

## Syllabus

### STAT 02.290 – Probability and Statistical Inference for Computing Systems

#### CATALOG DESCRIPTION:

STAT 02.290 – Probability and Statistical Inference for Computing Systems - 3 s.h.

(Prerequisites: MATH 01.131 – Calculus II, Math 03.160 – Discrete Structures, and CS 04.113 - Introduction to Object Oriented Programming or CS 04.112 - Java for Object Oriented Programmers, all with a minimum grade of C-)

This laboratory course considers descriptive techniques for presenting and summarizing data, techniques in probability, discrete and continuous random variables, estimation and hypothesis testing. Emphasis is placed on concepts and simulation, using computer software for data manipulation and presentation, function manipulation and presentation, simulation, and statistical analyses. Examples will be drawn from the field of Computer Science.

#### OBJECTIVES:

This objectives of this course are to serve as an introduction to the concepts of probability; probability models; random variables, expected value and variance; and the concepts of descriptive statistics and statistical inference. All Computer Science majors will take this new course, so we will draw from examples relevant to their major when possible.

#### CONTENT:

1. Descriptive statistics (graphical and numeric summaries)
2. Basic probability rules
3. Combinatorial probability
4. Conditional probability, multiplication rule, and Bayes' Theorem
5. Independence of events and repeated independent trials
6. Discrete random variables, including the mean, variance, and standard deviation of a discrete random variable
7. Modeling and probability calculations using the following discrete random variables: Binomial, Geometric, Negative Binomial, Hypergeometric, Poisson
8. Continuous random variables, including the mean, variance, and standard deviation of a continuous random variable
9. Modeling and probability calculations using the following continuous random variables: Uniform, Normal, Exponential
10. Sampling distributions of the sample mean and the sample proportion, Central Limit Theorem
11. Confidence intervals for a population mean and a population proportion
12. Hypothesis testing for a population mean and a population proportion

#### POSSIBLE TEXTBOOKS:

- A. Due to the fact that this course draws material from an introductory data analysis course, as well as a calculus-based probability course, we have created a custom text, which draws from the following:
  - Peck, Roxy, Chris Olsen, and Jay Devore, Introduction to Statistics and Data Analysis, 4th edition, Brooks/Cole (Cengage Learning), Boston, 2012.

- Wackerly, Mendenhall, and Scheaffer, *Mathematical Statistics with Applications*, 7th edition, Brooks/Cole (Cengage Learning), Boston. 2008.
- B. Baron, M. (2013). [Probability and Statistics for Computer Scientists](#) (2nd Ed.). Boca Raton, FL: CRC Press [ISBN: 978-1439875902]