1. **Title of the module**

Introduction to Nanomaterials

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

Medway School of Pharmacy

1. **The level of the module (e.g. 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 (ECTS 7.5)

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

This module is being taught as part of the Foundation in Applied Chemical Science Technology which is being delivered by e-learning on a part-time basis over three years.

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

CHEM1118, CHEM1119, CHEM1130, CHEM1131

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

Foundation in Applied Chemical Science Technology

1. **The intended subject specific learning outcomes.
On successfully completing the module students will be able to:**
2. Discuss the difference between bulk and nanosized materials (PO A1-3; B1-3)
3. Explain basic synthetic methods of engineered nanomaterial (ENM) (PO A1-3; B1)
4. Explain the physical and chemical behavior of ENM (PO A1-3; B1).
5. Discuss basic characterization methods of nanomaterials (PO A1-3; B1)
6. Discuss existing potential applications of nanomaterials (PO A1-3; B1)
7. Understand established framework to evaluate nanomaterial toxicity (PO A1-3; B1)
8. Discuss successful examples of nanomaterials currently used in human health care (PO A1-3; B1)
9. **The intended generic learning outcomes.
On successfully completing the module students will be able to:**
10. The development of practical/technical skills (PO A4;C1)
11. An ability to analyse, evaluate and correctly interpret data (PO A6-8; C2)
12. An ability to present and communicate data (PO C3; C6; D1-3)
13. An ability to obtain and use information from a variety of sources as part of self-directed learning Time-management and organisational skills within the context of self-directed learning (PO C6; D7-9)
14. **A synopsis of the curriculum**
* Nanomaterials definition and classification
* Nanomaterial synthesis and preparation
* Analytical and chemical methods for the characterisation of nanomaterials Correlation between nanomaterial physicochemical properties and their biological effects
* Nanomaterials and Nanomedicine
* Nanomaterials in consumer goods
* Nanotoxicology
1. **Reading List (Indicative list, current at time of publication. Reading lists will be published annually)**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Author | Date | Title | Publisher | ISBN |
| Prof. Dr. Harald F. Krug | November 10, 2014 | Nanosafety Research—Are We on the Right Track? | Angewandte Chemie International Edition | DOI: 10.1002/anie.201403367 |
| Prof. Michael Swenk | February 1, 2015 | Uniform Description System For Materials on the Nanoscale | CODATA-VAMAS Working Group | http://www.codata.org/uploads/Uniform\_Description\_System\_Nanomaterials-Published-v01-15-02-01.pdf |
| Zoraida Aguilar | 3 Dec 2012 | Nanomaterials for Medical Applications | Elsevier Science Publishing Co Inc | 9780123850898 |

1. **Learning and Teaching methods**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Activity** | **e-learning** | **e-activities/****Practicals / Work activities** | **MSCL / CAL** | **Total hours** | **Learning Outcomes** |
| Teaching | 35 | 25 | 15 | **75** | All subject specific learning outcomes (SSLOs) |
| Private study | 15 | 5 | 10 | **30** | All subject specific learning outcomes (SSLOs) |
| Work-based experience |  | 40 |  | **40** | A2-11; B1-7; C1-5; D1-9 |
| Formal assessment |  |  |  | **5** | All subject specific learning outcomes (SSLOs) |
| **Total hours** |  |  |  | **150** |  |

*Please see section 14. Map of Module Learning Outcomes for more information.*

**Online e-learning** is intended to present the key information directly relating to the learning objectives.

**E-activities, practicals and work activities** serve to reinforce material presented online and also relate directly to the learning objectives. These are specifically based on enabling students to relate their theoretical knowledge of Cell Biology to the bioscience workplace in a variety of industries.

**MSCL** serves to reinforce and support materials presented in the above forms in the students’ minds. They also form part of the self-directed learning for the student.

**Private study** encompasses the revising of all material presented in the above various forms of teaching and learning, together with the opportunity to explore and read more widely around specific topics (this may already have been suggested in the MSCL materials).

1. **Assessment methods.**

|  |  |  |  |
| --- | --- | --- | --- |
| **Method of assessment** | **Learning outcomes assessed (POs & SSLOs)** | **Weighting** | **Outline details** |
| Continuous assessment (1) | A1-4; B1-3; C1-3  | 30% | Reflective report / case study / lab. report \* |
| Continuous assessment (2) | A1-11; B1-3; C1-6 | 20% | Based on assessment of myFolio entries. |
| Continuous assessment (3) | All subject specific learning outcomes (SSLOs) | 20% | 40 minute MCQ assessment |
| Examination | All subject specific learning outcomes (SSLOs) | 30% | 1 hour written examination |

*Please see section 14. Map of Module Learning Outcomes for more information.*

**The pass mark for this module is 40%. The aim of the assessment is that there should be an equal balance between ‘application’ (ie. reflection related to practical/work experience) and ‘theory’ (ie. examination), but that neither should enable the student to obtain a pass grade independently and in its entirety.**

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* | *9.1* | *9.2* | *9.3* | *9.4* |
| **Learning/ teaching method** | **Hours allocated** |  |  |  |  |  |  |  |  |  |  |  |
| Teaching | *75* | **X** | **X** | **X** | **X** | **X** | **X** | **X** |  |  |  |  |
| Private study | *30* | **X** | **X** | **X** | **X** | **X** | **X** | **X** | **X** | **X** | **X** | **X** |
| Work-based experience | *40* |  |  |  |  |  |  |  | **X** | **X** | **X** | **X** |
|  |  |  |  |  |  |  |  |  |  |  |  |  |
| **Assessment method** |  |  |  |  |  |  |  |  |  |  |  |  |
| Formal assessment | *5* | **X** | **X** | **X** | **X** | **X** | **X** | **X** | **X** | **X** | **X** | **X** |

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 student support service, and specialist support will be provided where needed.**
2. **Campus(es) or Centre(s) where module will be delivered:**

 **This is a distance learning module, however academic staff will be based at the Medway Campus, University of Kent.**

**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) |
|  |  |  |  |  |
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