

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

Credits 5.0 Study time 135 h Contact hrs 60.0 h

Course offerings and teaching methods in academic year 2018-2019

A (semester 2)	Dutch	excursion	15.0 h
		guided self-study	12.5 h
		lecture	32.5 h

Lecturers in academic year 2018-2019

Soetaert, Wim	LA25	lecturer-in-charge
---------------	------	--------------------

Offered in the following programmes in 2018-2019

	crdts	offering
<a href="#">Master of Science in Bioscience Engineering: Cell and Gene Biotechnology</a>	5	A
<a href="#">Master of Science in Bioscience Engineering: Chemistry and Bioprocess Technology</a>	5	A
<a href="#">Master of Science in Bioscience Engineering: Food Science and Nutrition</a>	5	A

Teaching languages

Dutch

Keywords

Production of microbial primary and secondary metabolites, enzymes, fine chemicals, biomass, microbiological, biochemical, genetical, processtechnological and economical aspects

Position of the course

This course gives a survey of industrially performed fermentation processes and deals - for each process- with the microbiology, biochemistry, genetics, processtechnology and product recovery involved. The economic aspects and the application range of these fermentation products are also discussed. The practical training consists of performing and discussing case-studies and aspects of biosafety.

The students will gain knowledge of the principles of fermentation processes and their industrial application.

Contents

1. Industrial Microbial Products and Processes
  - 1.1 Small bugs, big business : the economic power of the microbe
  - 1.2 Novel microbial pharmaco and agro active compounds
  - 1.3 Chemicals from Biotechnology
2. Production of microbial cells / Cell components / Fermented Foods & Drinks
  - 2.1 Production of Microbial Biomass; Single Cell Protein (SCP)
  - 2.2 Single Cell Oil (SCO) and PUFA's
  - 2.3 Probiotics, Startercultures and Fermented Foods / Drinks
  - 2.4 Biopesticides and other Startcultures for Agricultural Needs
  - 2.5 Vaccine Production
3. Microbial Production of Primary Metabolites
  - 3.1 Ethanol and other Yeast-derived Products
  - 3.2 Acetone, Butanol and other Solvents / Chemicals
  - 3.3 Organic Acids by Fermentation
  - 3.4 Amino Acid Production
  - 3.5 Nucleotides and Glutamic Acid as Flavour Enhancers

- 3.6 Vitamins and Pigments
- 3.7 Biosurfactants
- 3.8 Specialty Sugars
- 3.9 Polysaccharides and Polyesters
- 4. Microbial Production of Secondary metabolites
  - 4.1 Antibiotic Compounds and Bacteriocins
  - 4.2 Microbial Fine Chemicals and Biopharmaceuticals
  - 4.3 Agro-active Compounds of Microbial Origin
  - 4.4 Flavours, Fragrances and Biocosmetics
- 5. Microbial production of enzymes, proteins and peptides
  - 5.1 Microbial Enzyme Production
  - 5.2 Recombinant DNA Fermentation Processes
- 6. Biosafety aspects of (rDNA) fermentation processes
  - 6.1 Good Large Scale Practice (GLSP)
  - 6.2 Biohazard/Biocontainment: aspects and design

#### Initial competences

Industrial Fermentation Processes and Downstream Processing builds on the learning outcomes of course units Chemistry 1: Structure of Matter, Chemistry 2: Reactivity of Matter, Chemistry 3: Organic Chemistry - structure, Chemistry 3: Organic Chemistry - reactivity, Biochemistry and Molecular Biology, Microbiology, Industrial Biotechnology ; or the learning outcomes have been achieved differently.

#### Final competences

- 1 Have insight in the economical aspects of industrial fermentations
- 2 Have insight in the industrial applications of microorganisms (primary and secondary metabolites, proteins, ...)

#### 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

Guided self-study, excursion, lecture

#### Learning materials and price

A written course is available; some reference books are recommended. Cost: 16.0 EUR

#### References

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

#### Course content-related study coaching

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

#### Evaluation methods

end-of-term evaluation

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

Written examination with open questions, oral examination

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

Written examination with open questions, oral examination

#### Examination methods in case of permanent evaluation

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

not applicable

#### Calculation of the examination mark

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