

## 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 levels. Refer to the appropriate Faculty regulations for lists of subjects recognised as qualifying towards either a B.Sc. or M.A. degree.

#### **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 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**

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**

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.

<b>Degree Programmes</b>	<b>Programme Requirements at:</b>
(B.Sc. Honours): <b>Biomolecular Science</b>	<p><b>Single Honours Biomolecular Science (B.Sc. Honours):</b></p> <p><b>Level 1:</b> Biology Element: 40 credits including passes in (BL1101 and BL1102). Chemistry Element: 40 credits comprising passes in CH1401 and CH1601</p> <p><b>Level 2:</b> 120 credits comprising passes at grade 11 or better in BL2101, BL2104, CH2501 and CH2601</p> <p><b>Level 3:</b> 120 credits comprising Biology Element: BL3301, BL3310, BL3312, BL3320 Chemistry Element: CH3431, CH3612, CH3613, CH3615, CH3621, CH3716</p> <p><b>Level 4:</b> 120 credits comprising: Biology element: BL4210 and THREE modules chosen from (BL4212, BL4213, BL4215, BL4216, BL4222 and BL4223)#. Chemistry element: CH4442 and TWO other modules chosen from CH4614, CH4612, CH4613, CH5611, CH5612, CH5613, CH5614, CH5616. (By special arrangement only, BL4201 may be taken instead of CH4442; but modules chosen from # must then be eliminated.)</p> <p><b>Other Information:</b> This course is recognised by the Royal Society of Chemistry (RSC) for professional membership.</p>
(B.Sc. Honours): <b>Chemical Sciences</b>	<p><b>Single Honours Chemical Sciences (B.Sc. Honours):</b></p> <p><b>Level 1:</b> 60 credits comprising passes in CH1401, CH1402 and CH1601</p> <p><b>Level 2:</b> 90 credits comprising passes at grade 11 or better in CH2501, CH2601 and CH2701</p> <p><b>Level 3:</b> 120 credits comprising CH3431, CH3441, CH3511, CH3512, CH3521, CH3612, CH3615, CH3621, CH3712, CH3717, CH3721</p> <p><b>Level 4:</b> 120 credits comprising CH4442, 4 from (CH4511, CH4614, CH4612, CH4711, CH5717), and 4 from (CH4513, CH4613, CH4712, CH4713, CH5513-5, CH5612-4, CH5616, CH5712-4, CH5718)</p> <p><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 30 credits from the 3000-level and 4000-level modules listed above can be replaced with modules from other Schools. This course is recognised by the Royal Society of Chemistry (RSC) for professional membership.</p>

<b>Degree Programmes</b>	<b>Programme Requirements at:</b>
(B.Sc. Honours): <b>Chemistry</b>	<p><b>Single Honours Chemistry (B.Sc. Honours):</b></p> <p><b>Level 1:</b> 60 credits comprising passes in CH1401, CH1402 and CH1601</p> <p><b>Level 2:</b> 90 credits comprising passes at grade 11 or better in CH2501, CH2601 and CH2701</p> <p><b>Level 3:</b> 120 credits comprising CH3431, CH3441, CH3511, CH3512, CH3521, CH3612, CH3615, CH3621, CH3712, CH3717, CH3721.</p> <p><b>Level 4:</b> 120 credits comprising CH4442, CH4461, 2 from (CH4511, CH4614, CH4711), 2 from (CH4513, CH4613, CH4712, CH4713), either CH4612 or CH5717, and 2 from (CH5513-5, CH5612-4, CH5616, CH5712-4, CH5718).</p> <p><b>Other Information:</b> This course is recognised by the Royal Society of Chemistry (RSC) for professional membership.</p>
(B.Sc. Honours): <b>Chemistry and Geology (previously known as Geoscience)</b>	<p><b>Joint Chemistry - Geology B.Sc. Honours Degree:</b></p> <p><b>Level 1:</b> 60 credits comprising passes in CH1401, CH1402 and CH1601 and 40 credits comprising passes in (ES1001 or GG1011) and (ES1002 or GG1012)</p> <p><b>Level 2:</b> 60 credits comprising passes at grade 11 or better in CH2501 and either CH2601 or CH2701 and 60 credits comprising passes at grade 11 or better in (ES2001 or GS2011) or (ES2002 or GS2012)</p> <p><b>Level 3:</b> 120 credits comprising CH3431, CH3511, CH3521, CH3717, CH3721, CH4513, and ES3001, ES3004, ES3006 and ES3009</p> <p><b>Level 4:</b> 40 credits from CH4511, CH4614, CH4711, CH4712, CH5711, CH5717, CH5515 and EITHER 50 credits from (ES4010 and CH4448) OR ID4441, 10 credits from CH5515, and up to 30 credits from ES3008, ES4007, ES4009, ES4006 or ID4001.</p> <p><b>Other Information:</b> This course is recognised by the Royal Society of Chemistry (RSC) for professional membership.</p> <p>In total (between the two Schools) 240 credits are required at Level 3 and Level 4 of which at least 90 credits must be achieved at Level 4.</p>
(B.Sc. Honours): <b>Chemistry and Mathematics</b>	<p><b>Chemistry element of Joint Honours Degree (B.Sc. Honours):</b></p> <p><b>Level 1:</b> 60 credits comprising passes in CH1401, CH1402 and CH1601</p> <p><b>Level 2:</b> 60 credits comprising passes at grade 11 or better in CH2501 and CH2701</p> <p><b>Level 3:</b> 60 credits comprising 3 from (CH3431, CH3512, CH3615, CH3621, CH3717, CH3721), 30 credits from (CH3441, CH3511, CH3521, CH3712, CH3715)</p> <p><b>Level 4:</b> 60 credits comprising CH4442, 1 or 2 from (CH4511, CH4614, CH4612, CH4711), 1 or 2 from (CH4513, CH4613, CH4712, CH4713)</p> <p><b>Other Information:</b> This course is recognised by the Royal Society of Chemistry (RSC) for professional membership.</p> <p>In total (between the two Schools) 240 credits are required at Level 3 and Level 4 of which at least 90 credits must be achieved at Level 4.</p>

