Code - Course title: 17829 - STATISTICS AND PROBABILITY
Degree: Bachelor Degree in Computer Science and Engineering
Faculty: School of Engineering
Academic year: 2020/2021

SYLLABUS

- **DESCRIPTIVE STATISTICS**: Graphical and numerical summary for quantitative data. Measures of central tendency and spread. Relationship between two variables: covariance, regression line, correlation coefficient.

- **PROBABILITY MODELS AND METHODS OF SAMPLING**: Probability. Bayes' rule. Discrete and continuous random variables. Key probability models: Bernoulli distribution, binomial distribution, Poisson distribution, normal distribution, exponential distribution, uniform distribution. Random vectors. Law of Large Numbers. Central Limit theorem. Random sampling. Estimators. χ^2-distribution, t-Student distribution and F-Snedecor distribution.

- **POINT ESTIMATION**: General concept of point estimation. Desirable properties of an estimator. Methods of point estimation.

- **CONFIDENCE INTERVALS**: Definition of confidence interval. Method to derive a confidence interval. Confidence intervals for the mean of a normal distribution. Confidence intervals for the difference of two means: independent samples and paired samples. Confidence intervals for proportions using normal approximation. Large samples confidence intervals. Minimum sample size approximation.

- **HYPOTHESIS TESTING**: Statistical hypotheses. Null hypothesis and alternative hypothesis. Type I and Type II errors. Significance level and critical region. Hypothesis tests on the mean. Hypothesis tests on the difference of two means: independent samples and paired samples. Hypothesis test on a population proportion. Connection between confidence intervals and hypothesis testing. The p-value. (Nonparametric testing). (Testing for goodness of fit).

REFERENCES

- De La Horra, J. *Estadística Aplicada* (3rd ed.). Díaz de Santos Ed., 2003.
- Freedman, D., Pisani, R., Purves, R., Adhikari, A. *Statistics (4^{th} ed)*. W. W. Norton & Co. Ed., 2007.
- John, P. W. M. *Statistical Methods in Engineering and Quality Assurance*. Wiley, 1990.
- Miller, J. N. and Miller, J. C. *Statistics and Chemometrics for Analytical Chemistry (4^a ed.).* Prentice Hall, 2000.

- Montgomery, D. C. and Runger, G. C. *Applied Statistics and Probability for Engineers*. Wiley, 2013.
- Moore, D. S., Notz, W. I., and Fligner, M. A. *Basic Practice of Statistics*. W. H. Freeman, 2007.

ASSESSMENT SYSTEM

A grade of at least 5 out of 10 is required to pass the course.

- **May assessment.** There are two alternative ways to pass the course:

  1. Continuous assessments:
     - Two partial exams (P1 and P2) and three assignments (A1, A2, A3).
     - The final grade will be calculated using the following weighted mean:

       Final grade = 0.35 (P1 grade) + 0.35 (P2 grade) + 0.1 (A1) + 0.1 (A2) + 0.1 (A3)

     - Students who pass the course via the continuous assessments do not need to take the final exam.
     - **Important**: in order to pass the course via continuous assessments, a grade of at least 3.5 out of 10 is required in both partial exams and all the assignments.
  2. Global examination: The grade corresponds to the grade of the final global exam in May.

- **June assessment:**

  The grade corresponds to the grade of the final global exam in June.

- **Dates**

  - Partial exam 1: Friday, 9th April, from 9:00 to 11:00.
  - Partial exam 2: Friday, 7th May from 9:00 to 11:00.
  - Global (May) examination: Monday, 17th May.
  - Global (June) examination: Tuesday, 15th June.