

## **School of Chemistry**

### **Important Degree Information:**

#### **B.Sc./M.A. Honours**

The general requirements are 480 credits over a period of normally 4 years (and not more than 5 years) or part-time equivalent; the final two years being an approved honours programme of 240 credits, of which 90 credits are at 4000 level and at least a further 120 credits at 3000 and/or 4000 (H) levels. Refer to the appropriate Faculty regulations for lists of subjects recognised as qualifying towards either a B.Sc. or M.A. degree.

For the degree of BSc Chemical Sciences (Honours) the approved honours programme of 240 credits, requires 90 credits at 4000 level and a further 110 credits (minimum) at 3000 and 4000 levels. (Subject to approval by Academic Council.)

#### **B.Sc./M.A. Honours with Integrated Year Abroad**

The general requirements are 540 credits over a period of normally 5 years (and not more than 6 years) or part-time equivalent; the final three years being an approved honours programme of 300 credits, of which 60 credits are gained during the integrated year abroad, 90 credits are at 4000 level and at least a further 120 credits at 3000 and/or 4000 (H) levels. Refer to the appropriate Faculty regulations for lists of subjects recognised as qualifying towards either a B.Sc. or M.A. degree.

#### **M.Chem. Honours**

The general requirements are 600 credits over a period of normally 5 years (and not more than 6 years) or part-time equivalent; the final three years being an approved honours programme of 360 credits, of which 120 credits are at 5000 level and at least a further 210 credits at 3000 and 4000 levels.

#### **M.Sci. Honours**

The general requirements are 600 credits over a period of normally 5 years (and not more than 6 years) or part-time equivalent; the final three years being an approved honours programme of 360 credits, of which 120 credits are at 5000 level and at least a further 210 credits at 3000 and 4000 levels.

**Other Information:** Direct entry into Level 2000 is possible, in which case credit of 120 credits at level 1000 is given on the basis of school examinations. In the case of students who spend part of the Honours Programme abroad on a recognised Exchange Scheme, the Programme Requirements will be amended to take into account courses taken while abroad.

**The Honours syllabus is undergoing a major change commencing in 2002-03 and Programme requirements listed below are those for students entering the first year of the Honours Programme in 2002-03 or subsequently. Students entering the Second Year of the Honours programme in 2002-03 should refer to School Handbooks and consult Honours Advisers for the requirements of their Honours Programme.**

## Chemistry - Honours

Degree Programmes	Programme Requirements at:
<p>(B.Sc. Honours): <b>Biomolecular Science</b></p>	<p><b>Biomolecular Science (B.Sc. Honours):</b>  <b>Level 1:</b> 45 credits comprising Biology element: Passes in BL1001, BL1003 and BL1201 are normally required for entry to Single Honours Degrees.             Chemistry element: 20 – 40 credits comprising pass or bypass for CH1001, pass in CH1004   <b>Level 2:</b> 125 credits comprising BL2007 and passes at 11 or better in BI2201, BI2202, CH2101 and CH2103   <b>Level 3:</b> 120 credits comprising Biology Element: BL3001; BL3002; BL3009; BL3010 and modules as listed in the entry for Chemistry            Chemistry Element: CH3611, CH3612, CH3613, CH3621, CH3432, CH4613   <b>Level 4 (H):</b> 40 - 100 credits comprising Biology Element: TWO of BL4101, BL4102, BL4103; plus (BL4200 and BL4300) if CH4442 is NOT taken. If BL4200 is taken CH5614 and ONE of (CH5513, CH5612, CH5411) may be taken as an alternative to BL4300            Chemistry Element: 40 - 80 credits CH4442 (if BL4200 is NOT taken); TWO from (CH4611, CH4511, CH4612); CH5614 and ONE of (CH5513, CH5612, CH5411). If BL4200 is taken BL4300 may be taken as an alternative to CH5614 and ONE of (CH5513, CH5612, CH5411). If CH4442 is taken then BL4300 may be taken as an alternative to ONE of (CH5513, CH5612, CH5411).             Chemistry: Direct entry into Level 2000 is possible, in which case credit of 120 credits at level 1000 is given on the basis of school examinations. In the case of students who spend part of the Honours Programme abroad on a recognised Exchange Scheme, the Programme Requirements will be amended to take into account courses taken while abroad.</p>
<p>(B.Sc. Honours): <b>Chemical Sciences</b></p>	<p><b>Chemical Sciences (B.Sc. Honours Degree):</b>  <b>Level 1:</b> 40 credits comprising pass or bypass for CH1001, pass in CH1004 and 4 other level 1000 modules   <b>Level 2:</b> 60 credits comprising passes at 11 or better in CH2101 and CH2102 or CH2103 together with 60 credits from another School   <b>Level 3:</b> 120 credits comprising CH3511, CH3512, CH3611, CH3612, CH3711, CH3712, CH3521, CH3621, CH3721, CH3431, CH3441   <b>Level 4(H):</b> 120 credits comprising CH4442, 4 from (CH4511, CH4611, CH4711, CH4612, CH4712) 4 from (CH4512, CH4613, CH4713, CH5411, CH5512-5, CH5612-4, CH5712-5)   <b>Other Information:</b> This course is aimed at those who like Chemistry and were good at it at school, who want the varied training that a Chemistry Degree gives, but who do not wish to be professional Chemists. Up to 40 credits from the Level 3000 and Level 4000 modules listed above can be replaced with modules from other Schools.</p>