<b>Degree Programmes</b>	<b>Programme Requirements at:</b>
<p>(B.Sc. Honours): <b>Chemistry with Medicinal Chemistry</b></p>	<p><b>Chemistry with Medicinal Chemistry (B.Sc. Honours):</b>  <b>Level 1:</b> 60 credits comprising passes in CH1401, CH1402 and CH1601  <b>Level 2:</b> 90 credits comprising passes at grade 11 or better in CH2501, CH2601, CH2701  <b>Level 3:</b> 120 credits comprising CH3431, CH3441, CH3511, CH3512, CH3521, CH3612, CH3613, CH3615, CH3621, CH3716, CH3721,  <b>Level 4:</b> 120 credits comprising CH4442, CH4461, CH4511, CH4614, CH4612, CH4613, CH5611, 2 from (CH5612-4 and CH5616).  <b>Other Information:</b> This course is recognised by the Royal Society of Chemistry (RSC) for professional membership.</p>
<p>(B.Sc. Honours): <b>Chemistry with French<sup>W</sup></b></p> <p><sup>W</sup> also available as 'With Integrated Year Abroad Degrees'</p>	<p><b>Chemistry major element of B.Sc. Honours Degree with French:</b>  <b>Level 1:</b> 60 credits comprising passes in CH1401, CH1402 and CH1601  <b>Level 2:</b> 80 credits comprising passes at grade 11 or better in CH2501, CH2603 and CH2701  <b>Level 3:</b> 90 credits comprising CH3441 and 70 credits from (CH3431, CH3511, CH3512, CH3521, CH3612, CH3615, CH3621, CH3712, CH3717, CH3721)  <b>Year Abroad</b> (if WIYA version taken): 60 credits comprising FR3101  <b>Level 4:</b> 90 credits comprising CH4442, and 50 credits from (CH4461, CH4511, CH4513, CH4614, CH4613, CH4711, CH4712, CH4713)  <b>Other Information:</b> These courses are recognised by the Royal Society of Chemistry (RSC) for professional membership.                      In total (between the two Schools) 240 credits are required at Level 3 and Level 4 of which at least 90 credits must be achieved at Level 4.</p>
<p>(B.Sc. Honours): <b>Chemistry with Pharmacology<sup>N</sup></b></p> <p><sup>N</sup> Not available to entrants from 2010-11</p>	<p><b>Chemistry with Pharmacology (B.Sc. Honours):</b>  <b>Level 1:</b>                      Chemistry Element: 40 credits comprising passes in CH1401 and CH1601                      Biology Element: 40 credits including passes in (BL1101 and BL1102).  <b>Level 2:</b> 120 credits comprising passes at grade 11 or better in BL2101, BL2104, CH2501 and CH2601  <b>Level 3:</b> 80 credits comprising CH3431, CH3512, CH3615, CH3621, CH3716, CH3721, 20 credits from (CH3441, CH3511, CH3612, CH3613) and 40 credits from BL3312, BL3313  <b>Level 4:</b> 50 credits comprising CH4447, CH4461, and 70 credits from CH4511-2, CH4612 - CH4614, CH4711-3, CH5611-4, CH5616  <b>Other Information:</b> This course is recognised by the Royal Society of Chemistry (RSC) for professional membership. The project (CH4447) will be supervised jointly by staff from Chemistry and Biology.</p>

<b>Degree Programmes</b>	<b>Programme Requirements at:</b>
<p>(B.Sc. Honours): <b>Materials Science</b></p>	<p><b>Materials Science (B.Sc. Honours):</b>  <b>Level 1:</b> 120 credits comprising passes in CH1401, CH1402, CH1602, PH1011, PH1012 and MT1002  <b>Level 2:</b> 120 credits comprising passes at grade 11 or better in CH2501, CH2602, CH2701 and either PH2011 or MT2001  <b>Level 3:</b> 120 credits comprising CH3441, CH3513, CH3712, CH3715, CH3717, CH3722, PH3002, PH3074 and two other 3000-level modules.  <b>Level 4:</b> 120 credits comprising CH4442, CH4711, CH4712, CH4452 and a further three 10 credit 4000-level or 5000-level modules.  <b>Other Information:</b> This course is recognised by the Royal Society of Chemistry (RSC) for professional membership</p>
<p>(M.Chem. Honours): <b>Chemistry (M.Chem.) 5 years</b></p>	<p><b>Chemistry (M.Chem. Honours) Degree:</b>  <b>Level 1:</b> 60 credits comprising passes in CH1401, CH1402 and CH1601  <b>Level 2:</b> 90 credits comprising passes at 15 or better in CH2501, CH2601 and CH2701  <b>Level 3:</b> 120 credits comprising CH3431, CH3441, CH3511, CH3512, CH3521, CH3612, CH3615, CH3621, CH3712, CH3717, CH3721.  <b>Level 4:</b> 120 credits comprising CH4442, CH4511, CH4513, CH4614, CH4612, CH4613, CH4711, CH4712, CH4713.  <b>Level 5:</b> 120 credits comprising CH5461, CH5441, CH5511, CH5611, CH5711, 4 from (CH5513-5, CH5612-4, CH5616, CH5712-4, CH5717-8).  <b>Other Information:</b> This course has been accredited by the Royal Society of Chemistry (RSC) for professional membership.</p>
<p>(M.Chem. Honours): <b>Chemistry with External Placement (M.Chem.) 5 years</b></p>	<p><b>Chemistry with External Placement (M.Chem. Honours):</b>  <b>Level 1:</b> 60 credits comprising passes in CH1401, CH1402 and CH1601  <b>Level 2:</b> 90 credits comprising passes at 15 or better in CH2501, CH2601 and CH2701  <b>Level 3:</b> 120 credits comprising CH3431, CH3441, CH3511, CH3512, CH3521, CH3615, CH3612, CH3621, CH3712, CH3717, CH3721,  <b>Level 4:</b> 120 credits comprising CH4441, CH4451.  <b>Level 5:</b> 120 credits comprising CH5441, CH5461, CH5511, CH5611, CH5711, 4 from (CH5513-5, CH5612-4, CH5616, CH5712-4, CH5717-8).  <b>Other Information:</b> This course has been accredited by the Royal Society of Chemistry (RSC) for professional membership.</p>

