

### Summary Information

|                            |  |
|----------------------------|--|
| <b>Module Code</b>         | 7107BTBMOL                                       |
| <b>Formal Module Title</b> | Principles and Applications of Synthetic Biology |
| <b>Owning School</b>       | Pharmacy & Biomolecular Sciences                 |
| <b>Career</b>              | Postgraduate Taught                              |
| <b>Credits</b>             | 20   |
| <b>Academic level</b>      | FHEQ Level 7                                     |
| <b>Grading Schema</b>      | 50   |

### Module Contacts

#### Module Leader

| Contact Name    | Applies to all offerings | Offerings |
|-----------------|--------------------------|-----------|
| Femi Olorunniji | Yes                      | N/A       |

#### Module Team Member

| Contact Name | Applies to all offerings | Offerings |
|--------------|--------------------------|-----------|
| Baoxiu Qi    | Yes                      | N/A       |
| Gavin McStay | Yes                      | N/A       |

#### Partner Module Team

| Contact Name | Applies to all offerings | Offerings |
|--------------|--------------------------|-----------|
|--------------|--------------------------|-----------|

### Teaching Responsibility

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|--|
| <b>LJMU Schools involved in Delivery</b> |
| Pharmacy & Biomolecular Sciences         |

## Learning Methods

| Learning Method Type | Hours |
|----------------------|-------|
| Lecture              | 12    |
| Practical            | 30    |
| Workshop             | 4     |

## Module Offering(s)

| Offering Code | Location | Start Month | Duration |
|---------------|----------|-------------|----------|
| JAN-CTY       | CTY      | January     | 12 Weeks |

## Aims and Outcomes

|             |   |
|-------------|---|
| <b>Aims</b> | To provide in-depth knowledge of current concepts and applications of synthetic biology in industrial biotechnology, and critically explore the concepts of rational design, computer-assisted modelling, construction and characterisation of systems and devices. The module will place emphasis on applications of synthetic biology and bioengineering in tackling specific industrial, biomedical, and environmental challenges. |
|-------------|---|

## Learning Outcomes

After completing the module the student should be able to:

| Code | Description   |
|------|---|
| MLO1 | Critically evaluate how parts, systems and devices enable the 'design, build, test, learn' model of synthetic biology.  |
| MLO2 | Design gene circuits to carry out logical operations with specific application in biotechnology   |
| MLO3 | Critically discuss how synthetic biology principles are applied in metabolic pathway engineering for industrial biotechnology.  |
| MLO4 | Critically analyse experimental data and write a clear and concise presentation using these results.  |
| MLO5 | Design and execute an experimental plan aimed at addressing a specific research objective, analyse the results based on the experimental data, and communicate the scientific data tailored to academic and industrial audiences. |

## Module Content

### Outline Syllabus

Review of basic principles of synthetic biology and bioengineering (Parts, devices, systems) Role of Synthetic Biology in driving innovations in biotechnology Applications of metabolic pathway engineering in industrial biotechnology Microbial cell factories, cell-free synthetic systems, minimal cells and synthetic genomes Biomedical applications of synthetic biology and bioengineering Environmental applications and sustainability Public engagement and ethical Issues in synthetic biology

## Module Overview

### Additional Information

**Employability:** The practical in this module are based upon the work undertaken by scientists working in the biotechnology industry sector and those pursuing research career in the life sciences. They will give the student the necessary skills and experience to meet the workplace needs of biotechnology industries. They have been developed in consultation with employers of biotechnology graduates who have confirmed that the practical sessions are suitable and applicable to the industrial and biomedical workplace. **Inclusivity:** A conscious effort will be made to elevate the contributions of scientists from underrepresented groups, incorporating their research papers into the lecture material, showing photographs of diverse researchers, exploiting the EDIpedia database and highlighting good practice.

## Assessments

| Assignment Category | Assessment Name           | Weight | Exam/Test Length (hours) | Learning Outcome Mapping |
|---------------------|---------------------------|--------|--------------------------|--------------------------|
| Presentation        | Mini project presentation | 40     | 0                        | MLO2, MLO4, MLO5         |
| Centralised Exam    | Examination               | 60     | 2                        | MLO1, MLO2, MLO3, MLO4   |