MODULE SPECIFICATION TEMPLATE

1. CH623 – Main Group and Organometallic Chemistry
2. School responsible for module management: School of Physical Sciences
3. Start Date of module: Academic Year 2015/2016
4. 20 students AY2015/2016, 50 students AY2016/2017, 70 students AY2017/2018
5. Modules to be withdrawn on the introduction of this proposed module and consultation with other relevant Schools and Faculties regarding the withdrawal: None
6. The level of the module (e.g. Certificate [C], Intermediate [I], Honours [H] or Postgraduate [M])

Honours, [H]

1. Number of credits represented by module: 15 Credits – (7.5 value for ECTS)
2. Which term(s) the module is to be taught in (or other teaching pattern): Not yet determined
3. Prerequisite and co-requisite modules:

Completion of Stage 2 of the following programmes: Chemistry (BSc), Chemistry (MSc) and Chemistry with a Year in Industry

1. The programmes of study to which the module contributes Chemistry BSc, MSci and MSci with year in industry.
2. The intended subject specific learning outcomes

Knowledge and understanding of:

11.A1 Core and foundation scientific chemical, physical and biological concepts, terminology, theory, units, conventions, and laboratory practice and methods in relation to the chemical sciences.

11.A3 Areas of chemistry including properties of chemical elements, states of matter, organic functional groups, physiochemical principles, organic and inorganic materials, synthetic pathways, analytical chemistry, drug chemistry, biochemistry, fires and explosions.

11.A4 Appreciate developments at the forefront of some areas of chemical sciences.

Intellectual skills:

11.B1 Ability to demonstrate knowledge and understanding of essential facts, concepts, principles and theories relating to the subject and to apply such knowledge and understanding to the solution of qualitative and quantitative problems.

11.B2 Ability to recognise and analyse problems and plan strategies for their solution by the evaluation, interpretation and synthesis of scientific information and data.

Subject-specific skills:

11.C1 Skills in the safe handling of chemical materials, taking into account their physical and chemical properties, including any specific hazards associated with their use and to risk assess such hazards. Concepts in NMR (paramagnetic NMR, quadrupolar NMR, Variable temperature NMR).

11.C2 Skills required for carrying out documented standard laboratory procedures involved in synthetic and analytical work in relation to organic and inorganic systems. Skills in observational and instrumental monitoring of physiochemical events and changes. The systematic and reliable documentation of the above. Operation of standard analytical instruments employed in the chemical sciences. Synthetic techniques and reaction conditions for common organometallic syntheses. Synthetic techniques and reaction conditions for main group compounds. Identifying Lewis acidic and Lewis basic sites within molecules.

11.C3 The ability to collate, interpret and explain the significance and underlying theory of experimental data, including an assessment of limits of accuracy. Ability to make use of appropriate texts, or other learning resources as part of managing their own learning.

1. The intended generic learning outcomes:

12.D1 Communication skills, covering both written and oral communication.

12.D2 Generic skills needed for students to undertake further training of a professional nature.

12.D3 Problem-solving skills, relating to qualitative and quantitative information, extending to situations where evaluations have to be made on the basis of limited information.

12.D4 Numeracy and computational skills, including such aspects as error analysis, order-of-magnitude estimations, correct use of units and modes of data presentation.

12.D7 Interpersonal skills, relating to the ability to interact with other people and to engage in team working within a professional environment.

12.D8 Time-management and organisational skills, as evidenced by the ability to plan and implement efficient and effective modes of working. Self-management and organisational skills with the capacity to support life-long learning.

1. A synopsis of the curriculum:

This module will adopt a molecular orbital theory based approach to deliver an understanding of the variation fundamental bonding modes across the periodic table as applied to hard and transition metal organometallic systems *ie.* The common synthetic tools of modern chemists. Context for this will be formed by linking these concepts to synthetic transformations of academic and industrial importance, eg. Transmetallation and catalytic processes.

Lectures (24 Total):

I Structure and Bonding in the Main Group

 II Applications of NMR to Inorganic Systems

 III Transition Metal Organometallic Chemistry and Homogeneous Catalysis

Laboratory (Practical) Component:

The laboratory component comprises three synthetic practical sessions with the aim of providing exposure to the techniques and materials discussed in lectures, including inorganic spectroscopic techniques.

