IE 508   Statistical Inference, Spring 2022

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Objective: This course will give the mathematical basis necessary to understand the classical approaches of statistical inference. In parallel we will apply the learned methods to data sets using the statistical package "R".

Prerequisites: Undergraduate probability and statistic. Calculus and Linear algebra.

Week 1+2: The likelihood principle and sufficient statistics and Introduction to R
Week 3: Maximum likelihood estimation and Fisher information
Week 4: Properties of MLE and Cramer-Raos's lower bound
Week 5: The Neyman-Pearson approach and the general likelihood ratio test
Week 6: Applications of the likelihood ratio test
Week 7: Linear Models, the general framework
Week 8: Linear Models, Regression Applications
Week 9: Linear Models, Analysis of Variance
Week 10: Applied Statistics, Model Assumptions vs Data Mining Paradigma
Week 11: Generalized linear Models and logistic regression

Text Book: Lecture Notes (pdf will be provided on moodle)
Other useful books:
Adelchi Azzalini: Statistical inference : based on the likelihood
R.E. Walpole and R.H. Meyers: Probability and Statistics for Engineers and Scientists
(useful for most of the applied examples)

Homework: Every week there will be assignments called "TODO"
- reading assignments (= material in the lecture notes that must be prepared till the next course)
- mathematical HW questions
- sometimes also computer assignments

 It is important that you make all assignments!!!
The quizzes will mainly contain questions similar to the HW questions.
Of the 3 quizzes the one with the lowest points (or the one you missed) will be not counted. There will be accepted no excuses for not attending a quiz. (Only exception long (at least 2 week) illnesses with serious medical reports).

Grading: mid-term tests (27 %) , final exam (40 %) and data-projects (15%). 2 out of 3 Quizzes (18%)