



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

Studiepunten 3.0 Studietijd 80 u Contacturen 30.0 u

Aanbodssessies en werkvormen in academiejaar 2018-2019

A (semester 2) Engels hoorcollege 15.0 u
werkcollege: PC- 10.0 u
klasoefeningen

Lesgevers in academiejaar 2018-2019

Marchal, Kathleen WE09 Verantwoordelijk lesgever

Aangeboden in onderstaande opleidingen in 2018-2019

	stptn	aanbodssessie
Master of Science in Bioinformatics (afstudeerrichting Bioscience Engineering)	3	A
Master of Science in Bioinformatics (afstudeerrichting Engineering)	3	A
Master of Science in Bioinformatics (afstudeerrichting Systems Biology)	3	A

Onderwijstalen

Engels

Trefwoorden

Network-based data analysis, systems biology, data-integration

Situering

This is an advanced course in the master of bioinformatics and systems biology which aims at introducing the importance of data-integration in systems biology. The course is tailored towards students that pursue a master in bioinformatics or any other advanced master that aims at the analysis of cellular, molecular data. The course aims at showing how in systems biology specific biological questions are solved through data-integration. The course will highlight some state-of-the-art research questions and show how they can be approached using bioinformatics tools of which the underlying methods are taught in the theoretical courses. The main emphasis is by means of examples showing that the choice of the analysis method can severely influence the outcome of the results and that therefore in bioinformatics both understanding the intricacies of the biological problem and the underlying assumptions of the tool used to solve the problem are essential to critically evaluate the results. It also shows how different tools solve slightly different research questions and how users need to be aware of the intricacies of the tool to select to most optimal tool for a given research question. By giving examples of applications of integrative data analysis in real world (in plant breeding, synthetic biology, personalized medicine) students will be informed on the ethical aspects that go hand in hand with this novel domain of data-(re)analysis.

Inhoud

The course integrates tools and techniques discussed in the other courses to solve specific 'biological problems' in bioinformatics.

Part II (semester II)

Top down network inference

- Expression based methods
- Integrative methods

Network-based data-interpretation

- Overview of techniques to visualize data on a network (Pathfinding approaches, Graph based clustering, diffusion techniques)
- Application: eQTL analysis, gene prioritization, biomarker identification

Genotype phenotyping mapping

- Bulked seggregant analysis

- GWAS/QTL (population stratification, linear models)
 - Network-aided GWAS
 - Integrative genotype-phenotype mapping (cancer systems genetics)
- Applications in the domain of medical, microbial and Biotechnology (plant breeding, GWAS for trait selection, personalized medicine)

Begincompetenties

identical to those of the Master in Bioinformatics

Eindcompetenties

- 1 Understanding the concepts of network inference, motif detection, data integration.
- 2 Recognize analysis techniques underlying bioinformatics tools.
- 3 Being able to independently read and analyse a systems biology paper that combines biological results with advanced data-analysis.
- 4 Being able to apply a tool given the available documentation and literature.
- 5 Being able to implement a tool given the description in a paper.
- 6 Being able to construct a model to understand a complex biological problem.
- 7 Critical reading attitude towards the domain.
- 8 Understanding bioinformatics is a fastly evolving discipline.
- 9 Functioning as a member of a multidisciplinaire environment.
- 10 Communication in an interdisciplinary context.
- 11 Being aware of ethical and confidentiality aspects of some bioinformatics applications.

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

Hoorcollege, werkcollege: PC-klasoefeningen

Toelichtingen bij de didactische werkvormen

werkcollege (20)
 groepswork (10)
 hoorcollege (30)

Leermateriaal

presentations/course notes on Minerva

Referenties

recent research articles

Vakinhoudelijke studiebegeleiding

Evaluatiemomenten

periodegebonden evaluatie

Evaluatievormen bij periodegebonden evaluatie in de eerste examenperiode

Schriftelijk examen, openboekexamen

Evaluatievormen bij periodegebonden evaluatie in de tweede examenperiode

Schriftelijk examen, openboekexamen

Evaluatievormen bij niet-periodegebonden evaluatie

Tweede examenkans in geval van niet-periodegebonden evaluatie

Niet van toepassing

Eindscoreberekening

Students will be evaluated based on the written end exam (open book) for their understanding, analytical and synthesizing skills (20/20).