Tuesday, December 1, 2020

Course plan MVE510
HT 2020

Syllabus
https://www.student.chalmers.se/sp/course?course_id=30425

Course homepage
https://chalmers.instructure.com/courses/10879

Literature

- Lecture notes (available at the course homepage)
- Selected research papers (available at the course homepage)
- Optional course book: Xinkun Wang, *Next-Generation Sequencing Data Analysis*, CRC Press, ISBN:9781482217889. Available at Cremona.

Teachers
Erik Kristiansson, course administrator, lecturer, examiner
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Examination

- Written exam, 14 January 2020.
- Approved computer exercises. See the course homepage for deadlines.

All lectures and computer exercises will be held over Zoom. Please refer to the course homepage for more details.

Tuesday, November 3

Lecture 1	A first introduction to bioinformatics, Course overview, Introduction to the statistical programming language R	13.15-15.00

Tuesday, November 3

Computer exercise	Computer exercise 1: Introduction to R	15.15-17.00

Wednesday, November 4

Computer exercise	Computer exercise 1: Introduction to R	13.15-17.00

Friday, November 6

Lecture 2	Next generation DNA sequencing (NGS) Paper: *Ten years of next-generation sequencing technology* Wang page 55-72	13.15-15.00

Tuesday, November 10

Lecture 3	Next generation DNA sequencing (NGS) Sequencing errors, Preprocessing of NGS data Wang pages 73-78	13.15-15.00

Tuesday, November 10

Computer exercise	Computer exercise 1: Introduction to R	15.15-17.00

Wednesday, November 11

Computer exercise	Computer exercise 1: Introduction to R (cont) Computer exercise 2: Genome resequencing	13.15-17.00

Friday, November 13

Lecture 4	Pre-processing of NGS data Genome sequencing Wang pages 17-33, 119-130 Paper: *A beginners guide to SNP calling from high-throughput DNA-sequencing data*	13.15-15.00

Tuesday, November 17

Lecture 5	Sequence alignment Needleman-Wunsch and Smith-Waterman algorithms Wang pages 78-86 Paper: *Mapping Reads on a Genomic Sequence: An Algorithmic Overview and a Practical Comparative analysis.*	13.15-15.00

Tuesday, November 17

Computer exercise	Computer exercise 2: Genome resequencing	15.15-17.00

Wednesday, November 18

Computer exercise	Computer exercise 2: Genome resequencing (cont)	13.15-17.00

Friday, November 20

Lecture 6	Sequence alignment (cont) Suffix trees and arrays Paper: *Mapping Reads on a Genomic Sequence: An Algorithmic Overview and a Practical Comparative analysis.* Wang pages 78-86 Transcriptome sequencing (RNA-seq) Wang pages 35-51, 97-109, 111-117	13.15-15.00

Tuesday, November 24

Lecture 7	Suffix trees and arrays Paper: *Mapping Reads on a Genomic Sequence: An Algorithmic Overview and a Practical Comparative analysis.* Wang pages 78-86 Transcriptome sequencing (RNA-seq) Wang pages 35-51, 97-109, 111-117	13.15-15.00

Tuesday, November 24

Computer exercise	Computer exercise 2: Genome resequencing	15.15-17.00

Wednesday, November 25

Computer exercise	Computer exercise 2: Genome resequencing (cont.) Computer exercise 3: Gene expression analysis	13.15-17.00

Friday, November 27

Lecture 8	Transcriptome sequencing (RNA-seq) Linear models Lecture notes on the home page.	13.15-15.00

Tuesday, December 1

Lecture 9	Transcriptomics	13.15-15.00

Tuesday, December 1

Computer exercise	Computer exercise 3: Gene expression analysis	15.15-17.00

Wednesday, December 2

Computer exercise	Computer exercise 3: Gene expression analysis (cont)	13.15-17.00

Friday, December 4

Lecture 10	Linear models Multiple testing	13.15-15.00

Tuesday, December 8

Lecture 11	Unsupervised data exploration Two Papers: *Clustering* and *Principal component analysis*.	13.15-15.00

Tuesday, December 8

Computer exercise	Computer exercise 3: Gene expression analysis	15.15-17.00

Wednesday, December 9

Computer exercise	Computer exercise 3: Gene expression analysis (cont) Computer exercise 4: Metagenomics	13.15-17.00

Friday, December 11

Lecture 12	Guest lectures AstraZeneca 1928 Diagnostics	 13.15-14.00 14.15-15.00

Tuesday, December 15

Lecture 13	Metagenomics Wang 175-188 Paper: *The road to metagenomics: from microbiology to DNA sequencing technologies and bioinformatics*	13.15-15.00

Tuesday, December 15

Computer exercise	Computer exercise 4: Metagenomics	15.15-17.00

Wednesday, December 16

Computer exercise	Computer exercise 4: Metagenomics (cont)	13.15-17.00

Friday, December 18

Lecture 14	Reserve time Repetition	13.15-15.00, KB