

| Module Details |                                       |
|----------------|---------------------------------------|
| Module Title   | Practical Chemistry For Apprentices 2 |
| Module Code    | CFS5022-C                             |
| Academic Year  | 2021/2                                |
| Credits        | 30                                    |
| School         | School of Chemistry and Biosciences   |
| FHEQ Level     | FHEQ Level 5                          |

| Contact Hours                  |       |
|--------------------------------|-------|
| Type                           | Hours |
| Seminars                       | 2     |
| Work based learning            | 218   |
| Online Tutorials (Synchronous) | 10    |
| Laboratories                   | 60    |
| Directed Study                 | 10    |

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

| Module Aims                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
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| <p>You will further develop practical skills both within your work environment and during a residential block release period in Bradford.</p> <p>This module builds on the 'Practical Chemistry for apprentices 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 an understanding of their physical properties.</p> <p>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. 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.</p> |

## Outline Syllabus

1. Synthesis reactions: perform (multi-step) organic and inorganic syntheses and connect experiment and theory.
2. Coordination compounds: synthesis, characterisation and analysis of metal complexes including UV/vis spectrometry.
3. NMR techniques: analysis of nuclear magnetic resonance data of organic compounds.
4. Vibrational spectroscopy: analysing compounds by IR/Raman spectroscopy and understanding the vibrational characteristics of their functional groups.
5. Thermodynamic and kinetics: application of concepts (e.g. states of matter, phase equilibria, colligative properties, rates of reaction) to experiment and determination of thermodynamic and/or kinetic parameters.
6. Nanoscience: basic concepts, versatility of nano-particles within industrial applications
7. Communication skills: written and oral communication, using problem-solving skills with qualitative and quantitative information.
- 8.. Interpersonal skills: highlighting professional attributes via development of e-portfolio for professional development and reflective practice.
9. Understanding of the principles and practice of change management processes within a business environment.

## 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             | Demonstrate the use of information technology (IT) and data-processing skills, relating to chemical information and data analysis and interpretation.                                  |
| 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 and group work.                                                                         |
| 09             | Explain, with examples, the principles and practice of change management processes within a business environment.                                                                      |

## Learning, Teaching and Assessment Strategy

On-campus laboratory-based work will include staff-led demonstration of practical and manipulative skills at the bench and supervision of students' experimental work. Online material will be provided for each experiment to familiarise students with the concepts and procedures. Students will be asked to reflect on the results and their significance.

Apprentices will evidence the continued development of their practical skills in an industrial setting through engagement with e-portfolio systems. Support for this will come from the apprentice's supervisory team.

On-line seminars and support materials will be given to help apprentices in their continued professional development. This will be facilitated by meetings of the supervisory team with the apprentice.

On-line seminars and tutorials will help apprentices engage with the management theory of change-management processes.

Apprentices will refine an e-portfolio of skills and knowledge to evidence their progression in the chemical sciences. Laboratory work will be assessed via continuous assessment of students' laboratory practices.

Assessment 1 will cover the practical work conducted in the block release visit and will assess LOs 1, 2, 3, 4, 5, 6, 7 and 8. Formative feedback, oral and written, provided during practical school.

Assessment 2 will enable apprentices to evidence the practical skills that they have developed during the second year of their apprenticeship and will allow them to continue their reflective skills audit from year 1. LOs 3, 5, 6, 7 and 8. Formative feedback on the developing e-portfolio will be provided throughout the year by the supervisory team.

Assessment 3 will be a reflective essay that discusses an area of the apprentice's professional work where change management is required. The essay will identify the issue and discuss the collaborative nature of its resolution. This assessment will cover LOs 7-9. Formative feedback will be provided on a draft.

### Mode of Assessment

| Type      | Method                             | Description                                                                                                     | Weighting |
|-----------|------------------------------------|-----------------------------------------------------------------------------------------------------------------|-----------|
| Summative | Laboratory Report                  | Lab Report 1500 wds                                                                                             | 25%       |
| Summative | Coursework - Written               | Reflective report detailing a change-management process 1500wds                                                 | 25%       |
| Summative | Coursework - Portfolio/e-portfolio | e-portfolio of Chemistry skills and knowledge developed through year to include continued skills audit 3000 wds | 50%       |
| Formative | Coursework - Written               | Formative assessment of report detailing a change management process                                            | N/A       |
| Formative | Laboratory Report                  | Feedback on laboratory record                                                                                   | N/A       |
| Formative | Coursework - Portfolio/e-portfolio | Continuous feedback on e-portfolio                                                                              | 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.*

