Nottingham Trent University Programme Specification

	Basic Programme Information	
1	Awarding Institution:	Nottingham Trent University
2	School/Campus:	School of Science and Technology
3	Final Award, Programme Title, and Modes of Study	MSc Chemistry, Full Time and Part Time
4	Normal Duration:	12 moths FT; 24-36 months PT
5	UCAS code:	CHEM059

6 **Overview and general educational aims of the programme**

This exciting programme in Chemistry is designed to give you the theoretical and practical skills needed to enter a career in chemistry or an allied science either in an academic institution, a research institute or in the industrial/business sector. In particular, it will give you the opportunity to develop applied chemical knowledge and your chemistry practical skills. It will also enable you to develop an ability to plan a research project, apply effective data analysis skills to your results, and to communicate your findings in an articulate and professional manner.

This course is ideal if you are:

- a recently qualified graduate with the equivalent of a good UK honours degree chemistry and are looking for the professional skills needed to obtain a job in chemical sciences related area or a career in academic research in the general area of chemistry;
- are working for a company in chemical science or an allied science and want a masters-level qualification to give you a competitive edge;
- are a graduate of a general science degree with some chemistry content (examples include: forensic science, biochemistry, pharmacy, environmental science, etc.) and are interested in broadening your career options.
- are a student in any one of these groups who is interested in a bridging degree programme between your undergraduate programme and doctoral study.

In summary, the programme aims to:

- provide an intellectually challenging and professionally relevant programme at the forefront of chemistry, led by academic and professional experts;
- explain how the boundaries of knowledge in this discipline are advanced through research and enable you to conduct research through a chemistry research project;
- give you opportunities to deal with complex issues in a systematic and creative way and show originality in solving problems;
- develop the theoretical and practical skills needed to plan and execute a laboratory-based chemistry research project;
- produce post-graduates who have sound judgement, personal responsibility and initiative, thus making them attractive to employers and doctoral programs.

7 **Programme outcomes**

Programme outcomes describe what you should know and be able to do by the end of your programme if you take advantage of the opportunities for learning that we provide.

Knowledge and understanding. By the end of the programme you should be able to:

- Critically discuss and communicate clearly the ideas and concepts inherent in chemistry and assess the scientific, social and commercial impact of current and future developments.
- evaluate, critically appraise and use objective information and approaches in chemistry.
- apply appropriate scientific methods and reasoning to the analysis of complex problems in the field of chemistry.
-

Skills, qualities and attributes. By the end of the programme you should be able to:

- undertake and communicate the findings of a substantial, laboratory based research project in a subject allied to chemistry.
- take responsibility for planning and risk assessment of advanced laboratory procedures and be critical of outcomes including limits of accuracy
- learn independently for continuing professional development and interact with professionals from other disciplines.

8 **Teaching and Learning Methods**

This programme is delivered by a combination of traditional lectures, seminars and tutorials, together with laboratory classes and laboratory based research project.

If you are a full-time student, you will have the opportunity to carry out a research project in an a chemistry research group at Nottingham Trent University or with one of our industrial, academic or health sector partners. If you are a part-time student, you will normally conduct the research project in your own workplace. You will be provided with detailed guidance on how to complete the research project successfully, the milestones that must be achieved and the timescales involved.

9 **Assessment Methods**

In the taught part of the course, you will be assessed by a variety of different types of course work, and by formal examination in all one of the elected modules. The Research Project module will involve the design, implementation and reporting of a major research task. You will communicate your findings at an interim stage of the research project in peer-reviewed journal format and you will present your findings orally to your peers and to members of the Programmes Team. You will receive advice and training on data analysis and presentation skills in the induction week and in the Research Methods & Independent Study module.

You will be assessed in each module in a manner consistent with the aims, objectives and learning outcomes of the module. Assessed work will take one or more of the following forms:

- Research Project thesis
  This module tests your ability to design and implement a research programme, and communicate the findings to an informed audience in a comprehensive thesis, written in an appropriate scientific style.
- Written assignment
  This tests your writing skills. You are expected to consider the scientific problems of the assignment topic and the way in which they have been resolved; this must be fully referenced from the current literature.
- Oral presentation
  This assesses your oral communication skills. You will be assessed on your ability to communicate cogently using appropriate visual aids. You will also be assessed on your ability to answer questions with knowledge and authority.
- Poster presentation
  This is a written poster display of the findings of your research project or of a specific taught module task. It tests your ability to synthesise arguments and present them in a highly condensed, accessible and pictorial form. You will need to defend the work verbally to members of the Programme Team.
- Laboratory report
  This may take the form of a short report (laboratory file) or a long report (formal report) with extensive data analysis and interpretation.
- Computer based tests or computer aided learning packages
- Formal examination
  This involves a 2 hour examination in Master 20 credit point masters level modules.
- Minimum Competence
  This involves assessment of your academic and professional background and if required you will be asked to successfully complete a supporting module in analytical chemistry

