cancer
genomics &
developmental
biology

The Master's & The PhD Programme

Gene expression, epigenetics and disease in the post-genome era

March 12 - March 23, 2012 (2 week course)

Organizers: Prof. Marc Timmers and Prof. Frank Holstege
Dept. Molecular Cancer Research, UMC Utrecht

Venue: Stratenum, exact room to be announced

Registration: Please register online on the cgdb website: www.cgbd.nl (courses). CGDB students have priority in registration until 3 weeks before start of the course. Maximum participation (Master + PhD students) is 20, so please register in time. Applicants will be notified of their acceptance three weeks in advance.

Description of content: Regulation of gene expression is pivotal for the understanding of developmental programs, cellular homeostasis and many disease states including cancer. In the last few years it has become clear that the transcription process is critically linked to regulation of chromatin. Epigenetic mechanisms such as histone modification can transmit active/inactive states of a gene through cellular divisions. The study of transcription and chromatin regulation has received a great impetus through the availability of whole genome sequences, which sparked the development of DNA microarray and high-throughput sequencing technologies. Integration of biochemistry, molecular biology, genomics, proteomics and cell biology approaches can now provide unprecedented insight into transcription and chromatin regulation in health and disease.
This course will teach the crucial concepts of regulation of gene expression, with a focus on the process of transcription at the molecular level, but also including concepts derived from cellular, developmental and disease states. Epigenetics, chromatin and genome organization will be taught as well as state-of-the-art strategies and techniques in the field of gene regulation and genome research, all with a strong reference to human disease. The covered topics are: nuclear organization, genome/gene organization, the transcription machinery, chromatin regulation, epigenetics, regulation through small and long non-coding RNAs. Many techniques will be explained including classical assays used to investigate transcription in vivo and in vitro as well as high-throughput genomic approaches and systems biology analyses.
The course consists of a combination of lectures, exercises, literature and student discussions. The course will close with a written exam. Part of the course will be presentations by leading (inter)national scientists. Although many basic molecular principles will be reintroduced, the course is best suited for students that have already obtained a basic molecular understanding of gene expression through bachelors courses such as Biomolecular Sciences and as is taught from textbooks such as Molecular Biology of the Cell ("Alberts") or Genes ("Lewin").

In previous years this course was evaluated very favorably by the students (8.4 in 2011).