UNIVERSITEIT GENT

Studiefiche

Vanaf academiejaar 2026-2027

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 2026-2027

A (semester 1)	Engels	Gent	hoorcollege
			werkcollege
			zelfstandig werk

Lesgevers in academiejaar 2026-2027

Pattyn, Filip	FWO1	Verantwoordelijk lesgever
Hertleer, Carla	FWO2	Medewerker
Van Nieuwerburgh, Filip	FWO1	Medelesgever

Aangeboden in onderstaande opleidingen in 2026-2027	**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, relational & graph databases, differential expression/pathway/gene ontology analysis, R, Python, SQL & semantic web technologies

Situering

This course will introduce omics technologies, data science, programming, knowledge management and bioinformatic concepts and tools as applied in the context of drug development.

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

Data science & 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, graph-based and semantic 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 live by tackling some use cases. We will work with tools to setup a data extraction and transformation pipeline and learn how to inspect datasets in a critical way.

Begincompetenties

Basics in statistics, chemistry, biology

Eindcompetenties

1 Implement basic 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 and data stewardship using FAIR data principles in the context of drug discovery
6 Understand and apply the basics of relational database management, graph databases and semantic web technologies
7 Implement basic scripts in Python for data extraction and transformation.
8 Understand and apply SQL to query relational databases
9 Critically use AI tools in programming, data transformation and analysis 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

Groepswerk, Werkcollege, Hoorcollege, Practicum, Zelfstandig werk

Toelichtingen bij de didactische werkvormen

Pharmacogenomics, data management, and FAIR data topics will be covered in lectures, often combined with demonstrations and practical sessions.
Pipelines for the analysis of transcriptome data will be explained during lectures and applied in seminars and practical sessions.
During lectures and practical sessions, students will learn the basics of R, Python, SQL, and semantic web technologies.
The critical and responsible use of AI to assist in programming and data science will be addressed during practical sessions, seminars, and group work.
Group work and microteaching: in groups, students will solve practical problems by combining various tools and techniques. Topics relate to omics data analysis, data extraction, transformation and management, and data modeling in the context of drug discovery.

Studiemateriaal

Type: Syllabus

Naam: Recent manuscripts
Richtprijs: Gratis of betaald door opleiding
Optioneel: nee

Type: Slides

Naam: Slides
Richtprijs: Gratis of betaald door opleiding
Optioneel: nee
Taal : Engels
Beschikbaar op Ufora : Ja
Online beschikbaar : Ja

Type: Software

Naam: Python programming language, RStudio, SQL and relational database management software, Integrated Development Environment
Richtprijs: Gratis of betaald door opleiding
Optioneel: nee
Online beschikbaar : Ja

Referenties

Vakinhoudelijke studiebegeleiding

Evaluatiemomenten

periodegebonden en niet-periodegebonden evaluatie

Evaluatievormen bij periodegebonden evaluatie in de eerste examenperiode

Schriftelijke evaluatie met meerkeuzevragen, Mondelinge evaluatie open boek, Schriftelijke evaluatie met open vragen, Schriftelijke evaluatie

Evaluatievormen bij periodegebonden evaluatie in de tweede examenperiode

Evaluatievormen bij niet-periodegebonden evaluatie

Presentatie, Werkstuk

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.