<b>Degree Programmes</b>	<b>Programme Requirements at:</b>
<p>(B.Sc. Honours): <b>Chemistry</b></p>	<p><b>Chemistry (B.Sc. Honours):</b>  <b>Level 1:</b> 40 credits comprising pass or bypass for CH1001, pass in CH1004 and 4 other level 1000 modules.</p> <p><b>Level 2:</b> 90 credits comprising passes at 11 or better in CH2101 and either CH2102 and CH2103 or one of CH2102 and CH2103, together with 30 credits from another School.                      From 2003 passes in CH2101, CH2102, CH2103 and 30 credits from another School.</p> <p><b>Level 3:</b> 120 credits comprising CH3511, CH3512, CH3611, CH3612, CH3711, CH3712, CH3521, CH3621, CH3721, CH3431, CH3441.</p> <p><b>Level 4(H):</b> 120 credits comprising CH4461, CH4442, CH5411, 2 from (CH4511, CH4611, CH4711), 2 from (CH4512, CH4613, CH4713), either CH4612 or CH4712, 1 from (CH5512-5, CH5612-4, CH5712-5).</p> <p><b>Other Information:</b> The Single Honours course is recognised by the Royal Society of Chemistry (RSC) for professional membership</p>
<p>(B.Sc. Honours): <b>Chemistry and Computer Science, Internet Computing, Mathematics</b></p>	<p><b>Chemistry element of Joint Honours Degree (B.Sc. Honours):</b>  <b>Level 1:</b> 40 credits comprising pass or bypass for CH1001, pass in CH1004</p> <p><b>Level 2:</b> 60 credits comprising passes at 11 or better in CH2101, either CH2102 or CH2103</p> <p><b>Level 3:</b> 60 credits comprising 3 from (CH3512, CH3612, CH3711, CH3521, CH3721, CH3431), 30 credits from (CH3511, CH3611, CH3712, CH3621, CH3441)</p> <p><b>Level 4(H):</b> 80 credits comprising CH4442, 2 from (CH4511, CH4611, CH4711, CH4612, CH4712), 2 from (CH4512, CH4613, CH4713)</p>
<p>(B.Sc. Honours): <b>Chemistry and Geoscience</b></p>	<p><b>Chemistry element of Joint Honours Degree (B.Sc. Honours):</b>  <b>Level 1:</b> 40 credits comprising Pass or bypass for CH1001, pass in CH1004</p> <p><b>Level 2:</b> 60 credits comprising passes at 11 or better in CH2101, either CH 2102 or CH2103</p> <p><b>Level 3:</b> 60 credits comprising 3 from (CH3512, CH3612, CH3711, CH3521, CH3721, CH3431), 30 credits from (CH3511, CH3611, CH3712, CH3621, CH3441)</p> <p><b>Level 4(H):</b> 80 credits comprising CH4442, CH4512, 2 from (CH4511, CH4611, CH4711, CH4612, CH4712), 1 from (CH4613, CH4713)</p>
<p>(B.Sc. Honours): <b>Chemistry with Catalysis</b></p>	<p><b>Chemistry with Catalysis (B.Sc. Honours):</b>  <b>Level 1:</b> 120 credits comprising pass or bypass for CH1001, pass in CH1004 and 4 other level 1000 modules.</p> <p><b>Level 2:</b> 60-90 credits comprising Passes at 11 or better in CH2101 and either or both of CH2102 and CH2103</p> <p><b>Level 3:</b> 120 credits comprising CH3511, CH3512, CH3611, CH3612, CH3711, CH3712, CH3521, CH3621, CH3721, CH3431, CH3441.</p> <p><b>Level 4(H):</b> 120 credits comprising CH4461, CH4442, CH5411, CH5511, CH5512, 2 from (CH4512, CH4613, CH4713), 1 from (CH4511, CH4611, CH4711), either CH4612 or CH 4712</p> <p><b>Other Information:</b> The Single Honours course is recognised by the Royal Society of Chemistry (RSC) for professional membership.</p>

## Chemistry - Honours

Degree Programmes	Programme Requirements at:
<p>(B.Sc. Honours):  <b>Chemistry with Materials Chemistry</b></p>	<p><b>Chemistry with Materials Chemistry (B.Sc. Honours):</b>  <b>Level 1:</b> 120 credits comprising pass or bypass for CH1001, pass in CH1004 and 4 other level 1000 modules.</p> <p><b>Level 2:</b> 60 credits comprising passes at 11 or better in CH2101 and CH2102 together with two approved modules from Chemistry or another School</p> <p><b>Level 3:</b> 120 credits comprising CH3511, CH3512, CH3611, CH3612, CH3711, CH3712, CH3521, CH3621, CH3721, CH3431, CH3441</p> <p><b>Level 4(H):</b> 120 credits comprising CH4461, CH 4712, CH4713, CH4442, CH5411, CH5712, CH5515, 2 from (CH4511, CH4611, CH4711</p> <p><b>Other Information:</b> The Single Honours course is recognised by the Royal Society of Chemistry (RSC) for professional membership.</p>
<p>(B.Sc. Honours):  <b>Chemistry with Medicinal Chemistry</b></p>	<p><b>Chemistry with Medicinal Chemistry:</b>  <b>Level 1:</b> 120 credits comprising pass or bypass for CH1001, pass in CH1004 and 4 other level 1000 modules.</p> <p><b>Level 2:</b> 60 credits comprising passes at 11 or better in CH2101 and CH2103, together with 60 further credits from Chemistry or another School</p> <p><b>Level 3:</b> 120 credits comprising CH3511, CH3512, CH3611, CH3612, CH3711, CH3712, CH3521, CH3621, CH3721, CH3431, CH3441.</p> <p><b>Level 4(H):</b> 120 credits comprising CH4461, CH4442, CH5411, CH4612, CH4613, CH4611, 1 from (CH4511, CH4711), 1 from (CH4512, CH4713), 1 from (CH5612-4).</p> <p><b>Other Information:</b>The Single Honours course is recognised by the Royal Society of Chemistry (RSC) for professional membership.</p>
<p>(B.Sc. Honours):  <b>Chemistry with French<sup>^</sup> or German<sup>^</sup></b></p> <p><sup>^</sup>also available as 'with Integrated Year Abroad Degrees'</p>	<p><b>Chemistry element of Major Degree with French or German (B.Sc. Honours):</b>  <b>Level 1:</b> 40 credits comprising pass or bypass for CH1001, pass in CH1004,</p> <p><b>Level 2:</b> 60 credits comprising passes at 11 or better in CH2101 and either CH2102 or CH2103</p> <p><b>Level 3:</b> 90 credits comprising CH 3441, and 70 credits from (CH3511, CH3512, CH3611, CH3612, CH3711, CH3712, CH3521, CH3621, CH3721, CH3431, CH3431)</p> <p><b>Level 4(H):</b> 90 credits comprising CH4442, 5 from (CH4511, CH4611, CH4711, CH4512, CH4613, CH4713, CH4461, CH5411)</p> <p><b>Other Information:</b>The BSc.degree is recognised by the Royal Society of Chemistry (RSC) for professional membership.</p>