1. Indicative Reading List

1 – Cotton and Wilkinson, Advanced Inorganic Chemistry, Wiley

2 – Shriver and Atkins, Inorganic Chemistry, Oxford University Press

3 – Greenwood and Earnshaw, Chemistry of the Elements, Pergamon Press

4 – Mark J Winter, d-Block Chemistry, Oxford University Press

1. Learning and Teaching Methods, including the nature and number of contact hours and the total study hours which will be expected of students, and how these relate to achievement of the intended module learning outcomes

Learning and Teaching Methods:

Contact Hours: Lectures 24 hours

Laboratory Practicals 18 hours

Examples classes 3 hours

Private Study\*: 105 hours

\* Private study to include practical write-ups and preparatory work for examples classes.

Total Study Hours: 150 hours.

Learning Outcomes:

Lectures : 11.A1, 11.A3, 11.A4, 11.B1, 11.B2

Laboratory Practicals: 11.C1, 11.C2, 11.C3, 12.D3, 12.D7, 12.D8

Examples Classes: 11.B2, 11.C3, 12.D1, 12.D3

Self-study: 12.D1, 12.D2, 12.D3, 12.D4, 12.D7, 12.D8

1. Assessment methods and how these relate to testing achievement of the intended module learning outcomes

Laboratory Practical Write-up (18 hours):15% (11.C1, 11.C2, 11.C3, 12.D1, 12.D2, 12.D3, 12.D7, 12.D8)

Coursework Assessment: 10% (11.A1, 11.A3, 11.A4, 11.B1, 11.B2. 12.D3, 12.D4)

Final Exam: 75% (11.A1, 11.A3, 11.A4, 11.B1, 11.B2, 12.D4)

1. Implications for learning resources, including staff, library, IT and space

Lecture courses and workshops will require appropriate room allocation from existing facilities. The practical component will require both laboratory facilities and, as no current laboratory experimental procedures exist for this module, their development is required. Library resources for literature and self-study, already in place, will be required, coupled with Moodle for rolling assessment.

1. The School/Collaborative Partner (delete as applicable) recognises and has embedded the expectations of current disability equality legislation, and supports students with a declared disability or special educational need in its teaching. Within this module we will make reasonable adjustments wherever necessary, including additional or substitute materials, teaching modes or assessment methods for students who have declared and discussed their learning support needs. Arrangements for students with declared disabilities will be made on an individual basis, in consultation with the University’s/Collaborative Partner’s (delete as applicable) disability/dyslexia support service, and specialist support will be provided where needed.
2. Campus(es) where module will be delivered: Canterbury

**SECTION 2: MODULE IS PART OF A PROGRAMME OF STUDY IN A UNIVERSITY SCHOOL**

**Statement by the School Director of Learning and Teaching/School Director of Graduate Studies (as appropriate):** "I confirm I have been consulted on the above module proposal and have given advice on the correct procedures and required content of module proposals"

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| ................................................................Director of Learning and Teaching/Director of Graduate Studies (delete as applicable)…………………………………………………Print Name | ..............................................Date |

**Statement by the Head of School:** "I confirm that the School has approved the introduction of the module and, where the module is proposed by School staff, will be responsible for its resourcing"

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| .................................................................Head of School…………………………………………………….Print Name | ..............................................Date |

**SECTION 3: MODULE IS PART OF A PROGRAMME IN A PARTNER COLLEGE OR VALIDATED INSTITUTION**

(Where the module is proposed by a Partner College/Validated Institution)

**Statement by the Nominated Officer of the College/Validated Institution** *(delete as applicable)***:** "I confirm that the College/Validated Institution*(delete as applicable)* has approved the introduction of the module and will be responsible for its resourcing"

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| .................................................................Nominated Responsible Officer of Partner College/Validated Institution ………………………………………………….Print Name………………………………………………….. Post | ..............................................Date |

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Partner College/Validated Institution

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Last updated February 2013