<b>Degree Programmes</b>	<b>Programme Requirements at:</b>
<p>(M.Chem. Honours):  <b>Chemistry with French (M. Chem.)</b>  <b>5 years</b></p>	<p><b>Chemistry major element of M.Chem. Honours Degree with French (5 year degree) :</b></p> <p><b>Level 1:</b> 60 credits comprising passes in CH1401, CH1402 and CH1601</p> <p><b>Level 2:</b> 80 credits comprising passes at grade 15 or better in CH2501, CH2603 and CH2701</p> <p><b>Level 3:</b> 90 credits comprising CH3441 and 70 credits from (CH3431, CH3511, CH3512, CH3521, CH3612, CH3615, CH3621, CH3712, CH3717, CH3721 )</p> <p><b>Level 4:</b> 90 credits comprising 70 credits from CH4442, CH4511, CH4614, CH4711, and 20 credits from CH4513, CH4613, CH4712, CH4713</p> <p><b>Level 5:</b> 90 credits comprising CH5441, CH5461 and 40 credits from (CH5511, CH5513-5, CH5611-4, CH5616, CH5711-4, CH5717-8).</p> <p><b>Other Information:</b> This course has been accredited by the Royal Society of Chemistry (RSC) for professional membership.</p>
<p>(M.Chem. Honours):  <b>Chemistry with French and External Placement (M. Chem.)</b>  <b>5 years</b></p>	<p><b>Chemistry and External Placement major elements of M.Chem. Honours Degree with French (5 year degree) :</b></p> <p><b>Level 1:</b> 60 credits comprising passes in CH1401, CH1402 and CH1601</p> <p><b>Level 2:</b> 80 credits comprising passes at grade 15 or better in CH2501, CH2603 and CH2701</p> <p><b>Level 3:</b> 90 credits comprising CH3441 and 70 credits from (CH3431, CH3511, CH3512, CH3521, CH3612, CH3615, CH3621, CH3712, CH3717, CH3721)</p> <p><b>Level 4:</b> 90 credits from CH4441</p> <p><b>Level 5:</b> 90 credits comprising CH5441, CH5461 and 40 credits from (CH5511, CH5513-5, CH5611-4, CH5616, CH5711-4, CH5717-8).</p> <p><b>Other Information:</b> This course has been accredited by the Royal Society of Chemistry (RSC) for professional membership.</p>

<b>Degree Programmes</b>	<b>Programme Requirements at:</b>
<p>(M.Chem. Honours):  <b>Chemistry with Mathematics                      (M. Chem.) 5 years</b></p>	<p><b>Chemistry with Mathematics (M.Chem. Honours) (5 year degree) :</b>  <b>Level 1:</b> 60 credits comprising passes in CH1401, CH1402 and CH1601</p> <p><b>Level 2:</b> 60 credits comprising passes at 15 or better in CH2501 and CH2701</p> <p><b>Level 3:</b> 125 credits comprising CH3441, and 60 credits from (CH3431, CH3511, CH3512, CH3521, CH3615, CH3621, CH3712, CH3715, CH3717, CH3721), two of (MT3501, MT3503, MT3504), MT3600 or MT3601</p> <p><b>Level 4:</b> 115 credits comprising CH4442, 3 of (CH4511, CH4513, CH4614, CH4612, CH4613, CH4711, CH4712, CH4713) and 3 further 3000 or 4000 level MT modules.</p> <p><b>Level 5:</b> 120 credits comprising CH5441, CH5461, CH5711, CH5712, CH5713, CH5714, 3 from (CH5511, CH5513-5, CH5611-6, CH5717-8).</p> <p><b>Other Information:</b> This course is recognised by the Royal Society of Chemistry (RSC) for professional membership.</p>
<p>(M.Chem. Honours)  <b>Chemistry with Medicinal                      Chemistry (M.Chem.) 5 years</b></p>	<p><b>Chemistry with Medicinal Chemistry (M.Chem Honours )</b>  <b>Level 1:</b> 60 credits comprising passes in CH1401, CH1402 and CH1601</p> <p><b>Level 2:</b> 90 credits comprising passes at 15 or better in CH2501, CH2601 and CH2701</p> <p><b>Level 3:</b> 120 credits comprising CH3431, CH3441, CH3511, CH3512, CH3521, CH3612, CH3613, CH3615, CH3621, CH3716, CH3721</p> <p><b>Level 4:</b> 120 credits comprising CH4442, CH4511, CH4513, CH4614, CH4612, CH4613, CH4711, CH5612, CH5614.</p> <p><b>Level 5:</b> 120 credits comprising CH5441, CH5461, CH5511, CH5513, CH5514, CH5515, CH5611, CH5613, CH5616</p> <p><b>Other Information:</b> This course has been accredited by the Royal Society of Chemistry (RSC) for professional membership.</p>
<p>(M.Chem. Honours):  <b>Chemistry with Medicinal                      Chemistry and External Placement                      (M.Chem.) 5 years</b></p>	<p><b>Chemistry with Medicinal Chemistry and External Placement                      (M.Chem Honours):</b>  <b>Level 1:</b> 60 credits comprising passes in CH1401, CH1402 and CH1601</p> <p><b>Level 2:</b> 90 credits comprising passes at 15 or better in CH2501, CH2601 and CH2701</p> <p><b>Level 3:</b> 120 credits comprising CH3431, CH3441, CH3511, CH3512, CH3521, CH3612, CH3613, CH3615, CH3621, CH3716, CH3721</p> <p><b>Level 4:</b> 120 credits comprising CH4441, CH4451.</p> <p><b>Level 5:</b> 120 credits comprising CH5441, CH5461, CH5511, CH5611-6</p> <p><b>Other Information:</b> This course has been accredited by the Royal Society of Chemistry (RSC) for professional membership.</p>

