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| <b>Title:</b>  | Bioanalytical Techniques <b>APPROVED</b>   |
| <b>Long Title:</b>   | Bioanalytical Techniques   |
| <b>Module Code:</b>  | BIOT7002   |
| <b>Duration:</b>   | 1 Semester   |
| <b>Credits:</b>  | 5  |
| <b>NFQ Level:</b>  | Intermediate   |
| <b>Field of Study:</b>   | Biotechnology  |
| <b>Valid From:</b>   | Semester 1 - 2017/18 ( September 2017 )  |
| <b>Module Delivered in</b>   | <a href="#">9 programme(s)</a>   |
| <b>Module Coordinator:</b>   | Brigid Lucey   |
| <b>Module Author:</b>  | ANN WARD   |
| <b>Module Description:</b>   | This module aims to advance the student's knowledge of spectroscopic, chromatographic and other current bioanalytical methods. |
| <b>Learning Outcomes</b>   |  |
| <i>On successful completion of this module the learner will be able to:</i>  |  |
| LO1  | Describe the fundamental principles of protein purification  |
| LO2  | Identify the main analytical applications of electrophoretic separation and current laboratory applications of centrifugation  |
| LO3  | Describe the principles of gas chromatography and high performance liquid chromatography(HPLC) separations                     |
| LO4  | Explain the principle of operation of UV-visible and Infra-red spectroscopic instrumentation                                   |
| LO5  | Use, apply & analyse analytical techniques in the laboratory   |
| <b>Pre-requisite learning</b>  |  |
| <b>Module Recommendations</b>  |  |
| <i>This is prior learning (or a practical skill) that is strongly recommended before enrolment in this module. You may enrol in this module if you have not acquired the recommended learning but you will have considerable difficulty in passing (i.e. achieving the learning outcomes of) the module. While the prior learning is expressed as named MTU module(s) it also allows for learning (in another module or modules) which is equivalent to the learning specified in the named module(s).</i> |  |
| <b>Incompatible Modules</b>  |  |
| <i>These are modules which have learning outcomes that are too similar to the learning outcomes of this module. You may not earn additional credit for the same learning and therefore you may not enrol in this module if you have successfully completed any modules in the incompatible list.</i>   |  |
| No incompatible modules listed   |  |
| <b>Co-requisite Modules</b>  |  |
| No Co-requisite modules listed   |  |
| <b>Requirements</b>  |  |
| <i>This is prior learning (or a practical skill) that is mandatory before enrolment in this module is allowed. You may not enrol on this module if you have not acquired the learning specified in this section.</i>   |  |
| No requirements listed   |  |

**Module Content & Assessment**

**Indicative Content**

**Protein Purification Techniques**

Protein precipitation & concentration methods, Size exclusion, ion exchange & affinity chromatography principles & applications.

**Centrifugation**

Applications of centrifugation in analytical laboratories, criteria for design of experimental protocols.

**Electrophoresis**

Introduction to principles of separation, overview of electrophoretic techniques, Design & optimisation criteria, Analytical Applications, Analysis & interpretation.

**Chromatography**

Gas Chromatography and High Performance Liquid Chromatography-instrumentation, mobile and stationary phase, Introduction to GC-Mass Spectrometry

**Infra-red Spectroscopy**

Origin of absorption bands, instrumentation, sample handling techniques, correlation between infra-red spectra and structural features.

**Assessment Breakdown**

|                                  | %      |
|----------------------------------|--------|
| Course Work                      | 40.00% |
| End of Module Formal Examination | 60.00% |

**Course Work**

| Assessment Type             | Assessment Description   | Outcome addressed | % of total | Assessment Date   |
|-----------------------------|--|-------------------|------------|-------------------|
| Multiple Choice Questions   | Assessment of principles of protein purification                           | 1                 | 10.0       | Week 7            |
| Practical/Skills Evaluation | Performance and submission of reports for laboratory practical experiments | 5                 | 30.0       | Every Second Week |

**End of Module Formal Examination**

| Assessment Type | Assessment Description            | Outcome addressed | % of total | Assessment Date |
|-----------------|-----------------------------------|-------------------|------------|-----------------|
| Formal Exam     | End-of-Semester Final Examination | 1,2,3,4           | 60.0       | End-of-Semester |

**Reassessment Requirement**

**Repeat examination**

Reassessment of this module will consist of a repeat examination. It is possible that there will also be a requirement to be reassessed in a coursework element.

