



Module Specification

Chemistry in Context

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Part 1: Information

Module title: Chemistry in Context

Module code: USSJRT-30-1

Level: Level 4

For implementation from: 2023-24

UWE credit rating: 30

ECTS credit rating: 15

Faculty: Faculty of Health & Applied Sciences

Department: HAS Dept of Applied Sciences

Partner institutions: None

Field: Applied Sciences

Module type: Module

Pre-requisites: None

Excluded combinations: None

Co-requisites: None

Continuing professional development: No

Professional, statutory or regulatory body requirements: None

Part 2: Description

Overview: Not applicable

Features: Not applicable

Educational aims: See Learning Outcomes.

Outline syllabus: The topics covered include:

The Structure and Properties of Organic Molecules:

Atomic structure and the Periodic Table. Valence bond theory of covalent bonding. Electronegativity, polar bonds and intermolecular forces. Different representations of molecular structure.

The major classes of organic functional group. Aromatic and heterocyclic ring systems, examples within illicit drugs. Effects of chemical structure on pKa and bioavailability of organic molecules.

The Chemistry of Drugs, Toxins and Poisons:

Stereochemistry - Types of isomerism, enantiomers, diastereomers and meso compounds. Absolute configuration, CIP sequence rules and their assignment. Relevance of stereochemistry to forensic toxicology and analysis.

The major classes of illicit drug, chemicals and chemical reactions involved in the principal routes to illicit drugs. The illicit drug lab – health and safety, potential physical and chemical evidence.

Metal complexes as models of active sites in enzymes and proteins.

The Chemistry of Arson, Explosives and Firearms:

Energy from combustion, enthalpy. Types of fuel and accelerant, flammability and flash point. Entropy, order and disorder. An introduction to stability of atoms, molecules and mixtures, with examples of explosives.

Elementary kinetics. Definition and factors influencing the rate of a chemical reaction. Classification of reactions according to speed and complexity. Temperature dependence of reaction rates.

Chemical primers and propellants used in firearms. The chemical composition of gunshot residue and colour tests for nitrates.

Part 3: Teaching and learning methods

Teaching and learning methods: The material will be delivered using a combination of lectorials (lectures/tutorials) and workshops. Practical work may be included if consistent with the requirements of social distancing. Material will be augmented by directed reading in the recommended texts and in selected publications from the scientific literature. The topics selected for delivery by workshops will be designed to enhance problem solving skills.

Technology enhanced learning will be embedded within teaching materials via links to supplementary electronic online resources of the textbook and other relevant information portals, e.g. <http://www.chemspider.com>. Student learning will be further supported through a variety of materials posted on the University's E-Learning Environment, Blackboard.

Essential reading to support acquisition of knowledge and completion of problem solving skills exercises relating to lectorials or workshops

Preparation and submission of coursework

Revision and preparation for exams.

Module Learning outcomes: On successful completion of this module students will achieve the following learning outcomes.

MO1 Identify important classes of organic functional groups and ring systems within simple organic molecules and illicit drugs, and relate these structural features to the physicochemical properties of these molecules.

MO2 Illustrate their knowledge of isomerism, chirality and absolute configuration in organic molecules using examples of drugs, flavours or fragrances.

MO3 Use ideas of entropy and enthalpy to discuss the stabilities of fuels and explosives, and to analyse simple kinetic data to predict the speed, complexity and yields of chemical reactions.

MO4 Describe common classes of illicit drug, the chemical reactions relevant to their production, and the potential hazards and chemical evidence associated with illicit drug labs.

MO5 Carry out simple calculations and data handling, commonly used in chemistry.

Hours to be allocated: 300

Contact hours:

Independent study/self-guided study = 228 hours

Face-to-face learning = 72 hours

Total = 300

Reading list: The reading list for this module can be accessed at [readinglists.uwe.ac.uk](https://uwe.rl.talis.com/modules/ussjrt-30-1.html) via the following link <https://uwe.rl.talis.com/modules/ussjrt-30-1.html>

Part 4: Assessment

Assessment strategy: Assessment 1 is a portfolio of assessed worksheets containing a variety of questions and responses for students to complete and will be directed to increase the students' problem solving and laboratory skills.

Assessment 2 is a 24 hour online examination, assessing the students' knowledge acquired during lectorials and workshops, and from their own directed, independent learning.

Assessment tasks:

Portfolio (First Sit)

Description: Portfolio of worksheets

Weighting: 60 %

Final assessment: No

Group work: No

Learning outcomes tested: MO1, MO2, MO3, MO5

Examination (Online) (First Sit)

Description: Online examination (24 hours)

Weighting: 40 %

Final assessment: Yes

Group work: No

Learning outcomes tested: MO2, MO3, MO4, MO5

Portfolio (Resit)

Description: Portfolio of worksheets

Weighting: 60 %

Final assessment: No

Group work: No

Learning outcomes tested: MO1, MO2, MO3, MO5

Examination (Online) (Resit)

Description: Online examination (24 hours)

Weighting: 40 %

Final assessment: Yes

Group work: No

Learning outcomes tested: MO2, MO3, MO4, MO5

Part 5: Contributes towards

This module contributes towards the following programmes of study:

Forensic Science [Frenchay] BSc (Hons) 2023-24

Forensic Science [Frenchay] MSci 2023-24

Forensic Science {Foundation} [Frenchay] BSc (Hons) 2022-23

Forensic Science {Foundation} [Frenchay] MSci 2022-23