<b>Degree Programmes</b>	<b>Programme Requirements at:</b>
(M.Sci. Honours): <b>Chemistry and Physics (M.Sci. Honours) 5 years</b>	<p><b>Chemistry element of Chemistry-Physics M.Sci. Honours Degree:</b></p> <p><b>Level 1:</b> 40 credits comprising passes in CH1401 and CH1402</p> <p><b>Level 2:</b> 60 credits comprising passes at 15 or better in CH2501 and CH2701</p> <p><b>Level 3:</b> 120 credits comprising CH3431, CH3441, CH3511, CH3512, CH3615, CH3712, CH3717, CH3721, CH4711, CH4712, CH4713</p> <p><b>Level 5:</b> 40 credits from CH5441 or 60 credits from PH5101, at least 30 credits from CH5515, CH5711-CH5714, CH5717-8</p> <p><b>Other Information:</b> This course is recognised by the Royal Society of Chemistry (RSC) for professional membership.</p>
(M.Sci. Honours): <b>Materials Science 5 years</b>	<p><b>Materials Science M.Sci. Honours Degree:</b></p> <p><b>Level 1:</b> 120 credits comprising passes in CH1401, CH1402, CH1601, PH1011, PH1012 and MT1002</p> <p><b>Level 2:</b> 120 credits comprising passes at grade 15 or better in CH2501, CH2602, CH2701 and either PH2011 or MT2001</p> <p><b>Level 3:</b> 120 credits comprising CH3441, CH3513, CH3712, CH3715, CH3717, CH3722, CH4711, CH4712, PH3002 and PH3074.</p> <p><b>Level 4:</b> 120 credits comprising CH3511, CH4442, CH4452, CH4513, CH4713, two of (CH3512, CH3612, CH3613, CH3615, CH4511)</p> <p><b>Level 5:</b> 120 credits from CH5441, CH5515, CH5711, CH5712, CH5713, CH5716 CH5717, CH5718, (PH5208 or PH5022)</p> <p><b>Other Information:</b> This course is recognised by the Royal Society of Chemistry (RSC) for professional membership.</p>
(M.Sci. Honours): <b>Materials Science with External Placement 5 years</b>	<p><b>Materials Science with External Placement M.Sci. Degree:</b></p> <p><b>Level 1:</b> 120 credits comprising passes in CH1401, CH1402, CH1601, PH1011, PH1012 and MT1002</p> <p><b>Level 2:</b> 120 credits comprising passes at grade 15 or better in CH2501, CH2602, CH2701 and either PH2011 or MT2001</p> <p><b>Level 3:</b> 120 credits comprising CH3441, CH3513, CH3712, CH3715, CH3717, CH3722, CH4711, CH4712, PH3002 and PH3074.</p> <p><b>Level 4:</b> 120 credits comprising CH4441, CH4452</p> <p><b>Level 5:</b> 120 credits from CH5441, CH5515, CH5711, CH5712, CH5713, CH5716 CH5717, CH5718, (PH5208 or PH5022)</p> <p><b>Other Information:</b> This course is recognised by the Royal Society of Chemistry (RSC) for professional membership.</p>

**Students still completing degree programmes as defined in previous Course Catalogues should discuss their module selections with their Honours Adviser(s).**

### 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 students wishing to enter 3000 modules 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.**

### **InterDisciplinary (ID) Modules**

There are modules which relate to this School - **ID4001 Communication and Teaching in Science** which is interdisciplinary and also appears in the Interdisciplinary Section of the Catalogue (Section 23)

### **Chemistry (CH) Modules**

#### **CH3431 Chemistry Workshop**

Credits: 10 Semester: 1

Description: The aim of the module is to provide a basis in organic spectroscopy, molecular symmetry and point groups and their application to inorganic spectroscopy, and crystallography and X-ray diffraction. In addition, students will gain experience in chemical information retrieval and searching on-line databases.

Class Hour: To be arranged.

Teaching: 2 seminars and 1 or 2 lectures, and occasional tutorials.

Assessment: Continuous Assessment = 100%

#### **CH3441 Mini Chemistry Project**

Credits: 20 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%

#### **CH3442 External Placement for Chemical Sciences**

Credits: 20 Semester: 2

Availability: Not available 2011-12

Description: This module is designed to carry out a placement in a company or other body, in order to assist students in selecting an appropriate career outside direct Chemistry, but in which they will find their background Chemical knowledge useful (examples might include, Scientific Publishing, Patent Office, Management in the Chemical Industry, Hospital Management).

Class Hour: Full-time - 3 months between March & Sept.

Teaching: Full-time.

Assessment: Continuous Assessment = 100%

## Chemistry – Honours – 2011/12 – September 2011

### CH3511 Main Group Chemistry

Credits: 10 Semester: 2

Description: This module discusses the Chemistry of the elements of groups 2, 12, 13, 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. It also explores aspects of solid state Chemistry. A major component of the module will cover the use of spectroscopic techniques, including multinuclear NMR and EPR, to characterize main group and other inorganic compounds.

Class Hour: To be arranged.

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

Assessment: 2-hour Examination = 100%

### CH3512 Organometallic Chemistry

Credits: 10 Semester: 1

Description: This module 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 per week over 5 - 7 weeks and 2 - 3 tutorials.

