STAT 4214: Methods of Regression Analysis

Spring 2011

Instructor:

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Course Information:

Time: Tuesday and Thursday, 9:30-10:45am
Location: 209 Hutcheson Hall
Final Exam: Tuesday, May 10, 2011 at 10:05-12:05am
Textbooks:

Required: Montgomery, D., Peck, E., and Vining, G. (2006). *Introduction to Linear Regression Analysis*, fourth edition. John Wiley & Sons, Hoboken.

Recommended: Everitt, B. and Hothorn, T. (2010) *A Handbook of Statistical Analyses Using R*, second edition, Chapman & Hall/ CRC, Boca Raton.

Website: See Scholar
Prerequisite: This course requires the completion of one of the following STAT courses: 3006, 3616, 4106, 4706, 5606 or 5616. Thus, the students should feel comfortable with all or most of the following concepts: basic statistical methods, including estimation, hypothesis testing (one and two sided tests), and inference; exploratory data techniques; discrete and continuous distributions; and, measures of association.

Goal:

Students master and apply statistical theory to regression problems.
Objectives:

Statistics: To understand fundamental univariate and multivariate regression methods including: model specification and selection, parameter estimation, inference, and diagnostics. If time permits, they will also obtain basic knowledge of Bayesian statistics.

Computing: While learning regression, the students will practice statistical computing. In this class, we will use `R`. Students will use various R commands, create and utilize functions/macros, and learn the value of simulation exercises in statistical applications.

Grading:

The grading will depend on homeworks (20%) that will occur every one to two weeks, class participation (10%), a midterm (30%), a final exam (20%) and a final project (20%). The midterm will be in class and the date is TBA so that we have flexibility in covering material. I will give two weeks notice before the midterm and I will aim to have the test around March 15, 2011. The final exam is on Tuesday, May 10th from 10:05-12:05pm. Project details are below.

Late homework assignments will not be accepted unless I am approached well in advance and the reason is, what I consider to be, legitimate (life or death). Since I understand that some weeks can get hectic, the lowest homework for each person will be dropped before finalizing a course grade. This means that one homework can be missed without suffering a quantitative penalty (the zero is dropped, as it would be the student's lowest grade).

Feel comfort in knowing that I will only curve grades so that letter grades improve. I.e., I will not curve grades below the standard letter assignments: e.g., [97,100]:A+, [93,96]:A, [90,92]:A-, [87,89]:B+, [83,86]:B, [80,82]:B-,...,[60,62]:D-, [0,59]:F.

Project:

More details will be given to you after spring break. A tentative description is below:

- Students will work in groups (I will decide the group size at a later date).
- Groups will write a five page paper.
- Groups may choose any topic on which to conduct the study.
- The originality and interestingness of the project will be judged.
- The project must involve statistical applications using real data. Students may collect their own data or use existing data.
- The design of the study, the process of data collection and data manipulation will be judged.
- The data should be suitable for applying a regression method. The appropriateness of the analysis will be judged.

Computing:

The software used in this class is R. This software is free and ready to download at

`http://www.r-project.org/`.

At this website, click on "CRAN" (on the left); choose a reasonable mirror site (e.g., in the USA, `http://streaming.stat.iastate.edu/CRAN/`); and, click on "windows" or "mac" (whichever is appropriate). If "windows" was chosen, click "base" then "Download R 2.12.1 for Windows." If "mac" was chosen, click on either "R-2.12.1.pkg" or "R-2.12.2.dmg," depending upon your operating system. **Homework for next lecture: Please bring your computer to class on Thursday with R installed.**

Academic Honesty:

The students are expected to abide by Virginia Tech's Community Standard for all work for this course (`http://www.honorsystem.vt.edu/`). Violations of the Standard will result in a failing final grade for this course and will be reported to the Dean of Students for adjudication. Ignorance of what constitutes academic dishonesty is not a justifiable excuse for violations.

For homework problems, students may work with others, but each student must submit his/her own answers for grading. For exams, the students are required to work alone and during the specified time period.

Changes to the Syllabus:

The instructor reserves the right to make changes to the syllabus during the course. Any necessary changes will be announced in class and posted on the course website.

Students:

As supported by Virginia Tech's Principles of Community (`http://www.vt.edu/ diversity /principles-of-community.html`), all students will be treated equally. Those with special needs can be accommodated easily and should refer to the website `http://www.ssd.vt.edu/` for specific questions.