IE 508 Statistical Inference, Spring 2021

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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, Exponential families
Week 3: Maximum likelihood estimation and Fisher information
Week 4: Properties of MLE and Confidence Regions
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
Course Hours: the course hours will include lectures, solving of new problems, discussing the solution of new HW questions, 4 Quizzes. Monday 9.00-11.00 and Tuesday 9.00-11.00

Course System:

- We will combine guided self-study and online courses. You can always ask me by e-mail.
- The files Unit1.txt, Unit2.txt ... contain the exact description of which parts of the Lecture Notes (LN) are to be prepared. This includes definitions, explanations, examples of the LN, Videos (mainly with solved examples) and Home Work Examples, that you solve as part of the self-study.
- It is important that you try to solve and fully understand!! all HW examples.
- Some of the examples have to be submitted as HW1, HW2, ...

The quizzes will mainly contain questions (very) similar to the HW questions.
Of the 4 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 weeks) illnesses with serious medical reports).

Grading: mid-term tests (25 %) , final exam (36 %) and a data-project (15%). 3 out of 4 Quizzes (18%), 4 or 5 Homeworks with a total of 6%

Schedule of the course hours and Due dates
Unit 0 (Till Sunday, 21st of March)
1) Repeat in Selfstudy Unit0.ProbBasics.pdf and solve the questions
2) Selfstudy of "An introduction to R", LN p64
Mo 22nd of March: 9.30 1st ZOOM **Meeting ID: 440 100 8053 Passcode: 416461**
Tue 23rd of March PS on the Unit0 topics (Prob Basics and INTRO to R)
Unit 1: Study, Read LN, watch Videos, memorize definitions, try hard to solve all Unit 1 HWs till
Mo 29th of March: Course on Unit 1
Tue 30th of March: PS on UNit1; Wednesday 31st at 24.00: Due date HW1 Submission
Start Self-study Unit2 first part ....