10 **Programme structure and curriculum**

The programme may be taken on a full-time or part-time distance learning basis over 1-3 years, respectively, starting in September or January each year. A summary of the MSc programme is given below.
Core modules include:
Research Methods and Independent Study (20 credit points): This module aims to provide an underpinning in research skills relevant to the independent study required for a Masters-level project in Chemistry. You will be introduced to the techniques required to formulate a research project and to carry out a literature review, and you will be given practice in the use of the library and learning resources including relevant IT packages.
Research Project for MSc (60 credit points): To develop the application of knowledge and skills to enable the organisation, execution, analysis and interpretation of an original research project. To develop the ability to critically evaluate research literature in a topic area. To develop the skills of communication via a range of different media to a scientific research audience.
Organic Synthesis & Characterisation of Biologically Active Compounds (20 credit points): This modules looks at retrosynthetic analysis and total synthesis of biologically important molecules. Synthetic methodology for the controlled formation of C-C bonds and

functional group transformations. Structure elucidation of complex molecules, including advanced NMR analysis (^{1}H and ^{13}C 2D NMR spectroscopy) with applications to selected problems.

Inorganic Chemistry Beyond the Molecule (20 credit points): In this module you will investigate biomineralization as muse, aqueous and non-aqueous routes to small particles, nucleation and crystal/ particle growth, the partial charge model, the biomimetic approach, structures of proteins and small molecules, methods for the study of molecules at the 'interface'. Example studies including oxides and/or metals and application to biomaterials development. Supramolecular self-assembly; design, synthesis, analysis and application. Single crystal and powder x-ray diffraction theory and practice.

Physical Properties of Solid-state & Nano-composite Materials (20 credit points): This module will provide training in theoretical background, synthesis and characterization of inorganic and nanocomposite materials. These areas will include: classification of materials, synthesis methods (including solid state and solution based methods), characterization using solid state methods (DRIFT, diffuse reflectance UV, solid state NMR, X-ray/ neutron diffraction, XPS, EXAFS). Synthesis of carbon based nanomaterials and composites including fullerenes, carbon nanotubes and graphene. Synthesis of polymer/clay nanocomposites and measurement of their engineering and barrier properties. As a student you will be given direct practical experience of synthetic and characterization methods in the form of practical laboratory sessions.

You must then select an additional 40 credit point M-level module. Examples of possible option choices include:

Chemotherapeutics (20 credit point): This module is split into three sections (i) Cancer Therapies Introduction to cancer, the cancer cell and drug targets in cancer chemotherapy. Mortality and the effects of cancer on patients. The anti-cancer drugs, antimetabolites, nucleotide synthesis in cells, the *de novo* and salvage pathways, pyrimidine antagonists. Covalent DNA binding drugs, alkylating agents, the nitrogen mustards, nitrosoureas, mechanism of action. Non-covalent DNA binding drugs, electrostatic binding, groove binding and intercalation. The anthracyclines, intercalation and interaction with topoisomerase. Inhibitors of chromatin function. Drugs that affect endocrine function. (ii)Antibacterial Agents A brief history of bacteria and antibacterial agents, introduction to the cell, prokaryotic and eukaryotic cells, the bacterial cell - Gram positive and Gram negative. The five major pathways of antibacterial action, bacteriostatins, inhibition of cell metabolism, the use of sulphonamide drugs as inhibitors of the folic acid pathway, the concept of selective toxicity. Ionophore antibiotics, interaction with the bacterial plasma membrane and ion transport. Bacterial protein synthesis, differences in prokaryotic and eukaryotic cells, use of aminoglycosides and tetracyclines as inhibitors of protein synthesis. Cell wall biosynthesis; synthesis of precursors, formation of peptidoglycans, cross-linking. The cross-linking process and the use of B-lactam antibiotics as inhibitors. Development of penicillins and cephalosporins, synthetic routes, penicillin resistance and the development of broad-spectrum antibiotics, suicide inhibitors. Inhibition of DNA transcription and replication, the significance of supercoiling and the use of DNA gyrase inhibitors. General synthetic routes to nalidixic acid analogues. (iii)Synthetic Methodology A brief review of those reactions commonly encountered in the synthesis of drugs and drug-like molecules. Case studies of two recent syntheses of current drugs.

