1. **Title of the module**

CHEM3160 (CH316) - Computing Skills For Modern Data Analysis

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 4

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)**

Spring

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

None

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

Chemistry (BSc, BSc with Foundation Year, BSc with Year in Industry, MChem)

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:

1. A systematic understanding of how computers work according to human’s instructions.

2. Knowledge and understanding of computing languages and principles, and their application to diverse areas of applications.

3. An ability to solve problems in physics/mathematics/chemistry using appropriate mathematical tools. Ability to use computational methods for the practical application of theory and to use information technology and data-processing skills to search for, assess and interpret chemical information and data.

4. An ability to use mathematical techniques and analysis to model physical behaviour using computer programming.

5. Competent use of appropriate C&IT packages/systems for the analysis of data and the retrieval of appropriate information.

6. An ability to present and interpret information graphically using a computer.

7. An ability to make use of appropriate texts, research-based materials or other learning resources as part of managing their own learning, and develop simple algorithms.

8. Ability to recognise and analyse problems and plan strategies for their solution by the evaluation, interpretation and synthesis of scientific information and data. Ability to adapt and apply methodology above to solve advanced and unfamiliar problems found in computer programming.

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

Have:

1. Programming skills, in the context of both problems with well-defined solutions and open-ended problems. Numeracy is subsumed within this area.

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 and interpersonal skills – the ability to work independently, to use initiative, to organise oneself to meet deadlines and to interact constructively with other people within a professional environment. Including the ability to communicate and interact with professionals from other disciplines.

4. Problem-solving skills, relating to qualitative and quantitative information, extending to situations where evaluations have to be made on the basis of limited information .Including the demonstration of self-direction and originality.

5. Information-retrieval skills, in relation to primary and secondary information sources, including information retrieval through on-line computer searches.

1. **A synopsis of the curriculum**

Introduction to the concept of programming languages.

Introduction to practical programming, including the use of variables, constants, arrays and the different data types; iteration (loops) and conditional branching (if statements).

Modular design: subroutines and functions, the intrinsic functions.

Simple input/output, such as the use of format statements for reading and writing, File handling, including the open and close statements, practical read/write of data files. The handling of character variables.

Programming to solve physical/chemistry problems.

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

* The Python language reference manual: For Python version 3.2; Guido Van Rossum (2011), ISBN: 9781906966140. Copy in library and content available online.
* The Python language reference; Python Software Foundation (2019); docs.python.org
* Learn Python 3 the Hard Way: A Very Simple Introduction to the Terrifyingly Beautiful World of Computers and Code; Zed Shaw (2014); ISBN: 0134692888

1. **Learning and teaching methods**

Total contact hours: 40

Private study hours: 110

Total study hours: 150

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

Assignment 1 (3 hours, 10%)  
Assignment 2 (3 hours, 10%)  
Assignment 3 (3 hours, 10%)  
Assignment 4 (3 hours, 10%)  
  
Assignment 5 (3 hours,10%)  
Assignment 6 (3 hours,10%)  
Assignment 7 (3 hours,10%)  
Assignment 8 (3 hours,10%)  
Assignment 9 (6 hours, 20%)

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 | 9.4 | 9.5 |
| **Learning/ teaching method** |  |  |  |  |  |  |  |  |  |  |
| **Private Study** | **X** | **X** | **X** | **X** | **X** | **X** | **X** | **X** | **X** | **X** |
| *Lectures* | **X** | **X** |  |  |  |  |  |  |  |  |
| *Computer Laboratory* | **X** | **X** | **X** | **X** | **X** | **X** | **X** | **X** | **X** | **X** |
|  |  |  |  |  |  |  |  |  |  |  |
| **Assessment method** |  |  |  |  |  |  |  |  |  |  |
| *Assignments* | **X** | **X** | **X** | **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**

Computing 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 delivery of revised version | Section revised | Impacts PLOs (Q6&7 cover sheet) |
| 26/12/19 | Major | Sep 2020 | 7, 8, 10-12 | No |
|  |  |  |  |  |