



BST 463: Introduction to Biostatistics

Fall 2017, 3 credits

MW, 10:00-11:15am, SRB 1412

- Instructor:** Hongmei Yang, Ph.D
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Hongmei_Yang@urmc.rochester.edu
- Office Hours:** Wednesdays 11:20am-12:20pm
- Teaching Assistants:** Jeremiah Jones (**office hours:** Thursdays 11am-12pm @ SRB # 4216G)
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Corey Kimzey (**office hours:** Tuesdays 11am-12pm @ SRB # 4216D)
Corey_Kimzey@URMC.Rochester.edu
- Prerequisites:** Basic understanding of mathematics

Textbook: *Principles of Biostatistics (2nd Edition)*. Pagano, M. and Gauvreau, K.(2000).

Software: SAS / R

Course Description BST 463 will focus on statistical application in health and medical sciences, while providing an understanding of the development of statistical methodology. Topics to be covered are: data collection; summarization of data through numerical and graphical descriptive statistics; basic probability, including Bayes' Theorem and its applications in diagnostic testing; theoretical probability distributions, including the uniform, Bernoulli, binomial, Poisson, normal, Student's t, and chi-squared distributions; sampling distributions; and inferential statistics, including point estimation, confidence intervals, one- and two-sample hypothesis tests involving means and proportions, and sample size calculations. Other topics to be introduced include analysis of variance (ANOVA), nonparametric hypothesis testing, contingency tables and related chi-squared tests, correlation analysis, linear regression, and logistic regression. Each topic will be illustrated with real data examples.

Course Aims and Objectives This course aims to provide students with basic statistical competency necessary for performing medical and health research. To prepare for use of methodology outside the class, this course will focus on applications in order to expose students to realistic scenarios in which they will likely encounter a need for statistics. While these applications are important and will motivate all topics introduced in the course, it is just as essential that students understand how different methods work, when to use various methodological approaches, and why statistical procedures are necessary. Thus, students will be provided with a foundation in the general theory motivating each topic discussed. Additionally, computing knowledge is necessary for completing most statistical work. Students will be exposed to statistical computing software and will gain experience programming statistical methods in such software. Students are encouraged to bring their laptops to class.

Course Policies & Expectations

- General

- Students are highly encouraged to participate in class by asking questions, noting confusions, and providing examples from their research.
- It is expected that you use electronic devices for only class-related work. All electronic devices should be silenced.

- **Assignments**

- Statistics is a collaborative field, and you are encouraged to work with other students, but you are responsible for your own assignment. The work you submit must be your own. If you work with other students to complete the homework, please indicate who on your submitted assignment.
- While all assignments should be turned in on time, I understand that extenuating circumstances arise that may prevent you from completing it by the due date, in which case please contact me. In general, though, late work will not be accepted if you do not make arrangements before the due date.

- **Attendance and Absences**

- Students are required to attend the class.
- Students are responsible for all missed work, regardless of the reason for absence. It is also the absentee's responsibility to get all missing notes or materials.

Assignments and Grading Procedures

- Homework will be assigned on Wednesdays and due the following Wednesdays.
- No late homework will be accepted.
- The teaching assistants will be grading homework. If you have a question regarding a grade, please contact the TAs directly. If after talking with the TAs you still do not agree with the grade, please contact me.
- Make-up examinations will not be given unless emergency (such as serious illness) and can be arranged after receiving prior consent from the instructor.
- By the end of the course, each student is required to finish a real data analysis project.

Grade Distribution:

Class Participation	10%
Homework (10)	55%
Exams (2)	20%
Project	20%

Academic Integrity Academic integrity is a core value of the University of Rochester. Students who violate the University of Rochester University Policy on Academic Honesty are subject to disciplinary penalties, including the possibility of failure in the course and/or dismissal from the University. Since academic dishonesty harms the individual, other students, and the integrity of the University, policies on academic dishonesty are strictly enforced. For further information on the University of Rochester Policy on Academic Honesty, please visit the following website: http://www.rochester.edu/college/honesty/docs/Academic_Honesty.pdf

Accommodations for Students with Disabilities Students needing academic adjustments or accommodations because of a documented disability must contact the Disability Resource Coordinator for the school in which they are enrolled:

<http://www.rochester.edu/eoc/DisabilityCoordinators.html>

Lecture Notes & Assignments Lecture notes and assignments will be uploaded to Blackboard ahead of time. Lecture notes are revised versions of those used in 2016. Thanks to Joseph Ciminelli, the previous instructor for this course, for allowing us to use his materials.

Tentative Schedule:

MONDAY		WEDNESDAY	
Aug 28th (No Class)		30th Introduction	1
Sep 4th Labor Day (No Class)		6th Study design; descriptive statistics and displays (one variable) (HW 1 / Grader: Jones, J.)	2
11th Hands-on Coding (R & SAS)	3	13th Descriptive statistics and displays (one variable) (HW 2 / Grader: Kimzey, C.)	4
18th Probability (basic rules; Bayes' theorem)	5	20th Probability (diagnostic testing; relative risk; odds ratio)(HW 3 / Grader: Jones, J.)	6
25th Probability distributions	7	27th Sampling distributions (HW 4 / Grader: Kimzey, C.)	8
Oct 2nd Confidence intervals	9	4th Confidence intervals (HW 5 / Grader: Jones, J.)	10
9th Fall Term Break (No Class)		11th Hypothesis testing (one sample) (HW 6 / Grader: Kimzey, C.)	11
16th *Guest Speaker James Java on using R & Exam 1 Review	12	18th Exam 1	13
23rd Hypothesis testing (two samples)	14	25th Project Proposal Presentation	15
30th Hypothesis testing (proportions)	16	Nov 1st ANOVA I (HW 7 / Grader: Jones, J.)	17

MONDAY		WEDNESDAY	
6th	18	8th	19
ANOVA II		Non-parametric tests (HW 8 / Grader: Kimzey, C.)	
13th	20	15th	21
Contingency tables		Contingency tables (HW 9 / Grader: Jones, J.)	
20th	22	22nd	
Correlation		Thanksgiving (No Class)	
27th	23	29th	24
Regression		Regression (HW 10 / Grader: Kimzey, C.)	
Dec 4th	25	6th	26
Logistic Regression		Special Topic II: Immunological Data Processing & Analysis	
11th	27	13th	28
Labs & Exam 2 Review: ANOVA, Contingency tables, Regression		Exam 2	
18th		20th	
Project Due			

Note: on Oct 16th, our guest speaker James Java will give a lecture about using R. James is an expert on R language. Interested students can contact him at: James_Java@urmc.rochester.edu.