

ISYE 3770 - Statistics and Applications

Spring 2025

Catalog Description - Introduction to probability, probability distributions, point estimation, confidence intervals, hypothesis testing, linear regression, and analysis of variance. Cross-listed with CEE 3770.

Prerequisites - MATH 2401 or 2411 or 24X1 or MATH 2605 or equivalent.

Textbook - D.C. Montgomery and G.C. Runger, Applied Statistics and Probability for Engineers, 6th Edition, 2014, John Wiley and Sons.

Objective - Introduce probability and statistics, emphasizing applications in science and engineering.

Learning Outcomes and their Relationships to ISyE Program – (i) Ability to graphically collect, organize, summarize, and present data. (ii) Demonstrate ability to use formal mathematical argument with basic probability concepts, including conditional probability distributions. (iii) Understand how to characterize and assess probability's role in experiments. (iv) Use statistical tests and confidence intervals to assess mathematical uncertainty in statistical decisions. (v) Select proper statistical techniques for decision-making based on the data type available. (vi) Use statistical software/toolboxes to conduct data analyses and interpret output. (vii) Draw sound statistical conclusions from experiments and observational studies.

Instructors - Dr. Rontani. Office IL-004 – Lafayette Building on GTE Campus. e-mail: damien.rontani@centralesupelec.fr. When you email me, please start the email's subject with [ISyE 3770]. Failure to place this in the subject line could cause your email not to be read. Note that, regularly and except for urgent/critical matters, emails will typically not be answered on the weekends and after 9:00 pm on the weekdays.

Lectures (in person) - Monday, Wednesday: 03:30pm-04:45 pm, Yellow Room in the GTE Building. Any unexpected change of schedule will be announced in a timely manner; new times and locations will be provided to the students. Due to the highly constrained schedule on the GTE campus, if a class needs to be rescheduled, it will be at a time that allows all students to attend. **The lecture notes and handouts will be given in digital format only (no printed format) on Canvas prior to every lecture.** The shared printer at GTE (or a personal one) can be used to print your physical copy of the notes (if necessary).

Attendance - Attendance is mandatory and will be checked at the beginning of the class. Attendance is worth 1%. Students who do not miss more than two lectures during the entire term get 1% for attendance. Students who miss more than two classes get 0% for attendance. The exception is made for medical (with a note from your doctor), administrative (e.g., delay on your visa, the problem with your initial travel plans to come to GTE from the USA, other logistic-related issues, etc.), and family reasons. Do not hesitate to let the administration at GTE and me know if you have difficulty attending class for any specific reason so that you can be excused and benefit from the 1% on your final grade.

Participation / In-Lecture Polling / In-Class Question

Participation will be. Students will be asked to answer questions during some lectures, using either the Turning Point app or paper handout. Students who have correctly answered at least 80% of all questions asked will get 4%. The student will be informed via Canvas about Lecture polling / in-class questions one day in advance.

Online Office hours - Wednesday 3:30 pm-4:45 pm in virtual format (using, for example, Zoom). You can contact me to schedule a timeslot for Office Hours. Any unexpected change of schedule will be announced in a timely manner to the students. If you cannot attend online Office hours, do not hesitate to send me your

questions by email at damien.rontani@centralesupelec.fr. Note that emails will not be answered after 9:00 pm on weekdays and during the weekend except for urgent/critical matters.

Use of Digital Technology during Class

Using laptops and tablets allows for taking digital notes and following the lectures' material. Cell phones are helpful for Turning Point / online polling activities but are not otherwise recommended during class. If digital technologies become a distraction during class, they may be temporarily banned during the lectures, and the hard copies of slides will be distributed during that period.

Grading Policy

Attendance	1%
Participation	4 %
Homework	10%
Quiz 1 (1h15)	15%
Quiz 2 (1h15)	15%
Final (2h50)	30%
Practice Projects (x2)	25%

Grading Scale

Your final grade will be assigned as a letter grade according to the following scale:

A	90-100%
B	80-89%
C	70-79%
D	60-69%
F	0-59%

Important Dates (tentative dates)

Quiz 1	TBA
Quiz 2 (Mid-term)	TBA
Final Exam	Final Week of Class (TBA)
Practice Project 1	TBA
Practice Project 2	Final Week of Class (TBA)

Quizzes and Exams

The quizzes will be closed books with possibly authorized 1- or 2-page sheet notes depending on the quizzes. In some cases, formula sheets will be provided (e.g., statistical tables, formulas, etc.). Using a laptop, cellphone, or any smart device with Internet/WIFI connectivity is not authorized during quizzes and exams. Students are not permitted to collaborate or share information during quizzes and exams; these are individual assignments. The use of a calculator will be allowed.

Quizzes and exam grading policy: Any request regarding a quiz or exam must be made within one week of getting the quiz/exam back. There will be no make-up quizzes for any reason. Suppose you have an acceptable reason (e.g., illness and, in particular, related to the doctor's statement of your inability to take the quiz) for missing a quiz; in that case, the quiz can be retaken at a different time under the proctoring of our Georgia Tech Europe staff.

