

Web Page: <http://sites.google.com/site/biostat251/>

**Instructor:** Donatello Telesca  
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**Meeting Times**

Lecture: MW 10:00A - 11:50A PUB HLT 41-268

*Office Hours:* M (1:00P - 2:00P) or by appointment

**Reading Material**

**(Required)** Seber, G.A.F., (1984). *Multivariate Observations*. Wiley, NY.

**(Required)** Weiss, R.E., (2005). *Modeling Longitudinal Data*. Springer.

**(Required)** Journal Articles uploaded on the class web-page (Check frequently).

**(Optional)** Anderson T.W. *Introduction to Multivariate Statistical Analysis*. Wiley.

**(Optional)** Mardia, K.V., Kent and J.T. and Bibby, J.M., (2003). *Multivariate Analysis*. Academic Press.

**(Optional)** Diggle, Heagerty, Liang, and Zeger, (2003). *Analysis of Longitudinal Data*. Oxford.

**(Optional)** Rowe, D. B., (2003). *Multivariate Bayesian Analysis*. Chapman & Hall.

**Approximate Schedule**

**Week 1:** Multivariate Distributions

**Week 2:** Inference for the Multivariate Normal

**Week 3:** Multivariate Linear Models

**Week 4:** Multivariate Analysis of Variance and Covariance

**Week 5:** Graphical Models

**Week 6:** Analysis of Longitudinal Data

**Week 7:** Principal Components and Factor Analysis

**Week 8:** Discriminant Analysis

**Week 9:** Cluster Analysis

**Week 10:** Introduction to Copulas

**Computing.**

The supported software for 251 is the R statistical environment (<http://cran.r-project.org/>).

**Coursework**

The final grade will be determined as follows:

- 7 HW assignments 20%
- Mid-term (04/29) 30%
- Final (06/10) 50%

### Late policy

Each turned in item receives an initial grade of  $x$ , then the actual grade is  $y = x \exp(-d/10)$ , where  $d$  is the number of days after the due date I receive the work. Everyone receives one grace day to be applied to one homework for the entire quarter.

## Learning Objectives and Competencies

Learning objectives	PhD Competencies
Understand the theoretical foundations of multivariate analysis	<p><b>A8</b> Research biostatistical methods and computational resources for collaborative research.</p> <p><b>B1</b> Develop ability to critically read statistical methodological literature.</p>
Develop a critical sense of what works and what does not work in applied multivariate problems	<p><b>A2</b> Formulate a public health or scientific question in statistical terms.</p> <p><b>A5</b> Conduct appropriate statistical analyses of study data and interpret the results.</p> <p><b>B2</b> Develop ability to critically read literature on contemporary public health problems and to identify the salient statistical issues.</p> <p><b>B3</b> Develop ability to comprehend and be engaged in seminars and presentations on biostatistical research.</p>
Use statistical packages like <b>R</b> and <b>Bugs</b> to perform advanced calculations and statistical analyses	<p><b>B5</b> Develop ability to evaluate and incorporate new and evolving computational and digital technologies into biostatistical work.</p> <p><b>C6</b> Develop software and digital tools to implement novel biostatistical methodologies.</p>
Identify new statistical methodological problems and sketch the plan for possible new directions in statistical research	<p><b>C6</b> Develop software and digital tools to implement novel biostatistical methodologies.</p> <p><b>C7</b> Organize and present effective seminars on biostatistical research.</p> <p><b>D5</b> Learn to write and publish biostatistical methodology in biostatistical journal articles and books.</p> <p><b>D6</b> Learn to write and publish substantive field publications and communicate the statistical portion of the methodology to a substantive field audience.</p>