<b>Degree Programmes</b>	<b>Programme Requirements at:</b>
<p>(B.Sc. Honours): <b>Chemistry with Pharmacology</b></p>	<p><b>Chemistry with Pharmacology (B.Sc. Honours):</b></p> <p><b>Level 1: Chemistry element:</b> 40 credits comprising a pass or bypass for CH1001, pass in CH1004 and 2 other level 1000 modules.</p> <p><b>Biology element:</b> Passes in or exemption from BL1001, BL1201. Passes in or exemption from BL1003 and BL2007 are also required for entry to all Honours courses in the School of Biology</p> <p><b>Level 2: Chemistry element:</b> 60 credits comprising passes at 11 or better in CH2101, CH2103</p> <p>Biology element: 60 credits comprising any two of BL2201, BL2202, BL2006</p> <p><b>Level 3:</b> 60 credits from (CH3511, CH3512, CH3611, CH3612, CH3711, CH3712, CH3521, CH3621, CH3721, CH3431, CH3441), and 40 credits from BL3004, BL3007</p> <p><b>Level 4(H) and Level 5:</b> 50 credits comprising CH4461, CH4441, and 70 credits from CH5411, CH4511, CH4611, CH4711, CH4512, CH4613, CH4713, CH5512, CH5513, CH5713, CH4612 CH471</p> <p><b>Other Information:</b> The Single Honours course is recognised by the Royal Society of Chemistry (RSC) for professional membership. The project (CH4442) will be supervised jointly by staff from Chemistry and Biology.</p>
<p>(M.Chem. Honours): <b>Chemistry (M.Chem) 5 years</b></p>	<p><b>Chemistry (M.Chem.) Degree:</b></p> <p><b>Level 1:</b> 120 credits comprising pass or bypass for CH1001, pass in CH1004 and 4 other level 1000 modules</p> <p><b>Level 2:</b> 90 credits comprising Passes at 15 or better in CH2101, CH2102 and CH2103 together with 30 credits from another School</p> <p><b>Level 3:</b> 120 credits comprising CH3511, CH3512, CH3611, CH3612, CH3711, CH3712, CH3521, CH3621, CH3721, CH3431, CH3441</p> <p><b>Level 4(H):</b> 120 credits comprising CH4511, CH4611, CH4711, CH4512, CH4613, CH4713, CH4442, CH5411, 1 of (CH4612, CH4712)</p> <p><b>Level 5:</b> 120 credits comprising CH5511, CH5611, CH5711, CH5461, CH5441, 4 from (CH5512-5, CH5612-4, CH5712-5).</p> <p><b>Other Information:</b> The M. Chem.degree is recognised by the Royal Society of Chemistry (RSC) for professional membership.</p>
<p>(M.Chem. Honours): <b>Chemistry (Medicinal) with External Placement (M.Chem.) 5 years</b></p>	<p><b>Chemistry (Medicinal) with External Placement (M.Chem):</b></p> <p><b>Level 1:</b> 120 credits comprising pass or bypass for CH1001, pass in CH1004 and 4 other level 1000 modules</p> <p><b>Level 2:</b> 60 credits comprising Passes at 15 or better in CH2101 and CH2103 together with 60 further credits from Chemistry or another School</p> <p><b>Level 3:</b> 120 credits comprising CH3511, CH3512, CH3611, CH3612, CH3613, CH4612, CH3521, CH3621, CH4613, CH3432, CH3441</p> <p><b>Level 4(H):</b> 120 credits comprising CH4441, CH4451.</p> <p><b>Level 5:</b> 120 credits comprising CH5615, CH5511, CH5611, CH5462, CH5441, CH5411, 3 from (CH5513, CH5612-4).</p> <p><b>Other Information:</b> The M. Chem.degree is recognised by the Royal Society of Chemistry (RSC) for professional membership.</p>

## Chemistry - Honours

Degree Programmes	Programme Requirements at:
<p>(M. Chem. Honours):  <b>Chemistry with External Placement (M.Chem) 5 years</b></p>	<p><b>Chemistry with External Placement (M.Chem) 5 years:</b>  <b>Level 1:</b> 120 credits comprising pass or bypass for CH1001, pass in CH1004 and 4 other level 1000 modules</p> <p><b>Level 2:</b> 90 credits comprising passes at 15 or better in CH2101, CH2102 and CH2103 together with 30 credits from another School</p> <p><b>Level 3:</b> 120 credits comprising CH3511, CH3512, CH3611, CH3612, CH3711, CH3712, CH3521, CH3621, CH3721, CH3431, CH3441</p> <p><b>Level 4(H):</b> 120 credits comprising CH4441, CH4451.</p> <p><b>Level 5:</b> 120 credits comprising CH5511, CH5611, CH5711, CH5461, CH5441, 4 from (CH5411, CH5512-5, CH5612-4, CH5712-5).</p> <p><b>Other Information:</b> The M. Chem.degree is recognised by the Royal Society of Chemistry (RSC) for professional membership.</p>
<p>(M.Chem. Honours):  <b>Chemistry with French (M. Chem.) 5 years</b></p>	<p><b>Chemistry with French (M Chem Honours) (5 year degree) :</b>  <b>Level 1: 120 credits comprising</b> Pass or bypass for CH1001, pass in CH1004 and 4 other level 1000 modules</p> <p><b>Level 2:</b> 90 credits comprising Passes at 15 or better in CH2101 and CH2102 or CH2103</p> <p><b>Level 3:</b> 90 credits comprising CH3441, and 70 credits from (CH3511, CH3512, CH3611, CH3612, CH3711, CH3712, CH3521, CH3621, CH3721, CH3411)</p> <p><b>Level 4(H):</b> 90 credits from CH4441</p> <p><b>Level 5:</b> 50 credits from CH5441 and CH5411, and 40 credits from (CH5461, 4 from (CH5511-5, CH5611-4, CH5711-5).</p> <p><b>Other Information</b> The M. Chem.degree is recognised by the Royal Society of Chemistry (RSC) for professional membership.</p>
<p>(M.Sci. Honours):  <b>Chemistry and Physics (M.Sci. Honours) 5 year Degree</b></p>	<p><b>Chemistry element of Chemistry-Physics M.Sci. Degree:</b>  <b>Level 1:</b> 40 credits comprising a pass or bypass in CH1001, CH1004</p> <p><b>Level 2:</b> 60 credits comprising CH2101, either CH2102 or CH2103</p> <p><b>Level 3:</b> 80 credits comprising CH3512, CH3611, CH3711, CH3712, CH3721, CH3431, CH3441</p> <p><b>Level 4(H):</b> 40 credits comprising CH4711, CH4712, CH4512, CH4713, PH4021, PH4023</p> <p><b>Level 5:</b> 40 credits from CH5441 or 45 credits from PH5101, at least 30 credits from CH5512, CH5514, CH5515, CH5712-CH5715</p>

## Modules

Normally the prerequisite for each of the following Honours modules is entry to the Honours Programme(s) for which they are specified, as well as any additional specific prerequisite(s) given.

