Design and Analysis of Experiments

00 - Course Intro

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Outline

Course Overview

Objectives

- To develop basic skills in designing experiments, defining and testing hypotheses, and performing statistical data analyses within one's field of interest;
- By the end of this course, the student should be able to:
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  - Plan experiments related to his/her work;
  - Perform appropriate statistical analyses of the data obtained from the experiment;
  - Develop sound conclusions based on the available data;
  - Identify the problems and limitations of his/her own experiments, and suggest improvements;
  - Perform critical interpretations of other experimental methodologies and results reported in the literature.

Course Overview

Course Structure

- Lectures: discussions about several aspects and techniques for design and analyses of experiments. Theory and application examples;
  - Computational case studies;
  - Final project presentations;
  - Written exam;
  - Tutoring;

Course Overview

Course Structure

Evaluation criteria

Item	Type	Grades
Case studies	Short group projects and Assignment	40
Written exam	Written exam	40
Final Project	Report and presentation	20

Other relevant Information

- Lectures slides, example R files, data, etc. available at https://www.ahmedftech.com.et/learning-materials
- Software/services used: R

Course Overview

Course Bibliography

Main:

- Ahmed A[Msc](2017), *Lecture Notes on Design and Analysis of Experiments*. Online: https://www.ahmedftech.com.et/learning-materials
- D.C. Montgomery, G.C. Runger (2010), *Applied Statistics and Probability for Engineers*, John Wiley & Sons.

Additional:

- D.C. Montgomery (2012), *Design and Analysis of Experiments*, Wiley.
- Michael J. Crawley (2007), *The R Book*, Wiley.
- B. Caffo (2015), *Statistical inference for data science*, LeanPub - https://leanpub.com/LittleInferenceBook/
- J.J. Faraway (2002), *Practical Regression and Anova using R* - http://goo.gl/ewMWL
- D. Wiens (2005), *Introduction to Design and Analysis of Experiments* - http://goo.gl/hZXg1

Course Overview

Required / Desired background

- This is a course on *applied* experimental design and analysis. As such, a large portion of the course is dedicated to case studies in which the student will design experiments, collect (simulated) data, perform inference and report his or her analysis.