1. **Title of the module**

Physical Chemistry 1 - Energy and Rates (CHEM3630/CH363)

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

School of 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)**

Term 2

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

None

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

BSc(Hons) Chemistry

BSc(Hons) Chemistry with a Professional Placement

BSc(Hons) Chemistry with a Year Abroad

BSc(Hons) Chemistry with a Foundation Year

MChem Chemistry

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 core and foundation chemical, physical, and biological concepts, terminology, theory, units, conventions, and laboratory practice and methods in relation to the chemical sciences.
3. Demonstrate knowledge and understanding of essential facts, concepts, principles and theories relating to chemistry and to apply this knowledge and understanding to the solution of qualitative and quantitative problems.
4. Recognise and analyse problems and plan strategies for their solution by the evaluation, interpretation and synthesis of scientific information and data.
5. Understand the importance of observational and instrumental monitoring of physiochemical events and changes, and the systematic and reliable documentation of the above.
6. Collate, interpret and explain the significance and underlying theory of experimental data to fundamental chemical principles.
7. **The intended generic learning outcomes.**

 **On successfully completing the module students will be able to:**

1. Demonstrate a range of appropriate communication skills.
2. Build on generic skills to undertake further training of a professional nature.
3. Use problem-solving skills to interpret qualitative and quantitative information, extending to situations where evaluations have to be made on the basis of limited information.
4. Demonstrate numeracy and computational skills, including such aspects as order-of-magnitude estimations, and correct use of units.
5. Make use of Information-retrieval skills, in relation to primary and secondary information sources, including information retrieval through on-line computer searches.
6. Use information-technology skills such as word-processing and spreadsheet programmes, data-logging and storage, internet communication, etc.
7. Demonstrate 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.
8. Develop study skills needed for continuing professional development and professional employment.
9. **A synopsis of the curriculum**

This module discusses the key ideas of thermodynamics and kinetics in a chemical context. It shows how the universe may be understood in terms of the flow of energy from high to low, and how this allows not only an understanding of what transformations are possible but also how fast they will occur. These essential physical principles are then applied to real world phenomena such as batteries, showing that even the most fundamental theories have direct and important applications in the modern world.

1. **Reading list (Indicative list, current at time of publication. Reading lists will be published annually)**
* Atkins, de Paula, and Keeler, Physical Chemistry 11th Edition, 2017, Oxford University Press
* Keeler and Wothers, Structure and Reactivity: An Integrated Approach 2nd Edition, 2013, Oxford University Press
* Keeler and Wothers, Why Chemical Reactions Happen, Oxford University Press
* Elliott and Page, Workbook in Physical Chemistry, 2017, Oxford University Press
1. **Learning and teaching methods**

Total contact hours: 30

Total private study hours:120

Total module study hours: 150

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

|  |  |
| --- | --- |
| Online Quiz (1 hour) | 5% |
| Assessed Workshop 1 (4 hours) | 15% |
| Online Quiz 2 (1 hour) | 5% |
| Assessed Workshop 2 (4 hours) | 15% |
| Examination (2 hours) | 60% |

13.2 Reassessment methods

100% by Examination

1. **Map of module learning outcomes (sections 8 & 9) to learning and teaching methods (section 12) 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 | 9.6 | 9.7 | 9.8 |
| **Learning/teaching method** |  |  |  |  |  |  |  |  |  |  |  |  |  |
| **Private Study** | **X** | **X** | **X** | **X** | **X** |  | **X** | **X** | **X** | **X** | **X** | **X** | **X** |
| Workshop | **X** | **X** | **X** | **X** | **X** | **X** | **X** | **X** | **X** | **X** | **X** | **X** | **X** |
| Lectures | **X** |  | **X** | **X** | **X** |  |  |  | **X** |  |  | **X** | **X** |
| **Assessment method** |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Online Quizzes | **X** | **X** | **X** | **X** | **X** | **X** | **X** | **X** | **X** | **X** | **X** | **X** | **X** |
| Assessed Workshops | **X** | **X** | **X** | **X** | **X** | **X** | **X** | **X** | **X** | **X** | **X** | **X** | **X** |
| Examination | **X** | **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**

Chemistry is an inherently international subject, with teaching and research active across the globe, and this is facilitated by well-defined conventions in terminology and mathematical modelling which allow complex concepts to be communicated across language barriers. In recent years, Nobel prizes and prestigious awards have been awarded to international collaborators and rivals. This module introduces students to the work of these pioneers, as well as the fundamentals behind it, and so enables them to interact with this community. Where possible, the reading list has been chosen, in part, to demonstrate the diversity of backgrounds of chemists working in the field.

**DIVISIONAL 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) |
|  |  |  |  |  |
|  |  |  |  |  |