General degree and non-graduating students wishing to enter 3000 or 4000 level modules must consult with the relevant Honours Adviser within the School before making their selection.

### Chemistry (CH) Modules

#### CH3431 Chemistry Workshop

Credits: 10.0 Semester: 1

Anti-requisite: CH3432

Description: The aim of the module is to provide a basis in spectroscopy and group theory relevant to other modules forming the honours programmes in chemistry. In addition, students will develop communication and interview skills and gain experience in data handling, information retrieval and problem solving.

Class Hour: To be arranged.

Teaching: Two seminars and one or two lectures, and occasional tutorials.

Assessment: Continuous Assessment = 50%, Two One Hour Examinations = 50%

#### CH3432 Chemistry Workshop for Biomolecular Science

Credits: 10.0 Semester: 1

Anti-requisite: CH3431

Description: The aim of the module is to provide a basis in spectroscopy and molecular modelling to other modules forming the honours programmes in chemistry which interface with biology. In addition, students will develop communication and interview skills and gain experience in data handling, information retrieval and problem solving.

Class Hour: To be arranged.

Teaching: Two seminars and one or two lectures, and occasional tutorials.

Assessment: Continuous Assessment = 75%, One Hour Examination = 25%

#### CH3441 Mini Chemistry Project

Credits: 20.0 Semester: 2

Description: This is a group-based exercise where the students will tackle an unseen problem. Skills to be developed will vary but will include some or all of the following: The use of spectroscopy, retrosynthetic analysis, literature searching, web based searching and design, synthesis, catalysis, mechanistic studies, computational chemistry, surface chemistry, biological chemistry, communication skills.

Class Hour: 9.00 am Monday – Friday for 4 – 5 weeks.

Teaching: 7 hours per day 4 days a week, 4 hours on Wednesdays.

Assessment: Continuous Assessment = 100%

#### CH3511 Main Group Chemistry

Credits: 10.0 Semester: 2

Description: This course discusses the Chemistry of the elements of groups 2, 12, 13, 15, 17 and 18, with particular reference to systematic trends and to the chemistry of the hydrides, halides, oxides, hydroxides and solid state compounds. In all cases the basic chemistry is linked to the exciting applications of the compounds in fields as diverse as clearing runways from snow in Northern Canada to night vision and metal-containing enzymes.

Class Hour: To be arranged.

Teaching: 2 – 3 lectures over 5 – 7 weeks and two tutorials.

Assessment: One-and-a-half Hour Examination = 100%

## Chemistry - Honours

### CH3512 Structural Elucidation and Organometallic Chemistry

Credits: 10.0 Semester: 1

Description: This course will discuss how the use of analytical data and IR and NMR spectroscopy leads to the elucidation of the composition, structure and bonding in inorganic compounds. A variety of case studies will illustrate these principles. In addition, the course offers a systematic introductory treatment of organometallic compounds, emphasising fundamental concepts and the principal functional groups of organometallic chemistry. Topics include: the haptic nomenclature and 18-electron rule; synthesis of complexes of CO, alkyl, alkene, alkyne and carbocyclic ligands; static and dynamic structures; reactions of coordinated ligands; unit processes involved in homogeneous catalytic cycles.

Class Hour: To be arranged.

Teaching: 2 – 3 lectures over 5 – 7 weeks and two tutorials.

Assessment: One-and-a-half Hour Examination = 100%

### CH3521 Inorganic Chemistry Laboratory

Credits: 10.0 Semester: 1

Description: This module comprises practical experiments involving synthesis, characterisation and measurements in inorganic chemistry.

Class Hour: 9.00 am – 12.00 noon Monday through Friday

Teaching: 3 Hours daily for weeks 1 - 6.

Assessment: Continuous Assessment = 100%

### CH3611 Physical Organic Chemistry and Pericyclic Chemistry

Credits: 10.0 Semester: 2

Description: The objective of this course is to provide the student with a basic understanding of the physical aspects of organic chemistry. A problem-solving approach is employed in order to develop the ability to elucidate information, both qualitative and quantitative, concerning reaction mechanisms from experimental data. The use of quantum mechanical models of chemical reactivity is introduced, again with an emphasis on problem-solving and practical applications. The concepts developed in the first part of the course are then applied to the description and understanding of pericyclic reactions and stereoelectronic effects – topics which are key in synthetic chemistry.

Class Hour: To be arranged.

Teaching: 2 – 3 lectures and occasional tutorials over 5 – 7 weeks.

Assessment: One-and-a-half Hour Examination = 100%

### CH3612 Synthesis, Reagents and FGIs

Credits: 10.0 Semester: 1

Description: The course will teach methods in organic synthesis with a particular focus on the assembly of C-C bonds and C-X bonds. The course will introduce new reactions and reagents as well as strategies in organic synthesis. There will be a particular emphasis on the contribution organometallic reagents and the main group elements make to organic synthesis. Additionally, the common protecting groups which are used to mask vulnerable functional groups during such transformations will be highlighted.

Class Hour: To be arranged.

Teaching: 2-3 lectures over 5-7 weeks and two tutorials over two weeks.

Assessment: One-and-a-half Hour Examination = 100%

### CH3613 The Chemistry and Biology of Nucleic Acids

Credits: 10.0 Semester: 1

Description: The aim of the module is to cover aspects of the chemistry of nucleic acids. It will examine the ways in which DNA is chemically damaged and the mechanisms by which it is repaired. The module will relate the chemical reactions of DNA to mechanisms of carcinogenesis and then the development of drugs to treat cancer. The ways in which a range of drugs interact with DNA will be discussed. The chemistry of RNA will also be examined, and how this relates to the theory that RNA may have in fact been the original genetic material.

Class Hour: To be arranged.

Teaching: 2-3 lectures over 5-7 weeks.

