations, with a thorough appreciation of their limitations*

FSci21 - Generic: *Demonstrate a good knowledge of the various legal and law enforcement environments within which forensic science is practiced*

FSci22 - Generic: *Demonstrate an ability to record results accurately, organise data, make rational deductions and present clearly the results of investigations both in written and oral form, in a manner which can be readily assimilated within a legal, law...*

FSci23 - Generic: *Demonstrate a critical appreciation of how progress is made within the discipline*

FSci24 - *Generic: Demonstrate an evidenced commitment to continuing professional development*

FSci25 - *Generic: Demonstrate a knowledge of, and commitment to, the ethical and legal obligations of science and particularly forensic science*

FSci26 - *Generic: Demonstrate a good knowledge of and respect for issues and practices involved with the handling, storage and investigation of human tissues, DNA and other trace evidential material*

FSci27 - *Generic: Demonstrate competence in safe working practices, both for self and others*

FSci28 - *Generic: Demonstrate a critical appreciation of quality assurance procedures within a forensic science context*

FSci29 - *Crime scene investigation: Demonstrate a knowledge of the principal techniques and skills required for the recognition, processing, recording, preservation, recovery, scientific analysis and interpretation of evidence at and from a range of crime...*

FSci30 - *Crime scene investigation: Demonstrate familiarity with the responsibilities, roles and liabilities of those involved in a crime scene investigation, and an ability to work effectively within such a team*

FSci31 - *Crime scene investigation: Demonstrate the ability to construct and manage investigation strategies*

FSci32 - *Crime scene investigation: Demonstrate appropriate written and oral communication skills*

FSci33 - *Crime scene investigation: Demonstrate a wide knowledge of the techniques and skills required for the collection, processing, recording, preservation and interpretation of evidence at a crime scene*

FSci34 - *Crime scene investigation: Demonstrate a clear understanding of the responsibilities, roles and liabilities of those involved in a crime scene investigation, and an ability to work effectively and contribute positively within such a team*

FSci35 - *Crime scene investigation: Demonstrate the ability to construct and manage efficient investigation strategies*

FSci36 - *Crime scene investigation: Demonstrate good written and oral communication skills*

FSci37 - *Laboratory analysis: Demonstrate a knowledge of the theory and application of the principal laboratory methods used routinely in forensic science*

FSci38 - *Laboratory analysis: Demonstrate an ability to select and use a range of methods used in the location, identification, recovery, extraction and scientific analysis of commonly encountered physical, chemical and biological materials and marks,...*

FSci39 - *Laboratory analysis: Demonstrate an ability to adhere to contamination avoidance procedures*

FSci40 - *Laboratory analysis: Demonstrate satisfactory written and oral communication skills*

FSci41 - *Laboratory analysis: Demonstrate a wide knowledge of the theory and application of the laboratory methods used in forensic science*

FSci42 - *Laboratory analysis: Demonstrate competence in the selection, use and development of a range of methods used in the location, identification, recovery, extraction and scientific analysis of commonly encountered physical, chemical and biological...*

FSci43 - *Laboratory analysis: Demonstrate an ability to adhere to and develop contamination avoidance procedures*

FSci44 - *Laboratory analysis: Demonstrate good written and oral communication skills*

FSci45 - *Interpretation, evaluation and presentation of evidence: Demonstrate the ability to manage, interpret and communicate forensic evidence and experimental results in the context of casework, including expert opinion*

FSci46 - *Interpretation, evaluation and presentation of evidence: Demonstrate the ability to recognise and communicate levels of uncertainty in evidence or experimental data*

FSci47 - *Interpretation, evaluation and presentation of evidence: Demonstrate the ability to prepare and deliver impartial and comprehensible oral and written reports in a variety of legal and law enforcement situations, including those involving the public*

FSci48 - *Interpretation, evaluation and presentation of evidence: Demonstrate a working knowledge of prevailing legal standards applicable to evidence, including digital data*

FSci49 - *Interpretation, evaluation and presentation of evidence: Demonstrate the ability to effectively manage, critically interpret and clearly communicate forensic evidence and experimental results in the context of casework, including expert opinion*

FSci50 - *Interpretation, evaluation and presentation of evidence: Demonstrate the ability to quantify and clearly communicate levels of uncertainty in evidence or experimental data*

FSci51 - *Interpretation, evaluation and presentation of evidence: Demonstrate the ability to prepare and deliver impartial, comprehensible and comprehensive oral and written reports in a wide variety of legal and law enforcement situations, including those...*

FSci52 - *Interpretation, evaluation and presentation of evidence: Demonstrate a good working knowledge of prevailing legal standards applicable to evidence, including digital data*

FSci53 - *Master's degrees: Demonstrate either a deep specialist knowledge and experience of techniques within a particular area of forensic science, or a wide knowledge and critical awareness of the whole discipline*

FSci54 - *Master's degrees: Demonstrate engagement and familiarity with recent and current research methods, results and publications*

FSci55 - *Master's degrees: Demonstrate an effective self-critical attitude in planning, carrying out and reporting investigations*

FSci56 - *Master's degrees: Demonstrate the abilities and skills necessary to devise, plan, carry out and report an original investigation or research project*

FSci57 - *Master's degrees: Demonstrate a clear recognition of the constraints and opportunities of the environment in which professional forensic science is carried out*

FSci58 - *Master's Degrees: Demonstrate self-direction and originality in applying and adapting problem-solving skills to unfamiliar, complex and open-ended situations*

FSci59 - *Master's degrees: Demonstrate an open and innovative attitude in the ability to plan and execute new experimental procedures*

FSci60 - *Master's degrees: Demonstrate a familiarity with the moral and ethical issues involved in the practice of forensic science*

FSci61 - *Master's degrees: Demonstrate confidence in their ability to interpret complex technical information and to communicate it in a wide variety of professional situations*

FSci62 - *Master's degrees: Demonstrate the independent learning ability required for continuing professional development*