The institute reserves the right to alter the nature and timings of assessment

**Module Workload**

| <b>Workload: Full Time</b>                    |                                 |              |                   |  |
|---|---------------------------------|--------------|-------------------|--|
| <i>Workload Type</i>                          | <i>Workload Description</i>     | <i>Hours</i> | <i>Frequency</i>  | <i>Average Weekly Learner Workload</i> |
| Lecture                                       | Lecture                         | 2.0          | Every Week        | 2.00                                   |
| Lab   | Lab                             | 2.0          | Every Second Week | 1.00                                   |
| Independent & Directed Learning (Non-contact) | Independent & Directed Learning | 4.0          | Every Week        | 4.00                                   |
| Total Hours                                   |                                 |              |                   | 8.00                                   |
| Total Weekly Learner Workload                 |                                 |              |                   | 7.00                                   |
| Total Weekly Contact Hours                    |                                 |              |                   | 3.00                                   |

**This module has no Part Time workload.**

## Module Resources

### Recommended Book Resources

- David Sheehan 2009, *Physical Biochemistry*, 2nd Ed., 2,3,4,5, Wiley-Blackwell England [ISBN: 9780470856031]
- Wilson & Walker 2010, *Principles & Techniques of Practical Biochemistry*, 7th Ed., University Press [ISBN: 97805216358]

### Supplementary Book Resources

- Barbara H. Stuart 2004, *Infrared spectroscopy*, Wiley [ISBN: 0470854286]
- Graham, J. 2001, *Biological Centrifugation*, BIOS Scientific Publishers [ISBN: 1-85996-0375]
- David M. Hawcroft 1996, *Electrophoresis*, BIOS Scientific Publishers [ISBN: 0199635633]

*This module does not have any article/paper resources*

### Other Resources

- Website: Bionetworkn/a  
<http://ncbionetwork.org>
- Website: Biorad n/a  
<http://www.biorad.com>
- Website: GE Lifesciences n/a  
<http://www.labtube.tv>
- Website: GE Lifesciences n/a  
<http://proteins.gelifesciences.com>

**Module Delivered in**

| <b>Programme Code</b> | <b>Programme</b>   | <b>Semester</b> | <b>Delivery</b> |
|-----------------------|--|-----------------|-----------------|
| CR_SAGBI_8            | <a href="#"><u>Bachelor of Science (Honours) in Agri-Biosciences</u></a>             | 4               | Mandatory       |
| CR_SHERB_8            | <a href="#"><u>Bachelor of Science (Honours) in Herbal Science</u></a>               | 4               | Mandatory       |
| CR_SNHSC_8            | <a href="#"><u>Bachelor of Science (Honours) in Nutrition and Health Science</u></a> | 4               | Mandatory       |
| CR_SPHBI_8            | <a href="#"><u>Bachelor of Science (Honours) in Pharmaceutical Biotechnology</u></a> | 4               | Mandatory       |
| CR_SAGBI_7            | <a href="#"><u>Bachelor of Science in Agri-Biosciences</u></a>                       | 4               | Mandatory       |
| CR_SBIBI_7            | <a href="#"><u>Bachelor of Science in Applied Biosciences and Biotechnology</u></a>  | 4               | Mandatory       |
| CR_SFSTE_7            | <a href="#"><u>Bachelor of Science in Food and Health Science</u></a>                | 4               | Mandatory       |
| CR_SCEBS_8            | <a href="#"><u>Common Entry Biological Sciences</u></a>                              | 4               | Mandatory       |
| CR_SBIOS_6            | <a href="#"><u>Higher Certificate in Science in Applied Biosciences</u></a>          | 4               | Mandatory       |