Assessment: One-and-a-half Hour Examination = 100%

**CH3621 Organic Chemistry Laboratory**

Credits:	10.0	Semester:	2
Description:	Practical experiments involving synthesis, characterisation and measurements in Organic chemistry.		
Class Hour:	9.00 am - 12.00 noon Monday-Friday.		
Teaching:	Daily three-hour practical classes over six weeks.		
Assessment:	Continuous Assessment = 100%		

**CH3711 Chemical Thermodynamics and an Introduction to Statistical Mechanics**

Credits:	10.0	Semester:	1
Prerequisite:	CH2102 (from 2003)		
Description:	This module is mainly concerned with the study of thermodynamics. In the first set of lectures the field of classical chemical thermodynamics is addressed, in particular considering chemical equilibria and phase equilibria. In the second set of lectures the molecular basis of thermodynamics is covered in an introduction to the study of statistical mechanics.		
Class Hour:	To be arranged.		
Teaching:	2-3 lectures over 5-7 weeks and two tutorials over two weeks.		
Assessment:	One-and-a-half Hour Examination = 100%		

**CH3712 Quantum Theory of Atoms, Molecules and Solids**

Credits:	10.0	Semester:	2
Prerequisite:	CH2102 (from 2003)		
Description:	This course builds on 'Quantum Theory of Atoms, Molecules and Solids. Part I' given in CH 2102. It provides an introduction to further, basic concepts of quantum mechanics that are an essential part of the description of the electronic structures of atoms, molecules and solids. While the course is mathematically based, the emphasis throughout is on the physical and chemical implications of the mathematical results and how this provides a coherent, quantitative framework for understanding the beauty and complexities of the electronic structure of atoms, molecules and solids.		
Class Hour:	To be arranged.		
Teaching:	2-3 lectures over 5-7 weeks and one tutorial over five weeks.		
Assessment:	One-and-a-half Hour Examination = 100%		

**CH3721 Physical Chemistry Laboratory**

Credits:	10.0	Semester:	1
Description:	This course comprises practical experiments involving physical measurements and the use of computational programmes in Chemistry.		
Class Hour:	To be arranged.		
Class Hour:	9.00 am – 12.00 noon or 1.00pm Monday to Friday		
Teaching:	3 – 4 hours per day for 5 weeks		
Assessment:	Continuous Assessment = 100%		

**CH4441 External Placement**

Credits:	90.0	Semester:	Whole Year
Availability:	2003-04		
Co-requisite:	CH4451 or FR5810		
Description:	This module is intended to provide each individual student with direct experience of work in an industrial or similar laboratory. Activities are very varied, according to the nature of the particular company's or organisation's area of business. Some students will be engaged in synthetic work and some in analytical/measurement activities. Some will be based exclusively in a laboratory, while others will also be involved in liaison with the company's plant operators or with its customers.		
Teaching:	Day to day supervision by company supervisor, liaising with member of School academic staff.		
Assessment:	Continuous Assessment = 100%		

## **Chemistry - Honours**

### **CH4442 Chemistry Research Project**

Credits: 40.0 Semester: Whole Year

Availability: 2003-04

Anti-requisites: CH5441, CH4443 - CH4447

Description: The research project at Level 4000 aims to develop the students' skills in the following areas: experimental design and problem-solving; abstraction, evaluation and interpretation of data in the chemical literature; practical skills and teamwork; communication of results orally and in a dissertation. The project will be selected and supervised by a member of the academic staff.

Class Hour: Two days per week, to be arranged.

Teaching: Laboratory-based research project.

Assessment: Continuous Assessment = 100%

### **CH4443 Chemistry Research Project for Non-graduating Students**

Credits: 45.0 Semester: Either

Anti-requisites: CH5441, CH4442, CH4444 - CH4447

Description: The research project at Level 4000 only aims to develop the students' skills in the following areas: experimental design and problem-solving; abstraction, evaluation and interpretation of data in the chemical literature; practical skills and teamwork; communication of results orally and in a dissertation. The project will be selected and supervised by a member of the academic staff.

Class Hour: Two days per week, to be arranged.

Teaching: Laboratory-based research project.

Assessment: Continuous Assessment = 100%

### **CH4444 Chemistry Research Project for Non-graduating Students**

Credits: 60.0 Semester: Either

Anti-requisites: CH5441, CH4442 - CH4443, CH4445 - CH4447

Description: The research project at Level 4000 only aims to develop the students' skills in the following areas: experimental design and problem-solving; abstraction, evaluation and interpretation of data in the chemical literature; practical skills and teamwork; communication of results orally and in a dissertation. The project will be selected and supervised by a member of the academic staff.

Class Hour: To be arranged.

Teaching: Laboratory-based research project.

Assessment: Continuous Assessment = 100%

### **CH4445 Chemistry Research Project for Non-graduating Students**

Credits: 90.0 Semester: Whole Year

Anti-requisites: CH5441, CH4442 - CH4444, CH4446 - CH4447

Description: The research project at Level 4000 only aims to develop the students' skills in the following areas: experimental design and problem-solving; abstraction, evaluation and interpretation of data in the chemical literature; practical skills and teamwork; communication of results orally and in a dissertation. The project will be selected and supervised by a member of the academic staff.

Class Hour: To be arranged.

Teaching: Laboratory-based research project.

Assessment: Continuous Assessment = 100%

**CH4446 Chemistry Research Project for Non-graduating Students**

Credits: 120.0 Semester: Whole Year

Anti-requisites: CH5441, CH4442 - CH4445, CH4447

Description: The research project at Level 4000 only aims to develop the students' skills in the following areas: experimental design and problem-solving; abstraction, evaluation and interpretation of data in the chemical literature; practical skills and teamwork; communication of results orally and in a dissertation. The project will be selected and supervised by a member of the academic staff.

Class Hour: To be arranged.

Teaching: Laboratory-based research project.

Assessment: Continuous Assessment = 100%

**CH4447 Level 4000 Project for Chemistry/Pharmacology**

Credits: 40.0 Semester: Whole Year

Availability: 2003-04

Anti-requisites: CH4442, CH4443, CH4444, CH4445, CH4446, CH5441

Description: The research project at Level 4000 for Chemistry/Pharmacology students only aims to develop the students' skills in the following areas: experimental design and problem-solving; abstraction, evaluation and interpretation of data in the chemical literature; practical skills and teamwork; communication of results orally and in a dissertation. The project will be selected and supervised jointly by members of the academic staff in Chemistry and Biology..

