

## Data Intelligence in Sustainable Drug Discovery (J000530)

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

**Studiepunten 6.0** **Studietijd 180 u**

**Aanbodsessies en werkvormen in academiejaar 2023-2024**

A (semester 1)	Engels	Gent	hoorcollege zelfstandig werk werkcollege
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**Lesgevers in academiejaar 2023-2024**

De Preter, Katleen	GE31	Verantwoordelijk lesgever
Hertleer, Carla	FW02	Medewerker
Pattyn, Filip	TW07	Medelesgever
Van Nieuwerburgh, Filip	FW01	Medelesgever

**Aangeboden in onderstaande opleidingen in 2023-2024**

	stptn	aanbodssessie
<a href="#">International Master of Science in Sustainable Drug Discovery</a>	6	A

**Onderwijstalen**

Engels

**Trefwoorden**

Omics technologies, genetic analyses using bioinformatics, data visualization, data management, FAIR data, databases, differential expression/pathway/gene ontology analysis, R & SQL

**Situering**

This course will introduce omics technologies, and bioinformatic concepts and tools as applied in the context of drugging.

**Inhoud**

Pharmacogenomics

- Basics in genetics (human genome, epigenome, gene expression regulation, genetic variants)
- Omics techniques such as microarrays, and NGS/MPS
- Application of omics in GWAS, clinical diagnosis, neoantigen cancer treatment, etc.
- Practical sessions on BLAST, NGS read mapping, variant calling and genetic databases such as PharmGKB

Transcriptome data analysis

- Pipeline for analysis of transcriptome data in context of downstream pathway analysis of drugs
  - Data pre-processing, quality control, visualization/exploration
  - Differential expression analysis
  - Gene ontology and pathway analysis
- Public databases
- Single-cell versus bulk transcriptome data

Data management: sustainable storage and usage of data

- Data models and technologies, especially details on the pros and cons of these models/technologies in some existing use cases. Hereby, we will pay particular attention to relational data models. We will highlight fundamental operations on that model, which will lead us to the world of query languages. In addition, metadata annotation and data

standardization in drug discovery research will be handled.

- Usage of data in practical scenarios. This means we will see some best practices to make data available for internal and external sharing and re-use, which brings us to FAIR principles. This is of huge importance in a setting where re-validation and confirmation is becoming more and more important. Also, scenarios with public data initiatives will be handled.
- Some practical skills will be developed by bringing the theoretical principles to life by tackling some use cases. We will work with simple tools to setup a data pipeline and learn how to inspect datasets in a critical way.

### **Begincompetenties**

Basics in statistics

### **Eindcompetenties**

- 1 Implement simple algorithms in R for transcriptome analysis
- 2 Understand and perform a data-mining pipeline on genome and transcriptome data, including visualisation and differential expression analysis
- 3 Explain the different omics technologies and approaches
- 4 Extract useful drug discovery information from different datasets
- 5 Understand and apply data management using relational databases and FAIR data principles in the context of drug discovery

### **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**

Werkcollege, Hoorcollege, Zelfstandig werk

### **Toelichtingen bij de didactische werkvormen**

Pharmacogenomics, data management and FAIR data topics will be handled during lectures often combined with demonstrations and with practical sessions.

The pipeline for analysis of transcriptome data will be explained during lectures.

During the practical sessions, step by step students will learn the basics of R and more advanced analysis of transcriptome data.

### **Leermateriaal**

Laptop/computer

Recent manuscripts

### **Referenties**

### **Vakinhoudelijke studiebegeleiding**

### **Evaluatiemomenten**

periodegebonden evaluatie

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

Schriftelijke evaluatie met open vragen, Schriftelijke evaluatie open boek, Schriftelijke evaluatie, Werkstuk

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

Schriftelijke evaluatie met open vragen, Schriftelijke evaluatie open boek, Schriftelijke evaluatie, Werkstuk

### **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 for this course unit may be failed by the examiner.