Seminar Series

**geWorkbench, An Open-Source Platform for Integrated Genomics**

**Part 2: Systems Biology**

**Presenter: Kenneth Smith, PhD**

In Part 2 of this series we will introduce applications of geWorkbench to systems biology. We will concentrate on how cellular regulatory networks can be reverse-engineered from large sets of gene expression data in mammalian systems, and on how these networks can be interrogated to identify key regulators and modulators of particular phenotypes, using examples from cancer studies. The geWorkbench components to be discussed derive from work in the laboratory of Dr. Andrea Califano in the Center for Computational Biology and Bioinformatics here at the Columbia University Medical School. Topics will include:

- **ARACNe** - A basic description of mutual information calculations and their application to cellular regulatory network reconstruction will be provided.
- **MINDy** - this component examines the effects of candidate modulators on the effectiveness of particular transcription factors.
- **Master Regulator Analysis** - identifies regulatory genes that may have an outsized effect on the control of a particular phenotype.
- **IDEA** - concentrates on identifying particular interactions, or “network edges”, that are dysregulated in a particular phenotype, and in regulatory genes that are enriched in such edges.
- **Cellular Networks Knowledge Base** - geWorkbench provides access to a growing database of interactions calculated using the methods such as just described, and also interactions gathered from numerous public sources. Results from network queries can be visualized using the built-in Cytoscape component.

Examples of the use of these algorithms will be drawn from published work such as that on human B-cells (Basso et al., 2005; Lefebvre et al., 2010) and human glioblastoma (Carro et al., 2010).

**REFERENCES**


**Prerequisites** - attendance at Part I of the series will aid in understanding of how geWorkbench is used, however, Part 2 will include a review of key concepts and does not depend on attending Part 1.

**Monday, May 7, 2012**

**12:00 - 1:00p**

Irving Institute Educational Center Classroom (PH-10-405)

622 West 168 Street, Floor 10, Room 405, NYC 10032

RSVP to Michelle McClave, mm3098@columbia.edu or (212) 305-9425

Lunch will be provided