Class Hour: Two days per week, to be arranged.

Teaching: Laboratory-based research project.

Assessment: Continuous Assessment = 100%

**CH4451 MChem Distance Learning**

Credits: 30.0 Semester: Whole Year

Availability: 2003-04

Anti-requisites: CH4511, CH4611, CH4711

Description: This course offers the material covered by Level 4000 BSc/MChem modules CH4511, CH4611 and CH4711 in a distance learning mode to students on the MChem one year placement. See the module descriptions for modules CH4511, CH4611 and CH4711 for details of course content.

Teaching: Distance Learning

Assessment: Continuous Assessment = 100%

**CH4461 Chemistry – Tutorial Module**

Credits: 10.0 Semester: 1

Availability: 2003-04

Antirequisite: CH5461 and CH5462

Description: This is a general chemistry module aimed at developing and consolidating fundamental aspects of basic understanding. Students will be encouraged to gain a deeper understanding of elementary core material by a combination of discussion, general reading, essay work and problem solving at a more advanced level than previously required. Students will be expected to read externally on topics related to the tutorial. In addition, each student will be required to submit an essay which will be on a topic relevant to the broader issues of chemical study and knowledge. The tutorials will be aimed at Level 4000 standard.

Class Hour: To be arranged.

Teaching: Two tutorials each week for 9 weeks.

Assessment: Continuous Assessment = 40%, One Hour Examination = 60%

## Chemistry - Honours

### CH4511 Inorganic Reaction Mechanisms and Bioinorganic Chemistry

Credits: 10.0 Semester: 1

Availability: 2003-04

Antirequisite: CH4451

Description: This course aims to develop the students' understanding of the mechanisms that lie behind the reactions of inorganic compounds and to explore the role played by inorganic systems in biology and their growing importance in medicine. There will also be discussion of the mechanisms of action of some inorganic systems in biology which will link the two parts of the module together.

Class Hour: To be arranged.

Teaching: 2 – 3 lectures over 5 – 7 weeks and two tutorials.

Assessment: One-and-a-half Hour Examination = 100%

### CH4512 Chemistry in the Natural Environment

Credits: 10.0 Semester: 2

Availability: 2003-04

Description: This module is concerned with the role of chemical processes in the Earth's crust responsible for the development of natural resources, such as minerals and petroleum, and the role of chemistry in their exploitation. The effect of natural and anthropogenic processes on the natural environment will also be discussed, particularly with reference to water chemistry, together with chemical routes to safeguard water quality.

Class Hour: To be arranged.

Teaching: 2 – 3 lectures over 5 – 7 weeks and two tutorials.

Assessment: One-and-a-half Hour Examination = 100%

### CH4611 Target Synthesis and Medicinal Chemistry

Credits: 10.0 Semester: 1

Availability: 2003-04

Anti-requisite: CH4451

Description: The module will cover aspects of organic chemistry that are important for the synthesis of biologically active compounds such as pharmaceuticals and agrochemicals. Firstly, fundamental aspects of heterocyclic chemistry will be discussed, with a review of the structure, reactivity and synthesis of heterocyclic systems, which is important as the majority of pharmaceuticals and agrochemicals are heterocyclic compounds. The module will then go on to discuss the process of industrial chemical synthesis. This will include the design of synthetic routes, choice of reagents and conditions, as they apply to the development of processes for the synthesis of commercially important molecules.

Class Hour: To be arranged.

Teaching: One or two lectures over 11 weeks, one tutorial over 3 weeks.

Assessment: One-and-a-half Hour Examination = 100%

### CH4612 Blockbuster Pharmaceuticals

Credits: 10.0 Semester: 1

Availability: 2003-04

Anti-requisite: CH5615

Description: The module will discuss case studies from the most successful pharmaceutical products. How the compounds came to be discovered, what diseases they are targeting, how they work and how they are made and delivered to the market. Compounds that will feature are aspirin, penicillin, AZT, 5-flourouracil, Zantac, viagra,  $\beta$ -blockers, prozac etc.

Class Hour: To be arranged.

Teaching: Two - three lectures over 5-7 weeks, two tutorials.

Assessment: One-and-a-half Hour Examination = 100%

**CH4613 Natural Products and Society**

Credits: 10.0 Semester: 2  
 Availability: 2003-04

Description: Natural products are low molecular weight compounds produced by plants, fungi and bacteria. They have had a dramatic impact in shaping our society. The course will discuss the impact of natural products in medicine, the food industry and in society more generally. Particular case studies will be covered eg. The discovery and impact of penicillin from a fungal mould, morphine as the most widely prescribed pain killer, taxol from the yew tree as a new generation anticancer compound. The role of natural flavours and fragrances in the food and cosmetics industries will be highlighted as well as the impact and the misuse of drugs on social behaviour.

Class Hour: To be arranged.  
 Teaching: 2 - 3 lectures over 5 - 7 weeks and two tutorials.  
 Assessment: One-and-a-half Hour Examination = 100%

**CH4711 Physical Chemistry of Solutions**

Credits: 10.0 Semester: 1  
 Availability: 2003-04  
 Anti-requisite: CH4451

Description: This course discusses the physical chemistry of and in solutions. In the first part the thermodynamics of ideal and non-ideal solutions are covered, together with micellar solutions and the chemistry of colloidal suspensions. In the second part solution electrochemistry is covered.

Class Hour: To be arranged.  
 Teaching: 2 – 3 lectures over 5 – 7 weeks and two tutorials.  
 Assessment: One-and-a-half Hour Examination = 100%

**CH4712 Solid State Electrochemistry and Ion Transport in Solids**

Credits: 10.0 Semester: 1  
 Availability: 2003-04

Description: Whereas all ionic solids conduct to some extent due to the motion of ions, true ionically conducting solids exhibit levels of conductivity  $10^{12}$  times higher. Ionic conductivity in some solids can be greater than in liquids and gases! The aim of the course is to familiarise students with the basic mechanisms and principles of ionically conducting solids and intercalation compounds, how the new materials might be designed with even higher levels of conductivity and what applications are made possible by the unique properties of ionically conducting solids.