Assessment: 2-hour Examination = 100%

### CH3513 Advanced Solid State Chemistry

Credits: 10 Semester: 1

Prerequisite: CH2501

Description: This module on Advanced Solid State Chemistry brings together a number of advanced concepts including advanced crystal chemistry, electronic effects, phase equilibria and extended defects. It is key to the understanding of both modern solid state chemistry and materials science.

Class Hour: To be arranged.

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

Assessment: 2-hour Examination = 100%

### CH3521 Inorganic Chemistry Laboratory

Credits: 10 Semester: 2

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

Class Hour: 9.00 am - 12.00 noon Monday to Friday.

Teaching: 3 Hours daily for weeks 1 - 6.

Assessment: Continuous Assessment = 100%

### CH3612 Synthetic Methodology

Credits: 10 Semester: 2

Description: This module will cover a wide range of synthetic methods and applications of the methods to the synthesis of complex molecules. Students will gain a deep understanding of the importance of methods involving sulfur, phosphorus, boron, silicon, organolithium and organozinc reagents. Students will also be introduced to modern methods of alkene, alkyne and biaryl synthesis using palladium and ruthenium catalysts. The use of the protecting groups in conjunction with these synthetic methods will also be covered.

Class Hour: To be arranged.

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

Assessment: 2-hour Examination = 100%

**CH3613 Carbohydrate & Nucleic Acid Chemistry**

Credits: 10 Semester: 2

Description: The aim of the module is to cover aspects of the chemistry of nucleic acids. It will begin with an introduction to carbohydrate chemistry including discussion of biological processes, the synthesis of carbohydrates and carbohydrate-based pharmaceuticals. The structure and chemical synthesis of nucleic acids will then be discussed. The chemical reactivity of DNA and the ways in which it is chemically damaged will be examined. The chemical reactions of DNA will be related to mechanisms of carcinogenesis. The ways in which a range of drugs interact with DNA will be discussed in detail.

Class Hour: To be arranged.

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

Assessment: 2-hour Examination = 100%

**CH3615 Mechanism in Organic Chemistry**

Credits: 10 Semester: 1

Anti-requisites: CH3614

Description: The objective of this module is to provide the student with a thorough understanding of the mechanistic 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 module will also focus on the critical role of orbitals in determining the reactivity and selectivity of organic compounds. Reaction mechanism described as a flow of electrons through a correctly aligned orbital manifold will be developed as a tool to explore key topics in synthetic chemistry, with particular emphasis on stereoelectronic effects and aspects of alicyclic chemistry.

Class Hour: To be arranged.

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

Assessment: 2-hour Examination = 100%

**CH3621 Organic Chemistry Laboratory**

Credits: 10 Semester: 1

Description: Practical experiments involving synthesis, characterisation and measurements in organic chemistry.

Class Hour: 9.00 am - 12.00 noon Monday to Friday.

Teaching: Daily 3-hour practical classes over 6 weeks.

Assessment: Continuous Assessment = 100%

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

Credits: 10 Semester: 2

Prerequisite: CH2701

Description: This module builds on 'Quantum Theory of Atoms, Molecules and Solids. Part I' given in CH2701. 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 module 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 per week over 5 - 7 weeks and 2 - 3 tutorials.

Assessment: 2-hour Examination = 100%

## **Chemistry – Honours – 2011/12 – September 2011**

### **CH3713 Sustainable Chemistry in Relation to the Semiconductor Industry**

Credits: 10 Semester: 2

Availability: Not available 2011-12

Description: This module focuses on the application of "green chemistry" concepts to the semiconductor and chemical industry. The module will examine the changes employed by the chemical and semiconductor industries in recent years in terms of production methods, cost, and the minimization of waste material. The module will also describe existing legislation as applied to the chemical industries.

Class Hour: To be arranged.

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

Assessment: 2-hour Examination = 100%

### **CH3714 Surface Chemistry & Advanced Physical Chemistry**

Credits: 10 Semester: 2

Availability: Not available 2011-12

Description: This module focuses on the surface properties of the solid state and in particular the chemical interactions between solid state materials and selected adsorbates. The module will also include analytical methods to determine the surface composition and chemical properties of solid state materials that may or may not possess semiconducting properties.

Class Hour: To be arranged.

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

Assessment: 2-hour Examination = 100%

### **CH3715 Introduction to Analysis of Materials**

Credits: 10 Semester: 2

Description: The objective of this module is to introduce the principles of the most popular materials analysis methods using X-ray, ion beams, electrons and diffraction methods. The module will cover analytical principles of X-ray photoelectron spectroscopy (XPS) and Auger electron spectroscopy (AES) together with secondary ion mass spectroscopy (SIMS) and X-ray Diffraction methods (XRD). Diffraction techniques will also be covered with the introductory aspects of Electron Energy Loss Spectroscopy (EELS) together with vibrational spectroscopic techniques.

Class Hour: To be arranged.

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

Assessment: 2-hour Examination = 100%

### **CH3716 Quantitative Aspects of Medicinal Chemistry**

Credits: 10 Semester: 1

Description: The aim of the module is to cover some of the quantitative aspects of Medicinal Chemistry and drug design. Initially some relevant fundamental thermodynamics will be discussed. The thermodynamics of the drug receptor interactions will then be covered along with other aspects of pharmacology. The pharmacokinetic phase of drug action will be described including the absorption, distribution, metabolism and elimination (ADME) of drugs. The use of computational chemistry in the modern drug design process will then be discussed, covering force field calculations, molecular docking, QSAR and virtual screening.

Class Hour: To be arranged.

