

**HGEN 473 – spring 2017**  
**Genomics**  
**Tuesdays-Thursdays 1:30-2:50pm BSLC 218**

**Course Director** – Yoav Gilad ([gilad@uchicago.edu](mailto:gilad@uchicago.edu))  
**Teaching Assistant** – Katie Rhodes ([klrhodes@uchicago.edu](mailto:klrhodes@uchicago.edu))

**Guest lectures**  
 John Blischak ([jdblischak@uchicago.edu](mailto:jdblischak@uchicago.edu))  
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Genomics is a relatively new field that addresses biological questions by combining large scale collection of biological data with rigorous mathematical and statistical design and analysis. In this lecture course, we will explore the technologies that enable high-throughput collection of genomic-scale data, including next-generation sequencing, genotyping, gene expression profiling, assays of copy number variation, and regulatory interactions. In addition, the course will cover study design and statistical analysis of large data sets, as well as how data from different sources can be used to understand regulatory networks, i.e., systems. Statistical tools that will be introduced include linear models, likelihood-based inference, supervised and unsupervised learning techniques, methods for assessing quality of data, and controlling for false discovery rates in large data sets. Readings will be drawn from the primary literature. Evaluation will be based primarily on problem sets.

**Syllabus**

Day	Date	Topic	Lecturer
<b>Genomic Technologies</b>			
Tuesday	April 4	Genomic technologies and applications	Yoav
Thursday	April 6	Genomic protocols (RNAseq, ATAC-seq, ChIPseq)	Sebastian
Tuesday	April 11	Introduction to linear models	Yoav
Thursday	April 13	Paper and Discussion	Katie and Yoav
<b>Study Design and low level analysis</b>			
Tuesday	April 18	Genomics Study Design I	Yoav
Thursday	April 20	Genomics Study Design II	Yoav
Tuesday	April 25	Low level analysis and QC of genomic data	Yoav
Thursday	April 27	Paper and Discussion	Katie and Yoav
<b>Genomic Applications</b>			
Tuesday	May 2	Chromatin states and gene regulation	Sebastian
Thursday	May 4	Regulatory QTL mapping and human disease	Yoav
Tuesday	May 9	Analysis of RNAseq using R	John
Thursday	May 11	Analysis of RNAseq using R	John
Tuesday	May 16	Paper and Discussion	Katie and Yoav
<b>Other topics in Genomics</b>			
Thursday	May 18	Introduction to biological networks	Yoav
Tuesday	May 23	Single cell Genomics	Sebastian
Thursday	May 25	Paper and Discussion	Katie and Yoav
Tuesday	May 30	Solving problem sets	Katie and Yoav