1. **Title of the module**

CHEM5330 (CH533) – Materials and Solid State Chemistry

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

Division of Natural 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 Credit (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**

None

1. **The course(s) of study to which the module contributes**

Compulsory for BSc (Hons) Chemistry; BSc (Hons) Chemistry with a Foundation Year; BSc (Hons) Chemistry with a year in Industry; MChem Chemistry.

Not available as an elective module choice.

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

8.1 Demonstrate an ability to describe, with confidence, the features of the most common crystalline structures.

8.2 Demonstrate the ability to identify different bonding contributions in the solid state.

8.3 Demonstrate the ability to relate the crystalline structure with the bonding to predict materials properties.

8.4 Demonstrate assured ability to describe different defect structures in the solid state and how they affect the materials properties.

8.5 Demonstrate an assured ability to interpret and draw phase diagrams.

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

9.1 Demonstrate the 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.

9.2 Demonstrate thorough 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.

9.3 Demonstrate the ability to work independently, to use initiative, to organise oneself to meet deadlines and to interact constructively with other people.

1. **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)**

Smart, L. E. and Moore, E. A. (2020). *Solid State Chemistry: An Introduction*, Fifth Edition Boca Raton, FL: CRC Press

West, A. (2014). *Solid State Chemistry and its Applications*, Second Edition. London: Wiley

1. **Learning and teaching methods**

Total Contact Hours: 82

Total 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 Lab Reports (3 hours each) – 25%
* Examination (2 hours) – 60%

The assignments are compulsory sub-elements and must be passed to complete the module.

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** |
| Lecture | **x** | **x** | **x** | **x** | **x** |  |  |  |
| Laboratory Practical | **x** | **x** |  |  |  | **x** | **x** | **x** |
| **Assessment method** |  |  |  |  |  |  |  |  |
| Assignments | **x** | **x** | **x** | **x** | **x** | **x** | **x** | **x** |
| Practical Lab Reports | **x** |  | **x** |  |  |  |  |  |
| Examination | **x** | **x** | **x** | **x** | **x** | **x** | **x** |  |

1. **Inclusive module design**

The Division 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 Division of Natural 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 the Division provides to its students is also internationally attuned given our international student body.

**DIVISION USE ONLY**

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

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