GHENT UNIVERSITY

Course Specifications

Valid as from the academic year 2024-2025

Industrial Biotechnology (I002852)

Course size *(nominal values; actual values may depend on programme)*

Credits 4.0 **Study time 120 h**

Course offerings and teaching methods in academic year 2024-2025

A (semester 1)	English	Gent	lecture

Lecturers in academic year 2024-2025

Van Bogaert, Inge	LA25	lecturer-in-charge

Offered in the following programmes in 2024-2025	**crdts**	**offering**
Bachelor of Science in Molecular Biotechnology	4	A

Teaching languages

English

Keywords

Biotechnology, white biotechnology, industrial biotechnology, fermentation, microorganisms, bacteria, yeast, fungi, enzyme, biocatalysis, genetics, metabolism, bioreactor, amino acids, organic acids, biofuels, chemical building blocks, downstream processing

Position of the course

The course aims to provide knowledge in how microorganisms and enzymes can be applied in an industrial context to produce commercially relevant compounds such as chemical building blocks, feed and food additives, biofuels and pharmaceuticals. Fundamental aspects of the processes are discussed and the principles are exemplified with some industrial case-studies.

Contents

Following aspects will be discussed, not necessary in this order:
1. General introduction to industrial microbiology and biotechnology: production of microbial biomass, enzymes, primary and secondary metabolites
2. Microbial nutrition and substrates for industrial fermentation
3. Growing micro-organisms on an industrial scale: microbial growth kinetics, fermentation parameters and set-up
4. Development of industrial micro-organisms, including genetic and metabolic engineering
5. Biocatalysis and enzyme technology: enzyme classification, kinetics, production, case studie
6. Down-stream processing: biomass separation, product recovery
7. Case-studies: amino acids, biofuels, organic acids, biosurfactants and others

Initial competences

Industrial Biotechnology builds on certain learning outcomes of previous courses such as: General Biology, Microbiology, Introduction to Biochemistry: Biomolecules, Biochemistry: Metabolism, Molecular Biology: Concepts and Methods, Process Technology, Organic Chemistry 1: Structure and Reactivity

Final competences

1 The student has insight in the basic principles of microbial fermentation technology
2 The student has insight in the metabolic and genetic engineering of microorganisms
3 The student has insight in biocatalysis and enzyme engineering

4 The student has insight in the downstream processing technology for the recovery and purification of bioproducts
5 The student is able to perform simple calculations regarding fermentation and biocatalytic processes and can interpret these results.
6 The student can critically reflect on existing and hypothetical biotechnological processes

Conditions for credit contract

Access to this course unit via a credit contract is determined after successful competences assessment

Conditions for exam contract

This course unit cannot be taken via an exam contract

Teaching methods

Lecture

Extra information on the teaching methods

Teaching methods are subject to change depending on the number of subscribed students and global pandemic situations

Study material

Type: Syllabus

Name: Industrial Biotechnology
Indicative price: € 35
Optional: no
Language : English

Additional information: Price to be determined, could be less.

References

Industrial Biotechnology: Sustainable Growth and Economic Success & (Editors)
ISBN: 978-3-527-31442-3, 522 pages, April 2010

Course content-related study coaching

The students can always ask questions to the teacher, either personally or by e-mail.

Assessment moments

end-of-term assessment

Examination methods in case of periodic assessment during the first examination period

Written assessment

Examination methods in case of periodic assessment during the second examination period

Written assessment

Examination methods in case of permanent assessment

Possibilities of retake in case of permanent assessment

not applicable

Extra information on the examination methods

Evaluation based on a written exam.

Calculation of the examination mark

Score on the written exam.