UNIVERSITY of BRADFORD

Module Descriptor

Module Details	
Module Title	Practical Chemistry 2
Module Code	CFS5019-D
Academic Year	2024/5
Credits	40
School	School of Chemistry and Biosciences
FHEQ Level	FHEQ Level 5

Contact Hours	
Type	Hours
Seminars	6
Laboratories	168
Directed Study	226

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 and computational 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. Synthesis: perform (multi-step) organic and inorganic syntheses and connect experiment and theory. 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 and kinetics: application of concepts (e.g. phases of matter, phase equilibria, colligative properties, rates of reaction) to experiment and determination of thermodynamic and/or kinetic parameters. 8. Computational chemistry: application of computational chemistry techniques to practical problems. 9. Nanoscience: basic concepts, versatility of nano-particles within industrial applications 10. Electrochemistry: practical introduction to the basic terms and concepts. 11. Communication skills: written and oral communication, using problem-solving skills with qualitative and quantitative information. 12. 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.
02	Demonstrate breadth and depth of understanding of relevant core chemistry concepts and practical chemistry principles.
03	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.
04	Demonstrate the ability to conduct multistep preparative syntheses and characterise products through advanced analytical techniques.
05	Document all laboratory procedures to GLP standards.
06	Apply information technology (IT) and data-processing skills to solve chemical problems, analyse and interpret data.
07	Critically evaluate, select and perform appropriate analytical methods with the ability to explain associated arguments, assumptions and data used to make judgements and conclusions
08	Communicate scientific ideas, problems and solutions effectively through written lab write ups.
09	Identify skills and experience of professional value, and construct resources to aid in professional development.

Learning, Teaching and Assessment Strategy

The module uses a blended approach to support learning and achievement. Students will complete a mixture of laboratory experiments supported by 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. Opportunities for formative feedback will be given to guide progress.
Pre-laboratory classes 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. 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.

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.

The module assesses you in the following ways:
1) Attendance Requirement: In order to pass the module, students must register a minimum of 70% attendanceb at practical labs. This is required to gain sufficient laboratory experience and skills training. This is a PASS/FAIL component of the module. Students who fail this component will be required to repeat the module with attendance.

2) A long-looped assessment of the practical skills students have developed at stage 1 aligned with LOs 1, 2 & 3.

3) The development of a CV and cover letter is aligned with LO 9.

4) Weekly assessment of students Laboratory Books and answers to worksheet problems will cover LOs 1, 4, 5, 6, 7.

5) Laboratory Report on a practical experiment, aligned with LO 1, 2, 6, 7 and 8.

Mode of Assessment

Type	Method	Description	Weighting
Summative	Attendance requirement	Obtain sufficient laboratory skills, experience and practice skills. (MUST PASS, MUST ATTEND >= 70% of Labs)	0%
Summative	Examination - practical/laboratory	Practical examination of Stage 1 practical skills, health and safety. (420 minutes, MUST PASS AT 40% or highe	15%
Summative	Coursework - Written	Produce a CV, cover letter and a skills audit.	15%
Summative	Coursework - Written	Weekly assessment of worksheets and laboratory notebooks.	50%
Summative	Coursework - Written	Laboratory report on a practical experimen	20%

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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