Module Descriptor

Spectroscopy

Module Code: CFS7030-B
Academic Year: 2018-19
Credit Rating: 20
School: School of Chemistry and Biosciences
Subject Area: Chemistry and Forensic Science (ceases 2016)
FHEQ Level: FHEQ Level 7 (Masters)

Pre-requisites:
Co-requisites:

Contact Hours

<table>
<thead>
<tr>
<th>Type</th>
<th>Hours</th>
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<tbody>
<tr>
<td>Lectures</td>
<td>18</td>
</tr>
<tr>
<td>Practical classes and</td>
<td>18</td>
</tr>
<tr>
<td>Directed Study</td>
<td>164</td>
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Availability Periods

<table>
<thead>
<tr>
<th>Occurrence</th>
<th>Location/Period</th>
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<tbody>
<tr>
<td>BDA</td>
<td>University of Bradford / Semester 1 (Sep - Jan)</td>
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Module Aims

This module will provide you with specialist knowledge in the principles and application of IR, Raman and NMR. This covers; sample preparation, instrumental fundamentals and design, including case studies related to applications in specialist areas and recent advances.

The specialist knowledge is reinforced by the 'hands on' practical component and will include use of the analytical centre instruments, collecting and analysing data, troubleshooting and method development/enhancement. The practical sessions will also
involve following written experimental protocols, working in a small group, and working to deadlines.

Outline Syllabus

Advanced Nuclear Magnetic Resonance
An introduction to NMR spectroscopy: Theoretical overview of 1D and 2D NMR experiments. 1D experimentation including nuclei other than 1H and 13C (31P, 19F, 15N etc.) 2D experiments including COSY, HSQC, HMBC, H2BC etc. NOE experiments including NOEDIFF, NOESY and ROESY Hands on training in the Structure Elucidation of organic molecules using 1D and 2D NMR spectral data in association with other sources of data.

Practical considerations for NMR experimentation:
- Lock signal in modern spectrometers (2D lock)
- Shimming
- Calibration of 90° pulse
- Sensitivity and S:N
- Pulse programmes
- Working in protonated solvents

Advanced Spectral processing
- FID manipulation
- FFT, Phasing, Baseline corrections, integration

Solid state NMR – an introduction (cross polarisation, magic angle, molecular and symmetry considerations, nuclei). Quantitative NMR – an introduction (T1 relaxation, internal and external referencing, ERETIC)

Vibration Spectroscopy

Module Learning Outcomes

On successful completion of this module, students will be able to...

1. Evaluate and apply knowledge and understanding of the theories of instrumental analysis, including sample preparation and analysis.

2. Describe recent advances in the subject area.


4. Analyse, interpret and critically review experimental data generated with the selected techniques.
Identify poor quality analytical results and suggest/apply remedial action.

Apply skills in problem solving and written communication.

**Learning, Teaching and Assessment Strategy**

This module will be presented as a series of lectures and workshops/laboratory sessions. The lectures will describe sample preparation and instrumental techniques covering the fundamentals to recent developments. The lectures will include case studies enabling you to think across your own discipline and explore other fields. The lectures will be supported by practical workshops and 'hands-on' sessions with relevant samples. Formative progress tests will be used to revise previous content with feedback and questions from students. The assessment will be used to assess your learning and to enable you to demonstrate your problem solving and interpretation skills.

**Mode of Assessment**

<table>
<thead>
<tr>
<th>Type</th>
<th>Method</th>
<th>Description</th>
<th>Length</th>
<th>Weighting</th>
<th>Final Assess'</th>
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<tbody>
<tr>
<td>Summative</td>
<td>Laboratory Report</td>
<td>Student will submit a laboratory report detailing analysis of sample(s) and interpretation of experimental data.</td>
<td>-2000 words</td>
<td>50%</td>
<td>No</td>
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<tr>
<td>Summative</td>
<td>Examination - closed book</td>
<td>A formal exam covering the taught syllabus. Short questions followed by longer essay type questions.</td>
<td>2 hours</td>
<td>50%</td>
<td>Yes</td>
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**Legacy Code (if applicable)**

**Reading List**

To view Reading List, please go to **rebus:list**.