Drug detection, analysis and screening (20 credit points): In this module you will develop concepts of analytical chemistry applied to the detection and analysis of drugs and drug containing materials by standard methods such as: IR and NMR spectroscopic techniques, GC/HPLC, related hyphenated techniques, and immunoassays; develop concepts in calibration and statistics through to an advanced level for the purpose of analysing complex samples containing drugs; be able to present the principles, technologies, and methods of large scale drug analysis such as those encountered in high throughput screening and rapid screening of samples; develop an understanding of the role of advanced spectroscopy, chromatography, multivariate data processing, biophysics and related disciplines to the analytical chemistry of drugs and drug containing materials; be able to analyse trends and explore potential future developments in the methods, instrumentation, and analysis of drugs and drug containing compounds.

Other appropriate 20 credit point M-level modules from across the School may also be considered *e.g.* Mass Spectrometry and Proteomics, Clinical Chemistry, Medical Statistics, Pharmacology and Chromatographic Methods, to make up the 180 credit points required at M-level.

11 **Admission to the programme**

We wish to attract highly motivated and committed students who are seeking to gain skills and professional expertise in chemistry. We are interested in professionals in a public or private sector organisations wishing to obtain further qualifications or you may have just completed a first degree in chemistry or an allied discipline (biology, biochemistry, physics, forensic science, environmental science to a high standard and wish to carry out an extended research project in a full-time or part time programme. We are particularly keen to recruit students looking for a bridging degree between undergraduate general science degrees and Ph. D. work.

All recruitment and admission procedures will be conducted in accordance with the University's policy on equal opportunities. You will have to complete an application form and provide two

references. To join the programme, you will normally be expected to meet one of the following requirements:

- To hold a undergraduate degree in chemistry (normally 2ii or higher) or equivalent in an allied discipline such as pharmacy, biology, biochemistry, physics, etc., and evidence of significant experience in laboratory based work (e.g. a sandwich placement year or good honours research project)

OR

- Such other qualification(s) and experience as the Admissions Panel deem to be equivalent in subject content and level of attainment (e.g. a 3rd with evidence of excellent laboratory experience).

You will be required to provide a detailed CV outlining your relevant experience and may be asked to undertake an assignment to demonstrate your skills in a particular topic of relevance to the programme.
A good command of spoken and written English is an essential requirement for the programme. If you are an overseas applicant from a non-English speaking country, the minimum recommended requirement is the British Council IELTS grade 6.5 or its equivalent. Equivalent experience may include the successful completion of a non-UK degree in the English language or a significant period of residence/work placement in an English speaking country, for which evidence should be provided.
We wish to attract graduate (or equivalent) applicants with a particular profile. Individuals who:

- are highly self-motivated and committed;
- can deal with the demands of intensive learning;
- have the study skills and background required to acquire and retain the theoretical and practical knowledge relevant to analytical chemistry;
- have effective oral and written communication skills;
- may have work experience in this area;
- will benefit from the programme.
- are excited by the opportunity to carry out a yearlong research project and motivated to try to publish the results in international journals.

An important consideration is the extent to which you will succeed on the programme and benefit from it.

12 Support for Learning

You will receive considerable support throughout this programme from administrative staff, the academics and consultants on the teaching team and the Programme Leader. You will have a Research project Supervisor who will give you guidance on all aspects of your research project. The University also has many support mechanisms to deal with non-academic problems.
When you enrol on the programme, you will receive a comprehensive Student Handbook, which includes information on:

- guidance on programme aims, outcomes and content;
- advice on time management;
- writing and submitting assignments;
- taking tests;
- assessment criteria;
- completing a Student Progress File;
- regulations for student conduct;
- regulations for health & safety;
- academic and pastoral support;
- careers information;
- accessing University resources (Libraries and Learning Resources, C & IT, Student Support Services, Careers Advisory and Employment Service, Student Union etc.).

Detailed guidance is also provided for each module.

13 Graduate destinations/employability

There is a wide range of career opportunities within Chemistry. You will work with leading academics and practitioners on your programme so you will have gained important academic and professional skills necessary to help you obtain employment in this field. At the end of the programme, you will also have developed many transferable skills that will make you more attractive to potential employers possibly in a wide range of areas needing the skills of a well-trained analytical chemist. The Research Project will give you the skills you need to follow a career in research and development.
The University's Careers Service has an enviable reputation for helping our graduates find employment and offers individual consultations.

If you are already in employment and are seeking to further your career within an organisation, this programme will give you the skills you need to bring added value to your organisation and further your career.

