1. **Title of the module**

LABS520 - Materials and Solid State Chemistry

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

Centre for Higher and Degree Apprenticeships (CHDA)

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)**

This module is part of the FdSc and BSc (Hons) in Applied Chemical Sciences being delivered through a part-time distance learning approach.

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

**Prerequisites:**

LABS411 General and Inorganic chemistry

LABS410 Physical chemistry

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

FdSc and BSc (Hons) in Applied Chemical Sciences

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.
4. Molecular defects. An ability to describe different defect structures in the solid state and how they affect the materials properties.
5. Basic concepts of molecular symmetry.
6. Phase diagrams. An ability to interpret and draw phase diagrams. Understanding of how phase transitions affect industry, such as pharmaceuticals.
7. **The intended generic learning outcomes.
On successfully completing the module students will be able to:**
8. Demonstrate the development of practical/technical skills.
9. Demonstrate the ability to analyse, evaluate and correctly interpret data.
10. Demonstrate the ability to present and communicate data.
11. Demonstrate the ability to obtain and use information from a variety of sources as part of self-directed learning.
12. Demonstrate time-management and organisational skills within the context of self-directed learning.
13. **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, 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, pharmaceuticals, energy materials and nanomedicine.

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

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Author | Date | Title | Publisher | ISBN |
| Peter Atkins | 2018 | Physical Chemistry | Oxford University Press | 9780198769866 |
| Peter Atkins | 2017 | Elements of Physical Chemistry | Oxford University Press | 9780198727873 |
| Anthony West | 2014 | Solid State Chemistry and its Applications | Wiley | 9781118676240 |
| Lesley Smart | 2012 | Solid state chemistry an introduction | CRC Press | 9781439847923 |

1. **Learning and teaching methods**

Total Contact Hours: 120

Private Study Hours: 30

Total Study Hours: 150

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

Portfolio 30%

Assignment 20%

MCQ – 20%

Written Exam – 30% - 2 hours

The weighted average for both the overall coursework and the overall exam component must be of a pass standard.

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 | 8.6 | 9.1 | 9.2 | 9.3 | 9.4 | 9.5 |
| **Learning/ teaching method** |  |  |  |  |  |  |  |  |  |  |  |
| **Teaching** | **x** | **x** | **x** | **x** | **x** | **x** |  | **x** | **x** | **x** | **x** |
| Private Study | **x** | **x** | **x** | **x** | **x** | **x** | **x** | **x** | **x** | **x** | **x** |
| Work-based experience |  |  |  |  |  |  | **x** | **x** | **x** | **x** | **x** |
| **Assessment method** |  |  |  |  |  |  |  |  |  |  |  |
| Portfolio |  |  |  |  |  |  | **x** | **x** | **x** | **x** | **x** |
| Assignments | **x** | **x** | **x** | **x** | **x** | **x** | **x** | **x** | **x** | **x** | **x** |
| MCQ | **x** | **x** | **x** | **x** | **x** | **x** |  |  |  |  |  |
| Examination | **x** | **x** | **x** | **x** | **x** | **x** |  |  |  |  |  |

1. **Inclusive module design**

The School/Collaborative Partner *(delete as applicable)* 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**

Distance, Medway

1. **Internationalisation**

Materials and solid state chemistry is a core component of the Pharmaceutic R & D industry and reflects international aspects.

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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) |
| 05/10/20 | Minor | Sep 20 | 13 | No |
|  |  |  |  |  |