Homework

Problems will be assigned approximately once every or two weeks from Wednesday to Wednesday. Student collaboration is authorized and encouraged, but a submitted homework must be worked out and written

up on your own. Indicate on your copy whether or not you have collaborated with other students during the preparation of your homework, and if so, then indicate their names.

Homework should be submitted electronically on Canvas as a single pdf file. Please write your name and box all answers. Procedure for turning in late homework: late homework should also be submitted electronically on Canvas. If Canvas happens not to accept a late submission, email me directly to (damien.rontani@centralesupelec.fr). Please start the subject of the email with [ISyE 3770]: Failure to place this in the subject line could cause your email not to be read. I will then open a temporary slot for you to complete your submission. Homework are also solvable using software available to GT students such as Matlab, Python, or R software, so that students can develop additional computer-based skills with the notions taught in class using these software.

Homework grading policy: The homework will be graded on a completion mark basis and element of solution to the Homework will be provided. **Completion marks mean that your reasoning and work are clearly shown for each question/problem. If not, credit will be removed from the completion mark based on the relative proportion associated to the question/problem in the Homework.** Group work is authorized and encouraged for the homework. If turned in after the deadline, a homework submission loses 50%. Homework turned in three or more days late will not earn credit. The submission time on Canvas will be used to determine whether homework is submitted on time. If you experience a problem with the submission, do not hesitate to contact me. Copying solutions from a Faculty Solution Manual is cheating. An assignment might be due on the final instructional class days and based on material covered during the week before the Final Exam.

Practice / numerical projects

The format is that of a medium-sized problem on statistics using Matlab / Python or R software. **The practice projects will be distributed three to four weeks before the due date (i.e., this entire period to work on it).** The student will write a report (using word processing software) to summarize their results, including a technical appendix with their code. **The first project is an individual assignment, and no group work is allowed. Still, if you are blocked** or some aspects are unclear, you can ask me for clarification / additional explanations. **The second project will be a group-work project** (typically three to four students maximum per group). As it is home-based over an extended period, new notions beyond the content seen in class may be used; if this is the case, all the necessary bibliographic/technical information will be provided and detailed to ensure that students can do **the project**.

Tentative Topical Outline

Topics	Weeks (approx.)
Probability Introduction	1
Random Variables	1
Discrete Distributions	1
Continuous Distributions (including Normal)	1
Descriptive Statistics	1
Sampling Distributions	1
Point Estimation	1
Confidence Intervals	1.5
Hypothesis Testing	1.5
Simple Linear Regression	1.5
Analysis of Variance, Experimental Design	1.5

Faculty Expectations Agreement - At Georgia Tech we believe that it is important to strive for an atmosphere of mutual respect, acknowledgement, and responsibility between faculty members and the student body. See <http://www.catalog.gatech.edu/rules/22/> for an articulation of some basic expectation that you can have of me and that I have of you. In the end, simple respect for knowledge, hard work, and cordial interactions will help build the inclusive environment we seek. Therefore, I encourage you to remain committed to the ideals of Georgia Tech while in this class.

Academic Integrity

Georgia Tech aims to cultivate a community based on trust, academic integrity, and honor. Students are expected to act according to the highest ethical standards. For information on Georgia Tech's Academic Honor Code, please visit <http://www.catalog.gatech.edu/policies/honor-code/> or <http://www.catalog.gatech.edu/rules/18/>.

Any student suspected of cheating or plagiarizing on a quiz, exam, or assignment will be reported to the Office of Student Integrity, who will investigate the incident and identify the appropriate penalty for violations.

Accommodations for Students with Disabilities

If you are a student with learning needs that require special accommodation, contact the Office of Disability Services at (404)894-2563 or <http://disabilityservices.gatech.edu/> as soon as possible to make an appointment to discuss your unique needs and to obtain an accommodation letter. Please also e-mail me as soon as possible to set up a time to discuss your learning needs.

Covid 19 – During orientation, some information about good practices and social distancing has been issued to you. Please remember these during class to protect yourself and your fellow yellow jackets. Please follow all guidelines and information provided by the GTE administration.

Additional Information

Course Schedule

All courses will be taught in class. Classes will not be recorded / or shared through Canvas by faculty as is done on the Atlanta campus. Classes can eventually be live broadcasted for isolated students who cannot attend the lectures physically. Note that the scheduling of courses and the eventuality of distance learning may arise during this semester, depending on the evolution of the sanitary conditions in France.

Action in case of illness

If students are sick, they should remain in their apartments. They should also contact their professors and Dr. Paul Voss (paul.voss@ece.gatech.edu) for student support and academic accommodations.

Based on the new recommendations released by the Georgia Institute of Technology, sick students will need to collect class notes from their colleagues and Canvas. No classes will be recorded and shared through Canvas by faculty.

In case of faculty illness, the faculty will contact Dr. Bertrand Boussert (bb130@gatech.edu) and Mrs Corinne Guyot (corinne.guyot@georgiatech-metz.fr).