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

Assessment: 2-hour Examination = 100%

**CH3717 Statistical Mechanics & Computational Chemistry**

Credits: 10 Semester: 1  
Anti-requisites: CH3716

Description: This module combines the study of statistical mechanics with an introduction to theoretical and computational methods as applied in modern chemistry. In the first set of lectures the molecular basis of thermodynamics is covered in an introduction to the study of statistical mechanics. The use of computational chemistry in the modern drug design process will then be discussed, covering force field calculations, molecular docking, QSAR and virtual screening.

Class Hour: To be arranged.

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

Assessment: 2-hour Examination = 100%

**CH3721 Physical Chemistry Laboratory**

Credits: 10 Semester: 1  
Anti-requisite CH3722

Description: This module comprises practical experiments involving physical measurements and the use of computational programmes in Chemistry.

Class Hour: 9.00 am - 12.00 noon or 1.00 pm Monday to Friday.

Teaching: 3 - 4 hours per day for 5 weeks.

Assessment: Continuous Assessment = 100%

**CH3722 Materials Laboratory**

Credits: 10 Semester: 1  
Anti-requisite: CH3721

Description: This module comprises practical experiments involving physical measurements and the use of computational programmes in Materials Science.

Class Hour: 9.00 am - 12.00 noon or 1.00 pm Monday to Friday.

Teaching: 3 - 4 hours per day for 5 weeks.

Assessment: Continuous Assessment = 100%

**CH4441 External Placement**

Credits: 90 Semester: Whole Year  
Co-requisite: CH4451 or CH4452 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%

**CH4442 Chemistry Research Project**

Credits: 40 Semester: Whole Year  
Anti-requisites: CH4443 - CH4448, ID4441

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: 2 days per week, to be arranged.

Teaching: Laboratory-based research project.

Assessment: Continuous Assessment = 100%

## **Chemistry – Honours – 2011/12 – September 2011**

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

Credits: 45 Semester: Either

Anti-requisites: CH5441, CH4442, CH4444 - CH4448, ID4441

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: 2 days per week, to be arranged.

Teaching: Laboratory-based research project.

Assessment: Continuous Assessment = 100%

### **CH4444 Chemistry Research Project**

Credits: 60 Semester: Either or both

Anti-requisites: CH5441, CH4442 - CH4443, CH4445 - CH4448, ID4441

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 Semester: Whole Year

Anti-requisites: CH5441, CH4442 - CH4444, CH4446 - CH4448, ID4441

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 Semester: Whole Year

Anti-requisites: CH5441, CH4442 - CH4445, CH4447, CH4448, ID4441

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 Semester: Whole Year

Anti-requisites: CH4442 - CH4446, CH4448, CH5441, ID4441

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: 2 days per week, to be arranged.

Teaching: Laboratory-based research project.

Assessment: Continuous Assessment = 100%

**CH4448 Chemistry Project for Chemistry & Geology**

Credits: 20 Semester: 1

Anti-requisites: CH4442 - CH4447, CH5441, ID4441

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.

Class Hour: To be arranged.

Teaching: Laboratory-based research project.

Assessment: Continuous Assessment = 100%

**CH4451 M.Chem. Distance Learning**

Credits: 30 Semester: Whole Year

Anti-requisites: CH4511, CH4611, CH4614, CH4711, CH4452

Co-requisite: CH4441

Description: This module offers the material covered by Level 4000 B.Sc./M.Chem. modules CH4511, CH4614 and CH4711 in a distance-learning mode to students on the M.Chem. one-year placement. See the module descriptions for modules CH4511, CH4614 and CH4711 for details of module content.

Teaching: Distance Learning

Assessment: Continuous Assessment = 100%

**CH4452 Materials Science Distance Learning**

Credits: 30 Semester: Whole Year

Description: This distance-learning module allows students to develop an advanced understanding of the basic concepts of Materials Science. It will be delivered in three sections, metals, ceramics and polymers, each approximately equivalent to a normal 10-credit lecture module.

Teaching: Distance Learning

Assessment: Continuous Assessment = 100%

## Chemistry – Honours – 2011/12 – September 2011

### CH4461 Integrating Chemistry

Credits: 10 Semester: 1

Anti-requisites: CH4462, 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 related topics. 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 problems will be aimed at 4000-level standard.

Class Hour: To be arranged.

Teaching: 2 classes per week for 9 weeks.

Assessment: Continuous Assessment = 40%, 2-hour Examination = 60%

### CH4511 Inorganic Reaction Mechanisms & Bioinorganic Chemistry

Credits: 10 Semester: 1

Anti-requisite: CH4451

Description: This module 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 per week over 5 - 7 weeks and 2 - 3 tutorials.

Assessment: 2-hour Examination = 100%

### CH4513 Green Chemistry

Credits: 10 Semester: 2

Prerequisites: CH2501 and CH3512

Description: This module examines the concepts and parameters involved in a greener approach to chemistry. It will also discuss the remedies proposed for a sustainable chemistry. Students will learn the principles of green chemistry, how to evaluate the environmental impact of a process and cover the following topics: waste minimisation and treatment, catalysis, greener solvents, renewable resources, alternative energy sources, design of greener processes, industrial case studies.

Class Hour: To be arranged.

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

Assessment: 2-hour Examination = 100%

### CH4612 Blockbuster Pharmaceuticals

Credits: 10 Semester: 1

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-fluorouracil, Zantac, viagra,  $\beta$ -blockers, prozac etc.

Class Hour: To be arranged.

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

Assessment: 2-hour Examination = 100%



**CH4613 Natural Products & Society**

Credits: 10 Semester: 2

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 module will discuss the impact of natural products in medicine, the food industry and in society more generally. Particular case studies will be covered e.g. 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 of plant alkaloids in medicine.

Class Hour: To be arranged.

