

## Metabolic Engineering (C002717)

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> 3.0	<b>Study time</b> 80 h	<b>Contact hrs</b>	25.0 h

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

A (semester 1)	English	Gent	lecture	15.0 h
			seminar	10.0 h
			online lecture	0.0 h
			online seminar	0.0 h

### Lecturers in academic year 2020-2021

Goossens, Alain	WE09	lecturer-in-charge
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### Offered in the following programmes in 2020-2021

	crdts	offering
<a href="#">Master of Science in Bioinformatics (main subject Systems Biology)</a>	3	A
<a href="#">Master of Science in Biochemistry and Biotechnology</a>	3	A
<a href="#">Exchange programme in Biochemistry and Biotechnology (master's level)</a>	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.

### 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 & Mutasynthesis: 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, online lecture, online 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

#### **References**

X

#### **Course content-related study coaching**

Interactive support through Ufora, e-mails.

#### **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

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

Oral examination with written preparation.

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

On the basis of the exam.