Class Hour: To be arranged.  
 Teaching: 2 – 3 lectures over 5 - 7 weeks and two tutorials.  
 Assessment: One-and-a-half Hour Examination = 100%

**CH4713 Interactions of Light with Matter**

Credits: 10.0 Semester: 2  
 Availability: 2003-04

Description: This course describes the fascinating properties of matter relevant to their interaction with electromagnetic radiation. Absorption, transmission, reflection and diffraction of light across the electromagnetic spectrum is covered. The properties of matter, particularly in the gas and solid phases, which are important for the emission, modification and transport of light are discussed at the atomic and molecular level.

Class Hour: To be arranged.  
 Teaching: 2 – 3 lectures over 5 – 7 weeks and two tutorials.  
 Assessment: One-and-a-half Hour Examination = 100%

## **Chemistry - Honours**

### **CH5411 Industrial Chemistry**

Credits:	10.0	Semester:	2
Availability:	2003-04		
Description:	This module, to be given by visiting Industrial Chemists, will cover recent advances in the chemical, petrochemical and oil industries.		
Class Hour:	To be arranged.		
Teaching:	2 – 5 lectures and 3 – 4 seminars over 5 – 7 weeks.		
Assessment:	Continuous Assessment = 100%		

### **CH5441 Stage 5 Chemistry Research Project**

Credits:	40.0	Semester:	Whole Year
Availability:	2003-04		
Anti-requisites:	CH4443-CH4446		
Description:	The research project at Stage 5 of the MChem programme aims to develop the students' skills in the following areas: experimental design and problem-solving; abstraction, evaluation and interpretation of data in the chemical literature; practical skills and teamwork; communication of results orally and in a dissertation. The project is supervised by a member of the academic staff. The project topic and aims will be selected by both supervisor and student and a literature survey will be carried out.		
Class Hour:	Two days per week, to be arranged.		
Teaching:	Laboratory-based research project		
Assessment:	Continuous Assessment = 100%		

### **CH5461 Chemistry – Tutorial Module**

Credits:	10.0	Semester:	1
Availability:	2004-05		
Anti-requisites:	CH5462, CH4461		
Description:	This is a general chemistry module aimed at developing and consolidating fundamental aspects of basic understanding. Students will be encouraged to gain a deeper understanding of elementary core material by a combination of discussion, general reading, essay work and problem solving at a more advanced level than previously required. Students will be expected to read externally on topics related to the tutorials. In addition, each student will be required to submit an essay which will be on a topic relevant to the broader issues of chemical study and knowledge. The tutorials will be aimed at Level 5000 standard.		
Class Hour:	To be arranged.		
Teaching:	Two weekly tutorials over nine weeks.		
Assessment:	Continuous Assessment = 40%, One Hour Examination = 60%		

### **CH5462 Chemistry – Tutorial Module for Medicinal Chemistry**

Credits:	10.0	Semester:	1
Availability:	2004-05		
Anti-requisites:	CH5461, CH4461		
Description:	This is a general chemistry module aimed at developing and consolidating fundamental aspects of basic understanding. Students will be encouraged to gain a deeper understanding of elementary core material by a combination of discussion, general reading, essay work and problem solving at a more advanced level than previously required. In addition, each student will be required to submit an essay which will be on a topic relevant to the broader issues of chemical study and knowledge. A proportion of the problems and examples will contain material specifically relevant to Medicinal chemistry.		
Class Hour:	To be arranged.		
Teaching:	2-3 weekly tutorials over 6-8 weeks.		
Assessment:	Continuous Assessment = 40%, One Hour Examination = 60%		

**CH5511 Applications of Transition Metal Compounds**

Credits: 10.0 Semester: 1

Availability: 2004 - 05

Description: This course discusses the Chemistry of metals with particular relevance to their uses in [1] organic transformations and [2] inorganic pharmaceuticals.

Class Hour: To be arranged.

Teaching: 2–3 weekly lectures over 5 – 7 weeks and two tutorials.

Assessment: One-and-a-half Hour Examination = 100%

**CH5512 Homogeneous and Heterogeneous Catalysis**

Credits: 10.0 Semester: 2

Availability: 2003-04

Description: The role of catalysis in providing clean and energy efficient routes to a variety of chemicals will be discussed. Examples will be taken from systems where the catalyst is insoluble (heterogeneous) or soluble (homogeneous). Mechanistic details will be emphasised.

Class Hour: To be arranged.

Teaching: 2-3 weekly lectures over 5-7 weeks.

Assessment: One-and-a-half Hour Examination = 100%

**CH5513 Supramolecular and Macrocyclic Chemistry**

Credits: 10.0 Semester: 2

Availability: 2003-04

Description: This course offers a systematic introductory treatment of molecular recognition, emphasizing fundamental concepts of intermolecular interactions and molecular recognition in solution. The nature, strength and directionality of orbital, hydrogen-bonding and hydrophobic interactions will be explored. Spectroscopic and other techniques for studying these interactions will be outlined with examples. Recognition of cations and anions using macrocycle, cryptand and spherand hosts will be discussed, as will the interaction of neutral molecules with cyclodextrins, calixarenes, cyclophanes and clefts with applications in catalysis and enzyme mimics. Recent developments in other applications such as molecular electronics and solar energy conversion will be described.

Class Hour: To be arranged.

Teaching: 2-3 weekly lectures over 5-7 weeks.

Assessment: One-and-a-half Hour Examination = 100%

**CH5514 Advanced Coordination Chemistry**

Credits: 10.0 Semester: 2

Availability: 2003-04

Description: This is a Masters level course in advanced co-ordination chemistry covering the heavier d-block and f-block metals and also the theory behind bonding, magnetism and electronic spectroscopy in d-block metal complexes. At the end of the course students should be in a position to understand fully the nature of bonding in d- and f-block metal systems, to understand the electronic spectra of d-block complexes and to rationalise trends in chemical properties both down and across the periodic table.

Class Hour: To be arranged.

Teaching: 2-3 weekly lectures over 5-7 weeks.

Assessment: One-and-a-half Hour Examination = 100%

## Chemistry - Honours

### CH5515 Characterisation of Solids

Credits: 10.0 Semester: 2

Availability: 2003-04

Description: This course aims to describe the most important experimental techniques available for the characterisation of solids, viz. X-ray crystallography, solid-state NMR and transmission electron microscopy. The fundamentals of each technique, together with examples of their applications to inorganic chemistry will be covered.

Class Hour: To be arranged.

