BCB4004/BCB504/MA4603/MA548
Statistical Methods in Genetics and Bioinformatics
A term and Fall 2015

Instructor: Zheyang Wu; Office: SH101, Phone 831-5031, E-mail: zheyangwu@wpi.edu, Office Hours: TR 1:00 – 2:00pm or by appointment.

Lecture: TF: 11:00-1:50pm, SL 407.

Online blackboard: http://my.wpi.edu.

Textbooks :

- Computational Genome Analysis: an Introduction, by Denoier, R.C., Tavare, S and Waterman, MS. (electronic versions available in WPI library)

- Introduction to Quantitative Genetics, by Falconer, D.S. and Mackay, F.C. Trudy

Other references:

- Statistical Methods in Bioinformatics: an Introduction, by Ewens, W. and Grant, G. (electronic versions available in WPI library)

- Applied Statistics for Bioinformatics using R, by Win P. Krijnen (free online).

- Bioinformatics and Computational Biology Solutions Using R and Bioconductor, by Robert Gentleman et al. (electronic version available in WPI library)

- Bioconductor Case Studies, by Hahne et al. (electronic version available in WPI library)

- Handbook of Statistical Bioinformatics, Edited by Lu, Henry Horng-Shing; Schölkopf, Bernhard; Zhao, Hongyu.

Goals: This course provides students with theoretical understanding and practical skills in the applications of statistics for modern genetics and bioinformatics. It is a good preparation for your research project / job hunting / another level of academic achievements.

Recommended background: MA 2612, MA 2631 (or MA 2621), and one or more biology courses.

R programming: We will use programming language R in this class. R is the most commonly applied tool for statistical analysis in bioinformatics and beyond.

- To download and install R: http://www.r-project.org.

- A comprehensive R tutorial: http://cran.r-project.org/doc/manuals/R-intro.html.

- The appendix of the textbook by DTW.

- Chapter 1 in Applied Statistics for Bioinformatics using R (Win P. Krijnen) is also a good reference for beginners.

- It is handy to google R questions.

- Sample R codes will be provided for you to get started.

Grade: Homework and projects.

Reading: Reading assignment for the following week will be announced in advance.

Lecture Topics:

- Genetical and statistical background

- Statistics in genetics

    - Population genetics
    - Linkage study
    - Association study

- Statistics in bioinformatics

    - Characterization of DNA sequence using "words"
    - Signals in DNA
    - Physical mapping of DNA
    - Sequence alignment and assembly
    - Gene expression and classification

- Statistical research in genetics and bioinformatics

BCB504/MA548 Students: Course will continue in B term for literature studies and/or projects.

Academic Honesty: Each student is expected to familiarize him/herself with WPI's Academic Honesty policies which can be found at http://www.wpi.edu/offices/policies/honesty. All acts of fabrication, plagiarism, cheating, and facilitation will be prosecuted according to the university's policy. If you are ever unsure as to whether your intended actions are considered academically honest or not, please talk to the instructor.

Students with Disabilities: Students with disabilities who believe that they may need accommodations in this class are encouraged to contact the Disability Services Office (DSO) as soon as possible to ensure that such accommodations are implemented in a timely fashion. The DSO is located in the Student Development and Counseling Center and the phone number is 508-831-4908, e-mail is DSO@WPI.EDU. If you are eligible for course adaptations or accommodations because of a disability (whether or not you choose to use these accomodations), or if you have medical information that I should know about please make an appointment with me immediately.