Welcome to BIOS 567

Mikhail Dozmorov
Fall 2017

Course logistics

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Schedule: Monday, Wednesday 9:00am – 10:20am

Classroom: One Capital Square (OCS) 5009

Office hours: Mon, Wed 10:30am – 12:00pm, OCS 730

Course documents: https://blackboard.vcu.edu,
https://mdozmorov.github.io/bios567.2017/
Course prerequisites

**Prerequisites:** BIOS 524 Biostatistical Computing, BIOS 553 Linear Regression, and BIOS 554 ANOVA

- Supplemental reading and course materials will be provided in-class

**Software:** The R programming environment

Computational Genomics

**Genomics/Bioinformatics (general)**

- Generation, organization, analysis and interpretation of biological data (initially genomic data)
Biostatistics

Biostatistics

- Class of statistical methods for dealing with large biological data sets
- Goal: statistically identify significant changes in biological processes to answer relevant biological questions.
- High-throughput studies; get data matrix; mine the matrix for information

Meet the curse of dimensionality
Distributions to know

- Normal (Gaussian) distribution
- t distribution
- Chi-square distribution
- F distribution
- Binomial distribution
- Poisson distribution
- Gamma distribution
- Negative binomial distribution
- Beta distribution
- Beta Binomial distribution
- Multinomial distribution

1 parameter; 2 parameters; 3 parameters

Bioinformatics

Data Scientist = statistician + programmer + coach + storyteller + artist

- Shlomo Aragmon

https://genomejigsaw.wordpress.com/2015/09/27/faq
Data analysis

Which step of an RNA-Seq project do you find most intimidating?


Still microarray?

- Microarray is still widely used because of lower costs, easier experimental procedure and more established analysis methods.
- Still around 50% of all publications annually.
- Similar problems are presented in newer technologies such as RNA-seq, and similar statistical techniques can be borrowed.
Microarrays

Counts of papers per year in PubMed having the word microarray

![Bar chart showing counts of papers per year in PubMed having the word microarray](image)

Microarrays today

Researchers find that modern microarrays can outperform RNA-Seq in terms of reproducibility and cost

Expectations

- Attend every class
- Read every assigned reading
- Complete all homework in time
- Be active in class. Ask questions
- Work hard - it will pay off