



Module Specification

Medicinal Chemistry

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Part 1: Information

Module title: Medicinal Chemistry

Module code: USSKB5-15-2

Level: Level 5

For implementation from: 2023-24

UWE credit rating: 15

ECTS credit rating: 7.5

Faculty: Faculty of Health & Applied Sciences

Department: HAS Dept of Applied Sciences

Partner institutions: None

Field: Applied Sciences

Module type: Module

Pre-requisites: Cells, Biochemistry and Genetics 2023-24, Chemistry in Context 2023-24

Excluded combinations: None

Co-requisites: None

Continuing professional development: No

Professional, statutory or regulatory body requirements: None

Part 2: Description

Overview: Pre-requisites: Students must take USSJRT-30-1 Chemistry in Context or USSKA4-30-1 Cell Biochemistry and Genetics.

Features: Not applicable

Educational aims: See Learning Outcomes.

Outline syllabus: The syllabus includes:

The General Principles of Medicinal Chemistry:

General classes of drugs and their medicinal activity. Types of drug target and the origins of drug-target interactions. Identification of the essential structural features (pharmacophore) for bioactivity.

Examples of strategies in medicinal chemistry to develop leads, to optimise drug-target binding interactions, to alter drug solubility/stability, to improve drug pharmacokinetics, to enhance drug delivery/formulation, to mass produce drugs and to control drug stereochemistry.

Relationships between chemical structure, physicochemical properties of a drug and predicted biological availability. Structure-activity relationships (SARs) and their quantitative measurement (QSAR). Hydrophobicity and Hammett constants, Hansch analysis, Craig plots and Topliss decision trees.

Types of prodrug and the use of classical and non-classical bioisosteres. Applications to drug design and development in medicinal chemistry.

The use of X-ray crystal structure determination and spectroscopy to identify drug intermediates and to inform drug development.

Case Studies in Medicinal Chemistry:

To illustrate major classes of medicines and their chemical development and action, a selection of the following will be discussed.

Barbiturates and the benzodiazepines

Captopril, an antihypertensive agent – the development of a lead compound.

Development of the morphinans and methadone from morphine.

Structure and activity of the antibacterial penicillins.

Asymmetric synthesis in the production of chiral drugs.

Anticancer drugs targeting DNA.

Antiulcer treatment - QSAR in the development of omeprazole or cimetidine.

Part 3: Teaching and learning methods

Teaching and learning methods: The material will be delivered using a combination of lectorials and workshops . Lectures will be augmented by directed reading in the recommended text and in selected publications from the scientific literature, for example, Drug Discovery Today, Journal of Medicinal Chemistry. The topics selected for delivery by workshops will be designed to enhance problem solving skills and to provide experience of relevant laboratory techniques.

Technology enhanced learning will be embedded within teaching materials via links to supplementary electronic online resources of the textbook and other relevant information portals, for example, <http://www.chemspider.com>

Use will also be made of various in-house electronic resources and flash videos in chemistry for biologists available at <http://calcscience.uwe.ac.uk>

Student learning will be further supported through a variety of materials posted on the University's E-Learning Environment, Blackboard.

Contact: This module will run in semester 2.

Face-to face lectorials and workshops - 33 hours

Independent learning will take the following forms with an approximate indication of time required for each:

Essential reading to support acquisition of knowledge and completion of problem solving skills exercises relating to lectorials and workshops – 40 hours

Preparation and submission of coursework 1 – 37 hours

Revision and preparation for exams – 37 hours

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

MO1 Apply chemical knowledge to rationalise drug design, structural modification and synthesis

MO2 Comment on chemical strategies used in drug development to control pharmacokinetics and delivery.

MO3 Recognise and explain how physicochemical properties of drugs can be measured, and used to study and predict structure-activity relationships

MO4 Describe and explain the action and development of selected examples of medicines and drugs

Hours to be allocated: 150

Contact hours:

Independent study/self-guided study = 117 hours

Face-to-face learning = 33 hours

Total = 150

Reading list: The reading list for this module can be accessed at [readinglists.uwe.ac.uk](https://uwe.rl.talis.com/modules/usskb5-15-2.html) via the following link <https://uwe.rl.talis.com/modules/usskb5-15-2.html>

Part 4: Assessment

Assessment strategy: Students will undertake lectorials and workshops based on synthesis of selected drugs and the principles of drug development.

The assessed coursework will be based on this material and consist of a series of

questions and responses for students to complete and research in their own time.

The examination will assess the students' knowledge acquired during lectures and workshops, and from their own directed, independent learning.

Assessment tasks:

Examination (Online) (First Sit)

Description: Online examination (24 hours)

Weighting: 50 %

Final assessment: Yes

Group work: No

Learning outcomes tested: MO1, MO2, MO3, MO4

Written Assignment (First Sit)

Description: Worksheets with questions.

Weighting: 50 %

Final assessment: No

Group work: No

Learning outcomes tested: MO1, MO3, MO4

Examination (Online) (Resit)

Description: Online examination (24 hours)

Weighting: 50 %

Final assessment: Yes

Group work: No

Learning outcomes tested: MO1, MO2, MO3, MO4

Written Assignment (Resit)

Description: Worksheets with questions.

Weighting: 50 %

Final assessment: No

Group work: No

Learning outcomes tested: MO1, MO3, MO4

Part 5: Contributes towards

This module contributes towards the following programmes of study:

Applied Biomedical Science [Frenchay] BSc (Hons) 2022-23

Forensic Science [Frenchay] MSci 2022-23

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

Biomedical Science [Frenchay] BSc (Hons) 2022-23

Biomedical Science [Frenchay] MSci 2022-23

Biomedical Science [Sep][PT][Frenchay][6yrs] BSc (Hons) 2021-22

Biomedical Science {Foundation} [Sep][SW][Frenchay][5yrs] BSc (Hons) 2021-22

Biomedical Science {Foundation} [Sep][FT][Frenchay][4yrs] BSc (Hons) 2021-22

Biomedical Science [Sep][PT][Frenchay][8yrs] MSci 2021-22

Biomedical Science {Foundation} [Sep][SW][Frenchay][6yrs] MSci 2021-22

Biomedical Science {Foundation} [Sep][FT][Frenchay][5yrs] MSci 2021-22

Forensic Science {Foundation} [Sep][SW][Frenchay][5yrs] BSc (Hons) 2021-22

Forensic Science {Foundation} [Sep][FT][Frenchay][5yrs] MSci 2021-22

Forensic Science {Foundation} [Sep][SW][Frenchay][6yrs] MSci 2021-22

Forensic Science {Foundation} [Sep][FT][Frenchay][4yrs] BSc (Hons) 2021-22

Biomedical Science [Sep][PT][Frenchay][6yrs] BSc (Hons) 2020-21

Biomedical Science [Sep][PT][Frenchay][8yrs] MSci 2020-21