

## Industrial Biotechnology (I002413)

Due to Covid 19, the education and evaluation methods may vary from the information displayed in the schedules and course details. Any changes will be communicated on Ufora.

<b>Course size</b>	<i>(nominal values; actual values may depend on programme)</i>		
<b>Credits</b> 5.0	<b>Study time</b> 150 h	<b>Contact hrs</b>	40.0 h

### Course offerings and teaching methods in academic year 2020-2021

A (semester 1)	English	Gent	practicum	10.0 h
			seminar: coached exercises	5.0 h
			lecture	25.0 h
B (year)			practicum	10.0 h
			lecture	25.0 h
			seminar: coached exercises	5.0 h

### Lecturers in academic year 2020-2021

Van Bogaert, Inge	LA25	lecturer-in-charge
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### Offered in the following programmes in 2020-2021

<a href="#">Bachelor of Science in Molecular Biotechnology</a>	<b>crdts</b>	<b>offering</b>
	5	A, B

### 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 (including hands-on exercises on your computer)*
- 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. Metagenomics for industrial biotechnology*
- 8. 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, Biochemistry, Molecular Biology and Genetics, 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, practicum, seminar: coached exercises

#### **Extra information on the teaching methods**

*Teaching methods are subject to change depending on the number of subscribed students*

*Study or company visit can be combined with other courses*

#### **Learning materials and price**

*Course material will be made available online or will be sold at the beginning of the course*

#### **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 teachers, either personally or by e-mail.*

#### **Evaluation methods**

end-of-term evaluation and continuous assessment

#### **Examination methods in case of periodic evaluation during the first examination period**

Written examination

#### **Examination methods in case of periodic evaluation during the second examination period**

Written examination

#### **Examination methods in case of permanent evaluation**

Participation, report

#### **Possibilities of retake in case of permanent evaluation**

examination during the second examination period is not possible

#### **Extra information on the examination methods**

The student is also scored on the wet lab exercises (participation and reports)

#### **Calculation of the examination mark**

2/20: participation and reports

18/20: written examination