Studiefiche

Vanaf academiejaar 2015-2016

Integrative Biology (C003697)

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

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

Aanbodsessies en werkvormen in academiejaar 2015-2016

A (semester 2)	groepswerk	20.0 u
	hoorcollege	30.0 u
	werkcollege: PC-klasoefeningen	10.0 u

Lesgevers in academiejaar 2015-2016

Marchal, Kathleen	WE09	Verantwoordelijk lesgever
Maere, Steven	WE09	Medelesgever

Aangeboden in onderstaande opleidingen in 2015-2016	stptn	aanbodsessie
Brugprogramma Master of Science in Bioinformatics (afstudeerrichting Engineering)	6	A
Master of Science in Bioinformatics (afstudeerrichting Bioscience Engineering)	6	A
Master of Science in Bioinformatics (afstudeerrichting Engineering)	6	A
Master of Science in Bioinformatics (afstudeerrichting Systems Biology)	6	A

Onderwijstalen

Engels

Trefwoorden

Top down network inference, 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 dataintegration 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 dataintegration. 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 a users needs 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.

Meta-analysis
- Analysis of Expression compendia

Top-down Network inference
- Expression based methods

- Integrative methods

Network based datainterpretation
- Pathfinding approaches
- Graph based clustering
- Searching for network motifs
- Application: eQTL analysis, gene prioritization, biomarker identification

Studying regulation using motif detection
- Sequential analysis
- Integrative motif detection

Applications in the domain of medical, microbial and Biotechnology (plant breeding, GWAS for trait selection, synthetic biology, personalized medicine)

Begincompetenties

identical to those of the Master in Bioinformatics

Eindcompetenties

1 Understanding the concepts of network inference, motif detection, data integration (1.3, 1.5)
2 Recognize analysis techniques underlying bioinformatics tools (BE/SB1.7)
3 Being able to independently read and analyse a systems biology paper that combines biological results with advanced data-analysis (3.1)
4 Being able to apply a tool given the available documentation and literature (BE/SB2. 2, BE/SB2.5, BE/SB2.6)
5 Being able to implement a tool given the description in a paper (SE2.1)
6 Being able to construct a model to understand a complex biological problem (BE6.2, E6.1)
7 Critical reading attitude towards the domain (3.4)
8 Understanding bioinformatics is a fastly evolving discipline (1.6)
9 Functioning as a member of a multidisciplinaire environment (4.3)
10 Communication in an interdisciplinary context (4.1)
11 Being aware of ethical and confidentionality aspects of some bioinformatics applications (5.2, 5.3)

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

Groepswerk, hoorcollege, microteaching, werkcollege: PC-klasoefeningen

Leermateriaal

presentations/course notes on Minerva

Referenties

recent research articles

Vakinhoudelijke studiebegeleiding

1. The professors and assistants supervise the students during the groupwork
2. Professors give feedback on the groupwork after microteaching

Evaluatiemomenten

periodegebonden en niet-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

Participatie, verslag

Tweede examenkans in geval van niet-periodegebonden evaluatie

Examen in de tweede examenperiode is enkel mogelijk in gewijzigde vorm

Toelichtingen bij de evaluatievormen

Students will be evaluated based on the written endexam (open book) for their understanding, analytical and synthesizing skills (10/20).

The student will be evaluated based on his participation, report and presentation of the group work (10/20)

Eindscoreberekening

The examinator can decide on the failure of students that did not participate in the permanent evaluation.
The endresult is the weighed average of

- Permanent evaluation (10/20)
- Periodic evaluation (10/20)