

Industrial Fermentation Processes and Downstream Processing (I002631)

Cursusomvang (nominale waarden; effectieve waarden kunnen verschillen per opleiding)

Studiepunten 5.0

Studietijd 150 u

Aanbodsessies in academiejaar 2024-2025

A (semester 2)

Engels

Gent

Lesgevers in academiejaar 2024-2025

Soetaert, Wim

LA25

Verantwoordelijk lesgever

Aangeboden in onderstaande opleidingen in 2024-2025

stptn

aanbodsessie

Master of Science in Bioscience Engineering: Cell and Gene Biotechnology

5

A

Master of Science in de bio-ingenieurswetenschappen: chemie en bioprocesstechnologie

5

A

Master of Science in de industriële wetenschappen: biochemie

5

A

Uitwisselingsprogramma bio-ingenieurswetenschappen: cel- en genbiotechnologie

5

A

(niveau master-na-bachelor)

Uitwisselingsprogramma bio-ingenieurswetenschappen: chemie en bioprocesstechnologie

5

A

(niveau master-na-bachelor)

Onderwijstalen

Engels

Trefwoorden

Production of microbial primary and secondary metabolites, microbial products, enzymes, fine chemicals, bio-ethanol, biomass, white biotechnology, biochemistry, genetics, bioprocess technology, economical aspects, industry

Situering

This course provides an overview of relevant industrial fermentation processes in terms of their microbiology, biochemistry, genetics, bioprocess technology and product recovery. The economical aspects and applications of microbial products are also discussed in detail. Knowledge, principles and industrial relevance are demonstrated through company visits to applicable Belgian biotechnological companies.

Inhoud

1. Industrial Microbial Products and Processes

- Small bugs, big business: the economic power of the microbe
- Novel microbial pharmaco and agro active compounds
- Chemicals from Biotechnology

2. Production of microbial cells / Cell components / Fermented Foods & Drinks

- Production of Microbial Biomass; Single Cell Protein (SCP)
- Single Cell Oil (SCO) and PUFA's
- Probiotics, Startercultures and Fermented Foods / Drinks
- Biopesticides and other Startcultures for Agricultural Needs
- Vaccine Production

3. Microbial Production of Primary Metabolites

- Ethanol and other Yeast-derived Products
- Acetone, Butanol and other Solvents / Chemicals
- Organic Acids by Fermentation
- Amino Acid Production
- Nucleotides and Glutamic Acid as Flavour Enhancer
- Vitamins and Pigments
- Biosurfactants

- *Specialty Sugars*
- *Polysaccharides*
- 4. *Microbial Production of Secondary metabolites*
- *Antibiotic Compounds and Bacteriocins*
- *Microbial Fine Chemicals and Biopharmaceuticals*
- *Agro-active Compounds of Microbial Origin*
- *Flavours, Fragrances and Biocosmetics*
- 5. *Microbial production of enzymes, proteins and peptides*
- *Microbial Enzyme Production*
- *Recombinant DNA in Fermentation Processes*
- 6. *Gas fermentation for microbial production*

Begincompetenties

Industrial fermentation processes builds on the final competences of course units:
 "Microbiology": explaining nutritional needs (nutrient media) and growth control of micro-organisms, explaining the basic principles and applications of micro-organisms in industrial biotechnology (fermentation products, metabolites, etc), have understanding of microbial genetics

"General and inorganic chemistry: structure": Understanding of the fundamental concepts concerning the construction of matter, having a clear understanding of the specificity of chemical processes in contrast to physical processes.

"General and inorganic chemistry: reactivity and analysis": Understanding of the fundamental concepts concerning the reactivity of matter (e.g. electrochemical reactions)

"Biochemistry": To have knowledge of the structure and structure of the biomolecules in the cell. To have insight into the activity and regulation of enzymes. To have knowledge of the central metabolism, in particular the catabolic and anabolic processes. Know correct terminology with regard to biomolecules and metabolic processes.

"Cellular and Molecular Biology": Recognize and describe the structures of the cell, its compartments. Recognize and describe macromolecules. Explain genome structure, gene structure, gene expression and regulation of gene expression.

"Organic chemistry - structure": Estimation of the chemical and physical properties of organic compounds based on their structure (stability, mesomerism, chirality, acid-base reactions, boiling point, solubility, ...).

Eindcompetenties

- 1 Discuss the economical aspects of industrial fermentations
- 2 Distinguish the industrial applications of primary and secondary metabolites of microorganisms
- 3 Discuss relevant industrial bioprocesses for the production of microbial products
- 4 Discussing relevant industrial product recovery processes for the production of microbial products

Creditcontractvoorwaarde

Toelating tot dit opleidingsonderdeel via creditcontract is mogelijk na gunstige beoordeling van de competenties

Examencontractvoorwaarde

Dit opleidingsonderdeel kan niet via examencontract gevolgd worden

Didactische werkvormen

Excursie, Hoorcollege

Studiemateriaal

Type: Syllabus

Naam: Industrial Biotechnology

Richtprijs: € 15

Optioneel: nee

Taal : Engels

Aantal pagina's : 307

Oudst bruikbare editie : 2023 - 2024

Beschikbaar op Ufora : Ja

Online beschikbaar : Nee

Beschikbaar in de bibliotheek : Ja

Beschikbaar via studentenvereniging : Nee

Referenties

DEMAIN, A.L. and DAVIES, J.E. (Eds.) 1999 Manual of Industrial Microbiology and Biotechnology ASM-Press, USA (ISBN -1-55581-128-0C)

Vakinhoudelijke studiebegeleiding

The students can ask questions personally or by email to the professor and the assistants.

Evaluatiemomenten

periodegebonden evaluatie

Evaluatievormen bij periodegebonden evaluatie in de eerste examenperiode

Mondelinge evaluatie, Schriftelijke evaluatie met open vragen

Evaluatievormen bij periodegebonden evaluatie in de tweede examenperiode

Mondelinge evaluatie, Schriftelijke evaluatie met open vragen

Evaluatievormen bij niet-periodegebonden evaluatie**Tweede examenkans in geval van niet-periodegebonden evaluatie**

Niet van toepassing

Eindscoreberekening

Students who eschew period aligned and/or non-period aligned evaluations (e.g. excursions) for this course unit may be failed by the examiner.