

| Module Details |                                         |
|----------------|-----------------------------------------|
| Module Title   | Advanced Laboratory And Research Skills |
| Module Code    | CFS6030-D                               |
| Academic Year  | 2020/1                                  |
| Credits        | 40                                      |
| School         | School of Chemistry and Biosciences     |
| Subject Area   | Chemistry                               |
| FHEQ Level     | FHEQ Level 6                            |
| Pre-requisites | N/A                                     |
| Co-requisites  | N/A                                     |

| Contact Hours                      |       |
|------------------------------------|-------|
| Type                               | Hours |
| Laboratories                       | 86    |
| Lectures                           | 2     |
| Online Seminar (Synchronous)       | 6     |
| Supervised time in studio/workshop | 36    |
| Directed Study                     | 284   |

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

| Module Aims                                                                                                                                                                                                                                                                                                                                                                                                                                              |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| In this module you will learn how to take your practical skills and apply them to research based problems. We will take you through the tools required to approach a research question and you will develop your problem-solving skills. You will develop the skills required to disseminate your work in dissertation form. Additionally, you will also develop your interview and assessment centre techniques in sessions run by the careers service. |

## Outline Syllabus

Selected experiments to develop knowledge on advanced practical techniques: working under inert conditions, column chromatography, syringe technique etc.

Advanced use of chemical search engines such as Reaxys & SciFinder in constructing complex searches; critical appraisal of the primary scientific literature; preparation of a research plan based on engagement with the primary literature. Execution of this scientific plan and analysis of subsequent results. Advanced scientific writing - the nature of academic writing, management of bibliographies, plagiarism in advanced scientific writing.

Developing good interview and assessment centre technique.

## Learning Outcomes

| Outcome Number | Description                                                                                                             |
|----------------|-------------------------------------------------------------------------------------------------------------------------|
| 1              | Interpret data generated from experimental procedures, some of which may be contradictory.                              |
| 2              | Rationalise the results of experiments based on direct experimental evidence and precedent from the primary literature. |
| 3              | Make and justify scientifically informed decisions with regards to the management of experiments                        |
| 4              | Formulate and defend theories in an interview setting.                                                                  |
| 5              | Devise and sustain arguments using ideas, some of which are derived from the recent primary literature.                 |
| 6              | Source and select appropriate information; write a critical report on a specialist area; develop presentational skills. |

## 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.

Laboratory-based work will include staff-led demonstration of practical and manipulative skills at the bench and supervision of students' experimental work. Pre-laboratory workshops will be provided for each experiment to familiarise students with the concepts and procedures; the post lab workshops will allow students to reflect on the results and their significance.

Computer based workshops will introduce you to the web-based tools that are used by research chemists. Teaching of health and safety and laboratory skills will be delivered in workshops. Laboratory skills will be taught and practised in laboratory sessions. Students will receive feedback in the form of marked laboratory reports, review of laboratory records and orally in seminars. Instruction for interview and assessment centre technique will be given in workshops.

Introductory lectures will be given to introduce students to the dissertation writing process. Students will be given directed reading in the general area of their dissertation by their supervisor.

Students will meet in a group with their dissertation supervisor and will discuss their assigned research area. Students will be guided to produce a plan of laboratory work and will then perform the experiments. Students will then individually produce a dissertation based on this work, that should also extend into closely related areas of the chemical literature.

Laboratory work undertaken will cover LOs 1 and 2.

An individual viva will be conducted to cover LO 4.

A final individual dissertation will cover LO 1, 2, 3, 5 and 6.

### Mode of Assessment

| Type      | Method                         | Description                                                       | Length | Weighting |
|-----------|--------------------------------|-------------------------------------------------------------------|--------|-----------|
| Summative | Dissertation or Project Report | Final individual dissertation (0-6000 Words)                      | N/A    | 75%       |
| Summative | Coursework                     | Continuous assessment of laboratory record and associated reports | N/A    | 15%       |
| Summative | Examination - oral/viva voce   | Viva on technical and HR interview on laboratory work             | 1 hour | 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.*

