

## Functional (Meta)genomics (I002633)

**Wegens Covid19 kan mogelijk afgeweken worden van de onderwijs- en evaluatievormen. Dergelijke afwijkingen zullen via Ufora worden gecommuniceerd.**

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

**Studiepunten** 4.0      **Studietijd** 120 u      **Contacturen** 40.0 u

**Aanbodsessies in academiejaar 2020-2021**

A (semester 2)      Engels      Gent

**Lesgevers in academiejaar 2020-2021**

Van Bogaert, Inge      LA25      Verantwoordelijk lesgever

**Aangeboden in onderstaande opleidingen in 2020-2021**

	stptn	aanbodsessie
<a href="#">Master of Science in Bioscience Engineering: Cell and Gene Biotechnology</a>	4	A
<a href="#">Uitwisselingsprogramma bio-ingenieurswetenschappen: cel- en genbiotechnologie (niveau master-na-bachelor)</a>	4	A

### Onderwijstalen

Engels

### Trefwoorden

(Meta)genomics, (meta)transcriptomics, (meta)proteomics, functional genomics, microorganism, industrial biotechnology, novel enzymes and compounds

### Situering

Microbial (meta)genomics is a useful tool to discover novel genes and functions within the field of industrial biotechnology. As metagenomics is growing up as a discipline, we will also include other functional genomics tools that can serve industrial biotechnology. In this course, emphasis is put on the practical aspects of microbial metagenomics and functional genomics and their practical applications in industrial biotechnology.

### Inhoud

Due to the continuous evolution of DNA sequencing technologies, the genome of an organism and even of an entire microbial consortium can be resolved extremely fast. However, there is still a long way between obtaining the sequence and applying this information in an engineering strategy.

On the one hand, the course will cover information on metagenomics: sample preparation, as well as metagenome specific assembly techniques and how to find interesting novel genes or clusters. On the other hand, the course will focus on several functional genomics techniques such as transcriptomics, proteomics and metabolomics. Depending on the backgrounds and interest of the students, different accents are possible.

Metagenomics refers to the study of genomic sequences obtained from samples taken directly from nature. This technology allows sequencing of numerous genes from an entire ecosystem, while the precise origin of the genes is irrelevant. The big advantage over traditional genome sequencing techniques is the absence of a cultivation step, which even allows sequencing of genomes of difficult or non-cultivable organisms. Moreover, DNA sequences of already extinct species can be elucidated as well (paleogenomics). As mentioned above, the course will pay quite some attention to the application potential of the discussed techniques, which will be illustrated by numerous practical examples where hitherto unknown enzymes and biosynthetic pathways are deployed in industrial biotechnology.

### Begincompetenties

Functional (meta)genomics builds on certain learning outcomes of course

units 'Biochemistry and Molecular Biology', 'Microbiology', 'Bio-informatics', 'Industrial Biotechnology' and 'Molecular Microbial Techniques'; or the learning outcomes were achieved differently.

### **Eindcompetenties**

- 1 Know the general principles of functional (meta)genomics and their application
- 2 Have insight in the application potential of functional (meta)genomics for industrial biotechnology
- 3 Write of a scientifically sound project proposal with metagenomics as a research method
- 4 Formulate a sound opinion on scientific publications and methods used in functional (meta)genomics
- 5 Perform fundamental laboratory work regarding functional (meta)genomics

### **Creditcontractvoorwaarde**

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

### **Examencontractvoorwaarde**

Dit opleidingsonderdeel kan niet via examencontract gevolgd worden

### **Didactische werkvormen**

Begeleide zelfstudie, groepswork, hoorcollege, practicum, werkcollege: geleide oefeningen

### **Leermateriaal**

Slides available on Ufora

### **Referenties**

Functional Metagenomics: Tools and Applications (2017) Trevor C. Charles, Mark R. Liles, Angela Sessitsch (Editors) Springer, 252p

### **Vakinhoudelijke studiebegeleiding**

The students can always ask questions to the teachers, either personally or by e-mail.

### **Evaluatiemomenten**

periodegebonden en niet-periodegebonden evaluatie

### **Evaluatievormen bij periodegebonden evaluatie in de eerste examenperiode**

Schriftelijk examen met open vragen

### **Evaluatievormen bij periodegebonden evaluatie in de tweede examenperiode**

Schriftelijk examen met open vragen

### **Evaluatievormen bij niet-periodegebonden evaluatie**

Participatie, werkstuk, vaardigheidstest, gedragsevaluatie op de werkvloer, verslag

### **Tweede examenkans in geval van niet-periodegebonden evaluatie**

Examen in de tweede examenperiode is niet mogelijk

### **Toelichtingen bij de evaluatievormen**

Written exam. Scored on research proposal (assignment), its presentation and involvement in the discussion, and wet lab exercises (participation and reports) as well.

### **Eindscoreberekening**

Wet lab exercise: 2/20

Research Proposal writing, defense and discussion: 4/20

Exam: 14/20

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