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Title: BIOTECHNOLOGY:PRINCIPLES AND APPLICATIONS  
Status: Definitive  
Code: **7103BTBMOL** (124248)  
Version Start Date: 01-08-2021  
  
Owning School/Faculty: Pharmacy & Biomolecular Sciences  
Teaching School/Faculty: Pharmacy & Biomolecular Sciences

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**Academic Level:** FHEQ7      **Credit Value:** 20      **Total Delivered Hours:** 38  
**Total Learning Hours:** 200      **Private Study:** 162

### Delivery Options

Course typically offered: Semester 1

Component	Contact Hours
Lecture	28
Tutorial	10

**Grading Basis:** 50 %

### Assessment Details

Category	Short Description	Description	Weighting (%)	Exam Duration
Report	Report	Report	50	
Presentation	Present	Presentation	50	

### Aims

*The module will provide students with the principles of diverse techniques and their applications as they are currently utilised in the field of biotechnology.*

*It will also provide a platform for gaining an advanced understanding of these techniques and novel disruptive technologies that may replace them through facilitated and independent assessment of the recent research literature.*

*Assessment of the literature will also allow students to develop and demonstrate their ability to conduct independent research and present information on specific principles and applications of biotechnology using a range of presentation media.*

*Through the assessments the module will further hone the writing and presentation skills of the students and their ability to assimilate and critique scientific literature at a postgraduate level.*

## **Learning Outcomes**

After completing the module the student should be able to:

- 1 Display an advanced understanding of the principles of a range of techniques employed in the field of biotechnology.
- 2 Critically review the applications of techniques used in biotechnology in an industrial and research setting.
- 3 Critically discuss the development of novel single technologies and their application in biotechnology.
- 4 Assimilate and communicate complex information clearly to specialist and non-specialist audiences.

## **Learning Outcomes of Assessments**

The assessment item list is assessed via the learning outcomes listed:

Report	1	2	3
Presentation	2	3	4

## **Outline Syllabus**

*This module will cover aspects of the following techniques:*

- 1. Molecular Biology - Electrophoresis, PCR, Protein purification/separation, Sequencing, microarray technology*
- 2. Analytical Techniques - Flow Cytometry, Plate Reader technologies, Immunomagnetic Technologies, Chromatography, Mass Spectrometry, X-ray crystallography*
- 3. Imaging Technology - Scanning Probe Microscopy, Electron microscopy, Fluorescence microscopy*

#### *4. Single Cell Technology - Flow cytometry, imaging and laser micro-dissection, Mass Cytometry, Cell separation techniques, Intro to single cell genomics.*

### **Learning Activities**

Material will be delivered through lectures and tutorials. The lectures are designed to introduce the students to the basic principles of specific techniques currently used in the field of biotechnology. Lectures will also cover the specific applications of these techniques in biotechnology. This module will link with other modules, which will provide more detail on the biological aspects of the technologies at the molecular level.

The coursework will run over the semester and will involve the students presenting a biotechnological process for a learning aid or a visual protocol. This will be a group-based project and thus allow students to develop their transferable skills alongside their academic skills. At the end of the year the students will present their work visually using the IT skills they have developed.

Tutorials will run throughout the module to provide students with support in developing their knowledge of the 'principles and applications' underlying biotechnology and for providing support with the coursework.

#### **Course Work I (report):**

Individual students will identify, read and critically appraise a recent research paper (or papers) outlining the methods employed in the research and the theory and rationale behind their use. The students will consider the alternative methods that could have been employed. The students will present this in a formal report.

Tutorials will be provided to facilitate the students in their choice of paper(s), how they critique the methods and structure their reports.

#### **Course Work II (presentation):**

Students will identify, read and critically appraise a recent paper (or papers) outlining a new technology or news developments in an existent technology. Students will present their data as short 10 minute presentations. They will give lucid insight into the theory behind the new or improved technologies. Journals that will facilitate this include Nature Methods, Biotechniques, Methods etc. Tutorials will be provided to facilitate the students in their choice of paper(s), how they critique the methods and structure their presentations.

### **Notes**

This module will provide students with an understanding of some of the cutting edge techniques and their applications currently used in the field of biotechnology. This module will link to topics covered in other modules on the programme and will focus on four broad themes, molecular techniques, analytical techniques, imaging technology and single cell technologies. All lectures will be covered by experts in their respective fields who will introduce the basic principles of the techniques and how these techniques are employed

throughout biotechnology, both in an industrial and academic setting. Students will be expected to advance their knowledge of the topics covered in lectures throughout the programme by independent research.