

Course Name: **Statistics for the Sciences**
Course Code: **STAT1001**
Level: **1**
Semester: **2**
Number of Credits: **3**
Pre-requisites: CAPE Mathematics or its Equivalent

RATIONALE: Statistics can be described as the science of collection, organising and interpretation of data. Also, it looks at the planning of data collection either by conducting a survey or designing a questionnaire. In the FPAS, each department encounters a branch of statistics. This course is designed to nurture the students' foundation and equip them with necessary skills required for practice or in academia.

AIM: Is to provide a sound grounding in the principles and practice of statistics with emphasis on practical data collection, presentation and interpretation, to reinforce basic probability and problem solving and to provide an introduction to statistical inference and the analysis of data.

COURSE DESCRIPTION: This is a first-year course open to all students in the FPAS. The course begins with summarising and interpreting data graphically and descriptively. Then we proceed to at the ideas of probability, sampling and survey methods. Then we build on these topics beginning with discrete probability distribution (binomial and Poisson), the Normal distribution and linear combination of random variables. We then look at sampling and estimation from normal distribution, confidence intervals, hypothesis testing and contingency tables and linear regression.

OBJECTIVES: At the end of the course the student will be able to

- Discuss the advantages and disadvantages of selecting suitable ways of presenting raw statistical data
- Analyse and compile raw statistical data into information
- Identify and use the types of sampling procedures
- Calculate probabilities arising from a binomial, Poisson or Normal
- Distinguish between sample and population
- Apply the central limit theorem and determine the sample size
- Calculate the confidence intervals for a sample and proportion and their differences and interpret the confidence intervals
- Construct a hypothesis testing and interpret its finding
- Assess whether a set of data fits a suitable distribution
- Perform a two-way contingency analysis
- Use the simple linear regression to model data

SYLLABUS

- 1. Summarising and Interpreting Data**
- 2. Random Variables**
- 3. Probability and Probability Distribution**
- 4. Elementary ideas of sampling methods**
- 5. Sampling and Estimation**
- 6. Confidence Intervals**
- 7. Hypothesis Testing**
- 8. Chi-square Test**
- 9. Introduction to Simple Linear Regression**

TEACHING METHODOLOGY: This course will be delivered by a combination of lectures, tutorials and computer labs. The total of 39 contact hours is broken down as follows: 27 hours of lectures and 12 hours of tutorials/labs. The tutorial will be interspersed with the lectures by having students discuss exercises, revise material as needed, and cover new content each day. Course materials such as exercises, assignments, solutions, etc., will be posted on the webpage <http://ourvle.mona.uwi.edu/>

ASSESSMENT: The course assessment will be broken into two components; a course- work component worth **40%** and a final exam worth **60%**. The Final exam will be two hours in length.

The Coursework element will consist of three distinct parts:

- i. A mid-semester test; which is worth **20%** of the student's final grade.
- ii. 5 problems papers, worth **10%**
- iii. Computer assignment worth **10%**

Books:

1. Mendenhall W, Beaver R: Introduction to Probability and Statistics 13th edition, 2008.
2. (**Recommended textbook**) Clarke G M and Cooke D, A Basic course in Statistics, 5th edition, 2004.
3. Fowler J, Survey Research Methods 4th edition, 2008.

On-line Resource: <http://onlinestatbook.com/rvls.html>

This is useful in the demonstration of statistical concepts, link to other statistics resources on the web and case studies of real data and analyses and interpretation.