Basic Info:

Class Hours: Tuesdays and Thursdays, 9:00-10:25
Class Room: A622 Crabtree Hall, Graduate School of Public Health
Instructor: Yong Seok Park, PhD
Assistant Professor
Office: 306 Parran Hall, GSPH
Office Hour: 10:25-11:25am, Tuesday, or by appointment
Phone: 624-3028 (Dept.)
E-mail: yongpark@pitt.edu

Course Webpage: courseweb.pitt.edu

Grading:
Homework 20%
Mid-term Exam 30%
Final Exam 50%

TA
Office: A443, Crabtree Hall
Office hours: 1:00-3:00pm, Mon/Wed, or by appointment
E-mail:

Prerequisites:

- Standard probability and statistical theory (BIOST 2044 or equivalent).
- Linear algebra (important topics include: basic matrix operations, vector spaces, linear combination, orthogonal complement, inverse and generalized inverse, eigenvalues, decompositions, definiteness, etc. A useful review can be found in Appendix A of the first recommended book.)

Textbook: No formal textbook (notes will be provided).

Recommended Reference Book:

- A Primer on Linear Models, by John F. Monahan.
- A First Course in Linear Model Theory, by Ravishanker and Dey.

Test and Final Exam:
There will be an in-class mid-term test and a final examination. Tentative dates are:

- Mid-term: Thursday, October 23, 2013, and
- Final: Tuesday, December 16, 2013.

No makeup tests are allowed for missed tests and/or exams except in the cases of university excused absences.
Homework:

Homework assignments will be given at the end of the class. There will be approximately 5-6 HW assignments throughout the whole semester. No late homework will be accepted unless it is due to some excused absence.

Notice

If you have a disability for which you are or may be requesting an accommodation, you are encouraged to contact both your instructor and Disability Resources and Services, 216 William Pitt Union (412.648.7890 or TTY 412.383.7355), as early as possible in the term. DRS will verify your disability and determine reasonable accommodations for this course.

Academic Integrity

All students are expected to adhere to the school’s standards of academic honesty. Any work submitted by a student for evaluation must represent his/her own intellectual contribution and efforts. The GSPH policy on academic integrity, approved by EPCC on 10/14/08, which is based on the University policy, is available online at [http://www.publichealth.pitt.edu/interior.php?pageID=126](http://www.publichealth.pitt.edu/interior.php?pageID=126). The policy includes obligations for faculty and students, procedures for adjudicating violations, and other critical information. Please take the time to read this policy.

Students committing acts of academic dishonesty, including plagiarism, unauthorized collaboration on assignments, cheating on exams, misrepresentation of data, and facilitating dishonesty by others, will receive sanctions appropriate to the violation(s) committed. Sanctions include, but are not limited to, reduction of a grade for an assignment or a course, failure of a course, and dismissal from GSPH.

All student violations of academic integrity must be documented by the appropriate faculty member; this documentation will be kept in a confidential student file maintained by the GSPH Office of Student Affairs. If a sanction for a violation is agreed upon by the student and instructor, the record of this agreement will be expunged from the student file upon the student’s graduation. If the case is referred to the GSPH Academic Integrity Hearing Board, a record will remain in the student’s permanent file.
Detailed Syllabus
Materials to be covered

• Introduction and overview

• A short review of Matrix Algebra
  – Vectors, linear combinations, linear independence and orthogonality
  – Vector space, span, rank, column space and null space and orthogonal complements
  – Trace, determinants and eigenvalues, and factorizations

• Random vectors, multivariate normal distribution and quadratic forms
  – Random vectors, expectations and variance-covariance matrices
  – Multivariate normal distribution
  – Quadratic forms

• General linear model: Linear least squares problem
  – Normal equations
  – Generalized inverse and solution to the normal equations
  – Projections
  – Properties of least squares estimator
  – Least squares estimation under linear constraints

• Generalized least squares
  – GLS estimator (Aitken’s model)
  – Properties of GLS
  – GLS vs. OLS

• Statistical inference for the general linear model
  – More on the properties of LS estimator: sufficiency, completeness, maximum likelihood, MVUE and normality
  – Testable hypothesis
  – Motivation and derivation of F-test
  – Extra sum of squares
  – Partially testable hypothesis
  – Uniqueness of F-statistic
  – Likelihood ratio test
  – Power of F-test
– Testing independent and orthogonal contrasts
– Confidence intervals

• Sequential and hierarchical sums of squares

• Sensitivity of assumptions in general linear model: Under-fitting, over-fitting, misspecification of covariance structure, and non-normality

• Fixed, random effect, and mixed models
  – One-Way ANOVA, Two-Way ANOVA, and ANCOVA
  – Random-effect model
  – Mixed models

• Introduction to generalized linear model