

MENGSC INDUSTRIAL BIOTECHNOLOGY AND BIOMANUFACTURING

Overview

The Masters in Engineering Science (MEngSc) in **Industrial Biotechnology and Biomanufacturing** is a full-time intensive programme running for a minimum of 12 months (maximum 20 months) from the date of first registration.

Students take modules to the value of **90** credits, including **60** credits from the Postgraduate Diploma in Industrial Biotechnology and Biomanufacturing (<https://ucc-ie-public.courseleaf.com/programmes/pdibb/>), comprising of lectures and hands-on-training (tutorials, workshops, problem-based learning, laboratory practicals) at UCC, and either an industrial placement or an independent research project that can be taken place in UCC or at another academic institution in Ireland or internationally.

This MEngSc programme provide students with a formal qualification, the knowledge and skills that are required for development of new microbial bioprocesses that can be deployed in sustainable biotechnology applications and bioprocesses in a variety of industrial sectors.

The graduate attributes and skills encompass various areas, such as designing, constructing, and developing microbial strains for industrial applications. Students receive hands-on training in engineering principles and the operation of microbial bioprocesses. You will also learn to develop and implement bioprocesses at different scales, while gaining an understanding of concepts like techno-economic feasibility and Life Cycle Assessment for bioprocess development. Students acquire skills in data analytics and bioprocess monitoring, including aspects of digitalisation and digital twinning. Additionally, students gain proficiency in project planning, time management, work professionally and effectively in teams and project delivery. Furthermore, students demonstrate motivation and initiative to undertake independent and critical research thinking to develop and build new bioprocesses for novel applications and present a well-structured thesis.

Programme Requirements

For information about modules, module choice, options and credit weightings, please go to Programme Requirements (p. 1).

Programme Requirements

Code	Title	Credits
<i>Taught Modules</i>		
Students take 60 credits as follows:		
<i>Core Modules</i>		
MB6004	Advanced Molecular Microbial Biotechnology	5
MB6015	Microbial Strain Engineering	5
MB6016	Microbial Physiology in Bioreactors	5
MB6017	Biorefinery concepts for the bio-based economy	5
PE6037	Experimental Design and Data Analysis for Bioprocessing	5
PE6038	Industrial Bioprocessing Systems	5
PE6039	Manufacturing Excellence in the Bioprocessing Industries	5

PE6042	Sustainable Biochemical Engineering	5
PE6040	Engineering principles and operation of microbial bioprocesses	10
PE6041	Bioprocess Design Studio	10

Dissertation

Students take **30** credits as follows:

Core Modules

MB6020	Dissertation in Industrial Biotechnology and Biomanufacturing	30
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Examinations

Full details and regulations governing Examinations for each programme will be contained in the *Marks and Standards Book* and for each module in the *Book of Modules*.

Programme Learning Outcomes

Programme Learning Outcomes for the MEngSc in Industrial Biotechnology and Biomanufacturing (NFQ Level 9, Major Award)

On successful completion of this programme, students should be able to:

- Select, design, construct and develop microbial strains for application in biotechnology.
- Develop and implement bioprocesses at increasing scales.
- Integrate strain and bioprocess development in an holistic way by combining biological and engineering principles.
- Implement state of the art methodologies for both strain engineering and bioprocess development, monitoring and smart control.
- Critically evaluate the parameters required for bioprocess development including concepts like techno-economic feasibility and Life Cycle Assessment.
- Apply the latest concepts in data analytics and bioprocess monitoring including aspects of digitalisation and digital twinning.
- Work professionally and effectively in a team, to undertake research and development to build new bioprocess for novel applications.
- Appreciate the importance of the societal aspects of industrial biotechnology, including concepts like the regulatory environment, ethical research, and safe and sustainable by design.
- Analyse quantitative measures of microbial strain growth and productivity and explain the relationships between microbial physiological and productivity parameters.
- Complete a body of independent research in an area related to biotechnology or biomanufacturing and present research findings in a dissertation