

Industrial Biotechnology (I002413)

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

Credits	5.0	Study time	150 h	Contact hrs	40.0 h
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Course offerings and teaching methods in academic year 2019-2020

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

Lecturers in academic year 2019-2020

Van Bogaert, Inge	LA25	lecturer-in-charge
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Offered in the following programmes in 2019-2020

Bachelor of Science in Molecular Biotechnology	crdts	offering
	5	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 (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 had insight 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