UNIVERSITY of BRADFORD

Module Descriptor

Module Details	
Module Title	Practical Chemistry 2
Module Code	CFS5019-D
Academic Year	2020/1
Credits	40
School	School of Chemistry and Biosciences
Subject Area	Chemistry
FHEQ Level	FHEQ Level 5
Pre-requisites	N/A
Co-requisites	N/A

Contact Hours	
Type	Hours
Tutorials	5
Laboratories	168
Directed Study	227

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

Module Aims

This module builds on the Practical Chemistry 1 module and aims to enhance your synthetic and analytical techniques. You will further develop your skills for the synthesis of organic and inorganic compounds by employing multi-step reactions. You will also apply advanced spectroscopic techniques for the structure elucidation of reaction products and to gain understanding of the physical properties.

You will extend your laboratory skills to using methods required for nanoscience, electrochemistry, colligative properties, crystallisation and computational chemistry. You will develop your professional and transferable skills through the means of group work, presentations and CV workshops. Through pre-laboratory material, MCQ and COSHH assessment, laboratory write-ups, laboratory vivas and group work, you will develop your understanding and appreciation of practical chemistry, enabling you to link these practical skills to the other core curriculum modules and learn their importance within industrial applications.

Outline Syllabus

1. Multi-step reactions: understand organic multi-step reactions in theory and practice.

2. Coordination compounds: synthesis, characterisation and analysis of metal complexes.

3. UV/Vis spectroscopy: Crystal Field and Ligand Field Theory
4. NMR techniques: analysis of nuclear magnetic resonance data of organic and inorganic compounds.

5. Powder X-ray diffraction: theory, concepts and Bragg's Law.

6. Vibrational spectroscopy: analysing compounds by Raman spectroscopy and understanding the vibrational characteristics of their functional groups.

7. Thermodynamics: states of matter and determination of thermodynamic parameters.

8. Thermodynamic and kinetic control in organic reactions: calculating kinetic parameters for a given reaction; and understanding the concepts of phase equilibria/colligative properties.

9. Metal reduction: reduction of vanadium by various reduction techniques.

10. Separation techniques: concepts of ion exchange.

11. Carbonyl chemistry: synthesis and analysis

12. Diazo-compounds: manipulation to generate substituted aromatic compounds from commercially available or easily accessible aromatic amines.

13. Computational chemistry: theoretical basis of organic reaction mechanisms

14. Nanoscience: basic concepts, versatility of nano-particles within industrial applications

15. Electrochemistry: practical introduction to the basic terms and concepts.

16. Short Investigative Task: 4-week investigative group task with a topic relating to either research and/or industry.

17. Communication skills: written and oral communication, using problem-solving skills with qualitative and quantitative information.

18. Interpersonal skills: CV and cover letter writing, reflection on professional attributes.

Learning Outcomes	
Outcome Number	Description
01	Identify and describe types of chemical hazards, state how to minimise risks when using hazardous substances and perform COSHH assessments.
10	Interact effectively with other people and engage in team working, including presentation of lab work as part of a team.
02	Demonstrate breadth and depth of understanding of relevant core chemistry concepts and practical chemistry principles.
03	Apply core chemistry knowledge to solve qualitative and quantitative problems, including the analysis and interpretation of spectroscopic data.
04	Plan and implement efficient and effective modes of working on a range of synthetic and analytical tasks, both alone and in teams, within the laboratory environment.
05	Perform multistep preparative syntheses and characterise products through advanced analytical techniques.
06	Document all laboratory procedures to GLP standards.
07	Demonstrate the use of information technology (IT) and data-processing skills, relating to chemical information and data analysis and interpretation.
08	Critically evaluate, select and perform appropriate analytical methods with the ability to explain associated arguments, assumptions and data used to make judgements and conclusions
09	Communicate scientific ideas, problems and solutions effectively through written lab write ups and group work.

Learning, Teaching and Assessment Strategy

The module uses a blended approach to support learning and achievement. Students will complete a mixture of wet and dry laboratory experiments supported by weekly online pre-lab and post-lab learning packages. These will include short videos that demonstrate key skills, a set of structured activities (reading, online VLE quizzes etc.) that 'scaffold' the learning. Students will submit laboratory handbooks and reports towards a continual assessment of their progress. Opportunities for formative feedback will be given to guide progress. Wet labs will be held on-campus to ensure essential practical skills are developed. Pre-labs will include MCQ/COSHH assessments. For health and safety reasons, the MCQ/COSHH assessments must be completed with >80% mark to be allowed to enter the laboratory. The laboratory-based work will include staff-led demonstrations of practical, manipulative skills at the bench and supervision of students' practical work. All laboratory books are to be written during the laboratory sessions and signed off by a member of staff before the session is over. Aspects of health and safety and laboratory skills will be delivered during both prelabs and laboratory sessions; no student will be allowed to enter the laboratory without completing the MCQ/COSHH assessments. Students will receive feedback in the form of marked laboratory reports, review of laboratory records, oral vivas and group work/presentations.

Both semesters will have a combination of synthesis and measurement experiments, data analysis workshops and computational sessions that cover organic, inorganic, physical and analytical elements. Workshops will be used to develop reflective practice and for developing professional attributes in CV writing.

The module will contain three modes of assessment.
Assessment 001: A long-looped assessment of the practical skills students have developed at stage 1 will cover LOs 1 & 2
Assessment 002: The development of a CV and cover letter is aligned with LO 11.
Assessment 003: Continuing summative assessment of student?s practical work is aligned with LOs 1-10.

Directed study provides you with the opportunity to undertake guided reading and to develop your own portfolio of learning to enhance transferable skills and knowledge relating to evaluation of your own role and subject provision.

The VLE will be used to provide access to online resources. pre-laboratory material. COSHH forms, MCQ/COSHH assessments, and external links to websites of relevance.

Mode of Assessment

Type	Method	Description	Length	Weighting
Summative	Coursework	Continuous summative assessment of practical work and reports (0-7000 words).	N/A	80%
Summative	Coursework	Produce a CV, cover letter and a skills audit (0-2000 words).	N/A	10%
Summative	Examination - practical/laboratory	Practical examination of Stage 1 practical skills and health and safety. [MUST PASS AT 40%]	N/A	10%

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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