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

Assessment: 2-hour Examination = 100%

**CH4614 Heterocyclic & Pericyclic Chemistry**

Credits: 10 Semester: 1

Anti-requisites: CH4611, CH3611, CH3614, CH4451

Description: This module covers the important areas of heterocyclic and pericyclic chemistry in detail. In heterocyclic chemistry, the nomenclature and numbering of single and fused ring systems, and structure, reactivity, synthesis and applications of the main five and six-membered ring systems with one and two heteroatoms will be covered. Selected industrial syntheses of heterocyclic medicinal compounds are used to illustrate the basic principles as well as the factors to be considered in large scale synthesis. In pericyclic chemistry, a frontier molecular orbital approach based on the Woodward Hoffmann rules will be applied to pericyclic reactions and used to provide an understanding of the energetics and stereochemistry of Diels Alder and 1,3-dipolar cycloaddition reactions as well as electrocyclic processes and sigmatropic rearrangements. Synthetic applications of these processes will also be illustrated.

Class Hour: To be arranged.

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

Assessment: 2-hour Examination = 100%

**CH4711 Physical Chemistry of Solutions**

Credits: 10 Semester: 1

Anti-requisite: CH4451

Description: This module 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 per week over 5 - 7 weeks and 2-3 tutorials.

Assessment: 2-hour Examination = 100%

**CH4712 Energy Conversion & Storage**

Credits: 10 Semester: 2

Description: In our efforts to mitigate global warming it is essential to develop new and improved methods of generation and storage of energy. Foremost among these methods are the electrochemical technologies of batteries and fuel cells. In this module we will discuss the technical details and applications of such devices. Particular emphasis will be placed on the underlying electrochemistry and materials chemistry.

Class Hour: To be arranged.

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

Assessment: 2-hour Examination = 100%

## **Chemistry – Honours – 2011/12 – September 2011**

### **CH4713 Interactions of Light with Matter**

Credits: 10 Semester: 2

Description: This module 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 per week over 5 - 7 weeks and 2-3 tutorials.

Assessment: 2-hour Examination = 100%

### **CH5441 Research Project**

Credits: 40 Semester: Whole Year

Anti-requisites: CH4443, CH4444, CH4445, CH4446, CH4447, CH4448, ID4441

Description: The research project at Stage 5 of the M.Chem. 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: 2 days per week, to be arranged.

Teaching: Laboratory-based research project

Assessment: Continuous Assessment = 100%

### **CH5461 Integrating Chemistry**

Credits: 10 Semester: 1

Anti-requisites: CH5462, CH4461, CH4462

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 related topics. 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 problems will be aimed at Level 5000 standard.

Class Hour: To be arranged.

Teaching: 2 classes per week for 9 weeks.

Assessment: Continuous Assessment = 40%, 2-hour Examination = 60%

### **CH5511 Homogeneous Catalysis**

Credits: 10 Semester: 1

Description: This module discusses the use of metal based systems in organic transformations and a detailed treatment of homogeneous catalysis. Important processes in the petrochemicals industry will be used to exemplify the principles described.

Class Hour: To be arranged.

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

Assessment: 2-hour Examination = 100%

**CH5513 Advanced Main Group Chemistry**

Credits: 10 Semester: 2

Description: This module discusses the importance of and structural similarities between rings, cages and clusters particularly in main group chemistry. The general rules for predicting geometry in cage/cluster systems will be introduced and used to provide a framework for the range of systems to be discussed e.g. boranes, Zintl anions, phosphides. Further advanced topics in s and p block chemistry will be introduced, for example the stabilization of heavier main group multiple bonds, low coordinate main group element centres, biradicaloids and use of weakly coordinating anions.

Class Hour: To be arranged.

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

Assessment: 2-hour Examination = 100%

**CH5514 Advanced Coordination Chemistry**

Credits: 10 Semester: 2

Description: This is a Masters level module 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 module 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 lectures per week over 5 - 7 weeks and 2 - 3 tutorials.

Assessment: 2-hour Examination = 100%

**CH5515 Characterisation of Solids**

Credits: 10 Semester: 2

Description: This module 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 lectures per week over 5 - 7 weeks and 2 - 3 tutorials.

Assessment: 2-hour Examination = 100%

**CH5611 Asymmetric Synthesis**

Credits: 10 Semester: 1

Description: This module 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 lectures per week over 5 - 7 weeks and 2 - 3 tutorials.

Assessment: 2-hour Examination = 100%

**CH5612 Natural Products, Biosynthesis & Enzyme Co-factors**

Credits: 10 Semester: 2

Description: The module 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 lectures per week over 5 - 7 weeks and 2 - 3 tutorials.

Assessment: 2-hour Examination = 100%

## Chemistry – Honours – 2011/12 – September 2011

### CH5613 Reactive Intermediates

Credits: 10 Semester: 2

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 lectures per week over 5 - 7 weeks and 2 - 3 tutorials.

Assessment: 2-hour Examination = 100%

### CH5614 Chemical Biology

Credits: 10 Semester: 2

Description: This module 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 module 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 lectures per week over 5 - 7 weeks and 2 - 3 tutorials.

Assessment: 2-hour Examination = 100%

### CH5615 Advanced Pharmaceutical Chemistry

Credits: 10 Semester: 1

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-fluorouracil, Zantac, viagra,  $\beta$ -blockers, prozac etc.

Class Hour: To be arranged.

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

Assessment: 2-hour Examination = 100%

### CH5616 Molecular Recognition

Credits: 10 Semester: 2

Description: This module 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.

Class Hour: To be arranged.

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

Assessment: 2-hour Examination = 100%

### CH5711 Advanced Spectroscopic Methods

Credits: 10 Semester: 1

Description: This module 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 lectures per week over 5 - 7 weeks and 2 - 3 tutorials.

Assessment: 2-hour Examination = 100%

**CH5712 Functional Materials / Electrons in Solids**

Credits: 10 Semester: 2

Description: The module 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 per week over 5 - 7 weeks and 2 - 3 tutorials.