14	**Programme standards and quality**

The Programme Management Team takes day-to-day responsibility for managing the programme, under the overall direction of the Programme Committee. You will be represented on this committee by a full-time and part-time student representative, elected by the students. You may wish to stand for election. Student feedback is collected on each module and discussed in an annual Module Leader's Report. These reports are discussed at the Programmes Committee. Other methods for ensuring the standards and quality of the course include:

- The External Examiner report on the standards and quality of the programme, submitted annually.
- When the course was designed, the QAA descriptors for a qualification at Masters (M) level: Masters degree, informed the learning outcomes of this programme.
- The University was the subject of a successful institutional audit by the Quality Assurance Agency in May 2004.

An important measure of quality is the feedback you receive on your work. The Programme Team will ensure that you receive comprehensive feedback on all your assignments.

15	**Assessment regulations**

This programme is subject to the University's Common Assessment Regulations: Taught Postgraduate Programmes (located in it Section 16C of the Academic Standards and Quality Handbook).

16	**Additional Information**

Collaborative partner(s):

Programme referenced to national QAA

Benchmark Statements:

Programme recognised by:

Date implemented:

Any additional information:

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	Basic Programme Information	
1	Awarding Institution:	Nottingham Trent University
2	School/Campus:	School of Science and Technology
3	Final Award, Programme Title, and Modes of Study	MSc Chemistry (Professional Practice). Full Time and Part Time
4	Normal Duration:	24 months sandwich; 24-36 months PT
5	UCAS code:	CHEM060

6 **Overview and general educational aims of the programme**

This exciting programme in Chemistry is designed to give you the theoretical and practical skills needed to enter a career in chemistry or an allied science either in an academic institution, a research institute or in the industrial/business sector. In particular, it will give you the opportunity to develop applied chemical knowledge and your chemistry practical skills. It will also enable you to develop an ability to plan a research project, apply effective data analysis skills to your results, and to communicate your findings in an articulate and professional manner. This unique course allows you the opportunity to take a 12-month salaried work placement, as a sandwich year, following your examinations and before your three month research project.

This course is ideal if you are:

- a recently qualified graduate with the equivalent of a good UK honours degree chemistry and are looking for the professional skills needed to obtain a job in chemical sciences related area or a career in academic research in the general area of chemistry;
- are working for a company in chemical science or an allied science and want a masters-level qualification to give you a competitive edge;
- are a graduate of a general science degree with some chemistry content (examples include: forensic science, biochemistry, pharmacy, environmental science, etc.) and are interested in broadening your career options.
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- Laboratory report
  This may take the form of a short report (laboratory file) or a long report (formal report) with extensive data analysis and interpretation.
- Computer based tests or computer aided learning packages
- Formal examination
  This involves a 2 hour examination in Master 20 credit point masters level modules.
- Minimum Competence
  This involves assessment of your academic and professional background and if required you will be asked to successfully complete a supporting module in analytical chemistry

10 **Programme structure and curriculum**

The programme may be taken on a full-time with sandwich year or part-time distance learning basis over 2-3 years, respectively, starting in September or January each year. The sandwich year will be structured so that students undertake all the taught modules within three terms (9 months, 120 credit points) before starting a placement year out in industry and then return to University to complete their Research Project (60 credit points). A PGDip of Professional Practice will be awarded for successful completion of at least 43 weeks of placement. A summary of the MSc programme is given below.
Core modules include:
Research Methods and Independent Study (20 credit points): This module aims to provide an underpinning in research skills relevant to the independent study required for a Masters-level project in Chemistry. You will be introduced to the techniques required to formulate a research project and to carry out a literature review, and you will be given practice in the use of the library and learning resources including relevant IT packages.
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- may have work experience in this area;
- will benefit from the programme.
- are excited by the opportunity to carry out a yearlong research project and motivated to try to publish the results in international journals.

An important consideration is the extent to which you will succeed on the programme and benefit from it.
If you are unable to find a placement then you will be transferred to MSc Chemistry (CHEM059).

12 Support for Learning

You will receive considerable support throughout this programme from administrative staff, the academics and consultants on the teaching team and the Programme Leader. You will have a Research project Supervisor who will give you guidance on all aspects of your research project. The University also has many support mechanisms to deal with non-academic problems.
When you enrol on the programme, you will receive a comprehensive Student Handbook, which includes information on:

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13 Graduate destinations/employability

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academics and practitioners on your programme so you will have gained important academic and professional skills necessary to help you obtain employment in this field. At the end of the programme, you will also have developed many transferable skills that will make you more attractive to potential employers possibly in a wide range of areas needing the skills of a well-trained analytical chemist. The Research Project will give you the skills you need to follow a career in research and development.
The University's Careers Service has an enviable reputation for helping our graduates find employment and offers individual consultations.
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14	**Programme standards and quality**

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Programme referenced to national QAA

Benchmark Statements:

Programme recognised by:

Date implemented:

Any additional information: