1. **Title of the module**

CHEM5330 (CH533) - Materials and Solid State Chemistry

1. **School or partner institution which will be responsible for management of the module**

Physical Sciences

1. **The level of the module (Level 4, Level 5, Level 6 or Level 7)**

Level 5

1. **The number of credits and the ECTS value which the module represents**

15 credits (7.5 ECTS)

1. **Which term(s) the module is to be taught in (or other teaching pattern)**

Autumn and Spring

1. **Prerequisite and co-requisite modules**

**Prerequisites:**

CHEM3080 Molecules Matter & Energy

CHEM3820 Chemical Skills

Or

PSCI3810 Chemical Skills for Forensic Scientists

1. **The programmes of study to which the module contributes**

BSc Forensic Chemistry

MChem Forensic Chemistry

Forensic Chemistry with a Year in Industry

BSc Chemistry

MChem Chemistry

Chemistry with a Year in Industry

This is not available as a wild module.

1. **The intended subject specific learning outcomes.  
   On successfully completing the module students will be able to:**

Have a knowledge and understanding of:

1. Crystal structures - An ability to describe the features of the most common crystalline structures.
2. Bonding in the solid state - An ability to identify different bonding contributions in the solid state.
3. How the structure and bonding determines the chemical properties of a compound – An ability to relate the crystalline structure with the bonding to predict materials properties.
4. An ability to describe different defect structures in the solid state and how they affect the materials properties.
5. An ability to interpret and draw phase diagrams.
6. **The intended generic learning outcomes.  
   On successfully completing the module students will be able to:**

Have a knowledge and understanding of:

1. Problem-solving skills, an ability to formulate problems in precise terms and to identify key issues, and the confidence to try different approaches in order to make progress on challenging problems.
2. Analytical skills – associated with the need to pay attention to detail and to develop an ability to manipulate precise and intricate ideas, to construct logical arguments and to use technical language correctly.
3. Personal skills – the ability to work independently, to use initiative, to organise oneself to meet deadlines and to interact constructively with other people.
4. **A synopsis of the curriculum**

The arrangement of atoms and defects in a solid governs its properties. Here, we cover the crystal structures and phase diagrams of solid materials. Bonding in solids is discussed, including metallic, ionic and molecular crystals, band theory, defects and non-stoichiometry. You will be introduced to the synthesis, properties and applications of a wide range of materials and their solid state reactions. Applications covered include catalysis, energy materials such as fuel-cells and Li-ion batteries and nanomedicine.

1. **Reading list (Indicative list, current at time of publication. Reading lists will be published annually)**

* West, A. Solid State Chemistry and its Applications (1999)
* Smart, L. E. and Moore, E. A. Solid State Chemistry: An Introduction (2012)

1. **Learning and teaching methods**

Total contact hours: 82

Private study hours: 68

Total study hours: 150

1. **Assessment methods**
   1. Main assessment methods

Assignment 1 (3 hours, 7.5%)

Assignment 2 (3 hours, 7.5%)

Practical 1 (3 hours, 12.5%)

Practical 2 (3 hours12.5%)

Examination (2 hours, 60%)

13.2 Reassessment methods

Like-for-like

1. **Map of module learning outcomes (sections 8 & 9) to learning and teaching methods (section12) and methods of assessment (section 13)**

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Module learning outcome** | *8.1* | *8.2* | *8.3* | *8.4* | *8.5* | *9.1* | *9.2* | *9.3* |
| **Learning/ teaching method** |  |  |  |  |  |  |  |  |
| Private Study | **x** | **x** | **x** | **x** | **x** | **x** | **x** | **x** |
| Lectures | **x** | **x** | **x** | **x** | **x** |  |  |  |
| Laboratory | **x** | **x** |  |  |  | **x** | **x** | **x** |
|  |  |  |  |  |  |  |  |  |
| **Assessment method** |  |  |  |  |  |  |  |  |
| Assignments | **x** | **x** | **x** | **x** | **x** | **x** | **x** | **x** |
| Laboratory | **x** |  | **x** |  |  |  |  |  |
| Examination | **x** | **x** | **x** | **x** | **x** | **x** | **x** |  |
|  |  |  |  |  |  |  |  |  |

1. **Inclusive module design**

The School recognises and has embedded the expectations of current equality legislation, by ensuring that the module is as accessible as possible by design. Additional alternative arrangements for students with Inclusive Learning Plans (ILPs)/declared disabilities will be made on an individual basis, in consultation with the relevant policies and support services.

The inclusive practices in the guidance (see Annex B Appendix A) have been considered in order to support all students in the following areas:

a) Accessible resources and curriculum

b) Learning, teaching and assessment methods

1. **Campus(es) or centre(s) where module will be delivered**

Canterbury

1. **Internationalisation**

Chemistry is an international subject with physical laws discovered and techniques developed and refined by scientists across the globe. Mastery of the subject-specific learning outcomes will equip students to apply the theories and techniques of this module in a wide range of international contexts. The module team is drawn from the School of Physical Sciences, which includes many members of staff with international experience of teaching and research collaboration. In compiling the reading list, consideration has been given to the range of texts that are available internationally and a selection of texts has been identified to complement the delivery of the material. The support SPS provides to its students is also internationally attuned given our international student body.

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**Revision record – all revisions must be recorded in the grid and full details of the change retained in the appropriate committee records.**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Date approved | Major/minor revision | Start date of the delivery of revised version | Section revised | Impacts PLOs (Q6&7 cover sheet) |
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Revised FSO Jan 2018