Teaching: 2–3 weekly lectures over 5-7 weeks.

Assessment: One-and-a-half Hour Examination = 100%

### CH5611 Asymmetric Synthesis and Retrosynthesis

Credits: 10.0 Semester: 1

Availability: 2004-05

Description: This course discusses the methods available for the synthesis of chiral compounds. After a detailed introduction to the specialised terminology and analytical methods used, the main methods using chiral auxiliaries, chiral reagents and chiral catalysts will be described. This will then be combined with a consideration of synthetic strategy and total syntheses of several complex chiral compounds will be discussed.

Class Hour: To be arranged.

Teaching: 2–3 weekly lectures and 2 tutorials over 5-7 weeks.

Assessment: One-and-a-half Hour Examination = 100%

### CH5612 Natural Products, Biosynthesis and Enzyme Co-factors

Credits: 10.0 Semester: 2

Availability: 2003-04

Description: The course will investigate the biosynthesis of the main natural products groups (polyketides, terpenes, alkaloids). Unifying features of their structures and biosynthesis will be described and methods for studying the biosynthesis of natural products will be taught (isotope tracer methods). The common enzyme co-factors (PLP, TPP, NADH, co-enzyme B12) will be highlighted and their mechanistic role in mediating enzymatic transformations will be explored.

Class Hour: To be arranged.

Teaching: 2–3 weekly lectures over 5-7 weeks.

Assessment: One-and-a-half Hour Examination = 100%

### CH5613 Reactive Intermediates

Credits: 10.0 Semester: 2

Availability: 2003-04

Description: Aspects of the organic chemistry of the most important reactive intermediates viz.: carbocations, carbanions, free radicals, carbenes, nitrenes and arynes will be covered. Means of generating each type of reactive intermediate will be introduced. The key reactions of each intermediate will be reviewed and their characteristic reactions highlighted. An understanding of the use of each species in organic synthesis and of their significance in mechanistic analysis will be developed.

Class Hour: To be arranged.

Teaching: 2–3 weekly lectures over 5-7 weeks

Assessment: One-and-a-half Hour Examination = 100%

**CH5614 Drug Discovery, Protein Crystallography and Combinatorial Chemistry**

Credits: 10.0 Semester: 2

Availability: 2003-04

Description: This course will examine new methodologies for drug discovery. An overview of the processes of target discovery, lead discovery and lead optimisation will be given. The use of structural biology (protein crystallography, NMR), computational chemistry and combinatorial chemistry in 'rational drug design' will be described. The course will look at the technologies behind combinatorial library design, synthesis and high throughput screening. Broad and focused libraries will be discussed. Several examples will be explored, such as the development of drugs against AIDS and influenza.

Class Hour: To be arranged.

Teaching: 2–3 weekly lectures over 5-7 weeks.

Assessment: One-and-a-half Hour Examination = 100%

**CH5615 Advanced Pharmaceutical Chemistry**

Credits: 10.0 Semester: 1

Availability: 2003-04

Anti-requisite: CH4612

Description: The module will discuss case studies from the most successful pharmaceutical products. How the compounds came to be discovered, what diseases they are targeting, how they work and how they are made and delivered to the market. Compounds that will feature are aspirin, penicillin, AZT, 5-flourouracil, Zantac, viagra,  $\beta$ -blockers, prozac etc.

Class Hour: To be arranged.

Teaching: Two - three lectures over 5-7 weeks, two tutorials, plus extra directed reading.

Assessment: One-and-a-half Hour Examination = 100%

**CH5711 Advanced Spectroscopic Methods**

Credits: 10.0 Semester: 1

Availability: 2004-05

Description: This course describes the importance of more advanced spectroscopic methods for the elucidation of structure and properties of increasingly complex molecules and materials. Particular attention will be paid to those techniques which exploit synchrotron radiation.

Class Hour: To be arranged.

Teaching: 2–3 weekly lectures and 2 tutorials over 5-7 weeks.

Assessment: One-and-a-half Hour Examination = 100%

**CH5712 Functional Materials / Electrons in Solids**

Credits: 10.0 Semester: 2

Availability: 2003-04

Description: The course introduces the physical concepts of dielectrics, semiconductors, and metals. Electronic properties of interfaces and thin films which are fundamental to devices such as microprocessors, lasers in CD players, or solar cells will be discussed.

Class Hour: To be arranged.

Teaching: 2-3 lectures over 5-7 weeks.

Assessment: One-and-a-half Hour Examination = 100%

## Chemistry - Honours

### CH5713 Surface Chemistry

Credits: 10.0 Semester: 2

Availability: 2003-04

Description: The course will teach methods in organic synthesis with a particular focus on the assembly of C-C bonds and C-X bonds. The course will introduce new reactions and reagents as well as strategies in organic synthesis. There will be a particular emphasis on the contribution organometallic reagents and the main group elements make to organic synthesis. Additionally the common protecting groups which are used to mask vulnerable functional groups during such transformations will be highlighted.

Class Hour: To be arranged.

Teaching: 2-3 weekly lectures over 5-7 weeks.

Assessment: One-and-a-half Hour Examination = 100%

### CH5714 Statistical Mechanics and Quantum Mechanics

Credits: 10.0 Semester: 2

Availability: 2003-04

Prerequisite: CH3711

Description: This course builds on 'Statistical Mechanics. Part I', given in CH3712, 'Quantum Theory of Atoms, Molecules and Solids. Part I' given in CH 2102 and 'Quantum Theory of Atoms, Molecules and Solids. Part II' given in CH3711. While the course is mathematically based, the emphasis throughout is on the physical and chemical implications of the mathematical results and how this provides a coherent, quantitative framework for understanding the basis of thermodynamics and the electronic structure of atoms, molecules and solids.

Class Hour: To be arranged.

Teaching: 2-3 weekly lectures over 5-7 weeks.

Assessment: One-and-a-half Hour Examination = 100%

### CH5715 Excited States in Molecules

Credits: 10.0 Semester: 2

Availability: 2003-04

Description: This course discusses the special properties of excited states in molecules. The creation, characterisation and the relevance of excited states in analysis and detection, in the operation of lasers and in their ability to carry out state selective chemistry is described.

Class Hour: To be arranged.

Teaching: 2-3 weekly lectures over 5-7 weeks.

Assessment: One-and-a-half Hour Examination = 100%