

HUDM 6122
Multivariate Analysis
Spring, 2020

Classroom: TH 136
Class hours: MW, 1 – 2:40 pm
Instructor: Dobrin Marchev
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Course Description

A comprehensive survey of a large array of widely used multivariate statistical methods. The main topics of the course are:

- Multivariate normal and related distributions like Hotelling T^2 , Wishart, ...
- Multivariate analysis of variance and covariance.
- Multivariate regression.
- Principal components analysis.
- Canonical correlation.
- Multidimensional scaling.
- Factor analysis.
- Discriminant analysis.
- Classification analysis.
- Cluster analysis.

The topics will be accompanied with in-class computer labs, using R.

Course Materials

Required textbook:

- *Applied Multivariate Statistical Analysis*, R. Johnson & D. Wichern, 6th edition, 2007, Pearson

Optional:

- *Methods of Multivariate Analysis*, A. Rencher & W. Christensen, 3rd ed. 2012.
- *An Introduction to Applied Multivariate Analysis with R*, B. Everitt & T. Hothorn, 2011.

Grades

Your course grade will consist from scores on two tests, regular homework assignments and a final project.

Tests (30%):

There will be two tests: one covering the first third of the material and the other covering the second third of the material. Each test will be worth 15% of your grade. Here are the tentative dates of each of them:

- Test 1: **February 26th, 2020**
- Test 2: **April 1st, 2020**

Tests will be closed book and notes, but you will be allowed a formula sheet of your own making, a calculator and scrap paper. The formula sheet is restricted to exactly one letter-sized sheet of paper on which you can write on both sides. Students caught with extra pages of formula sheet will receive 0 points on the particular test.

No make-up tests will be given without valid, documented excuse and notification to the instructor prior to the scheduled exam. This means, for example, that if you are ill on a particular test day, you will need to see a doctor and obtain a written proof of your condition.

Homework (50%):

There will be about 10 homework assignments. Each assignment will consist of about 3-4 problems and will be due in one week from the time posted. The students can discuss the assignments but are expected to submit independently written solutions. If you need help with any of the assignments, I will be more than happy to assist you during my office hours, or you can seek help from the CA.

Project (20%): Can be done in teams of 2-3 students. The team needs to find a suitable dataset for their analysis. The project is due the last day of class and must include the following:

- Introduction: a brief, half to one page, description of the method/data, source/references, types of applications, and what you want to achieve.
- Main part: implement the method. Include graphs, if applicable, and summary of your results.
- Discussion: Discuss any issues you may have encountered. If applicable compare to other methods. Evaluate performance.

More details will be provided in class after the second test.

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.