SAGRADO
Universidad del Sagrado Corazón

SYLLABUS

TITLE: Computerized Statistics I

CODE: MAT 261

PREREQUISITE: MAT 134

CREDITS: 3 credits | 45 contact hours | 1 term

DESCRIPTION

MAT 261 is an elementary statistics course for students in the School of Natural Sciences. Study of frequency distributions and their graphical representations: histograms, pie charts, line graphs, ogives, bar graphs, stem and leaf plots. Study of measures of central tendency (mode, mean and median), measures of dispersion (range, variance and standard deviation), and measures of position (quartiles, percentiles). Basic concepts of probability and probability distributions: binomial, normal, t-distribution, and chi-square. Estimation methods and hypothesis testing. Introduction to linear regression. Computer activities are integrated using the EXCEL statistical package and the R platform. The purpose of the course is that the student learns to apply the tools of descriptive and inferential statistics to scientific research.

JUSTIFICATION

Statistical knowledge is a fundamental tool for the development of scientific knowledge and without this, it's impossible to determine when a research study is valid or not. Students who aspire to go to graduate school will need a solid knowledge of statistics to complete their projects or experimental research.

COMPETENCES

The course develops in the student the following competencies:

- **Critical Thinking**
- **Research and exploration**

OBJECTIVES

At the end of the course, students will be trained to:

1. Analyze and interpret data through descriptive and inferential statistical techniques.

2. Apply probability to the solution and modeling of problems.

3. Apply hypothesis testing to the analysis of experimental data.

4. Apply statistics in scientific research in an ethical manner.

CONTENT

I. Descriptive Statistics

    A. The nature of statistics
       1. Basic definitions
       2. Scales of measurement
          a. nominal
          b. ordinal
          c. interval
          d. ratio or quotient
    B. Data organization
       1. data
       2. grouped data
       3. graphs
    C. Descriptive measures
       1. Measures of central tendency
       2. Measures of dispersion
       3. Measures of central tendency and dispersion for grouped data
       4. Approximation of mean and standard deviation in frequency distributions by classes
       5. Measures of position

II. Concepts of probability

    A. Introduction to probability
       1. Set theory
       2. Combinatorial theory
          a. Tree Diagrams
          b. Multiplication principle and factorial notation
          c. Permutations

          d. Combinations

          e. Multinomial coefficient

      3. Experiments and sample spaces

      4. Axioms of probability

      5. Probability in finite and equiprobable sample spaces

      6. Probability of the union of two or more events

      7. Conditional probability

III. Probabilistic distributions

    A. Discrete and continuous random variables

    B. Probability distributions

      1. Discrete distributions

          a. Mean and standard deviation of a discrete random variable

          b. The binomial distribution

          c. The Poisson distribution

      2. Continuous distributions

          a. The normal distribution

IV. Estimate

    A. Point and interval estimation

    B. Mean estimation

    C. Estimation of a proportion

    D. Estimation of a standard deviation

V. t-distribution

VI. Hypothesis testing

    A. Hypothesis tests for the mean

    B. Hypothesis tests for the proportion

    C. Hypothesis tests for standard deviation

    D. Hypothesis tests for the comparison of two samples

VII. Chi-square distribution

VIII. Correlation and regression analysis

IX. Analysis of variances

METHODOLOGY

The following strategies of the active learning methodology are recommended:

- Flipped classroom
- Problem discussion
- Collaborative learning
- Teamwork
- Procedure-oriented coaching and problem solving
- Demonstration and hands-on exercises
- Self-assessment and peer evaluation
- Problem-based learning

EVALUATION

Participation	10%
Partial Assignment	30%
Compositions	30%
Project or final exam	30%
Total	100%

LEARNING ASSESSMENT

The institutional assessment rubric is applied to the core activity of the course.

BIBLIOGRAPHY

TEXT

Bluman A. G. (2018). *Elementary Statistics: A Step By Step Approach.* (10th edition)

New York: McGraw-Hill Education.

REFERENCES

Gareth J., Witten D., Hastie T. Tibshirani R. (2014). *An introduction to statistical*

learning: with applications in R. New York: Springer.

Triola M. (2018). *Elementary Statistics* (12th edition). Boston: Addison Wesley.

ELECTRONIC RESOURCES

https://www.khanacademy.org/math/statistics-probability

https://www.symbolab.com/

https://www.wolframalpha.com/

Find more information resources related to the course topics on the library page http://biblioteca.sagrado.edu/

REASONABLE ACCOMMODATION

To obtain detailed information on the process and the required documentation, you must visit the corresponding office. To guarantee equal conditions, in compliance with the ADA (1990) and the Rehabilitation Act (1973), as amended, all students who need reasonable accommodation services or special assistance must complete the process established by the Vice Presidency for Academic Affairs.

ACADEMIC HONESTY, FRAUD AND PLAGIARISM

Any student who misses the policy of honesty, fraud and plagiarism is exposed to the following sanctions: received a grade of zero in the evaluation and / or repetition of the work in the course, grade of F (*) in the seminar: suspension or expulsion as established in the Academic Honesty Policy document (DAEE 205-001) effective August 2005.