1. **Title of the module**

PSCI5340 (PS534) - Inorganic Chemistry, Fibres and Microscopy

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**

Prerequisite:

CHEM308 Molecules Matter and Energy

PS381

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

Updated module for the MSci/BSc Forensic Science and BSc Forensic Science with 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:**
2. Understand the characteristic properties of the d and f-blocks elements and their compounds.
3. Appreciate developments at the forefront of some areas of Forensic Science, particularly, developments in the structure and bonding in inorganic matter and how this relates to atomic analysis, and separately, developments in fibre and paper analysis which includes polarised light microscopy.

Intellectual skills:

1. 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. In particular, the ability to link chemical structure to reaction compatibility and further to link reaction sequences.
2. Ability to recognise and analyse problems and plan strategies for their solution by the evaluation, interpretation and presentation of scientific information and data.
3. Ability to recognise and implement good measure science and practice and commonly used forensic laboratory techniques.

Subject-specific skills:

1. A knowledge and understanding of the d-block elements and f-block elements and their compounds.
2. A knowledge and understanding of materials from which fibres and paper are derived, and of fibre structure and techniques used in comparative analysis of these materials for forensic assessment.
3. An understanding of preparation, purification and analysis of a range of inorganic compounds using techniques such as ion-exchange chromatography, infra-red and uv-vis spectroscopy relevant to forensic investigation.
4. An ability to make use of appropriate texts, or other learning resources as part of managing their own learning.
5. 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, and the ability to implement the execution of experiments.
6. Skills required for carrying out documented standard laboratory procedures involved in synthetic and analytical work in relation inorganic systems and forensic analysis. 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.
7. The ability to collate, interpret and explain the significance and underlying theory of experimental data, including an assessment of limits of accuracy.
8. **The intended generic learning outcomes.  
   On successfully completing the module students will be able to:**

Have a knowledge and understanding of:

1. Communication skills, covering both written and oral communication.
2. Problem-solving skills, relating to qualitative and quantitative information, extending to situations where evaluations have to be made on the basis of limited information.
3. Information-technology skills such as word-processing and spreadsheet use, data-logging and storage, Internet communication, etc.
4. Interpersonal skills, relating to the ability to interact with other people and to engage in team working within a professional environment.
5. 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.
6. Generic skills needed for students to undertake further training of a professional nature.
7. **A synopsis of the curriculum**

Inorganic Chemistry:

Here, you will explore the chemistry of the d- and f-block elements, including their electronic and colour properties as well as their magnetic behaviour, both in lectures and workshops and also practically through a lab component. Fibres and Microscopy: What is a fibre and associated polymers and how are they made? Cellulose and other natural polymers. Synthetic polymers and fibres such as nylon. Overview of methods of identification and analysis. A particular emphasis will be on polarized light microscopy for comparative analysis various materials including fibres, paper and soils.

Laboratory:

Experiments in preparative and analytical inorganic chemistry, to include: the separation of nickel and cobalt by ion-exchange chromatography; measurement of the ligand field splitting energy in a titanium (III) complex; preparation and properties of complex ions; isomerism in coordination complexes.

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

* Cotton, Wilkinson and Gaus, Basic Inorganic Chemistry. (3rd edition, 1995, Wiley)
* Greenwood and Earnshaw, Chemistry of the Elements. (2nd revised edition, 1997, Butterworth-Heinemann Ltd)
* Winter, d-Block Chemistry, (1994, Royal Society of Chemistry)
* Jones, d- and f-Block Chemistry, (2001, Royal Society of Chemistry)
* Bell, Forensic Chemistry, (2nd edition, 2012, Prentice Hall)

1. **Learning and teaching methods**

Total contact hours: 41

Private study hours: 109

Total study hours: 150

1. **Assessment methods**

Assignment 1 (~2 hours) – 7.5%

Assignment 2 (~2 hours) – 3.7%

Assignment 3 (~2 hours) – 3.8%

Practical Laboratory (5 reports each taking ~3 hours) – 25%

Examination (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* | *8.6* | *8.7* | *8.8* | *8.9* | *8.10* | *8.11* | *8.12* |
| **Learning/ teaching method** |  |  |  |  |  |  |  |  |  |  |  |  |
| Private Study | **x** | **x** | **x** | **x** | **x** | **x** | **x** | **x** | **x** |  |  | **x** |
| Lectures (including lab Induction lecture) | **x** | **x** | **x** | **x** | **x** | **x** | **x** | **x** | **x** | **x** | **x** | **x** |
| Lab classes | **x** | **x** | **x** | **x** | **x** | **x** | **x** | **x** | **x** | **x** | **x** | **x** |
|  |  |  |  |  |  |  |  |  |  |  |  |  |
| **Assessment method** |  |  |  |  |  |  |  |  |  |  |  |  |
| Assignments | **x** | **x** | **x** | **x** | **x** | **x** | **x** | **x** | **x** |  |  | **x** |
| Lab reports | **x** | **x** | **x** | **x** | **x** | **x** |  | **x** | **x** | **x** | **x** | **x** |
| Examination | **x** | **x** | **x** | **x** | **x** | **x** | **x** | **x** | **x** |  |  | **x** |
|  |  |  |  |  |  |  |  |  |  |  |  |  |

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Module learning outcome** | *9.1* | *9.2* | *9.3* | *9.4* | *9.5* | *9.6* |
| **Learning/ teaching method** |  |  |  |  |  |  |
| Private Study |  | **x** | **x** |  | **x** | **x** |
| Lectures (including lab Induction lecture) |  | **x** |  |  | **x** | **x** |
| Lab classes | **x** | **x** | **x** | **x** | **x** | **x** |
|  |  |  |  |  |  |  |
| **Assessment method** |  |  |  |  |  |  |
| Assignments |  | **x** | **x** |  | **x** | **x** |
| Lab reports | **x** | **x** | **x** | **x** | **x** | **x** |
| Examination | **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**

Science 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.

**FACULTIES SUPPORT OFFICE USE ONLY**

**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) |
|  |  |  |  |  |
|  |  |  |  |  |

Revised FSO Jan 2018