

Data Intelligence in Sustainable Drug Discovery (J000530)

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

Studiepunten 6.0 **Studietijd 180 u** **Contacturen** 60.0u

Aanbodsessies in academiejaar 2022-2023

A (semester 1) Engels Gent

Lesgevers in academiejaar 2022-2023

De Preter, Katleen	GE31	Verantwoordelijk lesgever
Bronselaer, Antoon	TW07	Medelesgever
Van Nieuwerburgh, Filip	FW01	Medelesgever

Aangeboden in onderstaande opleidingen in 2022-2023

	stptn	aanbodsessie
International Master of Science in Sustainable Drug Discovery	6	A

Onderwijstalen

Engels

Trefwoorden

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

Situering

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

Inhoud

- 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
- Advanced use of R in drug selection/discovery/repurposing
- Transcriptome data analysis (using R)
- Pipeline for analysis of transcriptome data in context of drug target prioritization/identification, drug repurposing and 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 three broad categories of models: those based on relations, those based on graphs and those based on trees. We will highlight fundamental operations on those models, 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. Next, we will discuss data quality techniques.
- 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 Python

Eindcompetenties

- 1 Implement simple algorithms (R or Python) in the context of drugging (drug prioritization, drug target identification, etc).
- 2 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 and FAIR data principles in the context of drug discovery

Creditcontractvoorwaarde

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

Examencontractvoorwaarde

Dit opleidingsonderdeel kan niet via examencontract gevolgd worden

Didactische werkvormen

Hoorcollege: plenaire oefeningen, Demonstratie, Groepswerk, Microteaching, Begeleide zelfstudie, Hoorcollege, Werkcollege: pc-klasoefeningen

Toelichtingen bij de didactische werkvormen

Group work for microteaching: in groups of 4/5 students work on a published dataset and run the transcriptome pipeline (data pre-processing, data exploration, differential expression analysis, GSEA, ...). Via microteaching, they present their scripts/approaches and findings to the other students.

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

Leermateriaal

Laptop/computer
Recent manuscripts

Referenties

Vakinhoudelijke studiebegeleiding

Evaluatiemomenten

periodegebonden evaluatie

Evaluatievormen bij periodegebonden evaluatie in de eerste examenperiode

Schriftelijk examen, Openboekexamen, Werkstuk

Evaluatievormen bij periodegebonden evaluatie in de tweede examenperiode

Schriftelijk examen, Openboekexamen, 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.

