

Module Information

2022.01, Approved

Summary Information

Module Code	6501YAUBIO
Formal Module Title	Synthetic Biology and Bioengineering
Owning School	Pharmacy & Biomolecular Sciences
Career	Undergraduate
Credits	20
Academic level	FHEQ Level 6
Grading Schema	40

Teaching Responsibility

LJMU Schools involved in Delivery
Pharmacy & Biomolecular Sciences

Learning Methods

Learning Method Type	Hours
Lecture	76
Practical	20

Module Offering(s)

Display Name	Location	Start Month	Duration Number Duration Unit
SEP-PAR	PAR	September	12 Weeks

Aims and Outcomes

Aims	The aim of the module is to provide the student with the basic concepts of synthetic biology and a good understanding of the foundational science that underpins synthetic biology, and develop appreciation for the importance of social responsibility in bioengineering. The module will provide knowledge of current concepts and applications of synthetic biology and bioengineering with emphasis on tackling specific industrial biotechnology, biomedical, agricultural, and environmental challenges.
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After completing the module the student should be able to:

Learning Outcomes

Code	Number	Description
MLO1	1	Explain the core principles of molecular biology and their application in engineering biological systems.
MLO2	2	Evaluate critically how novel research findings in the literature can translate into real world solutions to agricultural and environmental issues.
MLO3	3	Explain how understanding of parts, systems and devices enable the design, build, test, learn model of synthetic biology.
MLO4	4	Explain the key foundational science that enables modern synthetic biology.
MLO5	5	Critically discuss how synthetic biology principles are applied in engineering of metabolic pathways.
MLO6	6	Critically discuss how synthetic biology principles are used in design of biomedical diagnostic and therapeutic applications.
MLO7	7	Evaluate new developments in the field of synthetic biology that relate to industrial biotechnology via critical appraisal of the literature.
MLO8	8	Design, model, and test a genetic circuit aimed at addressing an industrial, biomedical, agricultural or environmental problem.
MLO9	9	Critically discuss how synthetic biology principles are applied in tackling challenges in agriculture such as crop improvement and food security.
MLO10	10	Evaluate new developments in the field of synthetic biology that relate to potential strategies for combating environmental issues.

Module Content

Outline Syllabus	The module will include a review of principles of molecular biology that underpins synthetic biology, and basic principles of synthetic biology and bioengineering (parts, devices, systems). Ethical issues in synthetic biology and public engagement, the role of synthetic biology in driving innovations in biotechnology, metabolic pathway engineering and microbial cell factories and minimal cells and synthetic genomes. The module will also cover biomedical applications of synthetic biology, synthetic biology in agriculture and food security, environmental applications and sustainability, and synthetic biology, biotechnology and entrepreneurship.
Module Overview	
Additional Information	The module is designed for students to develop an understanding of how the principles of molecular biology and biochemistry are brought together to allow a better engineering of cellular processes. Students will develop an appreciation of the modular nature of cellular machines and genetic systems. Students will develop an understanding and scope of how foundational knowledge and principles of synthetic biology are applied in specific areas that target real world problems. The focus will be on industrial biotechnology exemplified using metabolic pathway engineering and biomedical applications.

Assessments

Assignment Category	Assessment Name	Weight	Exam/Test Length (hours)	Module Learning Outcome Mapping
Exam	Exam	34	2	MLO1, MLO2, MLO3
Report	Essay	33	0	MLO4, MLO5, MLO6, MLO7
Report	Report	33	0	MLO7, MLO8, MLO9, MLO10

Module Contacts

Module Leader

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

Partner Module Team

Contact Name	Applies to all offerings	Offerings
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