DNA Microarray Analysis
Course #27612
7-27 January 2013
DTU
Center for Biological Sequence analysis (CBS)
Teachers
of the course

Agnieszka Junker
Graduate Engineer and PhD in Bioinformatics from DTU
Worked with bioinformatics and microarray data since 2000

Teaching on this course: Dimension reduction, several exercises, course coordinator.
Hanne Jarmer
Associate professor
Biotechnology Engineer and PhD in Bioinformatics from DTU
Worked with bioinformatics and microarray data since 1999

Teaching on this course: Technology, Image analysis and stat. exercises
Aron C. Eklund
Post.doc.
Master in Biology from Massachusetts Institute of Technology

Worked with bioinformatics since 1999 and microarray data since 2002, specializes in cancer research

Teaching on this course: Classification
H. Bjørn Nielsen
Associate professor
MC in Biology (KU), PhD from DTU
Worked with microarray data since 1999

Teaching on this course: Preprocessing, Statistics, Project work and Course organizer
Additional Teachers of the course

Damian Plichta
Kirstine Belling
Jens Friis-Nielsen
Simon Rasmussen
Chris Workman
Agata Wesolowska
Kasper Nielsen
Who are you
the students

The course has 25 students signed up

5 Bachelor students
12 Master students
5 PhD students
3 “åben uddannelse”
Learning Objectives (L.O.)
for the course

That the student learn

A) To apply the methods for microarray analysis on real data

B) To formulate interesting hypotheses that can be addressed by microarray data analysis

C) To manipulate simple data structures in the statistical computing environment R
Content of the course

Tree main tracks

A) Lectures, discussions and exercises on microarray analysis

B) Lectures and exercises on R

C) Problem formulation and project
The Course Tracks

Time Schedule

- Introduction
- The Pipeline
- Advanced Analysis
- Array exercises
- R
- Project Intro
- Problem Formulation
- Project
- Learning by doing
- Project

- 7th of January
- 16th of January
- 27th of January
**Track A: The DNA Array Analysis Pipeline**

1. Question/hypothesis
2. Experimental Design
   - Design Array
     - or by a standard array
   - Sample Preparation
     - Hybridization
3. Image analysis
4. Normalization
5. Comparable Gene Expression Data
6. Statistical Analysis
   - Fit to Model (time series)
7. Advanced Data Analysis
   - Clustering
   - PCA
   - Gene Annotation Analysis
   - Promoter Analysis
   - Classification
   - Meta analysis
   - Survival analysis
   - Regulatory Network

NGS data
Mapping
Course Program

Tuesday 8rd of January
Normalization
Expression Index calculation
More R

Wednesday 9th of January
Statistical analysis
Clustering and Dimension reduction
Course Program

Thursday 10th of January
- More Statistics
- Annotation Enrichment Analysis

Friday 11th of January
- Classification
- Integrative biology
- Project group formation

Monday 14th of January
- Next Generation Sequencing (RNAseq)
- Project: identify problem + data set
Tuesday 15th of January
   Genome Wide Association Study (GWAS)
   Project: problem formulation

Wednesday 16th of January
   Project work: problem formulation
   Deadline for problem formulation - hand in w

Thursday 17th of January
   Problem presentation (10 min pr. group)

16th to 26th of January
   Project work

Friday 27th of January
   Poster session (exam)
Course web page
www.cbs.dtu.dk/chipcourse

- Course program
- Lecture Slides
- Exercises
- And more