1. **Title of the module**

CHEM5310 (CH531) - Thermodynamics and Kinetics

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**

Prerequisites:

CHEM3080 Molecules Matter & Energy

CHEM3820 Chemical Skills

CHEM3200 Chemical Reactions

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

Chemistry (BSc)

Chemistry (MSc)

Chemistry with a Year in Industry

1. **The intended subject specific learning outcomes.  
   On successfully completing the module students will be able to:**
2. Understand and apply basic concepts in chemical thermodynamics.
3. Predict the feasibility of a chemical reaction.
4. Recognise the links between the macroscopic thermodynamic and microscopic statistical viewpoints.
5. Understand electrochemical reactions and processing.
6. Understand molecular reaction dynamics.
7. Perform calculations using thermodynamic data.
8. Perform practical experiments to gain thermodynamic information.
9. Operate standard chemical instrumentation, record data, evaluate observations and errors.
10. Present and interpret information graphically.
11. **The intended generic learning outcomes.  
    On successfully completing the module students will be able to:**

Have a knowledge and understanding of:

1. Problem-solving skills, an ability to formulate problems in precise terms and to identify key issues, and the confidence to try different approaches in order to make progress on challenging problems.
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 skills – the ability to work independently, to use initiative, to organise oneself to meet deadlines and to interact constructively with other people.
4. **A synopsis of the curriculum**

The speed (kinetics) and energetics (thermodynamics) of a reaction are of central importance in chemistry. Here, we use thermodynamics and kinetics to predict whether a particular reaction would take place and its likely product yield. We also cover equilibrium constants, electrochemical cells, colligative properties, including elevation and depression of melting and boiling points, zero, first, second and third order reaction kinetics and statistical thermodynamics. Experiments are included to help to cement understanding. (Lab component.)

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

* P.W Atkins, Physical Chemistry
* R. Chang, Physical Chemistry for the Chemical and Biological Sciences

1. **Learning and teaching methods**

Total contact hours: 60

Private study hours: 90

Total study hours: 150

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

* Assignment 1 (3 hours) – 9%
* Assignment 2 (3 hours) – 6%
* Laboratory Report (3 hours) – 25%
* Examination (2 hours) – 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* | *9.1* | *9.2* | *9.3* |
| **Learning/ teaching method** |  |  |  |  |  |  |  |  |  |  |  |  |
| Private Study | **x** | **x** | **x** | **x** | **x** | **x** |  |  |  | **x** | **x** | **x** |
| Lectures | **x** | **x** | **x** | **x** | **x** | **x** |  |  | **x** |  |  |  |
| Laboratory |  |  |  |  |  |  | **x** | **x** | **x** | **x** | **x** | **x** |
| **Assessment method** |  |  |  |  |  |  |  |  |  |  |  |  |
| Assignments | **x** | **x** | **x** | **x** | **x** | **x** |  |  |  | **x** | **x** |  |
| Lab Report |  |  |  |  |  | **x** | **x** | **x** | **x** | **x** | **x** | **x** |
| Examination | **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 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 Division of Natural 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 the Division provides to its students is also internationally attuned given our international student body.

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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.**

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| --- | --- | --- | --- | --- |
| 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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Revised FSO Jan 2018