

Course Specifications

Valid in the academic year 2018-2019

Metabolic Engineering (C002717)

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

Credits	3.0	Study time	80 h	Contact hrs	25.0 h
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Course offerings and teaching methods in academic year 2018-2019

A (semester 1)	English	seminar	10.0 h
		lecture	15.0 h

Lecturers in academic year 2018-2019

Goossens, Alain	WE09	lecturer-in-charge
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Offered in the following programmes in 2018-2019

	crdts	offering
Master of Science in Bioinformatics (main subject Systems Biology)	3	A
Master of Science in Biochemistry and Biotechnology	3	A
Exchange programme in Biochemistry and Biotechnology (master's level)	3	A
Exchange Programme in Bioinformatics (master's level)	3	A

Teaching languages

English

Keywords

Natural products, biosynthesis, biotechnology, genetic engineering, metabolism, plants, micro-organisms

Position of the course

This course aims to give the student 1) theoretical insight in the organisation of metabolism in plants and micro-organisms and 2) practical insight in biotechnology of complex biosynthetic pathways in living organisms. This will occur through theoretical and practical seminars.

This course will be given in the second master year of the major/minor biochemistry and structural biology and the major/minor microbial biotechnology. This course follows up to a certain extent on the courses Enzymology and Protein engineering/Molecular design of the first master year of the same major/minor, the course Applied Plant biotechnology from the second master year of the major/minor Plant biotechnology and the courses Bacterial biotechnology and Fungal biotechnology from the second master year of the major/minor Microbial biotechnology. None of the abovementioned courses needs to be specifically followed to allow following the course Metabolic Engineering.

This course contributes to the following program competencies: Ma.WE.BB.1.1; Ma.WE.BB. 1.2; Ma.WE.BB. 1.8; Ma.WE.BB. 1.9; Ma.WE.BB.2.1; MA.WE.BB.2.2.; Ma.WE.BB.2.7; Ma.WE.BB.3.1; Ma.WE.BB.3.4; Ma.WE.BB.3.5; Ma.WE.BB.4.3; Ma.WE.BB.5.1; Ma.WE.BB.6.2.

Contents

The following aspects of metabolism in plants and micro-organisms and the engineering thereof will be addressed:

- Definitions, classifications, functions, properties and applications of metabolites from micro-organisms and plants.
- Biosynthetic pathways and their regulation in micro-organisms and plants (physiological, biochemical and molecular-genetical).
- Functional genomics strategies to study metabolism (bio-informatics and genome, transcriptome, proteome en metabolome profiling): theory and practical examples.
- Synthetic biology: theory and practical examples.
- Metabolic engineering in micro-organisms and plants: theory and practical examples.
- Metabolic engineering in vitro: theory and practical examples.
- Combinatorial biochemistry: theory and practical examples.

- Biotransformation & Mutagenesis: theory and practical examples.
- Natural diversity, metagenomics and 'directed evolution'
- Metagenomics: theory and practical examples.
- Metabolic modeling

Initial competences

Basic knowledge molecular biology, biotechnology and biochemistry

Final competences

Theoretical and practical insight in the biotechnology of complex biosynthetic pathways in plants and micro-organism.

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, seminar

Extra information on the teaching methods

The exercise courses consist of a session with a guided exercise and a session with PC-exercises. Attendance of the Exercise courses and the last 2 Theoretical courses (linked with the guided exercise) is obligatory.

Learning materials and price

Powerpoint hand-outs, publications from scientific journals Cost: 5 EUR

References

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Course content-related study coaching

Interactive support through Minerva, e-mails

Evaluation methods

end-of-term evaluation

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

Written examination, oral examination

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

Written examination, oral examination

Examination methods in case of permanent evaluation

Possibilities of retake in case of permanent evaluation

not applicable

Extra information on the examination methods

Oral examination with written preparation

Calculation of the examination mark

On the basis of the exam