HUDM 5126
Linear Models and Regression Analysis
Fall, 2020

Class hours: Wednesday, 12:50 – 2:50 pm
Classroom: Online via Zoom
Instructor: Prof. Dobrin Marchev
Office: GD 456A
Phone: 212-678-8363
Office Hours: Thursday 10:30 – 11:30 am
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Course Description

The course introduces students to the theory and application of linear regression using calculus and matrix algebra. The course focuses on multiple regression models including dummy variables and polynomial models, regression diagnostics, and advanced methods such as weighted least squares, and an introduction to nonlinear and generalized linear models.

Course Materials

Textbooks:
Applied Linear Statistical Models, 5th ed., Kutner, M.H., Nachtsheim, C.J., Neter, J., and Li, W. 2004

Optional:
Statistical Regression and Classification: From Linear Models to Machine Learning, Matloff, N., 2017
Applied Linear Regression, 4th ed., Weisberg, S. 2013

Software

The topics will be accompanied with in-class computer presentations, using the R computer language and RStudio environment.

Classroom Policies

Students are responsible for all material covered in class. If you are absent, make arrangements with a classmate to borrow the notes from them. Moreover, your participation in class discussion is strongly encouraged. In particular, you should ask questions whenever you have them.

Grades

Your course grade will consist from scores on a final project, regular homework assignments and in-class quizzes.

In-class Quizzes (10%):

At the end of most lecture there will be a short quiz consisting of True/False and multiple-choice questions. Students residing in different time zones will have the option to take the quiz on the following day during my office hour.

Final Project (35%):

For the project you need to find your own dataset suitable for multiple regression and apply on it the methods discussed throughout the semester. More details will be provided in the middle of the semester.

Homework (55%):

There will be around 8 homework assignments. Each assignment will consist of about 3-4 problems and will be due in one week from the time posted on Canvas. The students are expected to work independently on their homework assignments. Any indication of cooperation between fellow students will result in zero points on the corresponding homework. If you need help with any of the assignments, I will be more than happy to assist you during my office hours.

Tentative Course Outline

- Week 1: Simple Linear Regression
- Week 2: Regression Inference
- Week 3: Diagnostics Part I
- Week 4: Regression in Matrix Form
- Week 5: Multiple Regression
- Week 6: Sum of Squares
- Week 7: Higher Order and Qualitative Predictors
- Week 8: Model Selection
- Week 9: Diagnostics Part II
- Week 10: Shrinkage and Other Remedial Measures
- Week 11: Autocorrelation
- Week 12: Nonlinear Models
- Week 13: Thanksgiving
- Week 14: GLM
- Week 15: Multiclass Classification
- Week 16: Final Project

TC Policies

The Provost and Dean of the College in conjunction with the Faculty has adopted the following statements to be included on all Teachers College syllabi:

1. **Accommodations** – The College will make reasonable accommodations for persons with documented disabilities. Students are encouraged to contact the Office of Access and Services for Individuals with Disabilities (OASID) for information about registration. You can reach OASID by email at oasid@tc.columbia.edu, stop by 163 Thorndike Hall or call 212-678-3689. Services are available only to students who have registered and submit appropriate documentation. As your instructor, I am happy to discuss specific needs with you as well. Please report any access related concerns about instructional material to OASID and to me as your instructor.
2. **Incomplete Grades** – For the full text of the Incomplete Grade policy please refer to http://www.tc.columbia.edu/policylibrary/Incomplete Grades
3. **Student Responsibility for Monitoring TC email account** – Students are expected to monitor their TC email accounts. For the full text of the Student Responsibility for Monitoring TC email account please refer to http://www.tc.columbia.edu/policylibrary/Student Responsibility for Monitoring TC Email Account
4. **Religious Observance** – For the full text of the Religious Observance policy, please refer to http://www.tc.columbia.edu/policylibrary/provost/religious- observance/
5. **Sexual Harassment and Violence Reporting** – Teachers College is committed to maintaining a safe environment for students. Because of this commitment and because of federal and state regulations, we must advise you that if you tell any of your instructors about sexual harassment or gender-based misconduct involving a member of the campus community, your instructor is required to report this information to the Title IX Coordinator, Janice Robinson. She will treat this information as private but will need to follow up with you and possibly look into the matter. The Ombuds officer for Gender-Based Misconduct is a confidential resource available for students, staff and faculty. "Gender-based misconduct" includes sexual assault, stalking, sexual harassment, dating violence, domestic violence, sexual exploitation, and gender-based harassment. For more information, see http://sexualrespect.columbia.edu/gender-based-misconduct- policy-students.

Emergency Plan:

TC is prepared for a wide range of emergencies. After declaring an emergency situation, the President/Provost will provide the community with critical information on procedures and available assistance. If travel to campus is not feasible, instructors will facilitate academic continuity through Canvas and other technologies, if possible.

1. It is the student's responsibility to ensure that they are set to receive email notifications from TC and communications from their instructor at their TC email.
2. Within the first two sessions for the course, students are expected to review and be prepared to follow the instructions stated in the emergency plan.
3. The plan may consist of downloading or obtaining all available readings for the course or the instructor may provide other instructions.