

The George Washington University

Department of Statistics

STAT 4158-10

Spring 2022

Days: TR
Meeting Time: 2:20 a.m.-3:35 p.m.
Venue: The first week will be online, teaching through blackboard. The university will then make a decision on whether to continue online or come back in person. If we go back to normal in-person meetings, the class will be held at Duques Hall 361

Instructor:

Hosam M. Mahmoud, Professor

Email: hosam@gwu.edu
Office hours: 4:00-5:15 Tuesday, also available by appointment

Grader: To be announced

Plan for COVID:

To deal with the reality of the coronavirus and the pandemic, the class plans will be adaptive according to the recommendations of the university, the emergence of new teaching technology and special needs for remote communication. Plans may change as we go along. An updated syllabus may be released from time to time.

Textbooks:

Mathematical Statistics with Applications,

By W. Mendenhall, D. Wackerly and R. Scheaffer

Scope:

Having finished Stat-4157 (or equivalent), a course in foundations of probability and basic statistical concepts, you are now ready to move on to applications of these concepts in the data-driven world. The construction of good statistical procedures, testing their goodness and passing to inference about populations from samples are primary topics.

Prerequisites:

An introductory course in probability at the level of GWU Stat 4157 (or equivalent) is required. Familiarity with all the basic discrete distributions (Bernoulli, binomial, geometric, Poisson, etc.) and all basic continuous distributions (uniform, exponential, normal, gamma, beta, etc.) is assumed. Also, familiarity with integral and differential calculus is assumed. For example, I expect everyone in the class to know $\int x^6 dx$, $\int e^{-x} dx$, $\int \ln x dx$. Competence in basic algebra is expected, for example extraction of roots of equations of the second and third degree and accurate manipulation of algebraic expressions are assumed to be in your background.

Topics:

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| WEEK 1: | Joint multivariate distributions, covariance concepts |
| WEEK 2: | Sampling distributions, the central limit theorem |
| WEEK 3: | Distribution important in statistics (Normal, chi squared), Quiz 1 |
| WEEK 4: | Distribution important in statistics (t, F), |
| WEEK 5: | Error bounds, Quiz 2 |
| WEEK 6: | Midterm |
| WEEK 7: | Estimation |
| WEEK 8: | Properties of a good estimator |
| WEEK 9: | Quiz 3, confidence intervals |
| WEEK 10: | Maximum likelihood estimators |
| WEEK 11: | Method of moments |
| WEEK 12: | Quiz 4, hypothesis testing |
| WEEK 13: | power of a test, projects |
| WEEK 14: | Projects |

Learning outcomes

As a result of completing this course, students will be able to:

1. Make inference from real data.
2. Analyze data sets.
3. Construct good estimators for unknown (and possibly unknowable) parameters in business, engineering, social sciences and physical phenomena.
4. Have a global look on the interplay between probability and statistics.
5. Design realistic statistical procedures.

Workload

It is expected that the student will spend 5-6 hours each week studying and preparing for the class. This time may be evenly split between writing solutions to the homework, reading in the textbook and planning the project.

Class policy

It is an integral part of the learning experience that you work out problems. Biweekly homework will be assigned. Late work will be penalized. Homework will constitute 25% of the grade.

There will be four quizzes of weight 5% each, a midterm examination of weight 20%, a project presentation of weight 20% and a final examination of weight 20%. Note that these percentage points add up to 105%!

Here is an example of what constitutes an A grade in this class. You score 95% or above: All homeworks are solid and well done. You get above 85% in the Final Examination. You can miss a couple of problems here and there and still get an A.

Blackboard

Please check Blackboard frequently, as there may be assignments, announcements, and material passed to the class via this electronic medium during the week. You can find it at

<http://blackboard.gwu.edu/webapps/portal/frameset.jsp>

You need to login, using your GW user ID and password.

For university policies on teaching, see

<http://www.gwu.edu/~academic/Teaching/main.htm>

Academic Integrity

I support the GW Code of Academic Integrity. It states: “Academic dishonesty is defined as cheating of any kind, including misrepresenting one's own work, taking credit for the work of others without crediting them and without appropriate authorization, and the fabrication of information.” For the remainder of the code, see:

<http://www.gwu.edu/~ntegrity/code.html>

Any case of the slightest hint of cheating will be prosecuted to the fullest extent of the university Academic Integrity Policy. You will receive an automatic F, and the case will be taken to the proper administrative channels.

Support for students outside the classroom

DISABILITY SUPPORT SERVICES (DSS)

Any student who may need an accommodation based on the potential impact of a disability should contact the Disability Support Services office at 202-994-8250 in the Marvin Center, Suite 242, to establish eligibility and to coordinate reasonable accommodations. For additional information please refer to:

<http://gwired.gwu.edu/dss/>