Northeastern University London

# LCHEM4119 General Chemistry Course Descriptor

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| Course Code | LCHEM4119 | Discipline | Bioscience and Chemistry |
| UK Credits | 15 | US Credits | 4 |
| FHEQ Level | 4 | Date Approved | August 2022 |
| Core Attributes | Engaging with the Natural and Designed World (ND) | | |
| Pre-Requisites | | | |
| Co-Requisites | LCHEM4114 General Chemistry Lab (for All Majors except Engineering) | | |

## Course Summary

This course introduces the principles of chemistry beginning with atomic and molecular structures, chemical bonding, intermolecular interactions, and the nature of the forces that control these interactions. This provides a microscopic view of matter that helps students understand the trends in the physical and chemical properties of the elements in the periodic table, and to better understand the atomic, ionic, and molecular - scale transformations that are at the core of all chemical processes including those that take place in living systems and other aqueous environments. The course also provides fundamental aspects of chemical kinetics, energy change, and equilibrium states in chemical reactions. These topics are covered in lectures and recitations. A concurrent Lab course will complement this course. Labs are not required for students in engineering programmes.

## Course Aims

- Introduce students to how the electronic structures of atoms are related to the charges of their monatomic ions, and the structures of the molecules they form.
- Introduce students to the relationship of the physical and chemical properties of substances to interactions between their particulate building blocks: atoms, ions or molecules.

# Learning Outcomes

On successful completion of the course, students will be able to:

## Knowledge and Understanding

K1a Demonstrate knowledge and understanding of the principles of chemistry.

K2a Describe how the periodic properties of elements relate to their positions in the periodic table

K3a Demonstrate an understanding of the energetics of chemical reactions and how they influence the degree to which reactants form products and the time scales of these reactions.

K4a Describe how the properties of molecular compounds are related to the structures of their molecules, the masses of those molecules, and the presence of functional groups

## Subject Specific Skills

S1a Apply the principles of chemistry to explain the physical and chemical properties of pure substances and the common mixtures they form.

S2a Predict the identities of the products formed by a given reaction mixture

S3a Calculate the quantities of products that theoretically could be formed by given quantities of reactants in a chemical reaction.

S4a Quantitatively describe the composition of a reaction mixture at equilibrium given the initial quantities of the components of the reaction and its equilibrium constant

## Transferable and Professional Skills

T1a Design and apply systematic problem solving strategies to solve problems in other disciplines.

T2A Describe the chemistry experiments and explain the results supporting phenomena of global significance, such as climate change.

T3a Demonstrate an ability to perform evidence–based decision making.

T4a Understand and be able to apply the scientific method to explain an observation or why an experimental result was obtained.

# Teaching and Learning

Teaching and learning strategies for this course will include:

A minimum of 40 contact hours, typically to include interactive group teaching, co-curriculars, individual meetings, recitations/tutorials and exams.

Course information and supplementary materials are available on the University's Virtual Learning Environment (VLE).

Students will receive individualised developmental feedback on their work for this course.

Students are required to attend and participate in all the formal and timetabled sessions for this course. Students are also expected to manage their directed learning and independent study in support of the course.

# Assessment

## Formative

Students will be formatively assessed through in-class activities such as collaborative lecture quizzes, by their doing homework assignments, and during office-hour discussions. Formative assessments will provide students with vital feedback on their progress in the course.

## Summative

| AE: | Assessment Activity | Weighting (%) | Online submission | Duration | Length |
|---|---|---|---|---|---|
| 1 | Written Examination | 40 | No | 1hr | N/A |
| 2 | Written Examination | 60 | No | 1hr 45min | N/A |

Further information on the structure of summative assessment elements can be found in the Summative Assessment Briefs.

## Feedback

Students will receive feedback in a variety of ways: written (including via email correspondence); oral (within office hours or on an *ad hoc* basis) and indirectly through class discussion.

Feedback on examinations is provided through generic internal examiners' reports and are made available to the student on the VLE.

For all other summative assessment methods, feedback is made available to the student either via email, the VLE or another appropriate method.

# Indicative Reading

Note: Comprehensive and current reading lists for courses are produced annually in the Course Syllabus or other documentation provided to students; the indicative reading list provided below is used as part of the approval/modification process only.

## Books

- Gilbert, Kirss, Foster & Bretz. Chemistry, an Atoms-Focused Approach, 3rd ed. W.W. Norton. ISBN: 978-0-393-42854.

## Electronic Resources

- Smartwork5 on-line homework system
- Poll Everywhere

# Indicative Topics

- Atomic and molecular structure, the nature and types of chemical bonds, and intermolecular interactions: their origins, relative strengths and impact on macroscopic properties such as freezing and boiling point and solubility in different solvents
- Chemical reactions including reactions in solution: acid-base, precipitation, and redox, writing chemical equations, and stoichiometric calculations based on chemical equations
- Chemical kinetics: reaction rates and rate laws, reaction mechanisms, and catalysts
- Thermochemistry and thermodynamics: enthalpy, entropy and free energy, the energetics of chemical reactions and reaction spontaneity
- The dynamic nature of chemical equilibria, equilibrium constants and calculations based on them; acid-base equilibria and the pH scale; pH buffers

| **Title: LCHEM4119 General Chemistry Course Descriptor**<br>**Approved by: Academic Board**<br>**Location: Academic Handbook/Programme Specifications and Handbooks/Mobility Courses** | | | | | |
|---|---|---|---|---|---|
| Version Number | Date Approved | Date Published | Owner | Proposed Next Review Date | Modification (As per AQF4) & Category Number |
| 2.2 | August 2024 | August 2024 | Dr Helen Dawe | August 2027 | Category 1: Corrections/clarifications to documents which do not change approved content. |
| 2.1 | August 2023 | September 2023 | Dr Helen Dawe | August 2027 | Category 1: Corrections/clarifications to documents which do not change approved content. |
| 2.0 | August 2023 | August 2023 | Dr Helen Dawe | August 2027 | Category 2: Change to summative assessment |
| 1.1 | January 2023 | January 2023 | Dr Thomas Gilbert | August 2027 | Category 1: Corrections/clarifications to documents which do not change approved content. |
| 1.0 | August 2022 | August 2022 | Dr Thomas Gilbert | August 2027 | |