UNIVERSITY of BRADFORD

Module Descriptor

Module Details	
Module Title	Practical Chemistry for Apprentices 1
Module Code	CFS4031-C
Academic Year	2020/1
Credits	30
School	School of Chemistry and Biosciences
Subject Area	Chemistry
FHEQ Level	FHEQ Level 4
Pre-requisites	N/A
Co-requisites	N/A

Contact Hours	
Type	Hours
Work based learning	220
Tutorials	12
Laboratories	60
Directed Study	8

Availability	
Occurrence	Location / Period
DLA	University of Bradford / Academic Year

Module Aims

This module will introduce the fundamental techniques required to work safely and efficiently in the laboratory. You will develop your skills in the safe handling of chemicals, in making accurate qualitative observations, quantitatively analysing compounds prepared in the laboratory, and in reporting and interpreting experimental results. You will learn about spectroscopic techniques and use these methods in the analysis of what you synthesise in the lab. You will use measurements of physical parameters to investigate aspects of physical chemistry.

Through preparing laboratory reports you will be introduced to the standard formats and drawing packages used by professional chemists to share their results. You will be tutored in the basic numeracy skills necessary to study a degree in the chemical sciences, and will apply these skills to your experimental work. The principles of Green Chemistry will be introduced, and you will learn how to assess the environmental impact of your laboratory work.

Students will build an e-portfolio of their work at distance, and re-enforce these with core chemistry skills both within and outside of a laboratory environment; in the workplace and in university laboratories.

Outline Syllabus

Chemical hazards and risk assessments, sources of safety data, on-line databases, definitions and safety terms, exposure limits, legislation, CHIP, COSHH, REACH.
Data manipulation & presentation of results. Precision, accuracy & sensitivity, linear regression, units. Experimental errors & calibration. Validation of data. Statistical methods. Reporting & interpreting experimental results. Quantitative & qualitative measurements, Algebra, Differential calculus, Integral calculus, Trigonometry. Green chemistry - Definitions & metrics used, the tools used to assess the environmental impact of chemical processes.

Purification of single & mixed substances. Separation & identification of mixtures by thin layer chromatography. Solvent extraction from solids & liquids. Experiments to illustrate thermodynamic equilibria & the variation of equilibrium position with temperature. Measurements of physical properties of states of matter; refractive index, boiling point & vapour pressure. Measurement of heats of reaction by calorimetry. Measurement of enthalpies of solution & partition coefficients. Experiments illustrating classical methods of inorganic analysis.

Laboratory techniques in separating organic mixtures: Elementary organic synthesis. Spectroscopic characterisation of organic & inorganic compounds.
Professional Development: Presenting information effectively, monitoring & evaluating results, drawing conclusions, chemical reports, chemical structure drawing.
Maths Skills: Formative and summative online assessments in maths abilities, with online material provided for student development.

Learning Outcomes	
Outcome Number	Description
01	Devise and manage a Chemical Skills E-Portfolio
02	Classify types of chemical hazards and implement safe working practices based on this analysis.
03	Apply appropriate standards of reporting for recording and then disseminating experimental data and results.
04	Record and interpret analytical data, combining the data to help answer experimental questions.
05	Conduct basic laboratory procedures in a safe and efficient manner.
06	Explain the role of Green Chemistry in measuring, and then minimising the environmental impact of practical chemistry.
07	Manipulate numerical data and equations and will be able to identify and quantify errors.
08	Identify and quantify experimental errors
09	Evidence practical skills developed through on-the-job training.

Learning, Teaching and Assessment Strategy

The Block release campus visit will include laboratory-based work with staff-led demonstration of practical and manipulative skills at the bench and supervision of students' experimental work.
The block release visit will also have taught components to cover Health and Safety and laboratory management, the reporting of laboratory work, handling of data, and the use of spectroscopic techniques.
Students will be introduced to the e-portfolio system they will use for recording the techniques they develop on-the-job throughout the academic year.
Outside of the laboratory sessions, the student will meet with their supervisory team to discuss the practical skills and techniques that will be developed in the workplace during that year. A skills development plan will be designed and implemented.
The supervisory team will monitor the development of the e-portfolio throughout the year and will identify if there are any additional learning requirements to meet the module learning outcomes.
At distance on-line seminars will be used to provide further instruction in fundamental spectroscopic techniques used in the lab, mathematical skills, and to give instruction in the use of specialist software for the preparation of laboratory reports.
Students will have the opportunity to build an e-portfolio of skills and knowledge to evidence their progression in the practical aspects of the chemical sciences. Laboratory work will be assessed via continous assessment of the student's laboratory practices.

Assessment 1: Written and oral report based on Block Release Practical work, tests LO 3,5,6,8.

Assessment 2: An on-line maths assigment, to test LO 7. A diagnostic maths formative assessment will be given to students at the start of the module. Students who require extra tuition in maths will be required to engage with further maths teaching materials.

Assessment 3: An e-portfolio where students will evidence their practical skills development. This assessment will be facilitated by the supervisory team. Formative feedback will be given throughout the year prior to final submission. Tests LO 1, 2, 4, 9

Mode of Assessment				
Type	Method	Description	Length	Weighting
Summative	Laboratory Report	Written and oral report based on Block Release Practical work	N/A	25%
Summative	Coursework	e-portfolio of Chemistry skills and knowledge developed through year	N/A	50%
Summative	Computer-based assessment	Data handling and mathematical skills	2 hour	25%
Formative	Coursework	e-portfolio of Chemistry skills and knowledge developed through year	N/A	N/A
Formative	Coursework	Formative laboratory report	Formative laboratory report	N/A
Formative	Computer-based assessment	Formative online diagnostic test on mathematical skills	Formative online diagnostic test on mathematical skills	N/A

Reading List
To access the reading list for this module, please visit https://bradford.rl.talis.com/index.html

Please note:
This module descriptor has been published in advance of the academic year to which it applies. Every effort has been made to ensure that the information is accurate at the time of publication, but minor changes may occur given the interval between publishing and commencement of teaching. Upon commencement of the module, students will receive a handbook with further detail about the module and any changes will be discussed and/or communicated at this point.

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