

# Syllabus for BCH5101, Analysis of -omics data (Winter 2012)

## General information

**Time and location:** Wednesday 13:00 - 16:00 from 11 Jan. 2012 to 4 Apr. 2012; RGN 2141

**Instructors:** David Bickel <dbickel@uOttawa.ca>, Alain Tchagang <Alain.Tchagang@nrc-cnrc.gc.ca>, Alexandre Blais <Alexandre.Blais@uottawa.ca>, Daniel Figeys <dfigeys@uottawa.ca>, Fazel Famili <Abolfazl.Famili@nrc-cnrc.gc.ca>, Ilya Ioshikhes <iioschik@uottawa.ca>, Julian Little <jlittle@uottawa.ca>, Theodore Perkins <theodore.j.perkins@gmail.com>

**Contact:** appointments may be made using the above email addresses

**Coordinator:** David Bickel

## Content

**Background and rationale:** In the post-genomic era, sophisticated computational and statistical methods of analyzing transcriptomics and proteomics data are increasingly used to generate hypotheses and to draw scientific conclusions. Consequently, students need familiarity with such methods in order to critically read much of the literature and often in order to interpret their own data in graduate studies and in future research careers.

**Course description:** Theoretical and practical aspects of various methods currently used to analyze the plethora of -omics data. Methods: sequence alignment and database searches; sequence analysis and bioinformatics of gene regulation; DNA microarray and sequencing technologies to identify transcription factor binding sites; analysis of proteomics data; statistical analysis of preprocessed gene expression and protein/metabolite abundance data; epidemiology applications. Critical reading of the literature and strategies for making informed choices of methods for the analysis of students' own data. Prerequisites: BCH2333 and BCH3170 or approval of coordinator.

**Topic and instructor for each week:** download "lectures by instructor (PDF)" from <http://goo.gl/VK3n1>

## Talks and written reports

Written reports are due April 18. The talks and written reports will be assigned by each of the instructors who covers two or more weeks of the course:

Instructor	Assignment	Subject
Alain Tchagang	Written report that includes a mini-project	Exploratory gene expression data analysis
Fazel Famili	Each student or group of students may choose either to give a talk on 22 Feb. 2012 or to complete a written report	Data mining applied to -omics data
Ted Perkins	Each student or group of students may choose either to give a talk on 21 Mar. 2012 or to complete a written report	Machine learning applied to -omics data
David Bickel	Written report that includes evaluation of scientific literature mentioning the data analysis methods covered	Statistical analysis of -omics data

## Evaluation

The assigned talks and the written reports are worth 70% of the grade (distributed equally: 17.5% per assignment for four assignments). Unannounced quizzes (20% of the grade) motivate students to stay updated on the course material, including material covered the previous week and possibly other material assigned such as recent review/research articles that mention the data analysis methods studied. Students may elect to work in small teams for the talks and reports as approved by each instructor but not for the quizzes. The remaining 10% of the grade is for participation since working out problems in class has proven to be an effective method of learning data analysis.