Assessment: 2-hour Examination = 100%

**CH5713 Surface Science & Heterogeneous Catalysis**

Credits: 10 Semester: 2

Description: The module describes the Chemistry of solid surfaces with particular reference to the structure of metal, oxide and semiconductor surfaces. The techniques available to characterise the uppermost atomic layers of a solid are presented and the novel reactivity of surfaces is linked to applications in sensors, electronic devices, heterogeneous catalysis as well as the processes of corrosion, friction and wear.

Class Hour: To be arranged.

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

Assessment: 2-hour Examination = 100%

**CH5714 Chemical Applications of Electronic Structure Calculations**

Credits: 10 Semester: 2

Prerequisites: CH3712, CH3717

Description: This module will build on the foundations laid in the CH2701 and CH3712 and introduce further aspects and methods of modern computational chemistry related to the electronic structures of atoms and molecules. It will be shown how results of such calculations can be used to complement, interpret, and guide experiments in many areas of chemistry.

Class Hour: To be arranged.

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

Assessment: 2-hour Examination = 100%

**CH5716 Processing of Materials**

Credits: 10 Semester: 1

Prerequisites: CH3513

Description: This module focuses on the processing of materials. Fundamental materials properties such as crystallinity, composition, crystal phase, phase mixing, domain structure, grains and grain boundaries, porosity and pore structure will be covered and the main methods used to control these properties in order to develop and improve materials for specific applications will be addressed. Processes including casting, extrusion, physical and chemical vapour deposition, calcination, sintering, annealing, plasma treatments, mechanical working, crystallization and dopant addition will be described and explained. Applications in high-value metals, ceramics and semiconductor materials will be emphasised.

Class Hour: To be arranged.

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

Assessment: 2-hour Examination = 100%

## Chemistry – Honours – 2011/12 – September 2011

### CH5717 Nanostructured Materials

Credits: 10 Semester: 1

Description: This module will introduce the concepts and science behind the design and synthesis of a wide range of nanostructures and the application of these structures in functional materials and devices. The relationship between nanoscale structure and composition and macroscale properties and behaviour will be emphasised. Structures will be classified and introduced in terms of their number of dimensions: clusters, nanoparticles and quantum dots (0-D); nanotubes, nanowires and nanorods (1-D); nanosheets and films (2-D); and porous crystals, mesoporous structures and metal-organic frameworks (3-D). Other specific topics will include the science of clusters, molecular assemblies and assemblies of nanostructures. Novel carbon based materials, including simple and functionalised fullerenes, carbon nanotubes and graphene and related materials will be described and their physical and chemical properties related to their structure and bonding. Advanced characterisation techniques and applications related to nanotechnology, MEMs, biomaterials, catalysis, and optical and magnetic devices will be addressed.

Class Hour: To be arranged.

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

Assessment: 2-hour Examination = 100%

### CH5718 Advanced Polymer Science

Credits: 10 Semester: 2

Description: This module focuses on the properties and applications of polymeric materials, particularly those relevant to materials science applications. It will include structure-property relationships, the major polymer synthesis routes, polymer design and applications of specialised polymeric materials in films, special coatings, dense bodies and foams. The module will cover functional polymer materials and structures for application in electronic and ionic conductors, ion-selective membranes, opto-electronic devices such as organic light-emitting diodes (OLEDs) and photovoltaic cells, and electro-active polymer (EAP) devices in which the size, shape or colour of a polymer element change in response to chemical, thermal, electrical or optical stimuli.

Class Hour: To be arranged.

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

Assessment: 2-hour Examination = 100%

### FR5810 French Science Project Dissertation

Credits: 30 Semester: Whole Year

Prerequisites: Admission to stage 4 of M.Chem. with French Programme

Anti-requisites: FR3101, FR3103, FR3810, FR3809, FR4809

Co-requisites: CH4441 or CH4442

Description: This module offers students the opportunity of personal study arising from a work placement or research project in connection with their science course. It will be assessed by a dissertation in French, normally 5,000 words in length including any quotations, on an agreed topic for which the student already possesses adequate foundation knowledge and for which suitable supervision can be provided. During the work placement or project year, students will collect data for their dissertation and will prepare a plan in French, which will be submitted at the beginning of their final year. This will provide a benchmark for writing the dissertation, which will allow any relevant knowledge acquired during the final year to be incorporated.

Assessment: Dissertation = 100%

**ID4001 Communication & Teaching in Science**

Credits: 15 Semester: 1  
Availability: Available only to final year students who have been accepted following application and interview in the preceding semester.

Description: This module is based on the Undergraduate Ambassador Scheme launched in 2002. It provides final year students within the Faculty of Science with the opportunity to gain first hand experience of science education through a mentoring scheme with science teachers in local schools. Students will act initially as observers in the classroom and later as classroom assistants. With permission of the teacher-in-charge, students may also be given the opportunity to lead at least one lesson, or activity within a lesson, during their placement. This module will enable students to gain substantial experience of working in a challenging and unpredictable working environment, and of communicating scientific ideas at various different levels; and to gain a broad understanding of many of the key aspects of teaching science in schools. While of particular value to students aiming for a career in education, these core skills are equally important for any career that requires good communication. Entry to this module is by selection following application and interview during the preceding semester.

Class Hour: Flexible  
Teaching: Occasional tutorials and a half-day training session.  
Assessment: Continuous Assessment = 100%

**ID4441 Combined Chemistry & Geology Research Project**

Credits: 40 Semester: Whole Year  
Availability: Not available 2011-12  
Prerequisites: Admission to stage 4 of B.Sc. programme  
Anti-requisites: CH4442-CH4448, CH5441

Description: The research project at Level 4000 for Chemistry and Geology 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 Geoscience.

Class Hour: 2 days per week.  
Teaching: Reflection, laboratory work, library work, written and oral presentation preparation.  
Assessment: Continuous Assessment = 100%

