Statistics

Academic Year: (2024 / 2025) **Review date: 24-04-2024**

Department assigned to the subject: Statistics Department

Coordinating teacher: MEILAN VILA, ANDREA

Type: Basic Core ECTS Credits : 6.0

Year : 1 Semester : 2

Branch of knowledge: Social Sciences and Law

REQUIREMENTS (SUBJECTS THAT ARE ASSUMED TO BE KNOWN)

Linear algebra
Calculus
Programming

OBJECTIVES

By the end of this course, students will be able to have:
1. Knowledge and understanding of the statistic principles underlying their branch of engineering
2. The ability to apply their knowledge and understanding to identify, formulate and solve statistic problems using established methods
3. The ability to apply their knowledge and understanding to analyse engineering products, processes and methods
4. An understanding of statistics methodologies, and an ability to use them
5. The ability to select and use appropriate statistic tools and methods
6. The ability to combine theory and practice to solve engineering problems
7. An understanding of applicable statistic techniques and methods, and of their limitations

DESCRIPTION OF CONTENTS: PROGRAMME

1. Descriptive statistics
1.1. Qualitative data vs quantitative data
1.2. Descriptive statistics for one variable
1.3. Descriptive statistics for two variables
2. Probability
2.1. Introduction to probability
2.2. Events and operations with events
2.3. Definition and properties of probability
2.4. Conditional probability and independence
2.5. The law of total probability
2.6. Bayes' theorem
3. Random variables
3.1. Concept of random variable
3.2. Discrete random variables
3.3. Continuous random variables
3.4. Characteristic measures of a random Variable
3.5. Independence of random variables
4. Distribution models
4.1. Binomial
4.2. Geometric
4.3. Poisson
4.4. Uniform (continuous)
4.5. Exponential
4.6. Normal (CLT)
5. Statistical inference

5.1. Introduction
5.2. Estimators and their sampling distributions
5.3. Confidence intervals
5.4. Hypothesis testing
6. Quality control
6.1. Introduction to quality control
6.2. Control charts for variables
6.3. Control charts for attributes
7. Linear regression
7.1. Introduction
7.2. Simple linear regression
7.3. Multiple linear regression

LEARNING ACTIVITIES AND METHODOLOGY

- Lectures: 2,2 ECTS
- Problem solving sessions: 1,8 ECTS
- Computes sessions: 1 ECTS
- Evaluation sessions (continuous evaluation and final exam): 1 ECTS

ASSESSMENT SYSTEM

% end-of-term-examination:	50
% of continuous assessment (assigments, laboratory, practicals…):	50

The course assessment comprises continuous evaluation and a final exam, each carrying equal weight:
50% - Final exam.
50% - Continuous assessment.
No minimum grade is required for either component.

Continuous assessment (50%):
Students will undergo continuous evaluation through two partial tests (25%+25%).

Final exam - ordinary call:
- The final exam will cover theoretical concepts and problem-solving using course materials.
- Evaluation will be based on a 50%-50% split between continuous assessment and the final exam grade.
- For students scoring equal or above 7 out of 10 on both partial tests, the final exam will be disregarded. In this scenario, the final grade will be calculated based on assigning 50% weight to the first partial test and 50% to the second.

Final exam - extraordinary call:
The final exam, which covers theoretical concepts and problem-solving, will be evaluated based on the highest of the following criteria:
a) 100% final exam grade.
b) 50% continuous assessment grade + 50% final exam grade

BASIC BIBLIOGRAPHY

- MONTGOMERY, D.C., RUNGER, G.C Applied Statistics and Probability for Engineers, John Wiley & Sons, 2003

- NAVIDI, W Statistics for Engineers and Scientists, McGraw-Hill, 2006

- SONG, TT Fundamentals of Probability and Statistics for Engineers, John Wiley & Sons, 2004

- WASSERMAN, L All of Statistics, Springer-Verlag, 2004

ADDITIONAL BIBLIOGRAPHY

- GUTTMAN, L., WILKS, S.S., HUNTER, J.S Introductory Engineering Statistics, Wiley, 1992