Manhattan College
Department of Mathematics
MATG 633 Section 01, Spring 2018

Advanced Statistical Inference

Class Time: MW 4:30-5:45 P.M.   *Class Room*: RLC 104

Instructor: Angel R. Pineda, Ph.D.   *Office*: RLC 201.J
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Office Hours: Monday 1:30-2:20 P.M., Wednesday 3:30-4:20 P.M., Thursday 11-11:50 A.M. and or by appointment.

Textbooks:

Required:
1) Mathematical Statistics and Data Analysis 3rd Edition (2007)
by John A. Rice
Publisher: Duxbury Press

2) The Elements of Statistical Learning: Data Mining, Inference and Prediction, Second Edition, (Springer Series in Statistics) 2009.
by Trevor Hastie, Robert Tibshirani and Jerome Friedman
Publisher: Springer
This text is available for free online:
https://statweb.stanford.edu/~tibs/ElemStatLearn/

3) An Introduction to Statistical Learning: with Applications in R (Springer Texts in Statistics) 2013.
by Gareth James, Daniela Witten, Trevor Hastie, Robert Tibshirani
Publisher: Springer
This text is available for free online:
http://www-bcf.usc.edu/~gareth/ISL/

Recommended:
1) Introductory Statistics with R (Statistics and Computing) 2nd Edition
by Peter Dalgaard
Publisher: Springer
This text is available in PDF from O'Malley Library.

Catalog Course Description:
This is a data intensive course on statistical inference. Topics covered in this course include regression analysis, hypothesis testing, analysis of variance, nonparametic modeling, and sequential tests of hypotheses. Students will utilize appropriate software for data analytics. Not open to students with credit for MATH 433.

Prerequisite: MATH 432 or MATG 630 or permission of the Graduate Director.

Course Objectives:
After completing this course, the students should be able to:
- Apply and understand methods of parameter estimation
- Conduct and understand statistical hypothesis tests
- Summarize data and conduct exploratory data analysis
- Compare samples using parametric and non-parametric methods
- Design and analyze experiments
- Analyze categorical data
- Use and statistically analyze multivariate linear regression
- Use and statistically analyze multivariate logistic regression
- Apply statistical methods to data science problems

If time permits, material will be covered so that students will be able to:
- Use and statistically analyze multivariate classification using linear and quadratic discriminants
- Use cross-validation of analysis of statistical models
- Linear model selection of features and regularization

Course Homepage (Moodle):
Here you will find four features that will be used in this course:
- *Email:* make sure that your email on Moodle is one that you check regularly. Homework assignments, announcements and other class related information will be sent via email.
- *Course Information and Documents:* material covered each week, assignments and solution keys.
- *Student Discussion Board:* online forum allows for students and faculty to communicate about the course.
- *Grades:* students will be able to keep track of their grades online.

Grading:
Homework (50 %)
There will be weekly assignments. Most of the learning will be in these weekly assignments.

Midterm Exam (20 %) February 28

Comprehensive Final Exam (30 %), Monday May 7, 4 – 6 pm.
The final exam for this class will serve as the qualifying exam in statistics for the master's program in applied mathematics-data analytics.

Tentative Grading Scale

Percent	90-100	85-89	80-84	75-79	70-74	65-69	60-64	50-59	0-49
Grade	A	A-	B+	B	B-	C+	C	D	F

The exact grading scale will be determined after the final exam. The numerical scores in the tentative grading scale guarantee the associated letter grade but the instructor may change the scale to the student's benefit.

Dates to Remember
January 24: Late Registration & Add/Drop Ends
February 28: Midterm Exam
March 6: Midterm Grades Due
March 12-16: Spring Break (No Classes)
March 29 – April 2: Easter Holiday (No Classes)
April 4 – Monday Schedule
April 13: Last Day to Withdraw from Courses
May 4: Last Day of Classes
May 7: Final Exam

Class Policies
- Late homework will not be accepted after the solutions are distributed. In case the homework is handed in before the solutions are posted it will be marked 20% off for every day (or part thereof) it is late.
- The lowest HW grade will be dropped.
- No make-up exams will be given, unless you have a medical or family emergency. These emergencies require valid documentation. The grade for a missed exam is zero.
- Calculators are allowed in this class but most of the computation will be done using the R computing language using the RStudio graphical user interface.
- Attendance is expected. In the case of an absence, you should notify the instructor of the reason.
- Cell phones (or other technology not related to the class) in the classroom is only allowed with express permission of the instructor for special circumstances. In general cell phone or other potentially disruptive technology use is not allowed in class.

Suggestions
- The course requires a time commitment of about 9 hours outside of class time. Make sure to make enough space in your schedule to spend the time needed.
- I suggest you work in groups on your homework but hand in individual solutions, not copied from each other. Doing the homework is when most of the learning occurs.
- I encourage you to come to office hours regularly. I will do my best to help you.

Academic Integrity:
Recall that as students of Manhattan College, you have each signed The Manhattan College Honor Pledge as a part of the Honor Code:

As a Manhattan College student, I will not lie, cheat, or steal in my academic endeavors, nor will I accept the actions of those who do. I will conduct myself responsibly and honorably in all my activities as a Manhattan College student. I am accountable to the Manhattan College community and dedicate myself to a life of honor.

Whenever you put your name on work to be handed in for grading in this class, you are reaffirming the above pledge. Violations of the Honor Code include, but are not limited to, cheating, plagiarism, fabrication, and other forms of academic misconduct. Refer to the code of conduct for more details:
https://inside.manhattan.edu/student-life/dean-of-students/code-conduct.php

Special Accommodations:
- Students with special needs should bring appropriate documentation to the Specialized Resource Center, https://inside.manhattan.edu/academic-resources/specialized-resource-center/index.php, to obtain an Academic Adjustment/Auxiliary Aid form. Bring the completed form to me as soon as possible, and together we will decide on how best to fulfill the adjustments and/or aids listed on the form.
- Student athletes should bring their event schedules to me as soon as possible.

The material in this syllabus may be changed at the instructor's discretion. Any changes will be communicated to the students.